

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

REFERENCE DOCUMENT 33 of 36

This document contains the following:

UWF Replacement Forestry

- **2018 Natura Impact Statement for Whole UWF Project Elements 1 to 5 – Volume D3 (Volume 3 of 6)**
 - Appendix A9: Environmental Management Plan for UWF Grid Connection
 - Appendix A10: Environmental Management Plan for UWF Related Works

VOLUME D: APPROPRIATE ASSESSMENT REPORTING

Whole Upperchurch Windfarm Project

Natura Impact Statement for Whole UWF Project Elements 1 to 5

May 2018

Volume D3 (Volume 3 of 6)

Appendix A9: Environmental Management Plan for UWF Grid Connection

Appendix A10: Environmental Management Plan for UWF Related Works



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Appendix A9: Environmental Management Plan for UWF Grid Connection



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UWF GRID CONNECTION

VOLUME D

ENVIRONMENTAL MANAGEMENT PLAN



ECOPOWER

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Tab 4	Surface Water Quality Management Plan
Tab 5	Invasive Species Management Plan
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1. Introduction to the EMP

This Environmental Management Plan (EMP) has been prepared for the UWF Grid Connection 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 Grid Connection to those with responsibility for carrying out works on site so that any likely significant adverse effects of the development on the receiving environment can be prevented.

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 Grid Connection.

1.2.1.1. Review and Update of the EMP

Planning consent for the UWF Grid Connection is currently being sought from An Bord Pleanála through a Strategic Infrastructure Development application. 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 Grid Connection 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 Grid Connection, 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 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 land slippage at works locations within peatland, frac-out during drilling works, and fuel or oil spillages along construction works areas.
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 Grid Connection, 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 Grid Connection is provided below, the full description of the project is provided in [Volume C EIA Report for the UWF Grid Connection, Volume C2 EIAR Main Report, Chapter 5: Description of Development – UWF Grid Connection](#).

The UWF Grid Connection proposal comprises of the following parts:

- Mountphilips Substation
- Mountphilips – Upperchurch 110kV Underground Cable (110kV UGC)
- UWF Grid Connection Access Roads and
- UWF Grid Connection Ancillary Works.

2.1. Purpose of UWF Grid Connection

The purpose of UWF Grid Connection is to connect the Consented UWF Substation at Upperchurch Windfarm (UWF) to the now proposed substation at Mountphilips. Mountphilips substation will be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line and thereby export electricity, from Upperchurch Windfarm when constructed and operational, to the national grid.

2.2. Location and overview description of UWF Grid Connection

Mountphilips Substation: A new substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new 110kV electrical substation will comprise 2 No. End Masts located at the Killonan – Nenagh 110kV overhead line; a compound, 230 meters east of the overhead line, measuring 95 meters x 94 meters which will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightening protection monopoles and other electrical apparatus. The 2 No. End Masts will be connected to the electrical equipment in the compound via underground cable.

Mountphilips - Upperchurch 110kV UGC: The 110kV UGC will connect the Mountphilips Substation to the Upperchurch Windfarm through the Consented UWF Substation, through the installation of underground cables. The route of the underground cables, which is 27.5km in length, will follow a generally west/east course through a mix of agricultural grassland (11.9km), commercial forestry plantations (1.9km), private forestry and farm roads (c.12km) and public roads (c.1.7km) through the townlands of Mountphilips, Coole, Freagh, Oakhampton, Newross, Castlewaller, Killeen, Knockacullin, Bealaclave, Baurnadomeeny, Goulmore, Laghile, Churchquarter, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons. The 110kV UGC will be installed underground in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at Joint Bay locations, in joint bay chambers. The ducts will be surrounded by concrete and the trench backfilled with excavated material or aggregate depending on the location. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

UWF Grid Connection Access Roads: To facilitate access to Mountphilips Substation and the Joint Bay locations and construction works areas along the Mountphilips – Upperchurch 110kV UGC, New Permanent Access Roads will be constructed at Mountphilips and at various locations along the route of the Mountphilips – Upperchurch 110kV UGC. Other access roads include existing farm and forestry roads which will be upgraded during construction works.

UWF Grid Connection Ancillary Works will support the construction of UWF Grid Connection and will include the construction of Temporary Access Roads along the 110kV UGC construction works areas; Permanent Site Entrances (including the provision of sightlines) at Mountphilips, Bealaclave and Knockcurraghbola Commons; Temporary Site Entrances at public road crossings along the 110kV UGC; installation of temporary and permanent watercourse crossing structures; construction and use of 3 No. Temporary Compounds, installation of drainage systems at Mountphilips Substation, around Temporary Compounds and along new UWF Grid Connection Access Roads; forestry felling; temporary and permanent hedgerow/tree removal; permanent hedgerow replanting; fencing; relocation of existing overhead electricity and telephone services and; storage of excavated materials at various locations within the construction works area boundary.

Relevant EMP Figures:

Figure EMP 1: Location of UWF Grid Connection on OSI Discovery Mapping

Figure EMP 2: Layout of UWF Grid Connection on Aerial Photography Mapping (Overview & Maps 1 to 15)

2.3. Main Construction Stage Activities

Construction stage activities will involve the following main works:

• Pre-Construction Activities	• Temporary and permanent site entrances
• Construction Works Area Preparation	• Temporary Compounds
• Mountphilips Substation Compound	• Horizontal Directional Drilling
• New End Masts at Mountphilips Substation	• Instream Works Preparation and Reinstatement
• 110kV Trenching and Ducting	• Instream Works
• 110kV Joint Bays and Associated Chambers	• Temporary Bailey Bridge
• 110kV Cable Pulling	• Forestry Felling
• 110kV Cable Jointing	• Relocation of Overhead Lines
• Widening or Resurfacing Existing Private Roads	• Overburden Storage Berms
• New Permanent Access Roads	• Reinstatement of Land
• Temporary Access Roads	•

Individual Outline Construction Methodologies (OCMs) for all of the above listed main works and activities of UWF Grid Connection 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 Grid Connection during its construction, the construction works area boundary is broken down into individual sections (S1 to S102). 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 EMP 3: Construction Works Areas and work Section Numbers on Aerial Photography Mapping (Overview & Maps 1 to 5)** 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:

- Mountphilips Substation including End Masts
- Joint Bay Locations
- Watercourse Crossing Locations (Class 1 and 2, fisheries value)
- Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value)
- Horizontal Directional Drilling Location
- Public Roads
- Temporary Construction Compounds
- Agricultural Lands
- Forestry Lands
- Existing Forestry Roads

2.5. Other Elements of the Whole Upperchurch Windfarm Project

The UWF Grid Connection is one part of a whole project, which is made up of five individual elements – the UWF Grid Connection, along with the Upperchurch Windfarm (UWF), UWF Related Works, 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:

Figure EMP 4: Location of the UWF Grid Connection 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 Grid Connection is adjacent to and overlaps with Other Elements of the Whole UWF Project per:

- is adjacent to the UWF Related Works in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands, and
- overlaps with Upperchurch Windfarm at the Consented UWF Substation.

Relevant EMP Figures:

Figure EMP 5: UWF Grid Connection and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm.

Figure EMP 6: UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

At Mountphilips Substation, some fibre-wrapping and re-sagging activities (UWF Other Activities) will be carried out from the new End Mast.

2.6. Other Activities in the vicinity of the UWF Grid Connection works

Other activities at and in the immediate vicinity of the UWF Grid Connection 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 Grid Connection, along with the duties and responsibilities of various personnel and a description of environmental training and communication processes are outlined below.

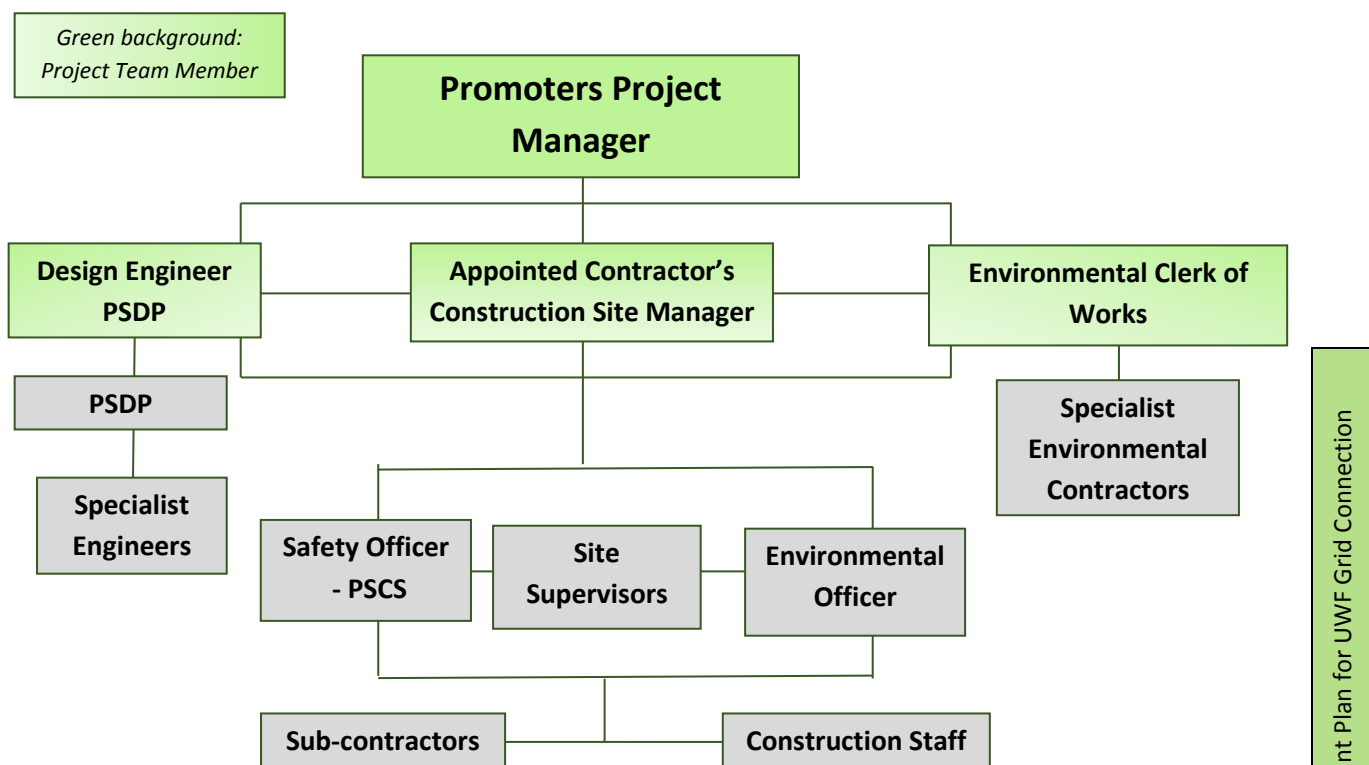
The construction Project Manager and Main Contractor will be appointed by the Promoter prior to commencement of the works. On appointment, the Project Manager and the Main Contractor will be required by the Project Promoter to update the outline organisational structure, the specific duties, roles and 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 Grid Connection 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 Grid Connection 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 Grid Connection 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 Grid Connection;
- 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
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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 and implementing the Additional Mitigation Measure AMM-01 for the protection of Otters,
- monitoring the implementation of the Invasive Plant Species Management Plan
- monitoring vegetation clearance, tree root protection
- the establishment of the Concealed Access Roads
- 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 Geotechnical Engineer

A competent geotechnical engineer will be appointed by the Design Engineer and will be responsible for:

- advising and the design and methodologies to be employed in the forestry/peatland section of the 110kV UGC in Castlewaller and Killeen,
- monitoring of construction works and of the surrounding peat during construction works
- advising on any contingency measures to be implemented, in the unlikely event of landslip or peat movement.

Project Mud Engineer

A competent mud engineer will be appointed by the Environmental Clerk of Works and will be responsible for:

- advising the Construction Manager on the selection of competent drillers for the HDD works,
- monitoring of Horizontal Directional Drilling at the Mulkear, Bilboa and Clare rivers, in particular monitoring the drilling pressures,

- monitoring and advising on any contingency measures to be implemented, in the unlikely event of frac out.

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.

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 Grid Connection 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 Grid Connection 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 be 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 Grid Connection 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 Grid Connection EIA Report (2018). 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 PD65.	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 Additional Mitigation Measure AMM-01 which will avoid significant disturbance or displacement effects to Otter	EIAR, Ch.8	Project Team Site Ecologist	AMM-01, included in Section 5 below
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-34.	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
An Bord Pleanála Order including Planning Conditions	Tab 1
Feedback from consultations with Statutory Bodies and Other Parties	Tab 2
UWF Grid Connection 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 PD65,
- Additional Mitigation Measures AMM-01
- Management Plans – Traffic, Surface Water Quality, Invasive Species and Waste,
- Schedule of Works Requirements,
- Environmental Survey Requirements, and
- Best Practice Measures GC-BPM-01 to GC-BPM-34.

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. Project Design Measures

Table 7: List of Environmental Protection Measures - Project Design

PD ID	Project Design Environmental Protection Measure
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 safe and efficient manner.
PD03	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 Related Works 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.
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.
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.
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.

PD ID	Project Design Environmental Protection Measure
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
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 in 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 initiate, 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 will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the 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>i.e.</i> 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 <u>while cubs are present in the holt</u> 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.
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.

PD ID	Project Design Environmental Protection Measure
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 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 1 st to June 30 th).
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 compounds. <u>All lighting</u> will be cowed 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. (Note: 17 trees with low suitability were identified within the UWF Grid Connection construction works area boundary during 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.
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.
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 hedgerows with semi-mature shrubs/trees (like for like) and limits on temporary 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 trimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.
PD44	All deliveries of construction materials that pass Kilcommon National School will be scheduled to take place outside of school drop-off/pick-up times - 9am to 9.30 am and 3pm to 3.30.
PD45	At Mountphilips Substation, water for welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or

PD ID	Project Design Environmental Protection Measure
	mains water connection and will avoid the need to treat waste water on-site.
PD46	Mountphilips Substation 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.
PD47	All Joint Bays will be located at least 25m from a Class 1 or Class 2 watercourse, with 35 no. of the total 38 no. located greater than 50m from a Class 1 or Class 2 watercourse.
PD48	Only precast concrete chambers will be used at joint bays locations. No batching of wet cement will take place on-site.
PD49	<u>Lower River Shannon SAC:</u> The route of the 110kV UGC is located along an existing farm track within the SAC boundary. Construction works will be confined to the existing track within the SAC boundary.
PD50	<u>Lower River Shannon SAC:</u> There will be no storage of overburden within the Lower River Shannon SAC
PD51	<u>Lower River Shannon SAC:</u> All excavated material will be removed for temporary or permanent storage at a suitable location more than 100m away from the Newport (Mulkear) River, Clare River and Bilboa River.
PD52	<u>Lower River Shannon SAC:</u> No in-streams works are proposed at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC) and therefore there will be no placement of cement within the river channels. The 110kV UGC will be installed by horizontal directional drilling technique.
PD53	<u>Lower River Shannon SAC:</u> All runoff from the construction works areas associated with the horizontal directional drilling works at the Newport (Mulkear) River and Bilboa River (which are located within the Lower River Shannon SAC) and at the Clare River (which is located upstream of the SAC), will be directed into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site.
PD54	<u>Lower River Shannon SAC:</u> At the Newport (Mulkear) and Bilboa River crossings, drilling activities will be carried out at least 15m from the Lower River Shannon SAC boundary. Double silt fencing will be set up between the drilling rig and the SAC boundary – the 1st silt fence close to the rig and the 2nd silt fence close to the SAC boundary. No works or activities will be conducted on the SAC side of these fences. For the Clare River (which is not in an SAC) drilling activities will be carried out at least 15m away from the river bank. Double silt fencing will be set up as before and no works or activities will be conducted on the river side of these fences.
PD55	<u>Lower River Shannon SAC:</u> Drilling fluid returns will be contained within a sealed tank / sump, and pumped onto a skip for removal off-site to an appropriately licenced facility.
PD56	<u>Lower River Shannon SAC:</u> The drilling works at the Newport (Mulkear) River and Bilboa River will <u>not</u> be carried out during the months of May, June or July.
PD57	<u>Lower River Shannon SAC:</u> There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Lower River Shannon SAC.
PD58	<u>Lower River Shannon SAC:</u> There will be no storage of fuels within 100m of the Newport (Mulkear) River, Clare River or Bilboa River.
PD59	<u>Bleanbeg Bog NHA:</u> The route within Bleanbeg Bog NHA is along an existing forestry track. There will be no excavation of blanket bog
PD60	<u>Bleanbeg Bog NHA:</u> There will be no storage of overburden within the Bleanbeg Bog NHA boundary.
PD61	<u>Bleanbeg Bog NHA:</u> There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Bleanbeg Bog NHA.
PD62	<u>Slievefelim to Silvermine Mountain SPA:</u> All new permanent access roads within the SPA will be 'concealed access roads' which will be created immediately following construction works by covering the hardcore surface of the new road with a vegetated layer using the following method - firstly a geotextile material is laid on the road, covered in a layer of load bearing root-zone mix of peat and stone and then covered in turn by interlocking rigid geocells. The geocells and roadside berms (where present) will be planted with a mix of mature native Irish or Scottish heathers and grasses, with the mix depending on location. Where

PD ID	Project Design Environmental Protection Measure
	heather is being planted a depth of at least 150mm of peat will be provided. These 'concealed access roads' will provide a load bearing surface for occasional maintenance vehicles. Within the SPA, the establishment of the Concealed Access Roads will be overseen by a competent peatland ecologist and a hen harrier expert.
PD63	<u>Slievefelim to Silvermine Mountain SPA:</u> All temporary storage berm locations will be re-instated to the biodiversity value of the underlying habitat. Permanent berms will be immediately re-seeded with native heather and upland grass species. Harvester crossing points will be covered with topsoil and reseeded immediately as will any other temporary land-use change locations. Within the SPA, this reinstatement will be overseen by a competent peatland ecologist and a hen harrier expert, outside the SPA this reinstatement will be overseen by the Project Ecologist.
PD64	<u>Slievefelim to Silvermine Mountain SPA:</u> Annual visual inspections of the lands over the 110kV UGC and the testing/inspection/planned maintenance at Joint Bays, will be scheduled outside of the hen harrier breeding season, on those parts of the 110kV UGC which occurs within the boundary of the Slievefelim to Silvermines SPA.
PD65	No construction works will take place within 800m of an active curlew nest, or active nesting attempt, within the breeding season (March to August).

5.2. Additional Mitigation Measure AMM-01: Disturbance to or Displacement of Otter

This measure is based on Best Practice guidance from the National Roads Authority (2006) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* and the UK's Highways Agency (1999) *Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99*. These guidance documents provide comprehensive advice and recommendations, which are derived from published peer-reviewed research, relating in particular to the timings of Otter surveys, delineations of survey areas and minimum disturbance distances for Otters during construction. It also includes measures already included within project design (Section 5.1)

Additional Mitigation Measure			
Title:	Disturbance/Displacement of Otter		Ref: AMM-01
Project Stage:	Construction Stage	Work Sections/Locations:	All watercourse crossing locations
Environmental Commitment	To avoid likely significant effects of disturbance/displacement of breeding and foraging Otters throughout the construction phase of the development.		
Roles & Responsibilities			
Construction Manager	Scheduling of construction activities		
Project Ecologist	<ul style="list-style-type: none">Confirmatory survey for active Otter holts and activity in line with Best Practice as already described as part of Project DesignOversight of both Project Design measures and additional mitigation as described herein;The Project Ecologist shall ensure adherence to the following best practice guidance: <ol style="list-style-type: none">National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin.National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin.Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.		
Mitigation Measures			
Measure Objective	Avoid disturbance to or displacement to breeding or foraging Otter during construction		
Existing Project Design Measures:			
<ul style="list-style-type: none">Confirmatory survey for active Otter holts and activity in line with Best Practice (particularly holts at which breeding females or cubs are present) will be undertaken 150m upstream and downstream of watercourse crossing points in line with NRA (2006) and Highways Agency (1999) guidance. This survey will determine the current status of areas where Otter activity was recorded in the pre-planning surveys (i.e. active or inactive) and to determine if any new holts/couches have been established in the intervening period between the initial pre-planning surveys and the commencement of construction activity. These surveys are required to be undertaken no more than 10-12 months in advance of proposed construction activities (NRA, 2006).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;

- All construction works will be carried out during daylight hours
- 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 hour after sunrise or before sunset during winter.
- 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.
- 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;

Further Additional Mitigation Measures:

- Surveys will be undertaken by an experienced otter surveyor, and will include a systematic search for spraints, paw prints, otter paths, slides, food remains, holts and places used for shelter in addition to locations of regularly used paths and areas of overland 'shortcuts' used by Otter where meanders occur.
- There are no seasonal constraints for otter surveys, but any dense vegetation (especially in summer) can reduce success in the identification of otter Holts or couches. (NRA, 2006). Surveys may also be unreliable if undertaken during or immediately following periods of high flow or after heavy rain, heavy leaf fall or heavy frost and snow, since many field signs may have been washed away or obscured. All surveys will be timed with due cognizance to the above.
- Note: The Project Ecologist will communicate all confirmatory survey results and information to the senior construction team as and when they arise at the weekly EHS meeting. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage;
- As per NRA (2006) guidelines, following consultation with NPWS, works closer to identified holts (not containing cubs – we note that no works will take place at watercourse crossings within 150m of holts containing cubs) may take place – provided appropriate mitigation measures are in place; Measures will include screening (screen fencing or planted vegetation) and/or restricted working hours on site as described above. The installation of all screen fencing or planted vegetation will be overseen by the Project Ecologist.
- Where holts are present in close proximity to invasive construction works, but are determined not to require destruction, construction works may commence once mitigation measures to address otters have been complied with (NRA, 2006); compliance will be confirmed by the Project Ecologist;
- In the case of a holt containing cubs; works shall only commence once the project ecologist has confirmed that the holt has been vacated;
- In the event destruction of a holt is required (considered unlikely), one or more artificial holts made from logs, boulders or pipes to tried and tested designs will be provided as appropriate (SNH 2017).
- The location selection and installation of these will be monitored by an appropriately qualified ecologist both pre- and post-installation.



- A report on both Confirmatory Surveys and implemented mitigation measures will be completed by suitably experienced ecologists and will be issued to the relevant competent authority and NPWS via the Developer.
- Post Construction monitoring of Otters will be undertaken on a yearly basis for years 1 to 3 inclusive post construction to confirm activity levels post construction and will include monitoring of any artificial holts;
- Surveys will include a systematic search for spraints, paw prints, otter paths, slides, food remains, holts and places used for shelter in addition to locations of regularly used paths and areas of overland 'shortcuts' used by Otter where meanders occur.
- An annual report, during construction and during years 1 to 3 post construction, will be issued to the Local Authority and relevant statutory consultees evaluating the results of this survey, and the success of mitigation within the context of the Conservation Objectives of European Sites under consideration.

References

- National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin.
- National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin.
- Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.
- Scottish Natural Heritage (SNH) Otters and Development: Scottish Wildlife Series. <http://www.snh.org.uk/publications/on-line/wildlife/otters/mitigation.asp>
- Scottish Natural Heritage (SNH) PROTECTED SPECIES ADVICE FOR DEVELOPERS. <https://www.snh.scot/sites/default/files/2017-07/A1959316%20%20Species%20Planning%20Advice%20-Project%20-%20otter%20-%20FINAL.pdf>

5.3. 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

5.4. 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 Knockmaroe and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm.
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).
PD28	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season <i>i.e.</i> 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 <u>while cubs are present in the holt</u> and NPWS will be notified immediately
PD35	No construction works will be carried within 50m of an active main badger sett during the main breeding season (December 1 st to June 30 th).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November.
PD44	All deliveries of construction materials that pass Kilcommon National School will be scheduled to take place outside of school drop-off/pick-up times - 9am to 9.30 am and 3pm to 3.30pm.
PD56	<u>Lower River Shannon SAC:</u> The drilling works at the Mulkear River and Bilboa River will <u>not</u> be carried out during the months of May, June or July.
PD26	<u>Slievefelim to Silvermine Mountain SPA:</u> No construction works will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the breeding season (March to August).
PD27	<u>Slievefelim to Silvermine Mountain SPA:</u> 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.
PD64	<u>Slievefelim to Silvermine Mountain SPA:</u> Annual visual inspections of the lands over the 110kV UGC and the testing/inspection/planned maintenance at Joint Bays, will be scheduled outside of the hen harrier breeding season, on those parts of the 110kV UGC which occurs within the boundary of the Slievefelim to Silvermines SPA.
PD65	No construction works will take place within 800m of an active curlew nest, or active nesting attempt, within the breeding season (March to August).

5.5. Environmental Survey Requirements

The surveys which will be carried out during the construction and operational stages of the UWF Grid Connection 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.
PD38 GC-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. (Note: 17 trees with low suitability were identified within the UWF Grid Connection construction works area boundary during 2016/2017 surveys).
PD39 GC-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 GC-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.
PD26 GC-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 initiate, 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.
PD27 GC-BPM-12	Winter roosting hen harrier surveys will be carried out to confirm the location of roosting hen harriers during the construction stage
GC-BPM-06	Surveying of drainage and ground conditions before and during tree felling activities. Water sampling at main watercourse downstream of felling post-felling.
GC-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.
GC-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

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
	surveyed by a suitably qualified Bat expert within the suitable survey season as per Best Practice.
GC-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.
GC-BPM-17	Where practical, vegetation clearance will be carried out outside of the restricted breeding bird period (1 st March to 31 st 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).
GC-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.
GC-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.
GC-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).
GC-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.
GC-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 the Project Ecologist will be required within these habitats prior to the commencement of the construction stage to confirm the presence/absence of individuals.
GC-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 access points on the local road network, and on the local road network from the junction of the R497 with the L2266-11 road.
GC-BPM-31	EMF: A confirmatory survey of Electromagnetic Field emissions from the Mountphilips 110kV Substation and from locations along the 110kV UGC will be carried out by a competent engineer.
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.

5.6. 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
GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
GC-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden
GC-BPM-12	Monitoring of nesting and roosting Hen Harrier (<i>Circus cyaneus</i>)
GC-BPM-13	Minimising the effects of lighting on bats
GC-BPM-14	Protection of potential tree and bridge bat roosts
GC-BPM-15	Bats – Post Construction Monitoring
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase



BPM ID	Best Practice Measure
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (<i>Alcedo atthis</i>).
GC-BPM-20	Monitoring of Identified Badger Setts
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species
GC-BPM-23	Best practice methods to ensure the protection of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).
GC-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)
GC-BPM-25	Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)
GC-BPM-26	Local Employment and Local Sourcing
GC-BPM-27	Landowner and Land-user Liaison
GC-BPM-28	Minimising Disturbance and Damage to Land
GC-BPM-29	Minimising Dust Emissions From Site Activities
GC-BPM-30	Traffic Management Measures
GC-BPM-31	Measuring Operational EMF Emissions
GC-BPM-32	Measuring Operational Electricity Production
GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works
GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.

5.7. 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 Construction Methodologies (OCMs)
Mountphilips Substation including End Masts	PD1, PD7, PD8, PD9, PD12, PD13, PD14, PD15, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD37, PD45, PD46	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-14, BPM-16, BPM-17, BPM-20, 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-04, OCM-05, OCM-07, OCM-10, OCM-11, OCM-13, OCM-15, OCM-16, OCM-20, OCM-21
Joint Bay Locations	PD1, PD7, PD8, PD12, PD13, PD14, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD47, PD48, 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-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-29, BPM-30, BPM-31, BPM-32	OCM-06, OCM-07, OCM-08
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-05, OCM-10, OCM-11, OCM 15, OCM-16, OCM-17
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-05, OCM-10, OCM-11, OCM 15, OCM-16, OCM-17
Horizontal Directional Drilling Locations	PD1, PD5, PD7, PD8, PD12, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD49, PD50, PD51, PD52, PD53, PD54, PD55, PD56, PD57, PD58	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-15, BPM-16, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-11, OCM-14, OCM-21
Public Roads	PD1, PD2, PD3, PD4, PD7,	Surface Water	BPM-02, BPM-03, BPM-	OCM-01-, OCM-02,

	Relevant Project Design Environmental Protection Measure (PDs)	Relevant Management Plans	Relevant Best Practice Measures (BPMs)	Relevant Outline Construction Methodologies (OCMs)
	PD8, PD12, PD17, PD18, PD21, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD44	Management Plan Traffic Management Plan Waste Management Plan Invasive Species Management Plan	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-05, OCM-12
Temporary Construction Compounds	PD1, PD6, PD7, PD8, PD13, PD14, PD16, PD17, PD18, PD19, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD37	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-20, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01, OCM-02, OCM-13, OCM-21
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-05, OCM-06, OCM-07, OCM-08, OCM-09, OCM-10, OCM-11, OCM-19, OCM-20, OCM-21
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-05, OCM-06, OCM-07, OCM-08, OCM-10, OCM-11, OCM-18, OCM-20, OCM-21
Existing Forestry 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-05, OCM-06, OCM-07, OCM-08, OCM-09, OCM-20

6. Environmental emergency response measures

Emergency or contingency measures relating to landslip, frac-out and fuel/oil spillage are included below.

Environmental Emergency Procedure for Frac-Out during Drilling Works	
Work Sections/Locations	
Horizontal Directional Drilling locations <ul style="list-style-type: none"> • Mulkear (Newport) River (W10) • Clare River (W36) • Bilboa River (W57) 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Liaising with the Mud Engineer and Drilling Contractor regarding the status of drilling works and the deployment of contingency measures
Mud Engineer	<ul style="list-style-type: none"> • Supervising drilling works, including drilling pressures, implementation of contingency measures
Purpose of Frac-Out Contingency Measures	
<ul style="list-style-type: none"> • Minimize the potential for a frac out associated with horizontal directional drilling activities through the implementation of GC-BPM-36; • Provide for the timely detection of frac outs; • Protect areas that are considered environmentally sensitive (streams, wetlands, other ecological resources, cultural resources); • Ensure an organised, timely, and “minimum impact” response in the event a frac out and release of drilling mud occur. 	
Contingency Measures	
<ul style="list-style-type: none"> • In the event of break-out occurring in the river bed, the rig will immediately shut off the pumps and the drilling assembly will be pulled off bottom to reduce annular pressures. • In the event of break-out on land an excavator will be made available to dig a pit to contain fluid with vacuum trucks/pumps available to transfer drill fluid from the containment point back to the recycling point. • Drilling fluid additives design to plug the formation will be introduced to the circulation system and let set. 	



Environmental Emergency Procedure for Land Slip in Peatland

Work Sections/Locations

Landslip in peatland along 110kV UGC in Castlewaller and Killeen forestry plantations – Sections 39 and 40

Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Liaising with the Project Manager, Design Engineer, Environmental Clerk of Works and competent Geotechnical Engineer regarding the implementation of contingency measures.
Environmental Clerk of Works	<ul style="list-style-type: none"> Communicating with the relevant bodies regarding the landslip incident

Excessive Movement

Where there is excessive movement or continuing peat movement recorded at a monitoring location or identified at any location within the site but no apparent signs of distress to the peat (E.g. cracking, surface rippling) then the following will be carried out.

1. All activities (if any) will cease within the affected area.
2. Increased monitoring at the location will be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.
3. Re-commencement of activities will only start following a cessation of movement and agreement with all parties (that is Design Engineer, Project Manager, Construction Manager, Environmental Clerk of Works, relevant authority).

Onset of Peat Slide

Where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following will be carried out.

- (1) On alert of a peat slide incident, all activities (if any) in the area will cease, plant and personnel removed from area and all available resources will be diverted to assist in the required control procedures.
- (2) Where considered possible, action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain and the inability to predict locations it may not be possible to implement any on land prevention measures, in this case a watercourse check barrage will be implemented.
- (3) All relevant authorities, including Tipperary County Council, Inland Fisheries Ireland and National Parks and Wildlife Service will be notified if a peat slide event occurs on site.
- (4) For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest, the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be appraised by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

Check Barrage

Whilst it is not anticipated that a peat slide will occur on site, as a contingency a typical check barrage procedure is included below.

The check barrage procedure deals with preventing a peat slide from moving downstream within a watercourse.

The most effective method of preventing excessive peat slide debris from travelling downstream in a watercourse is the use of a check barrage. A check barrage comprises the placement of rock fill across a watercourse. The check barrage is a highly permeable construction that will allow the passage of water but will prevent peat debris from passing through. Rock fill should comprise well graded coarse rock pieces from about 0.3m up to typically 1m.

The rock fill for the check barrage could be sourced from locally won granular fill material, such as quarry at Rear



Cross.

The size of the barrage will vary depending on the scale of the peat debris to be contained and the geometry of the watercourse at the barrage location. In general, due to the low speed of a peat slide there is generally little impact force and most of the lateral load is due to fluid pressure on the upslope face of the barrage.

Typically, the check barrage should fill the entire channel width of the watercourse up to a height of 3 to 4m with a crest width of typically 2m and side slopes of about 45 degrees, which will depend on the geometry of the barrage location.

The check barrage procedure is as follows:

- (1) Access to the check barrage location will be along vehicular access tracks/roads, where possible. When it is necessary to form the barrage then rock fill will be placed across the watercourse to effectively block the passage of peat debris.
- (2) Operatives employed to carry out the construction of the check barrage will be inducted by means of a briefing by on site supervisors as to the location of the check barrage.
- (3) The check barrage provides containment for peat debris in the highly unlikely event of a major peat slide. Further remedial measures may be required and would be appraised by all parties (such as the Project Team, Promoter, Geotechnical Engineer, relevant authorities) and carried out as soon as physically possible when the location and extent of the failure is established.
- (4) Where a barrage was constructed as a precaution and no peat debris reached the watercourse then the barrage should be removed as soon as any measures to prevent further peat sliding have been satisfactorily completed.



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 bowsters/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 banded. All transfer of hydrocarbons will be undertaken in a banded 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	<ul style="list-style-type: none"> Will inform the Environmental Clerk of Works of any observed issues.
Environmental Clerk of Works	<ul style="list-style-type: none"> 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 Grid Connection 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 Grid Connection (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 Grid Connection. 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
- 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
<u>Contractor or Subcontractor Details:</u> Contractor Name: Contact Name: Telephone:		
<u>Nature of Non-Compliance</u> (specify Environmental Protection Measure breached)		
<u>Time Specified for becoming compliant:</u>		
Contractor or Subcontractor's confirmation of receipt of NCR Yes <input type="checkbox"/> No <input type="checkbox"/> Contractors or Subcontractors signature: _____ Date of Signing: _____		

Register of Environmental Training

[illegible]

8.4. Register of Environmental Training

[illegible]

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 <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Tipperary County Council	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Office of Public Works	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Inland Fisheries Ireland	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	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 <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Further correspondence from complainant:	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Signed: _____			

8.8. Register of Environmental Complaints

[illegible]

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)	<div><div><div>•</div><div><input type="checkbox"/></div></div><div><div>•</div><div><input type="checkbox"/></div></div><div>(Specify exact location)</div></div>
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 GC EMP 1	Location of UWF Grid Connection on OSI Discovery Mapping
Figure GC EMP 2	Layout of UWF Grid Connection on Aerial Photography Mapping (Overview & Maps 1 to 15)
Figure GC EMP 3	Construction Works Areas and work Section Numbers on Aerial Photography Mapping (Overview & Maps 1 to 5)
Figure GC EMP 4	Location of the UWF Grid Connection and the Other Elements of the Whole UWF Project on OSI Mapping
Figure GC EMP 5	UWF Grid Connection and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm
Figure GC EMP 6	UWF Grid Connection and the Other Elements of the Whole UWF Project in <u>Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.</u>

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

- Mountphilips Substation including End Masts
- Joint Bay Locations
- Watercourse Crossing Locations (Class 1 and 2, fisheries value)
- Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value)
- Horizontal Directional Drilling Location
- Public Roads
- Temporary Construction Compounds
- Agricultural Lands
- Forestry Lands
- Existing Forestry Roads

Classification	Section Identification Codes
Agricultural Lands Agricultural Lands Forestry Lands Existing Forestry Roads	S1 - Section 1 to 102
Watercourse Crossing Locations (Class 1 and 2, fisheries value) Watercourse Crossing Locations (Class 3 and 4, sub-optimal or no fisheries value)	W1 - Watercrossings 1 to 90
Temporary Construction Compounds	C1 - Temporary Construction Compound 1 to 3
Public Roads	R1 - Public Road Crossings/Works 1 to 13
Joint Bay Locations	J1 - Joint Bays 1 to 38
Existing Forestry Roads	AR1 - Access Roads 1 to 16

Table 12: Classification of Construction Works Sections

Section	Classifications
S1	Mountphilips Substation and End Mast
W1	Watercourse Crossing (Class 1 or 2 Fisheries value)
S2	Mountphilips Substation and End Mast
C1	Temporary Construction Compound
S3	Agricultural Land New Road
W2	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S4	Agricultural Land New Road
W3	Watercourse Crossing (Class 1 or 2 Fisheries value)
S5	Agricultural Land New Road
S6	Agricultural Land New Road
R1	Public Road
S7	Agricultural Land New Road
W4	Watercourse Crossing (Class 1 or 2 Fisheries value)
S8	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J1	Joint Bay
S9	Agricultural Land No Roads (temporary only)
W5	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S10	Forestry Land
W6	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S11	Forestry Land
W7	Watercourse Crossing (Class 1 or 2 Fisheries value)
AR1	Agricultural Land Existing Farm Road
W66	Watercourse Crossing (Class 1 or 2 Fisheries value)
S12	Agricultural Land New Road
S13	Agricultural Land New Road
S14	Agricultural Land New Road
S15	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J2	Joint Bay
S16	Agricultural Land No Roads (temporary only)
W8	Watercourse Crossing (Class 1 or 2 Fisheries value)
S17	Agricultural Land Existing Farm Road
W9	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S18	Agricultural Land Existing Farm Road
R2	Public Road
AR2	Agricultural Land Existing Farm Road
J3	Joint Bay
S19	Agricultural Land Existing Farm Road
S20	Agricultural Land No Roads (temporary only)
W10	Watercourse Crossing Drilling Location
S21	Agricultural Land No Roads (temporary only)
S22	Agricultural Land No Roads (temporary only)
J4	Joint Bay
S23	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
AR3	Agricultural Land Existing Farm Road

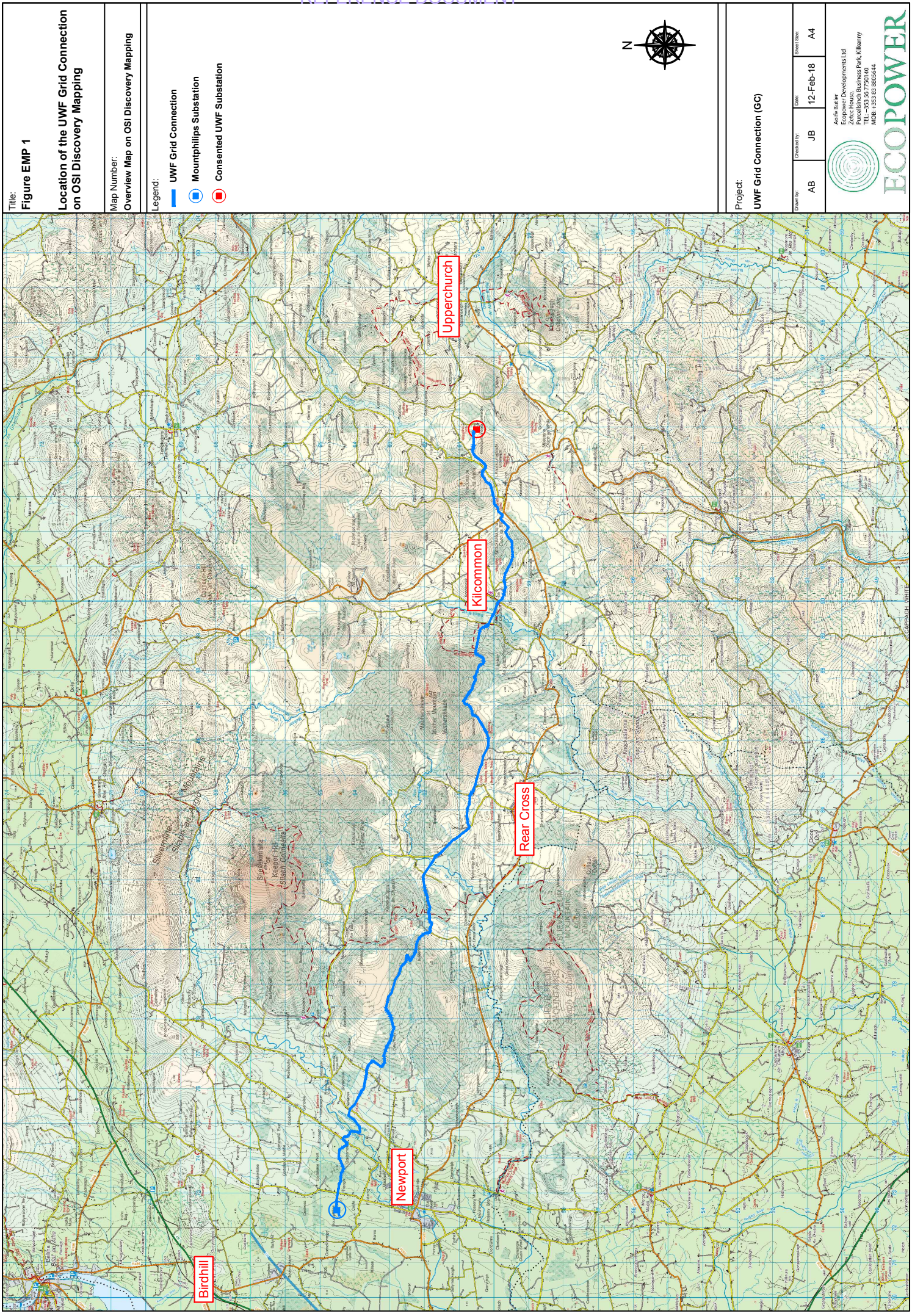
Section	Classifications
S24	Agricultural Land No Roads (temporary only)
R3	Public Road
S25	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J5	Joint Bay
W11	Watercourse Crossing (Class 1 or 2 Fisheries value)
S26	Agricultural Land No Roads (temporary only)
S27	Agricultural Land No Roads (temporary only)
S28	Agricultural Land No Roads (temporary only)
W12	Watercourse Crossing (Class 1 or 2 Fisheries value)
S29	Agricultural Land No Roads (temporary only)
S30	Agricultural Land No Roads (temporary only)
S31	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J6	Joint Bay
S32	Agricultural Land New Road
R4	Public Road
S33	Agricultural Land Existing Farm Road
S34	Agricultural Land New Road
J7	Joint Bay
S35	Agricultural Land New Road
S36	Agricultural Land New Road
W13	Watercourse Crossing (Class 1 or 2 Fisheries value)
S37	Existing Forestry Road
J8	Joint Bay
W14	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W15	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
J9	Joint Bay
W16	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
J10	Joint Bay
W17	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S38	Existing Forestry Road
W18	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S39	Forestry Land
W19	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W20	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W21	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
J11	Joint Bay
W22	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W23	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S40	Existing Forestry Road
J12	Joint Bay
W24	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W25	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
J13	Joint Bay
W26	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W27	Watercourse Crossing (Class 1 or 2 Fisheries value)

Section	Classifications
J14	Joint Bay
W28	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S41	Agricultural Land Existing Farm Road
J15	Joint Bay
R5	Public Road
S42	Agricultural Land No Roads (temporary only)
W29	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W30	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S43	Agricultural Land No Roads (temporary only)
W31	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S44	Agricultural Land No Roads (temporary only)
W32	Watercourse Crossing (Class 1 or 2 Fisheries value)
S45	Forestry Land
S46	Forestry Land
J16	Joint Bay
W33	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W34	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S47	Existing Forestry Road
S48	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J17	Joint Bay
W35	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S49	Agricultural Land Existing Farm Road
R6	Public Road
AR4	Existing Forestry Road
W75- W88	Watercourse Crossing (Class 1 or 2 Fisheries value) / 3 + 4
AR5	Existing Forestry Road
W70- W74	Watercourse Crossing (Class 1 or 2 Fisheries value) / 3 + 4
AR6	Existing Forestry Road
W67- W69	Watercourse Crossing (Class 1 or 2 Fisheries value) / 3 + 4
S50	Agricultural Land No Roads (temporary only)
S51	Agricultural Land No Roads (temporary only)
S52	Agricultural Land No Roads (temporary only)
W36	Watercourse Crossing (Class 1 or 2 Fisheries value)
S53	Agricultural Land No Roads (temporary only)
W37	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S54	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J18	Joint Bay
R7	Public Road
W38	Watercourse Crossing (Class 1 or 2 Fisheries value)
W39	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W40	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W41	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W42	Watercourse Crossing (Class 1 or 2 Fisheries value)

Section	Classifications
J19	Joint Bay
C2	Temporary Construction Compound
W43	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W44	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S55	Agricultural Land No Roads (temporary only)
W45	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
AR7	Existing Forestry Road
J20	Joint Bay
S56	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
W46	Watercourse Crossing (Class 1 or 2 Fisheries value)
S57	Agricultural Land No Roads (temporary only)
S58	Agricultural Land No Roads (temporary only)
S59	Agricultural Land No Roads (temporary only)
W47	Watercourse Crossing (Class 1 or 2 Fisheries value)
S60	Agricultural Land No Roads (temporary only)
S61	Agricultural Land New Road / Agricultural Land No Roads (temporary only)
J21	Joint Bay
R8	Public Road
S62	Agricultural Land Existing Farm Road
S63	Agricultural Land No Roads (temporary only)
W48	Watercourse Crossing (Class 1 or 2 Fisheries value)
S64	Agricultural Land No Roads (temporary only)
AR8	Agricultural Land Existing Farm Road / Agricultural Land New Road
W89	Watercourse Crossing (Class 1 or 2 Fisheries value)
J22	Joint Bay
S65	Agricultural Land No Roads (temporary only)
W49	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S66	Agricultural Land No Roads (temporary only)
S67	Agricultural Land No Roads (temporary only)
S68	Agricultural Land No Roads (temporary only)
J23	Joint Bay
AR9	Agricultural Land Existing Farm Road
W90	Watercourse Crossing (Class 1 or 2 Fisheries value)
S69	Agricultural Land No Roads (temporary only)
S70	Agricultural Land No Roads (temporary only)
J24	Joint Bay
S71	Agricultural Land Existing Farm Road / Forestry Land
W50	Watercourse Crossing (Class 1 or 2 Fisheries value)
W51	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
J25	Joint Bay
W52	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S72	Existing Forestry Road
J26	Joint Bay
W53	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W54	Watercourse Crossing (Class 1 or 2 Fisheries value)

Section	Classifications
J27	Joint Bay
W55	Watercourse Crossing (Class 1 or 2 Fisheries value)
W56	Watercourse Crossing (Class 1 or 2 Fisheries value)
J28	Joint Bay
AR10	Existing Forestry Road
S73	Existing Forestry Road
J29	Joint Bay
R9	Public Road
J30	Joint Bay
S74	Agricultural Land Existing Farm Road / Agricultural Land New Road
W57	Watercourse Crossing Drilling Location
S75	Agricultural Land No Roads (temporary only)
W58	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S76	Agricultural Land No Roads (temporary only)
W59	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
AR11	Agricultural Land Existing Farm Road
W60	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
S77	Agricultural Land No Roads (temporary only)
R10	Public Road
S78	Agricultural Land No Roads (temporary only)
J31	Joint Bay
S79	Agricultural Land No Roads (temporary only) / Agricultural Land New Road
S80	Agricultural Land No Roads (temporary only)
S81	Agricultural Land No Roads (temporary only)
W61	Watercourse Crossing (Class 1 or 2 Fisheries value)
S82	Agricultural Land No Roads (temporary only)
S83	Agricultural Land No Roads (temporary only)
R11	Public Road
S84	Agricultural Land No Roads (temporary only) / Agricultural Land Existing Farm Road
J32	Joint Bay
S85	Existing Forestry Road
J33	Joint Bay
AR12	Existing Forestry Road
S86	Agricultural Land Existing Farm Road / Agricultural Land No Roads (temporary only)
J34	Joint Bay
W62	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
R12	Public Road
AR13	Agricultural Land Existing Farm Road
S87	Agricultural Land No Roads (temporary only)
S88	Agricultural Land Existing Farm Road / Agricultural Land No Roads (temporary only)
AR14	Agricultural Land Existing Farm Road
J35	Joint Bay
S89	Agricultural Land No Roads (temporary only)
S90	Agricultural Land No Roads (temporary only)
S91	Agricultural Land No Roads (temporary only)

Section	Classifications
S92	Agricultural Land No Roads (temporary only)
AR15	Agricultural Land Existing Farm Road
J36	Joint Bay
S93	Agricultural Land No Roads (temporary only)
S94	Agricultural Land No Roads (temporary only)
S95	Agricultural Land No Roads (temporary only)
S96	Agricultural Land Existing Farm Road / Agricultural Land No Roads (temporary only)
J37	Joint Bay
W63	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
R13	Public Road
S97	Agricultural Land No Roads (temporary only)
S98	Agricultural Land No Roads (temporary only)
S99	Agricultural Land No Roads (temporary only)
S100	Agricultural Land No Roads (temporary only) / Agricultural Land New Road
J38	Joint Bay
AR16	Agricultural Land Existing Farm Road
S101	Agricultural Land Existing Farm Road
W64	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
W65	Watercourse Crossing (Class 3 or 4 Suboptimal or No fisheries value)
C3	Temporary Construction Compound
S102	Agricultural Land No Roads (temporary only)



Title:

Figure EMP 1

Location of the UWF Grid Connection
on OSI Discovery Mapping

Map Number:

Overview Map on OSI Discovery Mapping

Legend:

- UWF Grid Connection
- Mountphilips Substation
- Consented UWF Substation

Project:

UWF Grid Connection (GC)

Drawn by:	AB	Checked by:	JB	Date:	12-Feb-18	Sheet Size:	A4
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ECOPOWER
 ZONE HOUSE
 Porellan Business Park, Kilkenny
 TEL: +353 56 7750140
 MOB: +353 85 805644

Title:
Figure EMP 2

Layout of the UWF Grid Connection on
Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Overview Map on Aerial Photography Mapping

Legend:

- UWF Grid Connection
- Mounthphlips Substation
- Consented UWF Substation

Map 1 Map 1 of 15



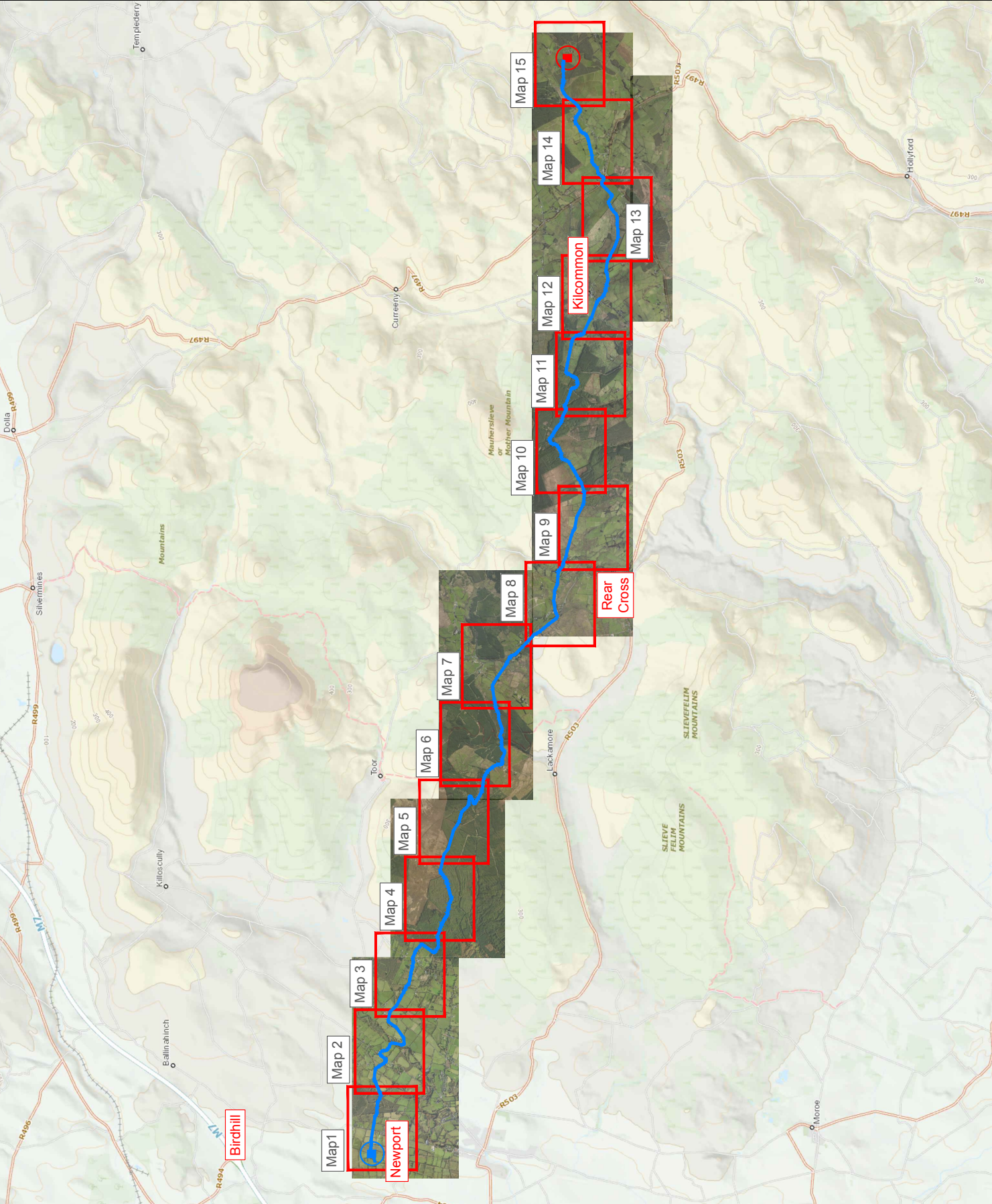
Project:
UWF Grid Connection (GC)

Drawn by:	Checked by:	Date:	Sheet Size:
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ECOPOWER



Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 1 of 15

- Legend:
- Existing Nenagh to Killonan 110kV OHL
 - End Masts
 - End Masts temporary crane handstands
 - Underground Cable from Nenagh to Killonan 110kV OHL into Mountphilips Substation
 - 110kV Substation Compound
 - 110kV Substation Control Building
 - Temporary Construction Compound C1
 - Mountphilips - Upperchurch 110kV UGC
 - Joint Bay Locations
 - New Permanent Access Roads
 - Temporary Access Roads
 - Existing Access Roads
 - Dirty water drain
 - Settlement Pond
 - Clean water drain
 - Drainage Berm
 - Permanent Berm
 - Temporary hedge/tree removal & pruning
 - Permanent hedge/tree removal
 - Diverted Stream
 - Grid Connection Road Crossings
 - Grid Connection Water Crossings
 - New Permanent Road ID
 - Existing Access Road ID
 - Temporary Site Entrance (unless indicated permanent on map)
 - Watercourse
 - Public Road
 - Public Road Number
 - Townlands



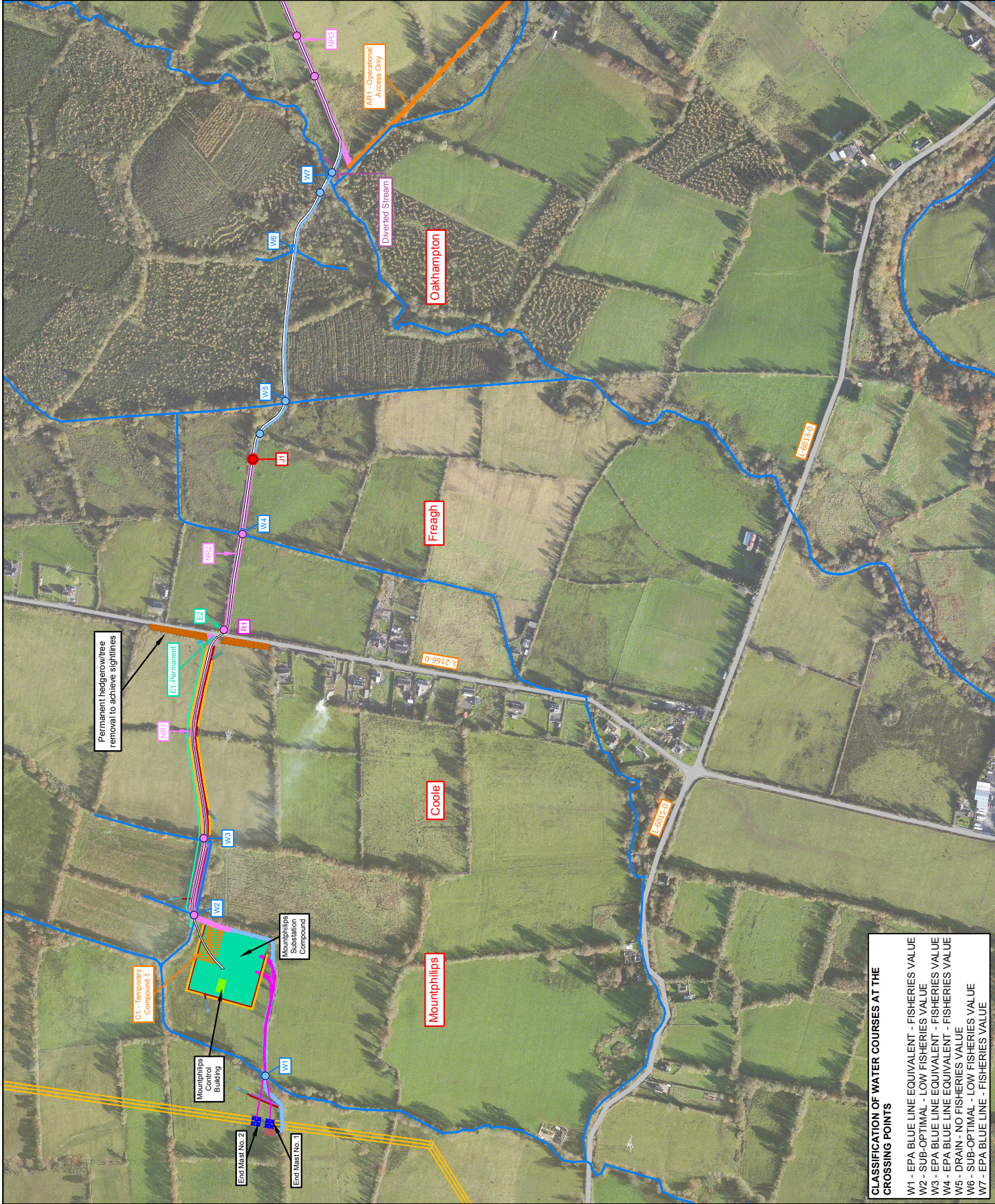
Project:

UWF Grid Connection (GC)

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



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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W1 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W2 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W3 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W4 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W5 - DRAIN - NO FISHERIES VALUE
- W6 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W7 - EPA BLUE LINE - FISHERIES VALUE

Title:
Figure GC EMP 2
Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 2 of 15

Legend:

- | | |
|---|--|
|  | MountPhillips - Upperchurch 110kV UGC |
|  | New Permanent Access Roads |
|  | Temporary Access Roads |
|  | Existing Access Roads |
|  | Permanent Berm |
|  | Temporary hedge/tree removal & pruning |
|  | Permanent hedge/tree removal |
|  | Joint Bay Locations |
|  | Grid Connection Road Crossings |
|  | Grid Connection Water Crossings |
|  | New Permanent Road ID |
|  | Existing Access Road ID |
|  | Bat Crossing Locations |
|  | Temporary Storage Area |
|  | Temporary Site Entrance
(unless indicated permanent on map) |
|  | Watercourse |
|  | Public Road |
|  | Public Road Number |
|  | Townlands |

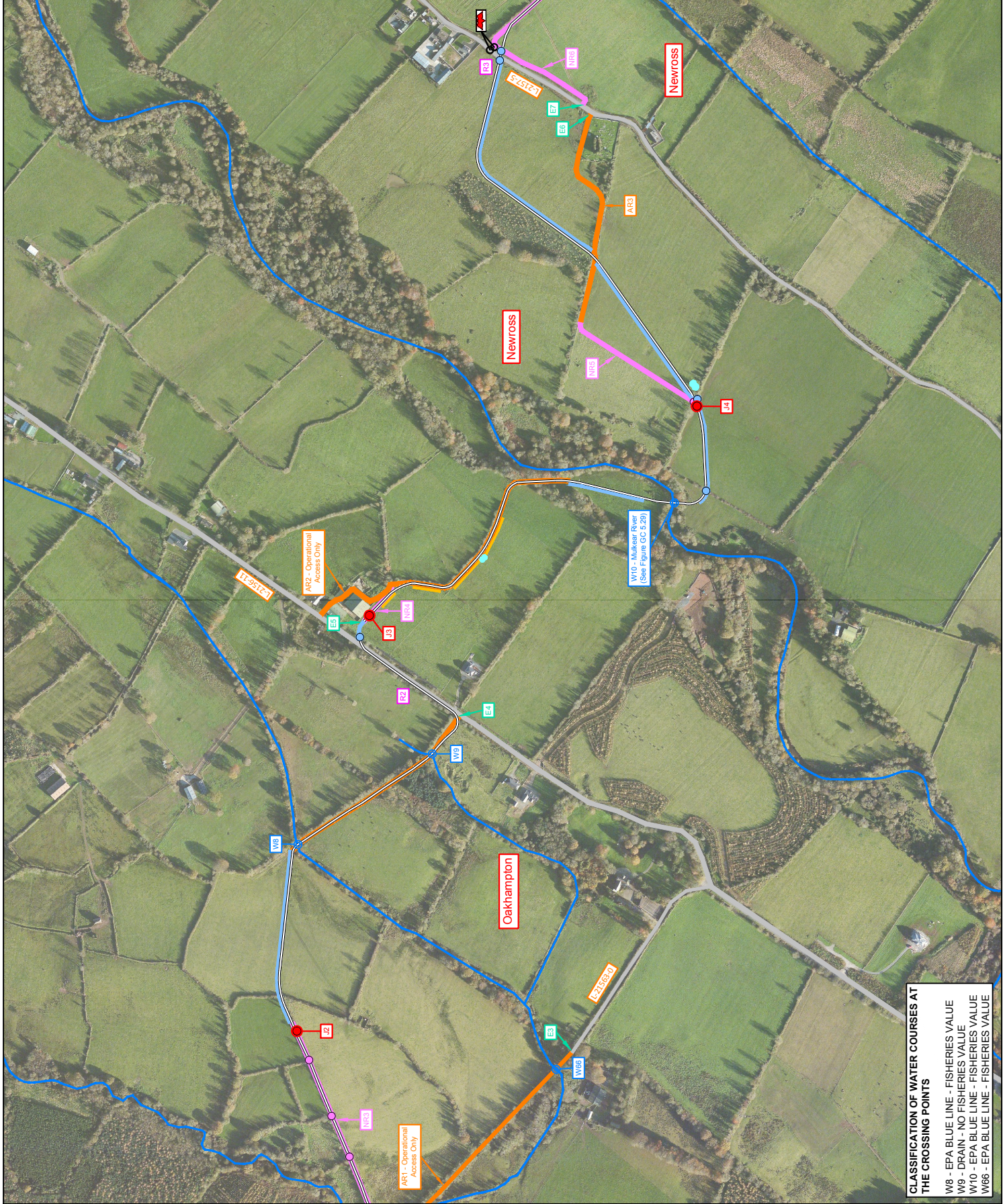
Project:
UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W8 - EPA BLUE LINE - FISHERIES VALUE
W9 - DRAIN - NO FISHERIES VALUE
W10 - EPA BLUE LINE - FISHERIES VALUE
W66 - EPA BLUE LINE - FISHERIES VALUE

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Legende

R12 W62 NR20

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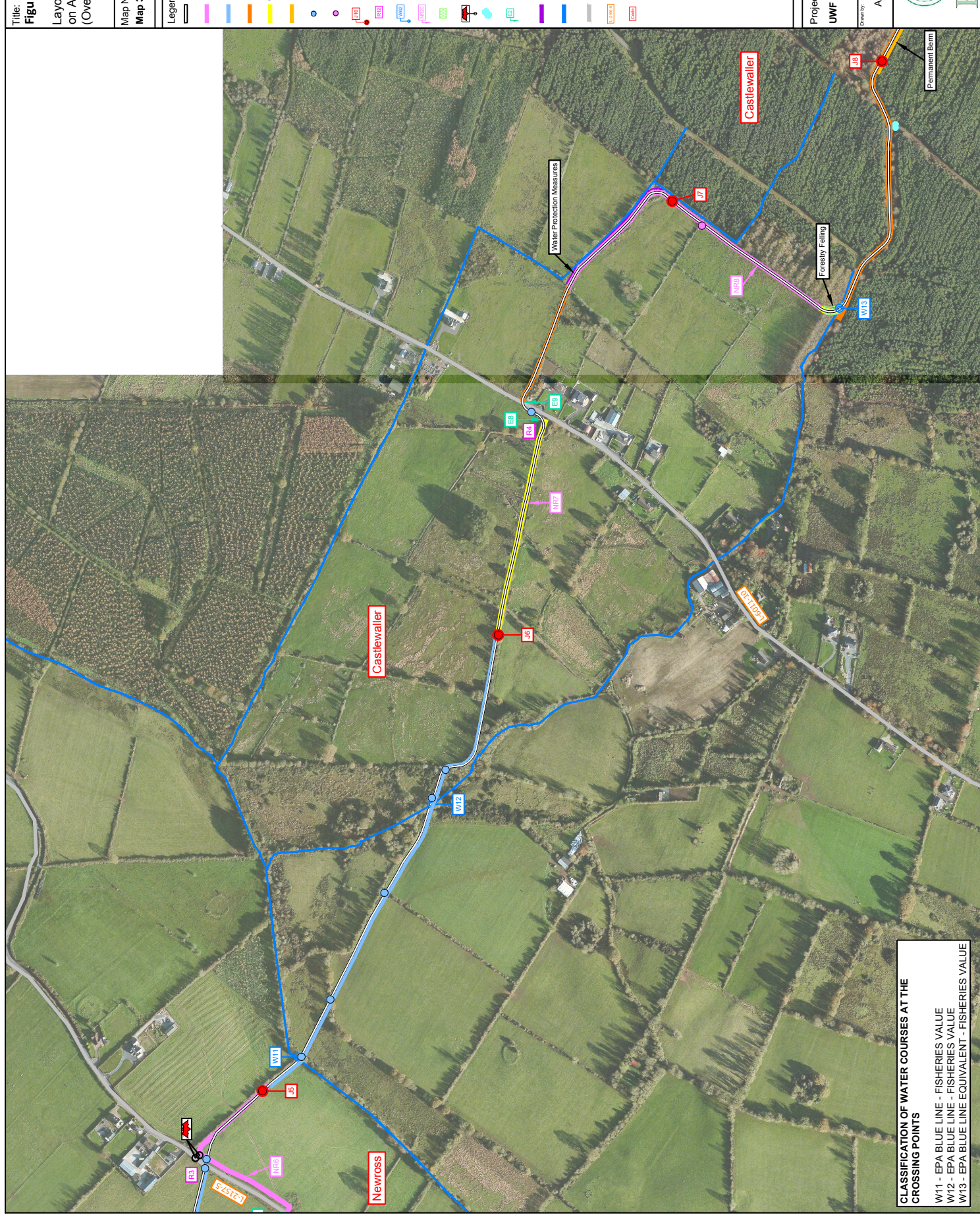
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UWF

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Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 4 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- Existing Access Roads
- Permanent Berm
- Joint Bay Locations
- Grid Connection Water Crossings
- Temporary Storage Area
- Watercourse
- Townlands



Project:
UWF Grid Connection (GC)

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Castlewallier

Castlewallier

Permanent Berm

Permanent Berm

CLASSIFICATION OF WATER COURSES
AT THE CROSSING POINTS

- W14 - DRAIN - NO FISHERIES VALUE
- W15 - DRAIN - NO FISHERIES VALUE
- W16 - DRAIN - NO FISHERIES VALUE
- W17 - DRAIN - NO FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection on
Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 5 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Temporary Access Roads
- Existing Access Roads
- Concealed Access Road (new permanent road)
- Joint Bay Locations
- Grid Connection Water Crossings
- New Permanent Road ID
- Forestry Felling
- Existing Access Road ID
- Temporary Storage Area
- Harvester Crossing Point
- Watercourse
- Townlands



Project:
UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W18 - DRAIN - NO FISHERIES VALUE
- W19 - DRAIN - NO FISHERIES VALUE
- W20 - DRAIN - NO FISHERIES VALUE
- W21 - DRAIN - NO FISHERIES VALUE
- W22 - DRAIN - NO FISHERIES VALUE
- W23 - DRAIN - NO FISHERIES VALUE
- W24 - DRAIN - NO FISHERIES VALUE
- W25 - DRAIN - NO FISHERIES VALUE
- W26 - DRAIN - NO FISHERIES VALUE
- W27 - EPA BLUE LINE - FISHERIES VALUE
- W87 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W88 - SUB-OPTIMAL - LOW FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 6 of 15

Legend:

Mountphilips - Upperchurch 110kV UGC

New Permanent Access Roads

Existing Access Roads

Temporary Access Roads

Concealed Access Road (new permanent road)

Joint Bay Locations

Grid Connection Road Crossings

Grid Connection Water Crossings

New Permanent Road ID

Existing Access Road ID

Temporary hedge/tree removal & pruning

Permanent Berm

Forestry Felling

Bat Crossing Locations

Temporary Site Entrance
(unless indicated permanent on map)

Harvester Crossing Point

Watercourse

Public Road

Public Road Number

Townlands



Project:

UWF Grid Connection (GC)

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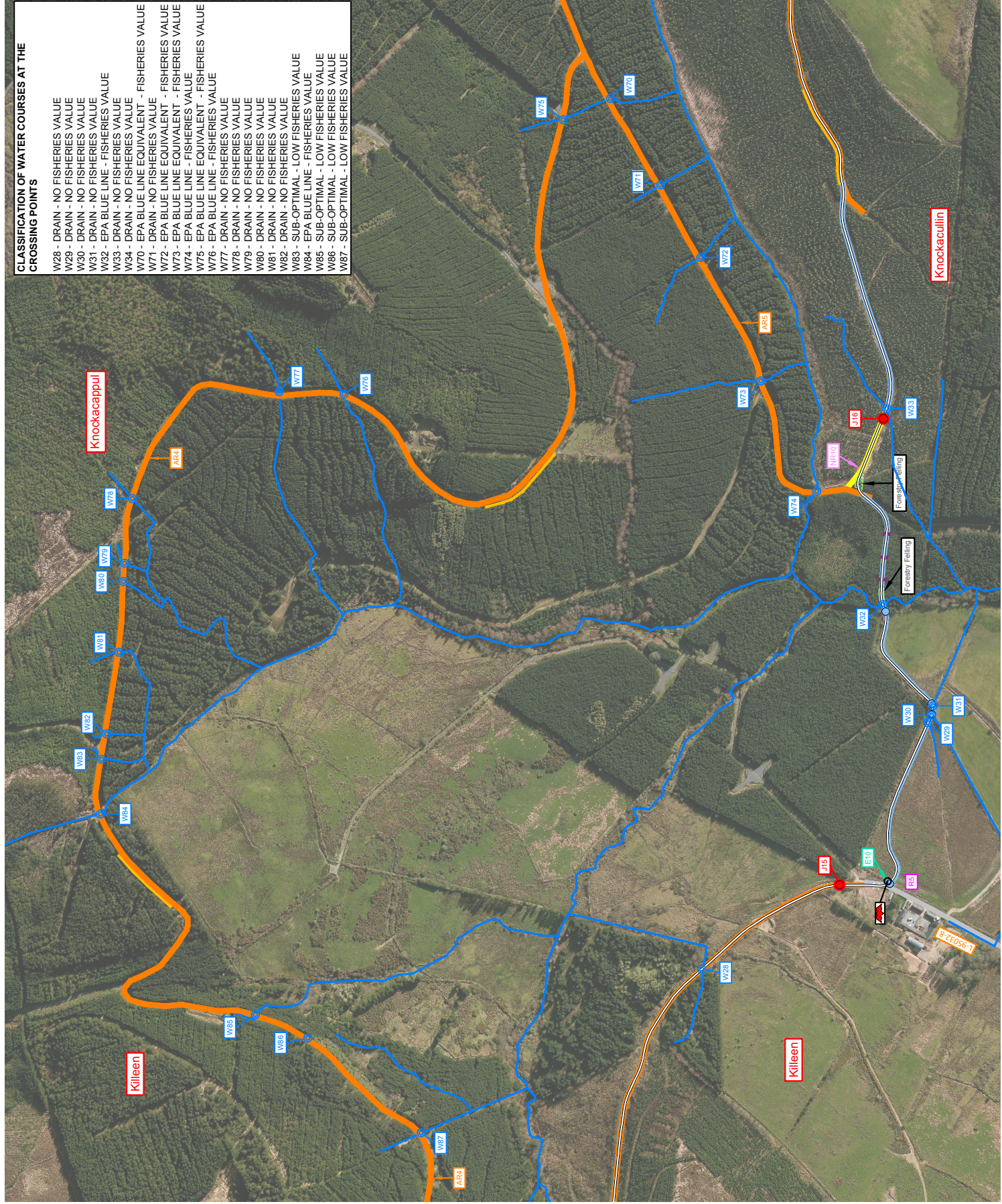
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**CLASSIFICATION OF WATER COURSES AT THE
CROSSING POINTS**

- W28 - DRAIN - NO FISHERIES VALUE
- W29 - DRAIN - NO FISHERIES VALUE
- W30 - DRAIN - NO FISHERIES VALUE
- W31 - DRAIN - NO FISHERIES VALUE
- W32 - EPA BLUE LINE - FISHERIES VALUE
- W33 - DRAIN - NO FISHERIES VALUE
- W34 - DRAIN - NO FISHERIES VALUE
- W70 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W71 - DRAIN - NO FISHERIES VALUE
- W72 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W73 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W74 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W75 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W76 - EPA BLUE LINE - FISHERIES VALUE
- W77 - DRAIN - NO FISHERIES VALUE
- W78 - DRAIN - NO FISHERIES VALUE
- W79 - DRAIN - NO FISHERIES VALUE
- W80 - DRAIN - NO FISHERIES VALUE
- W81 - DRAIN - NO FISHERIES VALUE
- W82 - DRAIN - NO FISHERIES VALUE
- W83 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W84 - EPA BLUE LINE - LOW FISHERIES VALUE
- W85 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W86 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W87 - SUB-OPTIMAL - LOW FISHERIES VALUE



Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 7 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Temporary Access Roads
- Existing Access Roads
- Concealed Access Road (new permanent road)
- Temporary hedge/tree removal & pruning
- Joint Bay Locations
- Grid Connection Road Crossings
- Grid Connection Water Crossings
- New Permanent Road ID
- Existing Access Road ID
- Temporary Site Entrance (unless indicated permanent on map)
- Temporary Storage Area
- Watercourse
- Public Road
- Public Road Number
- Townlands



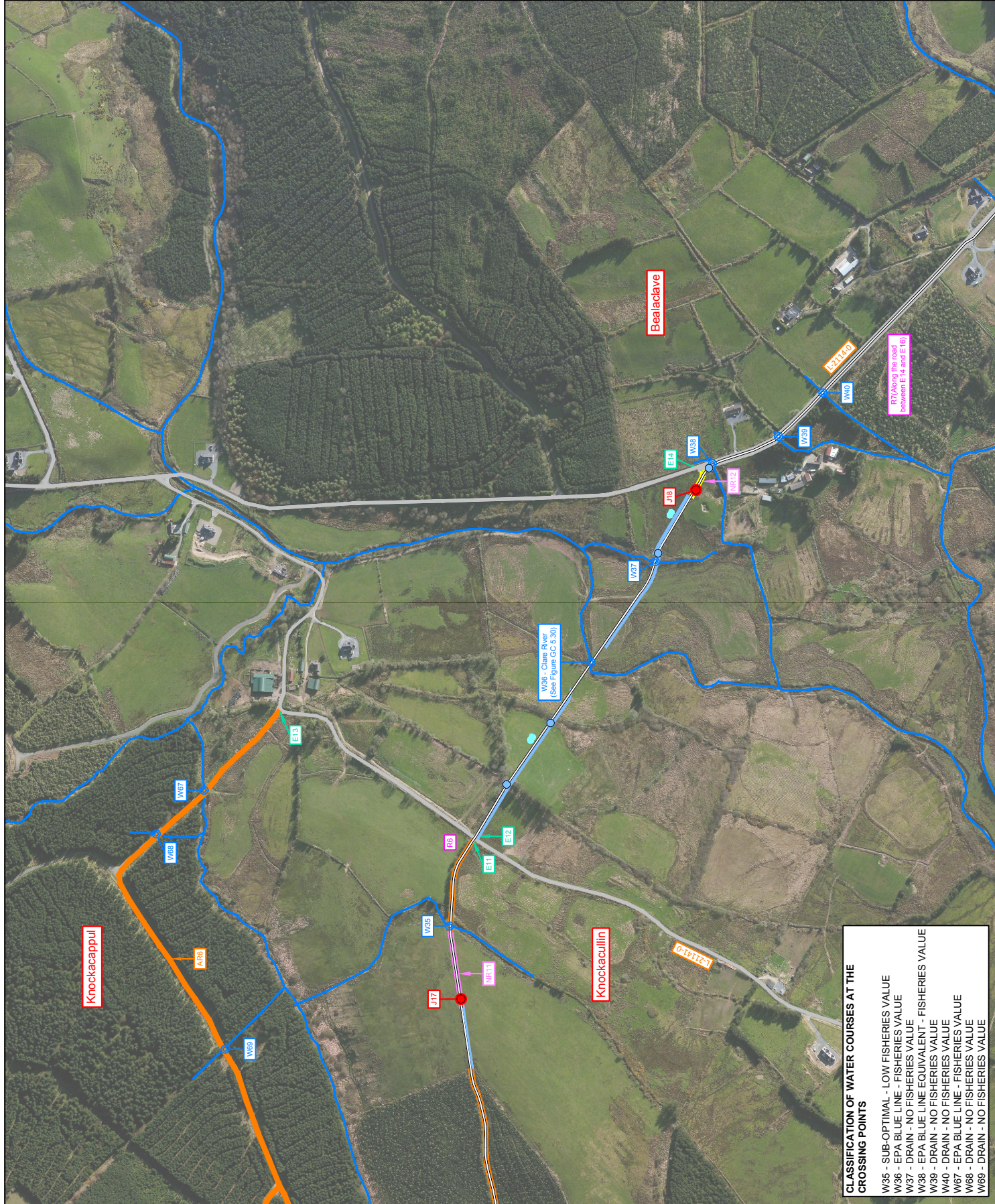
Project:
UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS	
W35	SUB-OPTIMAL - LOW FISHERIES VALUE
W36	EPA BLUE LINE - FISHERIES VALUE
W37	DRAIN - NO FISHERIES VALUE
W38	EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
W39	DRAIN - NO FISHERIES VALUE
W40	DRAIN - NO FISHERIES VALUE
W41	EPA BLUE LINE - FISHERIES VALUE
W42	DRAIN - NO FISHERIES VALUE
W43	DRAIN - NO FISHERIES VALUE
W44	DRAIN - NO FISHERIES VALUE
W45	DRAIN - NO FISHERIES VALUE
W46	DRAIN - NO FISHERIES VALUE
W47	DRAIN - NO FISHERIES VALUE
W48	DRAIN - NO FISHERIES VALUE
W49	DRAIN - NO FISHERIES VALUE
W50	DRAIN - NO FISHERIES VALUE
W51	DRAIN - NO FISHERIES VALUE
W52	DRAIN - NO FISHERIES VALUE
W53	DRAIN - NO FISHERIES VALUE
W54	DRAIN - NO FISHERIES VALUE
W55	DRAIN - NO FISHERIES VALUE
W56	DRAIN - NO FISHERIES VALUE
W57	DRAIN - NO FISHERIES VALUE
W58	DRAIN - NO FISHERIES VALUE
W59	DRAIN - NO FISHERIES VALUE
W60	DRAIN - NO FISHERIES VALUE
W61	DRAIN - NO FISHERIES VALUE
W62	DRAIN - NO FISHERIES VALUE
W63	DRAIN - NO FISHERIES VALUE
W64	DRAIN - NO FISHERIES VALUE
W65	DRAIN - NO FISHERIES VALUE
W66	DRAIN - NO FISHERIES VALUE
W67	DRAIN - NO FISHERIES VALUE
W68	DRAIN - NO FISHERIES VALUE
W69	DRAIN - NO FISHERIES VALUE
W70	DRAIN - NO FISHERIES VALUE
W71	DRAIN - NO FISHERIES VALUE
W72	DRAIN - NO FISHERIES VALUE
W73	DRAIN - NO FISHERIES VALUE
W74	DRAIN - NO FISHERIES VALUE
W75	DRAIN - NO FISHERIES VALUE
W76	DRAIN - NO FISHERIES VALUE
W77	DRAIN - NO FISHERIES VALUE
W78	DRAIN - NO FISHERIES VALUE
W79	DRAIN - NO FISHERIES VALUE
W80	DRAIN - NO FISHERIES VALUE
W81	DRAIN - NO FISHERIES VALUE
W82	DRAIN - NO FISHERIES VALUE
W83	DRAIN - NO FISHERIES VALUE
W84	DRAIN - NO FISHERIES VALUE
W85	DRAIN - NO FISHERIES VALUE
W86	DRAIN - NO FISHERIES VALUE
W87	DRAIN - NO FISHERIES VALUE
W88	DRAIN - NO FISHERIES VALUE
W89	DRAIN - NO FISHERIES VALUE
W90	DRAIN - NO FISHERIES VALUE
W91	DRAIN - NO FISHERIES VALUE
W92	DRAIN - NO FISHERIES VALUE
W93	DRAIN - NO FISHERIES VALUE
W94	DRAIN - NO FISHERIES VALUE
W95	DRAIN - NO FISHERIES VALUE
W96	DRAIN - NO FISHERIES VALUE
W97	DRAIN - NO FISHERIES VALUE
W98	DRAIN - NO FISHERIES VALUE
W99	DRAIN - NO FISHERIES VALUE
W100	DRAIN - NO FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 8 of 15

- Legend:
- Mountphilips - Upperchurch 110kV UGC
 - New Permanent Access Roads
 - Temporary Access Roads
 - Existing Access Roads
 - Concealed Access Road (new permanent road)
 - Temporary hedge/tree removal & pruning
 - Permanent hedge/tree removal
 - Joint Bay Locations
 - Grid Connection Road Crossings
 - Grid Connection Water Crossings
 - New Permanent Road ID
 - Existing Access Road ID
 - Temporary Compound
 - Temporary Site Entrance
(unless indicated permanent on map)
 - Bat Crossing Locations
 - Watercourse
 - Public Road
 - Public Road Number
 - Townlands



Project:
UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS	
W41 - DRAIN - NO FISHERIES VALUE	
W42 - EPA BLUE LINE - FISHERIES VALUE	
W43 - DRAIN - NO FISHERIES VALUE	
W44 - DRAIN - NO FISHERIES VALUE	
W45 - DRAIN - NO FISHERIES VALUE	
W46 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE	
W47 - EPA BLUE LINE - FISHERIES VALUE	

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 9 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Temporary Access Roads
- Existing Access Roads
- Concealed Access Road (new permanent road)
- Temporary hedge/tree removal & pruning
- Permanent hedge/tree removal
- Joint Bay Locations
- Grid Connection Road Crossings
- Grid Connection Water Crossings
- New Permanent Road ID
- Existing Access Road ID
- Forestry Felling
- Temporary Site Entrance
(unless indicated permanent on map)
- Temporary Storage Area
- Watercourse
- Public Road
- Public Road Number
- Townlands



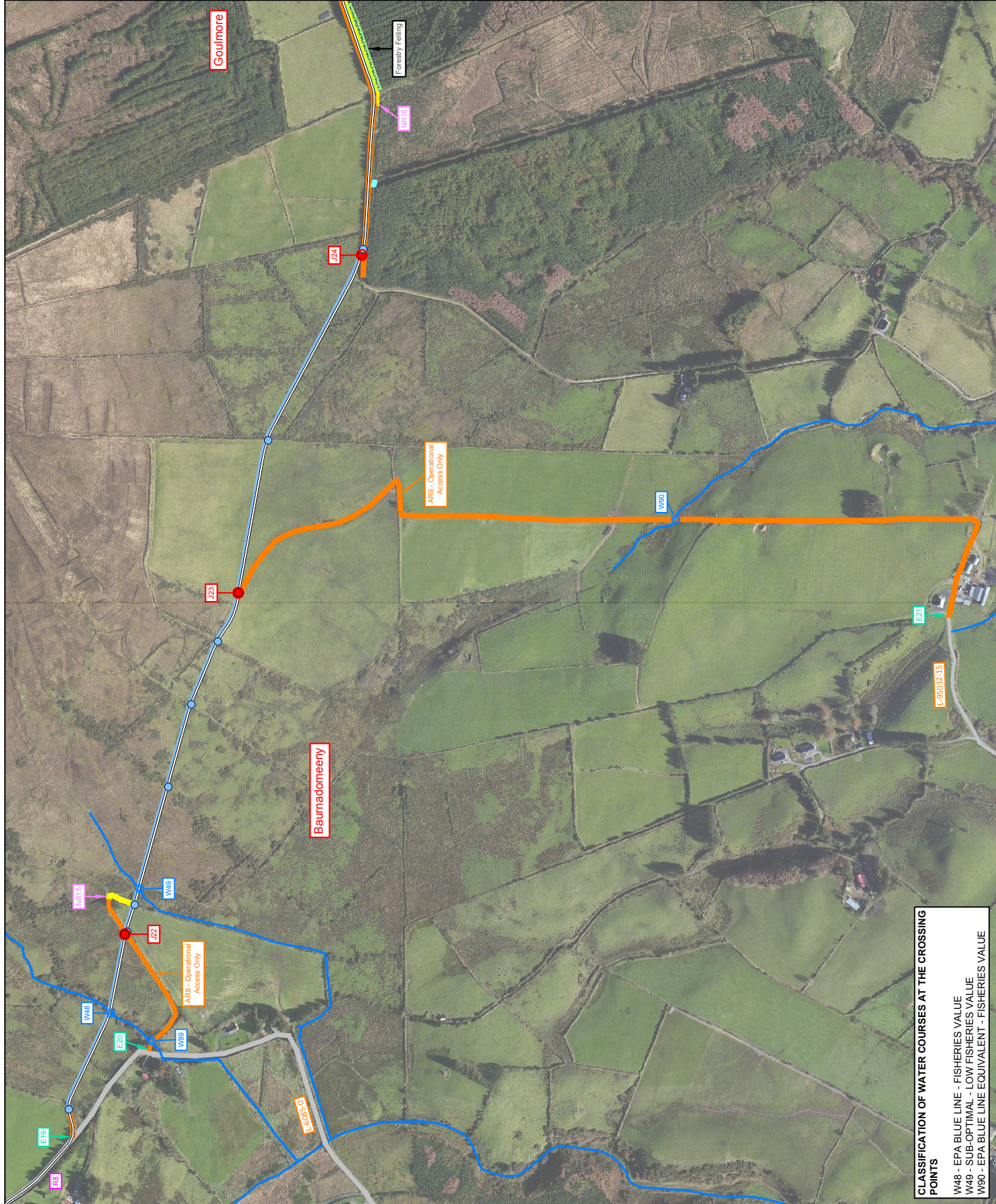
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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W48 - EPA BLUE LINE - FISHERIES VALUE
- W49 - SUB-OPTIMAL - LOW FISHERIES VALUE
- W90 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 10 of 15


Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Existing Access Roads
- Concealed Access Road (new permanent road)
- Permanent Berm
- Joint Bay Locations
- Grid Connection Water Crossings
- New Permanent Road ID
- Forestry Felling
- Temporary Storage Area
- Watercourse
- Public Road
- Public Road Number
- Townlands



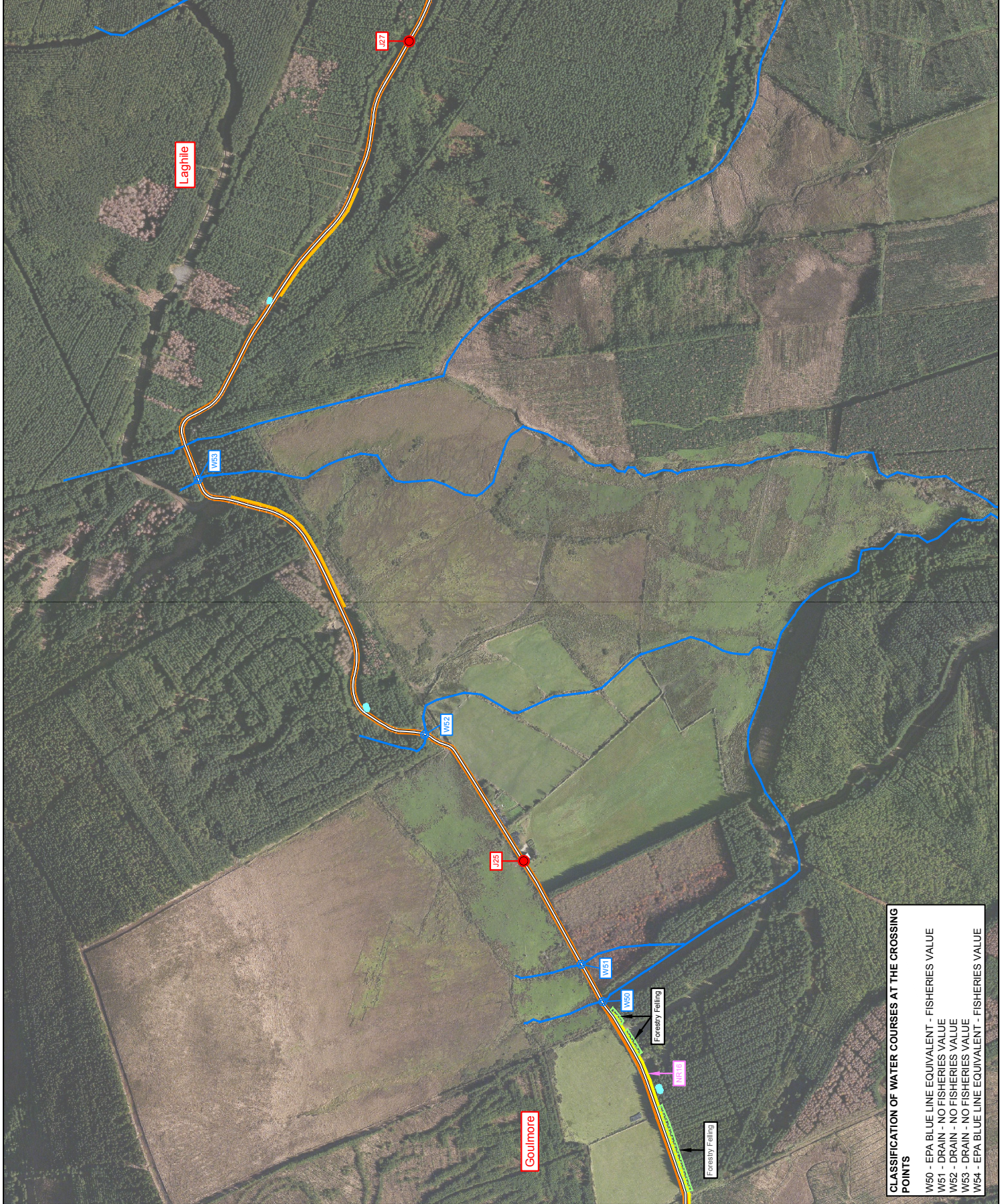
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UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W50 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- W51 - DRAIN - NO FISHERIES VALUE
- W52 - DRAIN - NO FISHERIES VALUE
- W53 - DRAIN - NO FISHERIES VALUE
- W54 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 11 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Existing Access Roads
- Temporary Access Roads
- Concealed Access Road (new permanent road)
- Joint Bay Locations
- Grid Connection Water Crossings
- New Permanent Road ID
- Existing Access Road ID
- Forestry Felling
- Temporary Site Entrance
(unless indicated permanent on map)
- Temporary Storage Area
- Watercourse
- Public Road
- Public Road Number
- Townlands



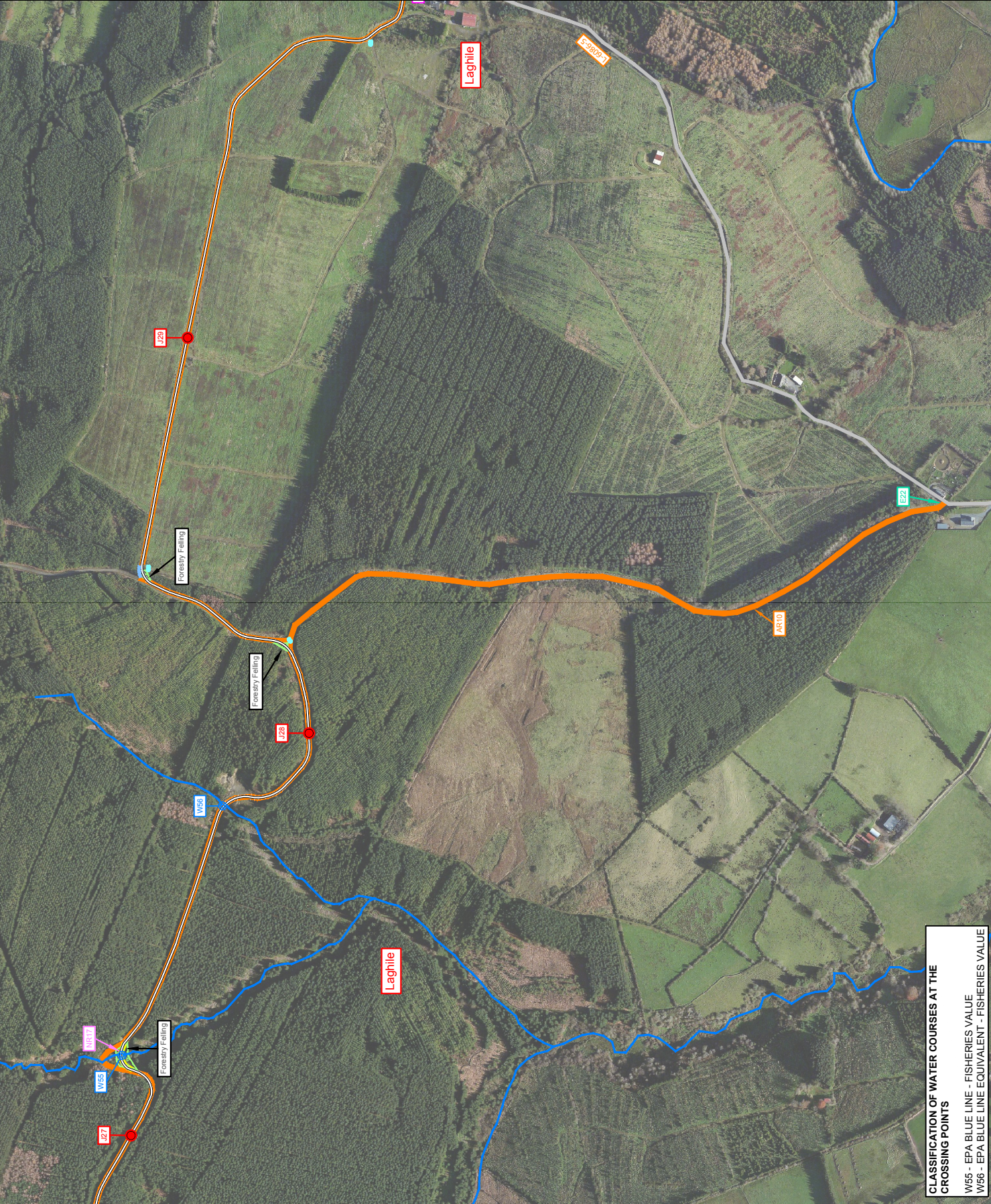
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UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS







W55 - EPA BLUE LINE - FISHERIES VALUE

W56 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE

Title: **Figure GC EMP 2**
Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 12 of 15

Legend:

-  Mounthillips - Upperchurch 110KV UGC
-  New Permanent Access Roads
-  Temporary Access Roads
-  Existing Access Roads
-  Temporary hedge/tree removal & pruning
-  Joint Bay Locations


Grid Connection Road Crossings

Grid Connection Water Crossings

New Permanent Road ID

AR13 Existing Access Road ID

Forestry Colling

 Bat Crossing Locations

1. **Introduction**

Water Protection Measure

Temporary Site Enhancements
(unless indicated permanent on map)

Temporary Storage Area

Permanent Storage Area

Watercourse

Public Board

Public Read Number

Project cost

Funding round number

LOWLANDS



Project:

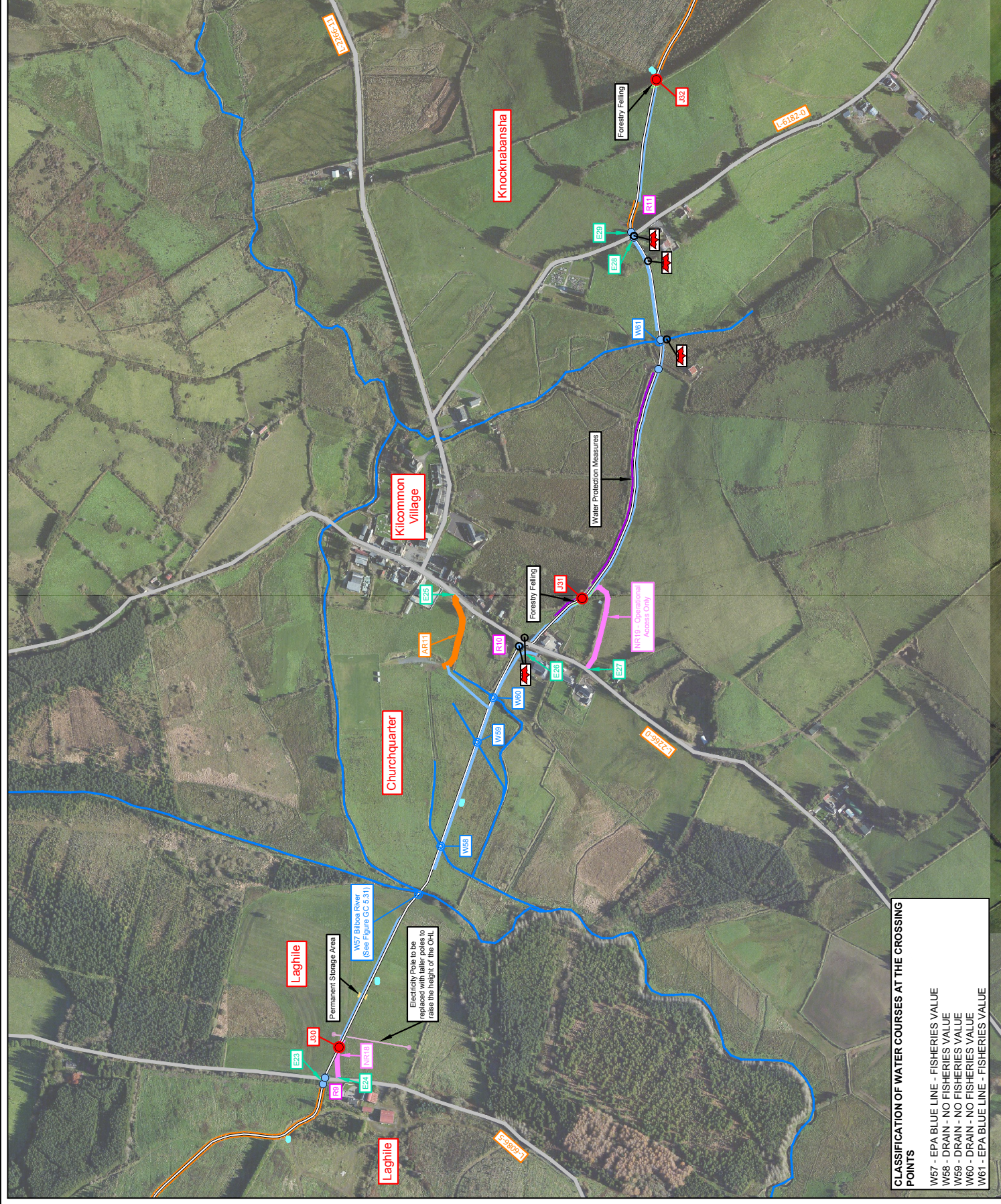
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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

- W57 - EPA BLUE LINE - FISHERIES VALUE
W58 - DRAIN - NO FISHERIES VALUE
W59 - DRAIN - NO FISHERIES VALUE
W60 - DRAIN - NO FISHERIES VALUE
W61 - EPA BLUE LINE - FISHERIES VALUE

Title:
Figure GC EMP 2

Layout of the UWF Grid Connection
on Aerial Photography Mapping
(Overview & Maps 1 to 15)

Map Number:
Map 13 of 15

Legend:

- Mountphilips - Upperchurch 110kV UGC
- New Permanent Access Roads
- Temporary Access Roads
- Existing Access Roads
- Concealed Access Road (new permanent road)
- Temporary hedge/tree removal & pruning
- Joint Bay Locations
- Grid Connection Road Crossings
- Grid Connection Water Crossings
- New Permanent Road ID
- Existing Access Road ID
- Forestry Felling
- Bat Crossing Locations
- Water Protection Measure
- Temporary Site Entrance (unless indicated permanent on map)
- Temporary Storage Area
- Permanent Berm
- Watercourse
- Public Road
- Public Road Number
- Townlands

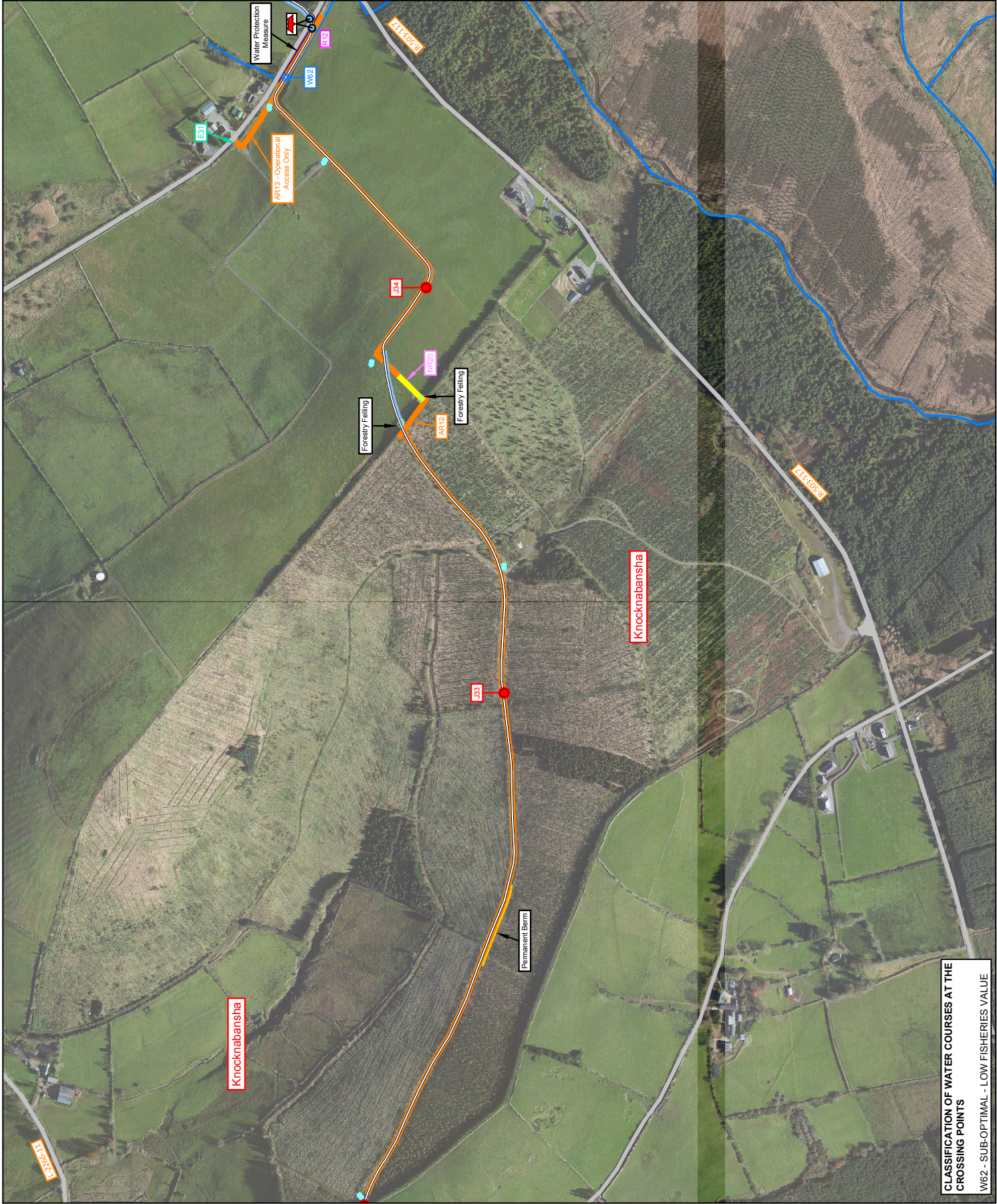


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UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE
CROSSING POINTS
W62 - SUB-OPTIMAL - LOW FISHERIES VALUE

Title: **Figure GC EMP 2**

Layout of the UWF Grid Connection on Aerial Photography Mapping (Overview & Maps 1 to 15)

Map Number:
14 of 15

Legend:

-  Mountphilips - Upperchurch 110kV UGC
-  New Permanent Access Roads
-  Temporary Access Roads
-  Existing Access Roads
-  Temporary hedge/tree removal & pruning
-  Joint Bay Locations
-  Grid Connection Road Crossings
-  Grid Connection Water Crossings
-  New Permanent Road ID
-  Existing Access Road ID
-  Bat Crossing Locations
-  Temporary Site Entrance
(unless indicated permanent on map)
-  Water Protection Measure
-  Watercourse
-  Public Road
-  Public Road Number
-  Townlands

Project:

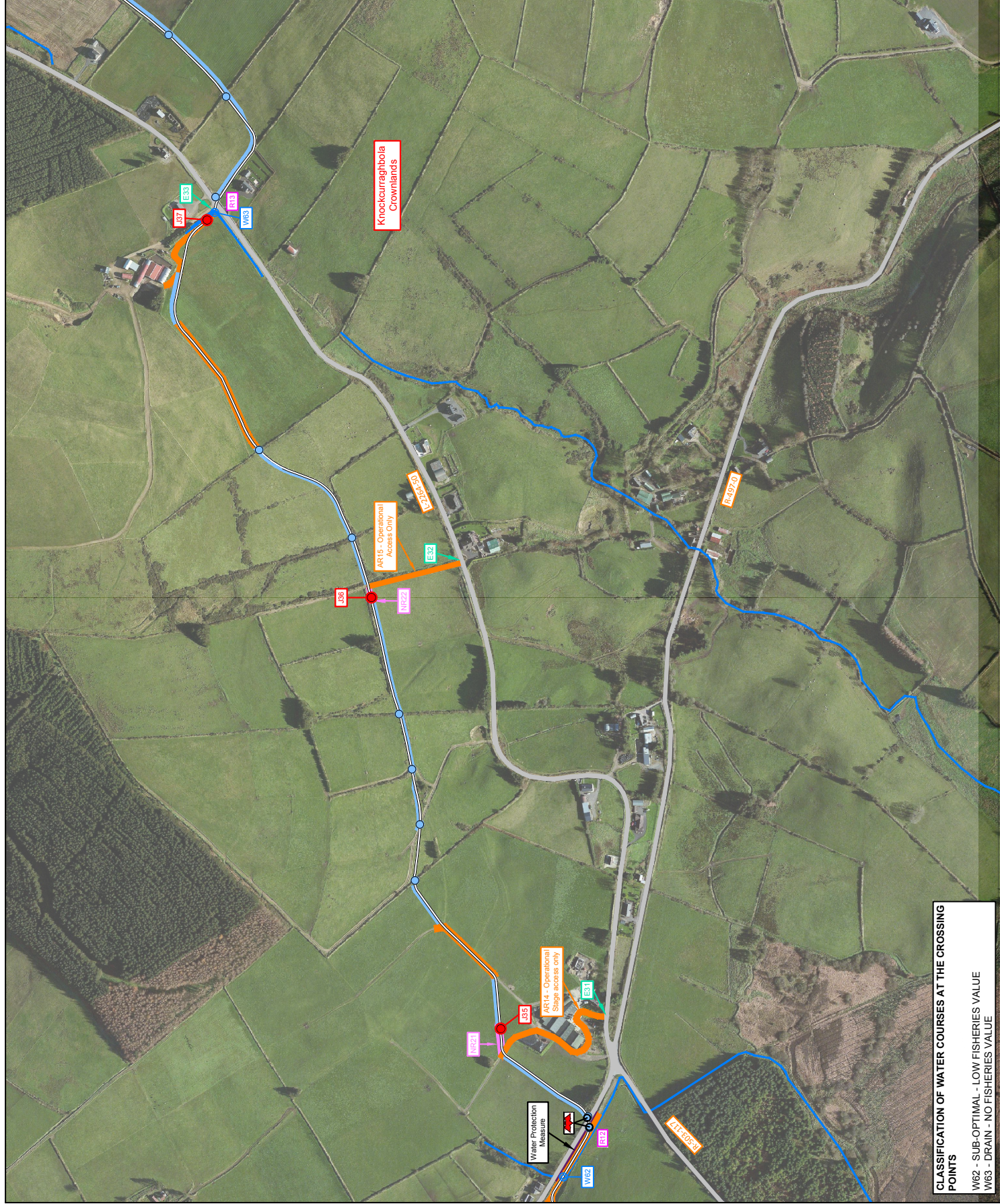
UWF Grid Connection (GC)

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CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

W62 - SUB-OPTIMAL - LOW FISHERIES VALUE

W63 - DRAIN - NO FISHERIES VALUE

Knockourraghbola

-



COWHILL

An aerial photograph of a rural landscape. A prominent blue line, likely a digital overlay, runs diagonally across the image, separating a dark, wooded area on the left from a lighter, grassy field on the right. In the upper left corner, there is a small cluster of buildings, including a blue-roofed structure. The terrain is divided into various fields and patches of vegetation.

CLASSIFICATION OF WATER COURSES AT THE CROSSING POINTS

W63 - DRAIN - NO FISHERIES VALUE




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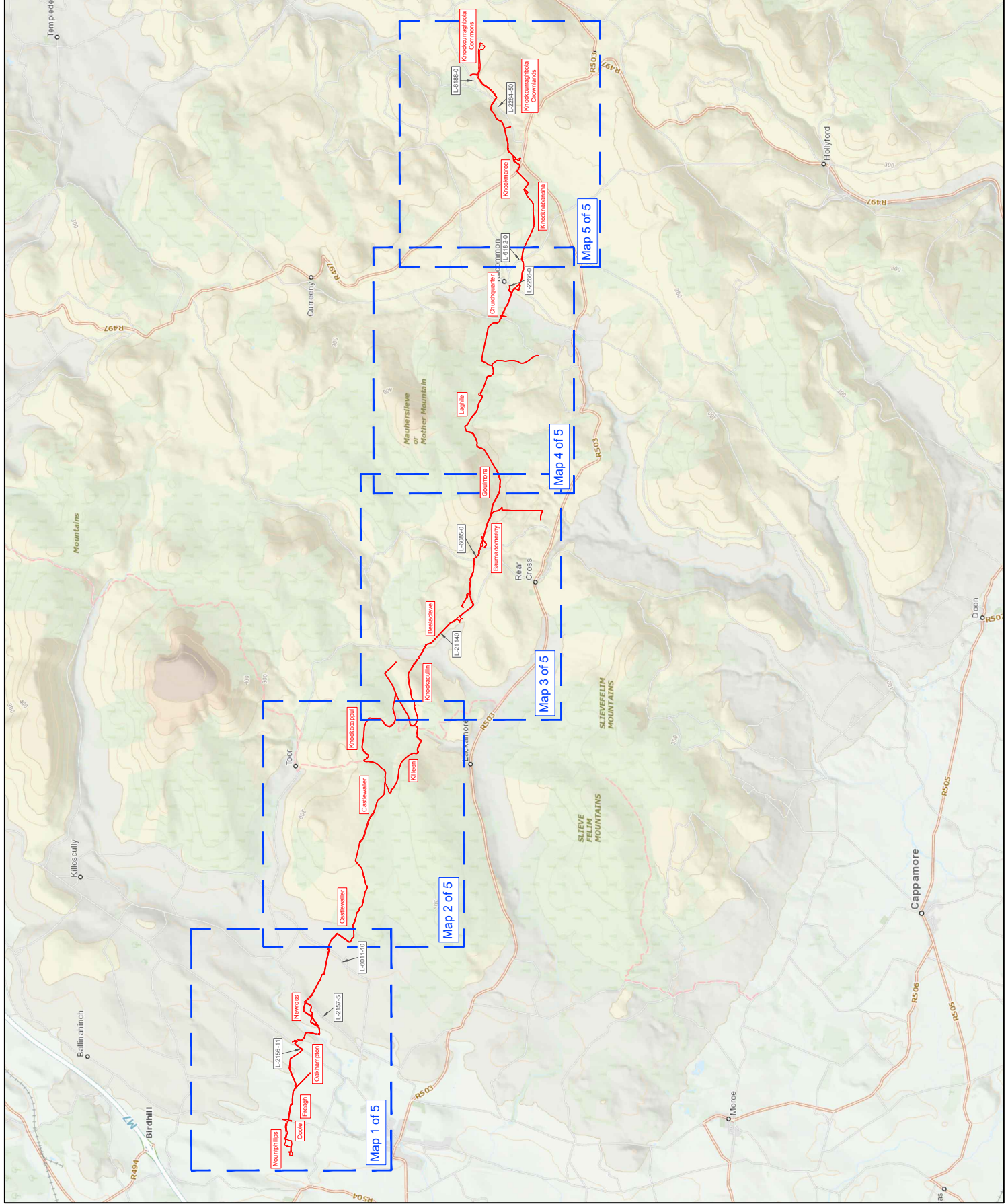
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Figure GC EMP 3

Layout of the UWF Grid Connection, including Construction Works Areas and work Section Numbers on Aerial Photography Mapping (Overview & Maps 1 to 5)

Map Number:
Overview Map

Legend:

-  Construction Works Area Boundary
-  Townlands
-  Public Road Numbers



Project: UWF Grid Connection (GC)

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Title:
Figure GC EMP 3

Layout of the UWF Grid Connection,
including Construction Works Areas and
work Section Numbers on Aerial
Photography Mapping
(Overview & Maps 1 to 5)

Map Number:

Map 1 of 5

Legend:

Construction Works Area Boundary

Townlands

Section Numbers (S1 - S102)

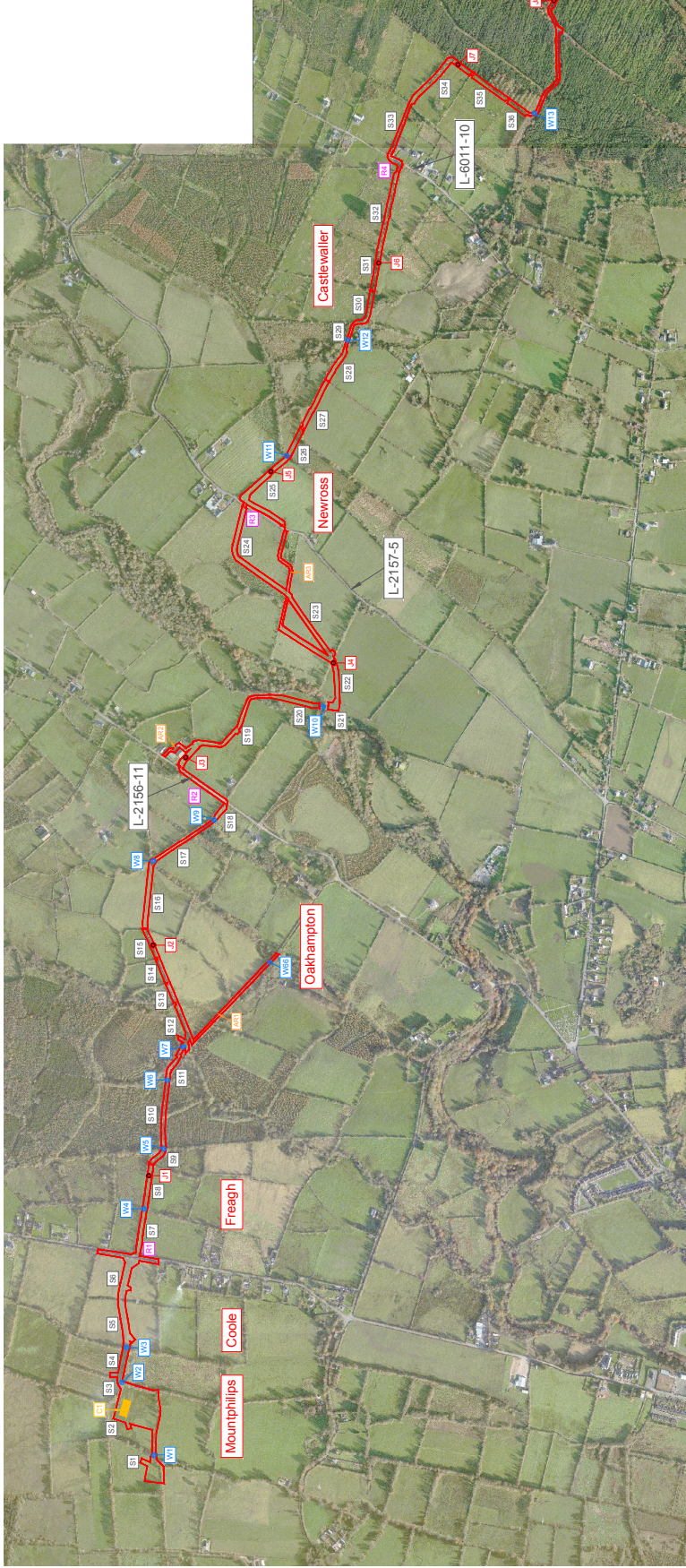
Joint Bay Locations (J1 - J38)

Water Crossing (W1 - W65)

Existing Access Road (AR1 - AR16)

Road Crossings (R1 - R13)

Public Road Numbers



Project:

UWF Grid Connection (GC)

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Title:
Figure GC EMP 3

Layout of the UWF Grid Connection,
including Construction Works Areas and
work Section Numbers on Aerial
Photography Mapping
(Overview & Maps 1 to 5)

Map Number:
Map 2 of 5

Legend:

- Construction Works Area Boundary
- Townlands
- Section Numbers (S1 - S102)
- Joint Bay Locations (J1 - J38)
- Water Crossing (W1 - W65)
- Existing Access Road (AR1 - AR16)
- Road Crossings (R1 - R13)



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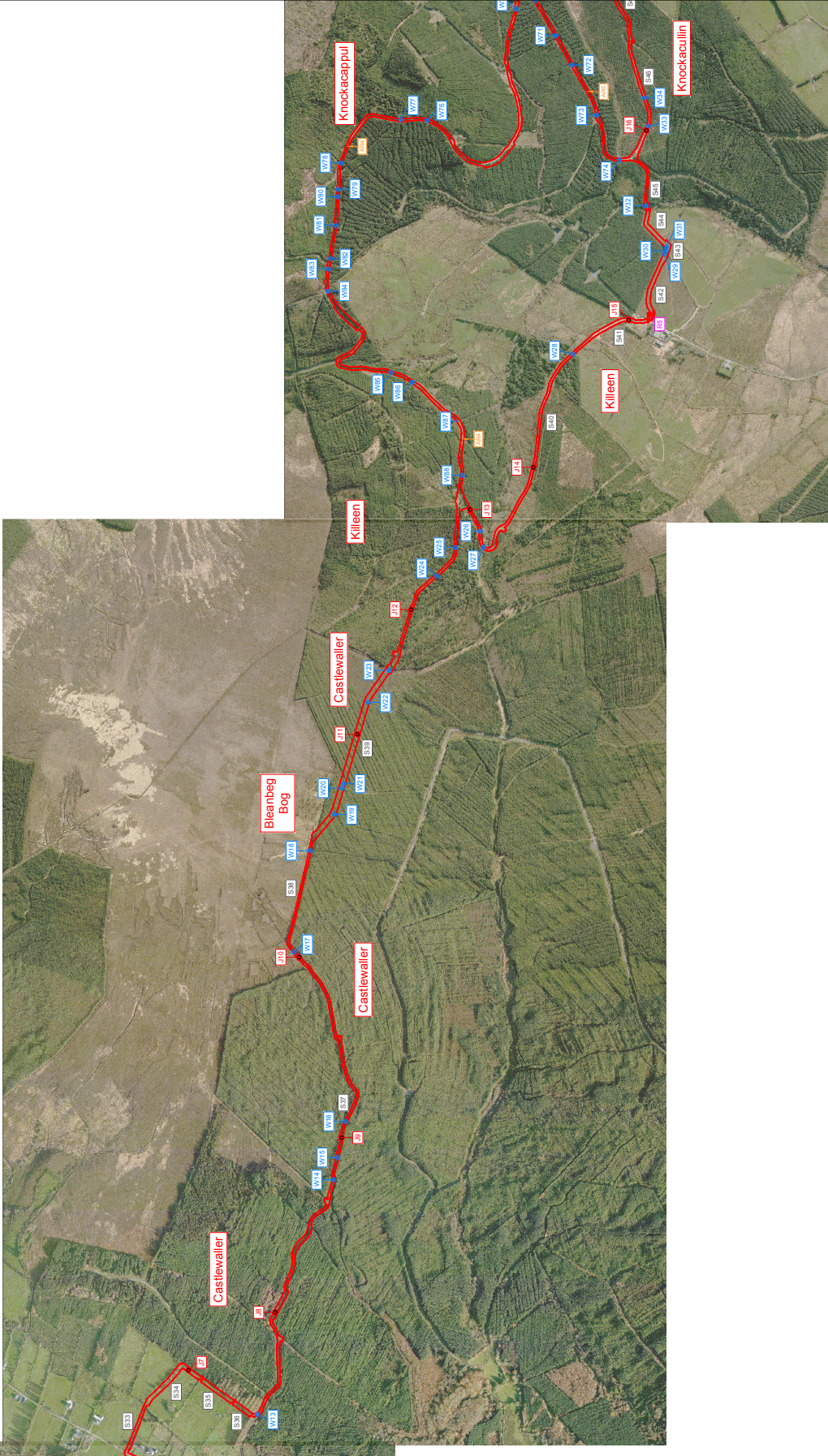
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Title:
Figure GC EMP 3
Layout of the UWF Grid Connection,
including Construction Works Areas and
work Section Numbers on Aerial
Photography Mapping
(Overview & Maps 1 to 5)

Map Number:
Map 3 of 5

Legend:

- Construction Works Area Boundary
- Townlands
- Section Numbers (S1 - S102)
- Joint Bay Locations (J1 - J38)
- Water Crossing (W1 - W65)
- Existing Access Road (AR1 - AR16)
- Road Crossings (R1 - R13)
- Public Road Numbers

Project:
UWF Grid Connection (GC)

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Title:
Figure GC EMP 3
Layout of the UWF Grid Connection,
including Construction Works Areas and
work Section Numbers on Aerial
Photography Mapping
(Overview & Maps 1 to 5)

Map Number:
Map 4 of 5

Legend:

- Construction Works Area Boundary
- Townlands
- Section Numbers (S1 - S102)
- Joint Bay Locations (J1 - J38)
- Water Crossing (W1 - W65)
- Existing Access Road (AR1 - AR16)
- Road Crossings (R1 - R13)
- Public Road Numbers



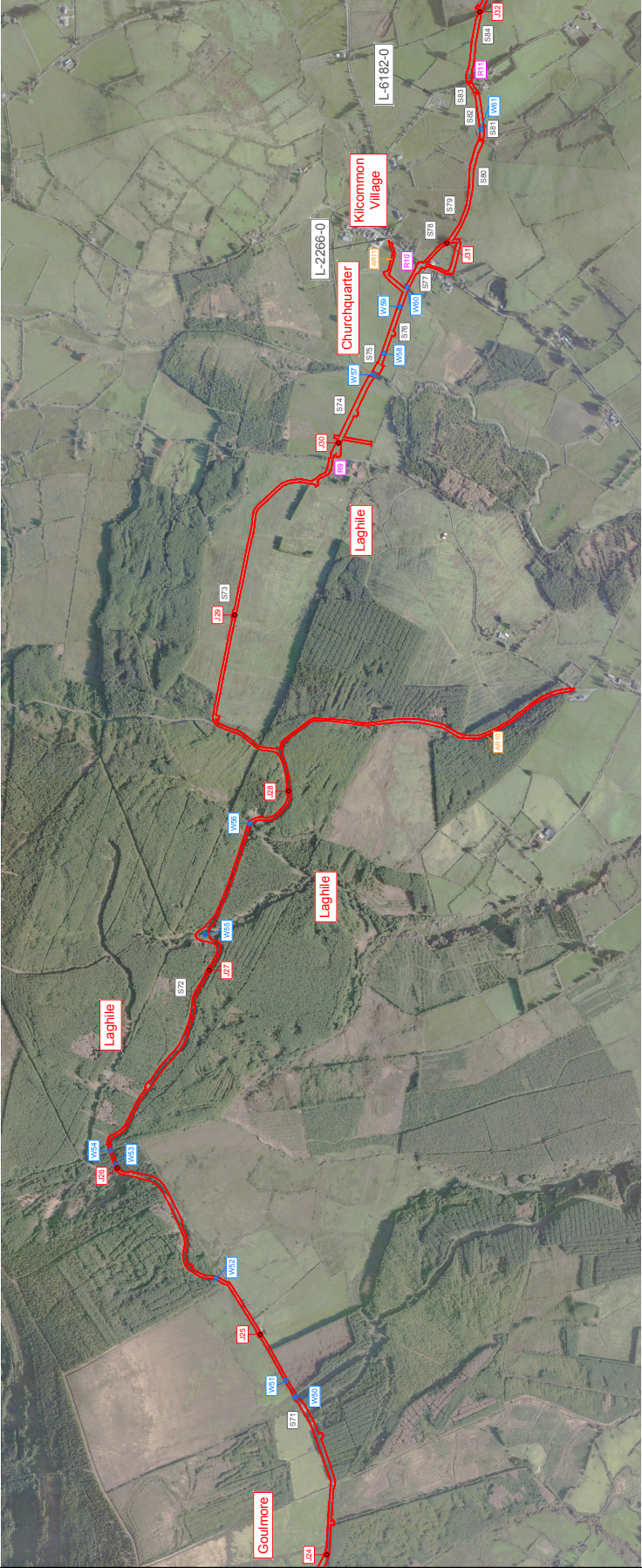
Project:
UWF Grid Connection (GC)

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Title:
Figure GC EMP 4

Location of the UWF Grid Connection
and the Other Elements of the Whole
UWF Project on OSI Mapping

Map Number:
Map 1 of 1

Legend:

Subject Development:

- UWF Grid Connection
- Mountphilips Substation

Other Elements of the Whole UWF Project:

- UWF Related Works
- Upperchurch Windfarm
- UWF Replacement Forestry
- UWF Other Activities



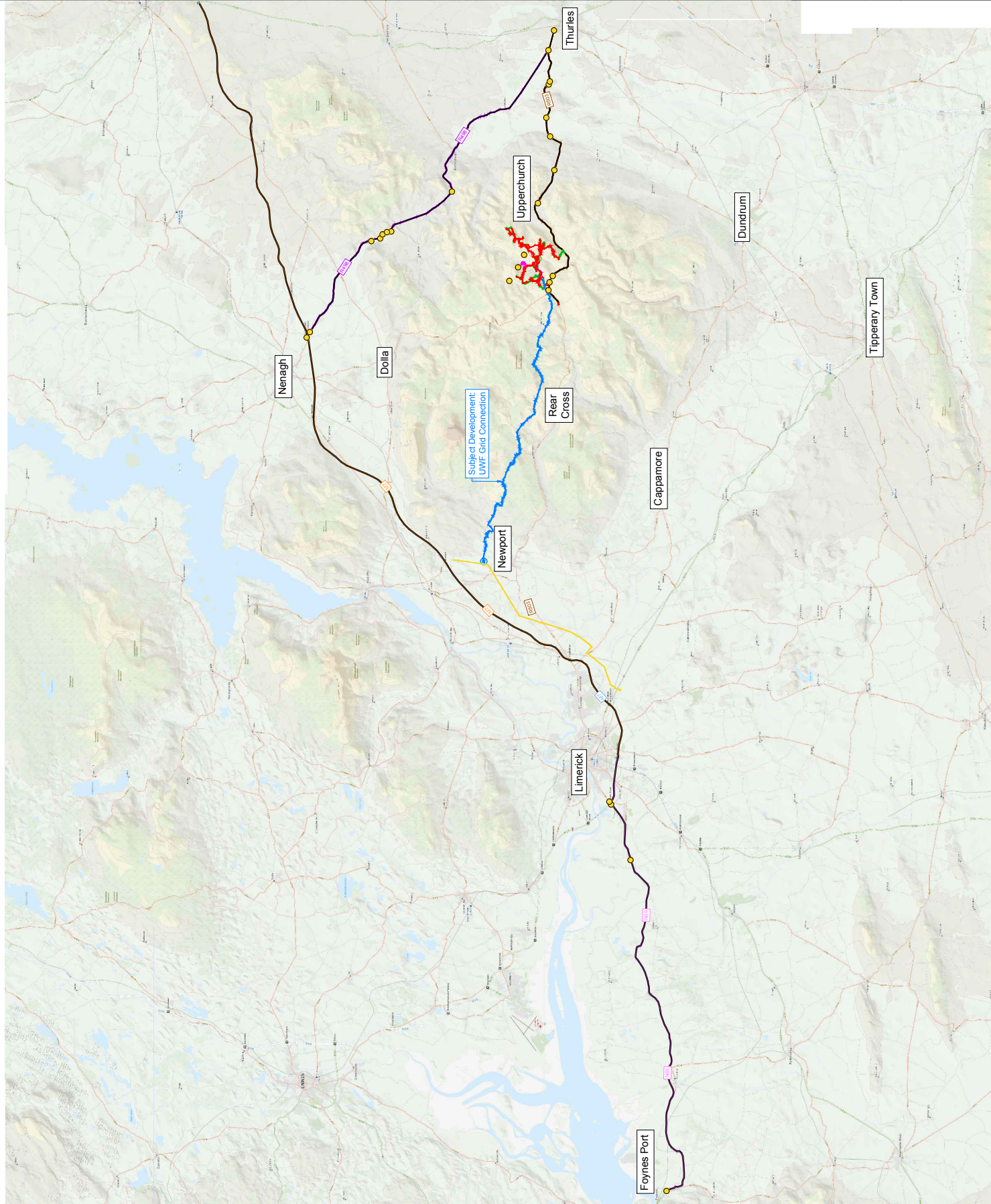
Project:
UWF Grid Connection (GC)

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Title:
Figure GC EMP 5

UWF Grid Connection and the Other
Elements of the Whole UWF Project in
the vicinity of Upperchurch Windfarm

Map Number:

Map Overview on OSI Mapping

Legend:

UWF Grid Connection: **(Subject Development)**

UWF Grid Connection

UWF Related Works:

Haul Route Works

Haul Route Works Numbers
(HW1 - HW13)

Realigned Windfarm Road

Realigned Windfarm Road Numbers
(RWR1 - RWR3)

Internal Windfarm Cabling

Telecom Relay Pole

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

Haul Route Activities Number

Upperchurch Hen Harrier Scheme

Regional Road Number



Project:

UWF Grid Connection (GC)

Drawn by:

AB

Checked by:

JB

Date:

28-Feb-18

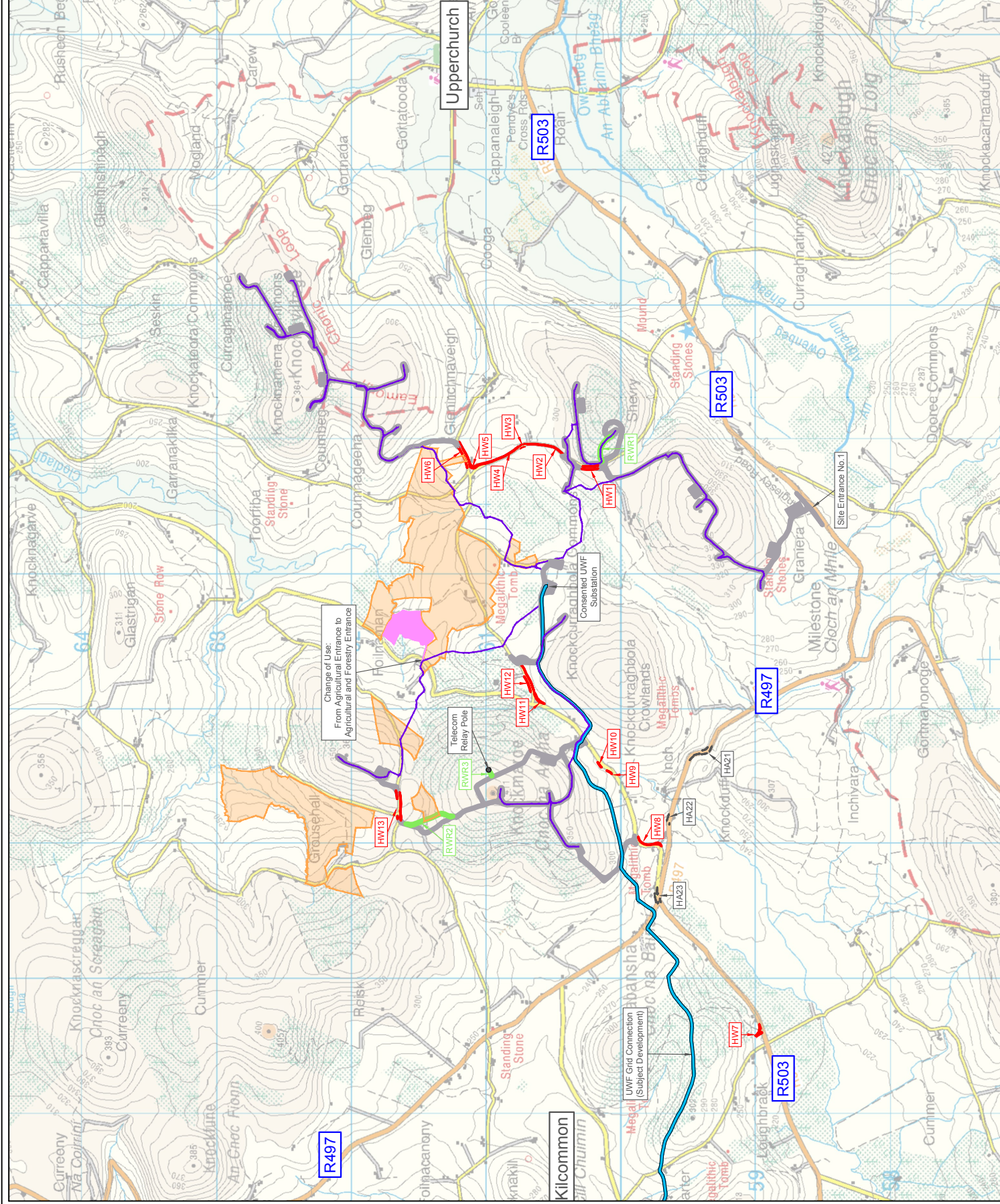
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Title:
Figure GC EMP 6

UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockmaroe, Knockurraghola Commons and Knockurraghola Crowlands

Map Number:

Map Overview on OSI Mapping

Legend:

UWF Grid Connection: (Subject Development)

- UWF Grid Connection
- New Permanent Access Roads
- New Permanent Road ID
- Existing Access Roads
- Existing Access Road ID
- Temporary Access Roads
- Temporary hedge/tree removal & pruning
- Joint Bay Locations
- Grid Connection Road Crossings
- Grid Connection Water Crossings
- Grid Connection Site Entrance
- UWF Related Works:
 - 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 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

Project:

UWF Grid Connection (GC)

Drawn by: AB

Checked by: JB

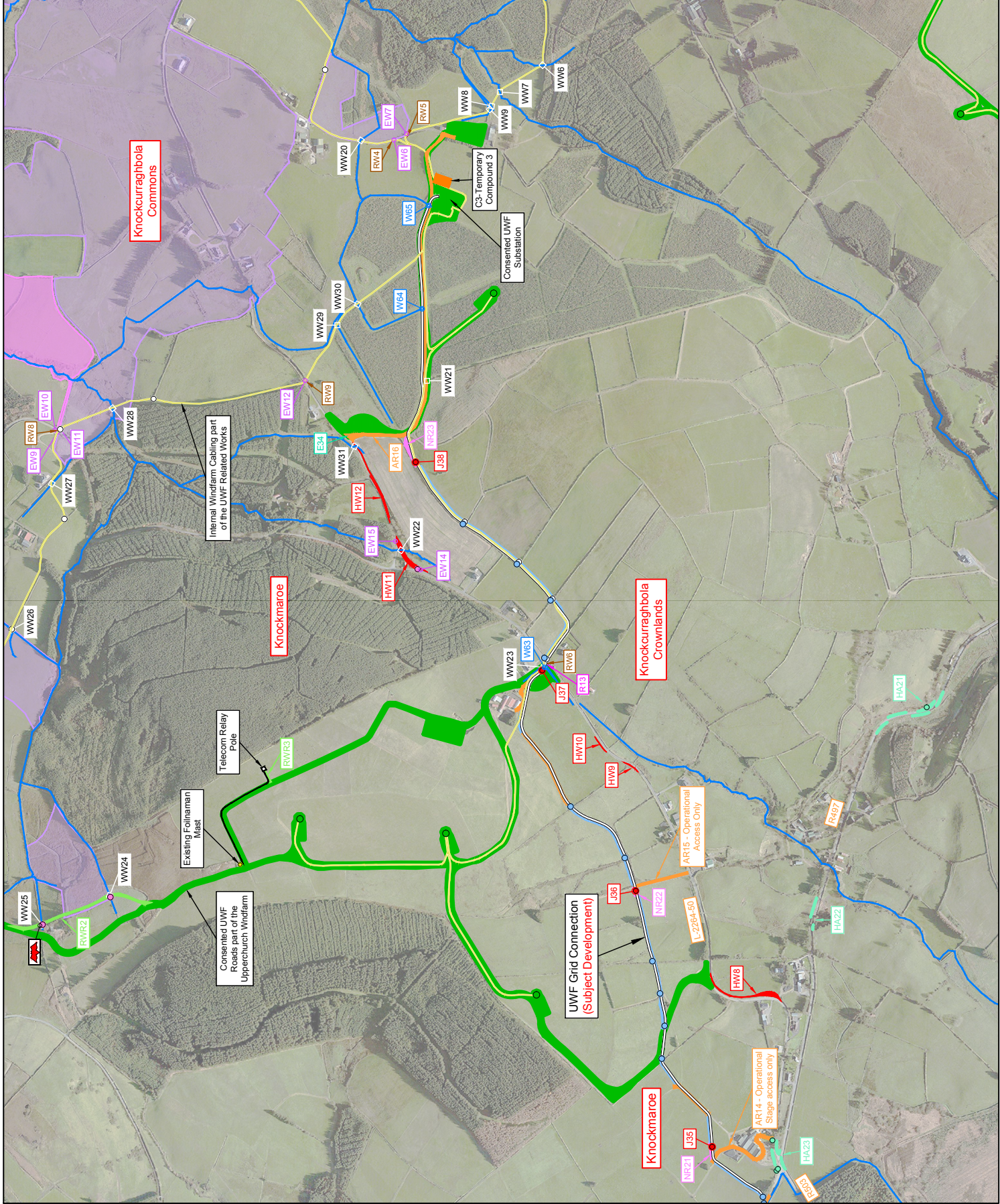
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UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 1 An Bord Pleanála Order including Planning Conditions

(post planning consent)



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UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

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



February 2018

UWF GRID CONNECTION

Tab 3 Traffic Management Plan



ECOPower

February 2018

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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 grid connection 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;
- at and on approach to the site access points for the 3 No. temporary compounds in the townlands of Mountphilips, Bealaclave and Knockcurraghbola Commons;
- at and on approach to the 25 No. temporary access points along the route of the 110kV Underground Cables between the new Mountphilips Substation and the consented UWF Substation;
- 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 the route where road repairs are required following completion of the works.

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 Grid Connection 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 Grid Connection. Operational traffic will involve a monthly site visit by ESB Personnel to the Mountphilips Substation, along with annual maintenance at the Substation. Along the route of the 110kV Underground Cables, a yearly inspection will be carried out by an ESB team who will travel along the route in a short vehicle – most likely a van. In total c.17 trips per year are expected for routine maintenance of the UWF Grid Connection. Very occasional maintenance or repair work may be required along the UWF Grid Connection route to replace a damaged cable section, 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 the Proposed Grid Connection

UWF Grid Connection, comprises the following elements:

- A new 110kV electrical substation at Mountphilips townland (to be called Mountphilips Substation)
- A new 110kV underground electrical cable connecting the Mountphilips Substation to the consented UWF substation (to be called Mountphilips – Upperchurch 110kV UGC or 110kV UGC)
- new roads on private lands (Grid Connection Access Roads), and
- ancillary works, which include permanent and temporary site entrances and temporary site compounds.

The layout of the Grid Connection is illustrated on **Figure TMP 1: Location of the Grid Connection on OSI Discovery Mapping**, which is included at the end of this plan.

The purpose of UWF Grid Connection is to connect the Consented UWF Substation at Upperchurch Windfarm (UWF) to the Mountphilips Substation at Mountphilips. Mountphilips Substation will be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line and thereby export electricity, from Upperchurch Windfarm when constructed and operational, to the national grid.

The characteristics of the UWF Grid Connection are described in more detail in the EIA Report, which accompanies the 2018 planning application to An Bord Pleanála for the UWF Grid Connection – see **Chapter 5: Description of Development (UWF Grid Connection)**, in Volume C2 Main EIA Report.

1.3 Overview of the Construction Stage of the UWF Grid Connection

1.3.1 Construction Process

The construction process for the UWF Grid Connection, is a relatively straightforward civil build. A number of separate dedicated 'crews' will work from each compound, each working on a different part of the UWF Grid Connection. The workers will arrive and depart daily to and from the relevant construction compounds, parking spaces will be provided at the site compounds. 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 compounds 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 main civil and electrical construction activities for the construction of Mountphilips Substation, 110kV UGC, UWF Grid Connection Access Roads, UWF Grid Connection Ancillary Works is approximately 6 to 8 months, and is projected to commence in 2018/2019.

The actual duration of works 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.
- All deliveries of construction materials that pass Kilcommon National School will be scheduled to take place outside of school drop-off/pick-up times - 9am to 9.30 am and 3pm to 3.30pm

1.3.4 Road Works Locations

Road works will be required along the 110kV UGC where the route crosses or is aligned along the public road network. There will be no joint bays along the public road corridor, and road works will be limited to the Cables Trench. In total there are 13 No. locations (labelled R1 to R13) where trenching will occur within the road corridor, as described in Table 1.

Table 1: Road Works associated with UWF Grid Connection

No.	Road No.	Location	Extent of trenching	Duration of Road Works	Traffic Management
R1	L2166-0	Coole / Freagh	7.5m	1 day	Road Crossing
R2	L2156-11	Oakhampton	170m	3 days	One lane closure
R3	L2157-5	Newross	5m	1 day	Road Crossing
R4	L6011-10	Castlewaller	4.5m	1 day	Road Crossing
R5	L95032-8	Killeen	65m	1 day	Road Crossing (end of cul-de-sac)
R6	L21141-0	Knockacullin	3.2m	1 day	Road Crossing
R7	L2114-0	Bealaclave	1270m	c.20 days	One lane closure
R8	L6085-0	Baurnadomeeny	130m	4 days	Road Closure
R9	L6086-5	Laghile	2.5m	1 day	Road Crossing
R10	L2266-0	Kilcommon	10m	1 day	Road Crossing
R11	L6182-0	Kilcommon	4.2m	1 day	Road Crossing
R12	R497	Knocknabansha / Knockmaroe	8.3m	1 day	Road Crossing
R13	L2264-50	Knockmaroe/ Knockcurraghbola Commons	7m	1 day	Road Crossing

Road Closure: It is expected that the L6085-0 in Baurnadomeeny will be closed for c.4 days to accommodate the trenching works. The closure will not be continuous throughout a given day, but will be timed by arrangement with the local residents (8 No.). In any case, works will take place during school holidays, and there will be a diversion for road traffic set –up for the duration of the works. Signage of this diversion will be in accordance with Chapter 8: Temporary Traffic Measures and Signs for Roadworks of the Department of Transport, Tourism and Sport Traffic Signs Manual, November 2015.

One lane closures: The works on the public roads L2156-11 at Oakhampton and the L2114-0 at Bealaclave, can be accommodated with one-lane closures. Traffic flow will be maintained using a stop/go system with flagmen.

Road Crossings: The remaining roadworks for the UWF Grid Connection relate to locations where the 110kV UGC crosses the road. Traffic flow will be maintained by placing a steel plate over the trench to allow traffic to pass over, while the works are on-going and flagmen will control a stop/go system.

Licences: All road closures will be subject to Road Closure application to Tipperary County Council. All 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.

1.3.5 Site Access Points

The requirement for permanent and temporary entrances for each element is outlined in Table 2 below.

Table 2: Permanent and Temporary Site Access points

Permanent Entrances	Temporary Entrances
L-2166-0: Site Compound C1 & Mountphilips Substation L-2114-0: Site Compound C2 L-6188-0: Site Compound C3	25 No. along the route of the Mountphilips to Upperchurch 110kV UGC

1.3.5.1 Temporary Construction Stage Compounds

3 No. temporary compounds will be set up during the construction stage to support the construction of the UWF Grid Connection. These compounds will be provided at the Mountphilips Substation location (Temporary Compound C1), approximately halfway along the Mountphilips – Upperchurch 110kV UGC (110kV UGC) at Bealaclave (Temporary Compound C2) and, adjacent to the Consented UWF Substation location in Knockcurraghbola Commons (Temporary Compound C3).

Temporary Compound C1 at Mountphilips will support both substation construction and 110kV UGC construction on the western end of the 110kV UGC route; Compound C2 at Bealaclave will support 110kV UGC construction along the middle section of the route; and Compound C3 at the consented UWF Substation and will support the construction of the 110kV UGC on the eastern end of the route.

1.3.5.2 Permanent Site Entrances

Three separate permanent site entrances will be provided through existing farm entrances. These entrances will provide access to the Mountphilips Substation and to the Temporary Compounds, as per

- A permanently widened entrance (Site Entrance E1) will be provided off the L2166-0, for the Mountphilips Substation and Temporary Compound C1, and
- As requested by Tipperary County Council Roads Department, a permanently widened entrance (Site Entrance E15), off the L2114-0, for Temporary Compound No.2 in Bealaclave
- As requested by Tipperary County Council Roads Department, a permanently widened entrance (Site Entrance E34), off the L6188-0, for Temporary Compound No.3 in Knockcurraghbola Commons.

For the construction stage, the three existing farm entrances will be widened to 10m, with a visibility splay of 160m provided at Site Entrances E1 and E15 and 90m at Site Entrance E34. The sightlines are based on the 85th percentile ambient traffic speed on the Local Road serving the access, as recorded during traffic count surveys. These sightlines will be provided through the partial removal of the roadside boundary and the pruning of any hedgerow or trees within the visibility splay. Any hedges or trees that are removed will be replaced with an equivalent length of hedge and/or number of trees which will be replanted behind the sight lines. Each entrance will be fenced with post and rail and an entrance gate will be installed set back 4.8m from the road edge.

Following the completion of construction works, the operational stage sightlines, at all three entrances, will satisfy the sightline requirements as set out in Table 10.1 of the North Tipperary County Development Plan 2010 (as amended), being reduced at Site Entrance E1 and Site Entrance E15 to 90m sightlines, and reduced to 70m at Site Entrance E34.

1.3.5.3 Temporary Site Entrances

To facilitate the installation of the Cable Trench and the delivery of materials to construction works areas from the public road network, a total of 25 No. temporary site entrances will be required. 20 No. of these will be through existing farm or forestry entrances, and the remaining 5 No. will comprise a new entrances through the roadside boundary.

Existing agricultural field entrances will be widened to 5m. Similarly, the 5 No. new entrances will involve the removal of 5m of the roadside boundary to gain access to construction works areas on the adjacent agricultural lands. No works are required at forestry entrances.

Flag-men will be used to control traffic at temporary entrances.

1.3.5.4 Road Cleaning

The public road at the permanent and temporary site entrances will be regularly cleaned by a road sweeping machine.

1.3.6 Construction Material Haulage Routes

The construction materials, which will be brought onto the Grid Connection site, are listed in Table 3 along details of the quantity and source of the materials.

Table 3: Quantities, type and source of construction materials

Materials	Quantity ¹	Source of Materials
Lean Mix Concrete	9,490m ³ / 1050 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone) ²	5,470m ³ / 455 No. loads	Shanballyedmond, Rear Cross
Hard core for temporary surface (public road sections)	700 m ³ / 59 No. loads	Clare
Surface dressing (public road sections)	1300 m ³ / 108 No. loads	Clare
Geotextile/GeoCell	10 No. loads	Cork
Control Building doors	1 load	Tullow, Co Carlow
Lattice towers (End Masts)	4 No. loads	Cork
Electrical cabling and plant	5 No. loads	EU
Switchgear	5 No. loads	EU
Reinforcing Steel	5 No. loads	Various Irish Suppliers
Communication cabling and equipment	2 No. loads	EU
General building materials	10 No. loads	Various Irish Suppliers
Joint bay chamber and cover	10 No. loads	Offaly
Communication chamber and cover	5 No. loads	Offaly
Link Box Chambers and cover	5 No. loads	Offaly
Earth Sheet Link Boxes and connections	5 No. loads	UK
Duct jointing collars and draw ropes	5 No. Loads	Cork
Profiles for ducting and chambers	5 No. Loads	Cork

¹ Based on use of stone on all temporary access roads

Materials	Quantity ¹	Source of Materials
HDPE Ducting	20 No. loads	Cork
HDPE Comms Ducting	14 No. loads	Cork
110kV electrical cable	26 No. loads	Cork
Fibre Optic communication cables	5 No. loads	Cork
Red cable protection strip	1 No. loads	Cork
Yellow warning tape	1 No. loads	Cork
Steel protection plate	1 No. loads (if required)	Birr, Co Offaly
Marker posts and plates	1 No. load	Dundrum, Co Dublin
Hedging and tree species	1 No. load	Dundrum, Co Tipperary
Fencing materials, posts, rails, wire	1 No. load	Arrabawn Co-Op, Reiska

1.3.6.1 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

1.3.6.2 Material and Delivery Traffic Haulage Route

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

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, using the haul routes specified in **Figure TMP 2: Haul Routes for Aggregate and Concrete Deliveries (Overview Map & Map 1)**, which is included at the end of this plan.

Other Construction Material

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Temporary Compounds via the national and regional road network as identified on **Figure TMP 3: Haul Route for Other Construction Materials & Equipment**, which is included at the end of this plan.

This material will be stored at the Temporary Compounds until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, cable protection strip, warning tape, duct jointing collars etc. to each active works area, using the haul routes specified in **Figure TMP 2**.

Table 4: Construction traffic volumes on the local road network

Road ID	Entrance ID	Flagmen or Sightlines Provided	85% ile Traffic Design Speed Km/Hr	24Hr 2-Way AADT (PCUs)	% HGVs	AM Peak Hr 2-Way Flow (PCUS)	PM Peak Hr 2-Way Flow (PCUS)	UWF Grid Connection			
								24Hr 2-Way AADT (PCUs)	AM Peak Hr Flow (PCUS)	2-Way (PCUS)	PM Peak Hr 2-Way Flow (PCUS)
L-2166-0	E1 & E2	Sightlines at E1 Flagmen at E2	87	665	0.46	69	63	67	18		18
L-2156-11	E4 & E5	Flagmen	92	941	0	77	80	8	1		1
L-2157-5	E6 & E7	Flagmen	58	442	0.7	36	44	8	1		1
L-6011-10	E8 & E9	Flagmen	70	92	0	12	13	8	1		1
L-51853-0	N/A	Flagmen	67	1795	0.17	161	162	16	2		2
L-2157-0	N/A	Flagmen	70	850	0.5	80	67	16	2		2
L-6011-0	N/A	Flagmen	76	358	0	28	30	16	2		2
L-95032-8	E10	Flagmen	42	48	0	2	1	8	1		1
L-21141-0	E11, E12 & E13	Flagmen	41	30	0	0	4	8	1		1
L-2114-0	E14, E15 & E16	Flagmen - E11/E12 Sightlines at E15	73	166	5	10	11	28	8		8
L-6085-0	E18 & E19	Flagmen	45	60	0	8	9	8	1		1
L-6086-5	E22, E23 & E24	Flagmen	36	47	0	5	4	8	1		1
L-2266-0	E25, E26 & E27	Flagmen	60	305	0	13	26	8	1		1
L-6182-0	E28 & E29	Flagmen	57	42	0	4	3	8	1		1
L-2266-11	N/A	Flagmen	74	358	0	16	17	8	1		1
L-497	E30	Flagmen	57	535	0.6	34	43	8	1		1
L-2264-50	E33	Flagmen	76	211	1.5	14	19	28	8		8
L-6188-0	E34	Sightlines	49	63	0	2	8	28	8		8

1.3.7 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. 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 access points on the local road network, and on the local road network from the junction of the R497 with the L2266-11 road. 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 Grid Connection 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 TMP 2: Haul Routes for Aggregate and Concrete Deliveries \(Overview Map & Map 1\)](#).

The hazards are

- Higher volume of traffic
- Deliveries of construction materials
- Access and egress at the 3 No. permanent site entrances and the 25 No. temporary site entrances
- Spoil and dust deposited on the public road
- Diversion of local traffic due to road closure at Baurnadomeeny.

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.

Information Signs

Three information sign will be installed, one at each at the three 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.

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 materials deliveries to the Mountphilips substation works will have clear directional signs from Newport to the site. The haul routes for construction material deliveries to the grid connection works will have clear directional signs and this signage will be relocated to indicate the location of the grid connection works as the works progress along the grid connection route.

Warning Signage

Advance warning signage will be erected on both 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 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 Grid Connection 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-37) which is included below. The control measures identified will be implemented during the construction of the UWF Grid Connection.

Traffic Management Measures				
Title:	Traffic Management Measures		Ref:	BPM-32
Environmental Commitment				
Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.				
Responsibilities				
Project Manager	<ul style="list-style-type: none">Consult with Tipperary County CouncilConsult with GardaíContractor arrangements regarding speed limits, alert beacons, haulage routes etc.Oversee the implementation of the Traffic Management Plan			
Design Engineer	<ul style="list-style-type: none">Design sight lines at 3 no. permanent entrances.Design adequate drainage at permanent site entrances			
Construction Manager	<ul style="list-style-type: none">Install information, direction and warning signage in advance of road works, site entrances and along haul routesImplement the Traffic Management Plan			
Environmental Clerk of Works	<ul style="list-style-type: none">Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures			
Community Liaison Officer	<ul style="list-style-type: none">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				
<ul style="list-style-type: none">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 each at the site entrances to the Temporary Compounds C1, C2 and C3. These signs 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 materials deliveries to the Mountphilips substation works will have clear directional signs from Newport to the site. The haul routes for construction material deliveries to the UWF Grid Connection works will have clear directional signage from the R503 to the temporary site access points, and this signage will be relocated to indicate the location of the UWF Grid Connection works as the works progress along the grid connection route.				

- 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 or concrete to works areas or delivering other materials to the temporary compounds or Mountphilips Substation 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 Temporary Compounds and the temporary site access points.
- There will be onsite parking for all construction personnel at the main compounds.
- 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 permanent site entrances for C1 and C3/

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 be used to organise through traffic in the event of the public carriageway being temporarily obstructed.
- At Baurnadomeeny, the road closure will take place during school holidays. All local residents and landowners will be informed of construction works in advance. The Community Liaison Officer will keep in touch with the local residents before, during and after the road works at Baurnadomeeny.
- 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 Related Works 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 entrances for the 3 No. Temporary Compounds 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 Grid Connection 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 access points on the local road network, and on the local road network from the junction of the R497 with the L2266-11 road. 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 3 No. permanent entrances for the temporary compounds and in the 3 No. 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
- The PSCS will notify all other construction traffic in the area of the incident and
- The PSCS 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 TMP 1

**Location of the UWF Grid Connection
on OSI Discovery Mapping**

Map Number:
Overview Map on OSI Discovery Mapping

Legend:

- UWF Grid Connection
- Mounthphillips Substation
- Consented UWF Substation
- ★ Temporary Compound



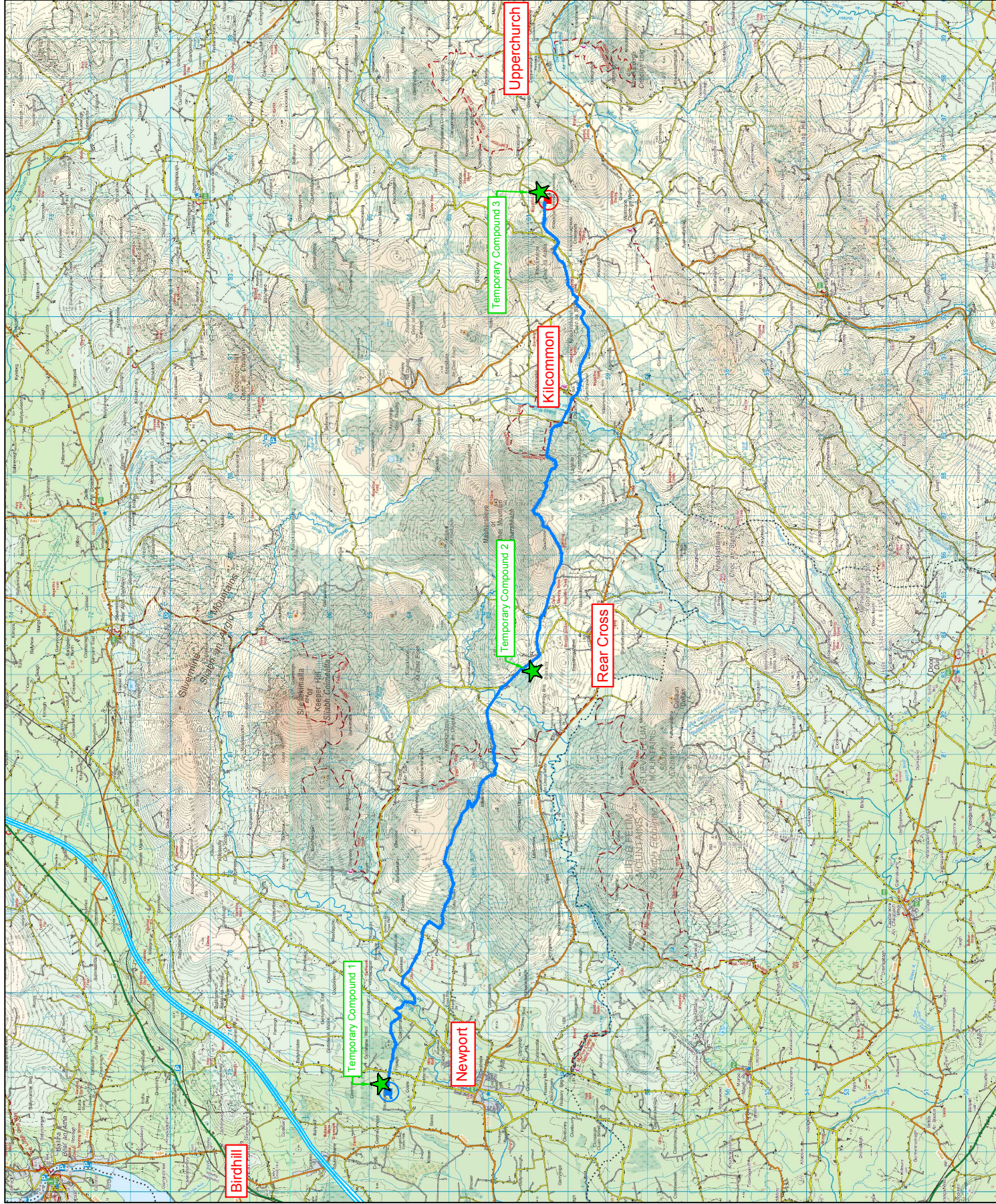
Project:

UWF Grid Connection (GC)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	12-Mar-18	A4



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TEL: +353 56 7730740
AICB: 13513 080644



Title:
Figure TMP 2

**Haul Routes for Aggregate and
Concrete Deliveries
(Overview Map & Map 1)**

Map Number:
Map 1 of 1

Legend:

- UWF Grid Connection
- Regional Road R503
- Haul Route from Local Quarries to the R503
- ★ Temporary Compound
- Haul Route to Temporary Compounds from the R503 along local roads
- L-264-3 Local Road Numbers
- Access Road

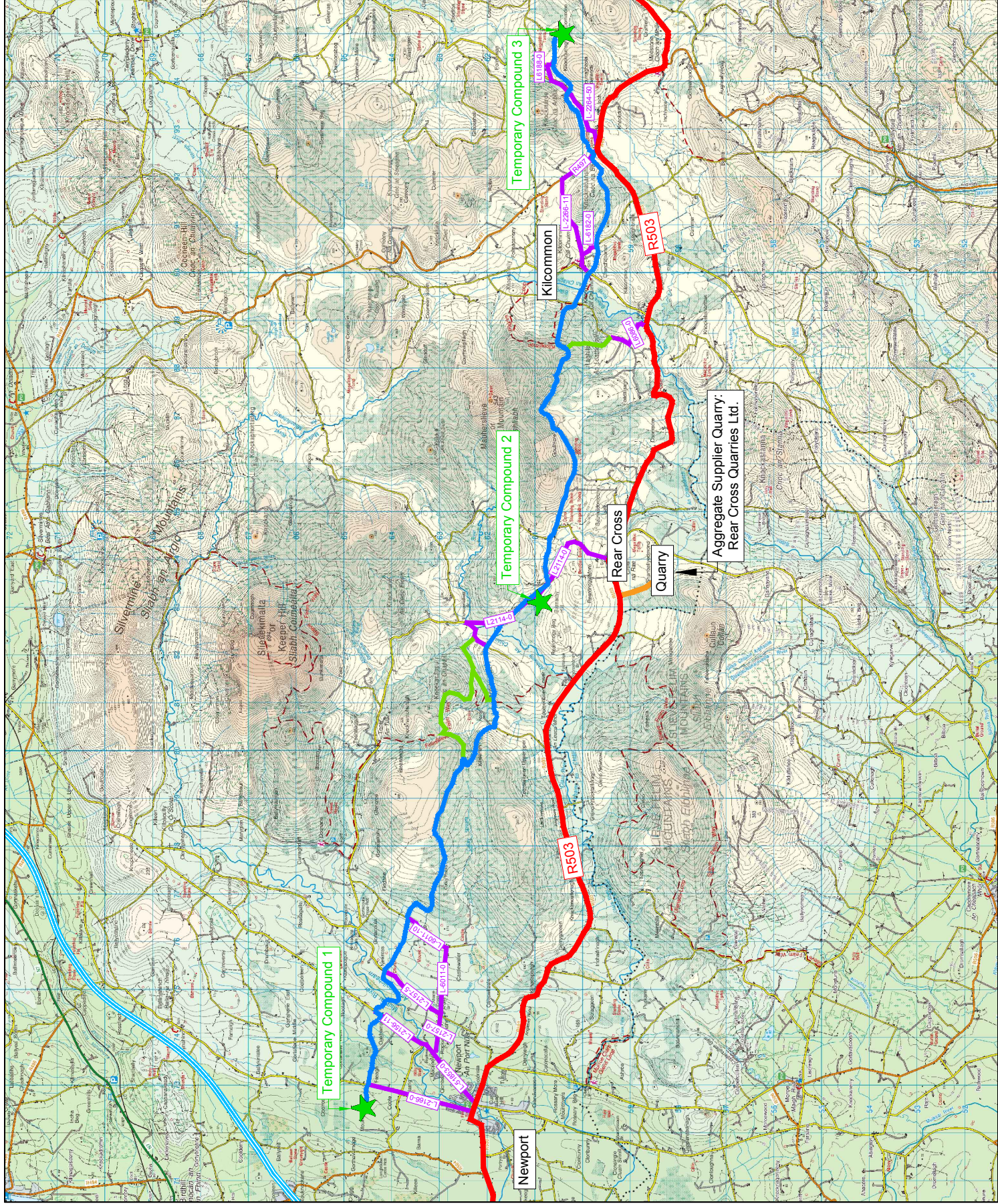


Project:
UWF Grid Connection (GC)

Drawn by:	Checked by:	Date:	Sheet Size:
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WK 001



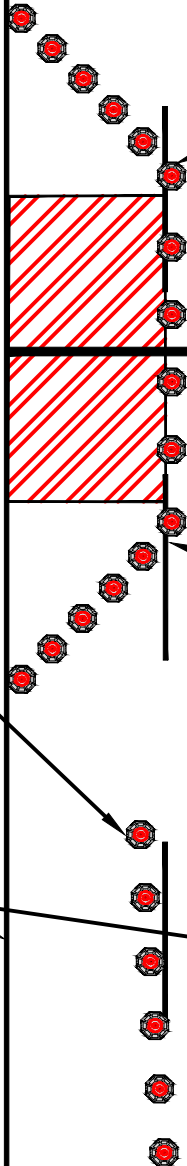
Crioch
END

P 010

direction of travel



20m From End Of Works



Traffic cone spacings
and tapers to be set-out
in accordance with the
DoT TSM

Carraigeway edges

WK 061



WK 061



WK 001



~25m

~25m

Figure Figure TMP 4
**Advance Warning Signage for Road
Works & Site Entrances**

Designed in conjunction with



Note: This drawing is not to scale

*Department of Transport Traffic Signs Manual
(DoT TSM)*

Project:
UWF Grid Connection (GC)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	12-Mar-18	A4

UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 4 Surface Water Quality Management Plan



ECOPOWER

February 2018

UWF GRID CONNECTION, 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 GRID CONNECTION –CONSTRUCTION PHASE SURFACE WATER MANAGEMENT PLAN
ISSUE DATE:	23RD 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
<p>Disclaimer: <i>This report has been prepared by HES with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.</i></p>	

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FIGURES

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FIGURE SWMP 6	SURFACE WATER QUALITY MONITORING LOCATIONS – MAP 2

FIGURES (IN TEXT)

FIGURE A	SITE LOCATION MAP
FIGURE B	OPW FLOOD HAZARD MAP

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TABLE A	A SUMMARY OF WATERCOURSE CROSSINGS ALONG THE 110KV UGC
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TABLE C	WATER RELATED PROJECT DESIGN MEASURES
TABLE D	WATER RELATED BEST PRACTICE MEASURES
TABLE E	PARAMETER SUITE FOR SURFACE WATER QUALITY MONITORING

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APPENDIX I	WATER RELATED BEST PRACTICE MEASURES
------------	--------------------------------------

1. INTRODUCTION

1.1 BACKGROUND

This document presents a Surface Water Management Plan and pollution prevention measures which will be implemented during the construction of the UWF Grid Connection, Co. Tipperary. The location of the UWF Grid Connection is shown on **Figure A** below.

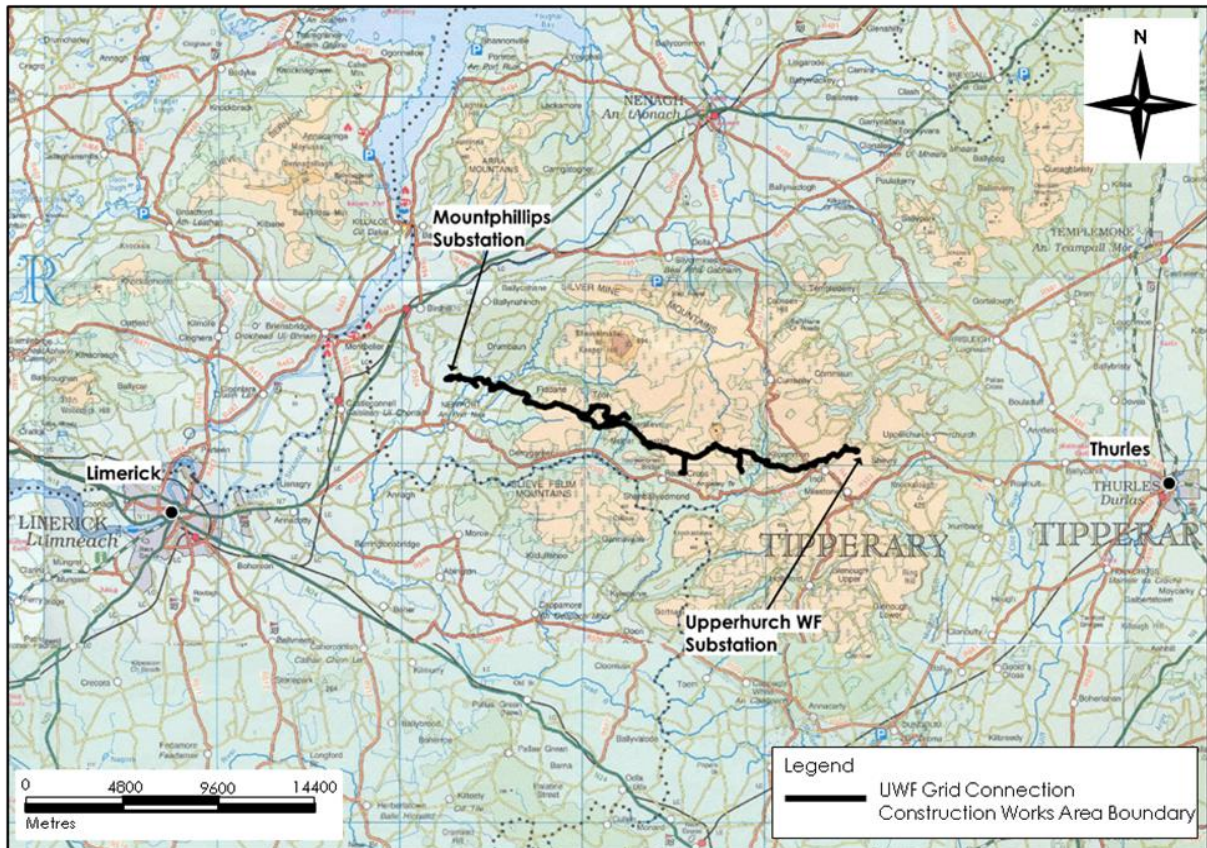


Figure A: Site Location Map

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) submitted 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 along the route, and then sets out the proposed measures required for surface water management during the construction of the UWF Grid Connection.

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 Grid Connection was developed by Hydro-Environmental Services.

1.2 DEVELOPMENT DESCRIPTION

The UWF Grid Connection comprises the following main proposed elements:

- Mountphilips Substation near Newport, Co. Tipperary
- Mountphilips – Upperchurch 110kV Underground Cables (110kV UGC) – 27.5km
- Grid Connection Temporary Access Roads (9.3km) and Permanent Access Roads (4.4km); and,
- Ancillary Grid Connection Works

The project comprises a 110kV substation at Mountphilips near Newport, the Mountphilips – Upperchurch 110kV Underground Grid Connection (27.5km), UWF Grid Connection Access Roads and Ancillary Grid Connection Works such as watercourse crossings.

The Mountphilips Substation is proposed for a location 150m east of the existing Killonan - Nenagh 110kV line in agricultural grassland in Mountphilips townland, 2km north of Newport, Co. Tipperary which is approximately 23km west of Upperchurch Windfarm at Upperchurch (also in Co. Tipperary).

The 110kV UGC will connect the Mountphilips Substation to the Consented UWF Substation, through the installation of underground cables. The route of the underground cables, which is c.27.5km in length, will follow a generally west/east course through a mix of agricultural grassland, commercial forestry plantations, private roads (c.12km) and public roads (c.1.7km). There are 65 no. watercourse crossings along the direct cable route of the 110kV UGC. The cable will either be placed under these watercourses (by open trench or directional drilling) or over/under or within existing structures.

The watercourses intersected range from drains / small headwater streams to larger rivers such as the Newport (Mulkear) River, Bilboa River and Clare River.

To facilitate construction and operational access to the Mountphilips Substation and to joint bays along the the Mountphilips – Upperchurch 110kV UGC, a new permanent access road will be constructed at Coole/Mountphilips, and new access road will also be constructed at various other locations along the route of the 110kV UGC. These permanent access roads will be used to access the Mountphilips Substation and the joint bays (~38 no.) during the operational stage for inspection and maintenance purposes.

UWF Grid Connection Access Roads also include the use of existing farm and forestry roads, these roads will be upgraded during or immediately after construction works. Ancillary grid connection works infrastructure also includes temporary access roads and temporary compounds.

In addition, there will also be a requirement to construct 12 no. permanent watercourse crossing structures (culvert/bridge) along the grid cable route to allow access during the construction and operational phases

1.3 SITE DESCRIPTION AND TOPOGRAPHY

The Mountphilips Substation is located in the townland of Mountphilips which exists approximately 2km to the north of Newport Town in Co. Tipperary. The site is located on a low-lying, north-south trending ridge with the slope of the site being to the west/southwest. The current land use is grassland. The elevation of the site is at approximately 70m OD.

The UWF Grid connection runs in an easterly direction from the substation site and crosses over the southern hills of the Silvermine Mountains towards the consented UWF Substation. The straight line distance between the Mountphilips substation and the UWF Substation is ~23km while the actual length of the cable route is ~27.5km. The topography along the majority of the cable route is hilly with an overall elevation range of between 70 and 310m OD (Ordnance Datum). The 110kV UGC cable route follows a mix of agricultural grassland, commercial forestry plantations, private roads (c.12km) and public roads (c.1.7km). The route within grassland areas is typically off-road whereas within forestry it is typically along/below the existing forestry tracks.

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 UWF Grid Connection project to mitigate against any water related environmental impacts. The Project Design Environmental Protection 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 RELAVANT LEGISLATION & GUIDANCE

It is proposed that all surface water control measures relating to the UWF Grid Connection 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 UWF Grid Connection 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 route is assessed in Chapter 10 (Soils) and Chapter 11 (Water) of the EIAR (Ecopower Developments Ltd, 2018) for the UWF Grid Connection. 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 Grid Connection comprises mainly mineral or organic topsoil over glacial tills with very minor sections of blanket bog along off-road forestry sections. Alluvium and fluvio-glacial sand and gravels are present at the proposed larger watercourse crossings (Bilboa River, Clare River and Newport (Mulkear) River) which are intercepted by the grid connection route.

The underlying bedrock along the UWF Grid Connection comprises sandstone, limestone and Silurian meta-sediments with the latter been most predominant.

2.1.2 Existing Hydrogeological Regime

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

Within the Slieve Phelim GWB, the construction works areas are underlain by both Poor Bedrock Aquifers and Locally Important Aquifers with the former being more dominant. Within the Templemore A GWB, the construction works areas are completely underlain by Poor Bedrock Aquifers.

In general, the groundwater flow regime of both bedrock types is typically poorly productive. These bedrock aquifers generally have no inter-granular permeability. Groundwater flows within fractures and faults are more likely to occur within the Locally Important Aquifers rather than the Poor Aquifers.

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 Grid Connection is located within the River Shannon (Shannon River Basin District) and the River Suir (South Eastern River Basin District) surface water catchments. Approximately 26.3km of the 27.5km 110kv UGC route (including the Mountphilips Substation) is located in the River Shannon catchment while the remainder (1.2km) is located within the River Suir catchment.

Within the River Shannon catchment, the 110kV UGC route and the Mountphilips Substation site exist within the regional Mulkear River catchment. The local surface water bodies within the Mulkear River catchment that the UWF Grid Connection passes through (list from west to east) include the Newport (Mulkear) River (also referred to as the Mulkear), Small River, Clare River (also referred to as the Annagh River) and 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 route of the 110kV UGC (1.2km of the total 27.5km), exists within the Clodiagh River local surface water body.

As stated above, the route of the 110kV UGC crosses 65 no. watercourses and the number of crossings within each sub-catchment is also shown in **Table A** below.

Table A: Summary of Watercourse Crossings along the 110kv UGC

Regional Catchment	Sub-catchment ¹	Length of Route (km)	No. Watercourse Crossings
Mulkear (Shannon)	Newport River ²	3.7	10
	Small River	5	13
	Clare River	7.2	26
	Bilboa River	10.4	14
Clodiagh (Suir)	Clodiagh River	1.2	2

¹ Catchments are listed from west to east along the 110kV UGC route from the Mountphilips Substation to the Consented UWF Substation

² Also referred to as the Mulkear River

2.1.4 Local Drainage Features

A detailed survey of all watercourse crossings along the UWF Grid Connection 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 majority of the UWF Grid Connection, many of the watercourses in proximity of the works area are small headwater streams or drains. A summary of the watercourse types intercepted by the UWF Grid Connection are shown in **Table B** below. The locations of the watercourse crossings are shown on **Figure SWMP 2** to **Figure SWMP 4** attached.

Most of the larger watercourse crossings along the UWF Grid Connection are located at the lower-lying agricultural land on the west of the route (Sections S1 – S36), or at the bottom of the main valleys within the local surface water bodies.

The main watercourse crossings along the UWF Grid Connection include the Newport (Mulkear) River, Clare River and the Bilboa River. However, no above ground permanent infrastructure is required at these crossing locations.

With the exception of the Newport (Mulkear) River, the Clare River, and the Bilboa River crossing locations (floodplains), there was no evidence of past significant flood events at any other water crossing location.

Due to the elevated nature of the related works area, the watercourse crossings comprise mainly drains along with several headwater streams (1st – 2nd order).

Table B: Watercourse Crossing Types along the 110kv UGC

Type	Watercourse Description	Total No.
1	EPA mapped blue line, major river or stream	14
2	Headwater Stream, equivalent to EPA blue line but not mapped	10
3	Ephemeral watercourse, heavily vegetated with low or no flow during dry periods	5
4	Manmade Drain	37
	Total	66

2.1.5 Flood Risk Assessment

The OPW Indicative Flood Maps have no records of recurring flood incidences along the UWF Grid Connection, UWF Related Works or UWF Replacement Forestry areas or immediately downstream of them (**Figure B** below refers). The closest mapped recurring flooding event is mapped approximately 1km west of the Mountphilips Substation site. There are no works relating to the UWF Grid Connection upstream or downstream of this mapped flood location.

There are further afield recurring flood incidences mapped to the south (>3km downstream) of the 110kV UGC route along the Newport (Mulkear) River channel.



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 Grid Connection and therefore the PFRA mapping was consulted.

The OPW PFRA mapping relevant for the UWF Grid Connection include Maps no. 148, 149, and 150 (www.cfram.ie/pfra/interactive-mapping/). The PFRA mapping indicates that fluvial

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.

flooding along the 110kV UGC route is relatively localised to the larger stream and river crossing locations, namely; crossing locations W7, W8, W10 (Newport (Mulkear) River), W11, W32, W36 (Clare River) and W57 (Bilboa River) which are all mapped to be within the 100-year flood zone (Flood Zone A).

Access to the above mentioned crossing locations will only be required during the construction phase and this will be facilitated by temporary access roads (i.e. there are no joint bays located within the mapped flood zones associated with the aforementioned watercourse crossing locations).

There are 38 no. joint bays (and their communication and link box chambers) located along the 110kV UGC and none of the joint bay locations or their associated permanent access roads are located within a mapped fluvial flood zone. The Mountphilips Substation site is also not located within a mapped fluvial flood zone.

There are no significant mapped pluvial flood zones along the route of the 110kV UGC. Due to the elevated and hilly nature of the topography in the area of the 110kV UGC no significant pluvial flooding is anticipated. None of the joint bays or their permanent access roads are located within a mapped pluvial flood zone.

The UWF Grid Connection largely involves the installation of underground cables for the UWF Grid Connection. 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.

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 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.

The majority of the UWF Grid Connection (26.3km of the total 27.5km) is located within the River Shannon surface water catchment. The River Shannon downstream of the grid connection route is a designated SAC (i.e. Lower River Shannon SAC). The UWF Grid Connection is located within the SAC boundary at three locations; where the 110kV cable crosses the Newport (Mulkear) River (Watercourse Crossing W10) and the Bilboa River (Watercourse Crossing W57). Horizontal directional drilling will be undertaken at the two river crossing locations to avoid direct impacts on the watercourse/SAC).

The third location relates to a ~70m section of the UWG Grid Connection is routed along an existing farm track on the western side of the Newport (Mulkear) River as the route approaches the western river bank. The farm track runs within 50m of the Newport (Mulkear) River channel at this location.

In total, within the River Shannon catchment there are 64 no. (of 66 no.) watercourse crossings (inclusive of the Newport (Mulkear) River and Bilboa River crossings) along the UWF Grid Connection 110kV UGC route. The majority (~62%) of the watercourse crossings are at least 4km upstream of the Lower River Shannon SAC, with ~41% being more than 9km upstream of the SAC.

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 Whole UWF Project, 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 last ~1.2km of the 110kV UGC route is located within the Clodiagh River local surface water body. The UWF Grid Connection construction works are located at least 12km upstream of the River Suir SAC.

Clare Glen SAC is located approximately 10km downstream of the UWF Grid Connection 110kV UGC route within the Clare River catchment. The qualifying interests, which includes Old Oak Woodlands and Killarney Fern, are terrestrial based on therefore no hydrological impacts are anticipated from the proposed development.

Bleanbeg Bog NHA is a 1.3km² area of upland blanket bog that is located approximately 7km east of Newport, Co. Tipperary. A section of the UWF Grid Connection (Section S38) intersects the NHA for approximately 140m at the extreme south-western corner of the NHA. The route of the 110kV UGC inside the NHA is along an existing forestry track which runs along the NHA boundary and immediately downslope of the bog cutaway face. Therefore, any runoff from the construction works areas will flow in a southerly direction into the forestry and away from the bog.

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 Measures

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

Table C: Water Related Project Design Environmental Protection 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.
PD47	All Joint Bays will be located at least 25m from a Class 1 or Class 2 watercourse, with 35 no. of the total 38 no. located greater than 50m from a Class 1 or Class 2 watercourse.
PD50	<u>Lower River Shannon SAC:</u> There will be no storage of overburden within the Lower River Shannon SAC
PD51	<u>Lower River Shannon SAC:</u> All excavated material will be removed for temporary or permanent storage at a suitable location more than 100m away from the Newport (Mulkear) River, Clare River and Bilboa River.
PD52	<u>Lower River Shannon SAC:</u> No in-streams works are proposed at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC)

	and therefore there will be no placement of cement within the river channels. The 110kV UGC will be installed by horizontal directional drilling technique.
PD53	<u>Lower River Shannon SAC:</u> All runoff from the construction works areas associated with the horizontal directional drilling works at the Newport (Mulkear) River and Bilboa River (which are located within the Lower River Shannon SAC) and at the Clare River (which is located upstream of the SAC), will be directed into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site.
PD54	<u>Lower River Shannon SAC:</u> At the Newport (Mulkear) and Bilboa River crossings, drilling activities will be carried out at least 15m from the Lower River Shannon SAC boundary. Double silt fencing will be set up between the drilling rig and the SAC boundary – the 1st silt fence close to the rig and the 2nd silt fence close to the SAC boundary. No works or activities will be conducted on the SAC side of these fences. For the Clare River (which is not in an SAC) drilling activities will be carried out at least 15m away from the river bank. Double silt fencing will be set up as before and no works or activities will be conducted on the river side of these fences.
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. This is described in more detail in Section 3.1.3 below
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
PD53	<u>Lower River Shannon SAC:</u> All runoff from the construction works areas associated with the horizontal directional drilling works at the Newport (Mulkear) River and Bilboa River (which are located within the Lower River Shannon SAC) and at the Clare River (which is located upstream of the SAC), will be directed into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site.
PD55	<u>Lower River Shannon SAC:</u> Drilling fluid returns will be contained within a sealed tank / sump, and pumped onto a skip for removal off-site to an appropriately licenced facility.
PD57	<u>Lower River Shannon SAC:</u> There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Lower River Shannon SAC.
PD58	<u>Lower River Shannon SAC:</u> There will be no storage of fuels within 100m of the Newport (Mulkear) River, Clare River or Bilboa River.
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.
PD48	Only precast concrete chambers will be used at joint bays 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 in Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD46	Mountphilips Substation 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.
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.
PD45	At Mountphilips Substation, water for welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD49	<u>Lower River Shannon SAC:</u> The route of the 110kV UGC is located along an existing farm track within the SAC boundary. Construction works will be confined to the existing track within the SAC boundary.

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, but this will also apply to the Newport (Mulkear) River, Bilboa River and Clare River directional drilling works).

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 Environmental Protection Measures

BPM No.	Best Practice Measure Title
GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
GC-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works
GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.

The Best Practice Measures for the UWF Grid Connection are included in full in Tab-7 of the Environmental Management Plan.

3.3 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 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

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. 16 in total) within the local surface water bodies (i.e. Newport River, Small River, Clare River, Bilboa River and Clodiagh River) are shown on **Figure SWMP 5** and **Figure SWMP 6**.

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

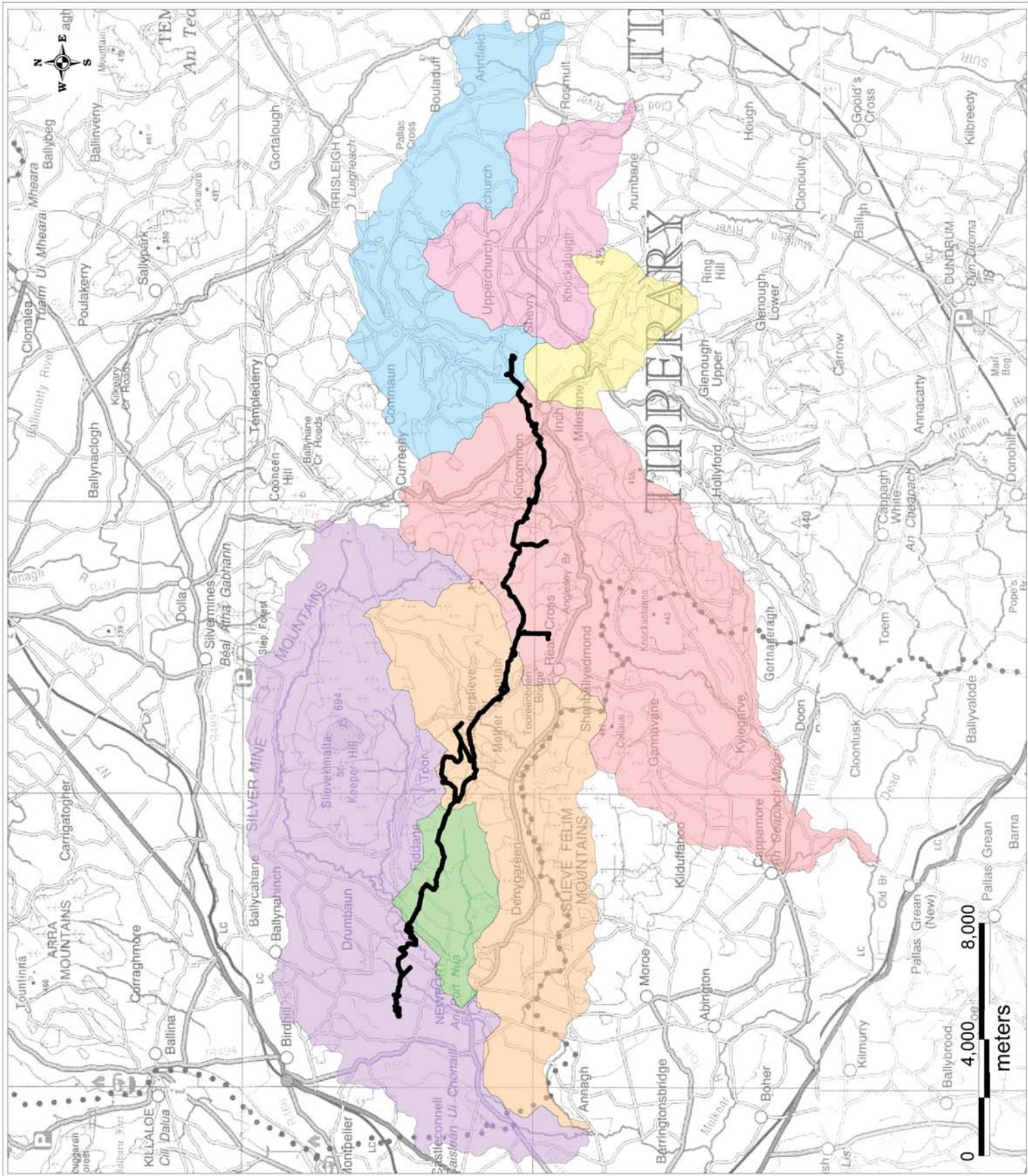
Results of water quality monitoring shall assist in determining requirements for improvements in drainage and pollution prevention measures implemented on site.

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



- Legend**
- UWF Grid Connection
 - Construction Works Area Boundary
 - Owenbeg River
 - Turraheen River
 - Small River
 - Newport (Mulkear) River
 - Clodagh River Local
 - Clare (Annagh) River
 - Bilboa River



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Client: Ecopower Development Ltd.

Job: Upperchurch WF Grid Connection

Title: Local Hydrology Map

Figure No: Figure SWMP 1

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

Sheet Size: A3

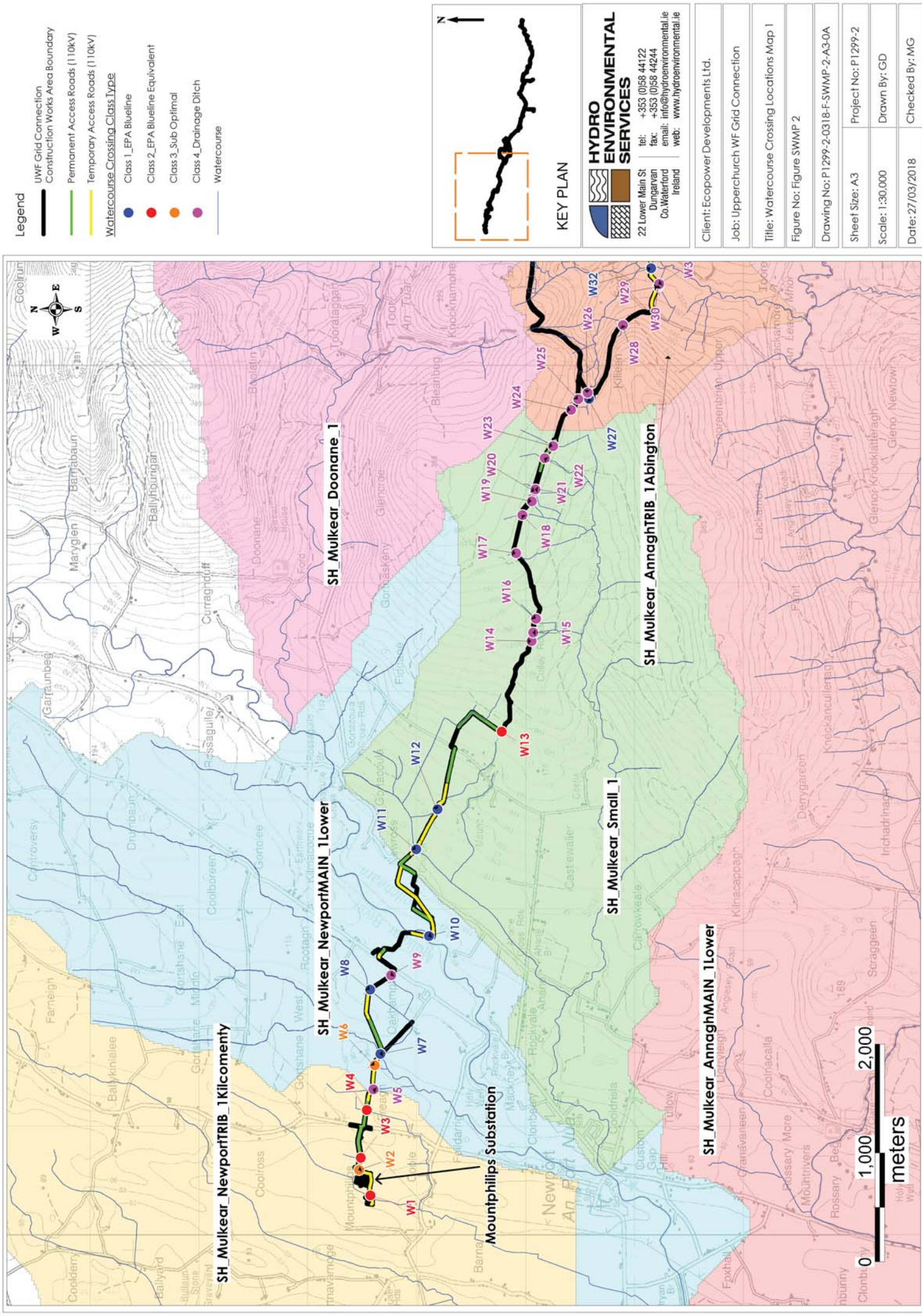
Scale: 1:125,000

Date: 27/03/2018

Project No: P1299-2

Drawn By: GD

Checked By: MG



Legend

- UWF Grid Connection
- Construction Works Area Boundary
- Permanent Access Roads (110kV)
- Temporary Access Roads (110kV)

Watercourse Crossing Class Type

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

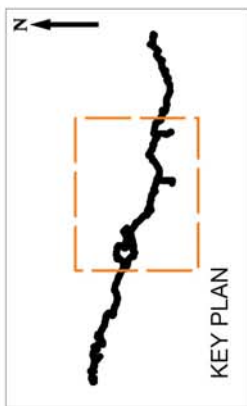
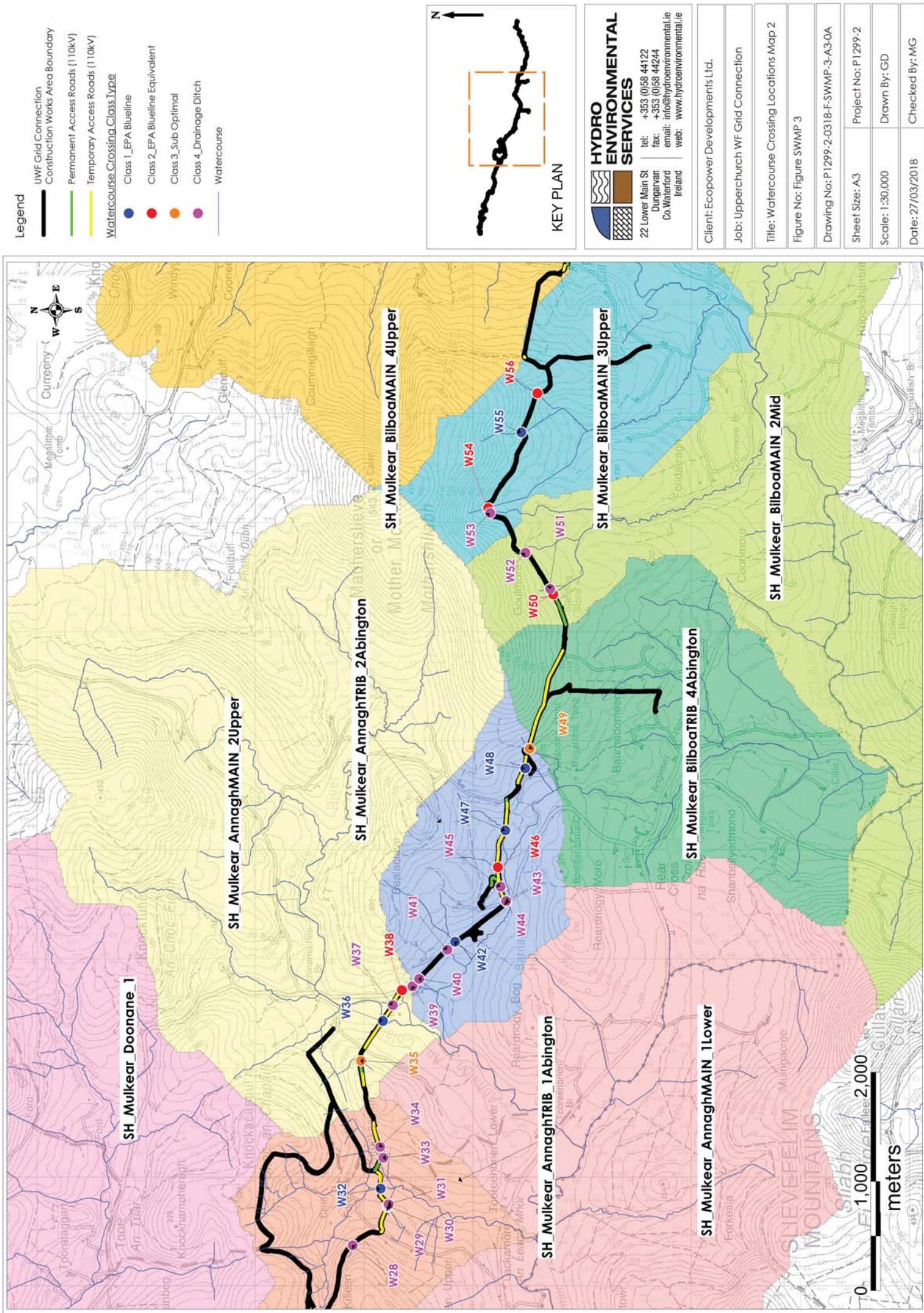
KEY PLAN

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Client: Ecopower Developments Ltd.	
Job: Upperchurch WF Grid Connection	
Title: Watercourse Crossing Locations Map 1	
Figure No: Figure SWMP 2	
Drawing No: P1299-2-0318-F-SWMP-2-A3-0A	
Sheet Size: A3	Project No: P1299-2
Scale: 1:30,000	Drawn By: GD
Date: 27/03/2018	Checked By: MG

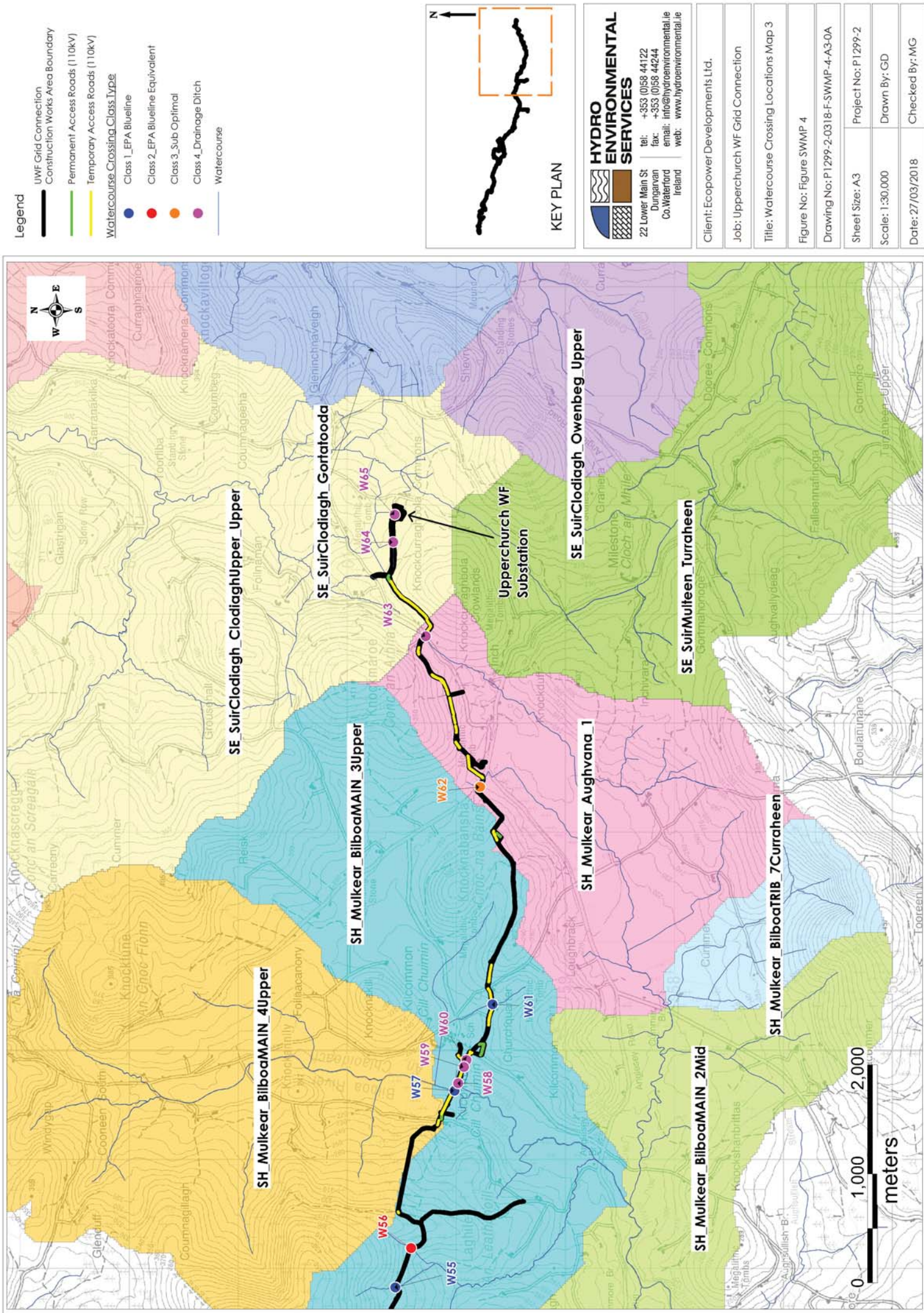
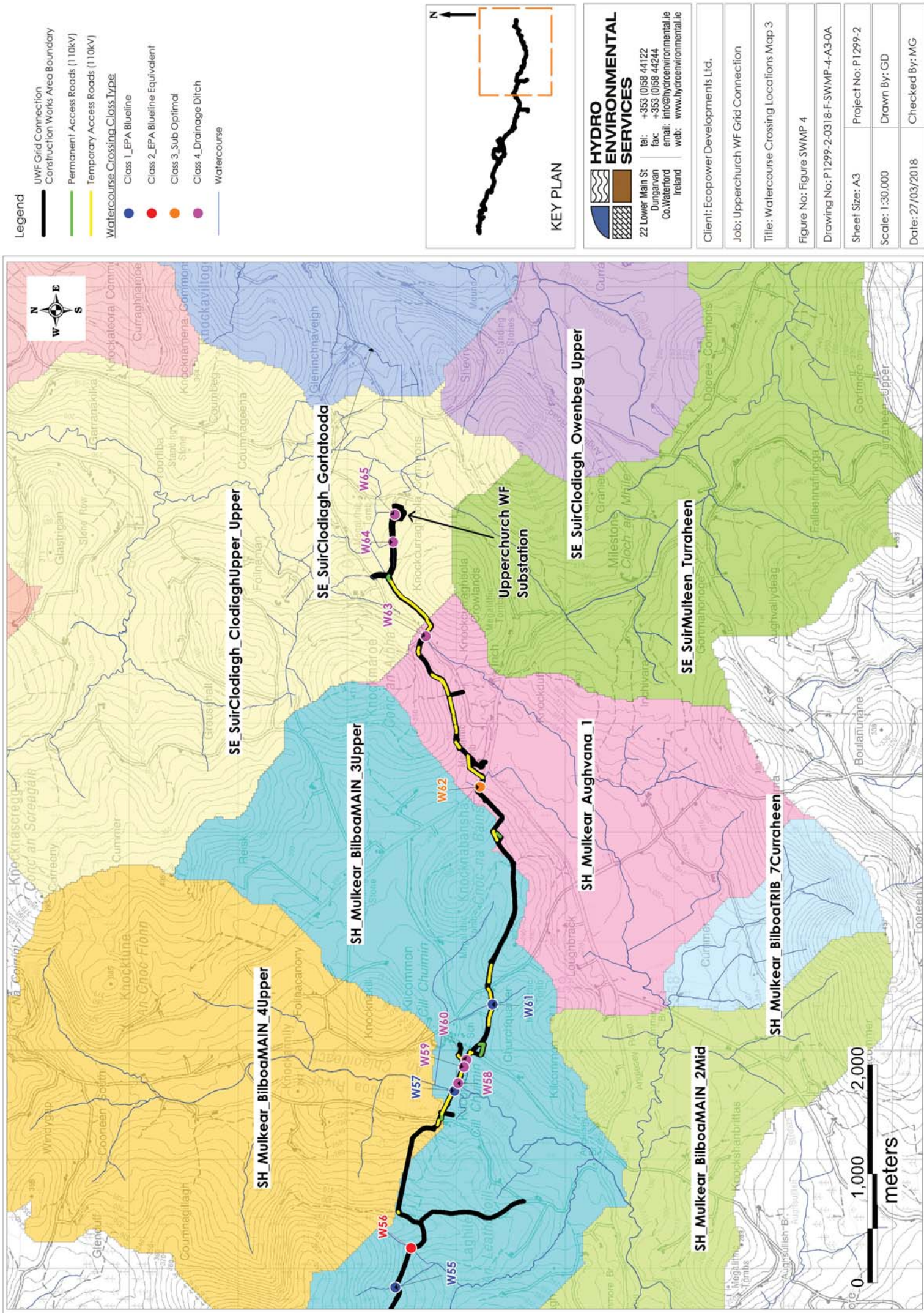


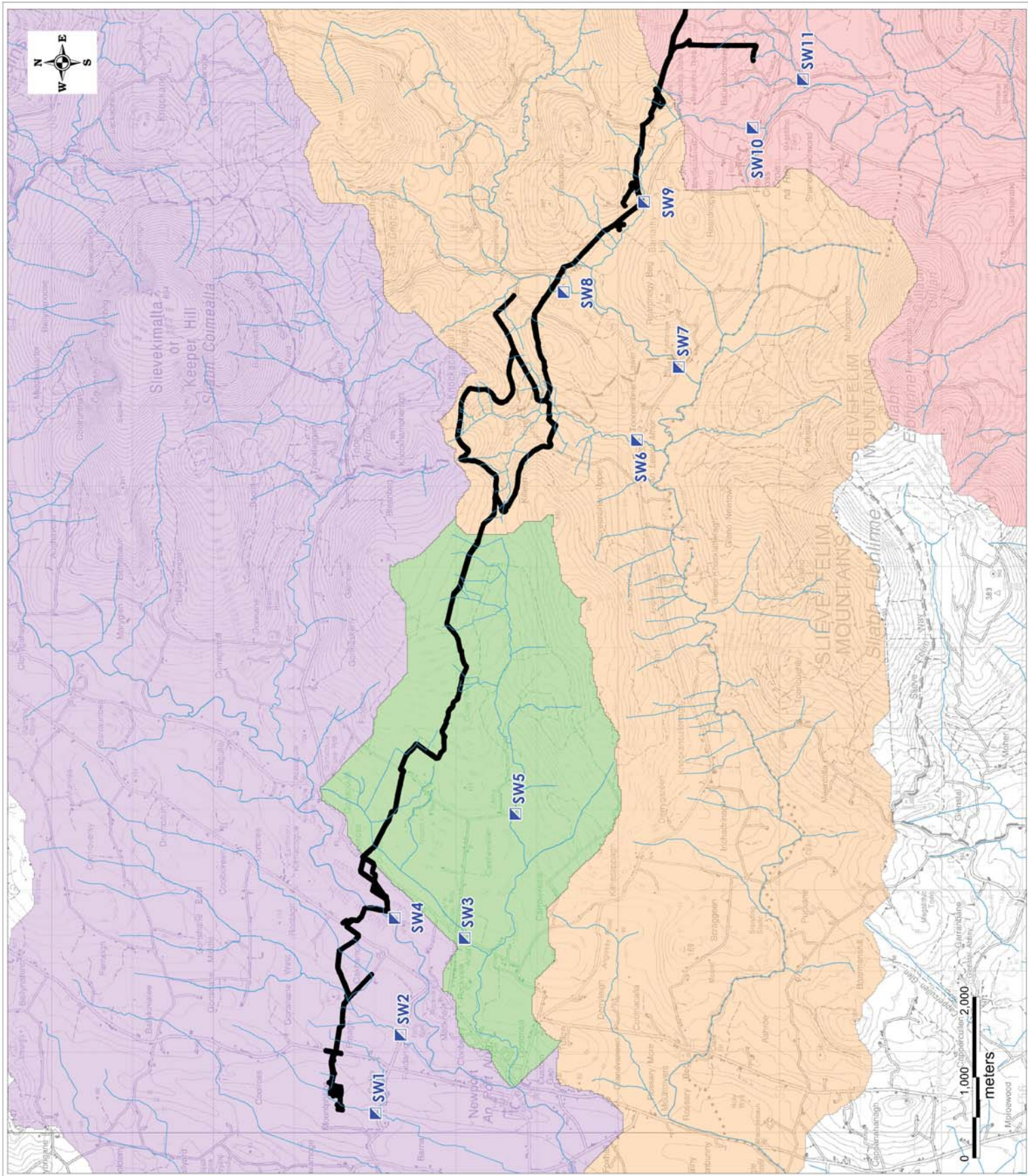
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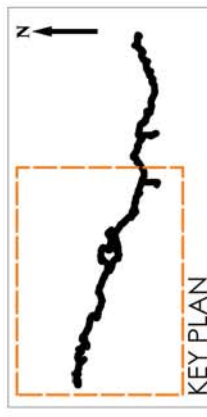
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Job: Upperchurch WF Grid Connection
Title: Watercourse Crossing Locations Map 2
Figure No: Figure SWMP 3
Drawing No: P1299-2-0318-F-SWMP-3-A3-0A
Sheet Size: A3
Scale: 1:30,000
Date: 27/03/2018
Project No: P1299-2
Drawn By: GD
Checked By: MG





Legend

- UWF Grid Connection Construction Works Area Boundary
- Proposed Surface Water Monitoring Locations
- Watercourse
- Small River
- Newport (Mulkear) River
- Clare (Annagh) River
- Bilboa River

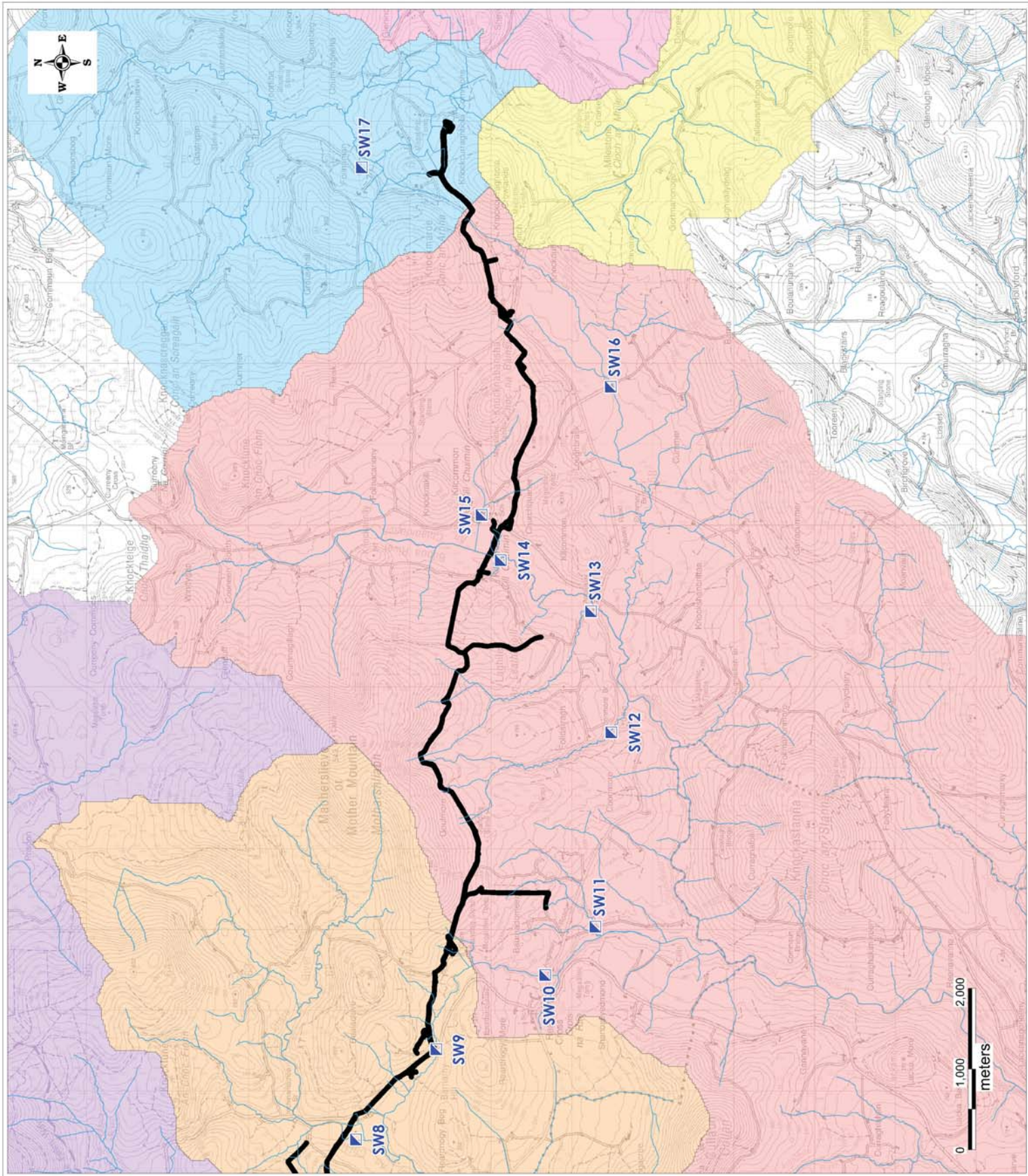


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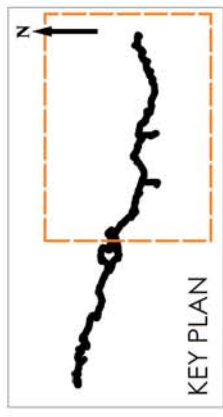
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Client: Ecopower Development Ltd.
Job: Upperchurch WF Grid Connection
Title: Surface Water Quality Monitoring Locations Map 1
Figure No: Figure SWMP 5
Drawing No: P1299-2-0318-F-SWMP-5-A3-0A
Sheet Size: A3
Scale: 1:45,000
Drawn By: GD
Date: 27/03/2018
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Legend

- UWF Grid Connection Construction Works Area Boundary
- Proposed Surface Water Monitoring Locations
- Watercourse
- Owenbeg River
- Turaheen River
- Newport (Mulkear) River
- Clodiagh River Local
- Clare (Annagh) River
- Bilboa River



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Client: Ecopower Development Ltd.	
Job: Upperchurch WF Grid Connection	
Title: Surface Water Quality Monitoring Locations Map 2	
Figure No: Figure SWMP 6	
Drawing No: P1299-2-0318-F-SWMP-6-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
GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
GC-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas

GC-BPM-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	
<ul style="list-style-type: none"> 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	
<p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> W8, W35, W47, W60, W64 and W65.</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> W12, W32 and W61.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works as required.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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;
- 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 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.

GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.
Environmental Commitment	
<ul style="list-style-type: none"> 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: W1, W2, W3, W4, W5, W6, W11, W13, W18, W19, W20, W21, W22, W23, W29, W30, W31, W33, W34, W37, W45, W46, W48, W49, W55, W58 and W59	
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: W12, W32 and W61.	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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.

GC-BPM-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.	
Work Sections/Locations	
<p>A new temporary diversion channel will be put in place to the south of the W7 watercourse crossing. The watercourse at W7 is an EPA blueline mapped stream (Class 1 watercourse).</p> <p>The channel will divert flow into a separate watercourse that merges with the watercourse to be diverted downstream of the W7 crossing location. The proposed diversion channel is approximately 50m in length.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 coarse 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 surrounded 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 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.

GC-BPM-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: <u>Relevant Watercourse Crossing Points: W8, W35, W47.</u>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 GC-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 GC-BPM-01 or GC-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 be 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.

GC-BPM-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 blue line mapped watercourse) or Class 2 (EPA blue line equivalent).	
Work Sections/Locations	
<ul style="list-style-type: none"> 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 110kV UGC; Trench excavations and access road construction will run over / adjacent / parallel to Class 1 or Class 2 watercourses at 110kV UGC route sections S1, S2, S3, S4, S5, S7, S8, S11, S12, S13 S16, S17, S20, S21(Newport River), S25, S26, S28, S29, S30, S34, S36, S37, S44, S45, AR5, AR6, S52, S53 (Claire River), S54, S55, S56, S58, S58, S60, S71, S72, S74, S75 (Bilboa River), S81, S82; Construction of joint bays within 50m of Class 1 or Class 2 watercourse will be required along the 110kv UGC at joint bay no. J7, J18 and J19. 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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 route 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.

GC-BPM-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		
<ul style="list-style-type: none">Coniferous tree block felling will be required at the following locations:UGC 110kV: S36, S38 – S39, S40, S45, S46, S71, S72, S73, S78 and S85.		
Responsibility of	Role/Duty	
Construction Manager	<ul style="list-style-type: none">Monitor weather conditions.Supervise tree felling works and drainage works.	
Pre-felling surveys		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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;Brush 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.

GC-BPM-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			
<ul style="list-style-type: none">• 110kV UGC• Mountphilips Substation			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">• Monitor weather conditions.• Ensure best practice storage and use of Cement Based Compounds.	
Measures along the 110kV UGC			
<ul style="list-style-type: none">• No wet-cement products will be used along the grid connection route (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 Mountphilips Substation and End Masts			
<ul style="list-style-type: none">• No batching of wet-cement products will occur on site (Project Design Measure).• Ready-mixed supply of wet concrete products will be used and pre-cast products will be used for watercrossing structures and joint bays;• 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			
<ul style="list-style-type: none">• 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.

GC-BPM-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		
<ul style="list-style-type: none">Construction works area boundary		
Responsibility of	Role/Duty	
Construction Manager	<ul style="list-style-type: none">Monitor weather conditions.Ensure best practice use and storage of fuels, oils and chemicals on-site.	
Manage of on-site refueling		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.		
Contingency for spillages		
<ul style="list-style-type: none">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 Grid Connection, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

GC-BPM-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: W18, W19, W20, W21, W22 and W23 (Class 4 water crossings), also W2 (Class 3 water crossings), also W3, W4, W13 and W90 (Class 2 water crossings), also W48 and W55 (Class 1 water crossings).	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Ensure appropriate culvert/bridge design. • Supervise the construction works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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. 	

GC-BPM-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: 110kV UGC: S19, S23, S37, S40, S51, S54, S71, S72, S73, S74, S76, S85, S86 and S88			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">• Monitor weather conditions.• Supervise excavation works and drainage works	
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">• No temporary overburden storage areas will be permitted within 50m of a Class 1 (EPA blue line mapped watercourse) or Class 2 (EPA unmapped blue line 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			
<ul style="list-style-type: none">• 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.			

GC-BPM-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: <u>110kV UGC</u> : S2, S5, S6, S19, S37, AR4, S72, S74 and S85			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">• Monitor weather conditions.• Supervise excavation works and drainage works.	
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">• 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			
<ul style="list-style-type: none">• 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.			

GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works.		
Environmental Commitment			
Prevention of significant surface water quality impacts during the Mountphilips Substation and End Mast Construction Works.			
Work Sections/Locations			
The proposed Mountphilips Substation compound and end masts.			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">Monitor weather conditions.Supervise excavation works and drainage works.	
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">Firstly, the substation compound and end mast construction works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;A minimum 30 metre vegetative buffer zone will be maintained between the substation works area and the stream to the west of the site;There will be no storage of material / equipment, excavated overburden or overnight parking of machinery inside the 30m buffer zone;Before any ground works is undertaken, double silt fencing will be placed upslope of the local stream to the west. The first line of the silt fencing will be placed 30m from the stream bank and the second line of silt fencing will be placed 5m from the stream bank;Double silt fencing will also be placed along the watercourses (drains) which run along the field boundary to the east and north of the proposed site;Due to the proximity of the compound works to the watercourse (drain) to the east of the site, silt traps will be placed at 20m intervals within the watercourse channel;The end mast construction site is located on the western side of the local stream, and a minimum 20 metre vegetative buffer zone will be maintained between the works area and the stream. Silt fencing will be arranged as described for the substation works;Additional silt fencing or temporary rectangular straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the local stream;Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;As the earthworks proceeds at the substation site, permanent earthen berms will be constructed around the substation compound site, and these berms will be used to contain surface water runoff during the substation compound work;Silt fencing will be placed along the base of the berms until they have vegetated and stabilised;As construction advances, there will a requirement to collect and treat small volumes of surface water that is contained within the footprint of the compound. This will be completed using perimeter swales and sumps at low points inside the compound;Water will be pumped from the sumps into a settlement pond(s) which will allow primary settlement of solids. From the settlement pond(s), water will be pumped to a proposed percolation area at least 30m from the local stream;Discharge onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure);In relation to the end mast construction area, silt fencing and straw bales will be arranged between the local stream as described above for the substation compound;Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;			

- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the local stream;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- As a final catch-all contingency, a mobile 'Siltbuster' or similar equivalent specialist treatment system will be available for emergencies in order to treat sediment polluted waters from the excavation should they be required. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites with sensitive downstream receptors;
- There will be no batching or storage of cement within 30m of the local stream;
- There will be no refuelling allowed within 100m of the local stream; and,
- All plant will be checked for purpose of use prior to mobilisation at the site.

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. CIRIA C532. London, 2006.

GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.		
Environmental Commitment			
Prevention of significant surface water quality impacts during Horizontal Directional Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossing locations.			
Work Sections/Locations			
<ul style="list-style-type: none">Newport (Mulkear) River – crossing no. W10Bilboa River - crossing no. W57, and,Clare River - crossing no. W36.			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">Monitor weather conditions.Supervise excavation works and drainage works.	
Mud Engineer		<ul style="list-style-type: none">Monitor drilling works	
Project Design Environmental Protection Measure / Best Practice Measure			
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">In order to prevent significant water quality impacts and morphological impacts, trenchless technology will be carried out to install the 110kV cable below the Newport (Mulkear) River, Bilboa River and Clare River (Project Design);Although no in-stream works are proposed, the drilling works will only be done over a dry period and will avoid the months of May, June or July as required by IFI (Project Design Measure);The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;The boundary of the Lower River Shannon SAC, which runs close to the Newport (Mulkear) River and Bilboa River bank, will also be clearly marked out and the crossing works area, including temporary surface water control measures (see below), will all be located outside the SAC;A minimum 15 metre vegetative buffer zone will be maintained between the works area and the SAC at the River crossing;A minimum 15 metre vegetative buffer zone will be maintained between the works area and the Clare River channel;There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone;Before any ground works are undertaken, double silt fencing will be placed upslope of the river channel along the 15m buffer zone boundary. At the Newport (Mulkear)River and Bilboa River crossing double silt fencing will also be placed along the SAC boundary;Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the river;Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;The area around the drilling fluid pumping and recycling plant will be bunded using terram geotextile (as it will clog) and sandbags in order to contain any spillages;Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area;Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before been taken off-site;If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works);This will be completed using a shallow swale and sump downslope of the disturbed ground, and			

water will be pumped to a proposed percolation area at least 50m from the river;

- The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure);
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the river;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated;
- 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.

Monitoring by Mud Engineer

- During drilling works the Mud Engineer will monitor fluid density, viscosity and solids content and any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.
- Monitoring of fluid tank volumes will also be undertaken to identify any unexpected changes.
- Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.
- Annular fluid velocity will be kept below Critical Velocity to prevent eddying and subsequent erosion caused by turbulent flow.
- When applicable a biodegradable drilling fluid will be selected such as Clear-Bore

Training and Communication

- All personnel involved in the drilling works will be trained in the emergency procedure for frac-out and will understand their responsibility for timely reporting of frac-outs;

Frac-Out Incident Preparedness

- Frac-out response equipment will be kept at the drilling location or at a readily accessible location close to the drilling works locations.

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.
- See **Environmental Management Plan for UWF Grid Connection**, Section 6: **Environmental Emergency Procedure for Frac-Out during Drilling Works**.
- **EIA Report, Volume C4**: EIA Appendices, Appendix 11.4: UWF Grid Connection HDD Risk Assessment

UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 5 Invasive Species Management Plan



ECOPOWER

February 2018

INVASIVE SPECIES MANAGEMENT PLAN

UPPERCHURCH WHOLE WIND FARM PROJECT, COUNTY TIPPERARY



January 2018

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ACRONYMS

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

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 site assessments of seven locations where Japanese knotweed or Himalayan knotweed infestations were recorded by Inis field ecologists during habitat assessments as part of their work on the Upperchurch Whole UWF Project. As part of the Whole UWF Project, UWF Grid Connection, UWF Related Works and UWF Ancillary Activities are planned near each of the seven invasive plant infestation locations.

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

The site assessments 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 each location (7 No.) to measure the exact extent of each infestation to allow for accurate GIS mapping of each infestation.

None of the 7 No. infestations that were identified are within 7 metres of the works and as such pose no risk of spreading through mechanical means. Notwithstanding this point, biosecurity measures are proposed throughout the construction phase. None of the 7 No. infestations 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 each infestation location during all critical stages of construction works.

INTRODUCTION

During fieldwork on the Upperchurch Whole Windfarm Project, Inis field ecologists identified seven invasive plant infestations.

Invasive non-native species are any animal or plant introduced (deliberately or accidentally) 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 each invasive plant infestation location and complete an assessment of each infestation. The site assessments by Dr. Giaquinto confirmed the presence of Japanese knotweed (*Fallopia japonica*) at six locations and Himalayan knotweed (*Persicaria wallichii*) at one location. Rhododendron (*Rhododendron ponticum*) was recorded at one location. Both *R. ponticum* and Himalayan knotweed are regulated for control under the same legislation¹ as Japanese knotweed.

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

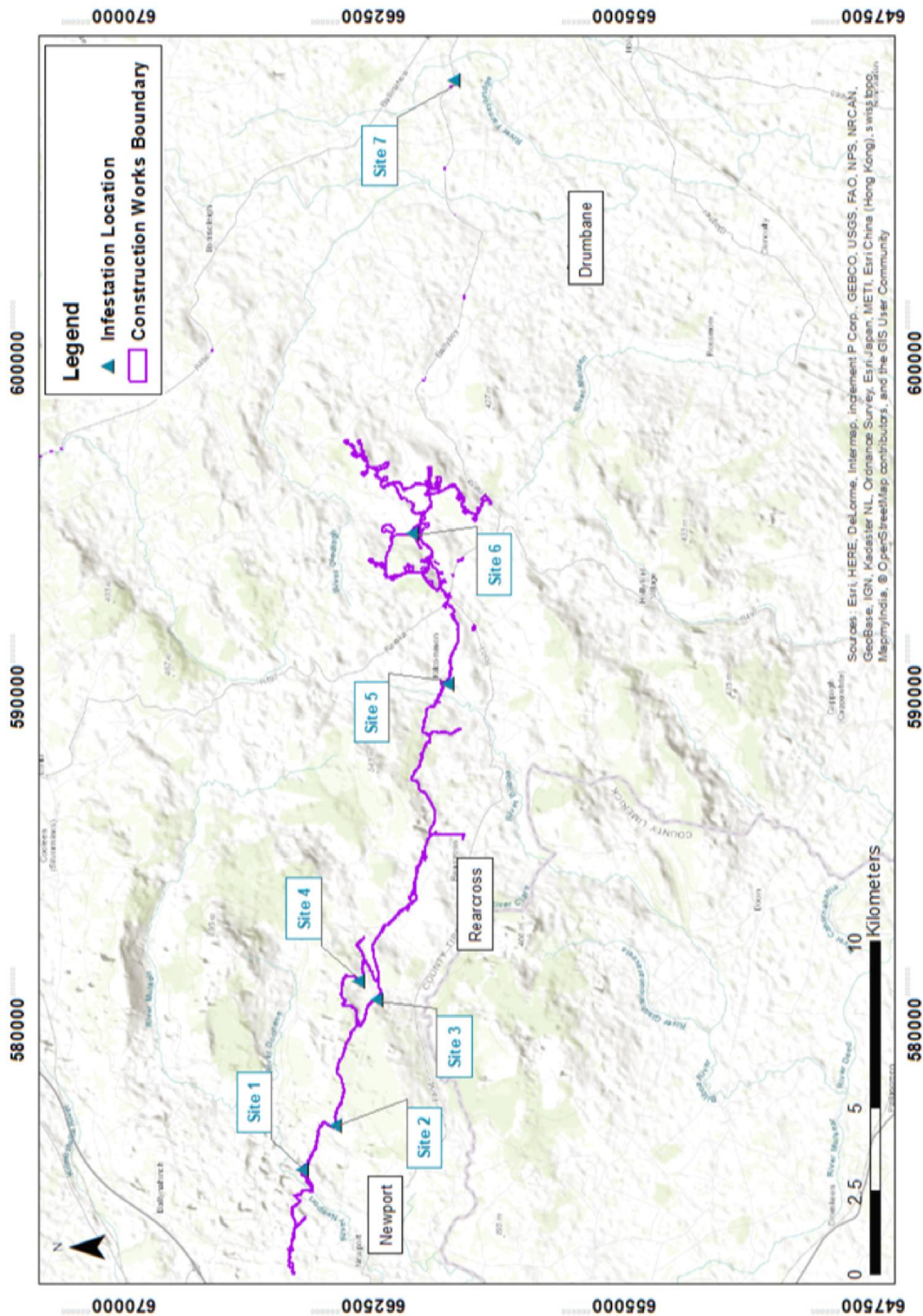
- most appropriate to each location;
- most likely to be effective;
- maintains compliance with EU and national legislation and guidelines pertaining to the control of invasive non-native plant species

¹ Relevant legislation includes: *European Communities (Birds and Natural Habitats) Regulations, 2011, S.I. No. 477*, which makes it an offence to *knowingly disperse or allow to escape* plant species listed in the Regulations.

DATA COLLECTED

At each location the following data (See Appendix R3) were gathered to assess the extent and severity of the 7 No. infestations:

- 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.



RESULTS

INFESTATION NUMBER	Site 1
INFESTATION TYPE	Himalayan knotweed (<i>Persicaria wallichii</i>)
INFESTATION LOCATION	575348 E 664200 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

Himalayan knotweed was recorded on the roadway verge, 12 metres from the proposed construction area (See Plate 1). Knotweed shoots were dispersed 26 m along the bank and extended 3 to 4 m across the width of the bank, with varying density (See Location Map below and Plates 1-3). The infestation extends into the adjoining field which was grazed with horses on the day of the site assessment; there was evidence that the knotweed had been grazed extensively (Plate 3).

No other invasive non-native species were recorded at this location.

RECOMMENDATION TO MAKE SAFE

- Implement appropriate biosecurity measures as per Appendix R2.
- The infestation's outer edge is 12 metres from the proposed construction area and, as such, poses no to low risk. The knotweed extends into the field and has been grazed extensively by horses.
- Heras 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 1



Plate 1 Location of Infestation Number: Site 1.

INFESTATION NUMBER	Site 2
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	676650 E 663221 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

An actively growing mature Japanese knotweed infestation was recorded at the edge of the forestry access road (See Location Map below and Plate 2), 11 metres from the construction area. The infestation appeared to be isolated in this location and is located well in from the edge of the road; no other infestations were recorded in the vicinity. There was minimal vegetation growing around the infestation, and there was no evidence of previous attempts at treatment.

No other invasive non-native species were recorded at this location.

RECOMMENDATION

- Implement appropriate biosecurity measures as per Appendix R2.
- The infestation's outer edge is 11 metres from the proposed construction area and, as such, poses no risk.
- Heras 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 during construction.

LOCATION MAP- SITE 2

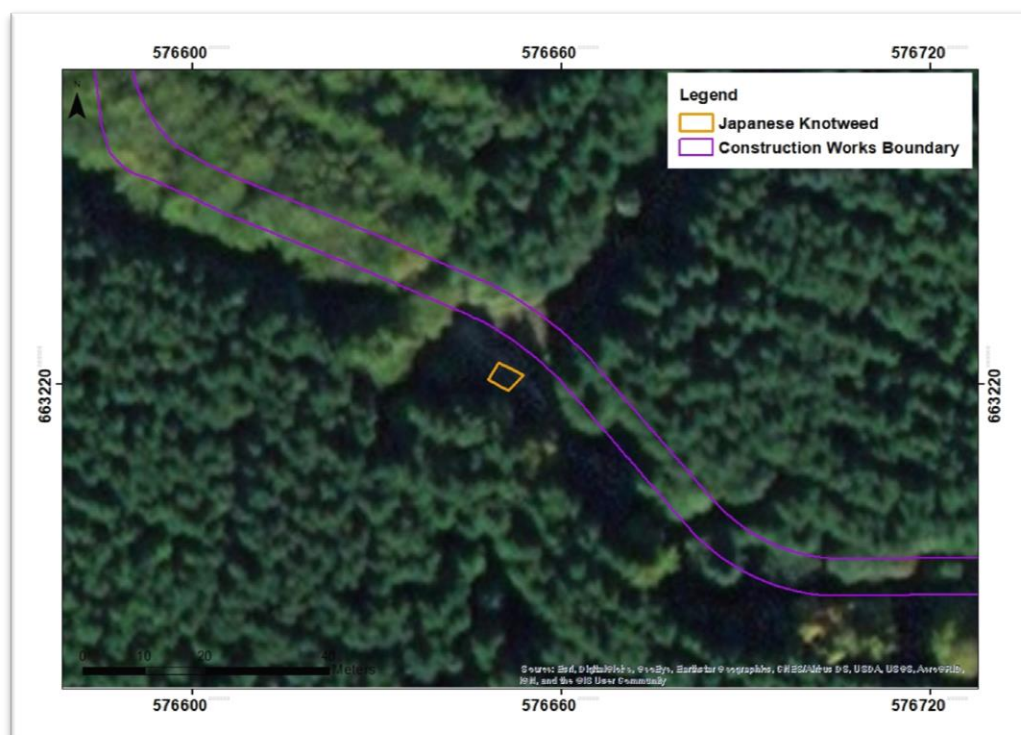


Plate 2 Location of Infestation Number: Site 2.

INFESTATION NUMBER	Site 3
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	580451 E 661921 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

A large tract of Japanese Knotweed was found in this location (See Plate 3). A bank of earth separates the infestation from the adjacent roadway. The infestation is mature and has been dispersed due to attempted failed eradication episodes. The infestation's outer edge is 10 metres from the proposed construction area and poses no risk to construction.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.
3. Heras 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 during construction.

LOCATION MAP- SITE 3

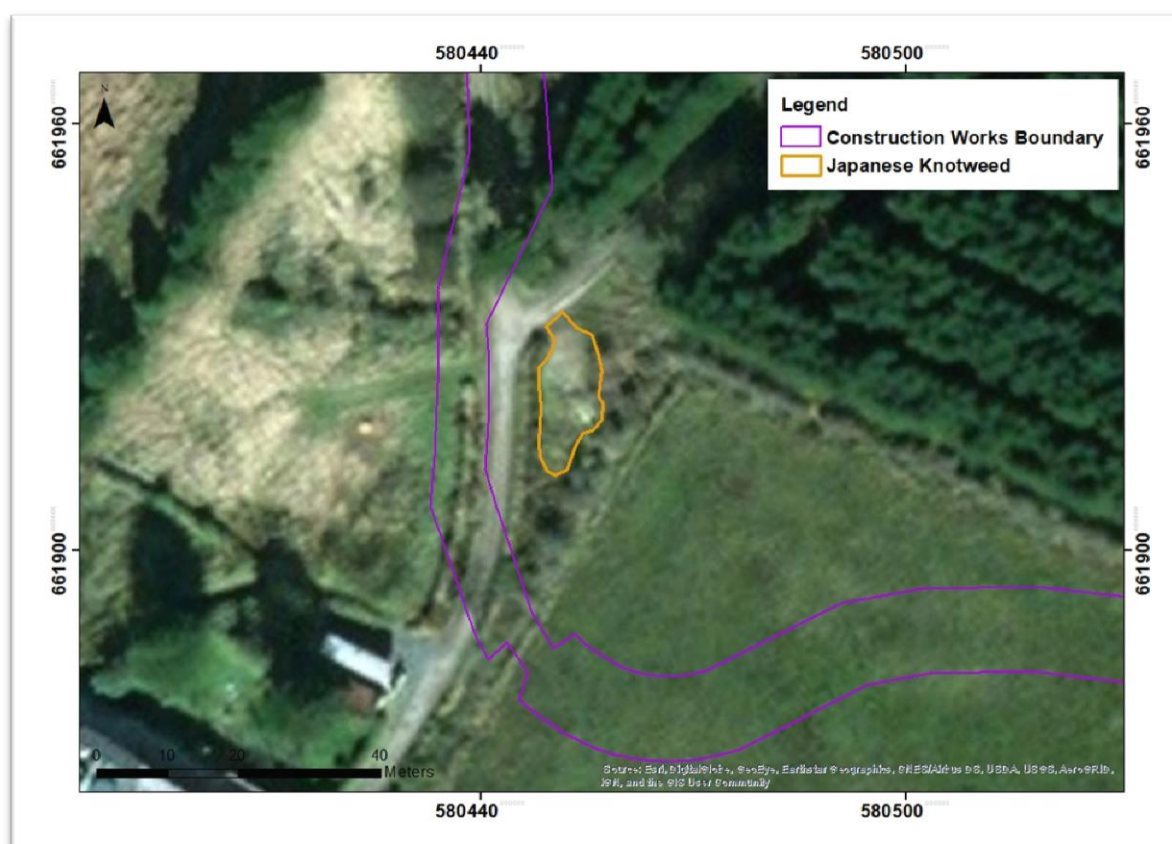


Plate 3 Location of Infestation Number: Site 3.

INFESTATION NUMBER	Site 4
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	580983 E 662504 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

Japanese knotweed (Plate 4) was recorded as an isolated infestation, 4 m from the centre of the adjacent forestry track. This track will be used for passing construction material deliveries/construction traffic only, with no construction work/excavation works in this track. The infestation is well contained with no evidence of disturbance or dispersal and thus poses no risk. No other invasive non-native species were recorded at this location.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.

LOCATION MAP- SITE 4

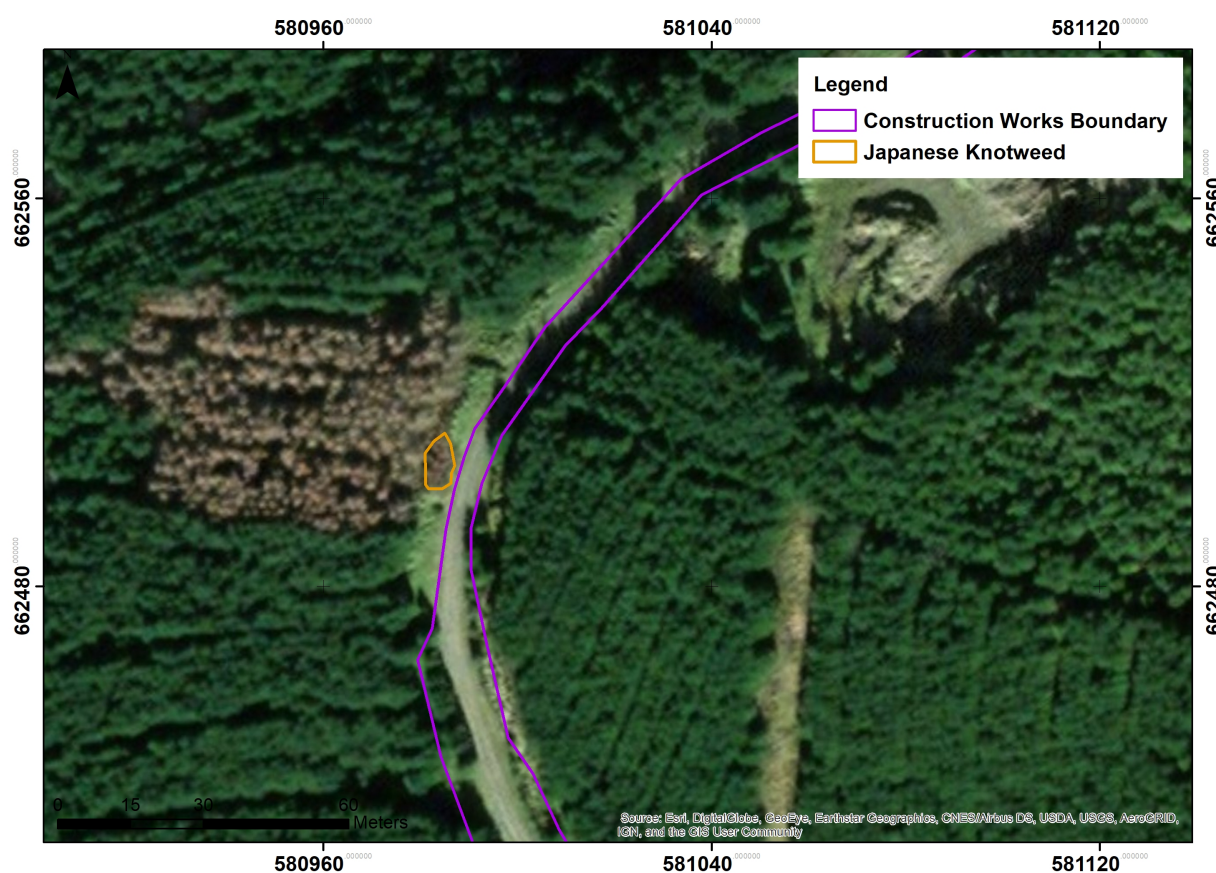


Plate 4 Location of Infestation Number: Site 4.

INFESTATION NUMBER	Site 5
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	589940 E 659894 N (ITM), 589923 E 659853 N (ITM), 589917 E 659824 N (ITM)

DESCRIPTION

Three infestations of Japanese Knotweed exist in this general area. Only one small isolated patch exists within the works boundary (See Plate 5) at a gate where no works are proposed. This patch is 9 metres from any proposed works, is well contained with no evidence of disturbance and thus poses no risk. The other two areas consist of extensive, severe Japanese knotweed (*Fallopia japonica*) infestations present within adjacent fields but these are outside the construction works area. No other invasive non-native species were recorded in this area.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.
3. The infestation's outer edge is 9 metres from the proposed construction area and, as such, poses no risk to construction.
4. Heras 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 during construction.

LOCATION MAP SITE 5



Plate 5 Location of Infestation Number: Site 5.

INFESTATION NUMBER	Site 6
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
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 Number: Site 6

INFESTATION NUMBER	Site 7
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	608032 E 659632 N (ITM)

DESCRIPTION

Not proximal to the construction works boundary this infestation was recorded as growing on the hard shoulder of the tertiary road R503 (See Plate 7). This road will be used for the delivery of turbines and no construction is proposed anywhere near this infestation.

The infestation is mature, well-established, over 3 m tall with an uneven canopy and many large basal crowns. The site has been used for disposing rubbish and the ground surface beneath the infestation is heavily littered and uneven.

No construction is happening at this location i.e. turbine deliveries will be passing the infestation along a public road. No contact with the infestation is possible due to it being 6 metres from the roadway.

RECOMMENDATION

1. Implement appropriate biosecurity measures as advised in Appendix R2.
2. The infestation's outer edge is more than 7 metres from the required access area and, as such, poses a low risk.
3. There is no need for Herras fencing or similar as there is no chance of any traffic coming into contact with the plant at this location.

LOCATION MAP

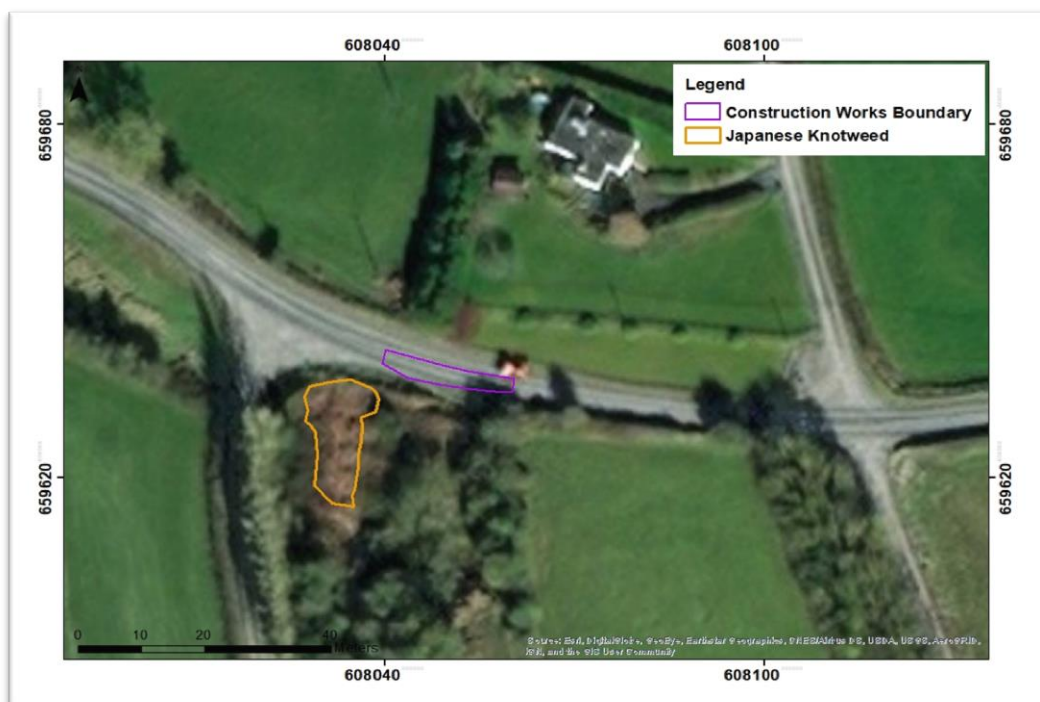










Plate 7 Location of Infestation Number: Site 7

APPENDIX R1
ILLUSTRATIVE PLATES

1		<p>Site 1 Himalayan knotweed on an infill bank of soil at road verge.</p>
2		<p>Site 1 As above, showing varying intensity of infestation along the bank</p>
3		<p>Site 1 Himalayan knotweed dispersed through the field and grazed by horses.</p>

4		<p>Site 2 Isolated infestation, actively growing.</p>
5		<p>Site 3 Disturbed Japanese knotweed by forestry track. Note infill in foreground which may have been used in an attempt to curb the infestation but has led to dispersal.</p>
6		<p>Site 4 Disturbed Japanese knotweed by forestry track which will be used by construction traffic only. No construction will occur anywhere near this infestation.</p>

7		Site 5 Isolated Japanese knotweed infestation at the gate of a house.
8		Site 6 Young, isolated Japanese knotweed infestation by farm gate.

9



Site 7

Extensive mature infestation growing on the verge of the tertiary road R503.

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 invasives 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_exten	Ave_hgt_(m)	BC	BC_no/m2	BCSz	Cane_d(cm)	Cane_age_no	Dispersed	Risk_cause	soil_type	prev_treat
1	HK	104	2B+	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	s400m	3cm	24	no	prox to forestry track	woodland	no
3	JKW	≥1000	massive	3m	mature	4	s400m	3cm	varies	yes	prox to track, LM	farmland	cutting
4	JKW	20	no	2.5	mature	2	s400m	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	s30	1-3cm	varies	yes	natural dispersal	road verge	cutting

□

LEGEND

Extent_m²	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/m²	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 GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 6 Waste Management Plan



ECOPOWER

February 2018

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LIST OF FIGURES– included at the end of this Plan

Figure No.	Figure Title
Figure WMP 1	Location of the Grid Connection on OSI Mapping

LIST OF TABLES

Table No.	Table Title
Table 1	Construction Wastes/Excavated Materials
Table 2	Waste Details to be Provided
Table 3	Measured waste quantities and costs

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 Waste Management Plan (WMP)

This WMP **concentrates on the construction stage** of the UWF Grid Connection 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 Grid Connection.

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

1.2 Overview of UWF Grid Connection

UWF Grid Connection, comprises the following elements:

- A new 110kV electrical substation at Mountphilips townland (to be called Mountphilips Substation)
- A new 110kV underground electrical cable connecting the Mountphilips Substation to the consented Upperchurch Windfarm substation (to be called Mountphilips – Upperchurch 110kV UGC or 110kV UGC)
- new roads on private lands (Grid Connection Access Roads), and
- ancillary works, which include permanent and temporary site entrances and temporary site compounds.

See Figure WMP 1: Location of the Grid Connection on OSI Mapping, which is included at the end of this plan.

1.2.1 Purpose of the UWF Grid Connection

The purpose of UWF Grid Connection is to connect the Consented UWF Substation at Upperchurch Windfarm (UWF) to the now proposed substation at Mountphilips. Mountphilips Substation will be connected to the existing, adjacent Killonan - Nenagh 110kV overhead line and thereby export electricity, from Upperchurch Windfarm when constructed and operational, to the national grid.

1.2.2 Description of the Characteristics of the UWF Grid Connection

The characteristics of UWF Grid Connection are described in more detail in the EIA Report, which accompanies the 2018 planning application to An Bord Pleanála for the UWF Grid Connection

- see [Chapter 5: Description of the Development \(UWF Grid Connection\)](#), 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 Grid Connection).

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 Grid Connection, the following construction wastes/ excavated materials will arise:

Table 1: Construction Wastes/Excavated Materials

Construction Waste Material	European Waste Code
Dry lean mix 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
Control building general materials – tiles, blocks, insulation materials, plaster, plastic covering and pipes, concrete	17 01 07/ 17 06 04/20 01 01
Canteen Waste – waste water from washing and toilet facilities	20 03 01
Excavated Materials arising - Soil & Stone Note: All <u>excavated soil and rocks</u> will be reused on site to form permanent berms, for reinstatement of construction works areas, and as such <u>will not constitute waste</u> but rather 'material arising' on the UWF Grid Connection 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 the temporary site compound. The licensed operator, will collect and transfer the skips/receptacles of both recyclable and non-recyclable wastes as they are filled. The temporary 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 have been identified as the appropriate licensed operator in the area.

General waste, waste water and public 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 the Temporary Compounds. 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 the temporary 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 (Toilet blocks at the Temporary Compounds) or bi-weekly (portable toilets at construction works areas) 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 the temporary 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 each of the Temporary Compounds 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.

Approximately, 660m³ of spoil will also arise during excavations in public roads. The excess material arising from lengths of 110kV UGC excavated in the public road or contaminated material arising during the construction of UWF Grid Connection will be collected by Arlo Group and transported to their approved licensed facilities at Thurles, County Tipperary.

To protect the environment and site workers, off-site removal by the authorised operator, Arlo Group, will be organised on a regular basis.

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 Grid Connection (e.g. Compound C1)
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 WMP 1

**Location of the UWF Grid Connection
on OSI Discovery Mapping**

Map Number:
Overview Map on OSI Discovery Mapping

Legend:

- UWF Grid Connection
- Mountphilips Substation
- Consented UWF Substation
- ★ Temporary Compound



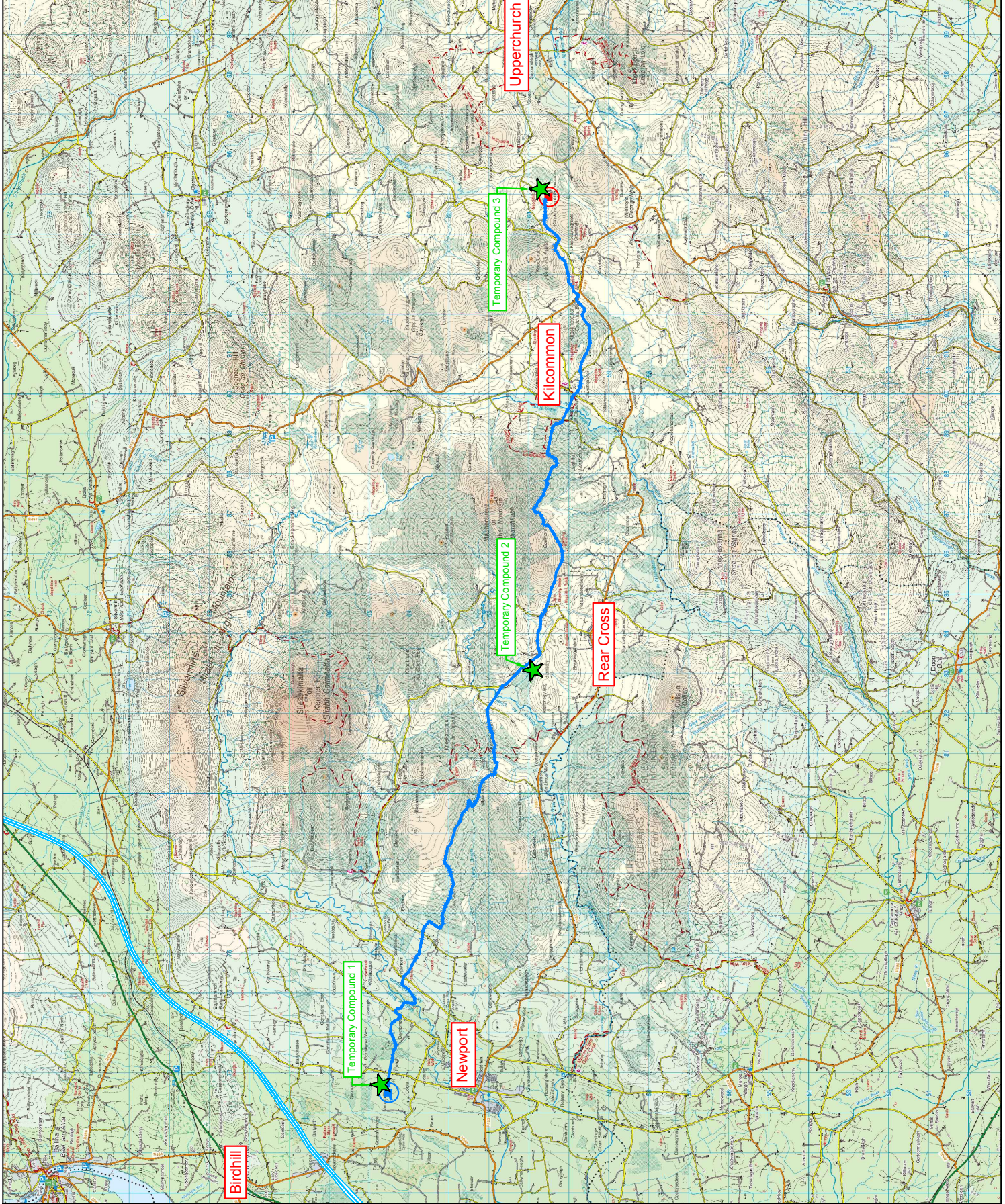
Project:

UWF Grid Connection (GC)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	12-Mar-18	A4



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UWF GRID CONNECTION

Tab 7 **Best Practice Measures**



ECOPOWER

Table 1: List of Best Practice Measures for the UWF Grid Connection

BPM No.	BPM Title
GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
GC-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
GC-BPM-12	Monitoring of nesting and roosting Hen Harrier (<i>Circus cyaneus</i>)
GC-BPM-13	Minimising the effects of lighting on bats
GC-BPM-14	Protection of potential tree and bridge bat roosts
GC-BPM-15	Bats – Post Construction Monitoring
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (<i>Alcedo atthis</i>).
GC-BPM-20	Monitoring of Identified Badger Setts
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species
GC-BPM-23	Best practice methods to ensure the protection of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).

Best Practice Measures for UWF Grid Connection

BPM No.	BPM Title
GC-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)
GC-BPM-25	Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)
GC-BPM-26	Local Employment and Local Sourcing
GC-BPM-27	Landowner and Land-user Liaison
GC-BPM-28	Minimising Disturbance and Damage to Land
GC-BPM-29	Minimising Dust Emissions From Site Activities
GC-BPM-30	Traffic Management Measures
GC-BPM-31	Measuring Operational EMF Emissions
GC-BPM-32	Measuring Operational Electricity Production
GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works
GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.

GC-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	
<ul style="list-style-type: none"> 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	
<p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> W8, W35, W47, W60, W64 and W65.</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> W12, W32 and W61.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works as required.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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;
- 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 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.

GC-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	
<ul style="list-style-type: none"> 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	
<p>The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.</p> <p><u>Relevant Watercourse Crossing Points:</u> W1, W2, W3, W4, W5, W6, W11, W13, W18, W19, W20, W21, W22, W23, W29, W30, W31, W33, W34, W37, W45, W46, W48, W49, W55, W58 and W59</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> W12, W32 and W61.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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.

GC-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	
<p>A new temporary diversion channel will be put in place to the south of the W7 watercourse crossing. The watercourse at W7 is an EPA blueline mapped stream (Class 1 watercourse).</p> <p>The channel will divert flow into a separate watercourse that merges with the watercourse to be diverted downstream of the W7 crossing location. The proposed diversion channel is approximately 50m in length.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 coarse 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 surrounded 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 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.

GC-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: W8, W35, W47.	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 GC-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 GC-BPM-01 or GC-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 be 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	
<ul style="list-style-type: none"> • 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. 	

GC-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 blue line mapped watercourse) or Class 2 (EPA blue line equivalent).	
Work Sections/Locations	
<ul style="list-style-type: none"> 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 110kV UGC; Trench excavations and access road construction will run over / adjacent / parallel to Class 1 or Class 2 watercourses at 110kV UGC route sections S1, S2, S3, S4, S5, S7, S8, S11, S12, S13 S16, S17, S20, S21(Newport River), S25, S26, S28, S29, S30, S34, S36, S37, S44, S45, AR5, AR6, S52, S53 (Claire River), S54, S55, S56, S58, S58, S60, S71, S72, S74, S75 (Bilboa River), S81, S82; Construction of joint bays within 50m of Class 1 or Class 2 watercourse will be required along the 110kv UGC at joint bay no. J7, J18 and J19. 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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>i.e.</i> base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route 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.

GC-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	
<ul style="list-style-type: none"> Coniferous tree block felling will be required at the following locations: UGC 110kV: S36, S38 – S39, S40, S45, S46, S71, S72, S73, S78 and S85. 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise tree felling works and drainage works.
Pre-felling surveys	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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.

GC-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	
<ul style="list-style-type: none"> • 110kV UGC • Mountphilips Substation 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Ensure best practice storage and use of Cement Based Compounds.
Measures along the 110kV UGC	
<ul style="list-style-type: none"> • No wet-cement products will be used along the grid connection route (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>i.e.</i> 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 Mountphilips Substation and End Masts	
<ul style="list-style-type: none"> • No batching of wet-cement products will occur on site (Project Design Measure). • Ready-mixed supply of wet concrete products will be used and pre-cast products will be used for watercrossing structures and joint bays; • 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	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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.

GC-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	
<ul style="list-style-type: none"> Construction works area boundary 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Ensure best practice use and storage of fuels, oils and chemicals on-site.
Manage of on-site refueling	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose. 	
Contingency for spillages	
<ul style="list-style-type: none"> 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 Grid Connection, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

GC-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: W18, W19, W20, W21, W22 and W23 (Class 4 water crossings), also W2 (Class 3 water crossings), also W3, W4, W13 and W90 (Class 2 water crossings), also W48 and W55 (Class 1 water crossings).	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Ensure appropriate culvert/bridge design. Supervise the construction works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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>i.e.</i> 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	
<ul style="list-style-type: none"> 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. 	

GC-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: 110kV UGC: S19, S23, S37, S40, S51, S54, S71, S72, S73, S74, S76, S85, S86 and S88	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 exist within 20m of the storage area; • Where the temporary overburden storage 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 storage areas will be checked / monitored on a daily basis until stabilised to ensure no drainage issues or surface water quality impacts are occurring. 	
References	
<ul style="list-style-type: none"> • 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. 	

GC-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: 110kV UGC: S2, S5, S6, S19, S37, AR4, S72, S74 and S85	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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>i.e.</i> 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	
<ul style="list-style-type: none"> • 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. 	

GC-BPM-12 Best Practice Measure	
Title:	Monitoring of nesting and roosting Hen Harrier (<i>Circus cyaneus</i>)
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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> A temporal construction exclusion zone of 500m will be established around any active hen harrier breeding attempt or active nesting location. 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. No construction works will take place within the temporal exclusion zone 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	
<ul style="list-style-type: none"> The temporal exclusion zone will be monitored by a suitably qualified Ornithologist. The Ornithologist will 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 GC-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>

GC-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 Grid Connection construction works areas	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Scheduling of works
Project Ecologist	<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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. <u>All lighting</u> 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	
<ul style="list-style-type: none"> • 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 	

GC-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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> Structures which were previously identified as having <u>no potential for bats</u> (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.

GC-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 Grid Connection	
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	<ul style="list-style-type: none"> • Post-construction activity surveys. • Liaising with NPWS. • Must be aware of the best practice guidance listed in References below.
Operational Surveys	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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). <i>Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.</i> National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. 	

GC-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	<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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. • Surveying will be carried out each year of operation and this survey information will be used to inform any construction works/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	
<ul style="list-style-type: none"> • 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 Grid Connection - Invasive Species Management Plan. 	

GC-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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<p>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.</p> <p>Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.</p> <p>The following approach will be taken in order to comply with the Wildlife Acts:</p> <ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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). 	

GC-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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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.

GC-BPM-19 Best Practice Measure	
Title:	Disturbance to and/or displacement of nesting Common Kingfisher (<i>Alcedo atthis</i>).
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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins <i>et al</i>, 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Cummins, S., Fisher, J., McKeever, R.G., McNaghten, L., and Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher (<i>Alcedo atthis</i>) 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 (EclA) of the Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (<i>Alcedo atthis</i>) and other riparian birds II. Office of Public Works and BirdWatch Ireland. http://www.opw.ie/en/media/Issue%20No.%2012%20%20EclA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf 	

GC-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	<ul style="list-style-type: none"> Must be aware of the best practice guidance listed in References below.
Monitoring of identified Badger setts during the operational phase of the development.	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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. 	

GC-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	<ul style="list-style-type: none"> Scheduling of construction activities.
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<p>In the event of the confirmation of pine martin breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> 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	
<p>In the event of the confirmation of red squirrel breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> 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>.

GC-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		<ul style="list-style-type: none">Requiring supply companies to clean delivery vehicles before entering the site to gain access to works areaObtaining and keeping a record of delivery companies cleaning of vehiclesTraining flagmen in the appropriate method of vehicle cleaning	
Flagmen		<ul style="list-style-type: none">Cleaning of delivery vehicles exiting the site with suitable disinfectantMaintaining a record of all vehicles cleaned and equipment, disinfectant used.	
Project Ecologist		<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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/>

GC-BPM-23 Best Practice Measure	
Title:	Best practice methods to ensure the protection of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).
Environmental Commitment	
To avoid effects on the breeding habitat of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>) if present along the cable route during the pre-construction and construction phase.	
Work Sections/Locations	
All construction works areas	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> Must be aware of the locations of all previously identified habitats suitable for breeding amphibian along the route corridor. 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	
<ul style="list-style-type: none"> 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 (<i>Bufo (Epidalea) calamita</i>), thus this species does not require mitigation within this Project. 	
References	
<ul style="list-style-type: none"> National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin. 	

GC-BPM-24 Best Practice Measure	
Title:	Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)
Environmental Commitment	
To avoid effects on Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>) during the pre-construction and construction phase.	
Work Sections/Locations	
All sections	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> 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 (<i>Anguis fragilis</i>), thus this species does not require mitigation within this Project. 	
References	
<ul style="list-style-type: none"> NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin. 	

GC-BPM-25 Best Practice Measure			
Title:	Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)	Ref:	GC-BPM-33
Environmental Commitment			
To avoid effects on Marsh Fritillary / Marsh Fritillary habitat during the pre-construction and construction phase.			
Work Sections/Locations			
UWF Grid Connection: S66, S55, and other suitable habitat within 50m of construction works areas.			
Responsibility of	Role/Duty		
Construction Manager	<ul style="list-style-type: none">Scheduling of construction activities		
Project Ecologist	<ul style="list-style-type: none">Carrying out of Confirmatory Survey of suitable habitatMonitor 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			
<ul style="list-style-type: none">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 areaSurveys 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			
<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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 Grid Connection.Results will be made available to the Local Authority and relevant statutory consultees, in the form of an annual report.			
References			
<ul style="list-style-type: none">National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.			

GC-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 Grid Connection	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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 	

GC-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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer
Landowner and Land-User Liaison Measures	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP) 	

GC-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	<ul style="list-style-type: none"> To fence all active construction works areas
Community Liaison Officer	<ul style="list-style-type: none"> 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 GC-OCM-21: 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	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP) 	

GC-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	<ul style="list-style-type: none"> Provide site induction to site personnel and contractors regarding the dust control measures
Training and Communication	
<ul style="list-style-type: none"> 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 3 site entrances to the 3 temporary compounds. The CLO and the ECoW will be the point of contact regarding air quality and dust issues. 	
Measures to minimize dust emissions	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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) 	

GC-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	<ul style="list-style-type: none"> 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
Design Engineer	<ul style="list-style-type: none"> Design sight lines at 3 no. permanent entrances. Design adequate drainage at permanent site entrances
Construction Manager	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 each at the site entrances to the Temporary Compounds C1, C2 and C3. These signs 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 materials deliveries to the Mountphilips substation works will have clear directional signs from Newport to the site. The haul routes for construction material deliveries to the UWF Grid Connection works will have clear directional signage from the R503 to the temporary site access points, and this signage will be relocated to indicate the location of the UWF Grid Connection works as the works progress along the grid connection route. 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	
<ul style="list-style-type: none"> 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 or concrete to works areas or delivering other materials to the temporary compounds or Mountphilips Substation 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 Temporary Compounds and the temporary site access points.
- There will be onsite parking for all construction personnel at the main compounds.
- 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 permanent site entrances for C1 and C3/

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 be used to organise through traffic in the event of the public carriageway being temporarily obstructed.
- At Baurnadomeeny, the road closure will take place during school holidays. All local residents and landowners will be informed of construction works in advance. The Community Liaison Officer will keep in touch with the local residents before, during and after the road works at Baurnadomeeny.
- 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 Related Works 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 entrances for the 3 No. Temporary Compounds 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 Grid Connection 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 access points on the local road network, and on the local road network from the junction of the R497 with the L2266-11 road. 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)

GC-BPM-31 Best Practice Measure	
Title:	Measuring Operational EMF Emissions
Environmental Commitment	
Work Sections/Locations	
Mountphilips Substation and 110kV UGC route	
Responsibility of	Role/Duty
Operational Manager – UWF	<ul style="list-style-type: none"> Ensure operational EMF emissions are measured
Measuring Operational EMP Emissions	
<ul style="list-style-type: none"> A confirmatory survey of Electromagnetic Field emissions from the Mountphilips 110kV Substation and from locations along the 110kV UGC will be carried out by a competent engineer. The locations along the 110kV UGC will include the following locations at a minimum: local road in Castlewaller, local road in Bealaclave, Kilcommon village, local road crossing in Knockmaroe/Knockcurraghbola. Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the 2018 EIA Report. 	
References	
<ul style="list-style-type: none"> UWF Grid Connection EIA Report (2018) 	

GC-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	<ul style="list-style-type: none"> Record annual electricity production levels
Measures to minimize dust emissions	
<ul style="list-style-type: none"> Recording and reporting of the annual renewable electricity production of the operational UWF. 	
References	
<ul style="list-style-type: none"> UWF Grid Connection EIA Report (2018) 	

GC-BPM-33 Best Practice Measure	
Title:	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works.
Environmental Commitment	
Prevention of significant surface water quality impacts during the Mountphilips Substation and End Mast Construction Works.	
Work Sections/Locations	
The proposed Mountphilips Substation compound and end masts.	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • Firstly, the substation compound and end mast construction works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation; • A minimum 30 metre vegetative buffer zone will be maintained between the substation works area and the stream to the west of the site; • There will be no storage of material / equipment, excavated overburden or overnight parking of machinery inside the 30m buffer zone; • Before any ground works is undertaken, double silt fencing will be placed upslope of the local stream to the west. The first line of the silt fencing will be placed 30m from the stream bank and the second line of silt fencing will be placed 5m from the stream bank; • Double silt fencing will also be placed along the watercourses (drains) which run along the field boundary to the east and north of the proposed site; • Due to the proximity of the compound works to the watercourse (drain) to the east of the site, silt traps will be placed at 20m intervals within the watercourse channel; • The end mast construction site is located on the western side of the local stream, and a minimum 20 metre vegetative buffer zone will be maintained between the works area and the stream. Silt fencing will be arranged as described for the substation works; • Additional silt fencing or temporary rectangular straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the local stream; • Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; • As the earthworks proceeds at the substation site, permanent earthen berms will be constructed around the substation compound site, and these berms will be used to contain surface water runoff during the substation compound work; • Silt fencing will be placed along the base of the berms until they have vegetated and stabilised; • As construction advances, there will a requirement to collect and treat small volumes of surface water that is contained within the footprint of the compound. This will be completed using perimeter swales and sumps at low points inside the compound; • Water will be pumped from the sumps into a settlement pond(s) which will allow primary settlement of solids. From the settlement pond(s), water will be pumped to a proposed percolation area at least 30m from the local stream; • Discharge onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing; • Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure); 	

- In relation to the end mast construction area, silt fencing and straw bales will be arranged between the local stream as described above for the substation compound;
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the local stream;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- As a final catch-all contingency, a mobile 'Siltbuster' or similar equivalent specialist treatment system will be available for emergencies in order to treat sediment polluted waters from the excavation should they be required. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites with sensitive downstream receptors;
- There will be no batching or storage of cement within 30m of the local stream;
- There will be no refuelling allowed within 100m of the local stream; and,
- All plant will be checked for purpose of use prior to mobilisation at the site.

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. CIRIA C532. London, 2006.

GC-BPM-34 Best Practice Measure	
Title:	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.
Environmental Commitment	
Prevention of significant surface water quality impacts during Horizontal Directional Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossing locations.	
Work Sections/Locations	
<ul style="list-style-type: none"> Newport (Mulkear) River – crossing no. W10 Bilboa River - crossing no. W57, and, Clare River - crossing no. W36. 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Mud Engineer	<ul style="list-style-type: none"> Monitor drilling works
Project Design Environmental Protection Measure / Best Practice Measure	
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> In order to prevent significant water quality impacts and morphological impacts, trenchless technology will be carried out to install the 110kV cable below the Newport (Mulkear) River, Bilboa River and Clare River (Project Design); Although no in-stream works are proposed, the drilling works will only be done over a dry period and will avoid the months of May, June or July as required by IFI (Project Design Measure); The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation; The boundary of the Lower River Shannon SAC, which runs close to the Newport (Mulkear) River and Bilboa River bank, will also be clearly marked out and the crossing works area, including temporary surface water control measures (see below), will all be located outside the SAC; A minimum 15 metre vegetative buffer zone will be maintained between the works area and the SAC at the River crossing; A minimum 15 metre vegetative buffer zone will be maintained between the works area and the Clare River channel; There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone; Before any ground works are undertaken, double silt fencing will be placed upslope of the river channel along the 15m buffer zone boundary. At the Newport (Mulkear) River and Bilboa River crossing double silt fencing will also be placed along the SAC boundary; Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the river; Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; The area around the drilling fluid pumping and recycling plant will be bunded using terram geotextile (as it will clog) and sandbags in order to contain any spillages; Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area; Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before been taken off-site; If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (<i>i.e.</i> soil and subsoil exposures created during site preparation works); 	

- This will be completed using a shallow swale and sump downslope of the disturbed ground, and water will be pumped to a proposed percolation area at least 50m from the river;
- The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure);
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the river;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated;
- 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.

Monitoring by Mud Engineer

- During drilling works the Mud Engineer will monitor fluid density, viscosity and solids content and any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.
- Monitoring of fluid tank volumes will also be undertaken to identify any unexpected changes.
- Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.
- Annular fluid velocity will be kept below Critical Velocity to prevent eddying and subsequent erosion caused by turbulent flow.
- When applicable a biodegradable drilling fluid will be selected such as Clear-Bore

Training and Communication

- All personnel involved in the drilling works will be trained in the emergency procedure for frac-out and will understand their responsibility for timely reporting of frac-outs;

Frac-Out Incident Preparedness

- Frac-out response equipment will be kept at the drilling location or at a readily accessible location close to the drilling works locations.

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.
- See **Environmental Management Plan for UWF Grid Connection**, Section 6: **Environmental Emergency Procedure for Frac-Out during Drilling Works**.
- **EIA Report, Volume C4**: EIAR Appendices, Appendix 11.4: UWF Grid Connection HDD Risk Assessment

UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 8 Outline Construction Methodologies

**(Further methodologies post planning consent /
pre-construction)**



ECOPOWER

February 2018

Outline Construction Methodologies for the UWF Grid Connection

The Outline Construction Methodologies for all of the main works and activities of UWF Grid Connection 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 Grid Connection are listed in Table 1 and then presented individually.

Table 1: List of Outline Construction Methodologies for the UWF Grid Connection

OCM Ref:	OCM Title	
GC_OCM_01	Pre-Construction Activities	
GC_OCM_02	Construction Works Area Preparation	
GC_OCM_03	Mountphilips Substation Compound	
GC_OCM_04	New End Masts at Mountphilips Substation	
GC_OCM_05	110kV Trenching and Ducting	
GC_OCM_06	110kV Joint Bays and Associated Chambers	
GC_OCM_07	110kV Cable Pulling	
GC_OCM_08	110kV Cable Jointing	
GC_OCM_09	Widening or Resurfacing Existing Private Roads	
GC_OCM_10	New Permanent Access Roads	
GC_OCM_11	Temporary Access Roads	
GC_OCM_12	Temporary and Permanent Site Entrances	
GC_OCM_13	Temporary Compounds	
GC_OCM_14	Horizontal Directional Drilling	
GC_OCM_15	Instream Works Preparation and Reinstatement	
GC_OCM_16	Instream Works	
GC_OCM_17	Temporary Bailey Bridge	
GC_OCM_18	Forestry Felling	
GC_OCM_19	Relocation of Overhead Lines	
GC_OCM_20	Formation of Overburden Storage Berms	
GC_OCM_21	Reinstatement of Land	

Outline Construction Methodology			
Title:	Pre-Construction Activities		Ref: GC-OCM-01
General Description			
Certain activities, will take place prior to the commencement of the main construction stage of the UWF 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	Materials	Machinery & Equipment	
<ul style="list-style-type: none">▪ Main Contractor▪ Project Manager▪ Environmental Clerk of Works▪ Site Ecologist▪ Site Hydrologist	<ul style="list-style-type: none">• None	<ul style="list-style-type: none">• Survey equipment	
Design and Management Activities			
<div>1. The Project Manager, Main Contractor, and the Environmental Clerk of Works will be appointed.</div> <div>2. The Environmental Management Plan will be reviewed and updated to form the Construction Environmental Management Plan, which will include the planning permission details and conditions, the identification of key project personnel and the addition of the Contractors method statements,</div> <div>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,</div> <div>4. Method statements will be prepared by the Contractor. These method statements will be based on the Outline Construction Methodologies.</div> <div>5. Pre-construction monitoring and confirmatory surveys will be carried out by specialist engineering and environmental consultants</div>			
Pre-Construction Windfarm Activities			
<div>1. Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities,</div> <div>2. Pre-construction water quality monitoring surveys will be carried out.</div> <div>3. Pre-construction ecological confirmatory surveys will be carried out.</div>			
END			

Outline Construction Methodology			
Title:	Construction Works Area Preparation		Ref: GC-OCM-02
General Description			
Ahead of construction works in any particular area, the works areas will be set out ahead of construction machinery entering onto the lands			
Duration			
1 day to 1 week depending on the location and length of works area			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• Site engineer• 2 civil works personnel	<ul style="list-style-type: none">• GPS equipment• Hand tools	<ul style="list-style-type: none">• 4 x 4 vehicle and trailer• Fencing posts• Fencing wire• Tape• Portable electric fencer• Goal posts• Signage• Wooden pegs	
Standard Methods			
<div>1. The route of the grid connection within the construction area will be marked out using GPS equipment and wooden pegs</div> <div>2. Construction areas will be set-out using GPS equipment</div> <div>3. The boundary of the construction areas will be temporarily fenced with wooden posts and wire or with electric fences if there is livestock present , and</div> <div>4. 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</div> <div>5. 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. (Project Design Environmental Protection Measure)</div> <div>6. 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. (Project Design Environmental Protection Measure)</div>			
END			

Outline Construction Methodology			
Title:	Mountphilips Substation Compound		Ref: GC-OCM-03
General Description			
The proposed 110kV Mountphilips Substation will facilitate a loop-in connection to the existing Killonan – Nenagh 110kV overhead line (See also OCM-04). This loop-in connection will then be used to connect Upperchurch Windfarm to the National Grid. The Mountphilips Substation compound will contain a control building, surge arrestors, lightening masts circuit breakers, busbars and other ancillary electrical equipment. The substation electrical equipment will be installed once the control building and compound civil works are complete. Fencing and lighting will be erected around the compound for security/protection.			
Duration			
32 Weeks Approx.			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 10 to 15 electrical personnel• 10 to 15 civil works personnel	<ul style="list-style-type: none">• Excavators• Dumpers / loaders• tractors and trailers• Crane• Hoist• Power Tools• Generator• Scaffolding• Vibrating roller• Substation Electrical Equipment• Cabling	<ul style="list-style-type: none">• Clause 804• 6F2 capping stone• Paving.• Fencing• Geotextile• Concrete and concrete blocks• Roofing Timber and other building materials• Tiles and Cladding• Steel Doors	
Standard Methods			
<div>1. The new 110kV Mountphilips Substation will be constructed circa 240m to the east of the existing 110kV overhead line in the townland of Mountphilips near Newport.</div> <div>2. This new Mountphilips Substation will be in a compound of circa 95m x 95m plan area secured by a 2.6m high palisade fence.</div> <div>3. A drainage system will be excavated and installed around the compound area.</div> <div>4. Topsoil and subsoil will be removed to competent from the footprint of the compound using excavators. The excavated material will be temporarily stored in adjacent berms for later use during reinstatement works, as per OCM-020: Formation of Overburden Storage Berms.</div> <div>5. A layer of geotextile material will be laid over the footprint of the compound.</div> <div>6. Using an excavator, a base layer of Clause 804 material will be laid followed by a 6F2 capping layer which will provide the finished surface.</div> <div>7. Each layer will be compacted using a vibrating roller.</div> <div>8. The compound will contain a control building measuring circa 19m x 11m, outdoor electrical equipment, lightening protection and internal access roads.</div> <div>9. Two sets of underground 110kV cables will run from two new end masts to be located along the Killonan to Nenagh 110kV overhead line at a point c.240m to the west of the substation compound and will be connected into the substation from the southern side of the compound.</div>			

10. The Upperchurch windfarm underground grid connection cables will run from Upperchurch Windfarm Substation and will be connected to Mountphilips substation from the northern side of the Mountphilips compound.
11. Once the delivery and installation of all of the High Voltage (HV) and Low Voltage (LV) equipment has taken place and the protection and control cabinets are installed and fully tested the substation can then be energised and commissioned.
12. Water for welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site (Project Design Environmental Protection Measure)

Relevant Drawings from Volume C3 EIAR Figures

Extracts from

Figure GC 5.4: Plan of the Mountphilips Substation Compound

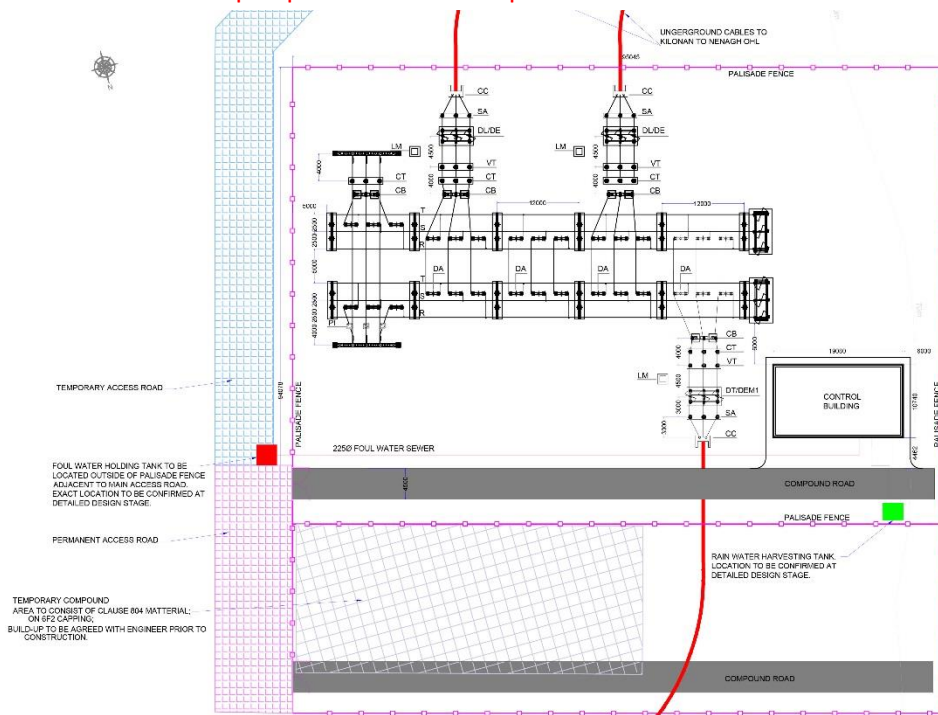


Figure GC 5.5: Elevation Mountphilips Substation Compound

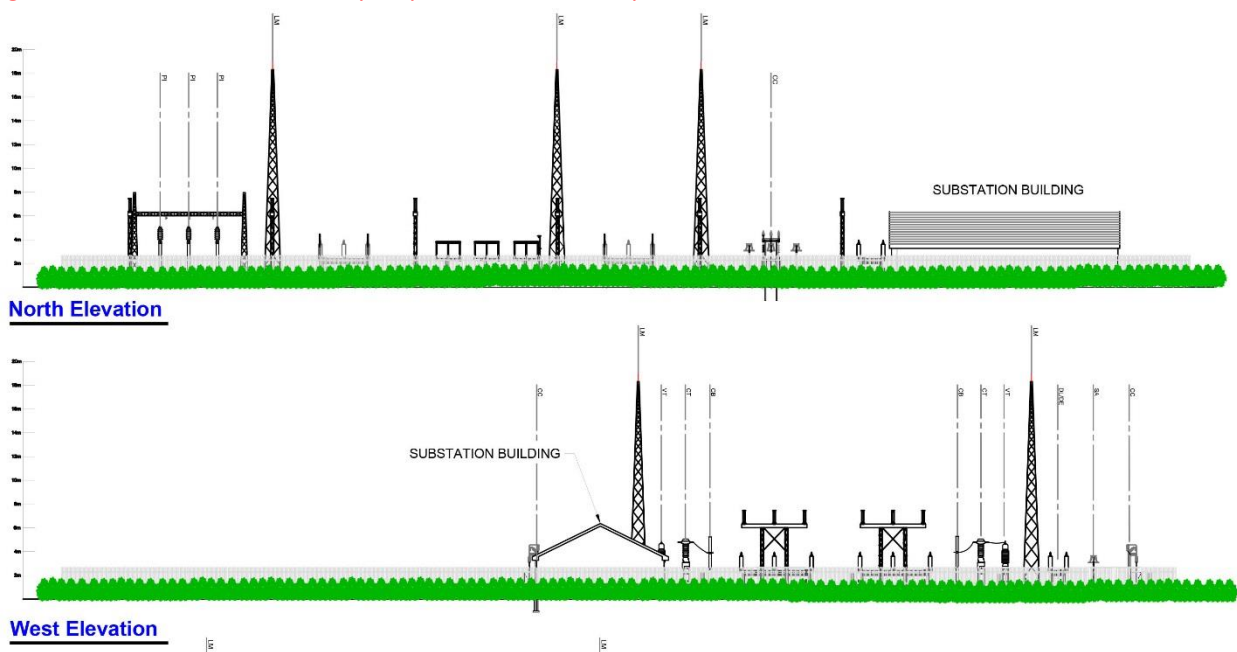
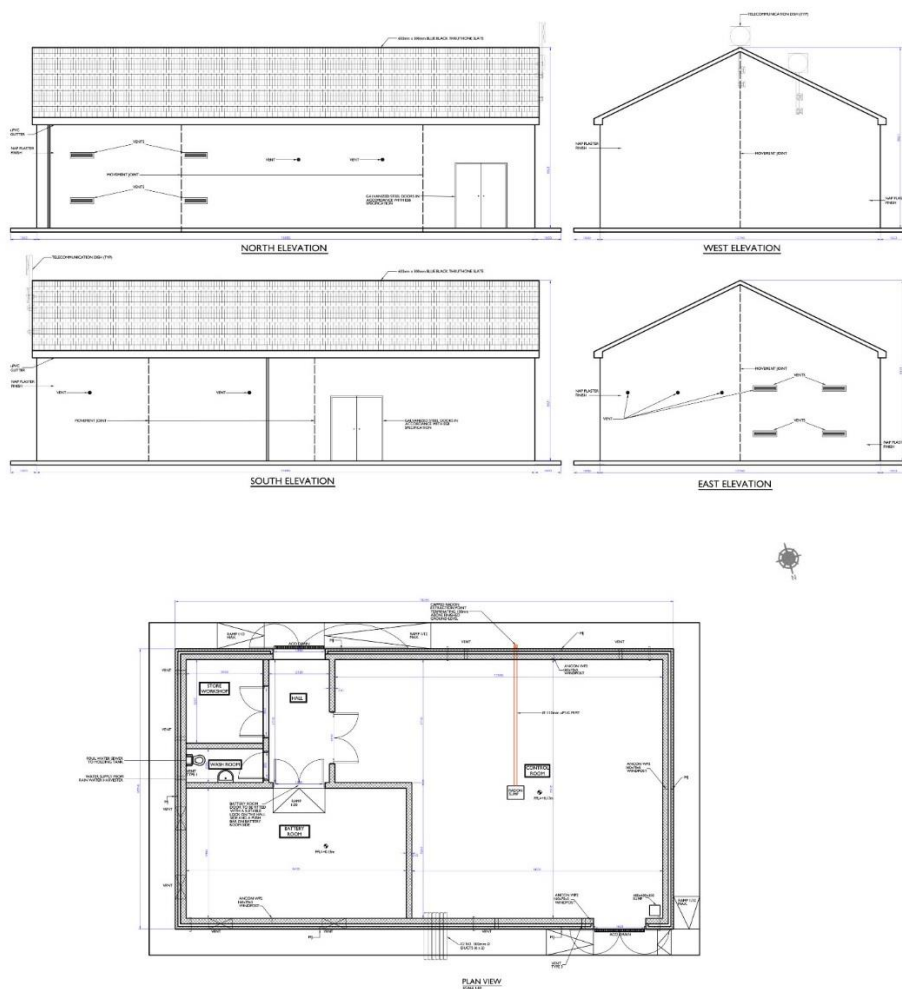


Figure GC 5.6: Plan and Elevation of the Control Building at Mountphilips Substation



Photographs



Example of similar 110kV substation with End Masts connecting to overhead 110kV line

END

Outline Construction Methodology			
Title:	New End Masts at Mountphilips Substation		Ref: GC-OCM-04
General Description			
Two End Masts will be constructed approximately 20m apart at a point along the existing Killonan – Nenagh 110kV Overhead Line, approx. 240m west of the 110kV Mountphilips Substation. The existing 110kV overhead line will be cut and connected to the End Masts. Cables will then be run from Mountphilips Substation to each end mast where they are brought up the mast structure and joined to the overhead line. This will allow electricity to flow from the end masts, through Mountphilips Substation and back to the end masts thus forming a loop-in connection of the Mountphilips Substation to the National Grid.			
Duration			
<ul style="list-style-type: none">• Construction of end mast foundations – 7 days.• Erection of towers - 3 days, weather dependant• Cable jointing – 5 days per tower.			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 5 operatives	<ul style="list-style-type: none">• 4x4 vehicle• Tractor and trailer• Crane Teleporter• Chains / small tools• Tracked Excavator• Tracked Dumper	<ul style="list-style-type: none">• Lattice steel towers• Cable Interface platform• Insulators• Electrical Connections (Jumpering conductors)• Cable sealing ends• Concrete (foundation)• Copper/Aluminium Conductor• Aggregate• Concrete pipes 1m high 1.5m diameter• Reinforcing bars	
Standard Methods			
<ol style="list-style-type: none">1. Each end masts will be assembled on four steel supporting legs. For each leg of the two End Masts (8 in total) a foundation c.3m x 3.6m x 3.6m deep will be excavated and the formation levels (depths) will be checked by the onsite foreman. The excavated material will be temporarily stored close to the excavation site.2. To aid construction, a concrete pipe, 1m high and 1.5m in diameter, will be placed into each excavation to allow operatives level the legs at the bottom of the excavation. Once the legs are levelled and are in situ, the frame of the reinforcing bars will be prepared and strapped to the concrete pipe with spacers as required.3. 1m x 1m shuttering will be installed around the individual legs of each tower and will protrude 300mm over ground level.4. Concrete will then be poured directly into the foundation and into the shuttering up to the required levels. When the concrete is offloaded, the concrete mixers and chutes will be washed out at the designated washout area at Temporary Construction Compound C1.5. Once the concrete is set the shuttering will be removed and the concrete will be allowed to cure for approx. 28 days.6. The area around the end mast foundations will be backfilled with the sub soil material already excavated at the location. The backfill will be placed and compacted in layers with topsoil placed at surface level and any excess material will be permanently stored in a berm alongside the new permanent access road to the Substation.7. Once the concrete is sufficiently cured, work can commence on erecting the bases of the end masts.8. A temporary hardstand area for the crane will be constructed adjacent to the end mast foundations by laying geogrid material on the ground and overlaying this geogrid with a suitable grade of aggregate.9. When the bases for the masts are assembled and in place, the upper sections of the masts will be assembled horizontally on the ground beside the mast bases.10. The overhead line will then be switched out (de-energised).11. The overhead line can then be moved off centre using stay wires and weights.12. The pre-assembled upper mast sections will then be lifted onto the base sections using the crane and guide ropes and bolted into position.			

13. When the masts are complete and secured to the bases, the overhead line will be centred and attached to the end masts. The section of the electric line between the two masts will then be cut and removed.
14. Cable interface platforms will be lifted into place on the masts and all electrical equipment will be bolted down onto these platforms.
15. Two sets of underground cables will be constructed from the Mountphilips Substation and will connect to the end masts, one cable set to each mast. The cables will be brought up in steel trunking along the front face of the masts to the cable interface platforms.
16. Jumpering Conductors (for electrical connections) will be installed from the overhead line down onto the interface platform and jointed to the cables.
17. Scaffolding will be erected at the side of both towers to enable the cable jointers to work in a controlled environment.
18. Once all works have been completed on the platforms the scaffolding will be taken down and the area cleared of all work materials. The temporary crane hardstand will be removed and the area reinstated and reseeded.
19. The circuit will be tested in both directions before the overhead line is re-energised

Reference Documents

- ESB specification Drawing PE610-D005-024-001-000

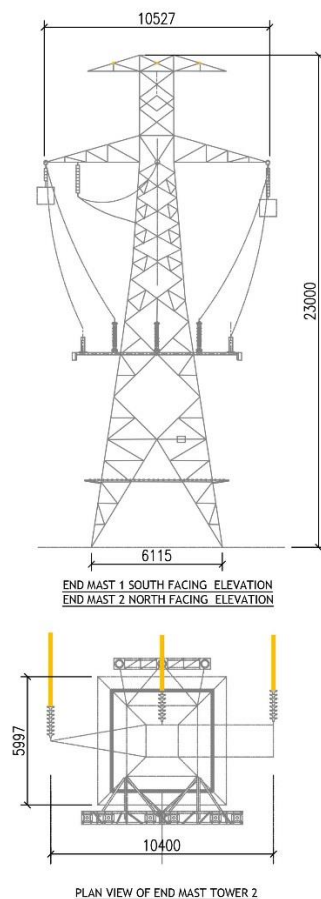
Photographs



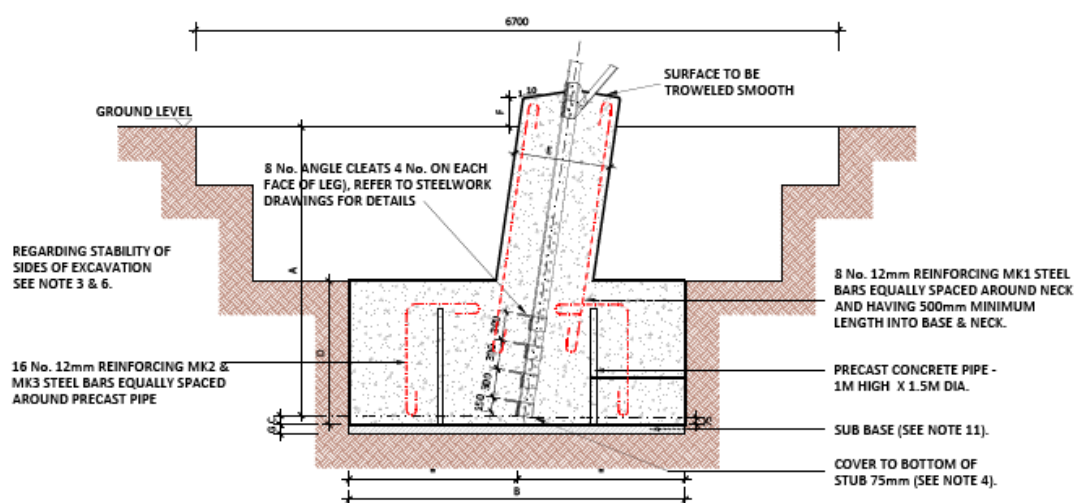
Typical tower base

Relevant Drawings from Volume C3 EIAR Figures

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



Tower Foundation



END

Outline Construction Methodology			
Title:	110kV Trenching and Ducting		Ref: GC-OCM-05
General Description			
A trench of c.1.25m deep, 0.6m wide will be dug to accommodate 5 No. ducts necessary for the grid connection works. Three of these ducts will be used to contain the grid connection electrical cables and 2 of them will be used to house the telecommunications cables. Up to 2.2km of copper wire (between single point bonded sections) will also be contained within one of the telecoms duct at various locations along the route			
Duration			
<ul style="list-style-type: none">▪ The civil contractor carrying out the standard 110kV trenching and ducting will complete between 50 to 70 linear metres of trench per crew per day depending on the site conditions▪ Up to 6 crews will be working at any one time▪ Approximate duration 16-18 weeks.			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 2-3 general operatives & 1 Excavator Operator per crew• 1 geotechnical engineer/ appropriately competent person to supervise works in peatland (Variation 5A)	<ul style="list-style-type: none">• 13 ton tracked excavator per crew• 1 tracked dumper and tractor and trailer per crew• 1 long reach, low ground pressure tracked excavator• 1 No. vibrating compaction plate per crew• Brush & mandrel	<ul style="list-style-type: none">• Blinding Concrete where necessary• Clause 804 Material• 150mm rock fill• 160mm and 125mm diameter uPVC ducting• Red cable marker strip Yellow marker warning tape• CGBM4 lean mix concrete• Duct spacers• Nylon ropes	
Standard Methods			
<ol style="list-style-type: none">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, see GC.OCM-20: Formation of Overburden Storage Berms.4. A bedding layer of lean mix concrete will be placed at the bottom of the trench.5. 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.6. The ducts will be surrounded and covered with the lean mix concrete and concrete will then be compacted.7. Red cable marker warning strips will be placed on the compacted lean mix concrete directly over the three ducts which will contain the electrical cables.8. The top two ducts, which will contain the fibre optic cables, will then be installed by hand on top of the red cable marker.9. The top ducts will then be surrounded and covered with lean mix concrete material and compacted.10. Another layer of red cable protection strip will be placed on top.11. A layer of Clause 804 backfill or sub-soil backfill as specified will then be laid to within 300mm of the ground surface and compacted.12. Yellow warning tape, will be placed over the compacted Clause 804 backfill or sub-soil backfill.13. A final layer of Clause 804 or topsoil, as specified, will then be placed in the trench to ground level.14. For public road sections, immediate reinstatement will be carried out using road surfacing material to surface level.15. For forestry roads and farm roads, the top of the trench will be backfilled using Clause 804. Where the road needs to be widened, stone will be brought in to build up the area to the same level as the existing road in accordance with GC.OCM-09: Widening or Resurfacing Existing Private Roads.16. For grass/forestry firebreak sections, the top of the trench will be backfilled with suitable excavated material to 300mm below ground level. The remaining 300mm of the trench will be backfilled with topsoil.			

17. The ducts will be cleaned and tested by pulling through a brush and mandrel. A nylon draw rope will be installed in each duct, and all ducts will be sealed using duct end seals fitted with rope attachment eyes in preparation for cable installation at a later date.

Marker Posts

1. Marker posts will have a centred lightning symbol, on engineering grade fluorescent yellow background.
2. Marker posts will be used on public road verges, at public road crossing points and on non-roadway routes to delineate the duct route and joint bay positions.
3. Marker plates will be inserted where the grid connection cable runs in the centre of roadways and farm tracks.
4. The siting of marker posts and plates will be dictated by ESBN as part of the detailed design process

Variation 5A: Section 39 On Peatland in forestry in Castlewaller and Killeen townlands

Section 39 of the 110kV UGC at Castlewaller/Killeen runs through forestry growing in peat of varying depths. A floating road will be used to facilitate the installation of the grid connection works by providing a stable platform to store excavated material and to transport concrete, rock infill, ducting etc.

1. A corridor of trees, 15m wide, will be felled along the route of the 110kV UGC through Castlewaller forestry.
2. The floating road will be constructed by placing the felled trees and branches along the northern side of the felled corridor on top of the peat so they form a supporting layer for the floating road. Before the trees are laid down at locations where main drains cross the corridor, culverts will be placed into the existing main drains to maintain the existing drainage regime. It is estimated that there will be about 10 main drains crossing beneath floating road and grid connection works in this manner.
3. Any minor drains will be connected to the culverted main drains upslope of the works by excavating interceptor drains parallel to the works so water flows from the minor drains into the main drains then under the floating road and grid connection works area. This will prevent any ponding of water upslope of the works and avoid water coming into contact with any sediment from the works.
4. Once the trees have been laid along the route of the proposed floating road, a layer of geogrid will be laid on the felled trees and a layer of granular fill (Class 6 F or similar) will be spread on top of geogrid. A second layer of geogrid will then be laid on the granular fill and a capping layer of granular fill laid to complete the construction of the floating road.
5. The grid connection trench will then be dug by a long reach, low ground pressure tracked excavator working on the peat surface and will excavate a trench to a depth of 0.2m into the competent layer beneath the peat.
6. The extracted peat will be placed by the long reach excavator onto the far side of the floating road (upslope side). The ground conditions at the location of any placed peat will be inspected prior to placement by a competent geotechnical engineer.
7. As the peat is being extracted a second excavator, working from the near side of the floating road will immediately back fill the excavated trench with a layer of 150mm rock fill. This layer of rock will be brought up to a depth of 1.25m from the top of the trench. A bedding layer of lean mix concrete will then be laid and works described at 5,6,7,8,9,10,11 and 12 described in Standard Methods above will be carried out. The final layer to the top of the trench will be finished with a 0.3m layer of peat.
8. All excavations will be adequately supported with shoring systems if required or alternatively, peat slopes will be battered to a safe slope inclination if required. Slope inclinations on stored peat will be reviewed by a geotechnical engineer or appropriately competent person during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.
9. The works will be supervised by a geotechnical engineer or appropriately competent person, as appropriate.
10. Only short sections (about 20m length) of the trench will be opened at any one time and construction works to infill the trench will be carried out in the shortest possible time.
11. All excavated peat that is stored along the route will be graded to complement the topography and drainage system in the area.
12. Once works through the peatland have been completed, and bare peat/soil will be re-seeded by hand. The surface of the road will be covered with geo-cell which will be covered with peat and planted with seeds and local vegetation

Reference Documents

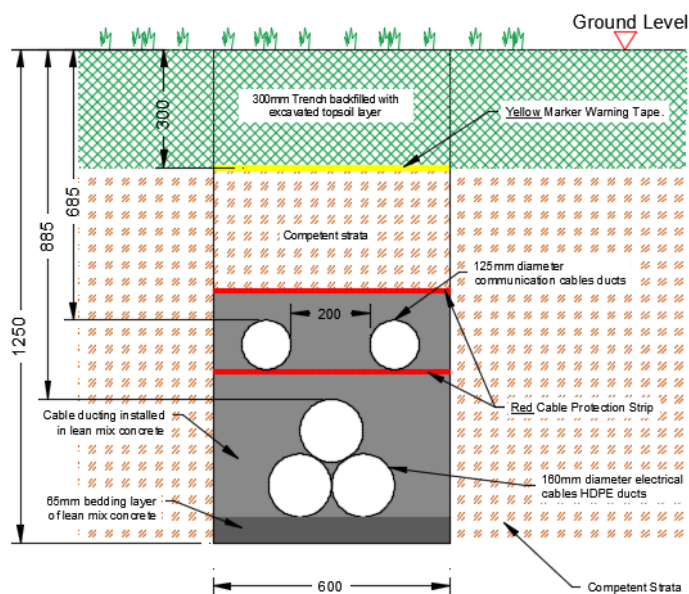
- ESB Specification
- Standard Trench Cross Section Trefoil Formation (PE424-D7001-001-003-005)
- Standard Trench Cross Section Flat Formation (PE424-D7001-001-005-002)

- EirGrid Specification

Relevant Drawings from Volume C3 EIAR Figures

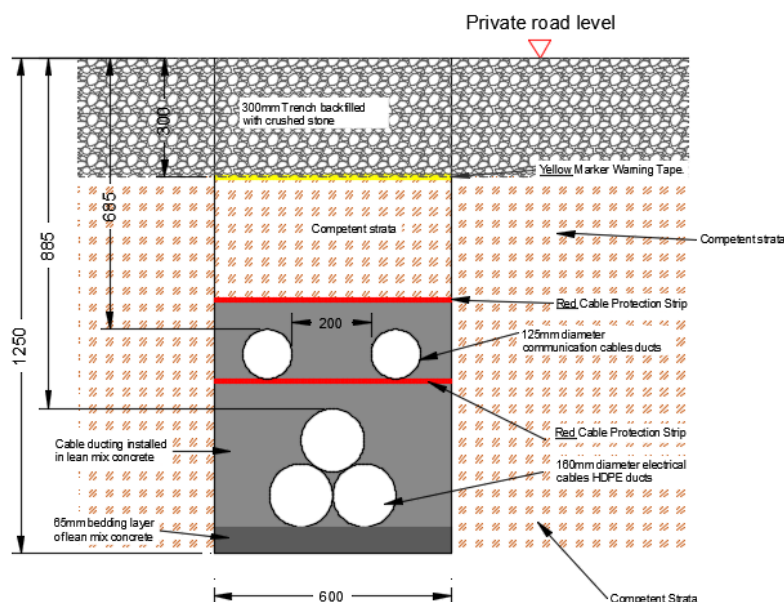
Extract from

Figure GC 5.8: Cross Section Views of Mountphilips - Upperchurch 110kV Underground Cables Trench



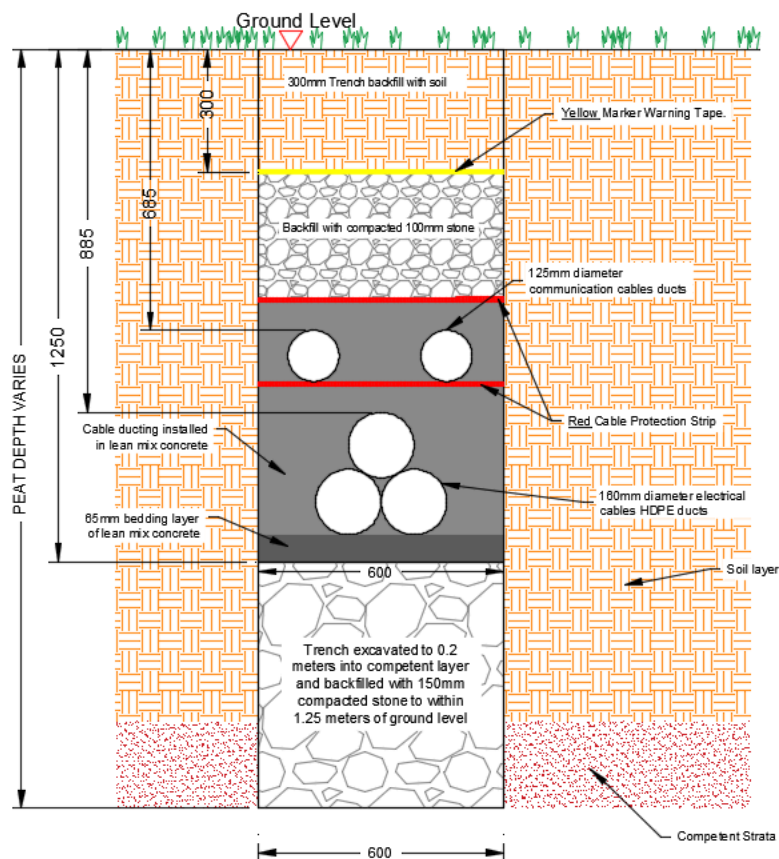
110kV CABLES TRENCH - TYPICAL SECTION THROUGH AGRICULTURAL LANDS

Figure GC 5.8: Cross Section Views of Mountphilips - Upperchurch 110kV Underground Cables Trench



110kV CABLES TRENCH - TYPICAL SECTION THROUGH PRIVATE ROADS

Figure GC 5.8: Cross Section Views of Mountphilips - Upperchurch 110kV Underground Cables Trench



110KV CABLES TRENCH -TYPICAL CROSS SECTION THROUGH PEATLAND - SECTION NUMBER S39

Figure GC 5.10: Cross Sections of 110kV UGC in Public Road Pavements or Verges

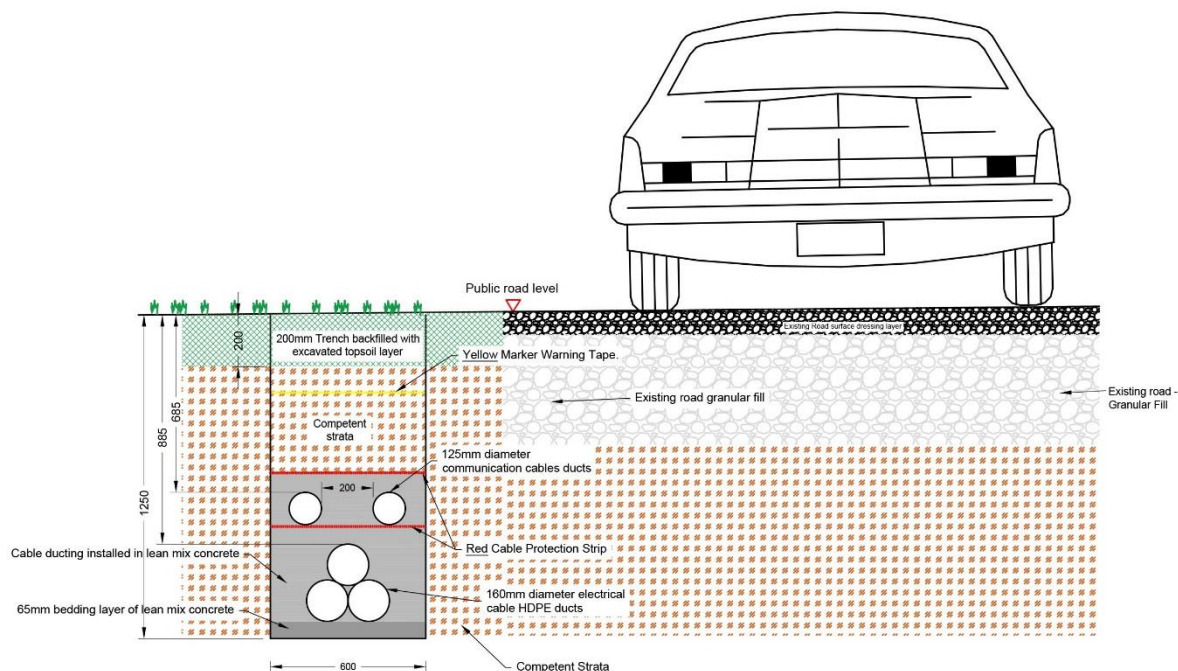


Figure GC 5.16: Cross Section View of New Permanent Concealed Floating Access Roads through Castlewaller (inside the SPA)

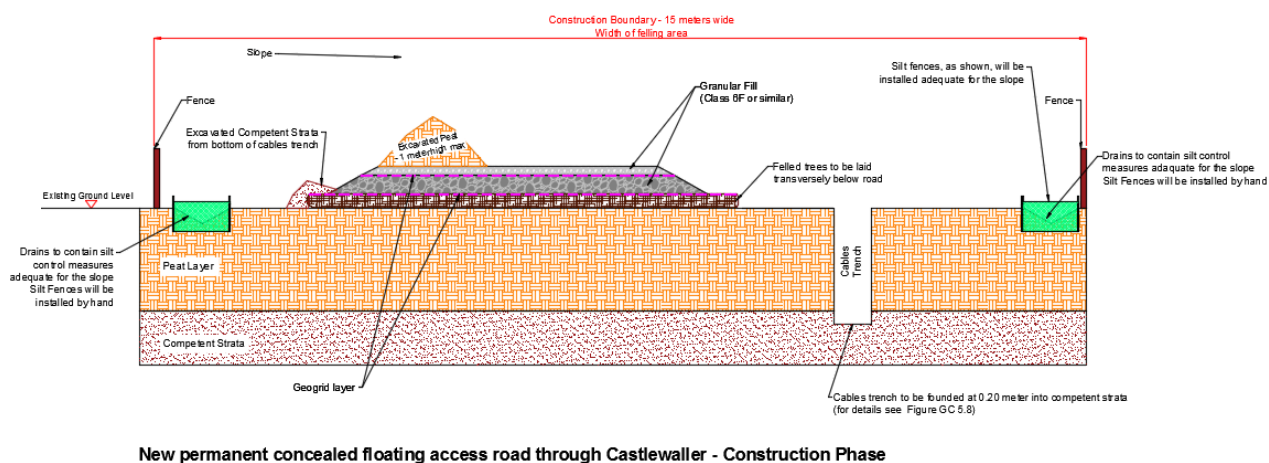
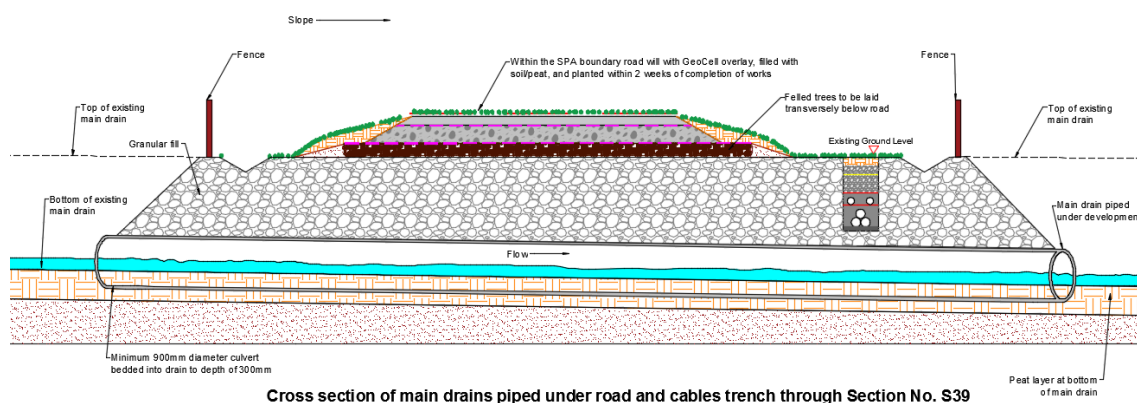


Figure GC 5.16.1: Plan and cross section views of the New Permanent Concealed Floating Access Road and existing drains through Castlewaller (Section Number S39)



Photographs



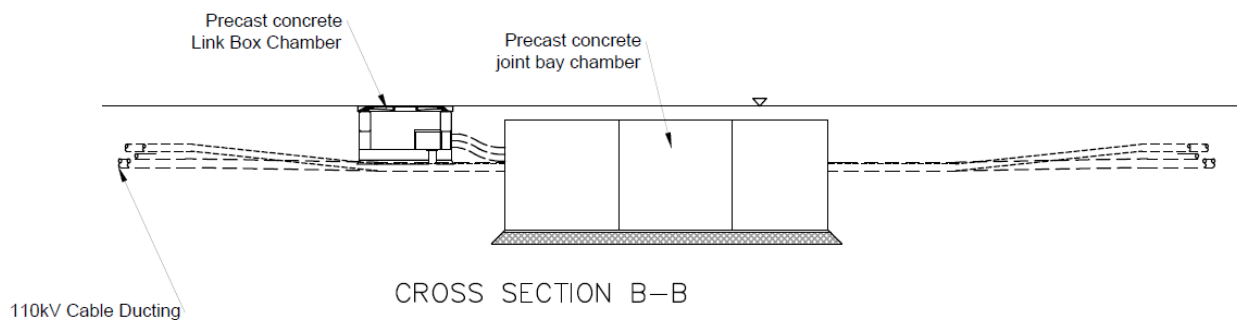
Typical 110kV Cable Trench on public roads



Typical 110kV Cable Trench in grassland

END

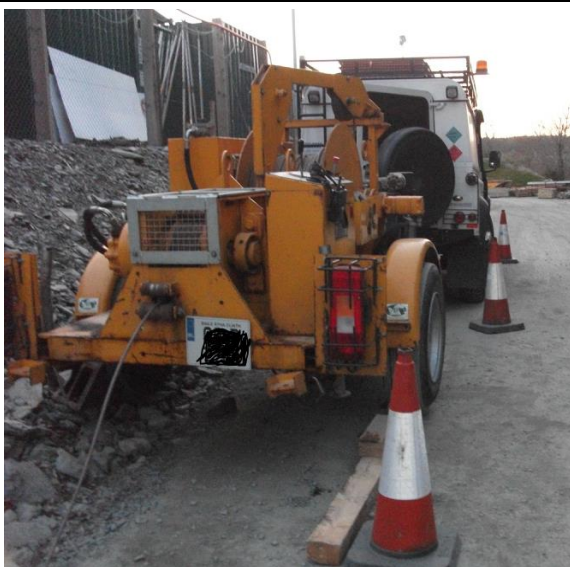
Outline Construction Methodology			
Title:	110kV Joint Bays and Associated Chambers		Ref: GC-OCM-06
General Description			
Along the UWF Grid Connection route there will be 38 No. Joint Bay locations. These locations will contain joint bay chambers, communication chambers and link box chambers, located underground and adjacent to each other. Joint Bays will be constructed using precast concrete chambers. The joint bay chambers are used to join lengths of cable that form the Mountphilips – Upperchurch 110kV grid connection.			
Duration			
2-3 days per joint bay location			
Personnel		Materials	Machinery & Equipment
<ul style="list-style-type: none">2-3 General Operatives1 Excavator Operator		<ul style="list-style-type: none">360° tracked excavator1 no. tracked dumper or tractor and trailerWater Pump & HosesCompactor	<ul style="list-style-type: none">Bedding sandClause 804 MaterialHDPE ductingPrecast Chamber UnitsLink Box ChamberCopper cable (for earthing of the link box and joint bay chamber)Earth Rods
Standard Methods			
<ol style="list-style-type: none">A pit will be excavated to a depth of c.2.5m, deep enough to accommodate the joint bay chamber.A layer of 200 mm deep Clause 804 granular material will be placed on the bottom of the excavation. A 50 mm layer of sand will be then be laid on top of the Clause 804 to provide a level base for the pre-cast joint bay chamber. The joint bay will then be lifted and placed on the sand layer. The level of bottom of the joint bay will be adjusted so that the finished level of the top of the joint chamber will match the surrounding ground surface level.The pre-cast concrete sections for the communication chambers and earth sheath link chambers will be also placed on the sand bedding and installed so that the top of the chambers will be level with the surface ground levels.Earthing rods and earthing cables will be installed as per design. Typically, steel rods are driven into the ground and connected back to the chambers using copper conductor or wire.The excavations around the precast concrete joint bays will be backfilled with granular fill and compacted in layers up to the existing ground level.Once constructed, the joint bays can be infilled with sand or covered with a precast concrete cover until the cable pulling and jointing works are scheduled.Following the completion of the cable pulling and cable jointing, the joint bay will be backfilled with sand to a depth of 250 mm below surface. The sand will be backfilled in layers and compacted.The joint bay chamber will have a precast concrete cover placed on top of the sand infill at the finished surface level. Steel access covers will be fitted to the communication chamber and earth sheath link chambers at the finished surface level.The work area around the Joint Bays will be reinstated.			
Reference Documents			
<ul style="list-style-type: none">ESB SpecificationESB Specification 18153			

Relevant Drawings from Volume C3 EIAR Figures**Extract from Figure GC 5.9: Cross Section Views of 110kV UGC Joint Bays****Photographs****Typical joint bay under construction (pre-cast)**END

Outline Construction Methodology			
Title:	110kV Cable Pulling		Ref: GC-OCM-07
General Description			
Cables will be pulled, from one joint bay to the next joint bay along the cable route, through the ducting installed in the cable trench using a cable pulling winch. Three electrical cables and two communication cables will be pulled into the ducts, one cable to each duct. The electrical and communication cables will be supplied on steel or timber cable drums.			
Duration			
Site specific, 1 day per cable section between joint bays depending on conditions			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">4 electrical personnel	<ul style="list-style-type: none">Cable Winch and four wheel drive vehicle.Nylon Ropes & Rope Guide Roller.Swivel Link.Drum trailer and tractor.	<ul style="list-style-type: none">Cable attachment lugs110kV Electrical CableFibre optical cableCable Pulling stockings	
Standard Methods			
<div>1. The cable drums will be transported from the temporary compounds to the Joint Bay locations using a truck and low loader or tractor and drum trailer. The cable pulling winch will be transported to the next joint bay location along the route using a tractor or four wheel drive vehicle.</div> <div>2. The winch will be parked and anchored at the mouth of the joint bay and the winch wire rope will be pulled, using nylon ropes, through the ducts to the next joint bay along the cable route where the cable drum is parked.</div> <div>3. When the winch rope emerges from the duct at the joint bay where the cable drum is parked, it will be connected to the cable using approved suitably sized and rated cable pulling stockings and swivels or alternatively using a pulling head fitted to the cable by the manufacturer.</div> <div>4. Rope guide rollers will be placed at the duct opening to guide the cable into the duct.</div> <div>5. If required, lubrication will be applied to the cable coating before it enters the duct. Lubricants will be stored in designated bunded storage areas in the temporary compounds.</div> <div>6. The winch will pull the cable from the cable drums through the ducts until it reaches the joint bay where the winch is located.</div> <div>7. Once the pulled cable has reached the winch, the cable is cut, coiled and placed back into the joint bay chamber in preparation for Cable Jointing</div>			
Variation 7A: Cable Jointing at a later date			
<div>1. Where the cable jointing work is not scheduled to take place immediately after the cable has been pulled into the joint bay, the joint bay will be covered until the jointing works can take place</div>			
Reference Documents			
<ul style="list-style-type: none">ESB Specification			


Photographs

**HV cable pulling procedure
(Typical drum set-up)**



Cable Winch

END

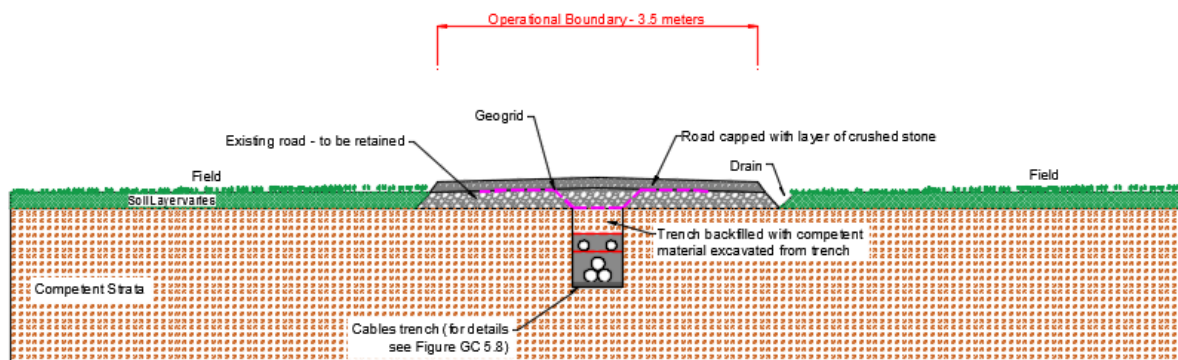
Outline Construction Methodology			
Title: 110kV Cable Jointing		Ref: GC-OCM-08	
General Description			
Cable jointing is carried out at the joint bays in order to join two lengths of cable.			
Duration			
Circa 2 days per joint bay			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 3 Cable Jointers	<ul style="list-style-type: none">• Tractor Unit and trailer with Hi-Ab or City Crane• Heating blankets• Hand tools• Jointing Container• 1 Excavator Operator• 360° tracked excavator• 1 no. tracked dumper or tractor and trailer	<ul style="list-style-type: none">• Sand for pipe bedding• Cement-bound sand• Sand bags	
Standard Method			
<div>1. A jointing container will be transported to the joint bay location and lifted into place and positioned over the joint bay using a Hi-Ab or city crane,</div> <div>2. The jointing container will provide a controlled environment in the joint bay where the cables will be heated for several hours using heating blankets.</div> <div>3. After the cables are heated the cable jointing procedure will be carried out,</div> <div>4. Jointing works will involve the joining of the cables and the sealing of ducts in the joint bay using hand held equipment ensuring the area and cable is kept clean from any dust or dirt.</div> <div>5. Following the completion of jointing and duct sealing works in the joint bay, the cable joints will be supported by placing compacted cement-bound sand in c. 200 mm layers up to the level of the cable joint.</div> <div>6. Testing will then be carried out on the joint once it is fully supported by the sand base.</div> <div>7. Once testing is complete additional layers of cement-bound sand will be laid and compacted in the joint bay chamber until the cement-bound sand is 100mm above the level of the top of the joint,</div> <div>8. A Cable protection strip is then placed over the compacted sand 100mm above the joint and another layer of warning tape will be placed 400mm below the finished ground level of the joint bay.</div> <div>9. The joint bay will be backfilled with cement-bound sand to a depth of 150 mm below ground level. A 150mm precast concrete cover then will be placed over the joint bay.</div> <div>10. The ground over and around the joint bay location will then be reinstated.</div>			
Photographs			
<div></div>			
Typical HV cable jointing container			
END			

Outline Construction Methodology			
Title:	Widening or Resurfacing Existing Private Roads		Ref: GC-OCM-09
General Description			
Some existing farm and forestry roads require widening and/or resurfacing to accommodate the construction machinery, cable ducting and access to joint bays. All upgrading of existing roads will at a minimum, return them to the condition they were in when newly built.			
Duration			
1 day per 200m			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• Site Engineer• Crew size: 3 operatives• 1 Excavator Operator	<ul style="list-style-type: none">• Clause 804 Stone• Geotextile• Granular fill as per design• 	<ul style="list-style-type: none">• 4x4 vehicle• Wheeled dumper or Track dumper• 360° tracked excavator.• Vans• Vibrating roller	
Standard Methods for widening roadway.			
<div>1. The stretches of roadway that require widening will be marked out by the site engineer.</div> <div>2. Geotextile matting will be used to tie in the widened road sections into the exiting road.</div> <div>3. The existing drainage regime will be maintained or new drains will be dug where required.</div> <div>4. Dump trucks will be used to transport stone and other material as required.</div> <div>5. 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 GC.OCM-20: Formation of Overburden Storage Berms.</div> <div>6.</div> <div>7. A stone sub-base will be laid if required.</div> <div>8. A surface layer will be laid over the widened road, which will consist of 150mm compacted granular fill, suitable to accommodate HGV traffic.</div> <div>9. The stone will be compacted using a vibrating roller.</div> <div>10. The surface will be finished with a 1% gradient to allow water run-off.</div>			
Variation 9A: Carrying out resurfacing work only to existing roads.			
<div>1. A surface layer will be laid over the existing road which will consist of 150mm compacted granular fill, suitable to accommodate HGV traffic.</div> <div>2. Each layer will be compacted using a vibrating roller.</div> <div>3. The surface will be finished with a 1% gradient to allow water run-off</div>			

Relevant Drawings from Volume C3 EIAR Figures

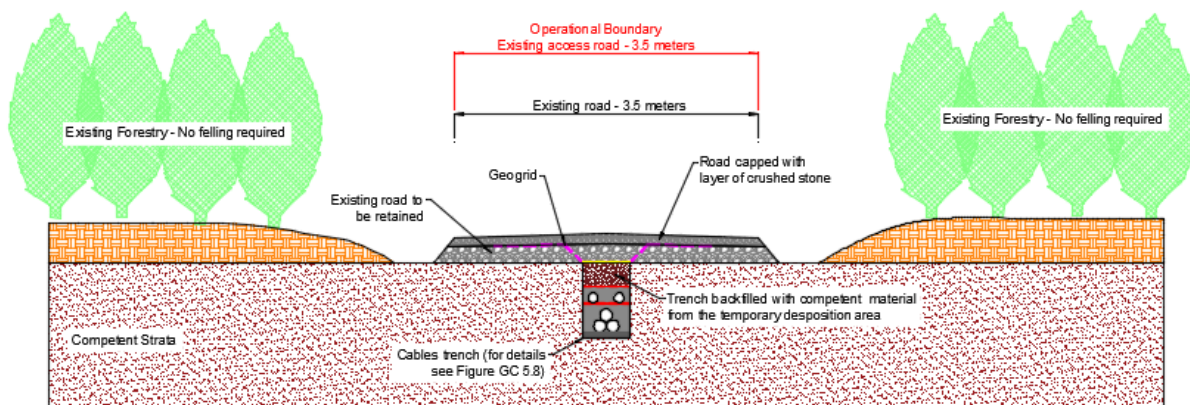
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Figure GC 5.11: Cross Section View of 110kV UGC in Existing Farm Roads (Upgraded)



Cross Section of Upgraded Existing Farm Roads and Cables Trench - Operational Phase

Figure GC 5.12: Cross Section View of 110kV UGC in Existing Forestry Roads (Upgraded)



Cross Section of Upgraded Existing Forestry Roads and Cables Trench - Operational Phase

END

Outline Construction Methodology			
Title:	New Permanent Access Roads		Ref: GC-OCM-10
General Description			
New permanent access roads 3.5m in width, will be constructed to provide vehicular access to Joint Bays and construction works areas.			
Duration			
Site Specific, c.100m/day			
Personnel		Materials	Machinery & Equipment
<ul style="list-style-type: none">Site EngineerCrew size: 3 operativesExcavator OperatorSite Ecologist		<ul style="list-style-type: none">4x4 vehicleWheeled dumper or Track dumper (6 to 8 tons)360° tracked excavator.VansVibrating RollerTree harvester	<ul style="list-style-type: none">Pre-cast culverts50mm crushed stoneGeotextileGranular fill as per design
Standard Method			
<ol style="list-style-type: none">The route of the new access road will be marked out using GPS equipment and wooden pegs by the site engineer.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. Goal posts will be erected under overhead electricity and telephone lines.An excavator will excavate the width of the new access road which will include a roadside drainage channel. All organic material and soft subsoil will be removed to formation level. Soft spots will be excavated and filled with suitable granular material. Excess material will be stored in berms alongside the new road.Geotextile material will be installed where necessary (subject to site conditions).A minimum sub-base will be laid which will consist of 200mm of crushed stone and compacted in layers.A surface layer of granular fill will then be laid and compacted. A vibrating roller will compact each layer.The surface of the new road will be finished with a 1% gradient to allow water run-off.			
Variation 10A: New Permanent Floating Road through Castlewaller Forestry			
<ol style="list-style-type: none">The new permanent floating road will be 4.5m in width.The alignment of the floating road will be marked out by the site engineer prior to works commencing.A corridor of trees, 15m wide, will be felled along the route of the 110kV UGC through Castlewaller forestry.A floating road will be constructed to facilitate the trenching and ducting works in Castlewaller forestry by placing the felled trees and branches along the northern side of the felled corridor on top of the peat so they form a supporting layer for the floating road. Before the trees are laid down at locations where main drains cross the corridor, culverts will be placed into the existing main drains to maintain the existing drainage regime. It is estimated that there will be about 10 main drains crossing beneath floating road and grid connection works in this manner.Any minor drains will be connected to the culverted main drains upslope of the works by excavating interceptor drains parallel to the works so water flows from the minor drains into the main drains then under the floating road and grid connection works area. This will prevent any ponding of water upslope of the works and avoid water coming into contact with any sediment from the works.Once the trees have been laid along the route of the proposed floating road, a layer of geogrid will be laid on the felled trees and a layer of granular fill (Class 6 F or similar) will be spread on top of geogrid. A second layer of geogrid will then be laid on the granular fill and a capping layer of granular fill laid to complete the construction of the floating road.A vibrating roller will compact each layer.			

8. The surface of the new road will be finished with a 1% gradient to allow water run-off.

Variation 10B: Concealed Roads

1. All new permanent roads within the Slievefelim to Silvermines SPA boundary will be concealed with a geocell or geohex type membrane, which will comprise of hexagonal shaped cells which interlock to provide a strong load bearing surface.
2. The geocell/geohex material will be overlaid on the newly constructed road surfaces and excavated topsoil/peat will be spread over the geocell/geohex, filling each cell with soil.
3. The cells will be planted by the Site Ecologist with locally sourced native heathers and grasses.

Relevant Drawings from Volume C3 EIAR Figures

Extract from

Figure GC 5.14: Cross Section of New Permanent Access Roads outside Slievefelim to Silvermines SPA

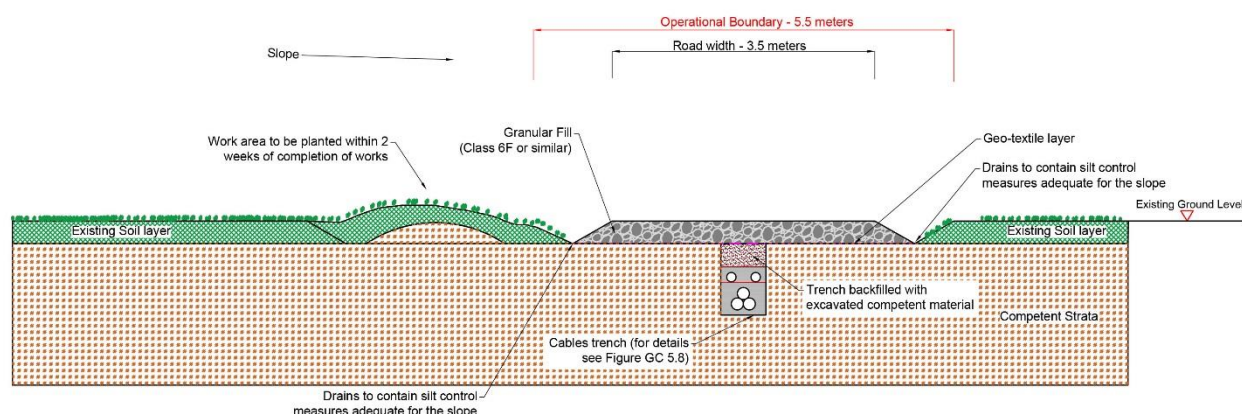


Figure GC 5.15: Cross Section of New Permanent Concealed Access Roads inside Slievefelim to Silvermines SPA

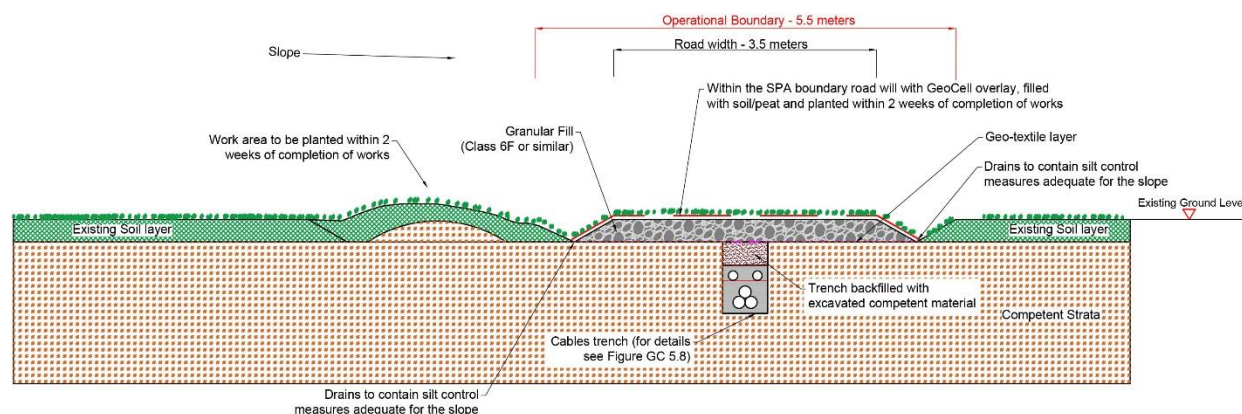
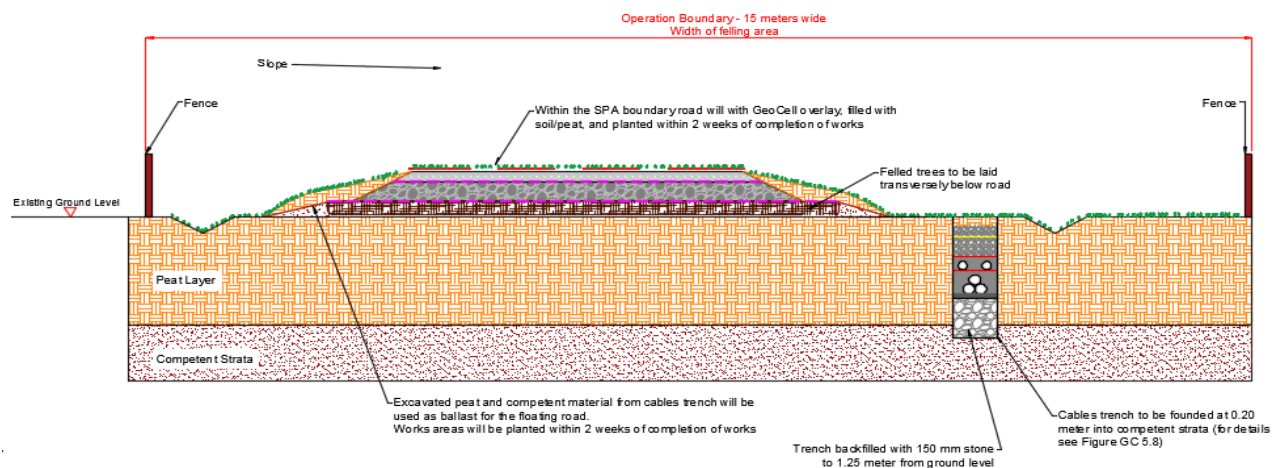


Figure GC 5.16: Cross Section of New Permanent Concealed Floating Access Roads through Castlewaller (inside the SPA)



New permanent concealed floating access road through Castlewaller - Operational Phase

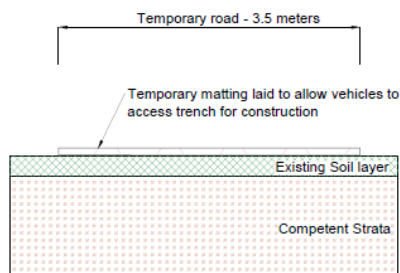
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Outline Construction Methodology			
Title:	Temporary Access Roads		Ref: GC-OCM-11
General Description			
Temporary access roads will provide access to off-road works locations and will be circa 3.5m in width.			
Duration			
Site specific, c.150m per day			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• Site Engineer• Crew size: 3 operatives 1 Excavator Operator	<ul style="list-style-type: none">• 4x4 vehicle• Excavator• Vans• Vibrating roller• Wheeled or tracked dumper	<ul style="list-style-type: none">• Geotextile• Plastic Mats / Aluminium Panel Tracks• Pre-cast culverts• 50mm crushed stone	
Standard Method - 3.5m wide excavated stone road			
<div>1. The alignment of the temporary road will be marked out by the site engineer.</div> <div>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 GC.OCM-20: Formation of Overburden Storage Berms, for later use during reinstatement works along the footprint of the temporary access road.</div> <div>3. The depth and width of soil removal will be kept to a minimum.</div> <div>4. A layer of geotextile material will be laid over the excavated ground</div> <div>5. A layer of 200mm deep of 50mm crushed stone will then be overlaid on the geotextile and compacted in suitable layers using a vibrating roller.</div> <div>6. Reinstatement will take place when the grid connection works necessitating the temporary road have been completed. 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. The soil will be levelled and reseeded. .</div>			
Standard Method - 3.5m wide floating stone road			
<div>1. The alignment of the temporary road will be marked out by the site engineer.</div> <div>2. A layer of geotextile material will be laid over the ground, and extend slightly beyond, the footprint of the road</div> <div>3. 50mm crushed stone will then be overlaid on the geotextile and compacted in suitable layers using a vibrating roller.</div> <div>4. Reinstatement will take place when the works necessitating the temporary road have been completed. 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..</div>			
Standard Method - Temporary bog mat or panel track road			
<div>1. The alignment of the temporary road will be marked out by the site engineer.</div> <div>2. A layer of geotextile material will be laid over the ground, and extend slightly beyond, the footprint of the road</div> <div>3. Plastic or aluminium mats will be laid over the geotextile.</div> <div>4. Once the works necessitating the temporary road is complete the matting and geotextile will be removed from the site.</div>			

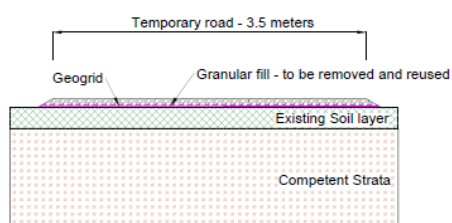
Relevant Drawings from Volume C3 EIAR Figures

Extract from

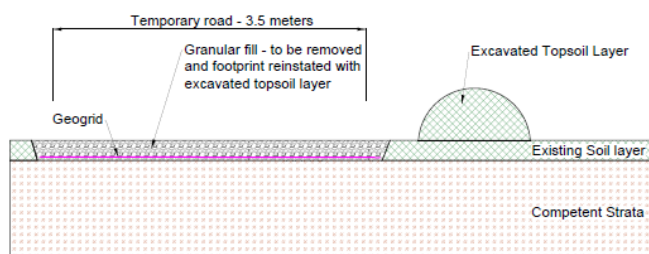
Figure GC 5.17: Cross Section Views of Temporary Access Road (3 types)



Cross Section of temporary access road - Matting



Cross Section of temporary access road - Floating road



Cross Section of temporary access road - cut and fill

Photographs



Temporary Aluminium Panel Tracks

END

Outline Construction Methodology			
Title:	Temporary and Permanent Site Entrances		Ref: GC-OCM-12
General Description			
Some existing farm entrances off the public road network will be temporarily widened to facilitate construction and operational access. These site entrances will be reinstated following the completion of construction works. The site entrance to Mountphilips 110kV Substation at Coole and to Temporary Construction Compound No. 2 in Bealaclave will be permanently widened and roadside hedgerows will be removed to achieve sightlines at these entrances.			
Duration			
1-2 days per entrance			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• Site engineer• 3 crews• Crew size: 3 workers• Traffic flagmen	<ul style="list-style-type: none">• 4x4 vehicle• 1 dumper per crew• 1 excavator per crew• Chains / hand tools• Vibrating rollers	<ul style="list-style-type: none">• 50mm Crushed Stone• Geotextile• Gates• Timber posts• Rail fence• Granular fill• Fencing materials• Silt fences	
Standard Method - Permanent Site Entrances (E1 at Coole, E15 at Bealaclave)			
<div>1. Prior to works at the entrances commencing, traffic management controls will be put in place and flagmen deployed</div> <div>2. The roadside fencing and hedgerows will be cleared back until adequate sightlines are achieved,</div> <div>3. Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary</div> <div>4. Any hedgerows or trees removed during widening of the entrance will be replaced behind the new sightlines.</div> <div>5. A base layer of stone, followed by subsequent layers of smaller graded stone and a final layer of capping stone will be laid over the excavated verge. A vibrating roller will be used to compact each layer.</div> <div>6. The final capping layer will be profiled to the existing road surface level and will provide a suitable surface to accommodate the delivery of materials, plant or equipment.</div> <div>7. The new verge at each side of the widened site entrance will covered with soil and reseeded.</div>			
Standard Methods – Temporary Entrances			
<div>1. Prior to works at the entrances commencing, traffic management controls will be put in place and flagmen deployed.</div> <div>2. The roadside fencing or hedges at site entrances will be removed to a width of circa 5 meters to provide access to the construction works area.</div> <div>3. Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary</div> <div>4. The roadside verge will be excavated down to a suitable formation level. Excavated material will be stored in berms along construction works areas. These berms will be constructed as per GC.OCM-20: Formation of Overburden Storage Berms.</div> <div>5. A base layer of stone, followed by subsequent layers of smaller graded stone and a final layer of capping stone will be laid over the excavated verge. A vibrating roller will be used to compact each layer.</div> <div>6. The final capping layer will be profiled to the existing road surface level and will provide a suitable surface to accommodate the delivery of materials, plant or equipment.</div> <div>7. Existing drainage channels will be kept clearn at all times. Where required, they will be piped in culverts to maintain the existing flows.</div> <div>8. Silt traps will be located along drains to stop suspended sediment from entering waterways.</div> <div>9. Reinstatement will take place when the grid connection works necessitating the temporary entrances have been completed. The layers of stone will be removed and the roadside boundary will be reinstated along its original alignment and roadside drainage will be reinstated.</div> <div>10. The stone removed will be either re-used to form another temporary entrance or disposed of to a licensed landfill.</div>			

Relevant Drawings from Volume C3 EIAR Figures

Extract from Figure GC 5.20: Plan View of Permanent Site Entrances E1 at Coole (Mountphilips Substation & Temporary Compound C1)

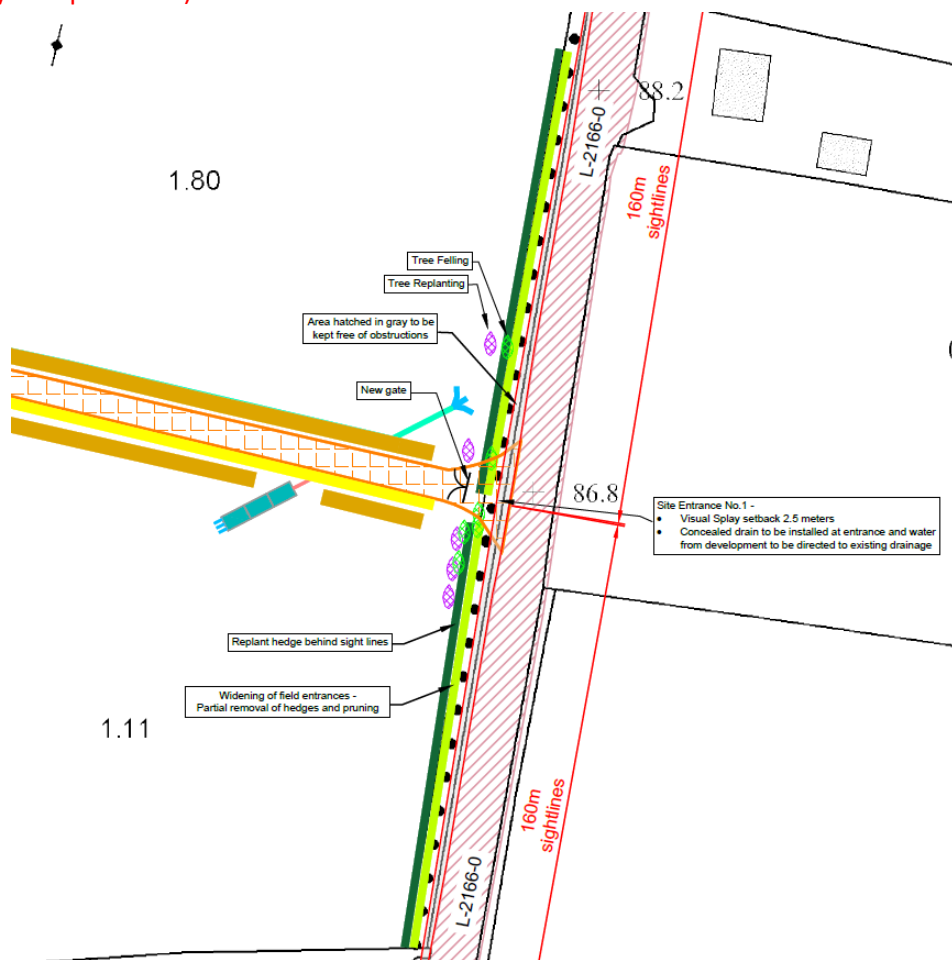
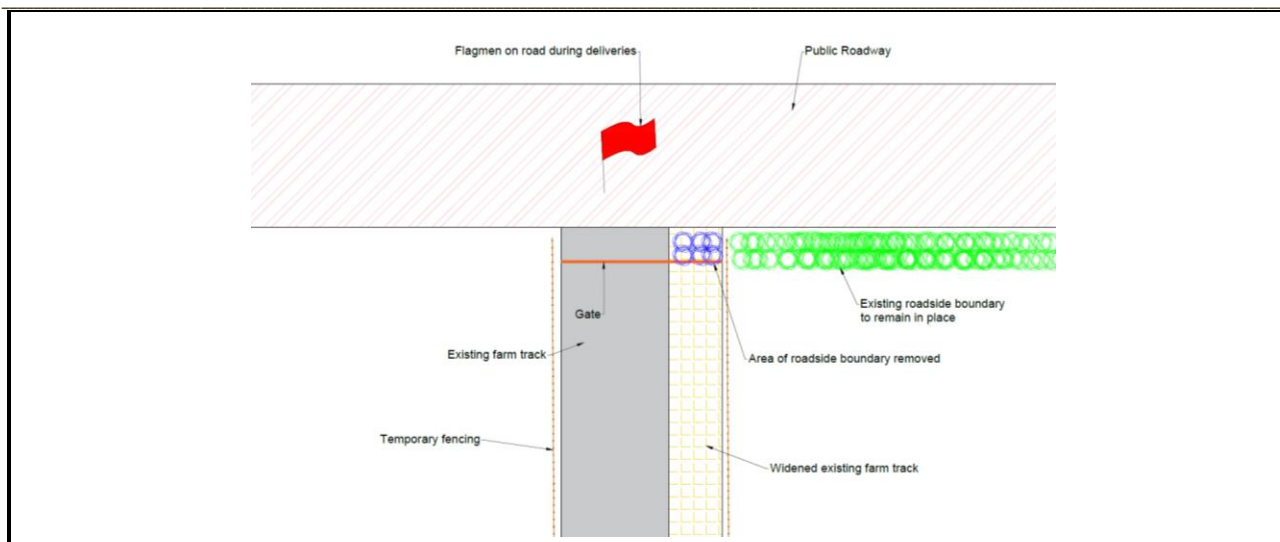


Figure GC 5.23: Plan View of Typical Temporary Site Entrances



Photographs



Existing entrance at Coole for Mountphilips Substation

END

Outline Construction Methodology			
Title: Temporary Compounds		Ref: GC-OCM-13	
General Description			
A Temporary Compound is a secure fenced area that will be used to store construction materials, equipment, machinery, fuel and waste, and will provide facilities for construction crews including offices, canteen and toilet facilities and parking. 3 No. temporary compounds will be set up; at 110kV Mountphilips Substation, Bealaclave and beside the consented 110kV Upperchurch Substation.			
Duration			
5-8 days to set up each compound			
Personnel		Materials	Machinery & Equipment
<ul style="list-style-type: none">• Site engineer• 3 crews• 2-3 General Operatives per crew• 1 Excavator operator per crew.		<ul style="list-style-type: none">• 1 excavator per crew• 1 no. dumper or tractor and trailer per crew.	<ul style="list-style-type: none">• Stone• Geotextile• Security fencing• Lighting• Portable Cabins•
Standard Methods			
<div>1. The temporary site compound area will be marked out.</div> <div>2. A drainage system will be excavated and installed around the compound area.</div> <div>3. Topsoil and subsoil will be removed from the footprint of the compound using an excavator. The excavated material will be temporarily stored in adjacent berms for later use during reinstatement works, as per OCM-18.</div> <div>4. A layer of geotextile material will then be laid over the footprint of the compound,</div> <div>5. Using an Excavator, a base layer of 100mm to 250mm of granular fill will be laid on the geotextile material and compacted followed by a capping layer of 100mm of Clause 804 which will provide the finished surface.</div> <div>6. Security fencing will be erected around the compound and access gates will be installed at the entrances.</div> <div>7. Portable cabins to be used for site offices, canteen and toilets will be delivered to the compound and set up.</div> <div>8. Bunded storage units will be installed in the compound.</div> <div>9. Parking areas will be marked out and signage will be erected.</div> <div>10. Goalposts will be erected under any overhead lines, and</div> <div>11. Cowled lighting will be installed around the compound area</div>			
Relevant Drawings from Volume C3 EIAR Figures			
<div>Figure GC 5.19: Plan View of Permanent Site Entrance E34 at Knockcurraghbola Commons (Consented Substation and Temporary Compound C3)</div> <div></div>			
END			

Outline Construction Methodology			
Title:	Horizontal Directional Drilling		Ref: GC-OCM-14
General Description			
Horizontal Directional Drilling (HDD) will be used to install the 110kV UGC under the Newport (Mulkear) River (W10), the Clare River (W36) and the Bilboa River (W57).			
Duration			
2-3 days per location			
Personnel		Materials	Machinery & Equipment
<ul style="list-style-type: none">• 1 surveyor• 1 river watcher• 2-3 drilling crew• 1 Excavator Operator•		<ul style="list-style-type: none">• Fencing materials• 50mm crushed Stone• Ducting• Bentonite• Silt fencing• Straw bales	<ul style="list-style-type: none">• Horizontal Directional Drilling Rig• Drilling fluid recycling system• 360° tracked excavator• 1 no. tracked dumper or tractor and trailer• Tractor and vacuum tank• Siltbuster.• Plastic or timber mats• PVC bunds.
Standard Methods			
<ol style="list-style-type: none">1. A temporary construction works area of 20m x 30m will be fenced off for the rig up area at the drilling location. This area will be a controlled working area and will house the drilling rig and fluid handling units. The drill exit area in the reception pit on the opposite side of the river will also be fenced off.2. At all three crossings, drilling activities will be carried out at least 15m from the river banks. Double silt fencing will be set up between the drilling rig and the river banks – the 1st silt fence close to the rig, and the 2nd silt fence close to the bank. No works or activities will be conducted on the river side of fences.3. The working area will not be stripped of topsoil, instead it will be overlain with a suitable geotextile material and 200mm of appropriate stone or plastic or wooden mats, if required.4. The drilling rig and fluid handling units will be transported to one side of the river, the fluid handling units will be stored on double bunded PVC bunds which will contain any fluid spills and storm water run-off.5. A launch pit and a reception pit (5m wide x 2m long x 1.5m deep) will be excavated within the construction works areas, the excavated material will be removed and stored temporarily in a berm at a suitable location more than 100m away from the river as per GC-OCM-20: Formation of Overburden Storage Berms.6. To avoid the launch pits and reception pits being open for longer than is absolutely necessary, all HDPE ducting required is to be available on site prior to commencement of pit excavation7. An overflow pit will be created beside the launch pit to cater for any excess drilling fluid. All runoff from the construction works area will be directed into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that any contaminated water can be contained and removed off-site.8. The location assembly will be fitted in the drill head by the system operator, and the driller will push the drill string into the ground and will steer a bore path beneath the bed of the river.9. The drill head will be fitted with a sensor to allow early detection of an obstruction across the drilling path. This will allow the drilling rods to be retracted and steered around the obstacle avoiding the potential for pressure to build up inside the borehole.10. The system operator will constantly monitor fluid volume, pressure, pH, weight and viscosity during the drilling works to ensure that the modelled stresses and collapse pressures are not exceeded.11. The cutting material will be flushed back by drilling fluid. For the Newport (Mulkear) river a fluid cleaning system will be utilised to reduce the volume of drilling fluids required to drill the bedrock. The excess material will be collected in a container and removed off site to a licensed waste facility.12. While the drilling is in progress below the river bed, a person (river watcher) will be deployed to monitor the river bed in order to alert the driller at the earliest time of a developing frac out.13. When the pilot bore reaches the reception pit at the other side of the river, the drill head will be removed and a reamer will be fitted. The reamer will be drilled back enlarging the borehole to the desired size. Once the driller is satisfied with the condition and size of the borehole, the ducting is then attached to the swivel behind reamer			

and pulled back to the rig through the borehole. At all times the driller is monitoring the pulling forces and pressures down hole.

14. The duct will then be cleaned and proven and its as-laid location recorded.
15. On completion of the works, the drilling rig will be removed from the launch pit and all equipment will be removed from site.
16. The pits will be backfilled and reinstated with the previously excavated material.
17. Any bare soil will be reseeded with grass species and fenced off from livestock.
18. Once the works areas have re-vegetated, the silt fences will be removed.

Relevant Drawings from Volume C3 EIAR Figures

Extract from

Figure GC5.29: Watercourse Crossing Type D - Directional Drilling at the Newport (Mulkear) River (W10)

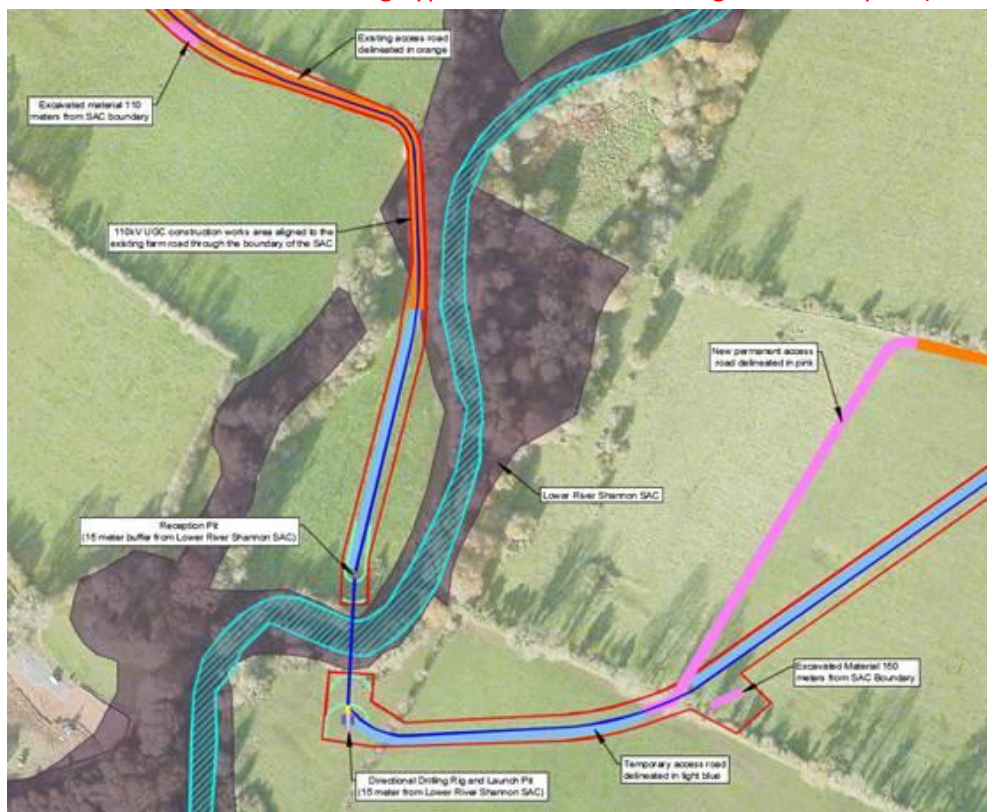


Figure GC5.30: Watercourse Crossing Type D - Directional Drilling at the Clare River (W36)

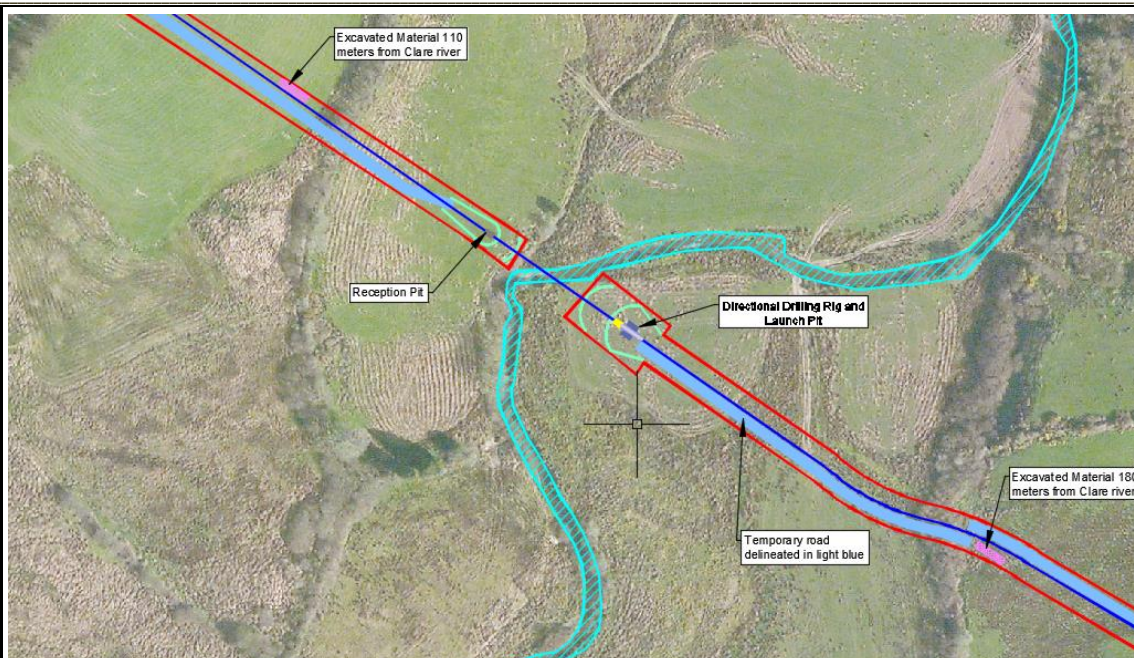
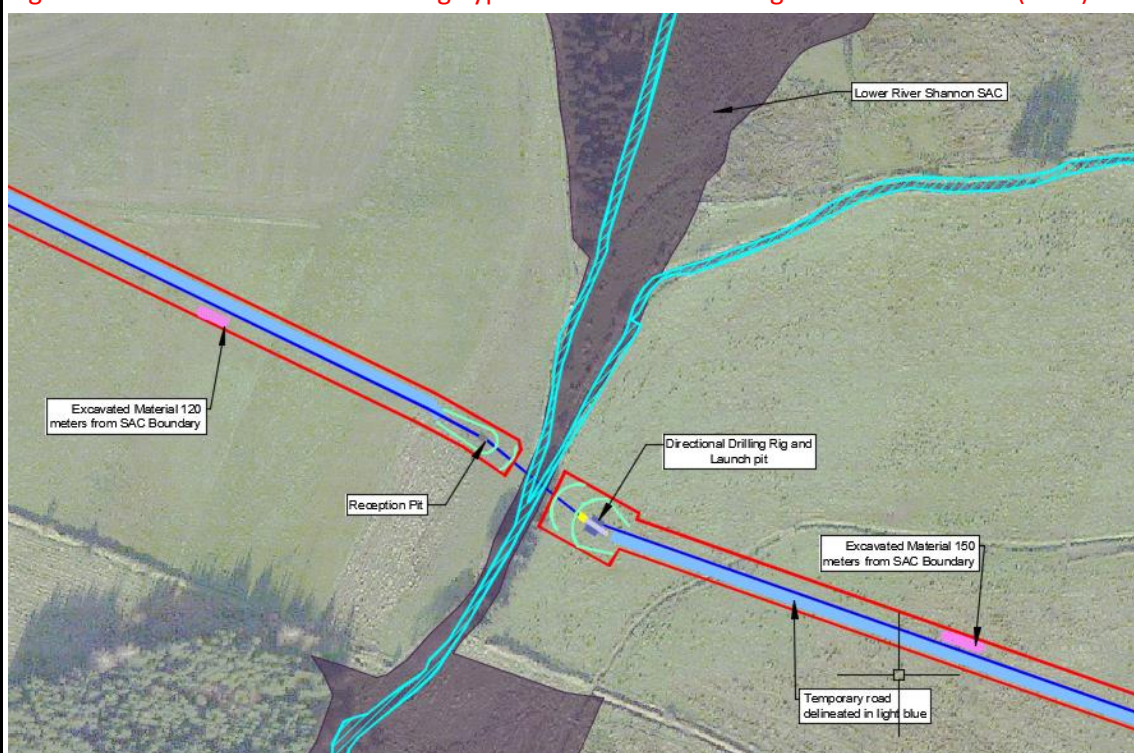


Figure GC5.31: Watercourse Crossing Type D - Directional Drilling at the Bilboa River (W57)



END

Outline Construction Methodology			
Title:	Instream Works Preparation and Reinstatement		Ref: GC-OCM-15
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	
<ul style="list-style-type: none">• Site engineer• 3-4 operatives	<ul style="list-style-type: none">• Wheeled or Tracked dumper• 360° tracked excavator• Mobile water pumps and hoses• 4 x 4 vehicle and trailer	<ul style="list-style-type: none">• Sand Bags containing washed sand• Geotextile membrane• Straw bales• Flume pipes• Splash plate• Silt Buster• Washed round stones	
Standard Method 1: Dam & Overpump work			
<div>1. A dam will be constructed, upstream of the works location, using sand bags containing washed sand.</div> <div>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.</div> <div>3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</div> <div>4. The works (outlined in GC.OCM-16 Instream Works) can then be carried out in the dry bed.</div> <div>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.</div> <div>Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.</div>			
Standard Method 2: Dam & Divert work			
<div>1. 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.</div> <div>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.</div> <div>7. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</div> <div>2. The works (outlined in GC.OCM-16 Instream Works) can then be carried out in the dry stream bed.</div> <div>3. 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</div>			

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

1. The flume pipe(s) will be set out on the bed of the watercourse.
2. A dam will be constructed using sand bags so that all the flow is diverted through the flume pipe(s).
3. 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.
4. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works location to minimise sedimentation
5. The works (outlined in **GC.OCM-16 Instream Works**) will be carried out under/around the flume pipe(s).
6. 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.
7. 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

1. Instream construction works will be followed by site-specific reinstatement measures to ensure that 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

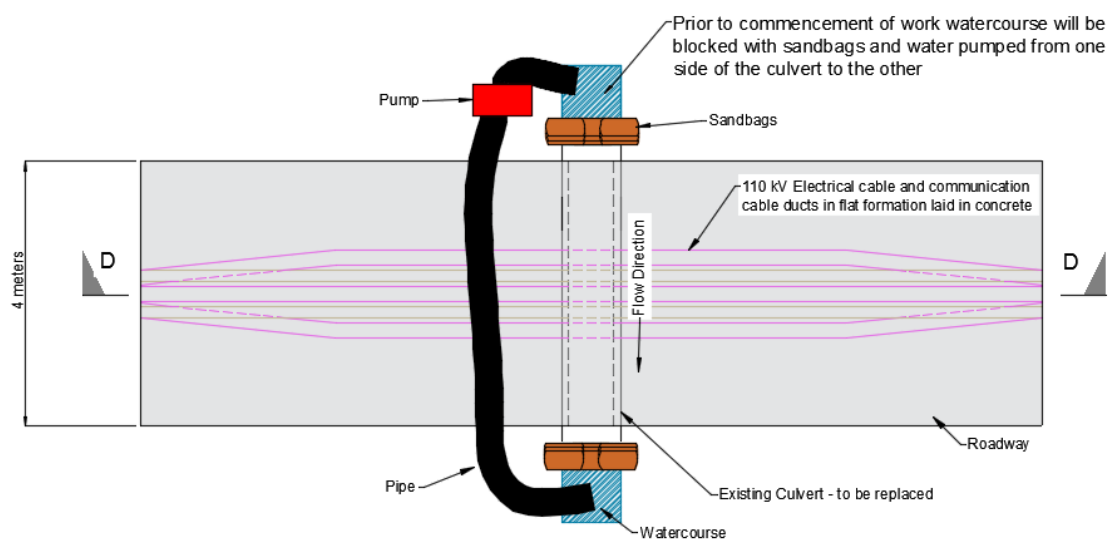


PVC Flume Pipes

Relevant Drawings from Volume C3 EIAR Figures

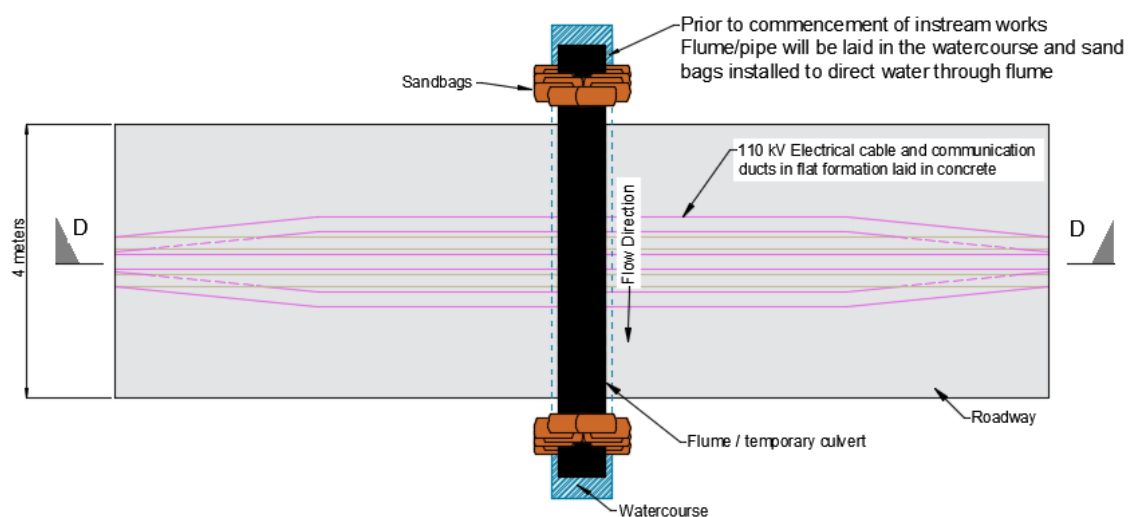
Extract from Figure GC 5.25:

Dam & Overpump Work



Extract from Figure GC 5.27:

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: GC.OCM-16
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
<ul style="list-style-type: none">• Site engineer• 3-4 operatives• 		<ul style="list-style-type: none">• Wheeled or Tracked dumper.• 360° tracked excavator• 	<ul style="list-style-type: none">• Pipe Culvert• Box Culvert• Cable Ducting & trenching materials• Dry Lean mix concrete• Siltbuster• 50mm stone
Standard Methods: Trenching & Ducting			
<div>1. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-15 Instream Works Preparation and Reinstatement.</div> <div>2. 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.</div> <div>3. A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined in GC_OCM_05: 110kV Trenching and Ducting. 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.</div> <div>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.</div> <div>5. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.</div>			
Standard Methods: Replacement of existing culvert			
<div>1. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-15 Instream Works Preparation and Reinstatement.</div> <div>2. 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.</div> <div>3. The old culvert will be dug out and removed using an excavator.</div> <div>4. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.</div> <div>5. 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.</div> <div>6. 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.</div> <div>7. The dam is removed and the watercourse can flow through the new culvert.</div> <div>8. Works can then take place above the culvert without the risk of sediments being released into the watercourse.</div>			

Variation 16A: Installation of New Culvert Structure and Roadway Crossing.

1. The works will take place in a dry stream bed, following damming methods outlined in [GC.OCM-15 Instream Works Preparation and Reinstatement](#).
2. 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.
3. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.
4. 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.
5. The dam is removed and the watercourse can flow through the new culvert.
6. Crushed stone will then be laid over the culvert and built up in layers to provide vehicular access above the watercourse.

Variation 16B: Installation of Cable Ducting together with New or Replaced Culvert Structures

1. 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.

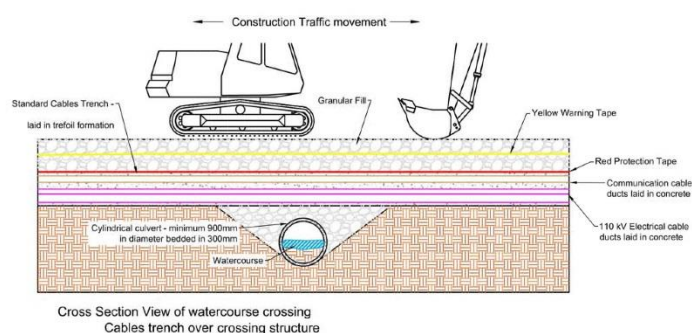
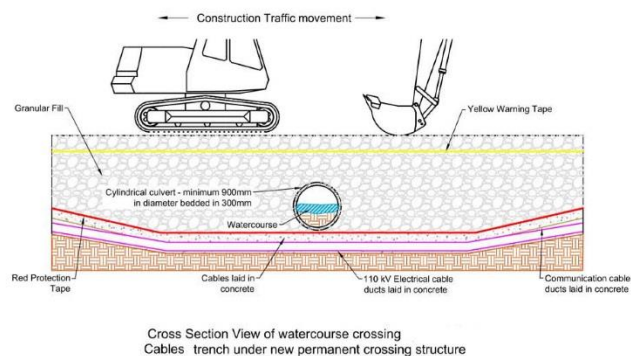
Variation 16C: Installation of Temporary Culverts

1. The works will take place in a dry stream bed, following damming methods outlined in [GC.OCM-15 Instream Works Preparation and Reinstatement](#).
2. 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.
3. A 900mm flume pipe culvert will be placed along the stream bed.
4. 50mm stone will be laid over the culvert and built up in layers to provide vehicular access across the watercourse.
5. When the culvert is no longer required, it will be removed by damming the watercourse as outlined in [GC.OCM-15 Instream Works Preparation and Reinstatement](#), removing the stone and lifting the culvert from the stream.
6. The watercourse will then be reinstated as per [GC.OCM-15 Instream Works Preparation and Reinstatement](#).

Relevant Drawings from Volume C3 EIAR Figures

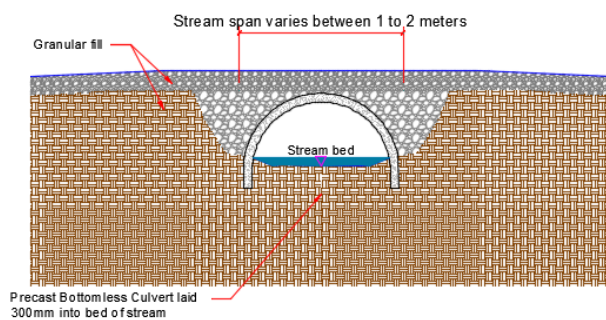
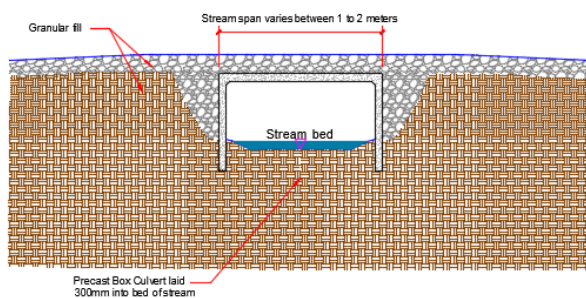
Extract from Figure GC 5.26:

Cables under crossing structures & Cables over crossing structures

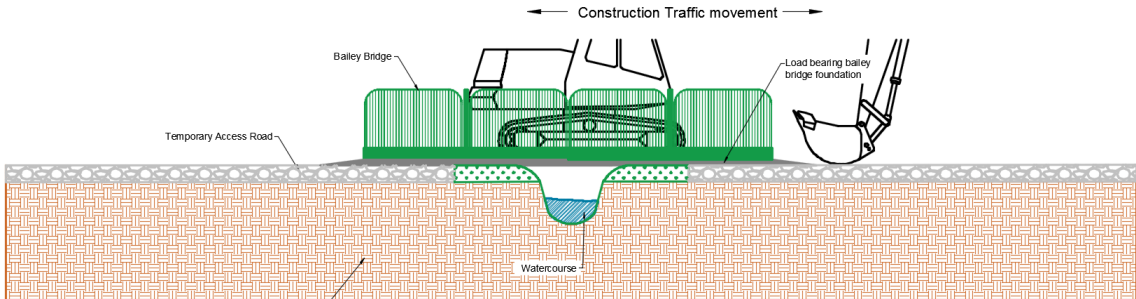


Extract from Figure GC 5.26:

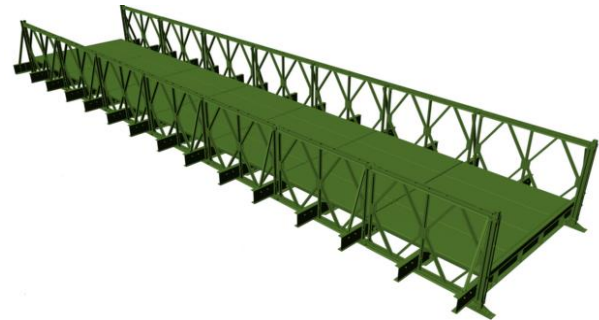
Box Culverts and Bottomless Box Culverts



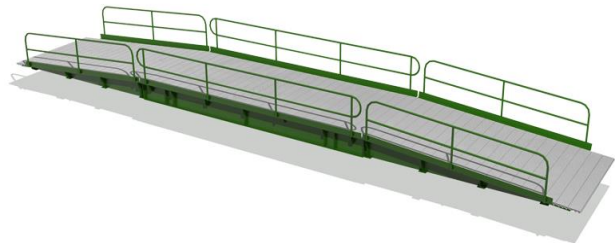
END

Outline Construction Methodology			
Title: Temporary Bailey Bridge		Ref: GC-OCM-17	
General Description			
Bailey bridges will be used to provide new 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 of ready-to-assemble components or will be delivered to site pre-assembled.			
Duration			
0.5 – 1 day per location			
Personnel		Materials	Machinery & Equipment
<ul style="list-style-type: none">• Site engineer• 2-3 operatives		<ul style="list-style-type: none">• Granular fill• Clause 804 stone• Geotextile• Bridge or bridge components	<ul style="list-style-type: none">• City Crane / Hi-Ab• Hand tools• Tractor and low loader• Tracked Excavator•
Standard Methods			
<ol style="list-style-type: none">1. A temporary access road will be constructed in advance of the arrival of the Bailey bridge as per GC-OCM_11: Temporary Access Roads.2. On each side of the watercourse, a 4m x 4m area of top soil will be removed and the area will be laid with geotextile. Clause 804 stone will then be in-filled and compacted to form a bearing pad which will support each end of the bailey bridge.3. The bridge will be delivered to the crossing point on a low loader.4. The bridge will be assembled using hand tools and lifted into place using the city crane or Hi-Ab.5. When the grid connection works are complete and the bridge is no longer required the bridge will be disassembled and removed from site.6. The stone will be removed from the bearing pads and the excavated soil reinstated and reseeded			
Reference Documents			
<ul style="list-style-type: none">• Groundforce Bridge – Temporary Bridge (https://www.vpgroundforce.com/ire/temporary-bridges/)			
Relevant Drawings from Volume C3 EIAR Figures			
Extract from Figure GC 5.32: Watercourse Crossing Type E –Temporary Portable Bailey Bridge			
E			
	Cross Section View D - D of watercourse crossing type E Bailey Bridge - (No Instream Works)		

Photographs



Typical Bailey Bridge



Typical Bailey Bridge

END

Outline Construction Methodology			
Title:	Forestry Felling		Ref: GC-OCM-18
General Description			
Trees of varying ages will be required to be felled during the construction of the Grid Connection. The total area to be felled is 1.3 hectares, at various locations along the 110kV UGC.			
Duration			
It will take 10 days to complete the required felling			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 2-3 forestry personnel• One forestry harvester		<ul style="list-style-type: none">• One timber forwarder machine• Timber lorries• Chainsaws	
Standard Methods			
<ol style="list-style-type: none">1. The trees will be cut and de-limbed using a forestry harvesting 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 adjacent to the roadside for collection by timber trucks.4. The brash will be baled and also taken off site for chipping.			
Variation 18A – Felling at Castlewaller			
<ol style="list-style-type: none">1. The trees will be cut and laid whole along the route of the intended floating road to provide a base for the road.2. No timber or brash will arise.			
Reference Documents			
<ul style="list-style-type: none">• Felling and Reforestation Policy published by Forest Service (Department of Agriculture, Food & the Marine May 2017)			
END			

Outline Construction Methodology			
Title:	Relocation of Overhead Lines		Ref: GC-OCM-19
General Description			
Relocation of existing services i.e. poles or overhead lines, underground cables or pipes to facilitate the works. Relocating 1 no. ESNB pole by 15m at Baurnadomeeny. Replacing 2 no. poles to raise the height of a 100m section of 20kV electrical overhead line at Laghile.			
Duration			
Typically, 0.5 Days per relocation			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">1 ESNB crew	<ul style="list-style-type: none">ESBN vehicles	<ul style="list-style-type: none">ESB poles, equipment and apparatusPole auger drill	
Standard Method: Poles and Overhead lines (ESB Networks)			
<ol style="list-style-type: none">The overhead line to be relocated will be disconnected from the electricity grid and removed from its supporting poles.The pole will be cut down using a chainsaw, and the pole and any associated equipment and apparatus will be removed from the site.A 2.3m deep hole will be drilled, using an auger drill, at a point where the new pole is to be relocated and the pole is inserted into the hole. The area around the pole will be backfilled and compacted.When the pole(s) is secure the electricity line will be restrung along the new alignment and re-connected to the existing networkThe line can then be re-energised			
END			

Outline Construction Methodology			
Title:	Formation of Overburden Storage Berms		Ref: GC-OCM-20
General Description			
Overburden will result from excavations for the UWF Grid Connection. This overburden will be temporarily and permanently stored in berms			
Duration			
For the duration of the construction works			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">• 2 operatives• 1 grounds person	<ul style="list-style-type: none">• 1 Excavator• 1 Dump truck	<ul style="list-style-type: none">• Grass seed	
Standard Methods			
<ol style="list-style-type: none">1. During the excavation of the cables trench, the excess overburden will be loaded onto a dump truck and transported to the overburden storage berm location.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 circa 1.5m and circa 4m wide.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 seeded with grass seed.			
END			

Outline Construction Methodology			
Title:	Reinstatement of Land		Ref: GC-OCM-21
General Description			
During construction works, vegetation, topsoil and subsoil will be removed from lands to facilitate the construction of the UWF Grid Connection. 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 per location			
Personnel	Materials	Machinery & Equipment	
<ul style="list-style-type: none">Crew size: 3 workers	<ul style="list-style-type: none">4x4 vehicle13 Ton diggerSub-soiler ploughLevelling harrow	<ul style="list-style-type: none">Native grass, heather, tree and hedgerow species – seeds/seedlings	
Standard Methods			
<ol style="list-style-type: none">Following the completion of works, any remaining building materials and any wastes and debris such as trees, vegetation and brash will be removed using a excavator and dump truckThe construction works area will, where required, be sub-soiled using a sub-soil plough to loosen any compacted areas.Sub-soil will be spread using the excavatorTopsoil will be spread evenly over the subsoil to surface level using an excavator.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.All stones in excess of 50mm will be removed from the surface.The soil will be seeded with grasses and native species common to the surrounding vegetation.Fertilizer will be spread on any sections of improved grasslandThe lands will remain fenced until sufficiently revegetated, at which time all fencing will be removed off-site..			
Variation 21A: Reinstating hedgerows and treelines			
<ol style="list-style-type: none">Boundaries where hedgerow and trees were removed during construction works will be replanted with a mix of native hedgerow species.New hedgerows and trees will be fenced to protect from damage by livestock.			
Variation 21B: Reinstating fencing and walls			
<ol style="list-style-type: none">Boundaries where timber fences and stone walls and banks currently exist will be reinstated to their former condition.Former timber fencing will be replaced with new timber fencing.Stone walls will be replaced using the original stoneEarthen banks will be replaced and replanted with grass or hedgerow, as appropriate for the location			
Reference Documents			
<ul style="list-style-type: none">ESB/IFA Code of Practice for Survey, Construction & Maintenance of Overhead lines in relation to the rights of landowners			
END			

UWF GRID CONNECTION

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 9 Construction Contract Documents (post planning consent / pre-construction)



ECOPOWER

February 2018

Whole Upperchurch Windfarm Project

Natura Impact Statement for Whole UWF Project Elements 1 to 5

March 2018

Appendix A10: Environmental Management Plan for UWF Related Works



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UWF RELATED WORKS

VOLUME D

ENVIRONMENTAL MANAGEMENT PLAN



ECOPOWER

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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 Environmental Management Plan (EMP) has been prepared for the UWF Grid Connection 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 Tipperary County Council through a planning application. 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 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 EIA Report for the UWF Related Works, Volume C2 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 Foilnahan 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, Foilnahan, Gleninchaveigh, 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:

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:

- is adjacent to the UWF Grid Connection in Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands, and
- overlaps with Upperchurch Windfarm at the consented UWF Turbines and along the Upperchurch Windfarm Roads.
- overlaps with UWF Replacement Forestry at the UWF Replacement Forestry site entrance.

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.

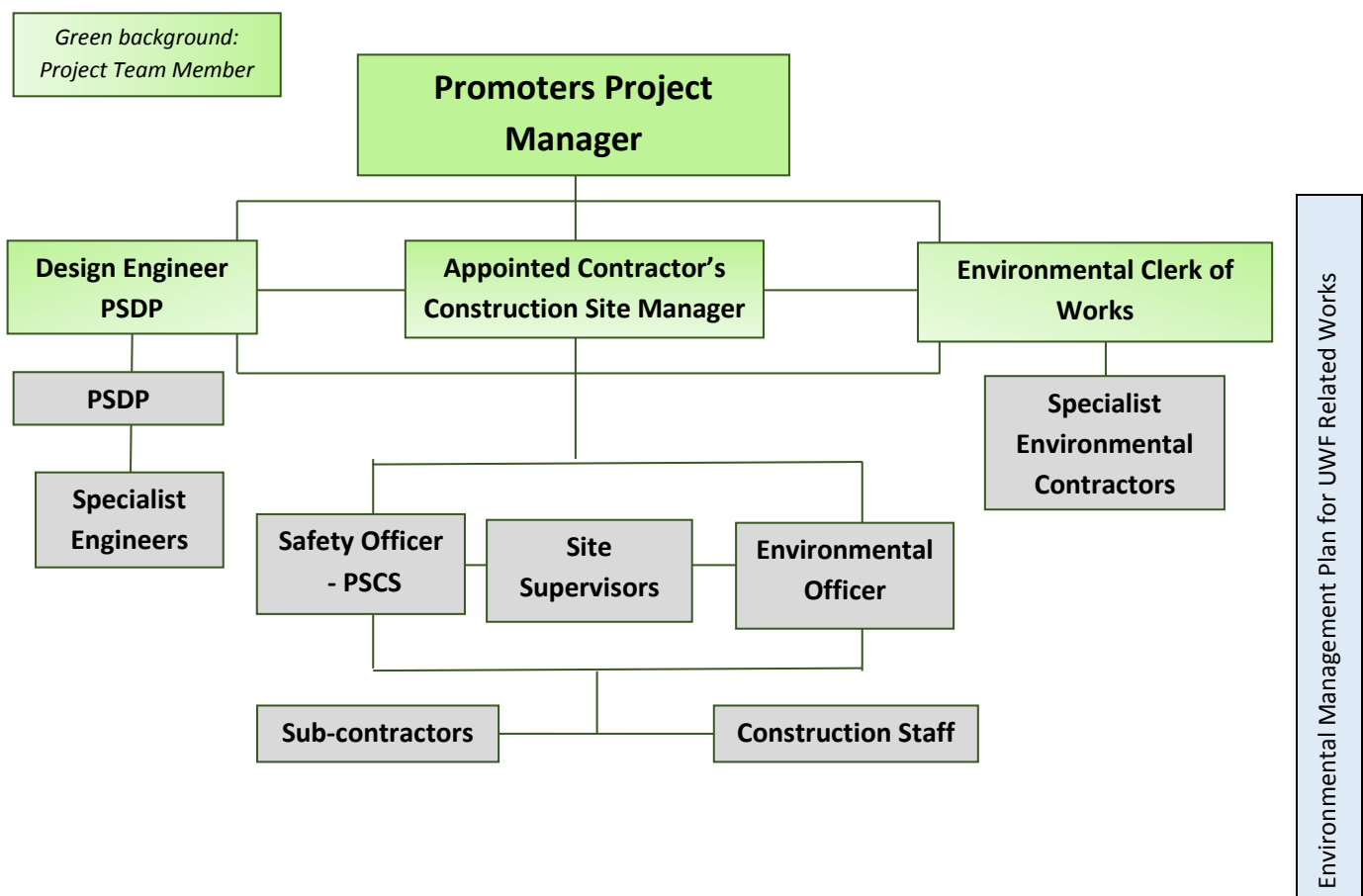
The construction Project Manager and Main Contractor will be appointed by the Promoter prior to commencement of the works. On appointment, the Project Manager and the Main Contractor will be required by the Project Promoter to update the outline organisational structure, the specific duties, roles and 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 be 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 (2018). 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
Tipperary County Council 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. Project Design Measures**Table 7: List of Environmental Protection Measures - Project Design**

PD ID	Project Design Environmental Protection Measure
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 safe and efficient manner.
PD03	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.
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.
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.
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.
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.

PD ID	Project Design Environmental Protection Measure
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
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 initiate, 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 will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the 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>i.e.</i> 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 <u>while cubs are present in the holt</u> 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.
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.

PD ID	Project Design Environmental Protection Measure
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 1 st to June 30 th).
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 compounds. <u>All lighting</u> 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.
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.
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 hedgerows with semi-mature shrubs/trees (like for like) and limits on temporary 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 trimmed/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 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.
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 initiate, 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 will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the 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>i.e.</i> 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 <u>while cubs are present in the holt</u> 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 1 st to June 30 th).
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.

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 trimmed/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 initiate, 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 will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the 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.

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
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 (1 st March to 31 st 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 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

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
	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 Foilnahan.
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 (<i>Circus cyaneus</i>)
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 (<i>Alcedo atthis</i>).
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 (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).
RW-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)
RW-BPM-25	Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)
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 Measure (PDs)	Relevant Management Plans	Relevant Best Practice Measures (BPMs)	Relevant 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,
Forestry Lands	PD1, PD6, PD7, PD8, PD9, PD12, PD13, PD14, PD15,	Surface Water Management	BPM-02, BPM-03, BPM-04, BPM-09, BPM-10,	OCM-01, OCM-02, OCM-04, OCM-05,

	Relevant Project Design Environmental Protection Measure (PDs)	Relevant Management Plans	Relevant Best Practice Measures (BPMs)	Relevant Construction Methodologies (OCMs)	Outline
	PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD38, PD39, PD40, PD41, PD62, PD63, PD64, PD65	Plan Waste Management Plan Invasive Species Management Plan	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-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 banded. All transfer of hydrocarbons will be undertaken in a banded 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
<u>Contractor or Subcontractor Details:</u> Contractor Name: Contact Name: Telephone:		
<u>Nature of Non-Compliance</u> (specify Environmental Protection Measure breached)		
<u>Time Specified for becoming compliant:</u>		
Contractor or Subcontractor's confirmation of receipt of NCR Yes <input type="checkbox"/> No <input type="checkbox"/> Contractors or Subcontractors signature: _____ Date of Signing: _____		

Environmental Management Plan for UWF Related Works

[illegible]

Environmental Management Plan for UWF Related Works

8.4. Register of Environmental Training

[illegible]

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 <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Tipperary County Council	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Office of Public Works	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	Date: _____
Inland Fisheries Ireland	Letter <input type="checkbox"/>	Phone <input type="checkbox"/>	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	

Environmental Management Plan for UWF Related Works

REFERENCE DOCUMENT

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 <i>(including investigation findings, corrective actions/preventative action taken if required)</i> 		
Corrective/Preventative Action Taken/Contingency Measures Employed 		
Follow up correspondence: To complainant/_____: Letter <input type="checkbox"/> Phone <input type="checkbox"/> Date: _____ Further correspondence from complainant: Letter <input type="checkbox"/> Phone <input type="checkbox"/> 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	

Environmental Management Plan for UWF Related Works

REFERENCE DOCUMENT

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)	<div><div><div><div><input type="checkbox"/></div></div><div><div><input type="checkbox"/></div></div></div><div><div>•</div><div>•</div></div><div>(Specify exact location)</div></div>
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 <u>Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.</u>

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

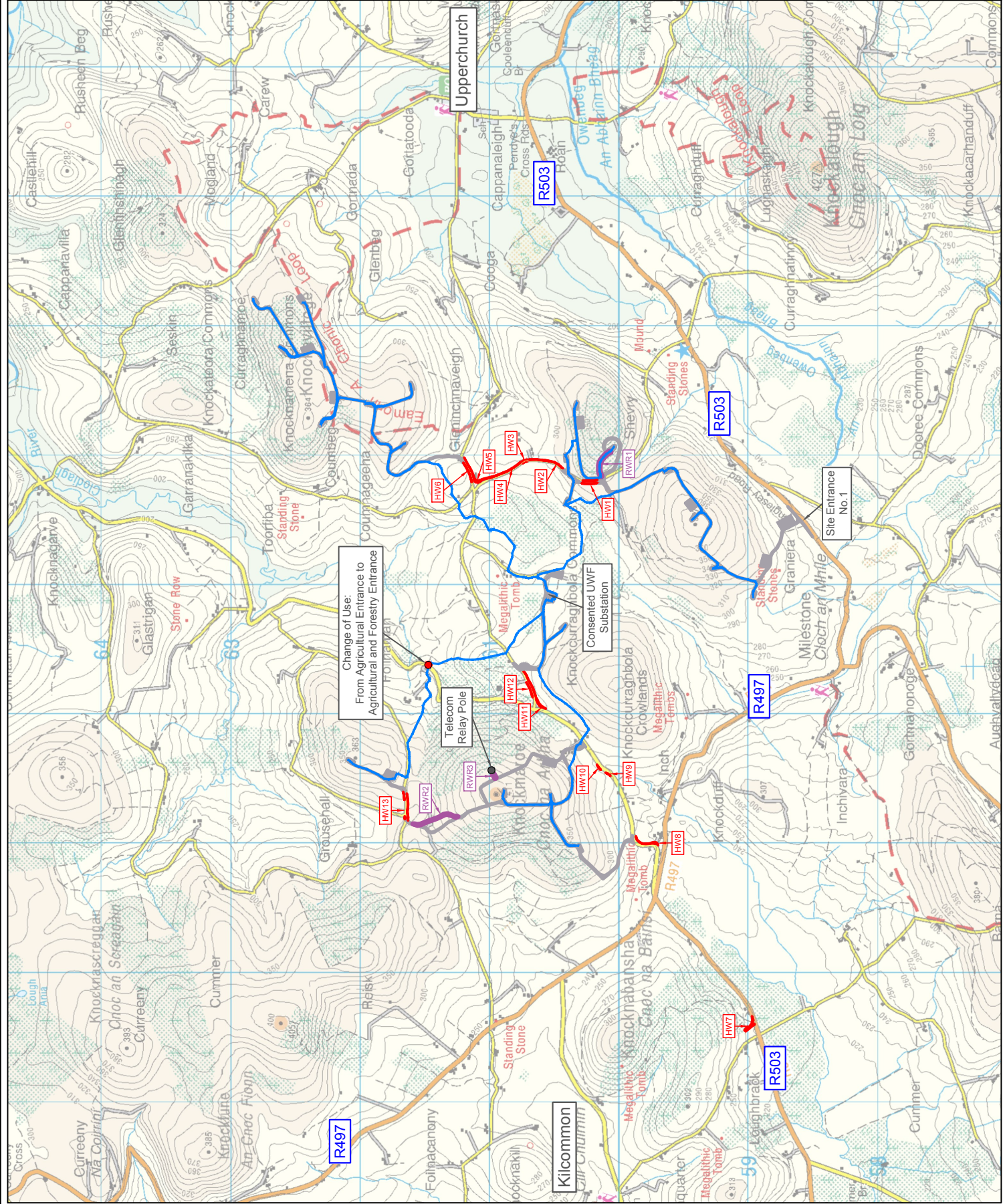
Legend:

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



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)

RW1 Section numbers for Realigned
Windfarm Roads

Shewy Townlands

WW16 Water Crossings

RW2 Road Crossings



Project:
UWF Related Works (RW)

Drawn by:
AB

Checked by:
JB

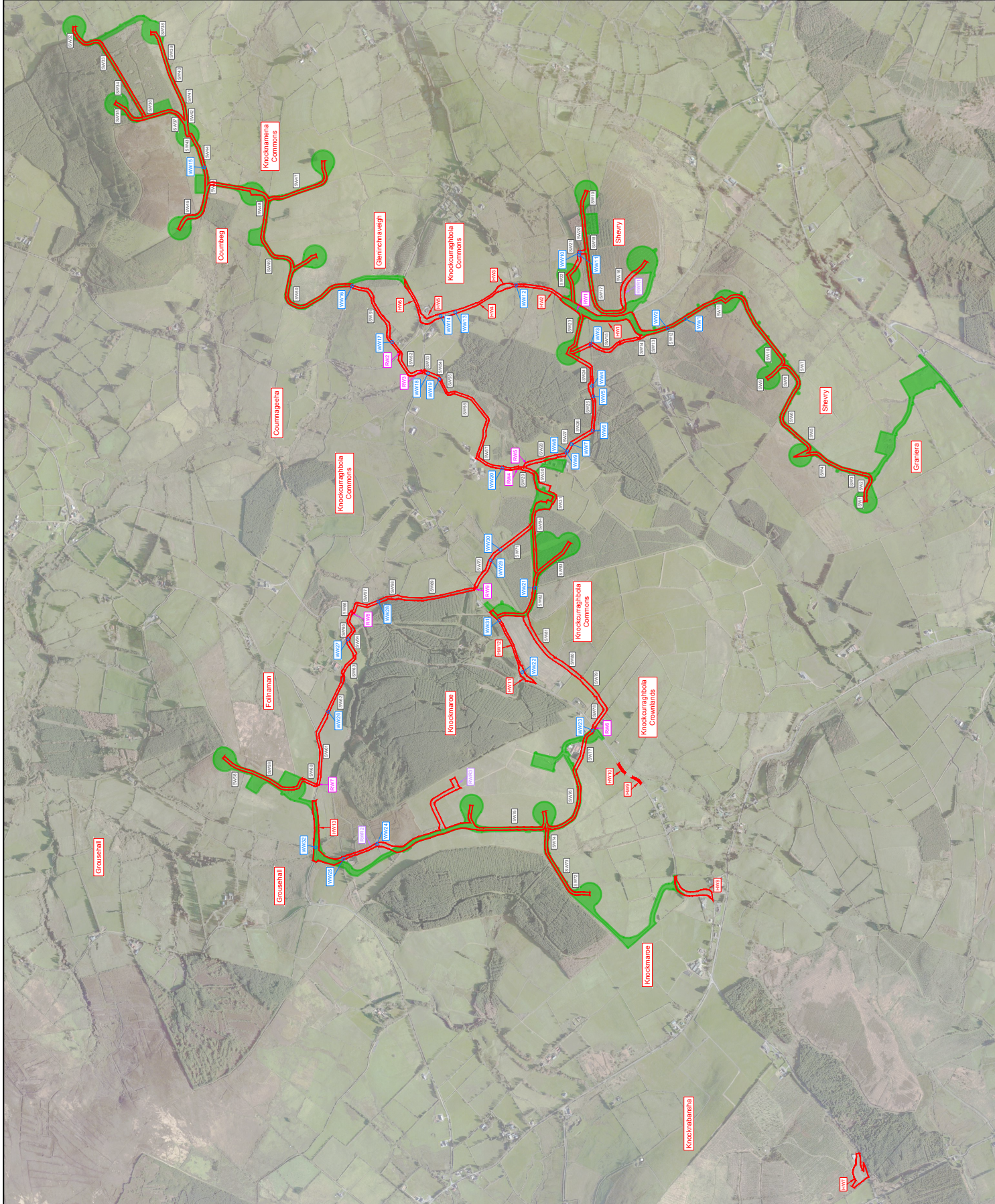
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ECOPower



Title:
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:

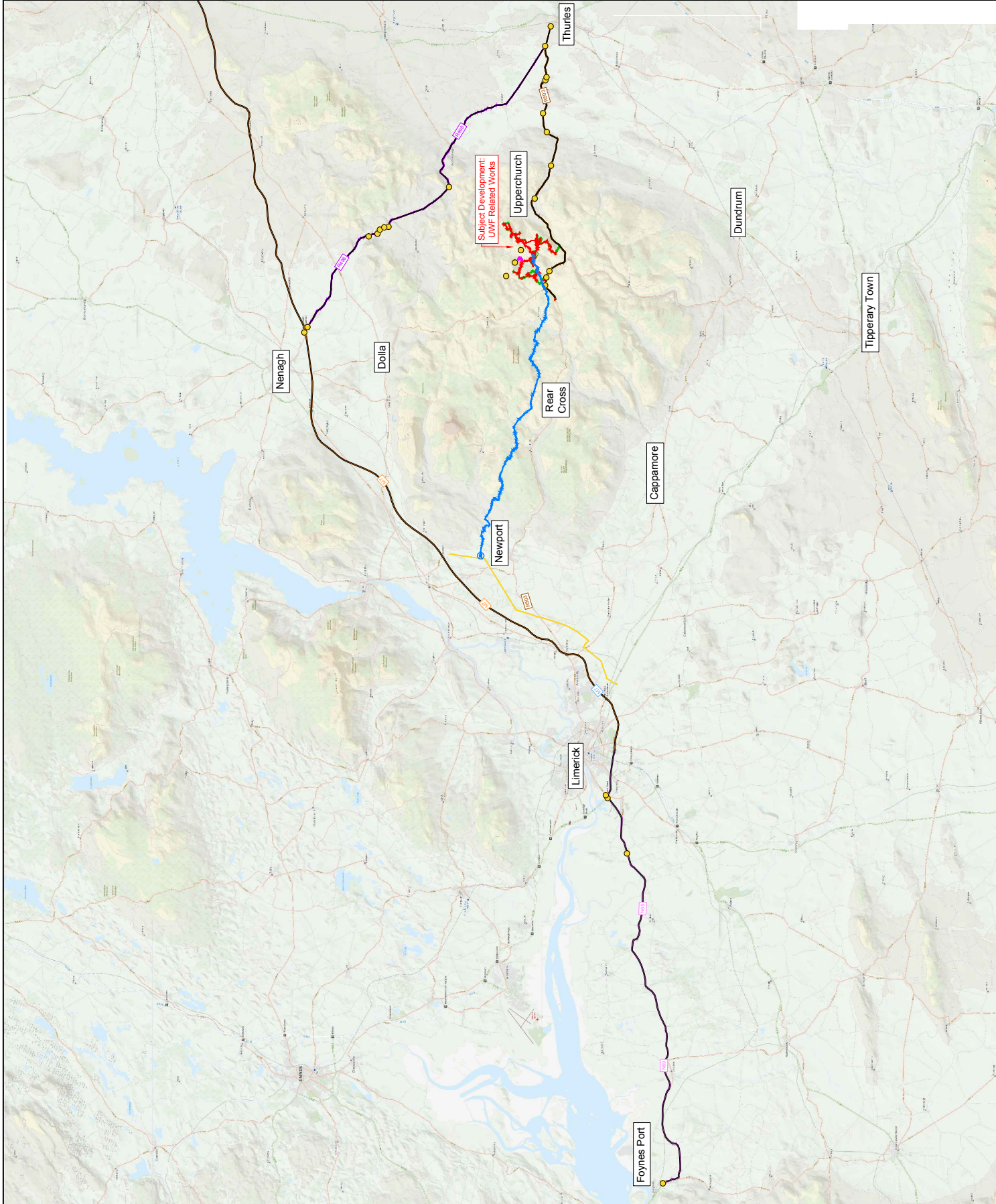
- UWF Grid Connection
 - Mountphilips Substation
 - Upperchurch Windfarm
- UWF Replacement Forestry
 - UWF Other Activities



Project:

UWF Related Works (RW)

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Ecopower							



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

Haul Route Works Numbers
(HW1 - HW13)

Realigned Windfarm Road

**Realigned Windfarm Road Numbers
(RWR1 - RWR3)**

Internal Windfarm Cablin

- Telecom Relay Pole

UWF Grid Connection:

 UWF Grid Connection

UWF Replacement Forestry:

UWF Replacement Forestry

Upperchurch Windfam:

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

UWF Other Activities:

■ Haul Route Activities

HA22 Haul Route Activities Number

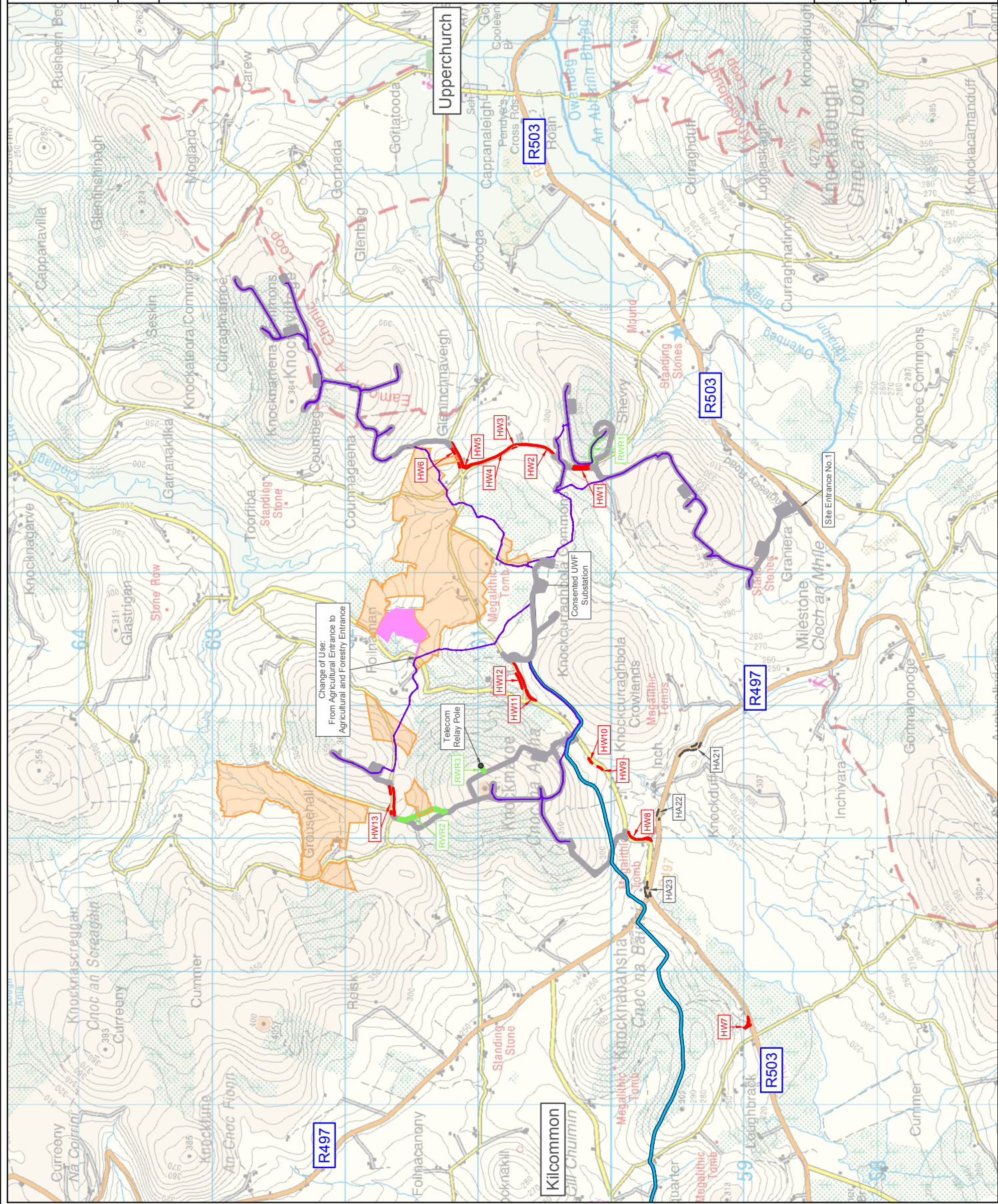
Upperchurch Hen Harrier Scheme

Regional Road Number **FR503**

Project:

UWF Related Works (RW)

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Title:
Figure RW EMP 6

UWF Related Works and the Other Elements of the Whole UWF Project in Knockmaroe, Knockcuraghola Commons and Knockcuraghola 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
Internal Windfarm Cabling

Telecom Relay Pole
Telecom Relay Pole

Temporary hedge/tree removal & pruning
Temporary hedge/tree removal & pruning

Permanent hedge/tree removal & pruning
Permanent hedge/tree removal & pruning

Related Works Water Crossings
Related Works Water Crossings

Bat Crossing Location
Bat Crossing Location

Related Works Road Crossings
Related Works Road Crossings

Related Works Site Entrance
Related Works Site Entrance

UWF Grid Connection:

UWF Grid Connection
UWF Grid Connection

New Permanent Access Roads
New Permanent Access Roads

New Permanent Road ID
New Permanent Road ID

Existing Access Roads
Existing Access Roads

Existing Access Road ID
Existing Access Road ID

Temporary Access Roads
Temporary Access Roads

Temporary hedge/tree removal & pruning
Temporary hedge/tree removal & pruning

Joint Bay Locations
Joint Bay Locations

Grid Connection Road Crossings
Grid Connection Road Crossings

Grid Connection Water Crossings
Grid Connection Water Crossings

Grid Connection Site Entrance
Grid Connection Site Entrance

UWF Replacement Forestry:

UWF Replacement Forestry
UWF Replacement Forestry

Upperchurich Windfarm:

Upperchurich Windfarm
Upperchurich Windfarm

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Project:

UWF Related Works (RW)

Drawn by: AB

Checked by: JB

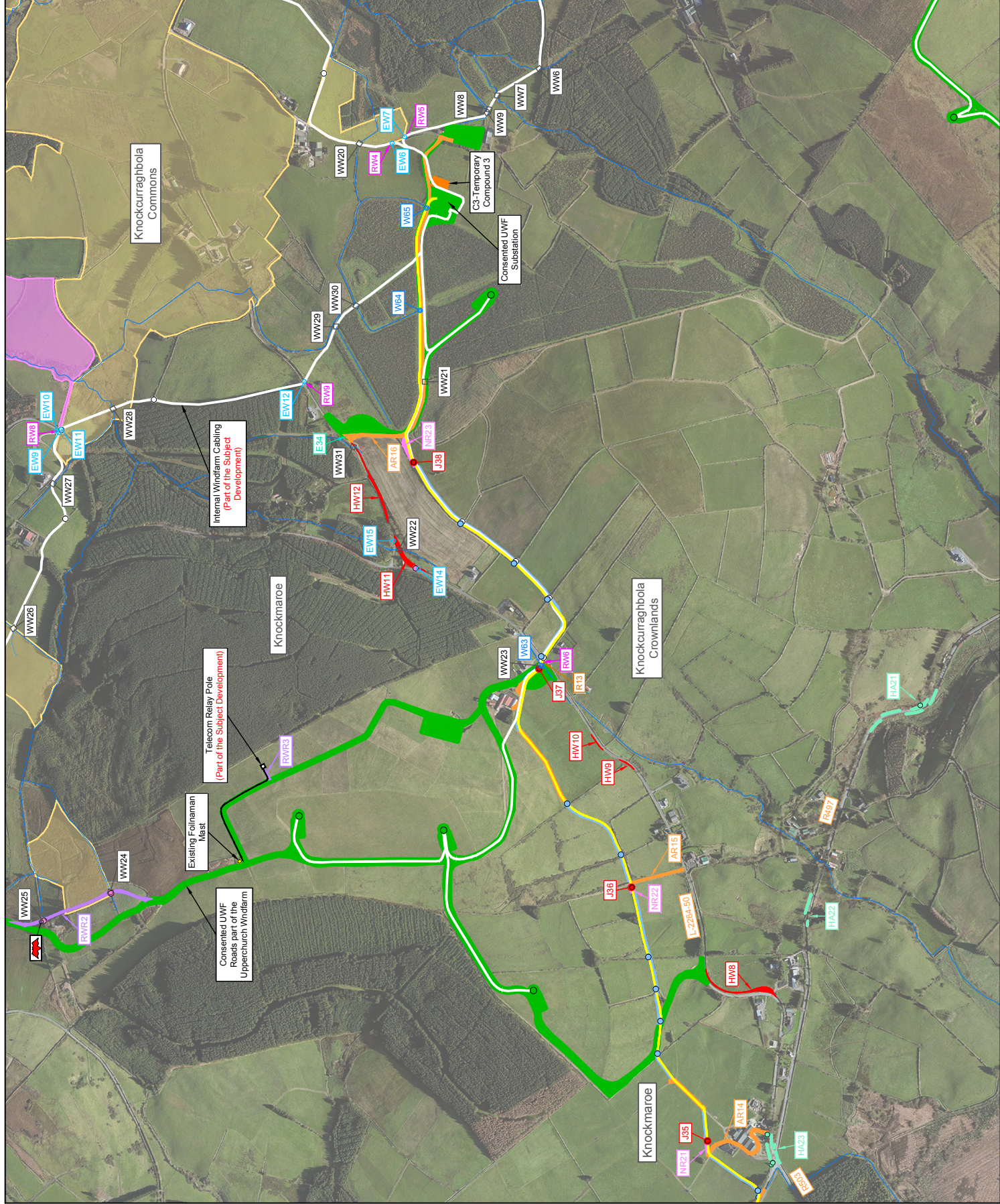
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UWF RELATED WORKS

VOLUME D
ENVIRONMENTAL MANAGEMENT PLAN

Tab 1
Tipperary County Council
Grant of Permission
including Planning Conditions

(post planning consent)



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UWF RELATED WORKS

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

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



February 2018

UWF RELATED WORKS

Tab 3 Traffic Management Plan



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Figure RW TMP 2:	Haul Routes for Concrete, Aggregate and Other Materials to UWF Site Compound No.1
Figure RW TMP 3:	Haul Route from UWF Site Compound No.1 to Construction Works Areas
Figure RW TMP 4:	Advance Warning Signage for Road Works & Site Entrances

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

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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 Foilnahan 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 be 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	180m ³ / 23 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone) <i>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.</i>	4620m ³ / 285 No. loads	Shanballyedmond, Rear Cross
Hard core for temporary public road surface	50m ³ / 7 No. loads	Clare
Surface dressing asphalt (public road sections)	12m ³ / 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	<ul style="list-style-type: none">Consult with Tipperary County CouncilConsult with GardaíContractor arrangements regarding speed limits, alert beacons, haulage routes etc.Oversee the implementation of the Traffic Management Plan		
Construction Manager	<ul style="list-style-type: none">Install information, direction and warning signage in advance of road works, site entrances and along haul routesImplement the Traffic Management Plan		
Environmental Clerk of Works	<ul style="list-style-type: none">Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures		
Community Liaison Officer	<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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.			

<ul style="list-style-type: none"> All material deliveries will have a maximum axle load of 12 tonnes per axle.
Measures for Site Personnel
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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 be 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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 PSCS will notify all other construction traffic in the area of the incident and
- The PSCS 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
- HW1 Haul Route Works Numbers (HW1 - HW13)
- RWR1 Realigned Windfarm Road
- RWR3 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

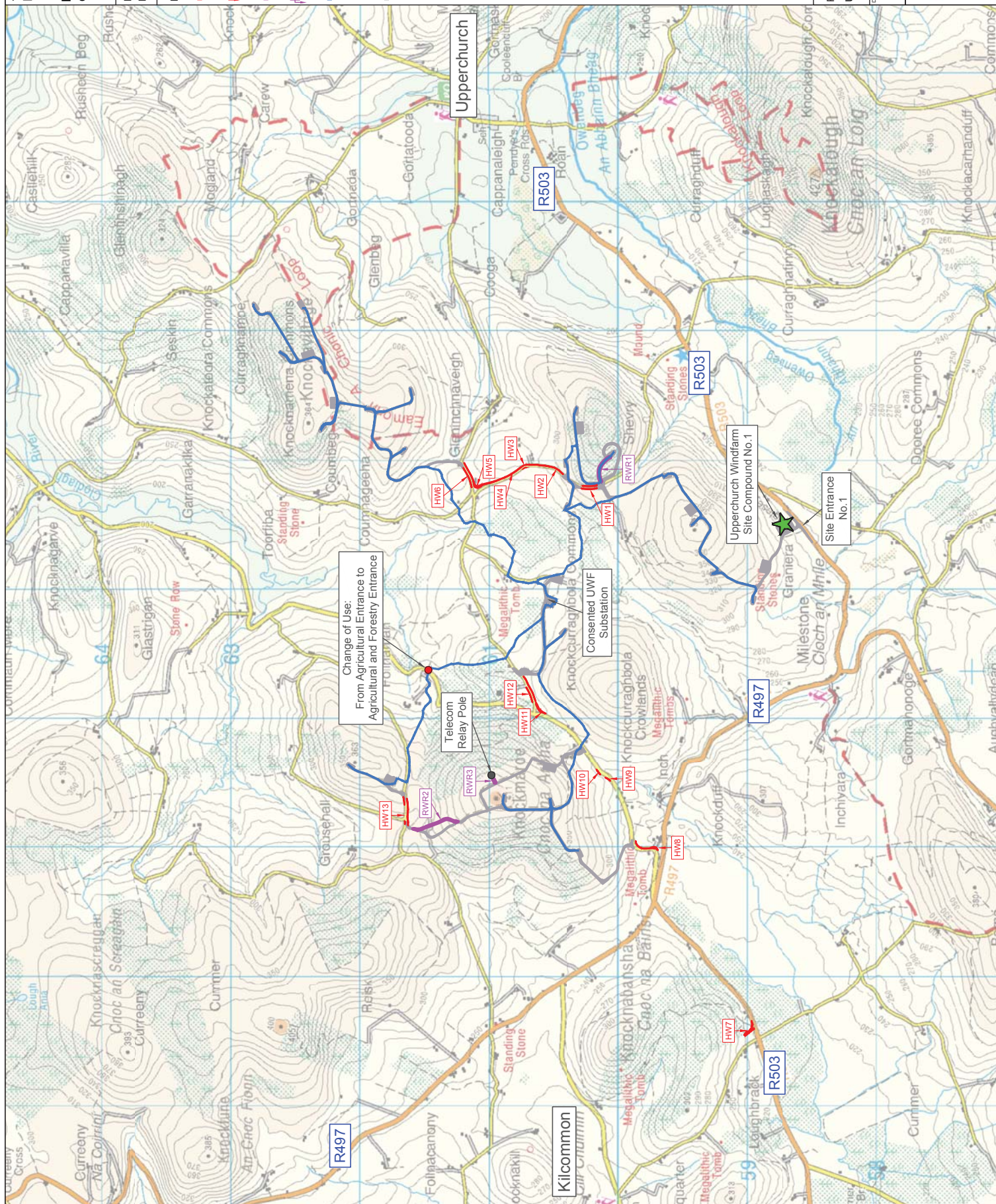
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Project:
UWF Related Works (RW)

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

REFERENCE DOCUMENT



Project:

UWF Related Works (RW)

Drawn by:

checked by.

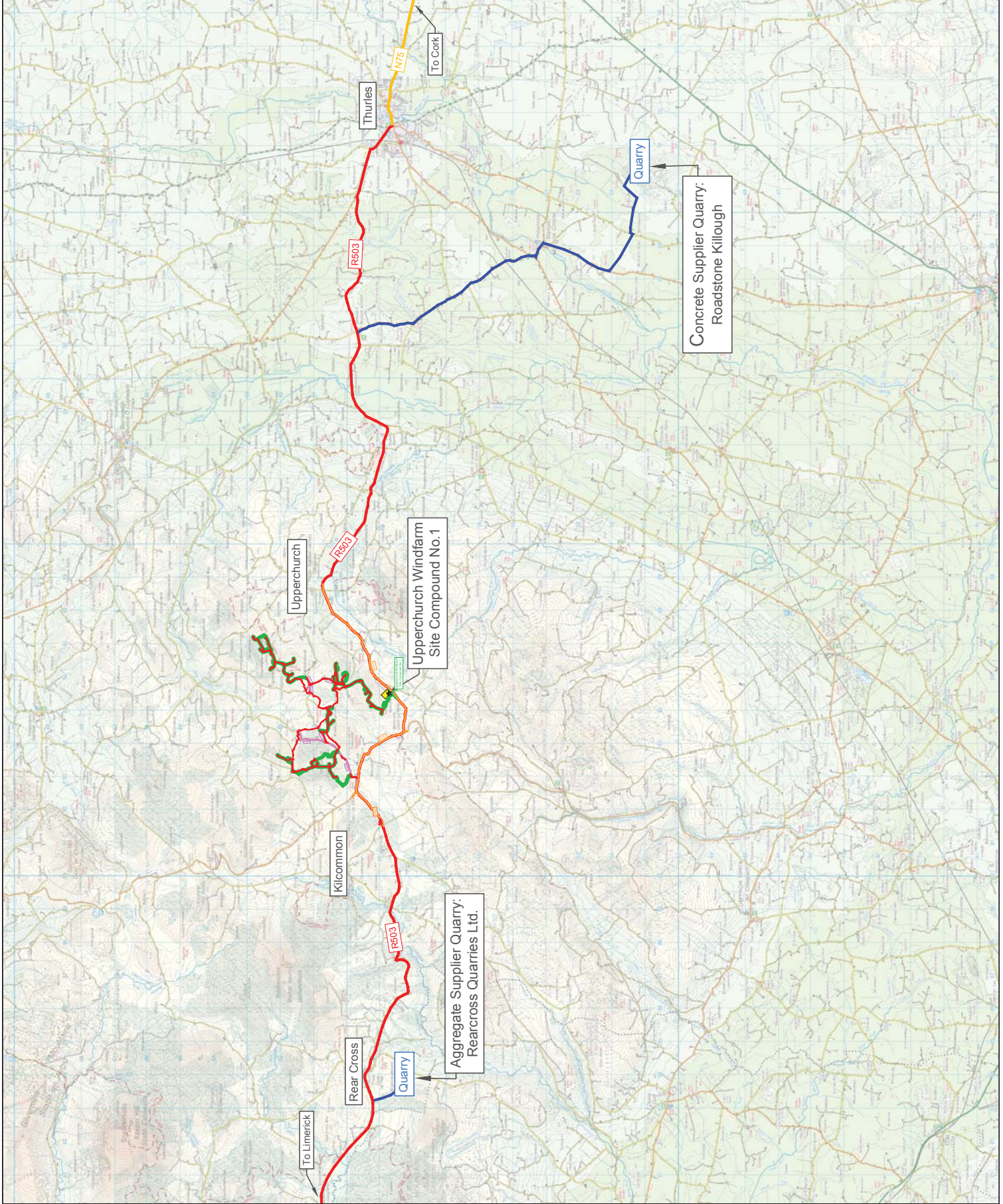
Date	
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Size:



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MOB: +353 83 6805644

ECOPOWER



Title:
Figure RW TMP 3

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

Map Number:
Map 1 of 1

Legend:

- | UWV Related Works | Construction Works Area | Haul Route along local roads from the R503 or the Upperchurch Windfarm Site Compound No.1 to the UWV Related Works Areas | Consented UWV Roads | Upperchurch Windfarm Site Compound No.1 | Regional Road | Public Road Number |
|---|---|--|---|---|---------------|--------------------|
|  |  |  |  |  | | |

REFERENCE DOCUMENT

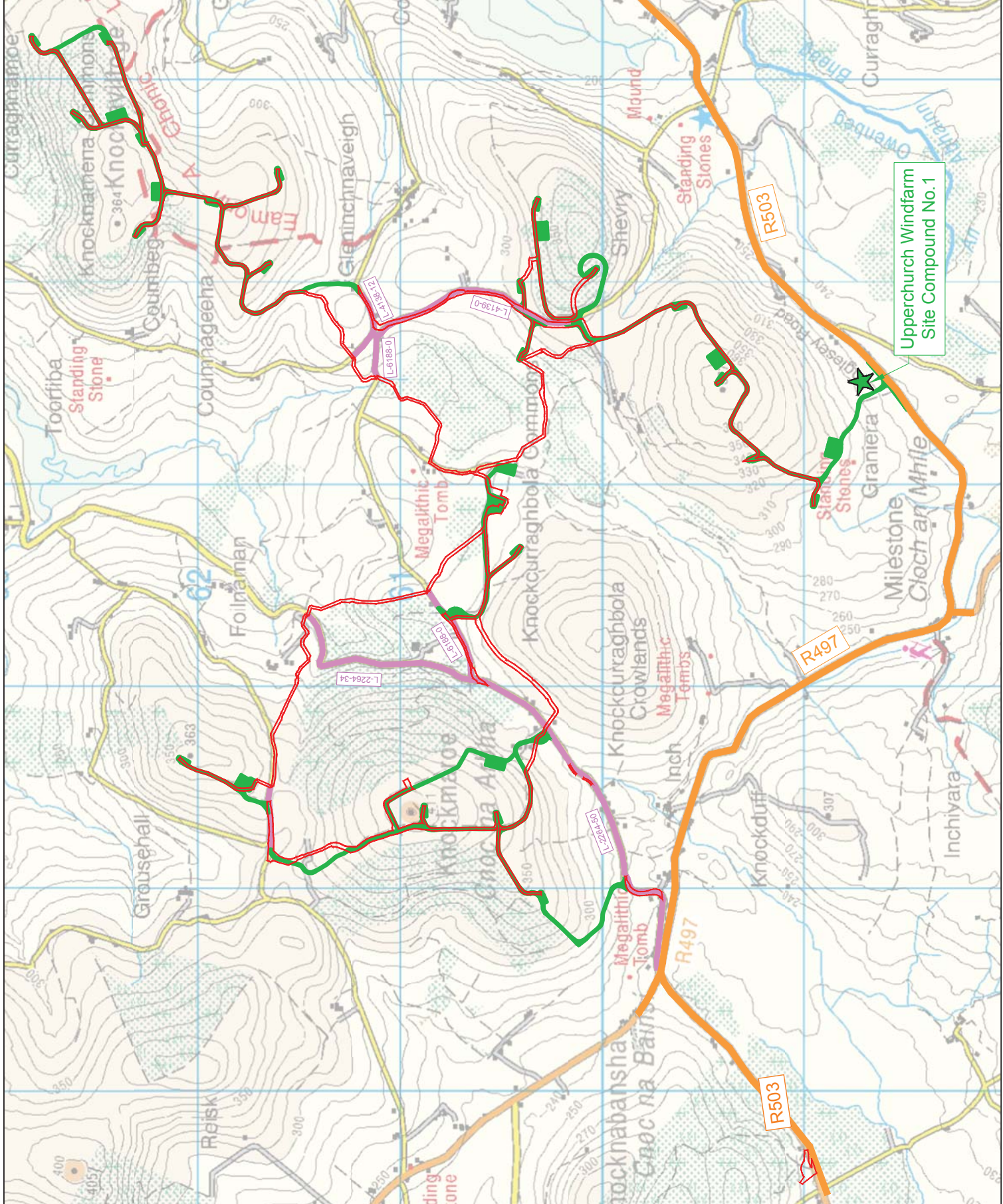


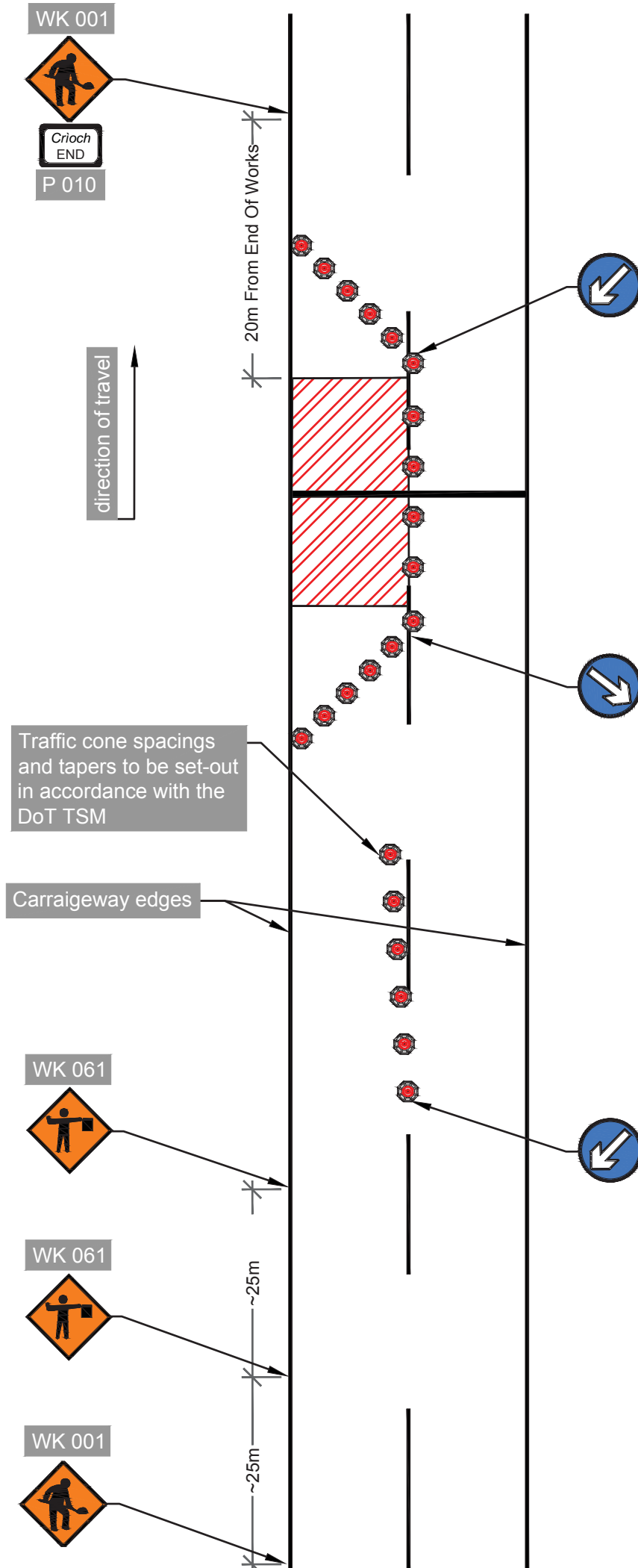
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Drawn by: AB	Checked by: JB	Date: 29-Mar-18	Sheet Size: A4
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ECOPOWER





Title:
Figure RW TMP 4

Advance Warning Signage for
Half Lane Closures

Designed in conjunction with



Note: This drawing is not to scale

Department of Transport Traffic Signs Manual
(DoT TSM)

Project:

UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
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UWF RELATED WORKS

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 4 Surface Water Quality Management Plan



February 2018



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

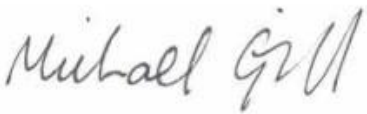
DOCUMENT TITLE:	UWF RELATED WORKS –CONSTRUCTION PHASE SURFACE WATER MANAGEMENT PLAN
ISSUE DATE:	29TH MARCH 2018
PROJECT NUMBER:	P1299-2
PROJECT REPORTING HISTORY:	P1299-1 P1299-0
CURRENT REVISION NO:	P1299-2 - REV 0 – FINAL REPORT
AUTHOR(S):	MICHAEL GILL DAVID BRODERICK
SIGNED:	 Michael Gill B.A., B.A.I., M.Sc., Dip. Geol., MIEI Managing Director – Hydro-Environmental Services
<p>Disclaimer: This report has been prepared by HES with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.</p>	

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FIGURES

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FIGURE SWMP 2	WATERCOURSE CROSSING LOCATIONS – MAP 1
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FIGURES (IN TEXT)

FIGURE A	SITE LOCATION MAP
FIGURE B	OPW FLOOD HAZARD MAP

TABLES

TABLE A	A SUMMARY OF REGIONAL AND LOCAL HYDROLOGY AT UWF RELATED WORKS
TABLE B	WATERCOURSE CROSSING TYPES ALONG THE WORKS
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TABLE D	WATER RELATED BEST PRACTICE MEASURES
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APPENDICES

APPENDIX I	WATER RELATED BEST PRACTICE MEASURES
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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.

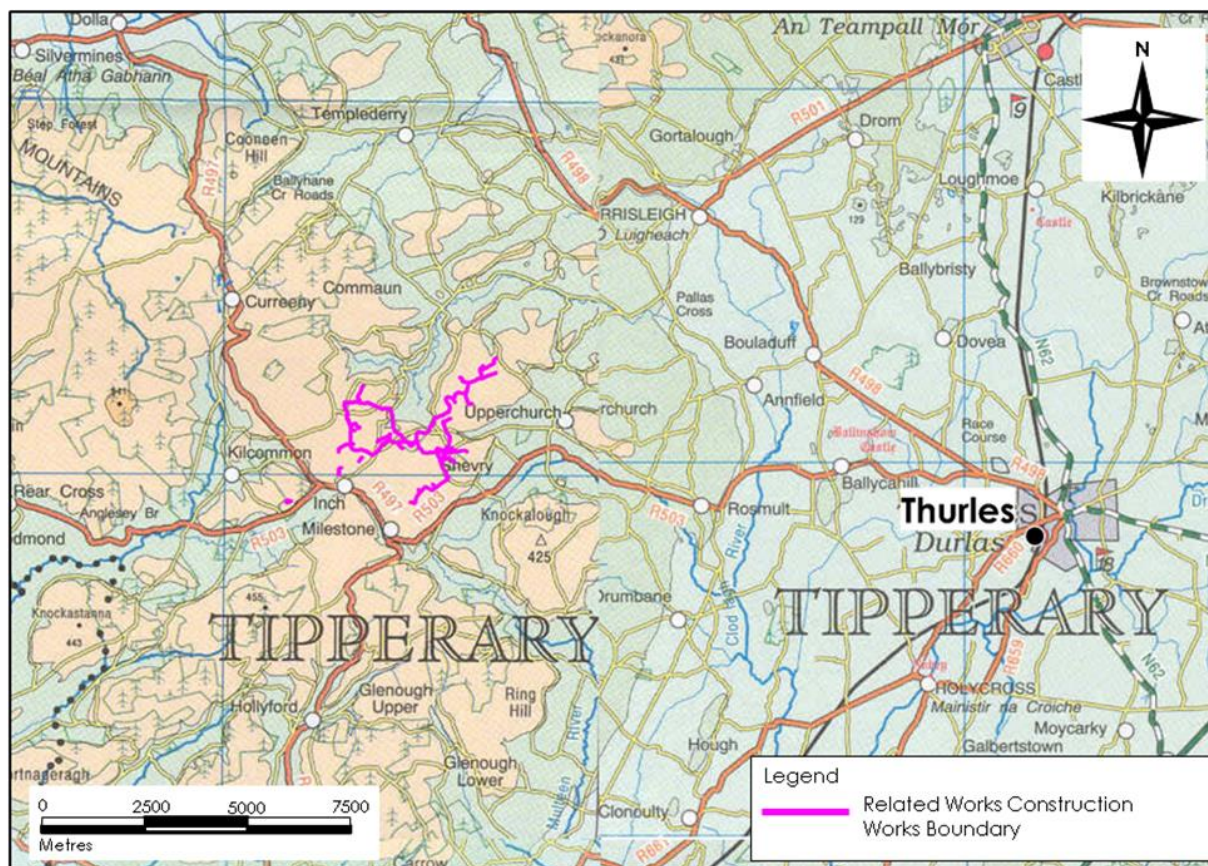


Figure A: Site Location Map

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, Foilnahan, Gleninchaveigh, 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 Foilnahan 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 Foilnahan 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 Foilnahan; 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, Gleninchaveigh, 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 RELAVANT 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 (Ecopower Developments Ltd, 2018) 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 Phelim 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).

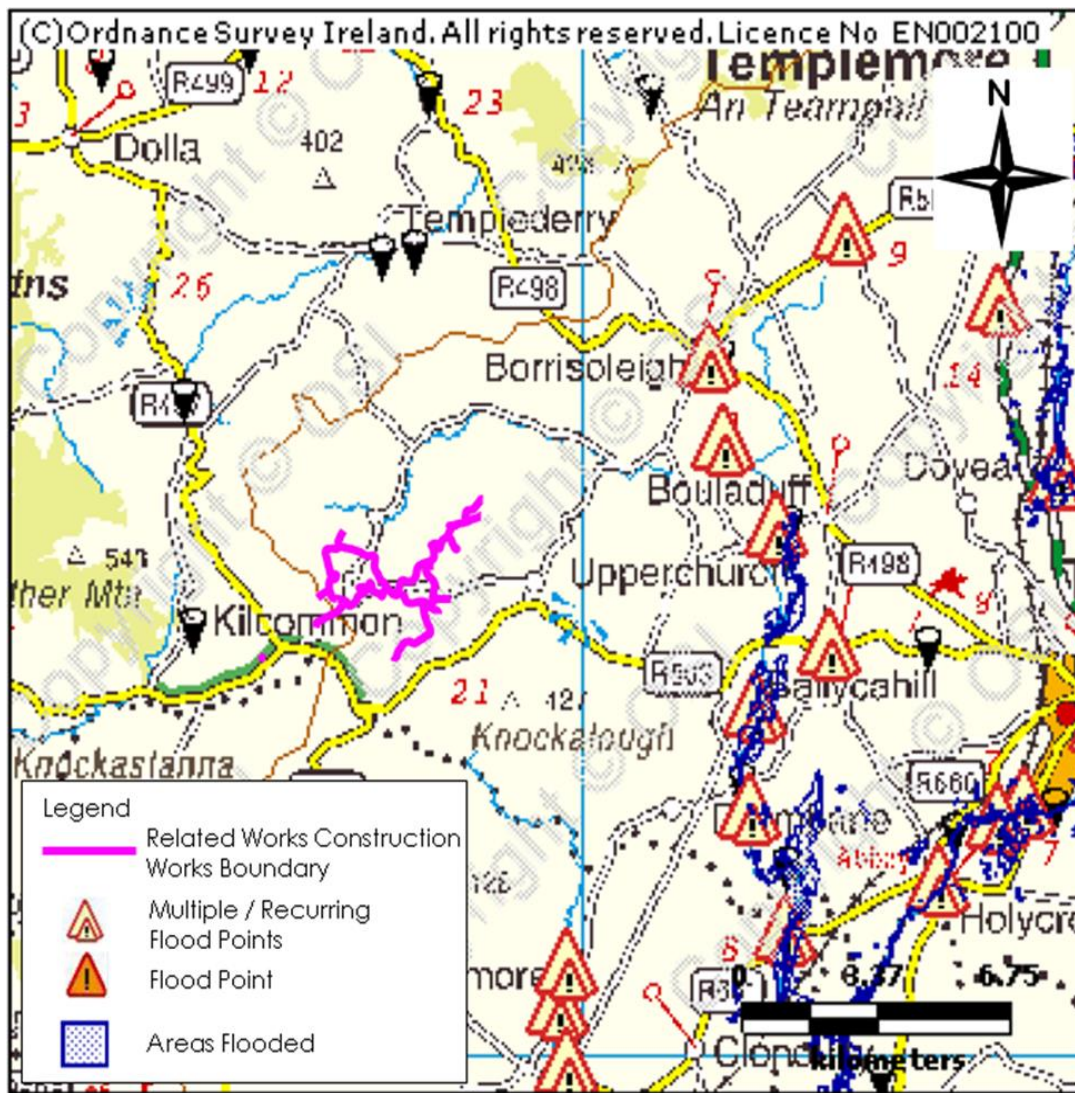


Figure B below). The closest mapped recurring flooding event is more than 15km downstream in the Clodiagh River.

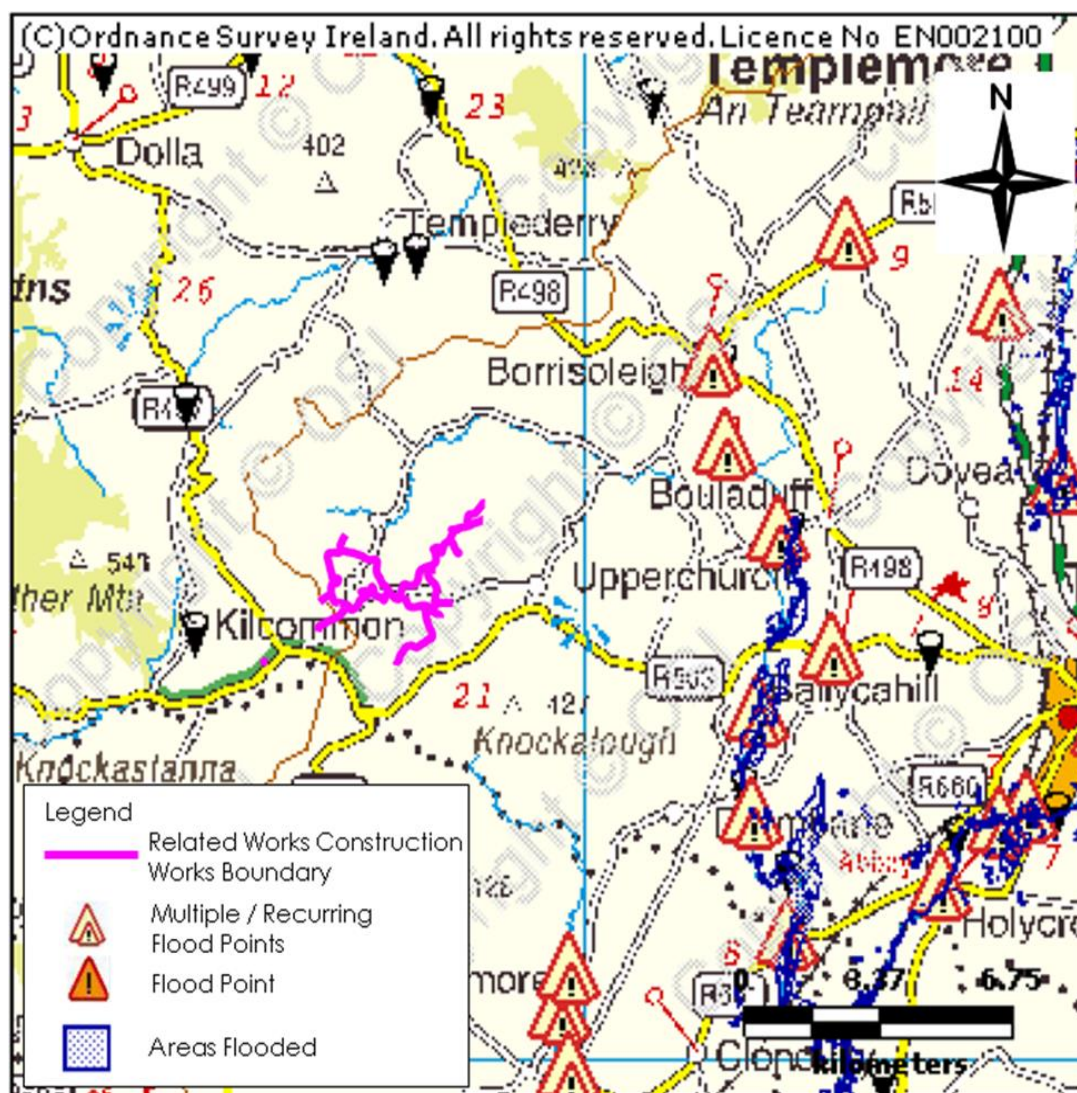


Figure B: OPW Flood Hazard Mapping (www.floods.ie)

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 Clodiagh 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 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.

As 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.

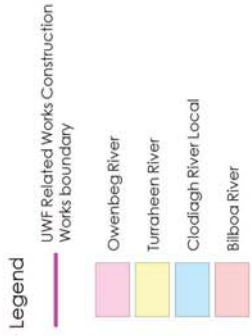
4.2.5 Surface Water Monitoring Reporting

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

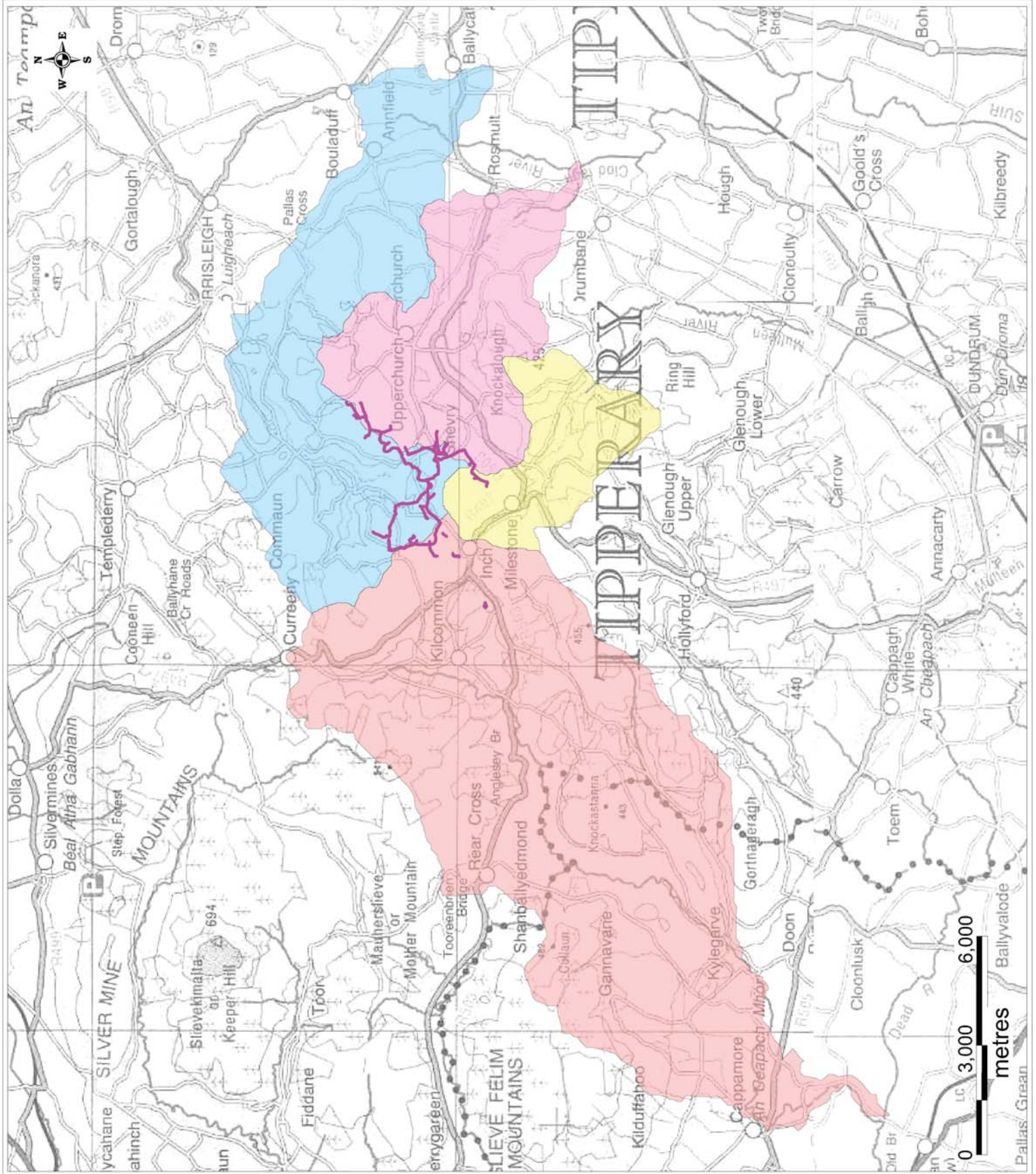


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Client: Ecopower Development Ltd.
Job: UWF Related Works
Title: Local Hydrology Map
Figure No: Figure SWMP 1
Drawing No: P1299-2-0318-F-SWMP-1-A3-0A
Sheet Size: A3
Project No: P1299-2
Scale: 1:100,000
Drawn By: GD
Date: 27/03/2018
Checked By: MG



Legend

- UWF Related Works Construction Works Boundary
- Permanent Access Roads
- Temporary Access Roads
- Haul Works Construction Works Boundary
- 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 Locations Map

Figure No: Figure SWMP 2

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

Sheet Size: A3

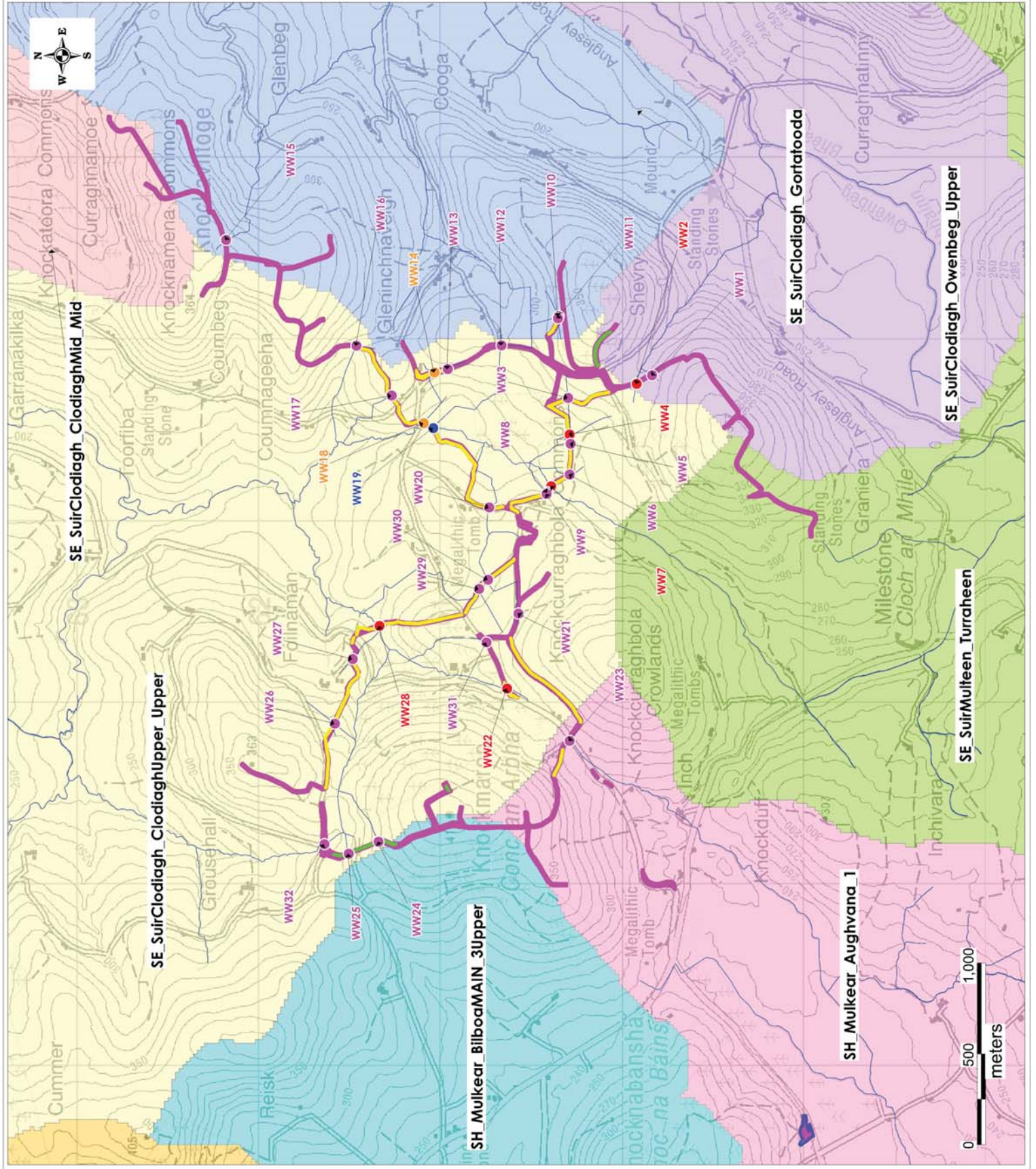
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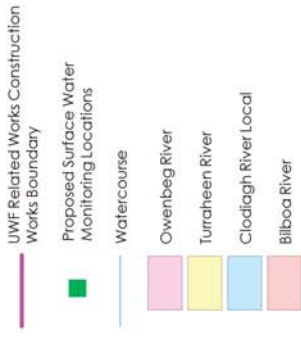
Project No: P1299-2

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Legend



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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

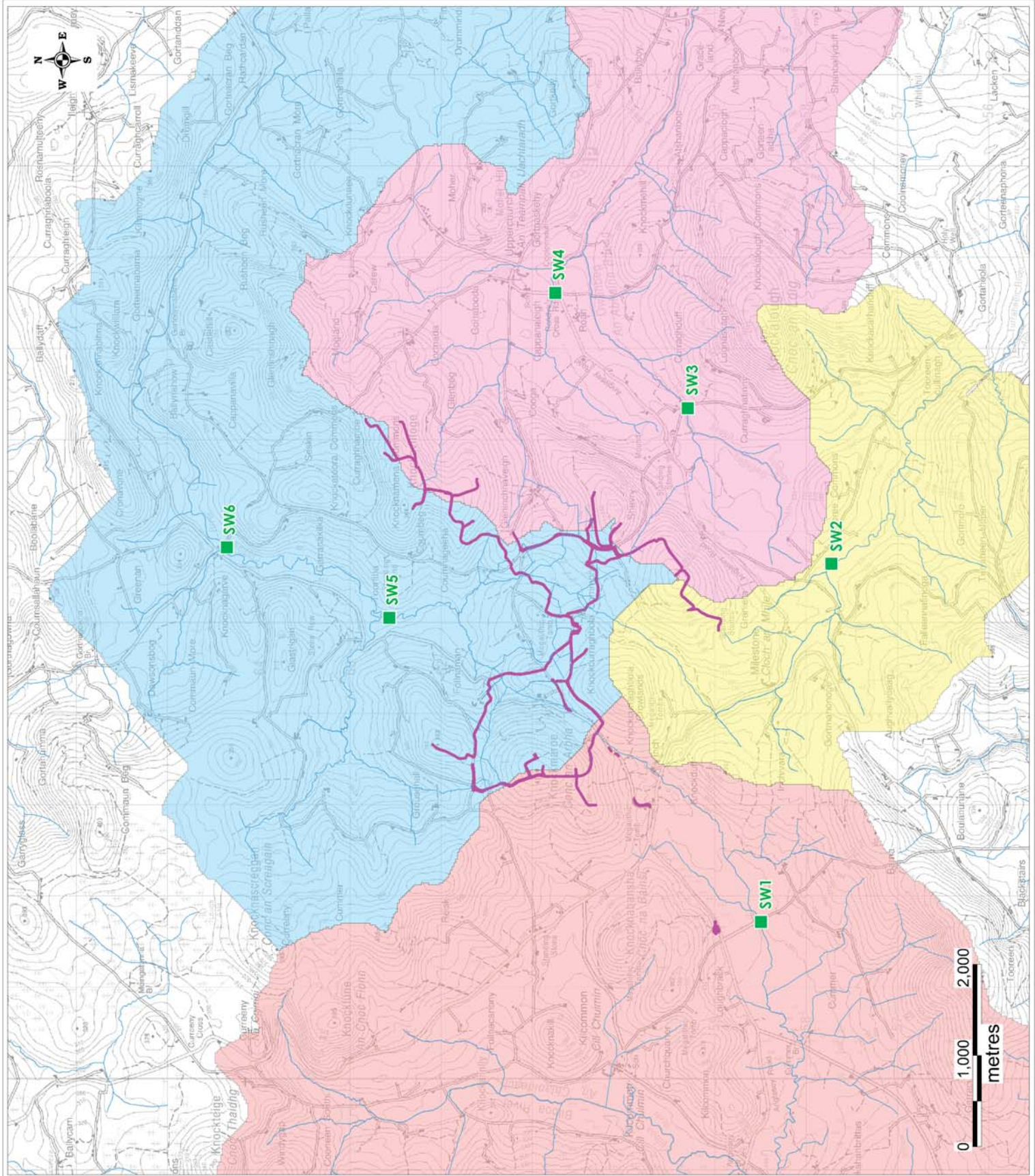
Project No: P1299-2

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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
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'.

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			
<ul style="list-style-type: none">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			
<p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</p>			
Responsibility of		Role/Duty	
Construction Manager		<ul style="list-style-type: none">Monitor weather conditions.Supervise excavation works and drainage works as required.	
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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 coarse 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 surrounded 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	<ul style="list-style-type: none">• Monitor weather conditions.• Supervise excavation works and drainage works.	
Surface Water Quality Protection Measures		
<ul style="list-style-type: none">• 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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		
<ul style="list-style-type: none">Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24		
Responsibility of	Role/Duty	
Construction Manager	<ul style="list-style-type: none">Monitor weather conditions.Supervise tree felling works and drainage works.	
Pre-felling surveys		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">Internal Windfarm Cabling – public road crossing locations andTelecom Relay Pole - foundations		
Responsibility of	Role/Duty	
Construction Manager	<ul style="list-style-type: none">Monitor weather conditions.Ensure best practice e storage and use of Cement Based Compounds.	
Related Works		
<ul style="list-style-type: none">No wet-cement products will be used along the grid connection route (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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">Construction works area boundary		
Responsibility of	Role/Duty	
Construction Manager	<ul style="list-style-type: none">Monitor weather conditions.Ensure best practice use and storage of fuels, oils and chemicals on-site.	
Manage of on-site refueling		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.		
Contingency for spillages		
<ul style="list-style-type: none">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	<ul style="list-style-type: none">Ensure appropriate culvert/bridge design.Supervise the construction works.	
Surface Water Quality Protection Measures		
<ul style="list-style-type: none">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		
<ul style="list-style-type: none">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		<ul style="list-style-type: none">• Monitor weather conditions.• Supervise excavation works and drainage works	
Surface Water Quality Protection Measures			
<ul style="list-style-type: none">• 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			
<ul style="list-style-type: none">• 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:			
<div>- Telecom Relay Pole</div> <div>- Realigned Windfarm Roads</div>			
Responsibility of		Role/Duty	
Construction Manager		<div><div></div> Monitor weather conditions.</div> <div><div></div> Supervise excavation works and drainage works.</div>	
Surface Water Quality Protection Measures			
<div><div></div> 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);</div> <div><div></div> Sloping ground and areas with wet ground conditions will be avoided;</div> <div><div></div> 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;</div> <div><div></div> 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;</div> <div><div></div> 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;</div> <div><div></div> 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;</div> <div><div></div> The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,</div> <div><div></div> 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.</div>			
References			
<div><div></div> IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</div> <div><div></div> NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,</div> <div><div></div> CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.</div>			

* * * * *

UWF RELATED WORKS

VOLUME D
ENVIRONMENTAL MANAGEMENT PLAN

Tab 5
Invasive Species Management Plan



ECOPOWER

INVASIVE SPECIES MANAGEMENT PLAN

UPPERCHURCH WHOLE WIND FARM PROJECT, COUNTY TIPPERARY



January 2018

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ACRONYMS

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

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 site assessments of seven locations where Japanese knotweed or Himalayan knotweed infestations were recorded by Inis field ecologists during habitat assessments as part of their work on the Upperchurch Whole UWF Project. As part of the Whole UWF Project, UWF Grid Connection, UWF Related Works and UWF Ancillary Activities are planned near each of the seven invasive plant infestation locations.

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

The site assessments 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 each location (7 No.) to measure the exact extent of each infestation to allow for accurate GIS mapping of each infestation.

None of the 7 No. infestations that were identified are within 7 metres of the works and as such pose no risk of spreading through mechanical means. Notwithstanding this point, biosecurity measures are proposed throughout the construction phase. None of the 7 No. infestations 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 each infestation location during all critical stages of construction works.

INTRODUCTION

During fieldwork on the Upperchurch Whole Windfarm Project, Inis field ecologists identified seven invasive plant infestations.

Invasive non-native species are any animal or plant introduced (deliberately or accidentally) 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 each invasive plant infestation location and complete an assessment of each infestation. The site assessments by Dr. Giaquinto confirmed the presence of Japanese knotweed (*Fallopia japonica*) at six locations and Himalayan knotweed (*Persicaria wallichii*) at one location. Rhododendron (*Rhododendron ponticum*) was recorded at one location. Both *R. ponticum* and Himalayan knotweed are regulated for control under the same legislation¹ as Japanese knotweed.

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

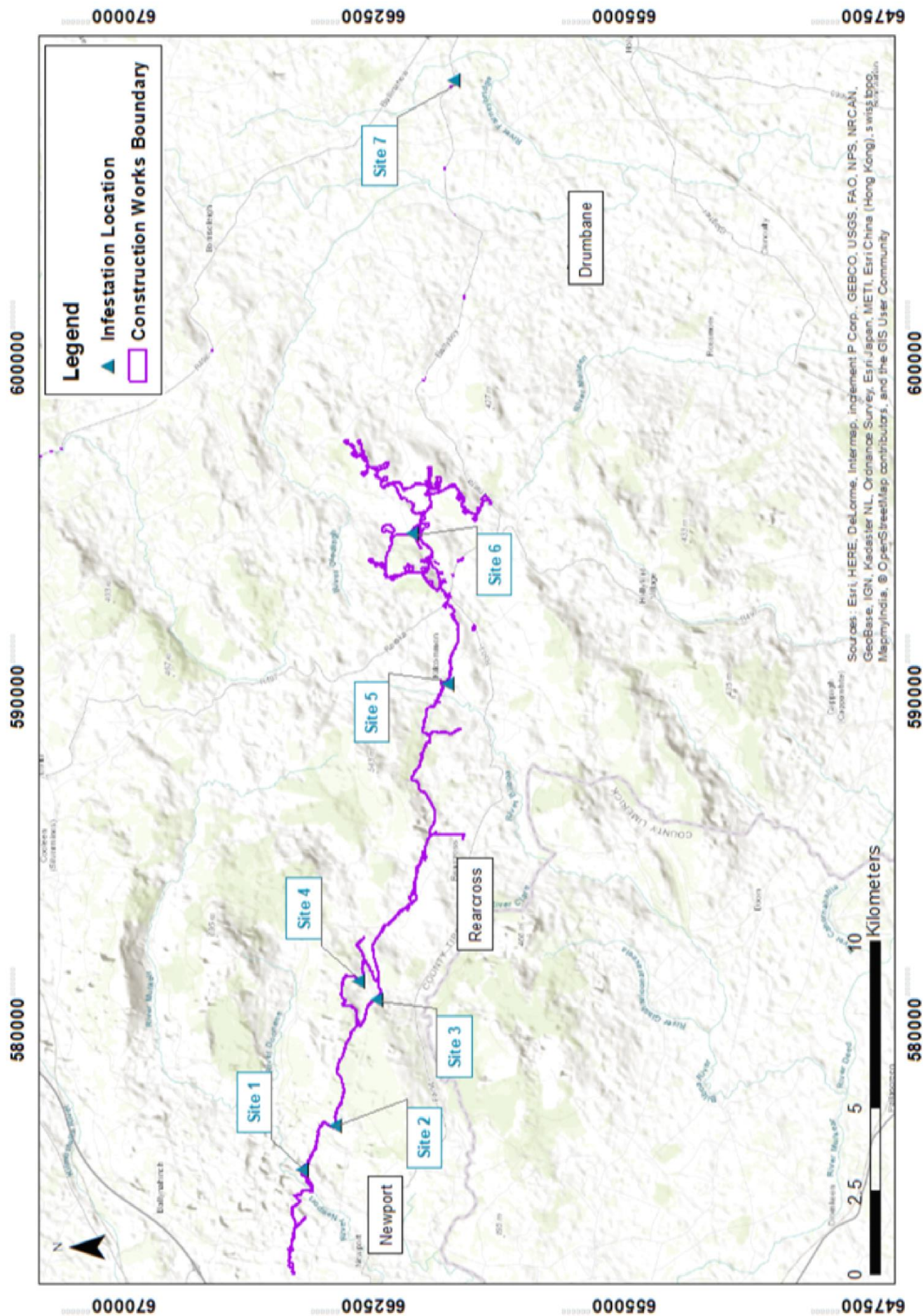
- most appropriate to each location;
- most likely to be effective;
- maintains compliance with EU and national legislation and guidelines pertaining to the control of invasive non-native plant species

¹ Relevant legislation includes: *European Communities (Birds and Natural Habitats) Regulations, 2011, S.I. No. 477*, which makes it an offence to *knowingly disperse or allow to escape* plant species listed in the Regulations.

DATA COLLECTED

At each location the following data (See Appendix R3) were gathered to assess the extent and severity of the 7 No. infestations:

- 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.



RESULTS

INFESTATION NUMBER	Site 1
INFESTATION TYPE	Himalayan knotweed (<i>Persicaria wallichii</i>)
INFESTATION LOCATION	575348 E 664200 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

Himalayan knotweed was recorded on the roadway verge, 12 metres from the proposed construction area (See Plate 1). Knotweed shoots were dispersed 26 m along the bank and extended 3 to 4 m across the width of the bank, with varying density (See Location Map below and Plates 1-3). The infestation extends into the adjoining field which was grazed with horses on the day of the site assessment; there was evidence that the knotweed had been grazed extensively (Plate 3).

No other invasive non-native species were recorded at this location.

RECOMMENDATION TO MAKE SAFE

- Implement appropriate biosecurity measures as per Appendix R2.
- The infestation's outer edge is 12 metres from the proposed construction area and, as such, poses no to low risk. The knotweed extends into the field and has been grazed extensively by horses.
- Heras 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 1



Plate 1 Location of Infestation Number: Site 1.

INFESTATION NUMBER	Site 2
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	676650 E 663221 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

An actively growing mature Japanese knotweed infestation was recorded at the edge of the forestry access road (See Location Map below and Plate 2), 11 metres from the construction area. The infestation appeared to be isolated in this location and is located well in from the edge of the road; no other infestations were recorded in the vicinity. There was minimal vegetation growing around the infestation, and there was no evidence of previous attempts at treatment.

No other invasive non-native species were recorded at this location.

RECOMMENDATION

- Implement appropriate biosecurity measures as per Appendix R2.
- The infestation's outer edge is 11 metres from the proposed construction area and, as such, poses no risk.
- Heras 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 during construction.

LOCATION MAP- SITE 2

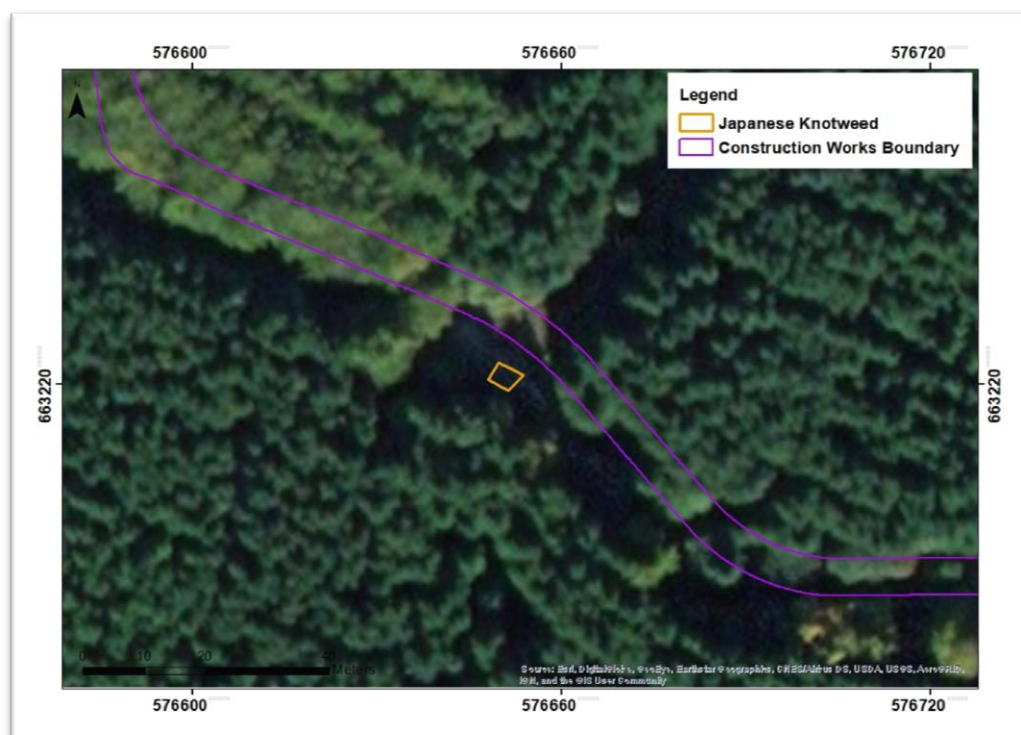


Plate 2 Location of Infestation Number: Site 2.

INFESTATION NUMBER	Site 3
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	580451 E 661921 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

A large tract of Japanese Knotweed was found in this location (See Plate 3). A bank of earth separates the infestation from the adjacent roadway. The infestation is mature and has been dispersed due to attempted failed eradication episodes. The infestation's outer edge is 10 metres from the proposed construction area and poses no risk to construction.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.
3. Heras 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 during construction.

LOCATION MAP- SITE 3

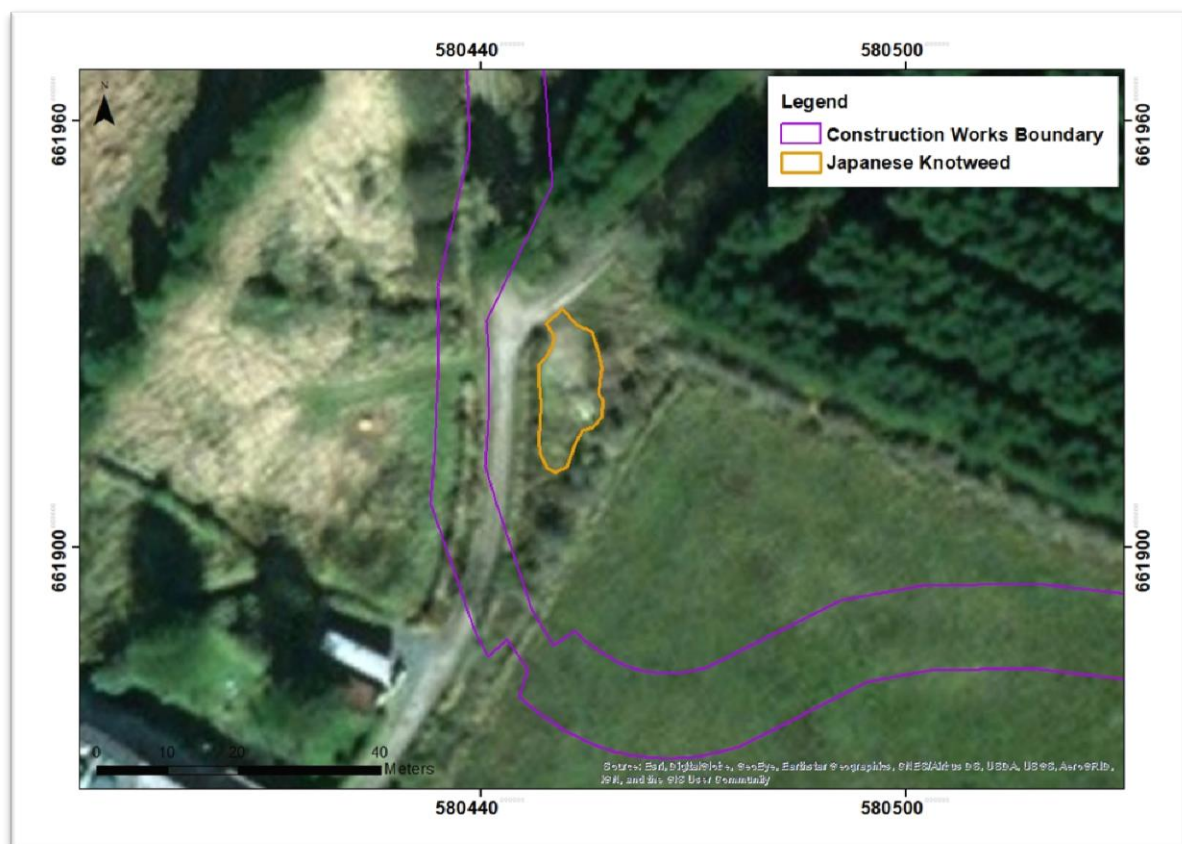


Plate 3 Location of Infestation Number: Site 3.

INFESTATION NUMBER	Site 4
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	580983 E 662504 N (ITM)
DATES OF SITE ASSESSMENT	24/09/17, 01/10/17, & 11/10/17

DESCRIPTION

Japanese knotweed (Plate 4) was recorded as an isolated infestation, 4 m from the centre of the adjacent forestry track. This track will be used for passing construction material deliveries/construction traffic only, with no construction work/excavation works in this track. The infestation is well contained with no evidence of disturbance or dispersal and thus poses no risk. No other invasive non-native species were recorded at this location.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.

LOCATION MAP- SITE 4

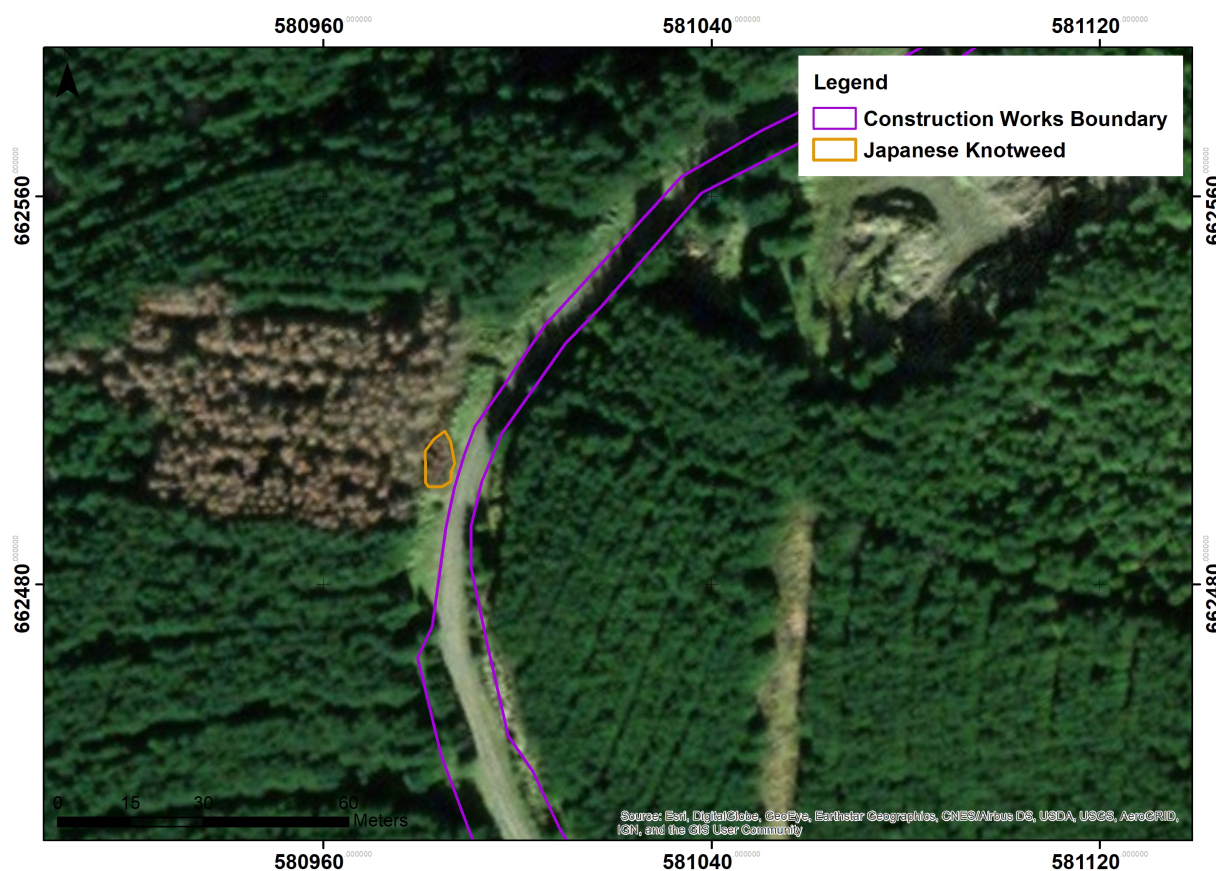


Plate 4 Location of Infestation Number: Site 4.

INFESTATION NUMBER	Site 5
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	589940 E 659894 N (ITM), 589923 E 659853 N (ITM), 589917 E 659824 N (ITM)

DESCRIPTION

Three infestations of Japanese Knotweed exist in this general area. Only one small isolated patch exists within the works boundary (See Plate 5) at a gate where no works are proposed. This patch is 9 metres from any proposed works, is well contained with no evidence of disturbance and thus poses no risk. The other two areas consist of extensive, severe Japanese knotweed (*Fallopia japonica*) infestations present within adjacent fields but these are outside the construction works area. No other invasive non-native species were recorded in this area.

RECOMMENDATION

1. An invasive species specialist will monitor this site throughout the construction period.
2. Implement appropriate biosecurity measures as advised in Appendix R2.
3. The infestation's outer edge is 9 metres from the proposed construction area and, as such, poses no risk to construction.
4. Heras 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 during construction.

LOCATION MAP SITE 5



Plate 5 Location of Infestation Number: Site 5.

INFESTATION NUMBER	Site 6
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
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 Number: Site 6

INFESTATION NUMBER	Site 7
INFESTATION TYPE	Japanese knotweed (<i>Fallopia japonica</i>)
INFESTATION LOCATION	608032 E 659632 N (ITM)

DESCRIPTION

Not proximal to the construction works boundary this infestation was recorded as growing on the hard shoulder of the tertiary road R503 (See Plate 7). This road will be used for the delivery of turbines and no construction is proposed anywhere near this infestation.

The infestation is mature, well-established, over 3 m tall with an uneven canopy and many large basal crowns. The site has been used for disposing rubbish and the ground surface beneath the infestation is heavily littered and uneven.

No construction is happening at this location i.e. turbine deliveries will be passing the infestation along a public road. No contact with the infestation is possible due to it being 6 metres from the roadway.

RECOMMENDATION

1. Implement appropriate biosecurity measures as advised in Appendix R2.
2. The infestation's outer edge is more than 7 metres from the required access area and, as such, poses a low risk.
3. There is no need for Herras fencing or similar as there is no chance of any traffic coming into contact with the plant at this location.

LOCATION MAP

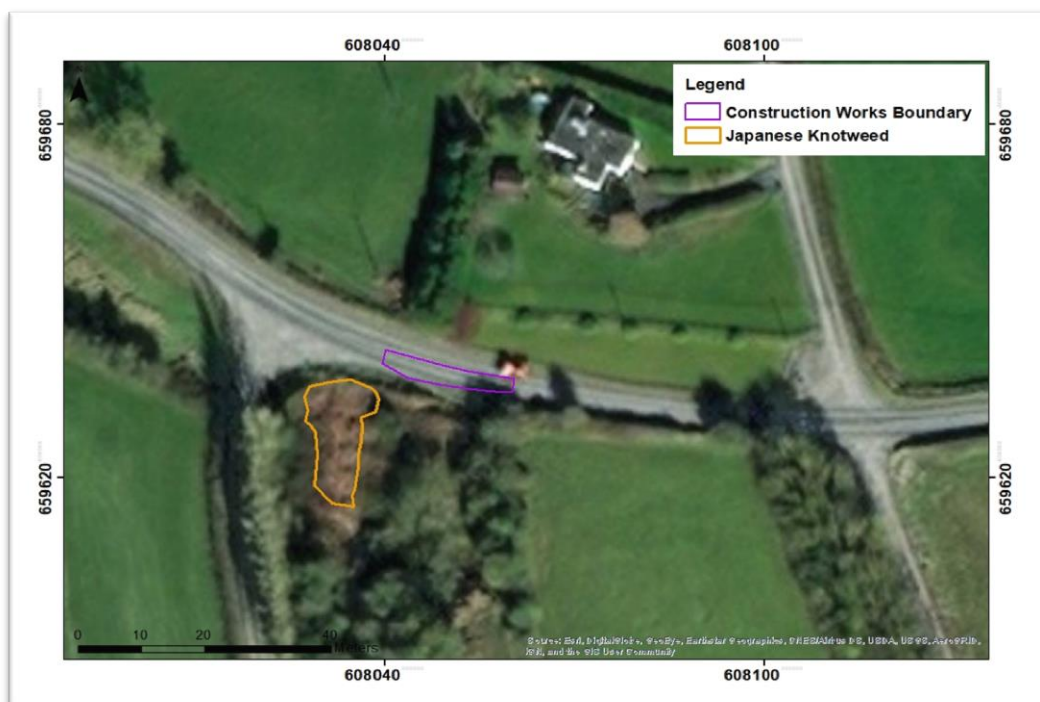










Plate 7 Location of Infestation Number: Site 7

APPENDIX R1
ILLUSTRATIVE PLATES

1		<p>Site 1 Himalayan knotweed on an infill bank of soil at road verge.</p>
2		<p>Site 1 As above, showing varying intensity of infestation along the bank</p>
3		<p>Site 1 Himalayan knotweed dispersed through the field and grazed by horses.</p>

4		<p>Site 2 Isolated infestation, actively growing.</p>
5		<p>Site 3 Disturbed Japanese knotweed by forestry track. Note infill in foreground which may have been used in an attempt to curb the infestation but has led to dispersal.</p>
6		<p>Site 4 Disturbed Japanese knotweed by forestry track which will be used by construction traffic only. No construction will occur anywhere near this infestation.</p>

7		Site 5 Isolated Japanese knotweed infestation at the gate of a house.
8		Site 6 Young, isolated Japanese knotweed infestation by farm gate.

9



Site 7

Extensive mature infestation growing on the verge of the tertiary road R503.

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 invasives 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_hgt_(m)	BC	BC_no/m2	BCSz	Cane_d(cm)	Cane_age_no	Dispersed	Risk_cause	soil_type	prev_treat
1	HK	104	2B+	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	s400m	3cm	24	no	prox to forestry track	woodland	no
3	JKW	≥1000	massive	3m	mature	4	s400m	3cm	varies	yes	prox to track, LM	farmland	cutting
4	JKW	20	no	2.5	mature	2	s400m	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	s30	1-3cm	varies	yes	natural dispersal	road verge	cutting

□

LEGEND

Extent_m²	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/m²	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 ENVIRONMENTAL MANAGEMENT PLAN

Tab 6 Waste Management Plan



ECOPOWER

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Table 2	Waste Details to be Provided
Table 3	Measured waste quantities and costs

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 UWF Site Compound No.1 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 Foilnahan 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 <u>will not constitute waste</u> 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 UWF Site Compound No.1. The licensed operator, will collect and transfer the skips/receptacles of both recyclable and non-recyclable wastes as they are filled. UWF Site Compound No.1 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 public 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 UWF Site Compound No.1. 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 UWF Site Compound No.1. 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 UWF Site Compound No.1, 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 UWF Site Compound No.1 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. UWF Site Compound No.1)
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

A detailed topographic map section showing the area around Glacien. The map features brown contour lines indicating elevation, with labels such as 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790, 1800, 1810, 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060, 2070, 2080, 2090, 2100, 2110, 2120, 2130, 2140, 2150, 2160, 2170, 2180, 2190, 2200, 2210, 2220, 2230, 2240, 2250, 2260, 2270, 2280, 2290, 2300, 2310, 2320, 2330, 2340, 2350, 2360, 2370, 2380, 2390, 2400, 2410, 2420, 2430, 2440, 2450, 2460, 2470, 2480, 2490, 2500, 2510, 2520, 2530, 2540, 2550, 2560, 2570, 2580, 2590, 2600, 2610, 2620, 2630, 2640, 2650, 2660, 2670, 2680, 2690, 2700, 2710, 2720, 2730, 2740, 2750, 2760, 2770, 2780, 2790, 2800, 2810, 2820, 2830, 2840, 2850, 2860, 2870, 2880, 2890, 2900, 2910, 2920, 2930, 2940, 2950, 2960, 2970, 2980, 2990, 3000, 3010, 3020, 3030, 3040, 3050, 3060, 3070, 3080, 3090, 3100, 3110, 3120, 3130, 3140, 3150, 3160, 3170, 3180, 3190, 3200, 3210, 3220, 3230, 3240, 3250, 3260, 3270, 3280, 3290, 3300, 3310, 3320, 3330, 3340, 3350, 3360, 3370, 3380, 3390, 3400, 3410, 3420, 3430, 3440, 3450, 3460, 3470, 3480, 3490, 3500, 3510, 3520, 3530, 3540, 3550, 3560, 3570, 3580, 3590, 3600, 3610, 3620, 3630, 3640, 3650, 3660, 3670, 3680, 3690, 3700, 3710, 3720, 3730, 3740, 3750, 3760, 3770, 3780, 3790, 3800, 3810, 3820, 3830, 3840, 3850, 3860, 3870, 3880, 3890, 3900, 3910, 3920, 3930, 3940, 3950, 3960, 3970, 3980, 3990, 4000, 4010, 4020, 4030, 4040, 4050, 4060, 4070, 4080, 4090, 4100, 4110, 4120, 4130, 4140, 4150, 4160, 4170, 4180, 4190, 4200, 4210, 4220, 4230, 4240, 4250, 4260, 4270, 4280, 4290, 4300, 4310, 4320, 4330, 4340, 4350, 4360, 4370, 4380, 4390, 4400, 4410, 4420, 4430, 4440, 4450, 4460, 4470, 4480, 4490, 4500, 4510, 4520, 4530, 4540, 4550, 4560, 4570, 4580, 4590, 4600, 4610, 4620, 4630, 4640, 4650, 4660, 4670, 4680, 4690, 4700, 4710, 4720, 4730, 4740, 4750, 4760, 4770, 4780, 4790, 4800, 4810, 4820, 4830, 4840, 4850, 4860, 4870, 4880, 4890, 4900, 4910, 4920, 4930, 4940, 4950, 4960, 4970, 4980, 4990, 5000, 5010, 5020, 5030, 5040, 5050, 5060, 5070, 5080, 5090, 5100, 5110, 5120, 5130, 5140, 5150, 5160, 5170, 5180, 5190, 5200, 5210, 5220, 5230, 5240, 5250, 5260, 5270, 5280, 5290, 5300, 5310, 5320, 5330, 5340, 5350, 5360, 5370, 5380, 5390, 5400, 5410, 5420, 5430, 5440, 5450, 5460, 5470, 5480, 5490, 5500, 5510, 5520, 5530, 5540, 5550, 5560, 5570, 5580, 5590, 5600, 5610, 5620, 5630, 5640, 5650, 5660, 5670, 5680, 5690, 5700, 5710, 5720, 5730, 5740, 5750, 5760, 5770, 5780, 5790, 5800, 5810, 5820, 5830, 5840, 5850, 5860, 5870, 5880, 5890, 5900, 5910, 5920, 5930, 5940, 5950, 5960, 5970, 5980, 5990, 6000, 6010, 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130, 6140, 6150, 6160, 6170, 6180, 6190, 6200, 6210, 6220, 6230, 6240, 6250, 6260, 6270, 6280, 6290, 6300, 6310, 6320, 6330, 6340, 6350, 6360, 6370, 6380, 6390, 6400, 6410, 6420, 6430, 6440, 6450, 6460, 6470, 6480, 6490, 6500, 6510, 6520, 6530, 6540, 6550, 6560, 6570, 6580, 6590, 6600, 6610, 6620, 6630, 6640, 6650, 6660, 6670, 6680, 6690, 6700, 6710, 6720, 6730, 6740, 6750, 6760, 6770, 6780, 6790, 6800, 6810, 6820, 6830, 6840, 6850, 6860, 6870, 6880, 6890, 6900, 6910, 6920, 6930, 6940, 6950, 6960, 6970, 6980, 6990, 7000, 7010, 7020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130, 7140

Topographic map of the Stone Row area in the Lake District. The map shows contour lines, the River Ure, and the town of Skipton. The map includes a scale bar from 0 to 1000m and a north arrow.

A topographic map of the area around Toorfilba and Carew. The map shows contour lines indicating elevation, with labels for 200, 250, 300, 350, 400, 450, and 500 feet. A river flows through the area, and a road is marked. The locations of Toorfilba and Carew are indicated by red dots. The map also shows a grid of latitude and longitude lines.

Földtázas

HW3

The map shows the Follonica Canyon with bathymetric contours ranging from 100 to 1000 meters. Two borehole locations are marked: HW6 (red dot) and HW7 (blue dot). A scale bar indicates distances up to 10 km, and a north arrow is present.

Telecom Relay Pole

Upperchurch Windfarm (UWF)

Upperchurch Windfarm
Site Compound No. 1

Regional Road Number

R503

Topographic map of the study area. The map shows the Kumbhrajung River flowing through the region. Key locations marked include Site Entrance No. 1, Inchiyara, and Mt. Kumbhrajung. The map also indicates the location of the Kumbhrajung River and the Kumbhrajung River. The map is oriented with North at the top.



UWF RELATED WORKS

Tab 7 **Best Practice Measures**



ECOPOWER

Table 1: 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 (<i>Circus cyaneus</i>)
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 (<i>Alcedo atthis</i>).
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 (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).

BPM No.	BPM Title
RW-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)
RW-BPM-25	Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)
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	
<ul style="list-style-type: none"> • 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	
<p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works as required.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> 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	
<p>The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW5, WW7, WW8, WW16 and WW27</p> <p>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.</p> <p><u>Relevant Watercourse Crossing Points:</u> WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</p>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> ● Monitor weather conditions. ● Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> ● 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 coarse 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 surrounded 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	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 Sections/Locations	
<ul style="list-style-type: none"> 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 110kV UGC; 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	<ul style="list-style-type: none"> Monitor weather conditions. Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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>i.e.</i> 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	
<ul style="list-style-type: none"> Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Supervise tree felling works and drainage works.
Pre-felling surveys	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Internal Windfarm Cabling – public road crossing locations and Telecom Relay Pole - foundations 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Ensure best practice e storage and use of Cement Based Compounds.
Measures along the 110kV UGC	
<ul style="list-style-type: none"> No wet-cement products will be used along the grid connection route (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>i.e.</i> 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 Mountphilips Substation and End Masts	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Construction works area boundary 	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Monitor weather conditions. Ensure best practice use and storage of fuels, oils and chemicals on-site.
Manage of on-site refueling	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose. 	
Contingency for spillages	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Ensure appropriate culvert/bridge design. Supervise the construction works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> 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>i.e.</i> 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	
<ul style="list-style-type: none"> 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: <u>Internal Windfarm Cabling</u> , construction works area boundary <u>Haul Route Works locations</u>	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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 exist within 20m of the storage area; • Where the temporary overburden storage 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 storage areas will be checked / monitored on a daily basis until stabilised to ensure no drainage issues or surface water quality impacts are occurring. 	
References	
<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Monitor weather conditions. • Supervise excavation works and drainage works.
Surface Water Quality Protection Measures	
<ul style="list-style-type: none"> • 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>i.e.</i> 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	
<ul style="list-style-type: none"> • 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 (<i>Circus cyaneus</i>)
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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> A temporal construction exclusion zone of 500m will be established around any active hen harrier breeding attempt or active nesting location. 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. No construction works will take place within the temporal exclusion zone 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	
<ul style="list-style-type: none"> The temporal exclusion zone will be monitored by a suitably qualified Ornithologist. The Ornithologist will 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	<ul style="list-style-type: none"> • Scheduling of works
Project Ecologist	<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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. <u>All lighting</u> will be cowed 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	
<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> Structures which were previously identified as having <u>no potential for bats</u> (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	<ul style="list-style-type: none"> • Post-construction activity surveys. • Liaising with NPWS. • Must be aware of the best practice guidance listed in References below.
Operational Surveys	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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). <i>Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.</i> 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	<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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	
<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<p>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.</p> <p>Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.</p> <p>The following approach will be taken in order to comply with the Wildlife Acts:</p> <ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 (<i>Alcedo atthis</i>).
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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins <i>et al</i>, 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Cummins, S., Fisher, J., McKeever, R.G., McNaghten, L., and Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher (<i>Alcedo atthis</i>) 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 (EclA) of the Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (<i>Alcedo atthis</i>) and other riparian birds II. Office of Public Works and BirdWatch Ireland. http://www.opw.ie/en/media/Issue%20No.%2012%20%20EclA%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	<ul style="list-style-type: none"> Must be aware of the best practice guidance listed in References below.
Monitoring of identified Badger setts during the operational phase of the development.	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Scheduling of construction activities.
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<p>In the event of the confirmation of pine martin breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> 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	
<p>In the event of the confirmation of red squirrel breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> 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		<ul style="list-style-type: none">Requiring supply companies to clean delivery vehicles before entering the site to gain access to works areaObtaining and keeping a record of delivery companies cleaning of vehiclesTraining flagmen in the appropriate method of vehicle cleaning	
Flagmen		<ul style="list-style-type: none">Cleaning of delivery vehicles exiting the site with suitable disinfectantMaintaining a record of all vehicles cleaned and equipment, disinfectant used.	
Project Ecologist		<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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			
<ul style="list-style-type: none">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 (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).
Environmental Commitment	
To avoid effects on the breeding habitat of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>) 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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 (<i>Bufo (Epidalea) calamita</i>), thus this species does not require mitigation within this Project. 	
References	
<ul style="list-style-type: none"> 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 (<i>Lacerta (Zootoca) vivipara</i>)
Environmental Commitment	
To avoid effects on Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>) during the pre-construction and construction phase.	
Work Sections/Locations	
All sections	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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.	
<ul style="list-style-type: none"> 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 (<i>Anguis fragilis</i>), thus this species does not require mitigation within this Project. 	
References	
<ul style="list-style-type: none"> 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 (<i>Euphydryas aurinia</i>)
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	<ul style="list-style-type: none"> Scheduling of construction activities
Project Ecologist	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be trimmed/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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer
Landowner and Land-User Liaison Measures	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To fence all active construction works areas
Community Liaison Officer	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Provide site induction to site personnel and contractors regarding the dust control measures
Training and Communication	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 be 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)

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	<ul style="list-style-type: none"> Ensure operational EMF emissions are measured
Measures to minimize dust emissions	
<ul style="list-style-type: none"> 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 Foilnahan. Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the 2018 EIA Report. 	
References	
<ul style="list-style-type: none"> EIA Report for UWF Related Works (2018) 	

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	<ul style="list-style-type: none"> Record annual electricity production levels
Measures to minimize dust emissions	
<ul style="list-style-type: none"> Recording and reporting of the annual renewable electricity production of the operational UWF. 	
References	
<ul style="list-style-type: none"> EIA Report for UWF Related Works (2018) 	

UWF RELATED WORKS

VOLUME D ENVIRONMENTAL MANAGEMENT PLAN

Tab 8 Outline Construction Methodologies

**(Further methodologies post planning consent /
pre-construction)**



ECOPOWER

February 2018

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 Grid Connection

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			
<ul style="list-style-type: none">Over a 6 month period prior to the commencement of the main construction stage			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">Main ContractorProject ManagerEnvironmental Clerk of WorksSite EcologistSite Hydrologist		<ul style="list-style-type: none">Survey equipment	
Standard Design and Management Activities:			
<ol style="list-style-type: none">The Project Manager, Main Contractor, and the Environmental Clerk of Works will be appointed.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.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.Method statements will be prepared by the Contractor. These method statements will be based on the Outline Construction Methodologies.Pre-construction monitoring and confirmatory surveys will be carried out by specialist engineering and environmental consultants.			
Pre-Construction Windfarm Monitoring Activities:			
<ol style="list-style-type: none">Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities.Pre-construction water quality monitoring surveys, will be carried outPre-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	
<ul style="list-style-type: none">Site engineer2 civil works personnel		<ul style="list-style-type: none">Hand toolsGPS EquipmentFencing postsFencing wireMarker TapePortable electric fencerGoal postsSignageWooden pegs4 x 4 vehicle and trailer	
Standard Methods:			
<div>4. Construction areas will be set-out using GPS and other surveying equipment.</div> <div>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.</div> <div>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.</div> <div>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.</div> <div>8. 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. .</div> <div>9.</div>			
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, Gleninchaveigh, 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			
<ul style="list-style-type: none">Half day to one day per entrance			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">Crew size: 3 operativesWheeled dumper or Track dumperVibrating Roller360° tracked excavatorChains / hand toolsChainsaw/Hedge TrimmersTraffic management signageTraffic Flagmen		<ul style="list-style-type: none">50mm crushed stoneGeotextile mattingGranular fillGatesTimber postsRail fenceWire fencing meshSilt fenceTimber Bog Mats / Aluminium Panel Tracks (where required)Precast concrete culverts	
Standard Methods			
<ol style="list-style-type: none">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.Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary.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.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.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.Existing drainage channels will be kept clean at all times. Where required, they will be piped in culverts to maintain the existing flows.Silt traps will be located along drains to stop suspended sediment from entering waterways..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

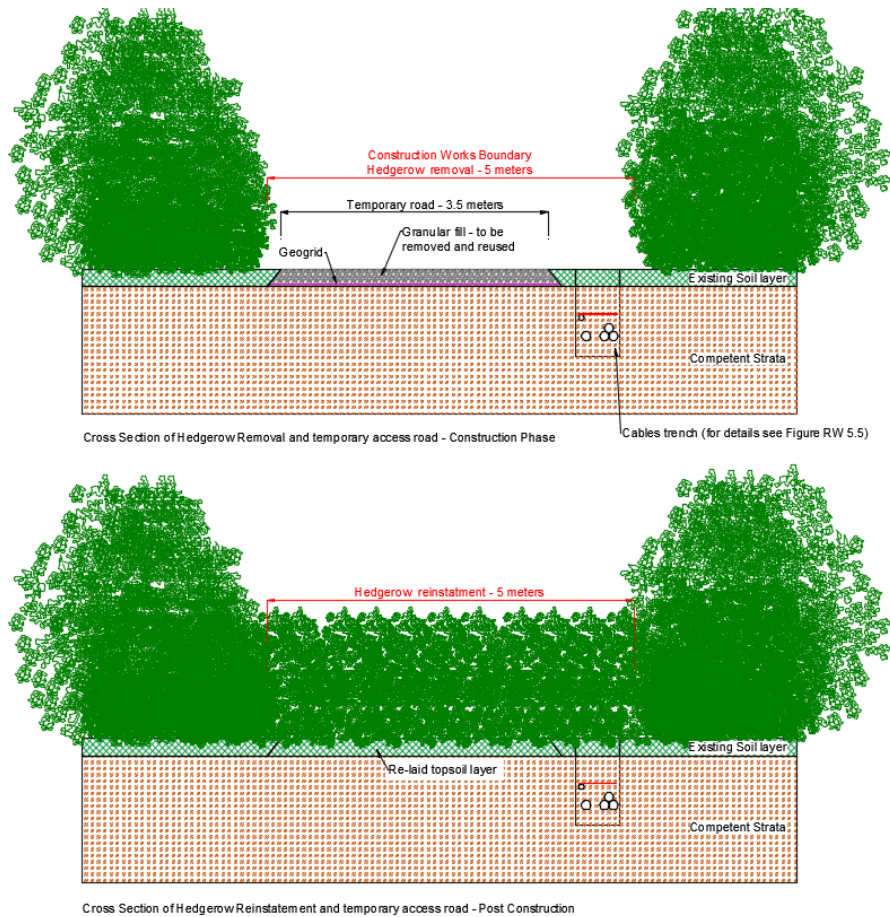
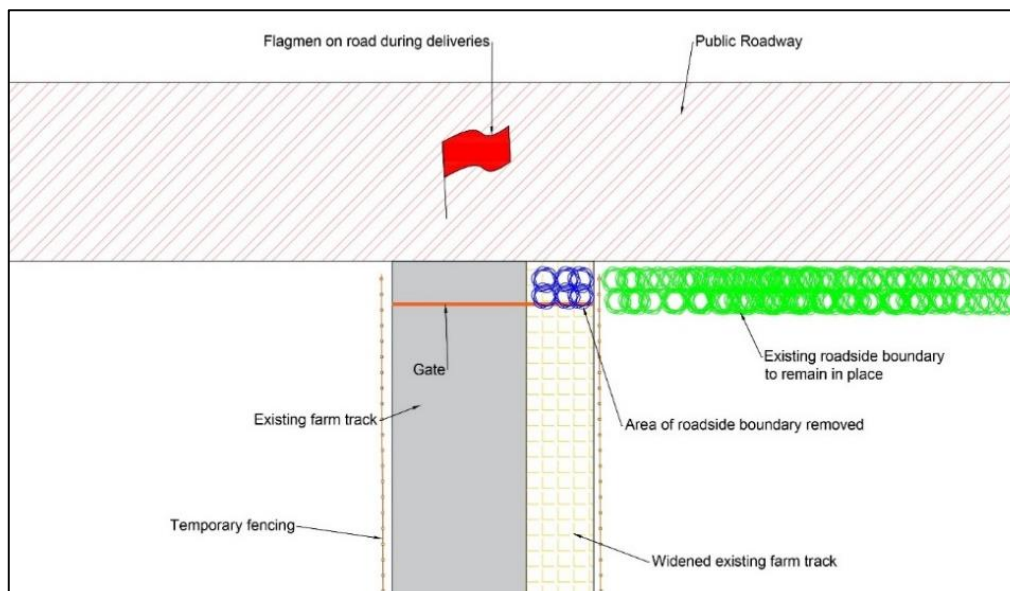


Figure RW 5.14: Plan View of Typical Temporary Site Entrance

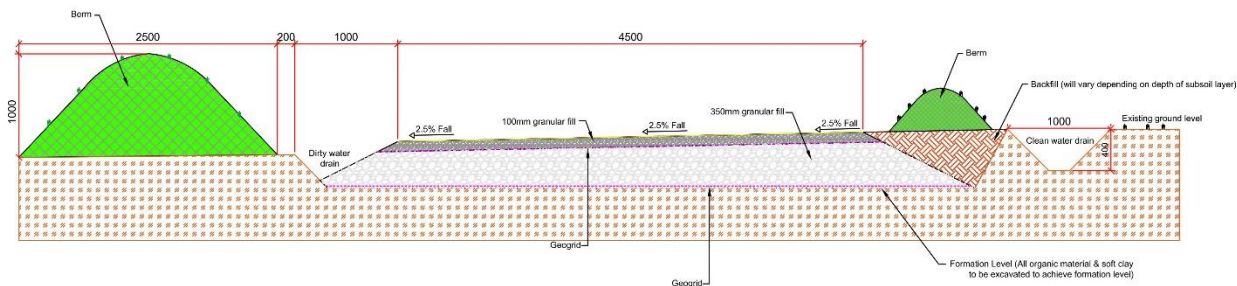


End

Outline Construction Methodology			
Title:	Realigned Windfarm Roads	Ref:	RW-OCM-04
General Description			
<p>The Upperchurch Windfarm Access Roads require realigning at three locations; RWR1, RWR2 and RWR3 as follows:</p> <p><u>RWR1:</u> 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.</p> <p><u>RWR2:</u> 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.</p> <p><u>RWR3:</u> A short length (30m) of new access road is proposed between the Upperchurch Windfarm Access Roads in Knockmaroe to the new Telecom Relay Pole.</p>			
Duration			
Site Specific, c.100m/day			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">• Crew size: 4 operatives• Site engineer• Site Ecologist• Wheeled or tracked dumper• 360° tracked excavator• Vibrating Roller• Tree harvester• Timber trucks		<ul style="list-style-type: none">• 50mm crushed stone• Granular fill• Geotextile matting• Wooden pegs• Wooden posts• Fencing wire/tape	
Standard Methods			
<ol style="list-style-type: none">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

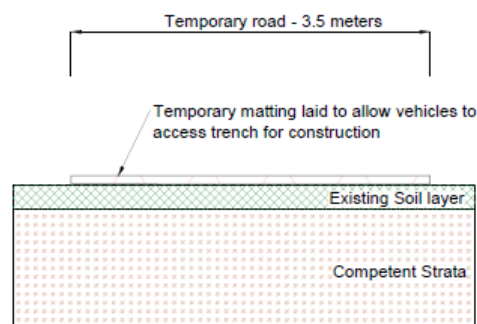
Outline Construction Methodology			
Title:	Temporary Access Roads	Ref:	RW-OCM-05
General Description			
Temporary access roads will provide access to off-road construction work locations and will be circa 3.5m in width.			
Duration			
<ul style="list-style-type: none">Site specific, c.150m length per day			
Personnel, Machinery & Equipment			
<ul style="list-style-type: none">Site EngineerCrew size: 3 operatives1 Excavator Operator		<ul style="list-style-type: none">Wooden pegs50mm Crushed StoneGeotextile mattingPlastic Mats / Aluminium Panel TracksPre-cast culvertsVibrating roller	
Standard Methods (based on a 3.5m wide stone road)			
<ol style="list-style-type: none">The alignment of the temporary road will be marked out with pegs by the site engineer.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.The depth and width of topsoil removal will be kept to a minimum.A layer of geotextile material will be laid over the excavated ground.A layer of 200mm deep of 50mm stone will then be overlaid on the geotextile and compacted in layers using a vibrating roller.Reinstatement will take place when the works necessitating the temporary road have been completed.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)			
<ol style="list-style-type: none">The alignment of the temporary road will be marked out with wooden pegs by the site engineer.Plastic / Aluminium mats will be laid along the marked route.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.			



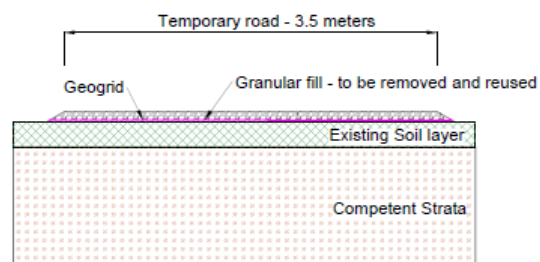
Temporary Aluminium Panel Tracks

Relevant Drawings from Volume C3 EIAR Figures

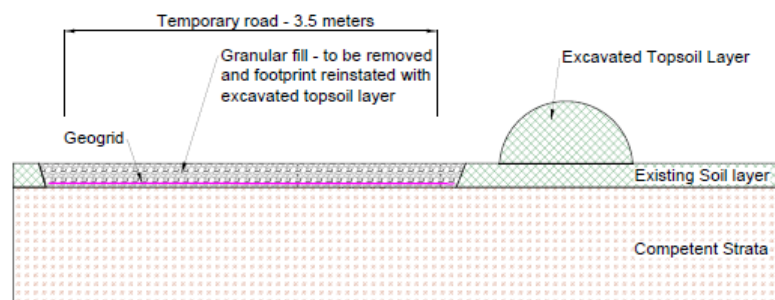
Figure RW 5.15: Cross Section of Temporary Access Roads



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			
<ul style="list-style-type: none">It will take 2 crews, 4 weeks to complete the works			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">Site Engineer2 tracked excavatorsDumper truckHedge cutter mounted on tractorMobile hoistsChainsawsVibrating roller1 No. JCB mounted auger drill		<ul style="list-style-type: none">Wooden pegsGeotextileSignage socketsTraffic management signageAluminum / plastic mats50mm crushed stoneTelephone poles	
Standard Methods for Road Widening into the Verge and Roadside Boundary			
<ol style="list-style-type: none">Traffic management protocols will be put in place before any works commence.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.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.A layer of 50mm stone will then be placed and compacted to road level in the excavated verge/boundary area.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. <p>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.</p>			
Standard Methods for Temporary Road Construction from the Public Road into Private Lands			
<ol style="list-style-type: none">Traffic management protocols will be put in place before any works commenceThe public road will be widened into the verge and the roadside boundary removed to provide an access point to the new temporary road.The alignment of the temporary road will be marked out with wooden pegs by the site engineer.			

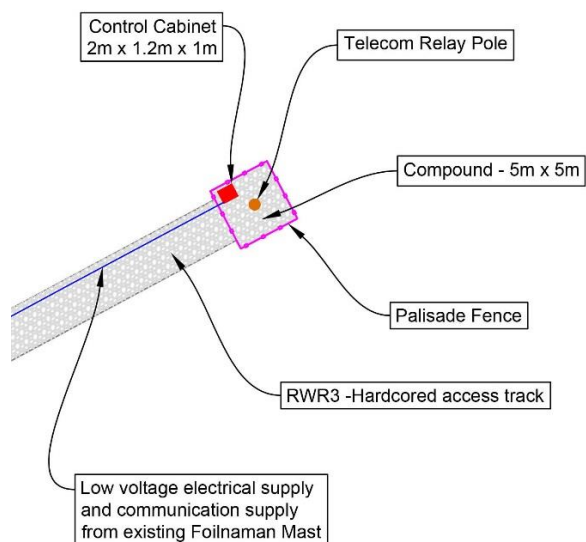
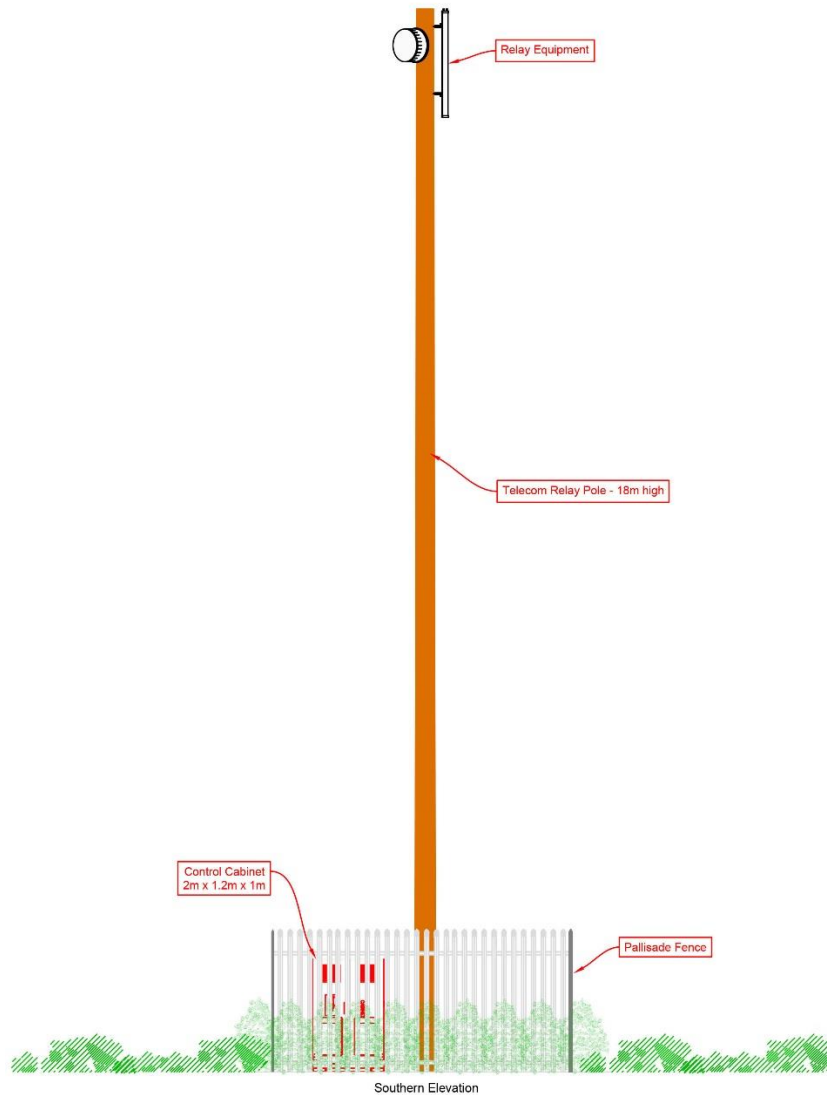
4. The excavator will first remove the topsoil/vegetation layer and will temporarily store this material in berms along the construction works corridor as per **RW.OCM-14: Overburden Storage Berms**, for later use during reinstatement works along the footprint of the temporary access road.
5. The depth 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 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 (25m²) in area.			
Duration			
<ul style="list-style-type: none">2 days			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">3 No. installation crew1 No. JCB mounted auger drillMobile hoist1 ExcavatorVibrating roller		<ul style="list-style-type: none">1 No. 20m wooden pole50mm Crushed StoneTelecoms dishes (Receivers and Transmitters)Underground electrical cable and connection equipmentGround equipmentNative grass, heather, tree and hedgerow species – seeds/seedlings	
Standard Methods			
<ol style="list-style-type: none">The location of the Telecom Relay Pole and 5m x 5m compound area will be pegged out.Topsoil will be excavated from the footprint of the compound area and stored in an adjacent berm.A layer of 50mm crushed stone will be overlaid and compacted on the compound area.A 2m deep hole will be auger drilled at the Telecom Relay Pole proposed location in the centre of the compound.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.An underground electrical cable to provide electrical power from the existing Foilnaman Mast to the relay equipment will be installed.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.Secure palisade fencing with an entrance gate will be erected around the compoundGround equipment will be installed, and connections between the Telecoms Relay Pole and the existing Foilnaman Masts will be commissioned.A low hedgerow, comprising native tree and shrub species will be planted around the compoundThe 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****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			
<ul style="list-style-type: none">Approx. 100m per crew per day, Circa 3 months in total			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">Three crews of 2-3 general operatives and 1 excavator operator per crewArchaeologist3 No. Wheeled dumper or Track dumpers (6 to 8 tons)3 No. 360° tracked excavatorsBrush & mandrelCable winch		<ul style="list-style-type: none">125mm diameter uPVC ductingRed cable marker stripYellow marker warning tapeMarker Plates and PostsRoad surfacing materialGranular fillsilt fenceing	
Standard Methods: Installing cable ducting.			
<ol style="list-style-type: none">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.The trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained.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.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.When installed, the ducts will be surrounded and covered with the suitable backfill from the excavated material which will be compacted in layers.Red cable marker strips will be placed on the compacted backfill directly over the bottom row of ducts which will contain the electrical cables.The top duct, through which the fibre optic cable will be pulled, will then be installed by hand onto the compacted backfill.The top duct will then be surrounded and covered with backfill material, in accordance with the drawings, and compacted.Another layer of red cable protection strip will be placed on top of the compacted backfill.The backfill will then be laid to within 300mm of the ground surface and compacted.			

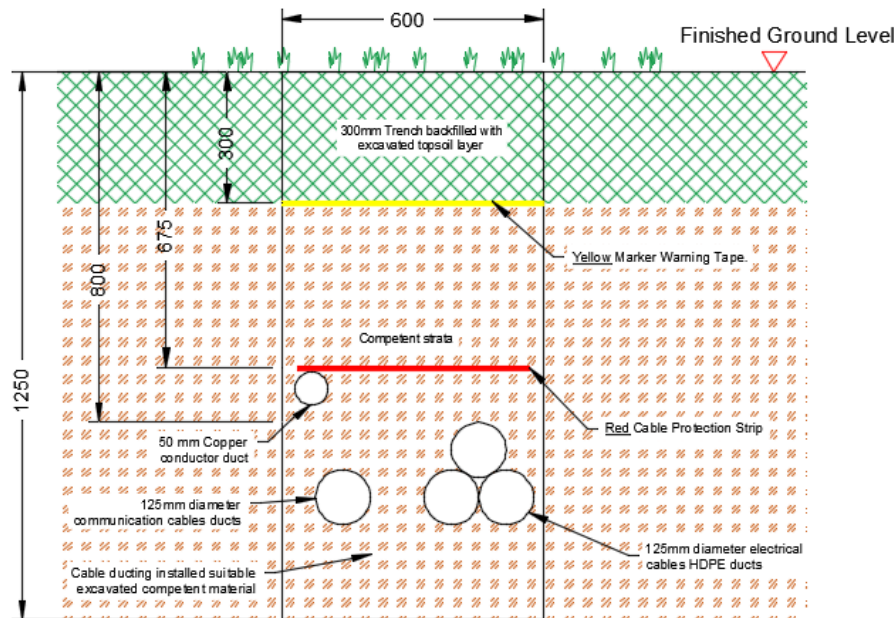
11. Yellow warning tape, will be placed over the compacted backfill.
12. A final layer of topsoil, as specified, will then be placed in the trench to ground level.
13. Land will be reinstated follows the methods outlined in **RW-OCM-15 Reinstatement of Lands**.
14. For public road crossings, the trench 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.

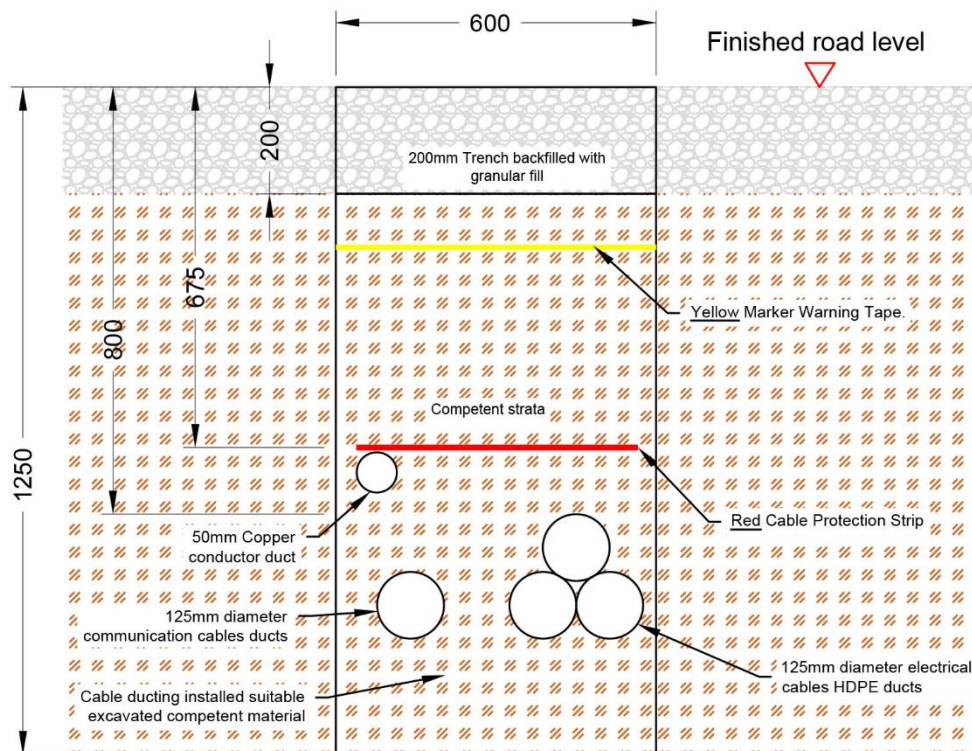
Relevant Volume C3 EIAR Figures:

Figure RW 5.5: Cross Section of Internal Windfarm Cables Trench

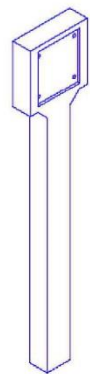


33kV CABLES TRENCH - TYPICAL SECTION THROUGH AGRICULTURAL LANDS AND FORESTRY LANDS

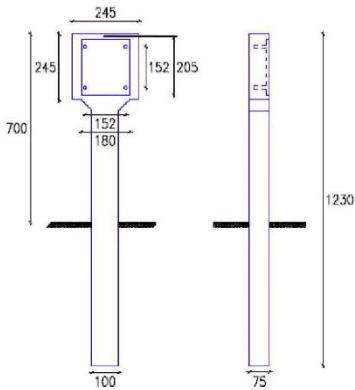
Figure RW 5.6: Cross Section of Internal Windfarm Cabling in Public Road Pavement



33kV CABLES TRENCH - TYPICAL SECTION THROUGH REALIGNED WINDFARM ROADS OR CONCENTED UWF WINDFARM ROADS



3D View



Front Elevation Side Elevation

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	
<ul style="list-style-type: none">• 3-4 operatives	<ul style="list-style-type: none">• Wheeled or Tracked dumper• 360° tracked excavator• Mobile water pumps and hoses• 4 x 4 vehicle and trailer	<ul style="list-style-type: none">• Sand Bags containing washed sand• Geotextile membrane• Straw bales• Flume pipes• Splash plate• Silt Buster• Washed round stones	
Standard Method 1: Dam & Overpump work			
<div>1. A dam will be constructed, upstream of the works location, using sand bags containing washed sand.</div> <div>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.</div> <div>3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</div> <div>4. The works (outlined in RW.OCM-10 Instream Works) can then be carried out in the dry bed.</div> <div>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.</div> <div>Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.</div>			
Standard Method 2: Dam & Divert work			
<div>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.</div> <div>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.</div> <div>7. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</div> <div>7. The works (outlined in RW.OCM-10 Instream Works) can then be carried out in the dry stream bed.</div> <div>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.</div>			

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

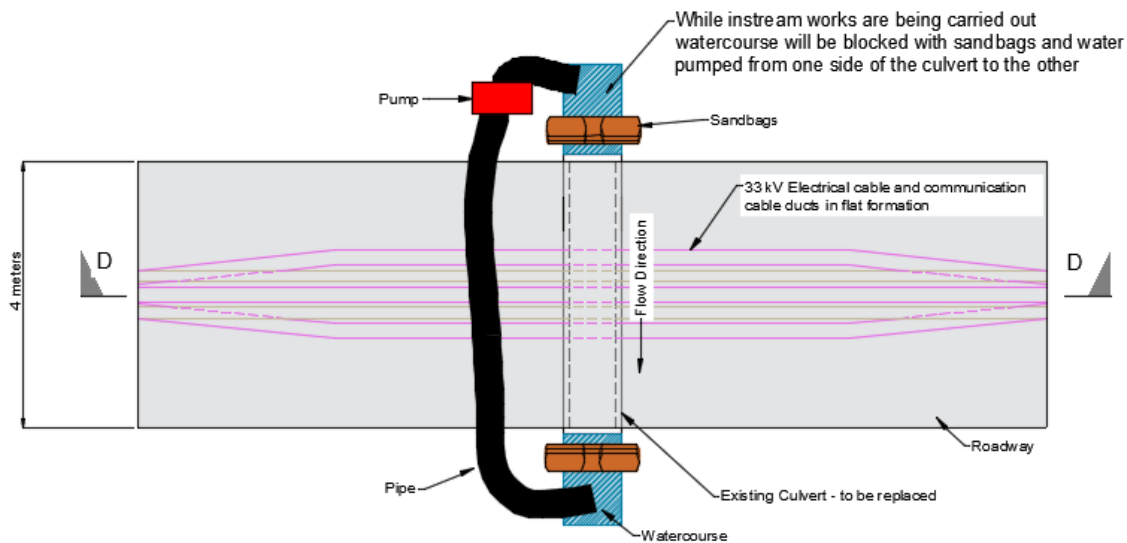


PVC Flume Pipes

Relevant Drawings from Volume C3 EIAR Figures

Extract from Figure RW 5.17:

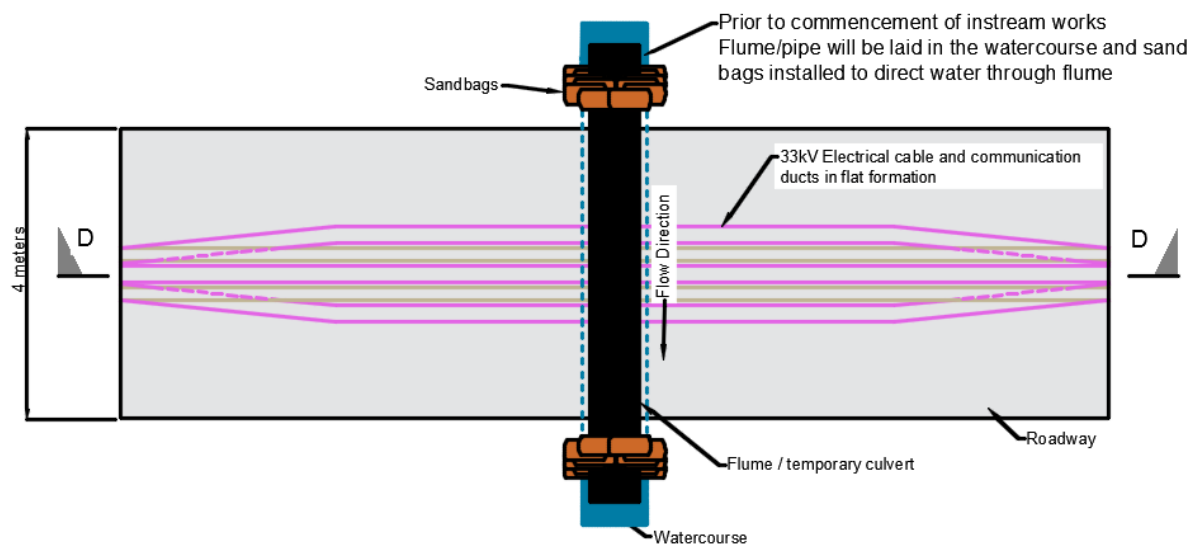
Dam & Overpump Work



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	
<ul style="list-style-type: none">Site engineer 3-4 operatives	<ul style="list-style-type: none">Wheeled or Tracked dumper.360° tracked excavator	<ul style="list-style-type: none">Pipe CulvertBox CulvertCable Ducting & trenching materialsDry Lean mix concreteSiltbuster50mm stone	
Standard Methods: Trenching & Ducting			
<p>9. The works will take place in a dry stream bed, following damming methods outlined in RW.OCM-09 Instream Works Preparation and Reinstatement.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>13. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.</p> <p>14.</p>			
Standard Methods: Replacement of existing culvert			
<p>15. The works will take place in a dry stream bed, following damming methods outlined in RW.OCM-09 Instream Works Preparation and Reinstatement.</p> <p>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.</p> <p>17. The old culvert will be dug out and removed using an excavator.</p> <p>18. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.</p> <p>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.</p> <p>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.</p> <p>21. The dam is removed and the watercourse can flow through the new culvert.</p> <p>22. Works can then take place above the culvert without the risk of sediments being released into the watercourse.</p>			

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.

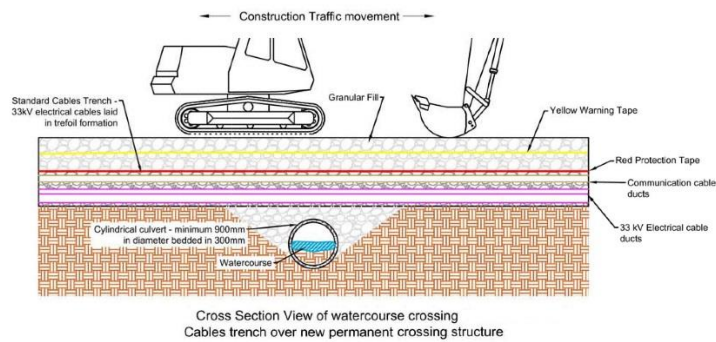
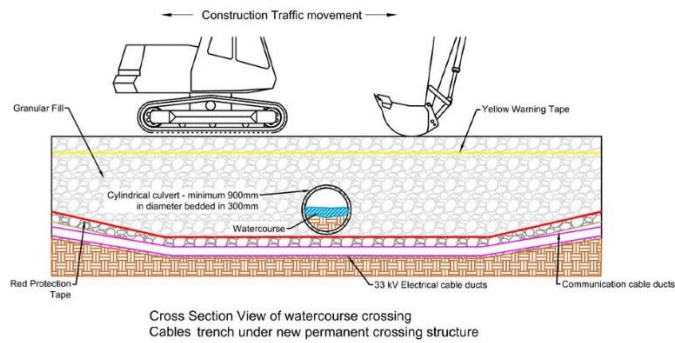
Variation 14C: Installation of Temporary Culverts

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

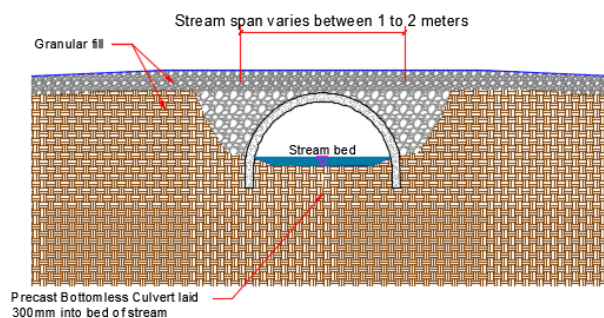
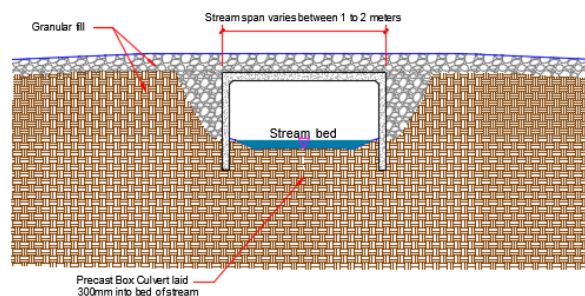
Extract from Figure RW 5.18:

Cables under crossing structures & Cables over crossing structures



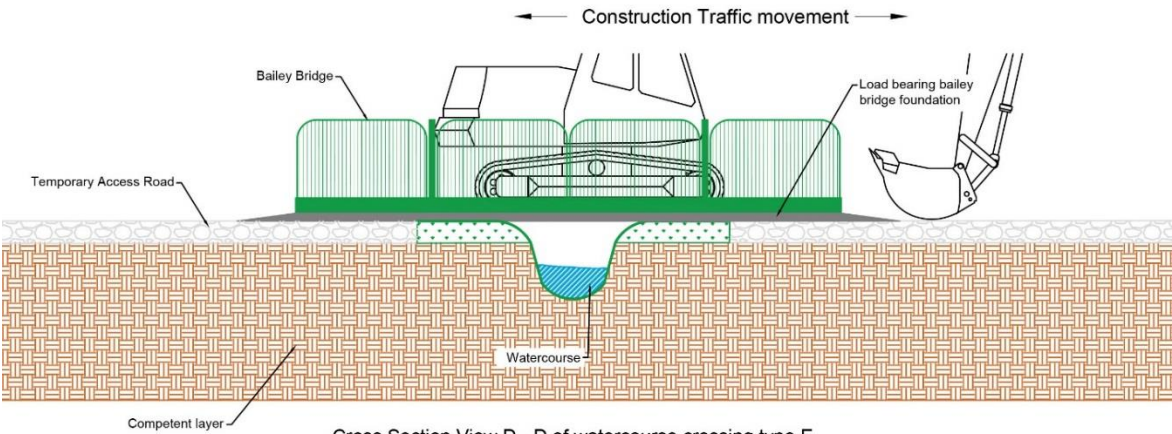
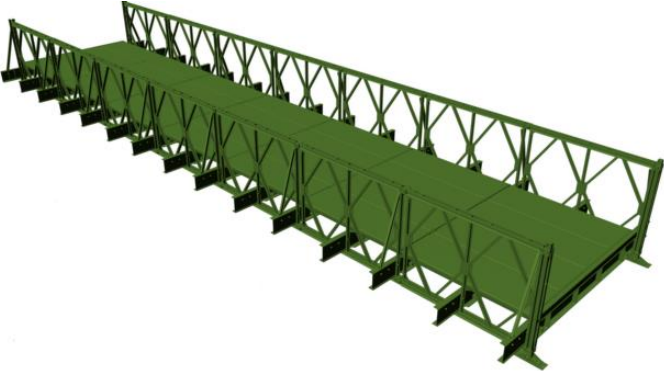
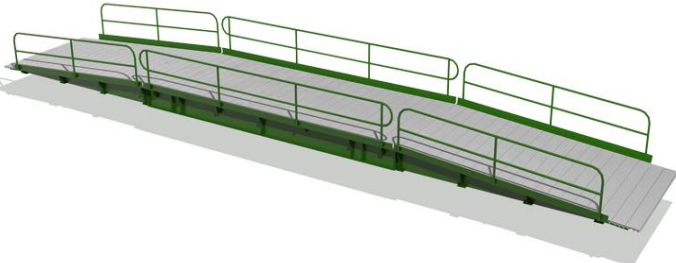
Extract from Figure RW 5.18:

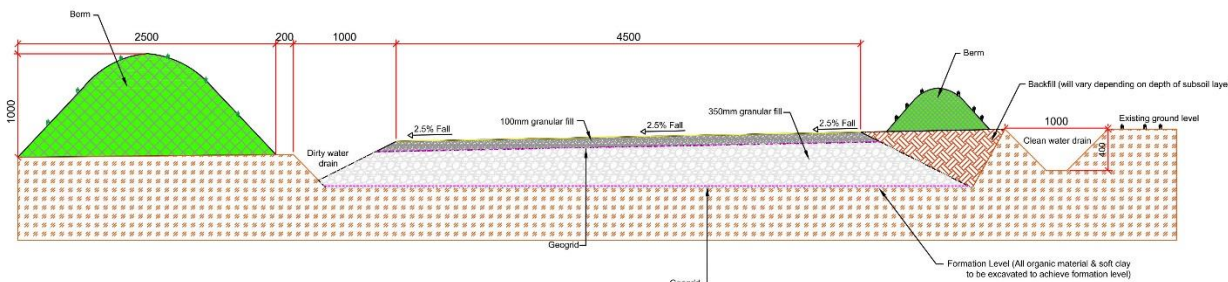
Box Culverts and Bottomless Box Culverts



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	
<ul style="list-style-type: none">• Site engineer• 2-3 operatives• City Crane / Hi-Ab• Hand tools• Tractor and low loader• Tracked Excavator		<ul style="list-style-type: none">• Steel frames• Bearing pads• Clause 804 stone• Granular fill• Geotextile	
Standard Methods			
<ol style="list-style-type: none">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			

 <p>Cross Section View D - D of watercourse crossing type E Bailey Bridge - (No Instream Works)</p>	
Relevant Plan Drawings/Photographs	
	Typical Bailey Bridge
	Typical Bailey Bridge
References	
<ul style="list-style-type: none"> Groundforce Bridge – Temporary Bridge (https://www.vpggroundforce.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			
			
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			
<ul style="list-style-type: none">For the duration of the works			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">1 Excavator1 Dump truck		<ul style="list-style-type: none">Grass seed	
Standard Methods			
<ol style="list-style-type: none">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.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.The sides will be battered at angles of 45 degrees or less and a light covering of topsoil/subsoil will be added.Permanent berms will be reseeded with grass seed.			
Relevant Plan Drawings/Photographs			
Figure RW 5.8: Cross Section of Realigned Windfarm Road			
<p>The diagram illustrates a cross-section of a realigned windfarm road. On the left, a green berm with a height of 1000 is shown, with a width of 2500 at its base. To its right is a 200-wide section, followed by a 1000-wide section. The main road section is 4500 wide and features a 2.5% fall. It consists of a 100mm granular fill layer over a 350mm granular fill layer. A 'Dirty water drain' is located on the left side of the road, and a 'Clean water drain' is on the right. A 'Berm' is also shown on the right side of the road. The diagram includes labels for 'Geogrid', 'Formation Level (All organic material & soft clay to be excavated to achieve formation level)', and 'Backfill (will vary depending on depth of subsoil layer)'. The 'Existing ground level' is indicated on the right side.</p>			
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 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
<ul style="list-style-type: none">• 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			
<ul style="list-style-type: none">Site specific, half day to 1 day per cable section between joint bays depending on conditions.			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">Cable Winch and four wheel drive vehicle3 operatorsRope Guide RollerCable JacksSwivel LinkDrum trailer and tractorfour wheel drive vehicle		<ul style="list-style-type: none">Cable attachment lugs110kV Electrical CableFibre optical cableNylon rope	
Standard Methods – Cable Pulling			
<ol style="list-style-type: none">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.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.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.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.Rope guide rollers will be placed at the duct opening to guide the cable into the duct.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.Once the pulled cable has reached the winch, the cable is cut and prepared for jointing.			
Standard Methods – Cable Jointing			
<ol style="list-style-type: none">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.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.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.Testing will then be carried out on the joint and the joint location will be logged for future reference.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			
<ul style="list-style-type: none">It will take 3 days to complete the required felling.			
Personnel, Machinery & Equipment		Materials	
<ul style="list-style-type: none">One forestry harvesterOne timber forwarder machineTimber lorriesChainsaws			
Standard Methods			
<ol style="list-style-type: none">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 for collection by forestry trucks. The brash will be baled and removed from site for chipping.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)



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February 2018

