

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

**REFERENCE DOCUMENT 14 of 36**

This document contains the following:

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

- **2019 Revised Appropriate Assessment Report For UWF Related Works – Volume E2 (2 of 5)**
  - Appendix A4: Project Information – Description of UWF Related Works
  - Appendix A5: Project Information – Compiled Description of the consented Upperchurch Windfarm
  - Appendix A6: Project Information – Description of UWF Replacement Forestry
  - Appendix A7: Project Information – Compiled Description of UWF Grid Connection
  - Appendix A8: Project Information – Description of UWF Other Activities
  - Appendix A9: Environmental Management Plan for UWF Related Works

# **VOLUME E**

## **REVISED APPROPRIATE ASSESSMENT REPORTING**

### **UWF Related Works**

### **Revised Appropriate Assessment Report**

### **For UWF Related Works**

January 2019

### **Volume E2 (2 of 5)**

**Appendix A4: Project Information - Description of UWF Related Works**

**Appendix A5: Project Information - Compiled Description of the consented  
Upperchurch Windfarm**

**Appendix A6: Project Information - Description of UWF Replacement Forestry**

**Appendix A7: Project Information - Compiled Description of UWF Grid Connection**

**Appendix A8: Project Information - Description of UWF Other Activities**

**Appendix A9: Environmental Management Plan for UWF Related Works**



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# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A4: Project Information**

### **Description of UWF Related Works**



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# UWF Related Works Revised EIA Report

## Volume C2: Revised EIAR Main Report

### Chapter 5

#### Description of Development (UWF Related Works)



*Revised January 2019*

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**Contents**

<b>5.</b>	<b><u>Description of the Development - UWF Related Works.....</u></b>	<b><u>1</u></b>
<b>5.1.</b>	<b>Introduction to Chapter 5 .....</b>	<b>1</b>
<b>5.2.</b>	<b>Characteristics of UWF Related Works .....</b>	<b>2</b>
5.2.1.	Purpose of UWF Related Works.....	2
5.2.2.	Location and overview description of UWF Related Works .....	2
5.2.3.	Characteristics of UWF Related Works .....	4
5.2.3.1.	Realigned Windfarm Roads.....	4
5.2.3.2.	Internal Windfarm Cabling.....	5
5.2.3.3.	Haul Route Works .....	6
5.2.3.4.	Telecom Relay Pole .....	8
5.2.3.5.	RW Ancillary Works.....	9
5.2.3.6.	Response to RFI from Roads Department, Tipperary County Council.....	15
5.2.4.	Environmental Protection Measures (Mitigation Measures) designed into the UWF Related Works	18
5.2.4.1.	Environmental Management Plan .....	21
5.2.4.2.	Response to RFI on Mitigation, Monitoring and Compensatory Measures .....	21
<b>5.3.</b>	<b>Life Cycle Stages of UWF Related Works.....</b>	<b>23</b>
5.3.1.	Construction Stage - UWF Related Works .....	23
5.3.1.1.	Overview of the Construction Process.....	23
5.3.1.2.	Duration & Timing.....	23
5.3.1.3.	Construction Personnel.....	24
5.3.1.4.	Construction Stage Activities .....	24
5.3.1.5.	Use of Machinery and Equipment .....	26
5.3.1.6.	Use of Hydrocarbons.....	27
5.3.1.7.	Other Facilities - Fuel Storage & Tool Storage .....	27
5.3.1.8.	Imported Construction Materials .....	27
5.3.1.9.	Traffic Management at Temporary Entrances and Road Work Locations.....	28
5.3.1.10.	EMP for the UWF Related Works.....	29
5.3.2.	Operational Stage – UWF Related Works .....	30
5.3.2.1.	Duration and Timing of Operational Stage .....	30
5.3.2.2.	Operational Personnel .....	30
5.3.2.3.	Operational Activities.....	30
5.3.2.4.	Use of Machinery and Equipment .....	31
5.3.2.5.	Use of Hydrocarbons.....	32



5.3.2.6.	Welfare Facilities.....	32
5.3.2.7.	Other Facilities - Fuel Storage & Tool Storage .....	32
5.3.3.	Changes to UWF Related Works .....	33
5.3.3.1.	Decommissioning.....	33
<b>5.4.</b>	<b>Use of Natural Resources, Emissions &amp; Wastes .....</b>	<b>34</b>
5.4.1.	Use of Natural Resources.....	34
5.4.1.1.	Use of Resources: Land.....	34
5.4.1.2.	Use of Resources: Biodiversity.....	35
5.4.1.3.	Use of Resources: Water.....	36
5.4.1.4.	Use of Resources: Soils .....	37
5.4.2.	Emissions.....	38
5.4.2.1.	Dust.....	38
5.4.2.2.	Vehicle Exhausts.....	38
5.4.2.3.	Noise .....	38
5.4.2.4.	Vibration .....	38
5.4.2.5.	Light.....	38
5.4.2.6.	Electromagnetic Radiation.....	38
5.4.3.	Waste .....	39
5.4.3.1.	Waste Water .....	39
5.4.3.2.	General Waste .....	39
5.4.3.3.	Chemical Waste .....	39
5.4.3.4.	Arisings.....	40
5.4.3.5.	Waste Management Plan.....	40
<b>5.5.</b>	<b>Vulnerability of the Project to Major Accidents and Natural Disasters .....</b>	<b>41</b>
5.5.1.	Vulnerability to Major Accidents .....	41
5.5.2.	Vulnerability to Natural Disasters (Land slippage, Flooding).....	41
5.5.2.1.	Land-slippage .....	41
5.5.2.2.	Flooding.....	41
5.5.2.3.	Consequences of Natural Disasters Occurring.....	42
5.5.2.4.	Overall Risk.....	42
5.5.2.5.	Mitigation Measures.....	42
<b>5.6.</b>	<b>Cumulative Descriptions .....</b>	<b>43</b>
5.6.1.	Description of the Other Elements of the Whole UWF Project.....	43
5.6.1.1.	Element 1: UWF Grid Connection.....	44
5.6.1.2.	Element 3: UWF Replacement Forestry.....	47
5.6.1.3.	Element 4: Upperchurch Windfarm.....	49

5.6.1.4.	Element 5: UWF Other Activities .....	51
5.6.1.5.	Cumulative Locational Context of all the Elements .....	53
5.6.2.	Secondary Projects.....	54
5.6.3.	Description of Other Projects and Activities.....	55
5.6.3.1.	Existing Killonan to Nenagh 110kV Overhead Line .....	55
5.6.3.2.	Existing Shannonbridge – Killonan 220kV Overhead Line .....	55
5.6.3.3.	Consented Bunkimalta Windfarm.....	56
5.6.3.4.	Consented Castlewaller Windfarm .....	56
5.6.3.5.	Existing Milestone Windfarm.....	56
5.6.3.6.	Operational Windfarms in the Republic of Ireland.....	57
5.6.3.7.	Existing Communication Structures.....	57
5.6.3.8.	Activities – Forestry, Agriculture.....	57
5.6.3.9.	Activity – Turf-Cutting .....	57

**List of Figures**

Figure No.	Figure Title
Figure RW 5.1	Location of UWF Related Works on OSI Discovery Mapping
Figure RW 5.2	Layout of UWF Related Works on Aerial Photography Mapping
Figure RW 5.3	UWF Related Works Construction Works Area Boundary
Figure RW 5.4	Layout of Internal Windfarm Cabling on Aerial Photography Mapping
Figure RW 5.5	Cross Section of Internal Windfarm Cables Trench
Figure RW 5.6	Cross Section of Internal Windfarm Cabling in Public Road Pavement
Figure RW 5.7	Layout of Realigned Windfarm Roads on Aerial Photography Mapping
Figure RW 5.8	Cross Section of Realigned Windfarm Road
Figure RW 5.9	Layout of Haul Route Works on Aerial Photography Mapping
Figure RW 5.10	Location and Layouts of Haul Route Works (Overview and Maps 1 to 3)
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
Figure RW 5.13	Location of “Change of Use at Existing Entrance” (including sightlines)
Figure RW 5.14	Plan View of Typical Temporary Site Entrance
Figure RW 5.15	Cross Section of Temporary Access Roads
Figure RW 5.16	Watercourse Crossing Type A1 & A2 – UWF Related Works at Existing Crossing Structure
Figure RW 5.17	Watercourse Crossing Type B1 & B2–UWF Related Works at Replaced and /or Widened Crossing Structure
Figure RW 5.18	Watercourse Crossing Type C1–New Permanent Structure
Figure RW 5.19	Watercourse Crossing Type C2 – New Temporary Structure & Watercourse Crossing Type C4 – New Permanent Structure
Figure RW 5.20	Watercourse Crossing Type C3 – Internal Windfarm Cable trench and ducting only
Figure RW 5.21	Watercourse Crossing Type E – Plan and Cross Section Views of Bailey Bridge
Figure RW 5.22	Watercourse Crossing Type F - New permanent clear-span bridge
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
Figure RW 5.25	Advance Warning Signage for Half Lane Closures
Figure RW 5.26	Operational Stage Land Use Change
Figure RW 5.27	Cross Section of Hedgerow Removal and Reinstatement

Note: The numbering system for Figures follows the sequence ‘Figure Number-Appendix Number’.

Figures and mapping referenced in this chapter can be found in **Volume C3 Revised EIA Figures**.

## List of Appendices

Appendix No.	Appendix Title
Appendix 5.1	Outline Construction Methodologies for UWF Related Works
Appendix 5.2	Classification and Crossing Method for UWF Related Works Watercourses
Appendix 5.3	Description of Development (UWF Grid Connection)
Appendix 5.4	Description of Development (UWF Replacement Forestry)
Appendix 5.5	Complied Description of Upperchurch Windfarm
Appendix 5.6	Description of the UWF Other Activities
Appendix 5.7	A Guide to Risk Assessment in Major Emergency Management Jan 2010
Appendix 5.8	EDL Response to RFI from Roads Department, Tipperary County Council

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

## Glossary of Terms

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

**List of Abbreviations**

<b><u>Abbreviation</u></b>	<b><u>Full Term</u></b>
<b>ABP</b>	An Bord Pleanála
<b>EDL</b>	Ecopower Developments Limited
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>EMP</b>	Environmental Management Plan
<b>EPA</b>	Environmental Protection Agency
<b>PD</b>	Ecopower <u>Project Design</u> Environmental Protection Measure developed by members of the EIAR Team
<b>RFI</b>	Response to Further Information
<b>SAC</b>	Special Area of Conservation
<b>SPA</b>	Special Protection Area (for wild birds)
<b>OCM</b>	Outline Construction Methodologies
<b>UWF</b>	Upperchurch Windfarm
<b>UGC</b>	Underground Cables

## 5. Description of the Development - UWF Related Works

### 5.1. Introduction to Chapter 5

There has been no revision to the location and characteristics; life-cycle stages; use of natural resources; emissions or wastes of UWF Related Works from the original planning application to Tipperary County Council, except for a revision on the characteristics on Haul Route Works HW7. Otherwise, this Chapter is only revised at **Section 5.6 Cumulative Descriptions: 5.6.1.1 Element 1: UWF Grid Connection** to reflect the refusal by An Bord Pleanála of UWF Grid Connection and in particular the 110kV UGC route. A new preferred preliminary 110kV UGC route is described in this revised Section 5.6.1.1.

UWF Related Works are described in this chapter, in the following order:

Section 5.2	<ul style="list-style-type: none"> <li>• A Description of the Location and Characteristics of the subject development (the UWF Related Works).</li> <li>• The Project Design Environmental Protection Measures incorporated into the design to avoid, prevent or reduce likely significant adverse effects on the environment.</li> </ul>
<p><b><u>The Development as described in Section 5.2</u></b></p> <p>At the conception of the UWF Related Works, 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, <u>by integrating environmental protection measures into the fundamental design of the UWF Related Works</u>. Various measures, particularly options for mitigation by avoidance and mitigation by prevention, were considered; these included alternative locations, alternative designs and alternative processes. Once the chosen location, design and process was decided the proposal was examined for opportunities to incorporate further mitigation measures (generally mitigation by reduction) in the final iteration of the development to be evaluated in the EIA Report. <u>The development, as described in Section 5.2, is the final iteration of the UWF Related Works</u>. It is this final iteration that is examined in Chapters 6 to 17, for effects on the prescribed environmental factors, by the topic competent experts.</p>	
Section 5.3	The durations and timing, main activities, personnel and material requirements for both the construction and operation stages. Any changes to the UWF Related Works, such as decommissioning.
Section 5.4	The use of natural resources, emissions and production of wastes for each stage.
Section 5.5	The vulnerability of the UWF Related Works to major accidents and natural disasters.
Section 5.6	<p>Cumulative Descriptions: For the purposes of cumulative assessment of the whole Upperchurch windfarm (UWF) project, a description of the other elements of the Whole UWF Project namely; UWF Grid Connection; already licenced UWF Replacement Forestry; the already consented Upperchurch Windfarm (UWF) and UWF Other Activities, is provided.</p> <p>For the purposes of a cumulative assessment with Other Existing or Consented Projects or Activities, a description of Other Existing or Consented Projects or Activities that were scoped in by the EIAR Team is also provided.</p>

## 5.2. Characteristics of 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

### 5.2.1. Purpose of UWF Related Works

**Internal Windfarm Cabling:** to connect the Consented UWF Turbines to the Consented UWF Substation.

**Realigned Windfarm Roads:** to realign two lengths of Consented UWF Roads and to provide access to a new telecom relay pole.

**Haul Route Works:** to facilitate the haulage of turbine components to the Upperchurch Windfarm site.

**Telecom Relay Pole:** to be erected in order to carry telecoms relay equipment, which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast. The Telecom Relay Pole will fulfil Condition No. 18 of the planning conditions associated with the Upperchurch Windfarm.

**RW Ancillary Works:** will facilitate the construction of the UWF Related Works.

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

### 5.2.2. Location and overview description of UWF Related Works

The **Internal Windfarm Cabling** will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnaageha, 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 Volume C3 Revised EIA Figures:**

Figure RW 5.1: Location of UWF Related Works on OSI Discovery Mapping

Figure RW 5.2: Layout of UWF Related Works on Aerial Photography Mapping which comprises all the UWF Related Works in one large format map in order to provide a comprehensive overview.

Figure RW 5.3: UWF Related Works Construction Works Area Boundary.

**Construction Works Area Boundary:** All construction works e.g. machinery movement; excavations; excavated materials storage, will take place within the construction works area boundary as delineated on **Figure RW 5.3**. This construction works area is predominately 12m in width. On Figures RW 5.3, consecutive Sections along the Internal Windfarm Cabling routes, (numbered from SW1 to SW84) are identified. These section numbers are used throughout the EIA Report and Appendices to refer to a particular geographical area of the Internal Windfarm Cabling routes.

**UWF Related Works is abbreviated throughout this chapter as RW. All the Figures Numbers are prefaced by RW per e.g. Figure RW 5.1**



### 5.2.3. Characteristics of UWF Related Works

#### 5.2.3.1. Realigned Windfarm Roads

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

- **RWR1:** The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and it will replace this road in its entirety by the Realigned Windfarm Road RWR1, which will be 230m in length through forestry and will require forestry felling of 0.2ha, but will avoid the felling of 0.4Ha along the original consented route to Turbine No.5.
- **RWR2:** The consented windfarm road between Turbine No.19, Turbine No. 20 and Turbine No. 21, is 840m long in total. It will replace 370m of this road by Realigned Windfarm Road RWR2, which will also be 370m in length. 220m of RWR2 is located on grassland field, with the remaining length located on existing farm road. The existing farm road section will be upgraded during construction works.
- **RWR3:** A short length (30m) of new access road will be between the Upperchurch Windfarm Roads in Knockmaroe to the new Telecom Relay Pole.

#### Relevant Volume C3 Revised EIAR Figures:

Figure RW 5.7: Layout of Realigned Windfarm Roads on Aerial Photography Mapping

Figure RW 5.8: Cross Section of Realigned Windfarm Road

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-04: Realigned Windfarm Roads

### 5.2.3.2. Internal Windfarm Cabling

Internal Windfarm Cabling will comprise c.17.9km of trenching, laid with ducts which will house 33kV electrical cables and communications cables. The cables trench will be 1.25m deep and 0.6 m wide. Closer to the windfarm substation in Knockcurraghbola Commons (in Section SW84, SW29, SW30 and SW31 where the electrical circuits from different directions are merging), a 400m length of the trench will be double width at 1.2m, to accommodate the double set of cabling. Cable Protection and Warning Tapes will also be laid in the trench as warning of the presence of electrical cables. 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.

The majority (11.1km) of the Internal Windfarm Cabling will be installed under Consented UWF Roads or Realigned Windfarm Roads. The remainder of the Internal Windfarm Cabling will be installed in agricultural lands (4.6km), forestry lands (2.1km), and crossing under 9 No. public roads (40 meters) (labelled RW1 to RW9 on the mapping).

#### 5.2.3.2.1. Public Road Works for Internal Windfarm Cabling

Road works will be required along the route of the **Internal Windfarm Cabling** where it crosses the public road on the L4139-0, L4139-16, L6188-0, L61881-0, L2264-50, L6185-13 and the L2264-34 local roads. In total there are 9 No. crossing points where the cables trench will be excavated across 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.

Lane closures: A lane closure will be required on the L-2264-50 (Borrisoleigh Road). Flagmen will control a stop/go system for these lane closures.

#### **Relevant Volume C3 Revised EIAR Figures:**

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

Figure RW 5.5: Cross Section of Internal Windfarm Cables Trench

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

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-08: Internal Windfarm Cabling

**5.2.3.3. Haul Route Works**

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 5-1: 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 WW12 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, <del>construction of 40m of new temporary site access road on forestry lands</del> and the use of an existing hardcored yard for turning manoeuvres. Temporary removal of 70m of roadside boundary. <del>Clearance of scrub and use of matting where required.</del> (changed here in Revised EIAR 2019)
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 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 Revised EIAR Figures:**

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

Figure RW 5.10: 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

#### 5.2.3.4. 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 Revised 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

**5.2.3.5. RW Ancillary Works**

**5.2.3.5.1. 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.

**5.2.3.5.2. 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 Revised EIAR Figures:**

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

**5.2.3.5.3. 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 5-2.

**Table 5-2: 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 Revised 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

5.2.3.5.4. 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 Revised 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

5.2.3.5.5. Watercourse Crossings

The construction of the UWF Related Works will involve crossing a total of 32 No. watercourses, which range in size from streams to small field drains, as outlined on Table 5-3.

**Table 5-3: Watercourse Classifications at Crossing Points**

Class	Watercourse Description	Number
1	EPA mapped blue line, major river or stream (fisheries value)	1
2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	5
3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	2
4	Drain (no fisheries value)	24

The construction of the UWF Related Works will involves:

- Crossing of 6 No. existing structures (Watercourse Crossing Type A1 and A2),
- Replacement of 1 No. existing crossing structures, (Type B1),
- Widening of 2 No. existing crossing structures at Watercourse Crossings WW12 and WW31, (Type B2)
- Construction of 5 No. new permanent crossing structures (cable and traffic), (Type C1),
- Construction of 5 No. new temporary crossing structures (cable and traffic), (Type C2) ,
- Trenching and ducting of 9 No. crossings (cable only, no traffic), (Type C3),
- Construction of 3 No. new permanent crossing structures (no cable, traffic only), (Type C4),
- Construction of 1 No. new permanent clear-span bridge (no in-stream works, cable and traffic), (Type F)
- In order to progress construction works across watercourses subject to fisheries timing restriction, temporary bailey bridges will be used to facilitate the passage of traffic across the watercourse.

All permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be at least 900mm in diameter regardless of the anticipated flood flow. 900mm culverts will be embedded into the bed of the watercourse to a depth of 300mm, while 1200mm culverts will be embedded to a depth of 500mm.

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), and as agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission. Details of the proposed works at WW12 and WW31 (culvert widening at Haul Route Works locations) will be agreed in advance with the District Engineer. No works to the road pavement will be required for the culvert extensions.

The treatment of each watercourse crossing along the UWF Grid Connection is specified in **Volume C4: Revised EIAR Appendices: Appendix 5-2: Classification and Crossing Method for UWF Grid Connection Watercourses.**

**Relevant Volume C3 Revised EIAR Figures:**

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

Figure RW 5.16: Watercourse Crossing Type A1 & A2 – UWF Related Works at Existing Crossing Structure

Figure RW 5.17: Watercourse Crossing Type B1 & B2–UWF Related Works at Replaced and /or Widened Crossing Structure



Figure RW 5.18: Watercourse Crossing Type C1–New Permanent Structure

Figure RW 5.19: Watercourse Crossing Type C2 – New Temporary Structure & Watercourse Crossing Type C4 – New Permanent Structure

Figure RW 5.20: Watercourse Crossing Type C3 – Internal Windfarm Cable trench and ducting only

Figure RW 5.21: Watercourse Crossing Type E – Plan and Cross Section Views of Bailey Bridge

Figure RW 5.22: Watercourse Crossing Type F - New permanent clear-span bridge

Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:

RW.OCM-09: Instream Works Preparation and Reinstatement

RW.OCM-10: Instream Works

RW.OCM-11: Bailey Bridge

#### 5.2.3.5.6. Drainage Systems

**New hard surface areas:** An integrated drainage system will be installed along the newly Realigned Windfarm Roads and at the Telecom Relay Pole. This integrated drainage system will keep ‘clean’ water upslope of the works separate from ‘dirty’ water runoff from construction works areas, while maintaining the existing drainage regime through the regular piping and release of clean water from the upslope side the works area to the downslope side. The integrated drainage system will include the installation of check dams, settlement ponds, clean water cross drains and outfall weirs. These parts of the drainage system will effectively avoid any contribution to flooding risk, minimise erosion, maintain drainage regimes, and minimise the amount of sediment entering downslope watercourses, through the attenuation (slow-down) of water flow rates and the settlement of suspended solid (sediment).

**Temporary roads** will be constructed upslope of the cables trench so that any surface water runoff will flow into the trench. 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, settlement pond, suitable water treatment train such as a Siltbuster or controlled release across existing vegetation, as appropriate.

**Existing roadside drainage** which occurs close to works associated with the Internal Windfarm Cables trench; Haul Route Works and at Permanent and Temporary Entrances will be piped to maintain flow.

Following construction, the drainage system around permanent features, will be left in place for the operations phase except for settlement ponds, which will be removed. The drainage system at all temporary works locations will be removed.

#### 5.2.3.5.7. Forestry Felling

Small areas of coniferous forestry at various locations along the Internal Windfarm Cabling and the Realigned Windfarm Roads will be permanently felled to facilitate construction and operation in these areas. In total, 0.3 hectares of forestry will be felled, 0.2Ha in Shevry along RWR1 and 0.1Ha in Knockcurraghbola Commons along the Internal Windfarm Cable route. This felling will be carried out under a felling license from the Forest Service, and an equivalent area of forestry will be replanted in Foilnaman townland (UWF Replacement Forestry) under the conditions of this license.

#### **Relevant Volume C3 Revised EIAR Figures:**

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

Figure RW 5.7 : Layout of Realigned Windfarm Roads on Aerial Photography Mapping

#### **Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

RW.OCM-13: Forestry Felling

#### 5.2.3.5.8. Fencing

Fencing will be erected at a number of locations during the construction of the UWF Related Works and will include:

- Temporary post and wire fencing which will be used to delineate construction works areas;
- Temporary battery powered electric fencing on the outside of construction works area boundaries, to prevent livestock from entering works areas. Electric fencing will also be used to protect reinstated lands until the grass is established;
- Temporary goal posts to mark the location of overhead electricity and telephone lines along construction works areas;
- Temporary timber post and rail fencing with gates which will be erected at the temporarily widened site entrances and at Haul Route Works locations, where required.
- Temporary bat crossing structures at selected hedgerow crossing locations along UWF Related Works areas.

Existing fencing and boundaries which are required to be removed from the works areas or from widened existing entrances or Haul Route Works locations will be reinstated, in the original alignment and position, following construction works.

#### 5.2.3.5.9. Relocation of local overhead services

A number of existing telephone poles will be moved, in conjunction with the infrastructure owner, as follows:

- At HW3, 1 No. existing telephone pole will be moved behind the widened haul route area;
- At HW4, 1 No. existing telephone pole will be moved behind the widened haul route area;
- At HW6, 1 No. existing telephone pole will be moved behind the widened haul route area.
- At HW9, 1 No. existing telephone pole will be moved behind the widened haul route area.
- At HW13, 1 No. existing telephone pole will be moved behind the widened haul route area.

These telephone poles are identified with blue dot on Figure RW 5.10.

#### **Relevant Volume C3 Revised EIAR Figures:**

Figure RW 5.10: Location and Layout of Haul Route Works (Maps 1 and 2 of 3)

**Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

## RW.OCM-06: Haul Route Works

## 5.2.3.5.10. Storage of Excavated Materials

In total 11,830m<sup>3</sup> of material will be excavated from the UWF Related Works areas. This will include topsoil, subsoils and to a lesser extent bedrock, along with spoil from public road sections.

This excavated material will be managed as follows:

- 930m<sup>3</sup> will be permanently stored in berms on both sides of the Realigned Windfarm Roads and around the Telecom Relay Pole Compound;
- 10,850m<sup>3</sup> will be temporarily placed alongside the Internal Windfarm Cables and Haul Route Works construction works areas, in separate soils layers, and will be used for infilling the trenches and reinstatement of the works areas. No excavated materials will be stored within 50m of a Class 1 or Class 2 Watercourse;
- 50m<sup>3</sup> will consist of spoil from public road sections and will be removed to the licensed landfill at Thurles.

**Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

## RW.OCM-14: Overburden Storage Berms

## 5.2.3.5.11. Reinstatement of Construction Works Areas

Following the completion of construction works in an area, with the exception of new permanent infrastructure such as Realigned Windfarm Roads or Telecom Relay Pole hardstand, the lands under the construction works areas will be reinstated to their former condition and returned to the landowner for use as before.

**Reinstatement of construction works areas:** the temporarily stored excavated soils will be used to backfill and landscape the works areas. These areas will then be sown with native, Irish sourced, certified seeds, seedlings or plants to reflect the habitats that were present before the work.

**Landholding boundaries** including any existing, hedgerows, banks or gates will be reinstated on their original alignment.

**Haul Route Works locations:** will be reinstated, in the original alignment and boundary position, following construction works.

**Reinstatement of hedgerow:** will involve the replanting of hedgerow with established (at least 3 years old) native hedgerow plants in their original locations, following the completion of the works in the area.

Along **sensitive bat corridors**, the bat crossing structures which will be installed during construction works will remain in place post-construction until the hedgerow has sufficiently regrown to provide viable habitat for bats. These bat crossing structures will be monitored by a suitably qualified bat specialist and maintained on a yearly basis, until they are no longer required.

**Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

## RW.OCM-15: Reinstatement of Land

## 5.2.3.5.12. 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.

#### 5.2.3.6. EDL Response to RFI from Roads Department, Tipperary County Council

The 1<sup>st</sup> iteration EIAR (May 2018) was submitted with the planning application to Tipperary County Council for UWF Related Works on 17/07/2018. A Request for Further Information was issued on 10/09/2018. The Roads Department specifically requested;

*The applicant is requested to provide:*

- (a) a schedule and accompanying road network map of public roads by road number identifying all roads impacted by haulage operations and construction traffic associated with the development. Same shall set out the length, width and grid coordinates of the start and finish point of each section of road together with facilitation and remedial works proposed,*
- (b) a schedule and accompanying map of all new entrances/amendments to existing entrances together with a layout plan for each entrance demonstrating appropriate sightlines, setbacks and forward stopping distances to satisfy the County Development Plan. Pavement construction specifications and surface water measures for each entrance are to be detailed,*
- (c) proposals for contribution or upgrade of the junction of the R497/L2264-50/R503 to accommodate the proposed development. A proposed upgrade may require revised site boundary and public notices.*

##### 5.2.3.6.1. EDL Response to Tipperary County Council Request – Roads and Entrances

A copy of EDL's response to the Roads and Entrances RFI, which was submitted on 14<sup>th</sup> November, 2018, is incorporated below and Figures and Appendices can be found in the EIAR volumes as indicated;

#### **(a) Public road network impacted by haulage operations and construction traffic**

A schedule of the public roads impacted by haulage operations and construction traffic has been compiled in reply to this request. The schedule sets out the length, width, and grid coordinates of the start and finish points of each section of road, together with a summary of the road works proposed for each section of road. These road sections are identified on the accompanying maps.

**Relevant Volume C4: Revised Appendices**

RW Appendix 5.8: Schedule of the Public Roads impacted by haulage operations and construction traffic and description of Haul Route Works.

**Relevant Volume C3: Revised EIAR Figures:**

**UWF.RW.RFI-01 to UWF RW. RFI-04** – Figure UWF.RW.RFI-01: Reply to RFI Site Location Map

**UWF.RW.RFI-01 to UWF RW. RFI-04** - Figure UWF.RW.RFI-02: Public Road Network Map.

**(b) New entrances/Amendments to existing entrances****Temporary Site Entrances**

To facilitate the construction of UWF Related Works, specifically the installation of the Internal Windfarm Cabling and the construction of the Haul Route Works for the delivery of turbine components, fourteen temporary site entrances will be required. These entrances will be used temporarily during the construction period for a short period of time. All temporary entrances, roadside boundaries, verges and roadside drainage will be reinstated to the satisfaction of Tipperary County Council following the completion of the works and following the delivery of turbine components, as relevant. It was agreed during consultation with Peter Fee, Executive Engineer Nenagh Municipal District, that flagmen may be used at these temporary entrances instead of providing sightlines and forward stopping distances, thereby avoiding the environmental effects which would have resulted from the removal of hedgerows and earthen banks to provide temporary sightlines.

**Relevant Volume C3 Revised EIAR Figures:**

**UWF.RW.RFI-01 to UWF RW. RFI-04:** Figure UWF.RW.RFI-03: Site Entrances (overview map)

**UWF.RW.RFI-01 to UWF RW. RFI-04:** Figures UWF.RW.RFI-03: Site Entrances Maps 1 to 11 comprising a layout plan; ITM co-ordinates; photo; description of works required; width of public road at that point; drainage; duration of use; total traffic movements and 85 percentile traffic design speed for the fourteen temporary site entrances and 1 No. 'Change of Use of Existing Entrance EW10' (see below).

**UWF.RW.RFI-01 to UWF RW. RFI-04:** Figures UWF.RW.RFI-04: Temporary Site Entrance Drainage Arrangements

See also:

**Relevant Volume C3 Revised EIAR Figures:**

Figure RW 5.2, Figure RW 5.4 and Figure RW 5.9 wherein the temporary entrances are identified as EW1 to EW9, and EW11 to EW15.

**Already consented entrances (as part of Upperchurch Windfarm)**

There are eleven other site entrances to be used to gain access to UWF Related Works, these entrances are the Upperchurch Windfarm entrances which have already been permitted under Upperchurch Windfarm planning permission Ref: 13/510003 and are identified as 'Consented UWF Site Entrance' on **Drawing Numbers UWF RW 04 to 11: Site Layout Maps 1 to 8** in Volume B: Planning Drawings.

**Change of Use of Existing Entrance EW10**

There is a 'change of use' permit required for an existing permanent entrance off the L2264-34 at Foilnaman. This will be used as access to sow/plant and maintain replacement forestry which is required for any forestry felling that occurs during the construction works for the whole Upperchurch Windfarm project.

The existing entrance (E10) is an agricultural (farm) entrance leading onto a farm track. This will change use to an 'agricultural and forestry entrance' and as before, remain in permanent use. A change of use from 'agriculture' to 'agriculture and forestry' is now being sought from the local authority for EW10 as part of this UWF Related Works application.

The L2264-34 local road is a very lightly trafficked with 99.5% spare capacity. There will be no noticeable increase in traffic volumes on this road due to the extremely low traffic volumes associated with the UWF Replacement Forestry - the planting stage will generate 1-2 van/jeep vehicles movements per day over a one-month period, and as a comparative example this level of traffic is substantially less than the daily level of traffic generated by a single residential dwelling. During the growth stage, traffic will be in the region of a negligible 2 to 4 van/jeep vehicle movements per year. The UWF Replacement Forestry will be a permanent native woodland and will not be harvested and therefore no harvesting traffic will occur. The change of use and necessary sightlines was discussed and agreed with Peter Fee during the pre-planning stage.

**Relevant Volume C3 Revised EIA Figures:**

**UWF.RW.RFI-01 to UWF RW. RFI-04: Figure UWF.RW.RFI-03: Site Entrances (overview map)**

**UWF.RW.RFI-01 to UWF RW. RFI-04: Figure UWF.RW.RFI-03: Site Entrance Map 8 of 11** comprising a layout plan including sightlines, set back, and forward stopping distances; ITM co-ordinates; photo; description of works required; width of public road at that point; drainage; duration of use; total traffic movements and 85 percentile traffic design speed at EW10.

**(c) Junction of the R497/L2264-50/R503**

The Haul Route Works, which are included in the UWF Related Works, will facilitate the delivery of large turbine components. There are no Haul Route Works proposed or required at the junction of the R497/L2264-50/R503.

To clarify, the delivery of turbine components coming from the Thurles direction, will pass off the R497/L2264-50/R503 junction, and will continue down the regional road and turn in the area known locally as 'the Christmas Tree yard' (HW7). The delivery can then approach the R497/L2264-50/R503 junction from the south/Newport side and make the turn onto the L2264-50 without requiring modifications to the junction, save some hedge trimming and road sign removal and replacement.

EDL confirm that no works are required at the junction of the R497/L2264-50/R503 to accommodate the proposed development – UWF Related Works, or indeed to accommodate the already permitted Upperchurch Windfarm

**Relevant Volume C3 Revised EIA Figures:**

**UWF.RW RFI Attachment 5 OA2 Map 8 of 8** from Appendix A5.6 to Chapter 5: Description of Development, where UWF Other Activities are described, is reproduced here in the Figures volume. This Figure shows the vegetation trimming and temporary traffic sign removal required at this junction (**HA23 on Figure OA2**).

**5.2.4. Environmental Protection Measures (Mitigation Measures) designed into the UWF Related Works**

The design of the UWF Related Works includes the Project Design Environmental Protection Measures (Mitigation Measures) listed on Table 5-4, which were devised to avoid, prevent or reduce likely or potentially significant effects on the environment. Eleven Project Design Measures (mitigation measures) were updated in January 2019, to take account of the Reason for Refusal by Tipperary County Council of UWF Related Works; the 2 No. Tipperary County Council Planner’s Reports; and the Submission to Tipperary County Council on UWF Related Works from NPWS. Any amendments to Project Design Measures is tracked, with additions in red and underlined text, and any ~~deleted text identified with a strikethrough~~.

Relevant individual Project Design Environmental Protection Measures from the list below are duplicated in the **Environmental Factor topic chapters**, and the list is duplicated in full as a set of Environmental Commitments in **Volume D: Revised EMP for UWF Related Works** with the planning application.

The interaction of Project Design Environmental Protection Measures across the various Environmental Factors is provided in matrix format in **Chapter 18: Interaction of the Foregoing**.

**Table 5-4: Schedule of Project Design Environmental Protection Measures (mitigation measures)**

PD ID	Schedule of Project Design Environmental Protection Measure (Mitigation 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 in a safe and efficient manner.
PD03	Construction works in <u>Knocknabansha</u> , Knockmaroe, <u>Knockcurraghbola Crownlands</u> 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. <u>Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.</u>
PD09	New permanent access roads ( <u>Realigned Windfarm Roads</u> ) 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

PD ID	Schedule of Project Design Environmental Protection Measure (Mitigation Measure)
	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. <a href="#">Spoil excavations from public roads being transported to landfill will be covered during transport.</a>
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.
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 ( <a href="#">Consented Upperchurch Windfarm Site Compound No.1</a> ). 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	<p><del>If works are programmed to begin in the Hen Harrier breeding season (March to August) Confirmatory hen harrier breeding surveys will be completed, before such works, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter.</del></p> <p>No construction works <a href="#">for UWF Related Works</a> will take place <del>within 500m of an active hen harrier breeding attempt or active nesting activity,</del> during the <a href="#">hen harrier</a> breeding season (March to August).</p>
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, <del>where possible</del> . This includes hedgerow and scrub removal in addition to hedgerow trimming.



PD ID	Schedule of Project Design Environmental Protection Measure (Mitigation Measure)
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.
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 <sup>st</sup> to June 30 <sup>th</sup> ).
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 <a href="#">the Consented Upperchurch Windfarm Site Compound No.1 compounds</a> . All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD38	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys.
PD39	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal. <a href="#">(Note. It is not expected that any trees with moderate or high suitability will be felled).</a>

PD ID	Schedule of Project Design Environmental Protection Measure (Mitigation Measure)
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. <u>Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.</u>
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 <u>at least the same number of</u> semi-mature shrubs/trees (like for like) <u>Irish-sourced, native trees</u> and <u>limits on no</u> temporary <u>construction works area</u> lighting near hedgerows.
PD43	Pre-construction survey of the distribution of Devil’s-bit Scabious (larval food plant of Marsh Fritillary) during the last available April prior to the commencement of construction works. This requires that any areas of Devil’s-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.

**5.2.4.1. Environmental Management Plan**

An Environmental Management Plan (EMP) is included with Volume D of the planning application. The purpose of the EMP is to communicate environmental control 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.

The Environmental Management Plan includes the Schedule of Mitigation Measures - the Project Design Environmental Project Measures (Schedule in Table 5-4 above), along with the Best Practice Methods that are included at the end of topic Chapters 6 to 17. Management plans for Traffic, Waste, Surface Water Quality and Invasive Species are also included in the EMP.

The environmental protection measures for UWF Other Activities which relate to UWF Related Works will be monitored through the UWF Related Works Environmental Management Plan.

See: Volume D: Revised EMP for UWF Related Works

**5.2.4.2. Response to RFI on Mitigation, Monitoring and Compensatory Measures**

This EIAR was submitted with the planning application to Tipperary County Council on 17/07/2018. A Request for Further Information was issued on 10/09/2018. The request and response in relation to Mitigation, Monitoring and Compensatory Measures is incorporated below;

*Request for Further Information under S.172 (1E) of the Planning and Development Act 2000 (as amended), as follows:*

*The applicant is requested to submit a comprehensive*

- *Schedule of features/measures to avoid, prevent or reduce/offset adverse effects on the environment;*
- *Schedule of monitoring measures;*
- *Schedule of compensatory measures.*

#### 5.2.4.2.1. EDL Response to Mitigation, Monitoring and Compensatory Measures RFI

##### **Schedule of features/measures to avoid, prevent or reduce/offset adverse effects**

The Project Design Environmental Protection Measures included in the application documents, constitute the features/measures to avoid, prevent or reduce/offset adverse effects on the environment. There are forty-three Project Design Environmental Protection Measures in total – named PD01 to PD43.

A Schedule of Project Design Environmental Protection Measures (Mitigation Measures) are located in the EIA Report in

- **Volume C2 EIA Report: Chapter 5: Description of Development: Section 5.2.4: Table 5-4 (above)**
- Volume C2 EIA Report: Chapters 6 to 17 where relevant
- Volume D: Environmental Management Plan (EMP): Table 7 (P. 19)

In response to Tipperary County Council on RFI, the features/measures to avoid, prevent or reduce/offset adverse effects on the environment were also reproduced in a separate schedule – the Schedule of Project Design Environmental Protection Measures (Mitigation Measures) in **Volume D: Revised EMP for UWF Related Works: Section 5.1 Project Design Measures**, Page 19.

##### **Schedule of monitoring measures**

Monitoring measures are included throughout the EIA Report and Environmental Management Plan (EMP). In particular, monitoring measures are part of the Project Design Environmental Protection Measures (PDs), the Traffic Management Plan, the Surface Water Management Plan, the Invasive Species Management Plan, the Waste Management Plan and the Best Practice Measures (BPMs), which plans are all part of UWF Related Works Environmental Management Plan (EMP).

In response to RFI, a Schedule of these Monitoring Measures has been collated from the EIA Report and the EMP and this Schedule is included **at the end of the Monitoring Arrangements Chapter 19 of this Revised EIAR**.

##### **Schedule of compensatory measures**

There is only one compensatory measure included in the UWF Related Works project:

##### **Project Design Environmental Protection Measure PD41**

**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.

### 5.3. Life Cycle Stages of UWF Related Works

#### 5.3.1. Construction Stage - UWF Related Works

##### 5.3.1.1. Overview of the 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 consented compound associated with the Upperchurch Windfarm 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 relevant construction compounds, parking spaces will be provided at the site 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 windfarm site compound and stored there until needed. Materials required 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.

##### 5.3.1.2. Duration & Timing

The duration and timing of the construction of UWF Related Works is outlined in Table 5-5.

**Table 5-5: 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 RW Ancillary 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.

##### 5.3.1.2.1. 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.

##### 5.3.1.2.2. Scheduling of Works

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

- 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.
- To reduce the potential for localised in-combination effects on surface water quality from the main potential sediment sources during construction works (i.e. Watercourse Crossing Works, Earthworks, Tree Felling and Excavation Dewatering), a phased approach will be undertaken during the construction works for these activities, where works within 50m of a Class 1 or Class 2 watercourse are required. The phased approach will only permit one of main potential sediment producing activities to be carried out at any one time within the local catchment to a watercourse (refer to Chapter 11: Water).
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses.
- No construction works will take place within 2km of an active hen harrier nest, or active nesting activity, during the breeding season (March to August). Additionally, during the roosting season, (October to February), construction works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
- No construction works will be carried within 50m of an active badger sett during the main breeding season (December 1<sup>st</sup> to June 30<sup>th</sup>).
- Felling of trees (if any) with bat roost suitability will be undertaken in the period late-August to late-October/early-November.
- If an active otter holt (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.
- 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.

**5.3.1.3. Construction Personnel**

The civil and electrical construction personnel involved in the construction of the Upperchurch Windfarm will also be involved in the construction of the Internal Windfarm Cabling, Realigned Windfarm Roads, Haul Route Works and the construction of the Telecom Relay Pole compound and the installation of underground communication and electricity cables between the existing Foilnaman Mast and the Relay Pole compound, no extra personnel will be required for these works and c.5 personnel from the Upperchurch Windfarm construction crew will be involved in the UWF Related Works. A specialist communication engineering crew, made up of c. 3 personnel, will be involved in the erection and set up of the Telecom Relay Pole.

**5.3.1.3.1. Welfare Facilities**

**Upperchurch Windfarm Site Compound No.1** will contain site offices, welfare, canteen and parking facilities, storage locations for oils and fuels, materials and wastes.

**Welfare Facilities at active construction works areas** will consist of solar powered, single, self-contained portable toilets.

**Toilet Servicing:** All toilets will be serviced on a weekly (Toilet blocks at Upperchurch Windfarm Site Compound No.1) or bi-weekly (portable toilets at construction works areas) basis. A record of servicing will be kept by the licensed waste removal operator. Servicing shall include internal cleansing, emptying and recharging with water and toilet additive and replenishing of all consumables.

**5.3.1.4. Construction Stage Activities**

Construction stage activities will involve the following works:

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

Individual Outline Construction Methodologies (OCMs) for all of the above listed main works and activities of UWF Grid Connection can be found at **Appendix 5-1: Outline Construction Methodologies for UWF Related Works**. 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.

The OCMs are also provided in **Volume D: Revised EMP for UWF Related Works**

**5.3.1.5. Use of Machinery and Equipment**

The main machinery, equipment and tools which will be required during the construction stage are listed in Table 5-6. A full list of machinery, equipment and tools which will be used during the construction of the UWF Related Works is listed on the Outline Construction Methodologies in [Appendix 5.1](#).

**Table 5-6: Construction machinery, equipment and tools**

Construction Machinery	Construction Equipment and Tools
1 No. 12ton excavator	Hand tools
1 No. 6ton excavator	Cable Jointing tools
2 No. dump trucks	1 No. dewatering pumps
1 No. Vibrating roller	1 No. water pumps and associated pipes
1 No. roller	1 No. Diesel generator
1 No. van	Sand bags
1 No. Cable Pulling winch	Silt traps and silt fences
Pole planter and auger drill	Oil absorbent booms
	Siltbuster units and skips
	Wooden stakes and wooden fencing lats
	Boundary tape and wire
	Battery powered electric fencers
	geotextile matting /plastic mats

**5.3.1.6. Use of Hydrocarbons**

Hydrocarbons will be used on UWF Related Works areas during construction activities and is limited to the diesel or petrol fuel and oils used by the site vehicles and machinery, delivery vehicles and any mobile generators used. Grease may be coated on the cables to aid in cable pulling during the construction stage.

**5.3.1.7. Other Facilities - Fuel Storage & Tool Storage**

**All fuels** required for construction activities will be stored in a designated location, away from main traffic flows, within Upperchurch Windfarm Site Compound No.1. All fuel will be stored in bunded, locked storage containers.

**Tools** and smaller pieces of equipment will be stored in locked containers, at Upperchurch Windfarm Site Compound No.1, during the construction stage.

**5.3.1.8. Imported Construction Materials**

The construction materials, which will be brought onto the UWF Related Works areas, are listed in Table 5-7 along with details of the quantity and source of the materials.

**Table 5-7: 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
Semi-dry Lean Mix Concrete	180m <sup>3</sup> / 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 <sup>3</sup> / 285 No. loads	Shanballyedmond, Rear Cross
Hard core for temporary public road surface	50m <sup>3</sup> / 7 No. loads	Clare
Surface dressing asphalt (public road sections)	12m <sup>3</sup> / 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



#### 5.3.1.8.1. 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 5.23](#). These haul routes have been agreed 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 5.24](#).

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.

##### **Relevant Volume C3 Revised 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.](#)

### 5.3.1.9. Traffic Management at Temporary Entrances and Road Work Locations

#### 5.3.1.9.1. Road Licences

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.

#### 5.3.1.9.2. Flagmen

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

#### 5.3.1.9.3. Advance 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 85<sup>th</sup> percentile traffic speeds, or the posted limit, whichever is the higher.

#### 5.3.1.9.4. Reinstatement of road boundaries

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.

#### 5.3.1.9.5. Engagement with Local Residents regarding Traffic

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

**5.3.1.9.6. Traffic Management Plan**

A Traffic Management Plan is included in [Volume D: Revised EMP for UWF Related Works](#).

**Relevant Volume C3 Revised EIA Figures:**

[Figure RW 5.25: Advance Warning Signage for Half Lane Closures](#)

**5.3.1.10. EMP for the UWF Related Works**

An Environmental Management Plan (EMP) for the UWF Related Works is included as Volume D of the EIA Report. The purpose of the EMP is to communicate environmental control 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.

The EMP comprises the main EMP statement; environmental commitments, environmental control measures and management plans for Surface Water Quality; Traffic, Waste, and Invasive Species; a schedule of Project Design Mitigation Measures and a compiled schedule of Best Practice Measures from the environmental topic chapters.

During construction, 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.

[EIA Volume D: Revised EMP for UWF Related Works](#).

**5.3.2. Operational Stage – UWF Related Works**

Once constructed and commissioned, as required, the UWF Related Works will be operated and maintained as part of the Upperchurch Windfarm.

**5.3.2.1. Duration and Timing of Operational Stage**

**Table 5-8: Duration and timing of Operation Phase of the UWF Related Works**

Description	Duration
Operation of the UWF Related Works	The duration of the operational period for the UWF Related Works will correspond with the operational period of the Upperchurch Windfarm which is granted for 25 years from the date of commissioning of the wind turbines under Condition 4 of the grant of planning permission for Upperchurch Windfarm, unless a planning period for a further period is granted.
Internal Windfarm Cables	1 day per year to carry out a visual inspection
Realigned Windfarm Roads	30mins per month 1 day per 5 years
Haul Route Works	During any subsequent, although infrequent, turbine component delivery: 2 days to re-use Haul Route Works Areas 1 week to reinstate roadside boundaries and lands
Telecom Relay Pole	1 day per year
RW Ancillary Works	No works

**5.3.2.2. Operational Personnel**

The personnel involved in the operation and maintenance of the Upperchurch Windfarm will also be involved in the operation and maintenance of the UWF Related Works. In addition, 2-3 No. specialised telecommunications personnel will be involved in an annual inspection and maintenance of the Telecom Relay Pole.

**5.3.2.3. Operational Activities**

**5.3.2.3.1. Internal Windfarm Cabling**

Operational activities will include both annual visual inspections of the cable routes, using a four wheel drive vehicle along Upperchurch Windfarm Roads and Realigned Windfarm Roads, or by walking over cross-country sections. The cables will have a design life of 80 to 100 years. It is not expected that the cables will require replacement during their operation.

5.3.2.3.2. Realigned Windfarm Roads

Operational activities will include both monthly visual inspection of the Realigned Windfarm Roads, using a four wheel drive vehicle and annual maintenance of roads and the associated drainage network, using both hand tools and mini-diggers as required.

5.3.2.3.3. Haul Route Works

Annual visual inspection of Haul Route Works areas at H1 to H13. Occasional hedge trimming may be required, to accommodate the delivery of abnormal loads during major maintenance works at the Upperchurch Windfarm. To facilitate the occasional delivery of larger components, some roadside boundaries at Haul Route Works locations will be temporarily reopened (having been reinstated following construction) or temporarily removed. Geotextile material will be laid over the concealed hard-core access roads in private lands where required. Once the components have been delivered, the roadside boundaries on these temporarily widened areas will be reinstated in their original alignment and ground cover on private lands will be reinstated.

5.3.2.3.4. Telecom Relay Pole

The support structure itself requires little maintenance during its operational lifetime; operational activities would consist of annual inspection and maintenance of the communications equipment mounted on the structure, outdoor cabinet, and compound area.

5.3.2.3.5. UWF Ancillary Works

No operational activities associated with these works are expected to take place during the operational stage.

**5.3.2.4. Use of Machinery and Equipment**

**Table 5-9: Use of Machinery and Equipment during the Operation of the UWF Related Works**

Machinery	Equipment	Materials
4x4 vehicle for routine inspection,	Tools for occasional maintenance works	Aggregate for Realigned Windfarm Road maintenance, if required
small excavator and roller for occasional maintenance and haul route works	Hand tools & testing equipment	Replacement communication equipment for the Telecom Relay Pole, if required
	fencing equipment	Replacement fencing for Haul Route Works locations, if required.

**5.3.2.5. Use of Hydrocarbons**

A small volume of hydrocarbons will be used on-site during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and occasional machinery used.

**5.3.2.6. Welfare Facilities**

The Upperchurch Windfarm site office containing site offices, welfare, and canteen and parking facilities will be available to any personnel working on UWF Related Works.

**5.3.2.7. Other Facilities - Fuel Storage & Tool Storage**

There will be no requirement for fuel storage for the UWF Related Works. There will also be no requirement for tool storage facilities -all tools will be brought onto site as required.

### 5.3.3. Changes to UWF Related Works

#### 5.3.3.1. Decommissioning

The UWF Related Works will cease to function following the decommissioning of the Upperchurch Windfarm. The following decommissioning works are relevant to the UWF Related Works:

**Internal Windfarm Cables:** The cables will be pulled from the ducts and will be re-used or recycled off-site in a licensed recycling facility.

**Realigned Windfarm Roads** will be left in situ, for use by the landowner. No works required.

**Haul Route Works** will be left in situ. No works required.

**Telecom Relay Pole:** The Relay Pole will be decommissioned following the decommissioning of the Upperchurch Windfarm. The communication links between Foilnaman Mast and Laghtseefin Mast will be restored, and then the antennae removed from the Relay Pole, the Pole, fence and the outdoor equipment will be decommissioned and removed. The footprint of the compound will be reinstated with the soils which formed the berms around the compound during construction.

## 5.4. Use of Natural Resources, Emissions & Wastes

### 5.4.1. Use of Natural Resources

The resources which will be imported onto the UWF Related Works areas or which will be obtained from within the works areas during the development of the UWF Related Works are described below.

#### 5.4.1.1. Use of Resources: Land

##### 5.4.1.1.1. Requirements for Land

**Construction Stage Requirement:** In order to safely accommodate the construction works and construction traffic, the land requirement for the construction of the UWF Related Works is greater than for the operation of the UWF Related Works. In total UWF Related Works will take place on 20.9 hectares of land within construction works areas, as follows; 0.3ha of farm roads, 6.9ha of agricultural land, 0.2ha of forestry road, 0.7ha of forestry firebreak, 0.4ha of forestry, 1.4ha of public road and 11.1ha of Upperchurch Windfarm Roads. These lands are outlined in red on [Figure RW 5.3](#)

**Operational Stage Requirement:** Following construction, with the exception of the 25m<sup>2</sup> Telecom Relay Pole compound, all of the lands will be returned to the landowner for their own use. The Realigned Windfarm Roads will be used by both the landowner and Upperchurch Windfarm.

##### 5.4.1.1.2. Landuse Restrictions

Restrictions on the use of land by landowners is limited to the Construction Stage, during which the use of the lands by the landowner will be restricted to varying degrees depending on the location and type of works taking place, as per:

- The use of agricultural lands, firebreaks and felled forestry in the construction works area will be restricted during construction works on these areas, with restrictions continuing until vegetation has re-established following construction works; and
- The use of farm or forestry roads can continue during the construction works with some restrictions in place, forestry traffic if it occurs will use alternative routes along the forestry road network where available.
- Access will be maintained to lands at all times during construction, by arrangement with the individual landowners.
- Following construction, the majority of the lands will be returned to their former use.

##### 5.4.1.1.3. Landuse Change

The construction of the UWF Related Works will result in the change of use of 25m<sup>2</sup> (0.0025Ha) of agricultural land to utility for the Telecom Relay Pole. In addition, 0.13ha of agricultural land will change use to Permanent Road, 0.09ha of forestry plantation will change use to Permanent Roads and 0.21ha will change use to Unplanted Forestry Firebreak.

During decommissioning, the Telecom Relay Pole will be removed, and 25m<sup>2</sup> of associated lands will be reinstated and returned to use as agricultural lands.

#### **Relevant Volume C3 Revised EIA Figures:**

[Figure RW 5.3: UWF Related Works Construction Works Area Boundary.](#)

[Figure RW 5.26: Operational Stage Land Use Change](#)

### 5.4.1.2. Use of Resources: Biodiversity

#### 5.4.1.2.1. Field Boundaries – Earthen Banks/Hedgerow/Trees

Hedgerows and earthen banks occur at most field boundaries within the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works locations. Some hedgerows also contain trees of varying maturity. The removal of field boundaries and the pruning or removal of hedgerows and trees is predominately limited to the construction stage. Field boundaries at Haul Route Works locations may also require temporary pruning or removal during the operational and decommissioning stage to facilitate the transport of turbine components.

**Pruning:** In total 540m of hedgerow will be pruned, 330m at Haul Route Works locations to facilitate delivery of turbine components and 210m close to works locations to facilitate the passage of machinery along works areas. All pruning will be conducted outside of the bird breeding season.

**Permanent Removal:** In total, 170m of hedgerow will be permanently removed to facilitate Haul Route Works (HR6 and HR13) and Realigned Windfarm Roads (RWR2). These hedgerows and trees will be replaced with an equivalent length of new native hedgerow along with an equivalent number of native trees immediately adjacent to the area.

**Temporary Removal:** In total, 145m of hedgerow and 4 No. trees will be temporarily removed at Internal Windfarm Cabling and some Haul Route Works locations.

**Bat Crossing Structures:** Bat crossing structures will be install at 2 no. locations. 1 no. at a 10m wide section of field boundary along Realigned Windfarm Road RWR2 and another at a 10m wide sections of roadside boundary (concrete wall) Haul Route Works HW5, a bat crossing structure in the form of ‘goal posts’ will be erected following the removal of a 10m section of each boundary. Vegetation and netting will be attached to these goal posts to provide a continuation of flight-line for bats during the construction works.

**Reinstatement of Hedgerows:** Following the completion of construction works in an area, **the temporarily removed** section of field boundary will be reinstated, with the formation of earthen banks and the replanting like for like with established (at least 3 year old) native hedgerow plant. Reinstatement will be carried out immediately following the completion of the works in the area.

Along **sensitive bat corridors**, the bat crossing structures installed during construction works will remain in place post-construction until the field boundary has been reinstated.

**New Hedgerow created:** c.370m of new hedgerow will be planted with locally sourced native species alongside the Realigned Windfarm Road RWR2.

#### **Relevant Volume C3 Revised EIA Figures:**

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

Figure RW 5.27: Cross Section of Hedgerow Removal and Reinstatement



5.4.1.2.2. Forestry Felling

Forestry felling is limited to the construction stage. In total 0.3ha of coniferous forestry will be permanently felled<sup>1</sup>, under a felling license from the Forest Service. Forestry felling will be carried out outside of the bird breeding season.

5.4.1.2.3. Invasive Species

Packaging will be checked for the presence of white toothed shrew and prior to arrival on site, contractor’s vehicles and equipment will be thoroughly cleaned and then dried. High-pressure steam cleaning, with water hotter than 65 degrees Celsius, in addition to the removal of all vegetative material, will be required for all vehicles and equipment involved in construction works.

An Invasive Species Management Plan will be implemented to prevent the spread of knotweed species, this Plan is included in [Volume D: Revised EMP for UWF Related Works](#).

**5.4.1.3. Use of Resources: Water**

5.4.1.3.1. Potable & Non-Potable Water

**During construction**, All water requirements for welfare facilities and drinking purposes will be supplied at Upperchurch Windfarm Site Compound No.1 during the Construction Stage, no additional water will be required for the UWF Related Works.

**During operation**, All water requirements for welfare facilities and drinking purposes will be supplied at the Upperchurch Windfarm Site Office during the Operational Stage, no additional water will be required for the UWF Related Works.

<sup>1</sup> A condition of the felling license will require that an equivalent area of forestry be replanted in another location. The New native woodland at Foilnaman, (UWF Replacement Forestry element of the whole UWF project) will fulfil this obligation.

**5.4.1.4. Use of Resources: Soils****5.4.1.4.1. Excavated Soils**

During the construction of the UWF Related Works, natural materials such as topsoil, subsoil and rock will arise from excavation works during the construction of the UWF Related Works. Approximately 4750m<sup>3</sup> topsoil, 6670m<sup>3</sup> subsoil and 360m<sup>3</sup> rock, will arise from excavation works. All of this excavated material will be used to backfill cables trenches, used to reinstate land along construction works areas. In addition, c.50m<sup>3</sup> of spoil will also arise during excavations in public roads

**5.4.1.4.2. Permanent Storage**

Some of the excavated material (930m<sup>3</sup>) will be permanent stored in berms alongside Realigned Windfarm Roads and around the Telecom Relay Pole compound.

**5.4.1.4.3. Temporary Storage**

The remaining material excavated from UWF Related Works construction works areas will be temporarily stored, within the construction works area. Topsoil, subsoil and rock will be stored separately, with as much surface vegetation left intact on the topsoil layer as possible. Suitable excavated competent material will be used to backfill the Cables Trench and following the completion of works in any area; the temporarily stored soil will be used to reinstate and landscape the works areas.

**5.4.1.4.4. Public Road Arising's and Contaminated Material**

The excess material arising from short lengths of Internal Windfarm Cabling excavated in the public road at the 9 no. road crossing locations, or contaminated material arising during the construction of UWF Related Works will be collected by Arlo Group and transported to their approved licensed facilities at Thurles, County Tipperary,

**5.4.1.4.5. Imported Rock**

Approximately 4,600m<sup>3</sup> of graded crushed stone will be imported onto UWF Related Works areas from the local Rear Cross Quarry. This stone will be mainly used for the Realigned Windfarm Roads, telecom relay pole compound and temporary access roads for installing the internal windfarm cabling.

This calculation is based on a circumstances where there is not plastic/bog mats used for the temporary roads but all of the temporary roads are built with crushed stone. The volume of crushed stone will reduce substantially by the use of matting and the promoter intends to utilise matting as much as possible.

Also the amount of stone required for the realigned roads will offset a similar amount of rock that will not be required for the section of originally consented roadway because it will not be built so therefore there will be no overall increase in the volume of stone required for the windfarm roadways.

**5.4.1.4.6. Operational Stage - Soil**

No excavations of soils will be required during the routine operation of the UWF Related Works.

Small amounts of aggregate/hard core may be required from time to time, during occasional maintenance activities, to recap the Realigned Windfarm Roads.

## 5.4.2. Emissions

### 5.4.2.1. Dust

During the construction stage, dust may arise, due to the transportation of aggregate to UWF Related Works areas, the movement of excavated material within the works areas and from stored excavated materials at the works areas, particularly during dry and windy weather. Dust will not cause any significant adverse effects to Air Quality. During the operational stage, the works areas will be re-vegetated therefore dust emissions will not occur. Dust emission would be limited to that emanating from occasional maintenance of the Realigned Windfarm Roads.

### 5.4.2.2. Vehicle Exhausts

During the construction stage, operating machinery used during the construction stage will be run on hydrocarbons and will emit nitrogen dioxide and other greenhouse gas emissions during their operation. Exhaust emissions will not be at levels to cause significant adverse effects. During the operational stage, a van or four wheel drive vehicle will be used for c.12 half days per year for monthly visual inspections, larger machinery may be required for 2 – 3 days every five years or so for road maintenance on the Realigned Windfarm Roads or occasionally for re-use of Haul Route Works areas. This minimal use of vehicles will result in negligible amounts of nitrogen dioxide and other greenhouse gas emissions during operation.

### 5.4.2.3. Noise

During the construction stage, heavy machinery and vehicles which will be used at works areas during the construction stage will emit noise during their operation, noise will also be emitted from certain construction activities such as excavation or rock breaking or by mobile generators which may be used at work areas. Noise emissions will not be at levels to cause significant adverse effects. During the operational stage, the presence of vehicles, and therefore noise emissions, during operation is considered negligible with a van or four wheel drive vehicle being used c.2 days per year during monthly visual inspections, larger machinery may be required for 2 – 3 days every five years for road maintenance on the Realigned Windfarm Roads or occasionally for c.7 days longer during any re-use of Haul Route Works areas.

### 5.4.2.4. Vibration

Construction works, including excavations and the use of heavy machinery will cause low levels of ground vibration. No blasting or piling will occur at the UWF Related Works construction works areas. Vibration emissions will not be at levels to cause significant adverse effects. No vibration emissions are expected during the operation of the UWF Related Works.

### 5.4.2.5. Light

Lighting will be used at Upperchurch Windfarm Site Compound No.1 during construction. This lighting will use a cowled design along with motion-sensor and timer controlled lights which will not remain turned-on overnight. No lighting will be required at construction works areas associated with the UWF Related Works and all construction works will be carried out during daylight hours.

### 5.4.2.6. Electromagnetic Radiation

Low frequency electrical and magnetic fields (EMF) will be present anywhere electricity is generated, distributed or used and therefore these fields are a common occurrence in everyday life. The operational Internal Windfarm Cables will be a source of very low frequency (50Hz) electromagnetic fields.

Electromagnetic fields will not be at levels to cause significant effects. No emissions of electromagnetic fields will occur during the construction stage.

### 5.4.3. Waste

The greatest potential for waste occurs during the Construction Phase.

#### 5.4.3.1. Waste Water

The UWF Related Works will be constructed by the personnel involved in the construction of the Upperchurch Windfarm. Self-contained toilets, with integrated waste water storage tanks, will be provided for construction workers at Upperchurch Windfarm Site Compound No.1. Waste water will be collected by licensed collector - by Arlo Group or other appropriately licensed operator, and transported to an approved water treatment plant in Thurles, County Tipperary or other appropriately licensed facility.

The personnel involved in the operation and maintenance of UWF Related Works will also be involved in the operation and maintenance of Upperchurch Windfarm, and will have access to the Upperchurch Windfarm site office facilities, including toilets serviced by an existing septic tank. Waste water will be collected by licensed collector - by Arlo Group or other appropriately licensed operator, and transported to an approved water treatment plant in Thurles, County Tipperary or other appropriately licensed facility.

#### 5.4.3.2. General Waste

During the construction stage, general waste materials such as pallets, packaging, and excess construction and building materials will be generated in small quantities at construction works areas. All individual waste streams will be identified at source, and stored at a designated area at Upperchurch Windfarm Site Compound No.1 with other General Waste arising from the Upperchurch Windfarm construction works. General waste will be collected by licensed collector - Arlo Group or other appropriately licensed operator and transported to their approved licensed facilities at Thurles, County Tipperary or other appropriately licensed facility. No general waste is expected during the operation of the UWF Related Works

#### 5.4.3.3. Chemical Waste

Any chemical waste which may be generated during the construction of the UWF Related Works will be limited to solid waste-oil such as oily rags or any oil contaminated material. Should any chemical waste arise, it will be stored in a secure, bunded container in a designated area at Upperchurch Windfarm Site Compound No.1 with other Chemical Waste arising from the Upperchurch Windfarm construction works. All chemical waste will be removed by Arlo Group or other appropriately licensed operator 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.

No chemical waste or contaminated material is expected during the operation of the UWF Related Works. However, should any chemical waste occur, it will be stored in a secure bunded container at the Upperchurch Windfarm site office with any other chemical waste arising from the Upperchurch Windfarm operational activities. All chemical waste will be removed from the Upperchurch Windfarm site office by Arlo Group or other appropriately licensed operator 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.

#### 5.4.3.4. Arisings

During the construction stage, arisings from any excavations within the structure of the public road will consist of old chip, tar, subsoils and rock material. Arisings also include any contaminated soils from off-road construction works areas. All of this material will be collected by operator Arlo Group or other appropriately licensed operator and transported to their approved licensed facilities at Thurles, County Tipperary or other appropriately licensed facility. No arisings from the public road network are expected during operation.

#### 5.4.3.5. Waste Management Plan

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

The **Waste Management Plan** is included in **Volume D: Revised EMP for UWF Related Works**.

## 5.5. Vulnerability of the Project to Major Accidents and Natural Disasters

Major accidents or natural disasters which have the potential to affect the UWF Related Works are described hereunder. The vulnerability (exposure and resilience) of the UWF Related Works to major accidents and disasters and the risk of these accidents or disasters is classified according to the *Guide to Risk Assessment in Major Emergency Management* (DoEHLG, 2010). This Guide is included as [Appendix 5.7 Volume C4: Revised EIA Appendices](#).

### 5.5.1. Vulnerability to Major Accidents

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

The UWF Related Works is **not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the UWF Related Works. Furthermore there are no Seveso sites in proximity to the UWF Related Works site, the closest being Grassland Agro in Limerick and MSD (pharmaceutical) in Kilsheelan, near Clonmel, Co Tipperary.

### 5.5.2. Vulnerability to Natural Disasters (Land slippage, Flooding)

**Natural disasters which could potentially affect the UWF Related Works include land slippage and flooding.** The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines. The risk classification tables are included in [Appendix 5.7: A Guide to Risk Assessment in Major Emergency Management Jan 2010](#).

#### 5.5.2.1. Land-slippage

It is considered that the UWF Related Works is not vulnerable to natural disasters such as land slippage, due to the absence of peat or very shallow peats at the works locations. Therefore it is considered that the likelihood of land slippage disaster occurring along the UWF Related Works is **Extremely Unlikely**.

#### 5.5.2.2. Flooding

In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland. Where complete the Catchment Flood Risk Assessment and Management (CFRAM)<sup>2</sup> 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 Upperchurch Windfarm site and therefore the PFRA maps have been examined.

A Stage II Flood Risk Assessment was completed for the subject development by Hydro Environmental Services, a specialist hydrological and hydrogeological consultancy, who concluded that there is a low risk of

<sup>2</sup> 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.

potential flooding because based on the PFRA mapping all of the works areas and infrastructure are located in mapped Flood Zone C (Low Risk) – where the probability of flooding is low (less than 0.1% or 1 in 1,000). The elevated nature of the UWF Related Works areas means no significant pluvial or fluvial flooding would be expected.

Also, there will be no potential of increased local flood risk as a result of the UWF Related Works as most of the subject development is located underground (i.e. windfarm cabling). The footprint of the above-ground permanent infrastructure (i.e. realigned windfarm access roads, relay pole base etc) is minimal and distributed over several catchments and all new permanent watercourse crossing culverts will be suitably designed to accommodate flood flows.

Therefore it is considered that the likelihood of flooding disaster affecting the UWF Related Works areas is **Unlikely**.

The Flood Risk Assessment can be found in [Appendix 11.3: Flood Risk Assessment](#), of [Volume C4 Revised EIAR Appendices](#).

#### 5.5.2.3. Consequences of Natural Disasters Occurring

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

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

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

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

#### 5.5.2.4. Overall Risk

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

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

In relation to downstream water quality, due to the higher level of effect (Serious) on water quality a land slippage or flooding event could be a major emergency. According to the DoEHLG 2010 guidelines, both flooding and landslip events would be at the lowest extreme of 'major emergency'.

#### 5.5.2.5. Mitigation Measures

No measures are required for land slippage risk. In relation to flooding, instream works on Class 1 and Class 2 watercourses will also be carried out during dry periods in the months of July, August and September, and all new permanent crossing structures will be sized to cope with a minimum 100 year flood event.

Should a disaster occur, unconnected to the project but in the locality – the above mitigation measures already designed into the project will ensure that the project will not make the consequences of the event worst. In addition the presence of the project will not increase the likelihood of such an event occurring.

## 5.6. Cumulative Descriptions

**Table 5-10: Subject Development: UWF Related Works - Element 2 of the Whole UWF Project**

Element No.	The Subject Development	Composition of the Subject Development	Status
2	<u>The Subject Development</u> UWF Related Works (RW)	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	This Appeal to An Bord Pleanála

An **overview of Element 2, UWF Related Works**, the subject development, is provided in [Section 5.2.2 above](#). A **full description** of the subject development is provided in the [successive Sections 5.2 to 5.5](#).

### 5.6.1. Description of the Other Elements of the Whole UWF Project

In order that a cumulative evaluation can be carried out for the UWF Related Works, an overview description is provided hereunder of all the other elements of the whole UWF project.

**Table 5-11: Element 1 and Element 3 to 5 of the Whole UWF Project**

	Element of the whole UWF project	Composition of each Element	Relevant Appendix Location for description of each element
1	UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Grid Connection Access Roads Grid Connection Ancillary Works	Appendix 5.3
3	UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman	Appendix 5.4
4	Upperchurch Windfarm (UWF)	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Appendix 5.5
5	UWF Other Activities (OA)	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	Appendix 5.6

#### **Relevant Volume C3 Revised EIA Figures:**

[Figure CE 1.1: Location of UWF Related Works and the Other Elements of the Whole UWF Project on OSI Mapping.](#)

This information on the other elements of the whole UWF project can be found in the following locations;

- **Full EIA Report** or EIS (as appropriate) for **Elements 3 and 4** in [Volume F: Reference Documents for Other Elements of the Whole UWF Project](#).
- **Description of Elements 1 and 5** (presented in a format similar to this chapter and with smaller scale reference mapping and figures) in [Appendix 5.3 and Appendix 5.6](#) see [Volume C4: Revised EIA Appendices](#).
- **Overview description of each elements 1, 3, 4, and 5** of each element in this Section hereunder.



**5.6.1.1. Element 1: UWF Grid Connection**

An application for planning permission for a revised UWF Grid Connection will most likely be submitted directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006). The application will be accompanied by an EIA Report. A pre-application request was made to An Bord Pleanála on 4<sup>th</sup> January, 2019. ABP Ref. No. **303385-19**.

A **detailed description** of the revised UWF Grid Connection (presented in a format similar to 5.2 to 5.5 above) along with **accompanying figures** is included in **Appendix 5.3: Description of Development (UWF Grid Connection)**.

**A summary overview of the revised UWF Grid Connection is provided hereunder.**

**5.6.1.1.1. Location and Characteristics of UWF Grid Connection**

There is no revision to Mountphilips Substation from the 1<sup>st</sup> SID application. The route of Mountphilips – Upperchurch 110kV UGC has been revised and therefore UWF Grid Connection Ancillary Works; life-cycle stages; use of natural resources; emissions or wastes have also been revised.

The UWF Grid Connection will comprise of the following:

**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; lightning 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 Mountphilips Substation to Upperchurch Windfarm through the Consented UWF Substation, through the installation of underground cables along the public road. The preferred preliminary route of the 110kV UGC, which is 28.9km in length, will follow a generally west/east course along the Public Road - Thurles to Newport Regional Road R503. The 110kV UGC route starting at Mountphilips Substation will be under a grassland field for 0.52km; under Local Road L2166-0 for 2.26km, under the Regional Road R503 for 23.14km; under the L2264-50 for 1.93km; the L6188-0 for 0.33km and under a Private Farm Road for 0.72km as far as UWF Substation. The route is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Newport, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Tooreenbrien Upper, Tooreenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Baurnadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons. The 110kV UGC will be installed in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at Joint Bay locations, in joint bay chambers. The ducts will be surrounded by concrete and the trench backfilled with aggregate and the road surface will be reinstated according to Local Authority specifications. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

**UWF Grid Connection Ancillary Works** will support the construction of UWF Grid Connection and will include the construction of a new Permanent Entrance at Coole townland (including the provision of sightlines) and Permanent Access Road from the new entrance to the proposed substation at Mountphilips townland;

construction and use of a Temporary Compound at Mountphilips; replacement of watercourse crossing structures; installation of drainage systems at Mountphilips Substation, around the Temporary Compound and along the new Access Road; fencing; protection of existing underground services; provision of electricity supply to Mountphilips substation; excavation and reinstatement and disposal of spoil; hedgerow/tree removal at Mountphilips and hedgerow replanting and site reinstatement.

#### 5.6.1.1.2. UWF Grid Connection: Construction & Operation

**UWF Grid Connection Construction Phase:** All elements of the whole UWF project will be constructed at the same time. Construction of UWF is expected to commence in 2019 and will take approx. 12 months. Approximately 100 persons will be engaged in the pre-construction, main construction, cable jointing and commissioning works for the UWF Grid Connection. 1290 No. loads of concrete; 1320 No. loads of aggregate; and 210 No. loads of surface dressing (public road sections) will be imported from Roadstone Killough, Co Tipperary and Bunratty, Co Clare and Shanballyedmond, Rear Cross. 20 No. loads of general building materials including geotextile, and 310 No. loads of electrical plant and equipment including lattice towers, control building doors and switching gear, will be imported to the site from various suppliers throughout Ireland and the EU. The excavated material from the 110kV public road trenches will be classed as spoil and will amount to 23,810m<sup>3</sup>, all of which will be removed to a licensed waste facility.

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

**UWF Grid Connection use of Natural Resources: Construction Phase** – There will be 5.9 hectares of **land** required for the construction works site. The use of the Public Road corridor (24.1 hectares) is not considered a natural resource. 35m of **hedgerow** and 2 No. of **trees**, which are immature, will be permanently removed to facilitate either a permanently widened entrance off the public road or a new permanent access road. These hedgerows and trees will be replaced immediately adjacent to the area. c.700m of new hedgerow will be planted with locally sourced native species. **Water** required for welfare facilities will be brought onto site. Approximately 2,470m<sup>3</sup> of **topsoil**, 1,570m<sup>3</sup> of **subsoil** and 30m<sup>3</sup> of **rock** will be permanently excavated from the works areas. 300m<sup>3</sup> of the excavated topsoil will be used to reinstate the temporary access road to the End Masts. 3,770m<sup>3</sup> of the excavated material will be permanently stored around the Mountphilips Substation and along the Permanent Access Road as linear berms.

**UWF Grid Connection use of Natural Resources: Operation Phase** – The Land required will reduce considerably to just 2.0ha of land permanently changing use - comprising the footprint of the Mountphilips Substation and access road. No further **hedgerow** or **tree pruning or removal** will be required during the operational stage. Non-potable **water** requirements will be provided at the Mountphilips Substation via a rain water harvesting system, and drinking water will be brought onto site as needed. **No excavations of soils** will be required during the routine operation of the UWF Grid Connection. Planned maintenance or unplanned repairs, if any occur are likely to involve the re-opening of the underground chambers, at Joint Bays. This work which will result in very small volumes of crushed stone and sand being temporarily removed from the area directly over the joint bay covers, stored adjacent to the Joint Bay, and re-used to reinstate the top of the Joint Bay following the completion of the repairs.

**UWF Grid Connection Emissions:** Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage, negligible levels are associated with the operation and maintenance activities. During operation, Mountphilips Substation will emit **noise** however this is unlikely to be audible above the existing background noise levels at nearest residence, which is 385m distant. The operational substation and 110kV underground cable will be a source of very low frequency (50Hz) **electromagnetic fields**.

**UWF Grid Connection Waste:** Waste water from construction stage welfare facilities will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at the Temporary Compound. Waste will be collected by an appropriately licensed waste contractor. Any wastes which result from the construction of the UWF Grid Connection will be managed under a specific **Waste Management Plan**. Approximately 22,210m<sup>3</sup> of spoil will arise during excavations in public roads. This excess material or other contaminated material arising during the construction of UWF Grid Connection will be collected by a licenced operator and disposed of in a licenced facility.

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

### 5.6.1.2. Element 3: UWF Replacement Forestry

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

The full **EIA Report including mapping and figures for UWF Replacement Forestry** was submitted with the planning application for UWF Related Works to Tipperary County Council in **Volume F: Reference Documents for Other Elements of the Whole UWF Project**.

An extract from Volume F of the **detailed description** of the UWF Replacement Forestry (presented in a format similar to 5.2 to 5.5 above) along with **a copy of the accompanying figures** is included in **Volume C4: Revised EIAR Appendix 5.4: Description of Development (UWF Replacement Forestry)**.

**A summary overview of UWF Replacement Forestry is provided hereunder.**

#### 5.6.1.2.1. Location and Characteristics of UWF Replacement Forestry

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands as part of the whole UWF project.

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

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

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

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

**5.6.1.2.2. UWF Replacement Forestry: Planting and Growth Stage**

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

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

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

**Emissions – Planting and Growth Stage:** Negligible.

**Waste - Planting and Growth Stage** - such as packaging, and excess planting materials will be generated in very small quantities and this waste will be removed at source and disposed of in an appropriate licensed facility.

**5.6.1.3. Element 4: Upperchurch Windfarm**

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

An application for planning permission for Upperchurch Windfarm (Consented UWF) was made to Tipperary County Council in January 2013. The **windfarm was permitted by Tipperary County Council in January 2014** and the permission was upheld by An Bord Pleanála in August 2014. The application was accompanied by an EIA Report (known as EIS at the time) and Natura Impact Statement. The full planning documents for consented UWF can be found in [Volume F: Reference Documents for Other Elements of the Whole UWF Project](#).

**5.6.1.3.1. Overview of the Location and Characteristics of Upperchurch Windfarm**

UWF will comprise 22 wind turbines with an overall height up to 126.6 metres, 2 meteorological masts with an overall height of up to 80 metres, turbine foundation and crane hardstanding areas, access roads and an electrical substation.

The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cumber, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary.

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

A document, with a **detailed description of the Upperchurch Windfarm**, has been compiled from the original 2013 Upperchurch Windfarm EIS, from the Reply to Further Information, the additional information submitted during the planning process and mitigation measures and planning conditions attaching to the Grant of Permission, to reflect a description of the development as it is now permitted. This compilation document has been prepared in the same format as the current application Chapter 5, for ease of cross referencing. The compilation document can be found in [Appendix 5.4: Complied Description of Upperchurch Windfarm](#).

The full planning documents for Upperchurch Windfarm can be found in [Volume F: Reference Documents for Other Elements of the Whole UWF Project](#).

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

- **Consented UWF Turbines** - 22 No. wind turbines of the three-bladed, tubular tower model, light grey in colour and an overall height to blade tip upto 126.6m. The turbines will be constructed on concrete bases with an adjacent hard-core hardstand area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to the Consented UWF Substation.
- **Consented UWF Substation** - 110kV substation compound which includes a control building, main transformer and other electrical equipment enclosed in a compound by a palisade fence. The substation will measure 64m x 41m.
- **Consented UWF Windfarm Roads** - 11.6km of windfarm access roads will comprise 8km of newly built 5m wide roads and 3.6km of existing farm roads which will require upgrading and widening (by an average of 2m).

- **Consented Ancillary Works** - The main items of ancillary works will include, 2 No. meteorological masts up to 80m in height; 11 No. site entrances; 1 No. stream crossing; site drainage system; 2 No. construction site compounds; 6 No. borrow pits from which most of the aggregate required will be won; forestry felling, hedgerow removal and reinstatement; excavation, storage and reinstatement of soils.

#### 5.6.1.3.2. Upperchurch Windfarm: Construction & Operation

**UWF Construction Phase:** All elements of the whole UWF project will be constructed at the same time.

Construction of UWF is expected to commence 2018/2019 and will take approx. 12 months. Approximately 277 persons will be engaged in the civil, electrical, project management, legal and financial services, material supply and component deliveries for the windfarm. Approximately 950 No. loads of concrete; 15 No. loads of reinforcing steel and 5 No. loads of general building materials and 212 No. loads of electrical plant and equipment (abnormal size loads) will be imported to the site by HGV. The abnormal turbine loads will be transported from Foynes Port.

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

**UWF use of Natural Resources:** 56.3 hectares of land within the construction works site will reduced to 6.4 ha during the operational phase; Approx. 108,000m<sup>3</sup> of excavated soils; 43,000m<sup>3</sup> of aggregate mostly won on-site and otherwise imported from local quarry at Shanballyedmond, Rear Cross; small amounts of potable water, carried on-site; felling of 4.4 hectares of conifers; 960m of hedgerow removed.

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

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

**5.6.1.4. Element 5: UWF Other Activities**

Although UWF Other Activities do not require planning permission, they do form part of the whole UWF project and therefore are included in the cumulative evaluation. **A description of these activities**, along with **mapping and figures** is included in **Appendix 5.6: Description of the UWF Other Activities**.

An overview of UWF Other Activities is provided hereunder.

**5.6.1.4.1. Location and Activities of UWF Other Activities**

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

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

**Monitoring Activities** will monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the UWF 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented UWF; and measures in the 2018 UWF Grid Connection EIA Report, the 2018 UWF Related Works EIA Report and the 2018 UWF Replacement Forestry EIA Report and associated UWF Grid Connection Environmental Management Plan and UWF Related Works Environmental Management Plans. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement.

**Overhead Line Activities** include re-sagging activities and fibre wrapping activities. The purpose of the re-sagging activities is to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters. The purpose of fibre wrapping is to provide a communication link to the newly installed Mountphilips Substation. The tension will be corrected on 2 no. Sections - i) between ESNB Angle Mast Structure No. 79 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and ii) between New Mountphilips End Mast No. 2 and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). Wrapping the overhead line with fibre optic cable from Killonan ESNB substation (just east of Limerick City) to Mountphilips substation. The Overhead Line Activities will be carried out according to industry standard method statements, including standard health & safety and environmental management systems.



## 5.6.1.4.2. UWF Other Activities: Construction &amp; Operation

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

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

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

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

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

**5.6.1.5. Cumulative Locational Context of all the Elements**

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

The UWF Related Works is predominately located adjacent to and overlaps with Other Elements of the Whole UWF Project, in particular the consented Upperchurch Windfarm per:

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

**Relevant Volume C3 Revised EIAR Figures:**

Figure CE 1.2: UWF Related Works and the Other Elements of the Whole UWF Project in the Upperchurch Windfarm area.

Figure CE 1.3: UWF Related Works and the Other Elements of the Whole UWF Project in Knocknabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

### 5.6.2. Secondary Projects

The development of the UWF Related Works is not expected to result in any secondary or consequential development.

In relation to the Other Elements of the Whole UWF Project, the addition of Mountphilips Substation (UWF Grid Connection) will add a new high voltage electrical substation in the Newport area. This may facilitate new connections to the Mountphilips substation in the future. There are no new connections planned at present.

**5.6.3. Description of Other Projects and Activities**

A cumulative evaluation of the effects of the subject development together with the Other Elements of the Whole UWF Project and Other Projects or Activities is presented in the Environmental Factor topic chapters.

Other Projects or Activities in the area were scoped using geographical and time-frame boundaries and conceptual site model exercises, see [Appendix 2.3: Scoping of Other Projects or Activities](#). The results of this scoping exercise is presented in Table 5-12, where Other Projects or Activities which have been scoped in for cumulative evaluation are listed in the left hand column of the matrix table, and the relevant Environmental Factor topic is identified in grey shading in the matrix.

**Table 5-12: List of Other Projects or Activities included in the Environmental Factor Cumulative Evaluation**

<b>Project</b> <i>(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters)</i>	<b>Population</b>	<b>Human Health</b>	<b>Biodiversity</b>	<b>Land</b>	<b>Soils</b>	<b>Water</b>	<b>Air</b>	<b>Climate</b>	<b>Built Services</b>	<b>Roads</b>	<b>Cultural</b>	<b>Landscape</b>
Existing Killonan to Nenagh 110kV Overhead Line												
Existing Shannonbridge – Killonan 220kV Overhead Line												
Consented Bunkimalta Windfarm												
Consented Castlewaller Windfarm												
Existing Milestone Windfarm (includes permitted turbine at Inchivara) currently under construction												
Operational Windfarms in the Republic of Ireland												
Existing Communication Structures - Foilnaman Mast - Cummermore Communications Pole												
Activity – Forestry												
Activity – Agriculture												
Activity –Turf-cutting												

A brief overview of each of the above listed projects is provided below. The location of each project in relation to the elements of the Whole UWF Project is identified on [Figure CE 2.1: Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters](#).

**5.6.3.1. Existing Killonan to Nenagh 110kV Overhead Line**

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

**5.6.3.2. Existing Shannonbridge – Killonan 220kV Overhead Line**

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

### 5.6.3.3. Consented Bunkimalta Windfarm

The Bunkimalta Windfarm is a consented 16-turbine windfarm, located on Coillte lands, c.2.5km to the north of the UWF Grid Connection at Bunkimalta, Bauraglanna, Lackabrack, Knockfune and Foilduff at, Keeper Hill, Co. Tipperary.

Bunkimalta Windfarm will comprise 16 wind turbines, each having a rated electrical output of approximately 2,500 - 3,000 kilowatts, access tracks, a fenced Electrical Transformer Station comprising a single-storey Control Building and Substation, an effluent treatment system, three anemometer masts, repository areas, borrow pits and all associated site works, above and below ground. Each wind turbine will comprise a tower up to a maximum of 100 metres high, with a diameter of about 4 metres at the base. Three blades, up to a maximum of 50 metres in length, will be attached.

The Bunkimalta Windfarm will connect to the National Grid via an already consented underground grid connection to the existing Nenagh Substation, on the outskirts of Nenagh town.

The Bunkimalta Windfarm could be constructed during the same period as the UWF Grid Connection and the Whole UWF Project. Bunkimalta Windfarm, when built, will be operational during the operational stage of the Whole UWF Project.

An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 13510035.

### 5.6.3.4. Consented Castlewaller Windfarm

The Castlewaller Windfarm is a 16-turbine windfarm, comprising 16 wind turbine generators (each with a maximum hub height of 100m, maximum rotor diameter of 90m, and with a total tip height of 145m), one permanent meteorological mast, 2 borrow pits, a sub-station including a control building, new internal access roads, upgrading of existing internal access roads, expansion of drainage system, turbine hardstands, wastewater holding tank, underground cables and ancillary works which is located along part of the 110kV UGC route in Castlewaller townland.

An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 11/51/0251 for Castlewaller Windfarm.

Castlewaller Windfarm has not as yet secured a grid connection offer to connect to the National Grid from either Eirgrid or E.S.B Networks and therefore is not likely to be in construction at the same time as the construction of the Whole UWF Project.

### 5.6.3.5. Existing Milestone Windfarm

Milestone Windfarm is an operational (since 2018) 6-turbine windfarm located adjacent to the southwest of the consented Upperchurch Windfarm with 5 No. turbines consented under planning ref: 12510385 at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera, Shevry and 1 No. turbine consented under planning ref: 1410 at Inchivara and Knockduff. Milestone Windfarm comprises wind turbines each with a maximum tip height of 126m, along with new access tracks, and electrical substation, a borrow pit and associated works. The grid connection associated with the Milestone Windfarm is towards the south at ESNB Cauteen Station, cabled along the public road network. An Environmental Impact Statement accompanied the planning applications for Milestone Windfarm – Ref: 12510385 & 1410.

Part of the landholding associated with the Milestone Windfarm occurs within one of the landholdings associated with the 110kV UGC element of the UWF Grid Connection, in Knockcurraghbola Commons townland.

#### **5.6.3.6. Operational Windfarms in the Republic of Ireland**

The Republic of Ireland has a generating capacity of 2,909.66 MW based on 233 windfarms.

#### **5.6.3.7. Existing Communication Structures**

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

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

#### **5.6.3.8. Activities – Forestry, Agriculture**

Agriculture and forestry are the predominant land uses in the area of the Whole UWF Project.

#### **5.6.3.9. Activity – Turf-Cutting**

Turbary (rights to cut turf) exists at Bleanbeg Bog immediately to the north of the UWF Grid Connection (110kV UGC) in the Castlewaller area.

The above projects and activities are included in the cumulative evaluations in the Environmental Topic chapters – Chapters 6 to 17. The relevant Environmental Factor topic is identified on Table 5-12.



Title: Figure RW 5.1

Location of UWF Related Works on OSI Discovery Mapping


Map Number: Map 1 of 1

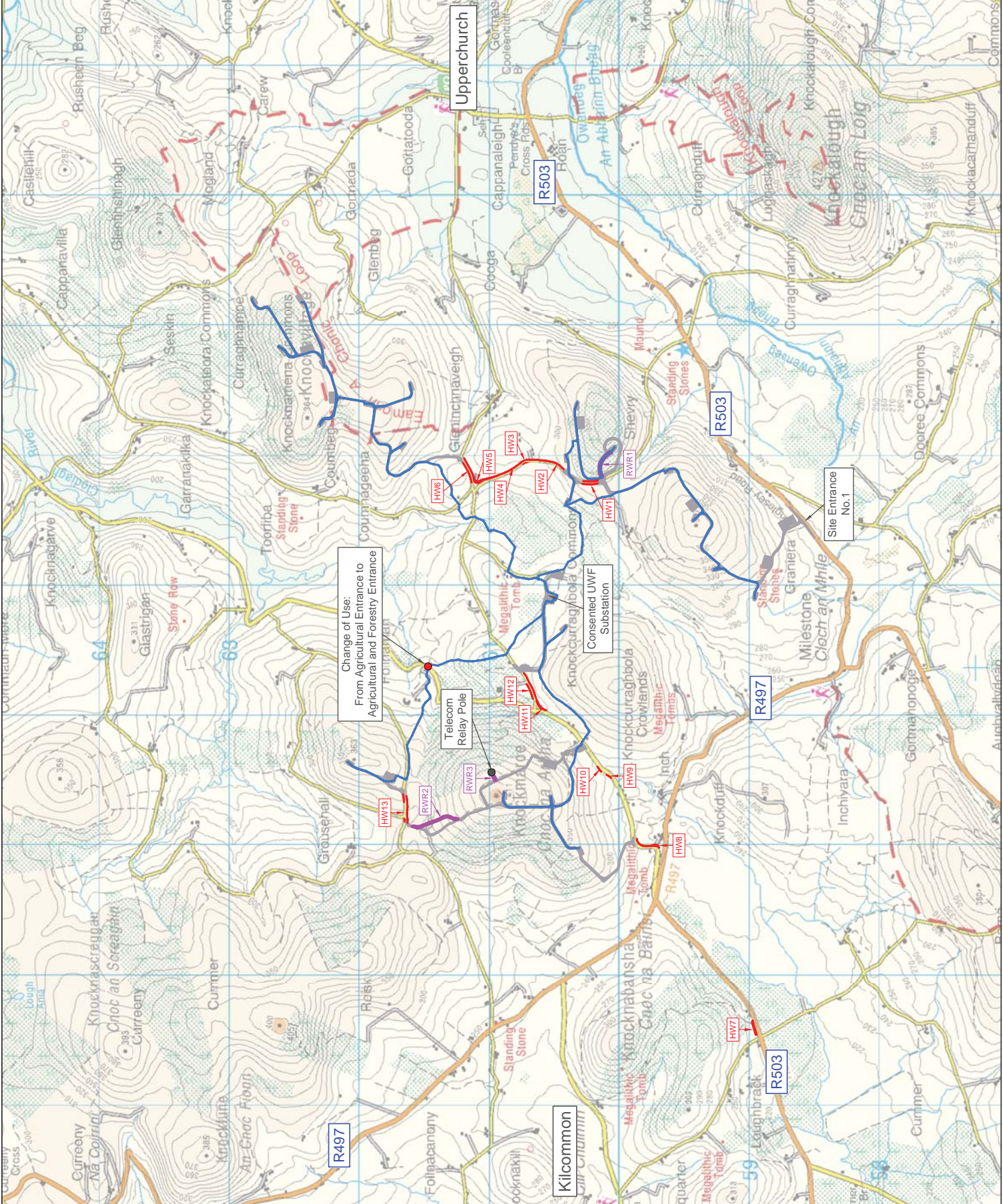
Legend:

- 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
- Upperchurc Windfarm (UWF)
- R503 Regional Road Number



Project: UWF Related Works (RW)

Drawn by: AB	Created by: JB	Date: January 19	Sheet Size: A3
			
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Title: Figure RW 5.2  
Layout of UWf Related Works on Aerial  
Photography Mapping

Map Number:  
Map 1 of 1

Legend:

- **PROPOSED**
  - Haul Route Works
  - Haul Route Works Numbers (HW1 - HW13)
  - Realigned Windfarm Road
  - Realigned Windfarm Road Numbers (RW1 - RW3)
  - Internal Windfarm Cabling
  - Temporary Access Roads
  - Telecom Relay Pole
  - Water Crossings
  - Bat Crossing Locations
  - Site Entrance
  - Road Crossing (RW1 - RW9)
  - Forestry Felling
  - Temporary hedge/tree removal & pruning
  - Permanent hedge/tree removal
- 
- **EXISTING**
  - Watercourse
  - Public Road
  - Public Road Number
  - Townlands



**CONSSENTED PLANNING Ref: ABP PL 22.63040**

**Consented Upperchurch Windfarm (UWf)**

Project: UWf Related Works (RW)

Company:	AB	Drawn by:	JB	Date:	January 19	Rev. No.:	A1
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Abbe Butler  
Ecopower Developments Ltd  
Parklands Business Park, Millery  
MOB: 193 33 862644



**CLASSIFICATION OF WATER COURSES AT THE CROSSING**

**POINTS**

- W001 - SWAMP, NO FISHERIES VALUE
- W002 - SWAMP, NO FISHERIES VALUE
- W003 - SWAMP, NO FISHERIES VALUE
- W004 - SWAMP, NO FISHERIES VALUE
- W005 - SWAMP, NO FISHERIES VALUE
- W006 - SWAMP, NO FISHERIES VALUE
- W007 - SWAMP, NO FISHERIES VALUE
- W008 - SWAMP, NO FISHERIES VALUE
- W009 - SWAMP, NO FISHERIES VALUE
- W010 - SWAMP, NO FISHERIES VALUE
- W011 - SWAMP, NO FISHERIES VALUE
- W012 - SWAMP, NO FISHERIES VALUE
- W013 - SWAMP, NO FISHERIES VALUE
- W014 - SWAMP, NO FISHERIES VALUE
- W015 - SWAMP, NO FISHERIES VALUE
- W016 - SWAMP, NO FISHERIES VALUE
- W017 - SWAMP, NO FISHERIES VALUE
- W018 - SWAMP, NO FISHERIES VALUE
- W019 - SWAMP, NO FISHERIES VALUE
- W020 - SWAMP, NO FISHERIES VALUE
- W021 - SWAMP, NO FISHERIES VALUE
- W022 - SWAMP, NO FISHERIES VALUE
- W023 - SWAMP, NO FISHERIES VALUE
- W024 - SWAMP, NO FISHERIES VALUE
- W025 - SWAMP, NO FISHERIES VALUE
- W026 - SWAMP, NO FISHERIES VALUE
- W027 - SWAMP, NO FISHERIES VALUE
- W028 - SWAMP, NO FISHERIES VALUE
- W029 - SWAMP, NO FISHERIES VALUE
- W030 - SWAMP, NO FISHERIES VALUE
- W031 - SWAMP, NO FISHERIES VALUE
- W032 - SWAMP, NO FISHERIES VALUE
- W033 - SWAMP, NO FISHERIES VALUE
- W034 - SWAMP, NO FISHERIES VALUE
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- W036 - SWAMP, NO FISHERIES VALUE
- W037 - SWAMP, NO FISHERIES VALUE
- W038 - SWAMP, NO FISHERIES VALUE
- W039 - SWAMP, NO FISHERIES VALUE
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- W041 - SWAMP, NO FISHERIES VALUE
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- W065 - SWAMP, NO FISHERIES VALUE
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- W068 - SWAMP, NO FISHERIES VALUE
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- W188 - SWAMP, NO FISHERIES VALUE
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- W197 - SWAMP, NO FISHERIES VALUE
- W198 - SWAMP, NO FISHERIES VALUE
- W199 - SWAMP, NO FISHERIES VALUE
- W200 - SWAMP, NO FISHERIES VALUE

Title: **Figure RW 5.3**

UWF Related Works Construction Works Area Boundary

Map Number:  
Map 1 of 1

Legend:

Construction Works Area

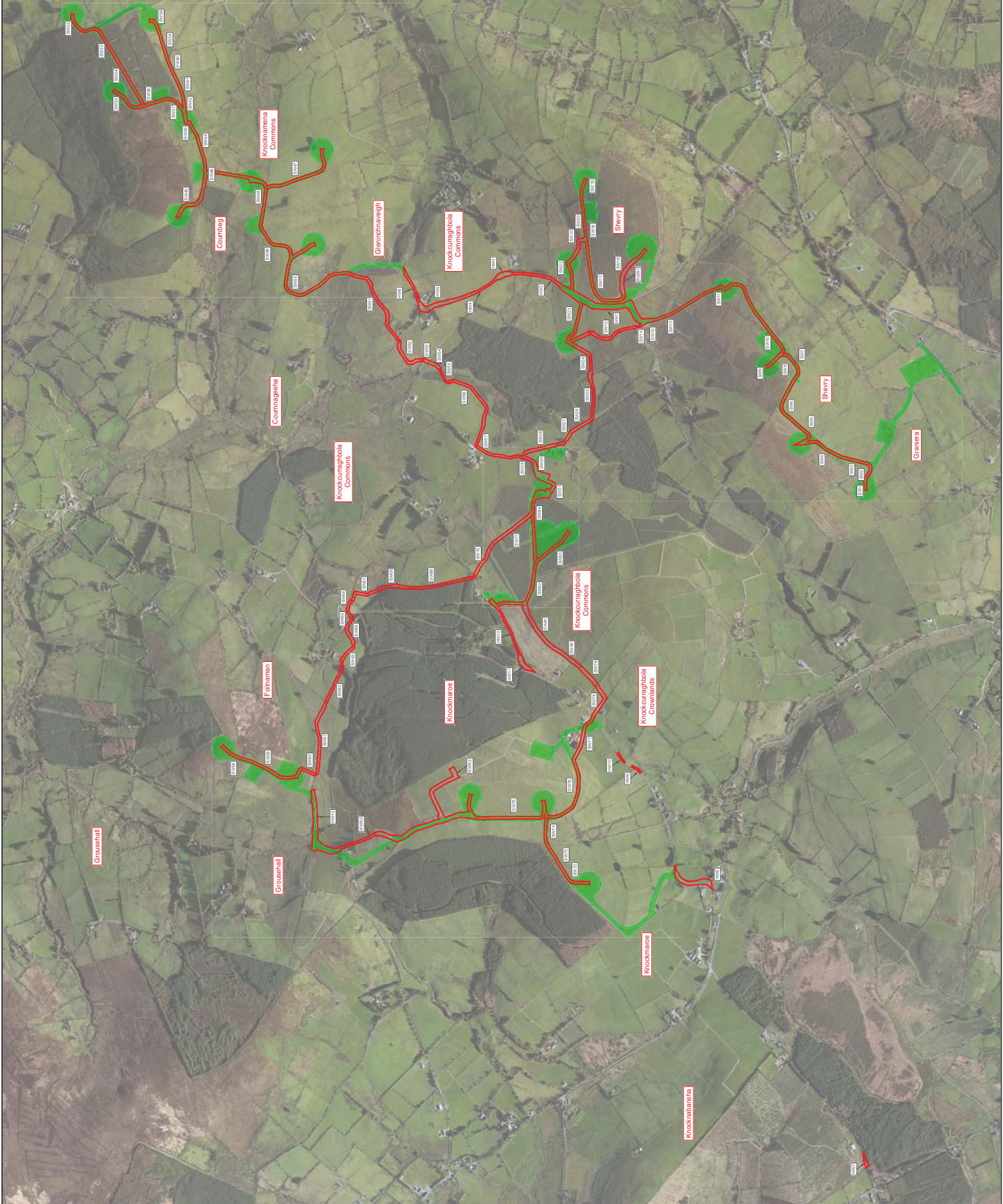
Upperchurch Windfarm (Land requirement during construction phase)

Section numbers for Internal Windfarm Cabling (SW1 - SW84)

Section numbers for Haul Route Works (HW1 - HW13)

Section numbers for Realigned Windfarm Roads (RWR1 - RWR3)

Townlands



Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	January 19	Sheet Size:	A3
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Avic Butler  
Developments Ltd  
Zooic House  
Purcellach Business Park, Kilkenny  
TEL: +353 86 7750140  
MOB: +353 83 8805644

Title: Figure RW 5.4

Layout of Internal Windfarm Cabling on Aerial Photography Mapping

Map Number: Map 1 of 1

Legend:

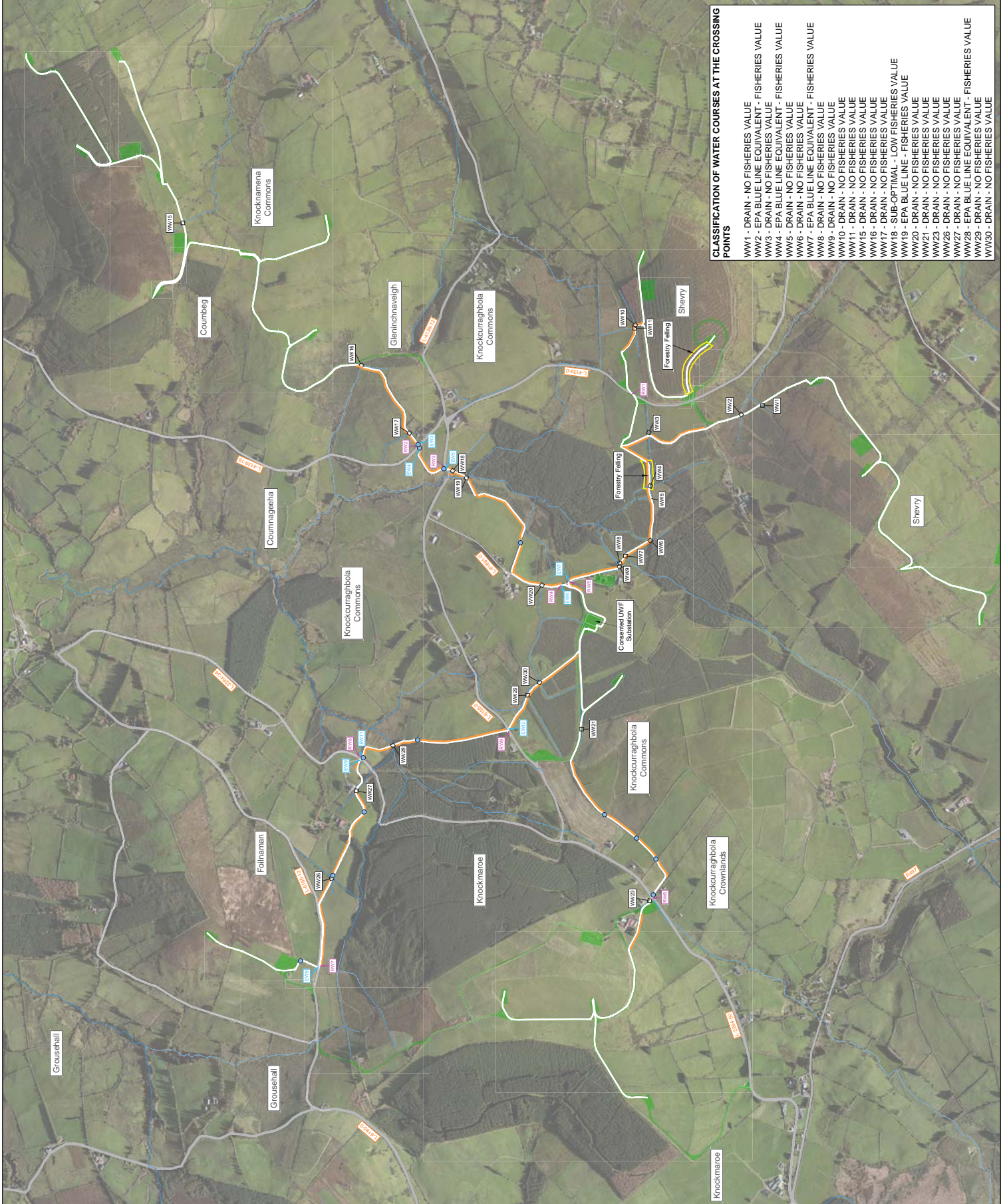
- Internal Windfarm Cabling
- Temporary Access Roads
- Water Crossings
- Site Entrance Numbers
- Road Crossing Numbers
- Forestry Felling
- Temporary hedge/tree removal & pruning
- Watercourse
- Public Road
- Public Road Number
- Townlands
- Upperchurch Windfarm (UWF)



Project:

UWF Related Works (RW)

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Aedife Butler Zeeac House, Porechinch Business Park, Killybeggy TEL: +353 56 7750140 MOB: +353 83 8805644 							



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

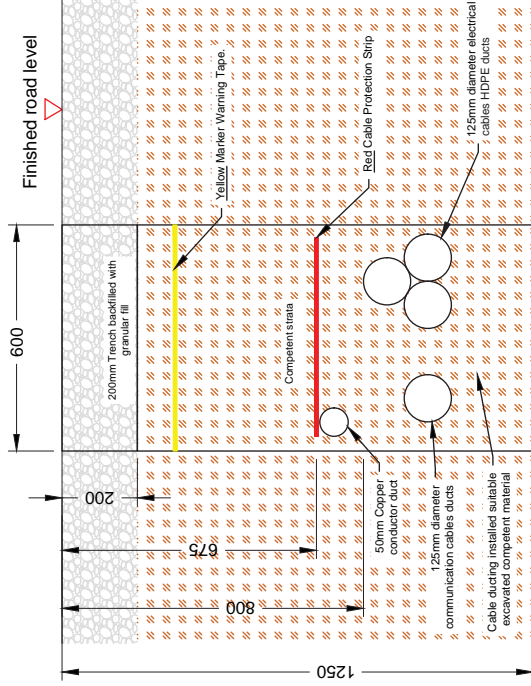
WW1 - DRAIN - NO FISHERIES VALUE
WW2 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
WW3 - DRAIN - NO FISHERIES VALUE
WW4 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
WW5 - DRAIN - NO FISHERIES VALUE
WW6 - DRAIN - NO FISHERIES VALUE
WW7 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
WW8 - DRAIN - NO FISHERIES VALUE
WW9 - DRAIN - NO FISHERIES VALUE
WW10 - DRAIN - NO FISHERIES VALUE
WW11 - DRAIN - NO FISHERIES VALUE
WW15 - DRAIN - NO FISHERIES VALUE
WW16 - DRAIN - NO FISHERIES VALUE
WW17 - DRAIN - NO FISHERIES VALUE
WW18 - SUB-OPTIMAL - LOW FISHERIES VALUE
WW19 - EPA BLUE LINE - FISHERIES VALUE
WW20 - DRAIN - NO FISHERIES VALUE
WW21 - DRAIN - NO FISHERIES VALUE
WW23 - DRAIN - NO FISHERIES VALUE
WW26 - DRAIN - NO FISHERIES VALUE
WW27 - DRAIN - NO FISHERIES VALUE
WW28 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
WW29 - DRAIN - NO FISHERIES VALUE
WW30 - DRAIN - NO FISHERIES VALUE

Title: **Figure RW 5.5**

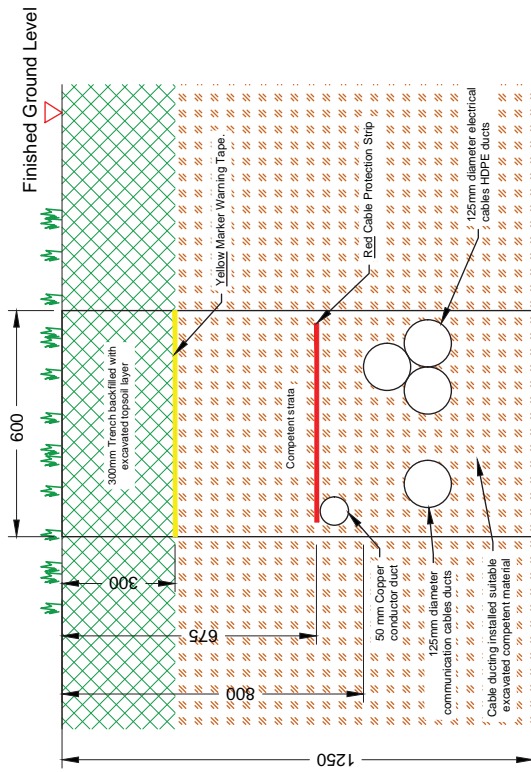
Cross Sections of Internal Windfarm Cables Trench

Map Number: N/A

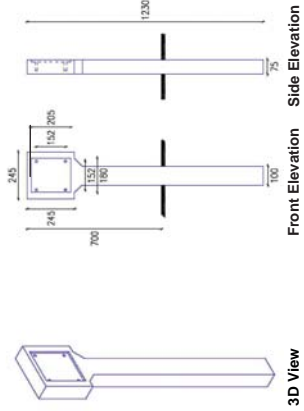
Note : Drawings not to scale. For illustration purposes only



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



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



TYPICAL MARKER POST AND MARKER PLATE DIMENSIONS

Designed in conjunction with



Project: **UWF Related Works (RW)**

Drawn by:	Checked by:	Date:	Sheet Size:
CB	JB	11-Feb-18	A3



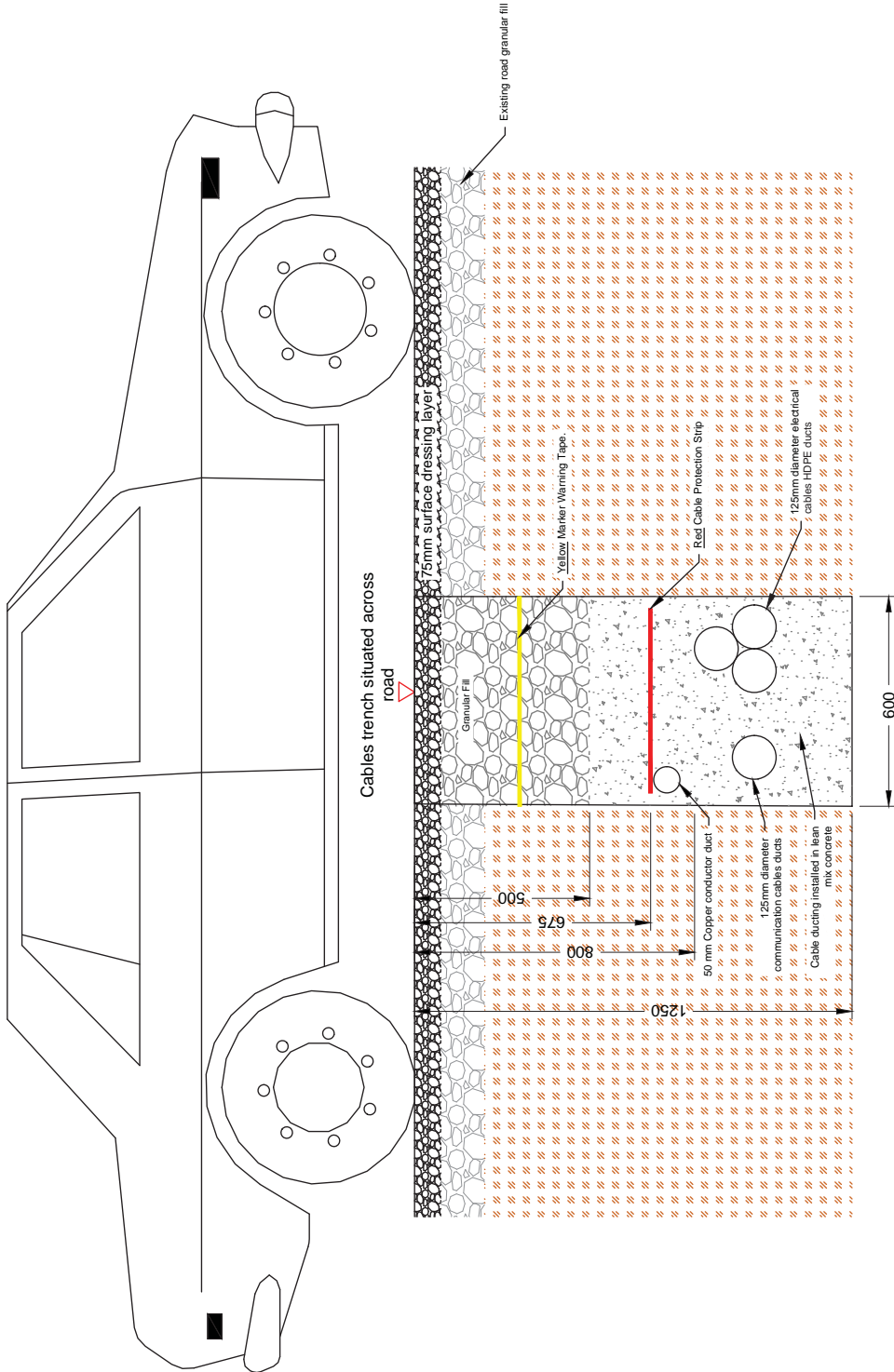
Company Name: Eco Power Limited  
 Address: Powerlink IFA Business Park  
 Dublin Road, Killybegs, Co. Wick  
 Ireland - 056-7750140 (t) 056-7750141 (f)  
 Mobile: +353 (0)87-4511418

Title:  
**Figure RW 5.6**

Cross Section of Internal Windfarm Cabling  
in Public Road Pavement

Map Number:  
N/A

Note :  
Drawings not to scale. For illustration purposes  
only



33kV TRENCH ACROSS PUBLIC ROADS (RW1 TO RW9)

Designed in conjunction with



Project:  
**UWF Related Works (RW)**

Drawn by:	CB	Checked by:	JB	Date:	11-Feb-18	Sheet Size:	A3
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Company Name:  
Eco Power Limited  
Address:  
Dunluce Road, Killybeggs, Co. Down, BT37 1YU  
Tel: +353 (0)28 4511418  
Fax: +353 (0)28 4511419

Title:  
Figure RW 5.7

Layout of Realigned Windfarm Roads  
on Aerial Photography Mapping

Map Number:  
Map 1 of 1

Legend:

Realigned Windfarm Road

Realigned Windfarm Road Numbers  
(RWR1 - RWR3)

Water Crossings

Bat Crossing Locations

Forestry Felling

Permanent hedge/tree removal &  
pruning

Watercourse

Public Road

Public Road Number

Townlands

Upperchurch Windfarm (UWF)



Project:

UWF Related Works (RW)

Drawn by: AB Date: 19-Feb-18 Sheet Size: A3

Created by: JB



Audie Butler  
Ecopower Developments Ltd  
Zooac House,  
Porellinch Business Park, Kilkenny  
TEL: +353 56 7750140  
MOB: +353 83 889544



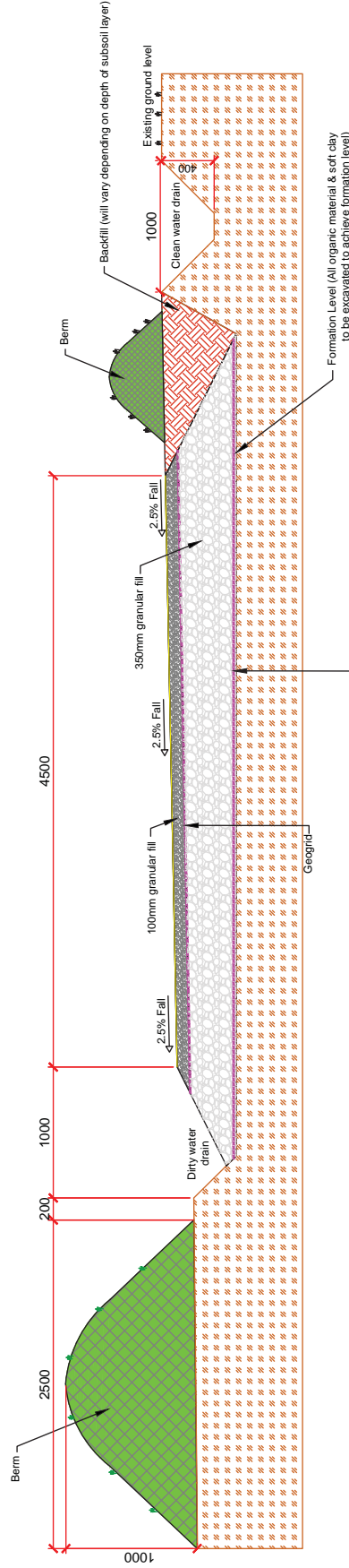
CLASSIFICATION OF WATER COURSES AT THE  
CROSSING POINTS  
WW24 - DRAIN - NO FISHERIES VALUE  
WW25 - DRAIN - NO FISHERIES VALUE

Title:  
**Figure RW 5.8**

Cross Section of Realigned Windfarm Road

Map Number:  
N/A

Note :  
Drawings not to scale. For illustration purposes only



**Cross section of Realigned Windfarm Road**

Project:  
**UWF Related Works (RW)**

Drawn by: CB  
Checked by: JB  
Date: 11-Feb-18  
Sheet Size: A3



ECOPOWER  
 Group Ltd  
 Energy and Land  
 27-29, Park Road, Ballymore Park  
 Dublin Road, Kildare - 3501 W Y98  
 Limerick - 051-7750140 (01-52 284)  
 Mobile - 0157 0745114148

Title:  
**Figure RW 5.9**

**Layout of Haul Route Works on Aerial Photography Mapping**

Map Number:  
Map 1 of 1

Legend:

- Haul Route Works
- ▶ Haul Route Works Numbers (HW1 - HW13)
- WW3 Water Crossings
- EWS Bat Crossing Locations
- EWS Site Entrances
- Temporary hedge/tree removal & pruning
- Permanent hedge/tree removal
- Watercourse
- Public Road
- L-7.162-9 Public Road Number
- Shelvy Townlands
- Upperchurch Windfarm (UWF)

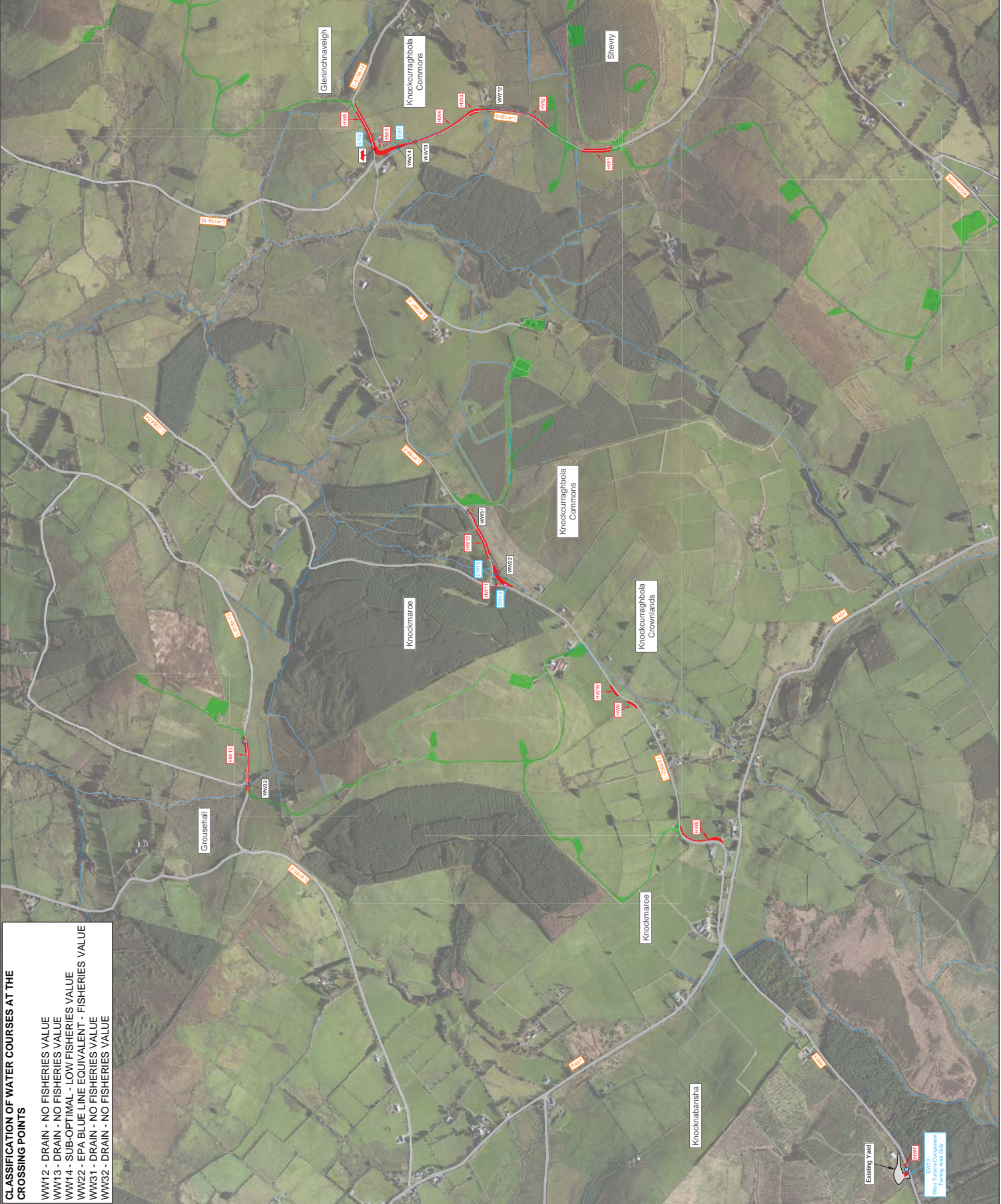


Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	January 19	Sheet Size:	A3
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Ardle Butler  
Windfarm Developments Ltd  
Zooic House,  
Porellinch Business Park, Kilkenny  
TEL: +353 56 7750140  
MOB: +353 89 860544

ECOPOWER



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

- WW12 - DRAIN - NO FISHERIES VALUE
- WW13 - DRAIN - NO FISHERIES VALUE
- WW14 - SUB-OPTIMAL - LOW FISHERIES VALUE
- WW22 - EPA BLUE LINE EQUIVALENT - FISHERIES VALUE
- WW31 - DRAIN - NO FISHERIES VALUE
- WW32 - DRAIN - NO FISHERIES VALUE





Title: Figure RW 5.10

Location and Layouts of Haul Route Works (Overview and Maps 1 to 3)

Map Number:

Map Overview

Legend:

Haul Route Works ID

Haul Route Works

Upperchurch Windfarm

Public Road Numbers



Project:

UWF Related Works (RW)

Drawn by:

AB

Checked by:

JB

Date:

January 19

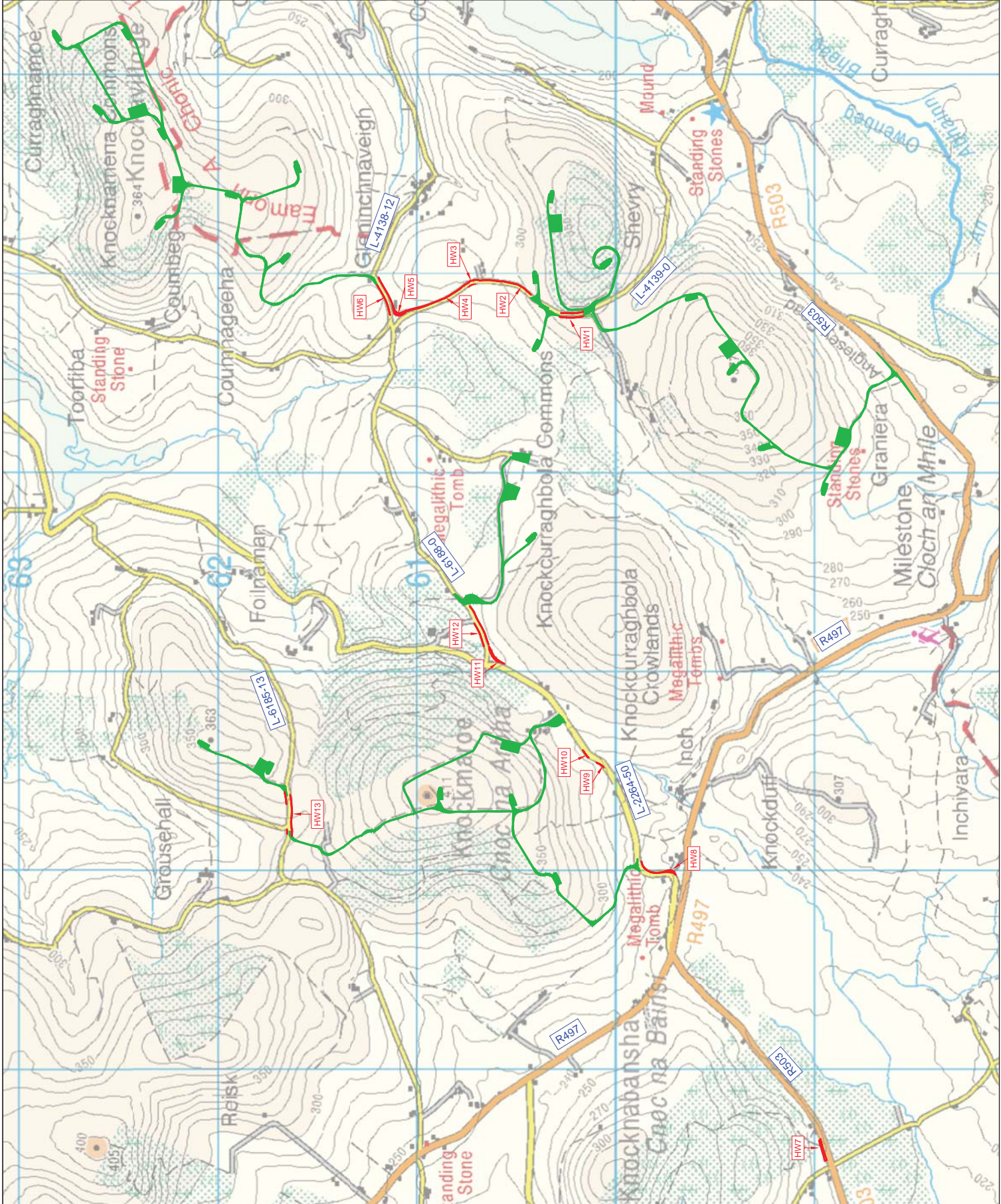
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ECOPOWER

Aoife Butler, Developments Ltd  
Zooke Wood  
Purcellinch Business Park, Killybeg  
TEL: +353 56 7750140  
MOB: +353 83 7805644



**Title:**  
**Figure RW 5.10**  
 Location and Layouts of Haul Route  
 Works (Overview and Maps 1 to 3)

Map Number:  
 Map 1 of 3

Legend:

- Move Telephone Pole
- Road Widening
- Public Road
- Temporary Removal of Roadside Boundary
- Public Road Number
- Upperchurch Windfarm

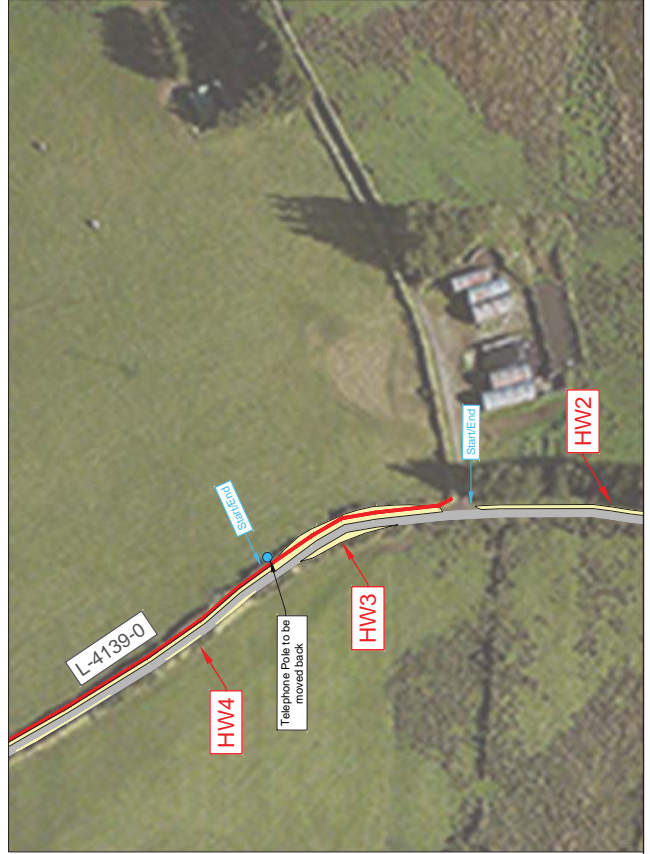


Project:  
 UWF Related Works (RW)

Drawn by: AB  
 Checked by: JB  
 Date: 19-Feb-18  
 Sheet Size: A3



**ECOPOWER**  
 Aoife Butler  
 Project Engineer  
 Zeehan House,  
 Puncelloinn Business Park, Kilkenny  
 TEL: +353 56 7750140  
 MOB: +353 83 8805644





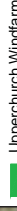


**Title:**  
Figure RW 5.10

Location and Layouts of Haul Route Works (Overview and Maps 1 to 3)

Map Number:  
Map 2 of 3

Legend:

-  Move Telephone Pole
-  Road Widening
-  Public Road
-  Temporary Removal of Roadside Boundary
-  Public Road Number
-  Upperchurch Windfarm

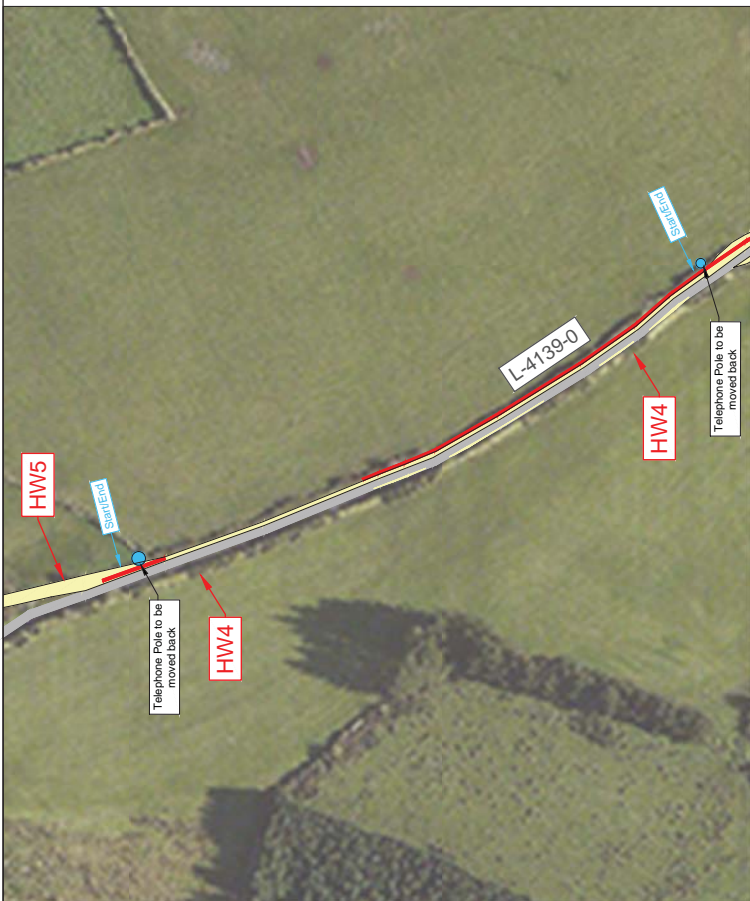


Project:  
UMF Related Works (RW)

Drawn by: AB  
Checked by: JB  
Date: January 19  
Sheet Size: A3




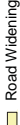
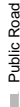



EcoPower  
Ardle Buder  
Infrastructure Developments Ltd  
Zooic House,  
Purcellinch Business Park, Kilkenny  
TEL: +353 56 7750140  
MOB: +353 83 8805644



Title: **Figure RW 5.10**  
Location and Layouts of Haul Route Works (Overview and Maps 1 to 3)

Map Number:  
Map 3 of 3

Legend:

-  Move Telephone Pole
-  Road Widening
-  Public Road
-  Temporary Removal of Roadside Boundary
-  Public Road Number
-  Upperchurch Windfarm



Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	19-Feb-18	Sheet Size:	A3
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Avilla Butler  
 EcoPower Developments Ltd  
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 Purcellinch Business Park, Kilkenny  
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 MOB: +353 83 8805644









Title:  
Figure RW 5.11

Location of the Telecom Relay Pole on  
Aerial Photography Mapping

Map Number:  
Map 1 of 1

Legend:

-  Telecom Relay Pole and Compound
-  Realigned Windfarm Road (RWR3)
-  Public Road
-  Public Road Number
-  Townland
-  Upperchurch Windfarm (UWF)



Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	19-Feb-18	Sheet Size:	A3
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 EcoPower Development Ltd  
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 Poreelloch Business Park, Killybeggy  
 TEL: +353 56 7750140  
 MOB: +353 83 8805544

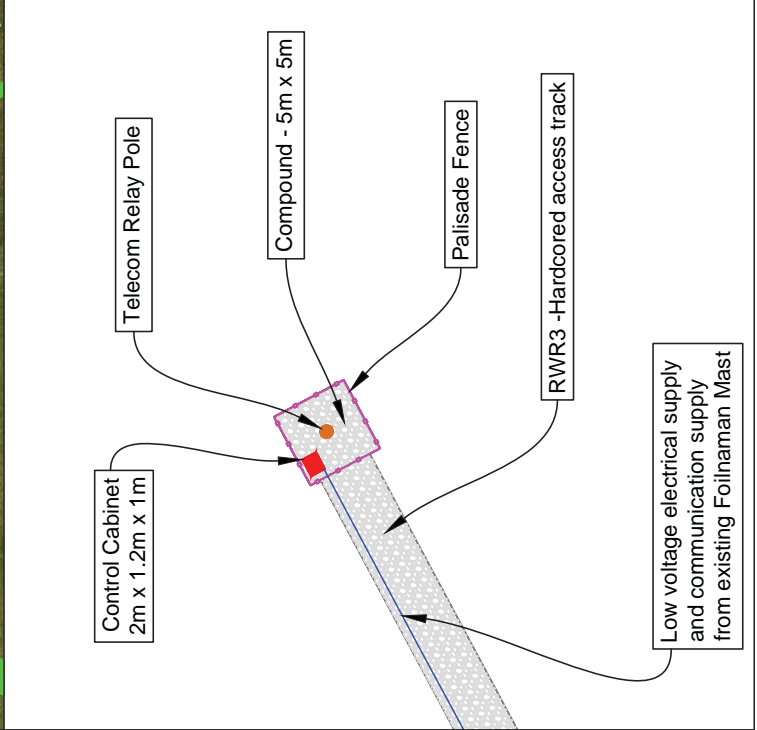
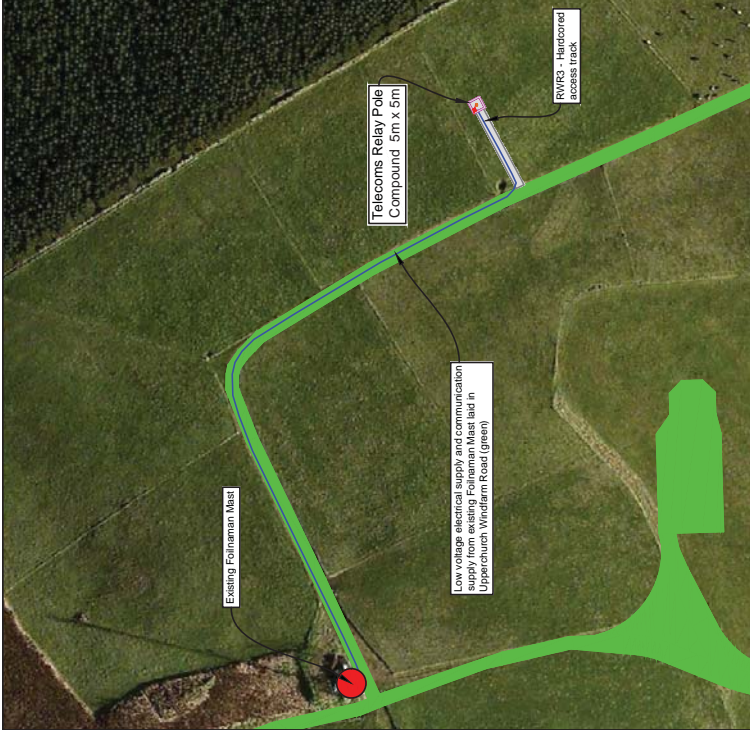


Title: **Figure RW 5.12**

Plan and Elevation of Telecom Relay Pole and Compound

Map Number: **N/A**

Note : Drawings not to scale. For illustration purposes only



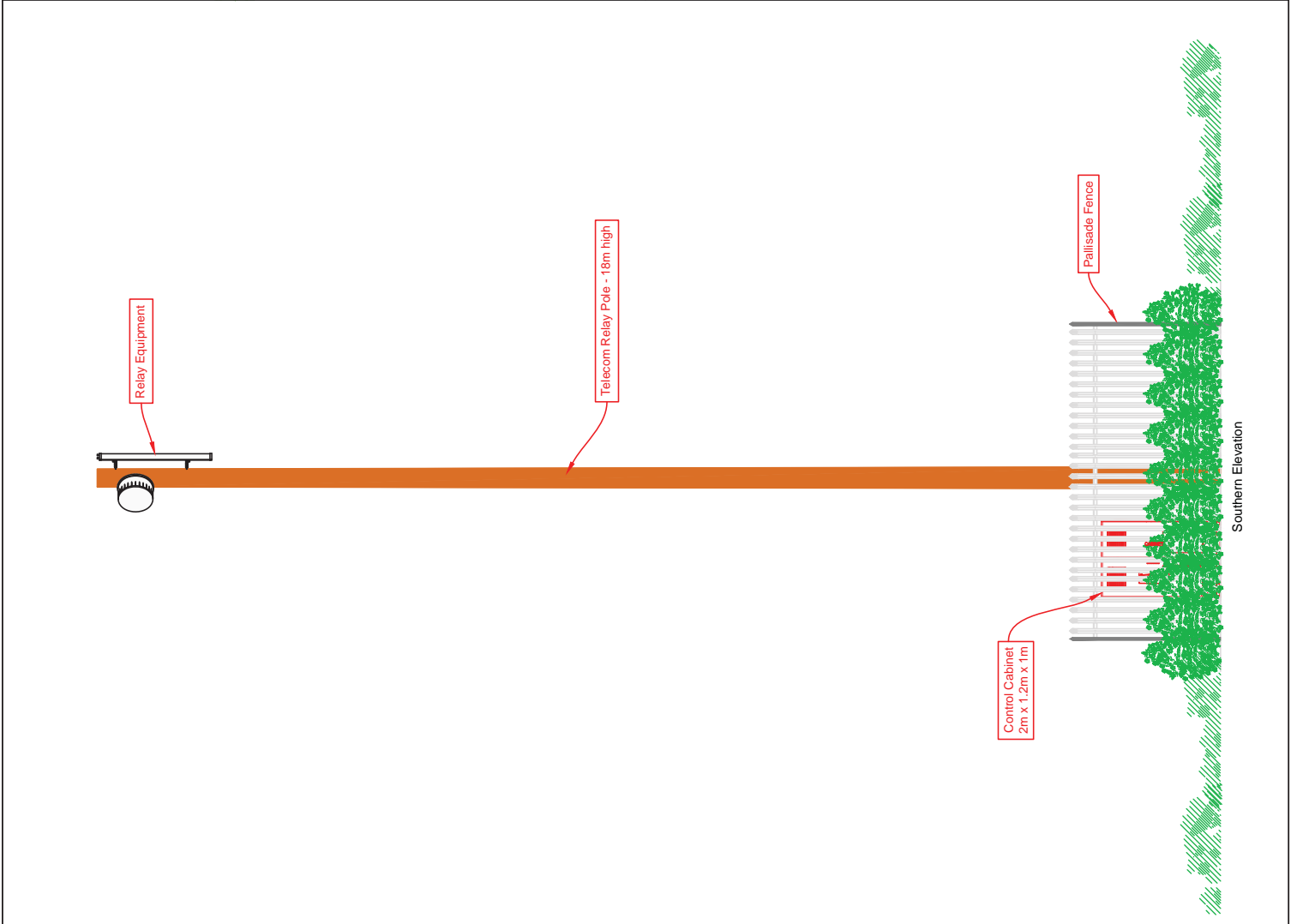
Designed in conjunction with



Project: **UWF Related Works (RW)**

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 EcoPower  
 Energy Limited  
 Delta Road, Killybeggs, Carrickmacross  
 Dublin Road, Killybeggs - D15 W3P6  
 Leinster - 086-759486 (Ext 261)  
 Mobile - 087 099-5431488



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

Map Number:  
Map 1 of 1

- Legend:
- Location of the change of use from Agricultural Entrance to Agricultural and Forestry Entrance
  - Public Road
  - Existing farm track
  - L-2102-03 Public Road Number
  - Townland
  - Upperchurch Windfarm (UWF)

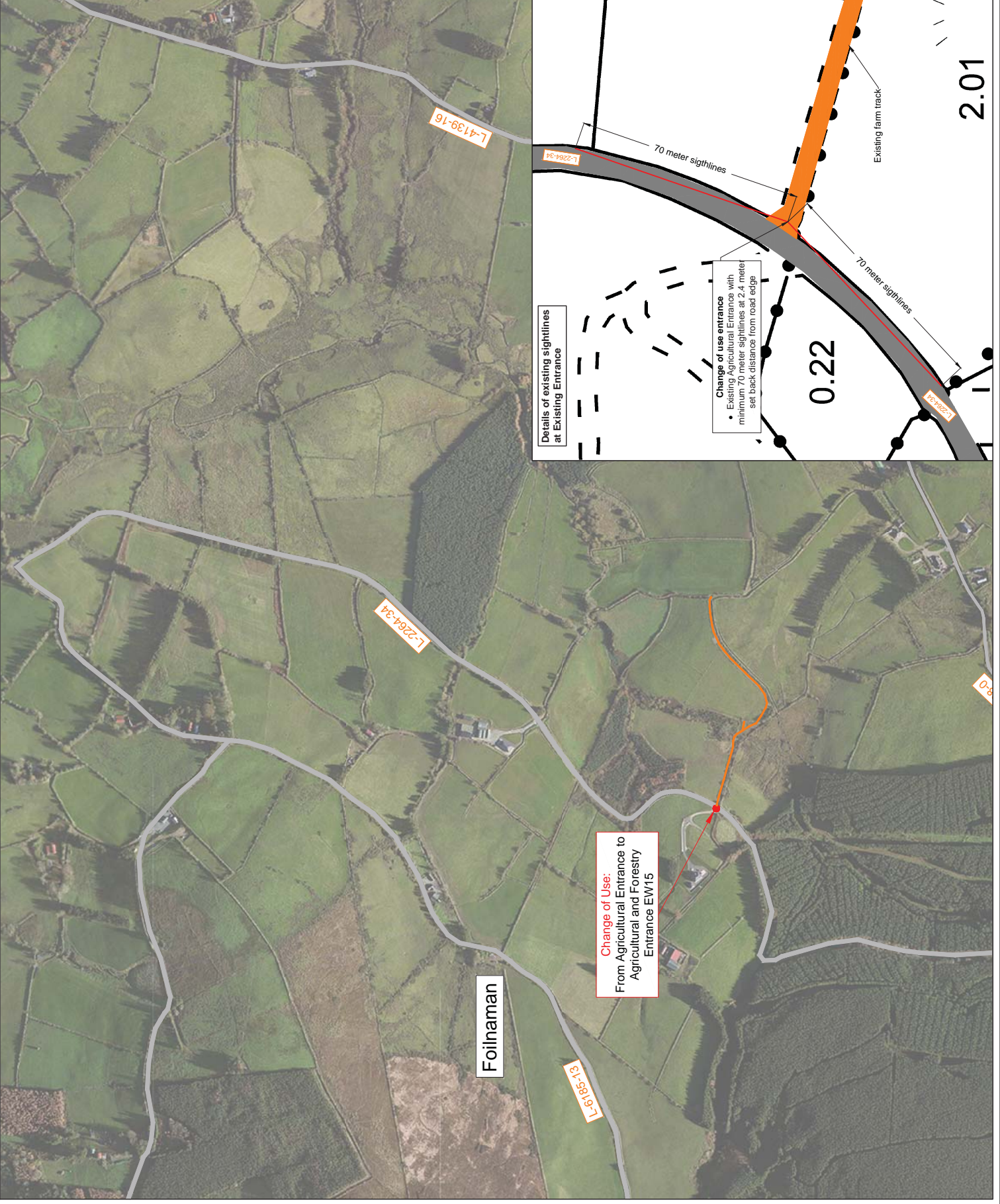


Project:  
UWF Related Works (RW)

Drawn by: AB  
Checked by: JB  
Date: 19-Feb-18  
Sheet Size: A3

Aodh Butler  
 EcoPower Developments Ltd  
 Zwick House,  
 Poreenbush Business Park, Kilkenny  
 TEL: +353 56 7750140  
 MOB: +353 83 880544

**ECOPOWER**



Title:  
**Figure RW 5.14**  
Plan View of Typical Temporary Site  
Entrance

Map Number:  
N/A

Note :  
Drawings not to scale. For illustration purposes  
only

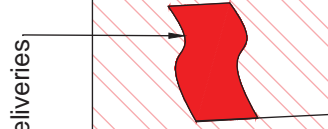
Project  
**UWF Related Works (RW)**

Drawn by:	CB	Checked by:	JB	Date:	11-Feb-18	Sheet Size:	A3
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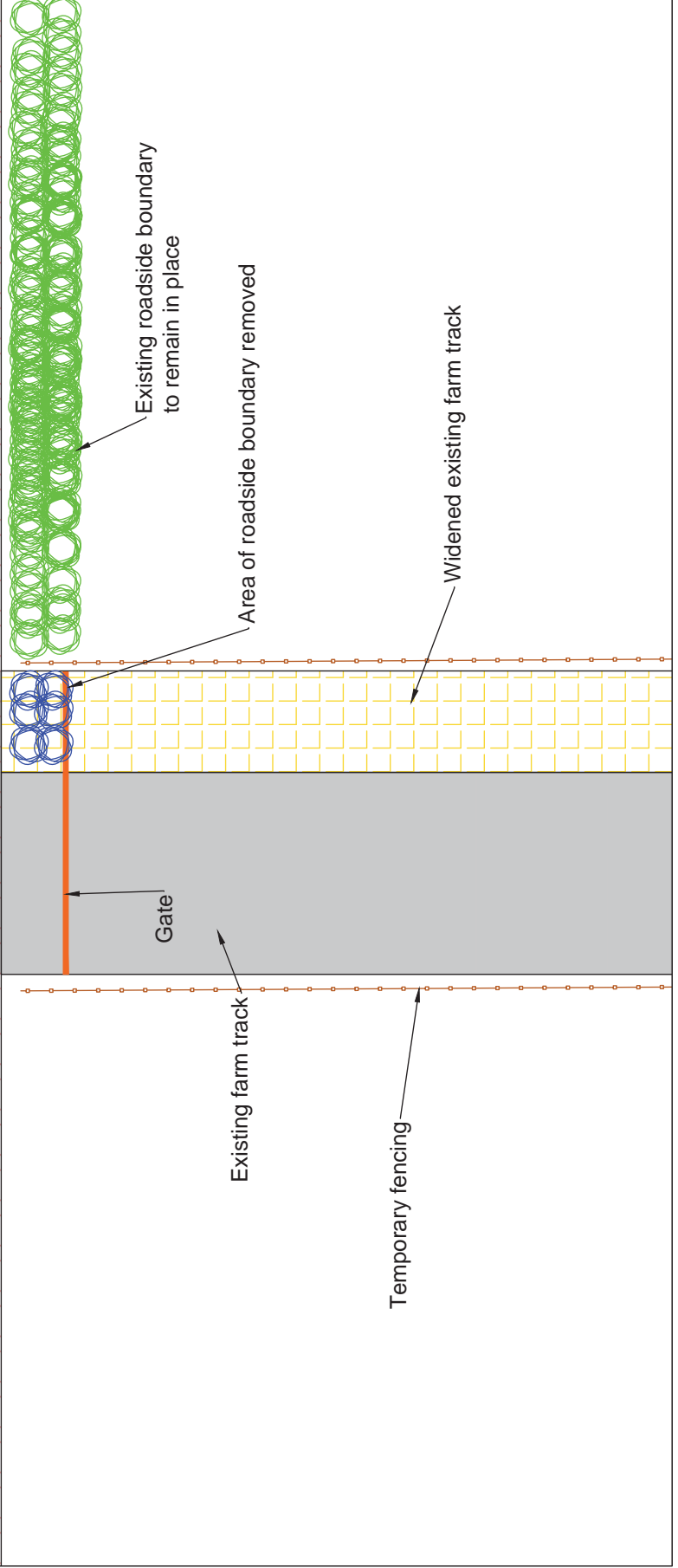


Green Power  
Engineering Limited  
Zircon House, Pineshill Road, Broomfield Park  
Dunedin Road, Kaitiaki - 4802 Wairoa  
Landline : 050-7709486 (Ext 264)  
Mobile : +353 (0)97-5431498

Flagmen on road during deliveries



Public Roadway



Existing roadside boundary  
to remain in place

Area of roadside boundary removed

Widened existing farm track

Gate

Existing farm track

Temporary fencing



Title:  
**Figure RW 5.15**

Cross Section of Temporary Access Roads

Map Number:  
N/A

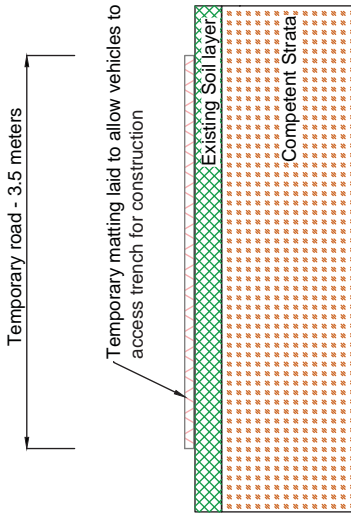
Note :  
Drawings not to scale. For illustration purposes only

Project:  
**UWF Related Works (RW)**

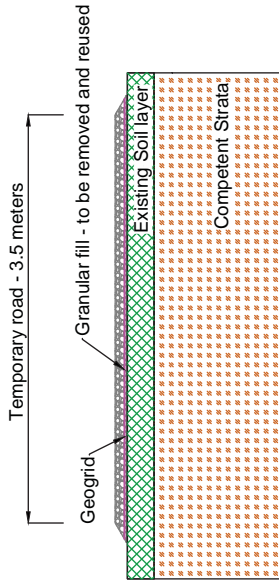
Drawn by: CB  
Created by: JB  
Date: 11-Feb-18  
Sheet Size: A3



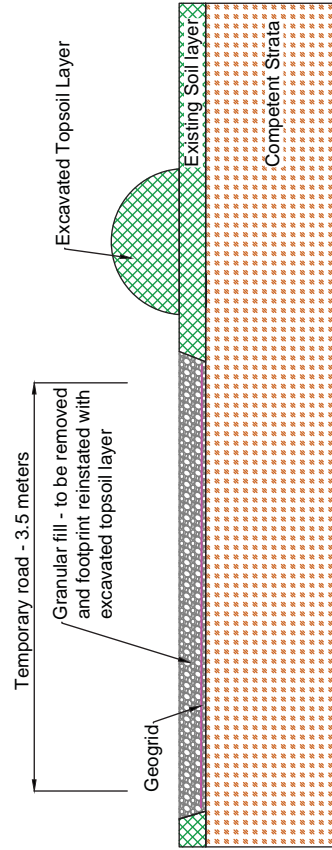
Company Name:  
Eco Power Limited  
Zone House, Perambalur, Karaikal  
Dattin Road, Kichanery - 859 509  
Landline : +91-7704-881431/2431  
Mobile : +91 9845431438



Cross Section of temporary access road - Matting



Cross Section of temporary access road - Floating road



Cross Section of temporary access road - Excavate and fill

Title: **Figure RW 5.16**

Watercourse Crossing Type A1 & A2 - UWF Related Works at Existing Crossing Structure

Note : Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type A1 (Total 5)**  
 Class 4 - Drain - No Fisheries Value: WW6, WW11, WW23, WW29, WW30

- Description of Crossing Type A1**
- Existing crossing structure
  - No Instream Works
  - Cable and Traffic crossing crossing structure
  - No works to existing watercourse crossing structure
  - 33kV Cables and Ducting installed over or under existing structure

**Watercourse Crossing Type A2 (Total 1)**  
 Class 4 - Drain - No Fisheries Value: WW32

- Description of Crossing Type A2**
- Existing crossing structure
  - No Instream Works
  - Traffic crossing only
  - No works to existing watercourse crossing structure
  - No Cables or Ducting installed

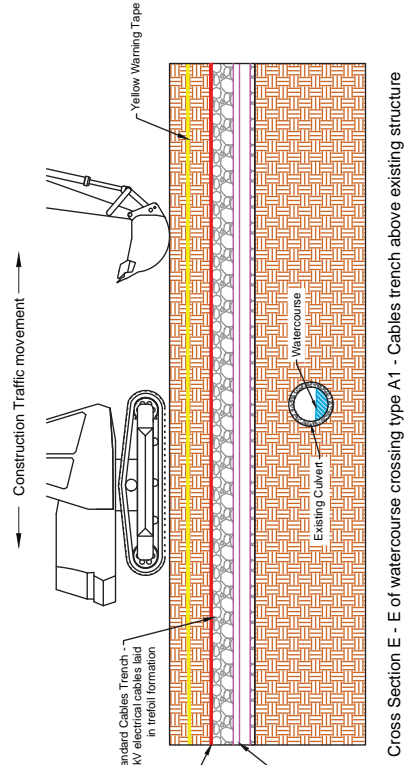


Designed in conjunction with

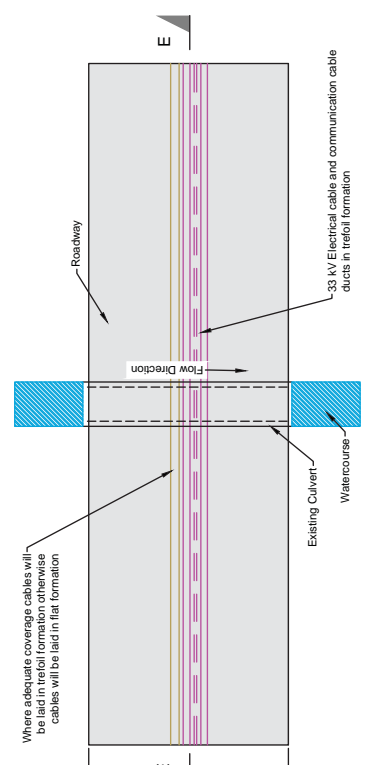
Project: **UWF Related Works (RW)**

Drawn by:	CB	Created by:	JB	Date:	11-Feb-18	Sheet Size:	A3
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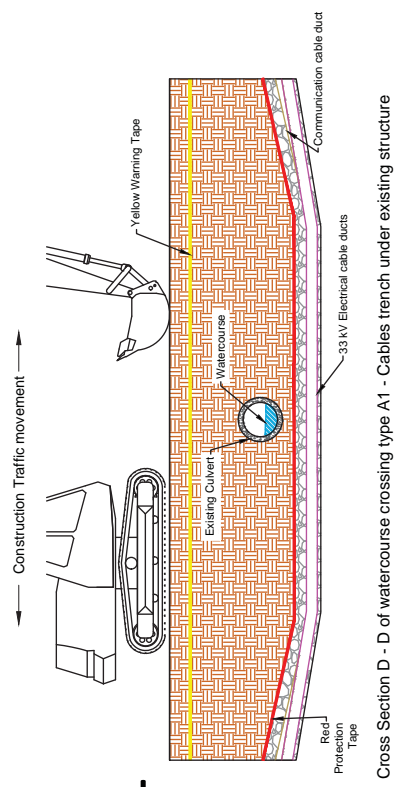
Eco Power Engineering Limited  
 Arise House, Panchsala BSA Business Park  
 Dallas Road, Kildare - 015 7591841 (Ext 261)  
 Mobile - +353 (0)87 5431418



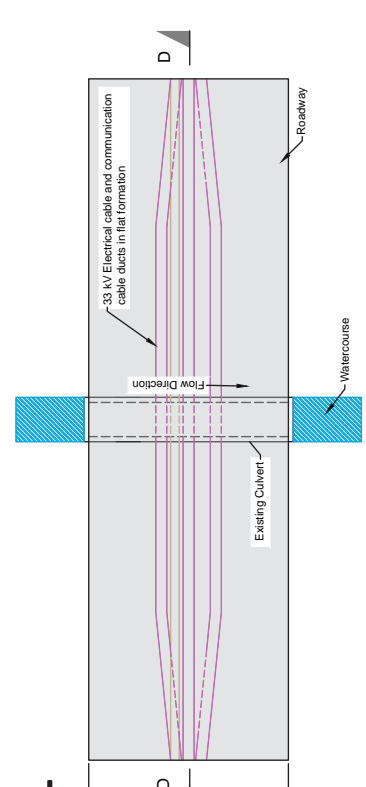
Cross Section E - E of watercourse crossing type A1 - Cables trench above existing structure



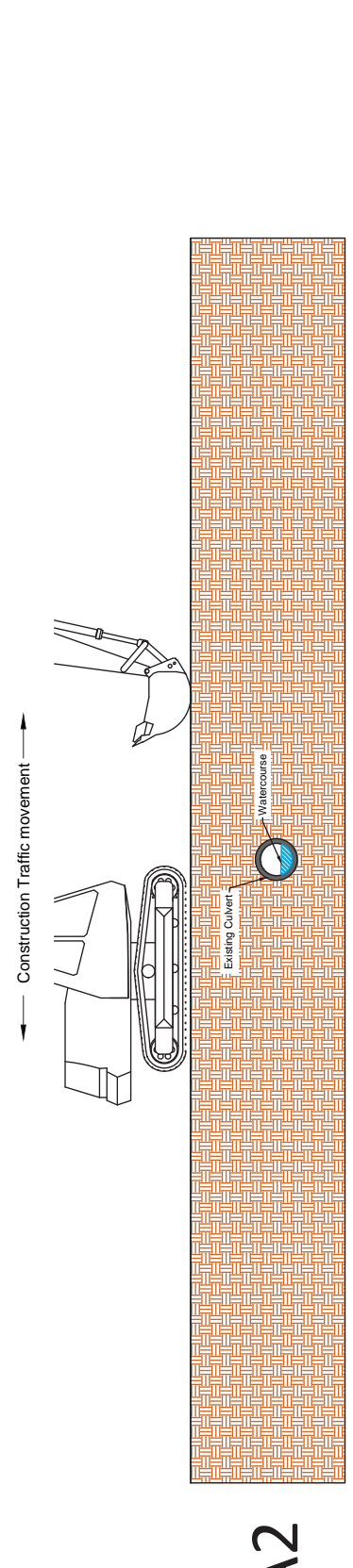
Plan View of watercourse crossing type A1 - Cable ducts laid in trefoil formation over existing structure  
 Excavation within 500mm of structure will be done by hand.  
 (No Instream works required)



Cross Section D - D of watercourse crossing type A1 - Cables trench under existing structure



Plan View of watercourse crossing type A1 - Cable ducts laid in flat formation under existing structure  
 Excavation within 500mm of structure will be done by hand.  
 (No Instream works required)



Cross Section of watercourse crossing type A2 - Traffic Movement over structure (No instream works required)

**Title:**  
**Figure RW 5.17**  
**Watercourse Crossing Type B1 & B2 - UWV**  
**Related Works at Replaced and/or widened**  
**Crossing Structure**

**Note :**  
 Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type B1 (Total 1)**  
 Class 4 - Drain - No Fisheries Value: WW12

**Description of Crossing Type B1**

- Existing crossing structure
- Instream Works
- Cable and Traffic crossing
- Replacement of existing watercourse crossing structure
- 33kV Cables and Ducting installed over or under replaced existing crossing structure

**Watercourse Crossing Type B2 (Total 2)**  
 Class 4 - Drain - No Fisheries Value: WW12  
 WW31

**Description of Crossing Type B2**

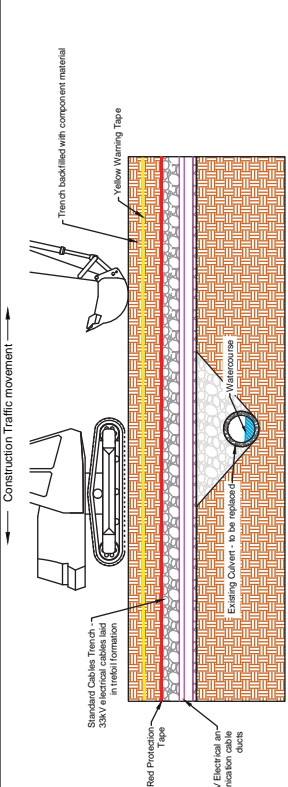
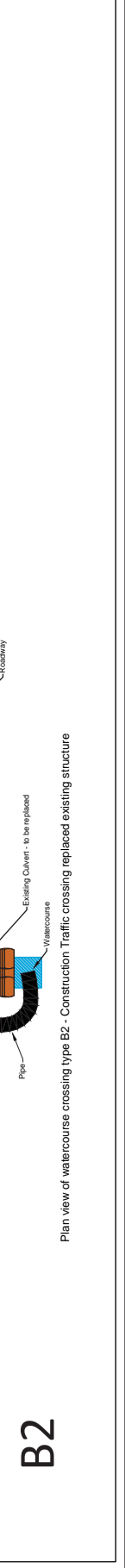
- Existing crossing structure
- Instream Works
- Traffic crossing only
- Replacement of existing watercourse crossing structure
- No Cables or Ducting installed



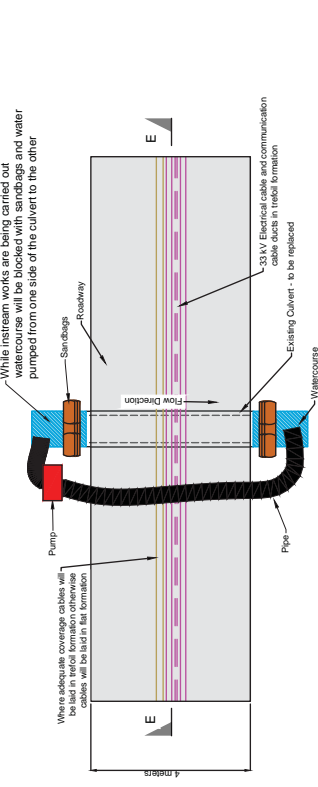
Designed in conjunction with

**Project:**  
**UWF Related Works (RW)**

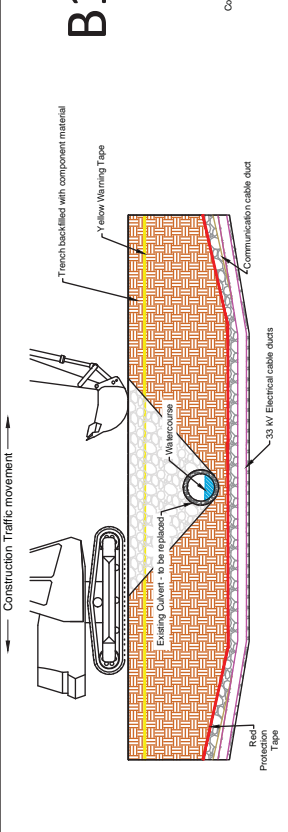
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CB	JB	11-Feb-18	A3



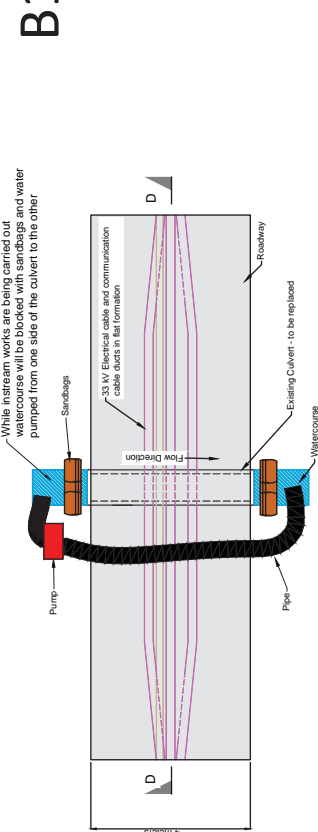
**B1**  
 Cross Section E - E of watercourse crossing type B1 - Cables trench over replaced structure



**B1**  
 Plan View of watercourse crossing type B1 - Cable ducts laid in trefoil formation over replaced structure



**B1**  
 Cross Section D - D of watercourse crossing type B1 - Cables trench under replaced structure



**B1**  
 Plan View of watercourse crossing type B1 - Cable ducts laid in flat formation under replaced structure



**B2**  
 Cross Section F - F of watercourse crossing type B2 - Construction Traffic crossing replaced existing structure



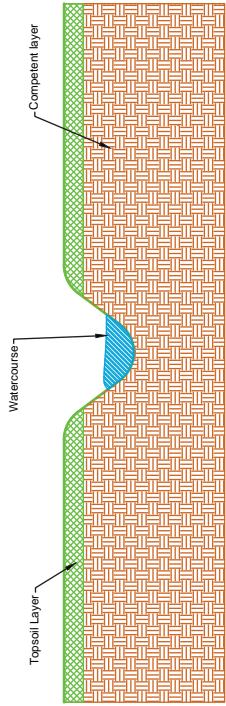
**B2**  
 Plan view of watercourse crossing type B2 - Construction Traffic crossing replaced existing structure

REFERENCE DOCUMENT

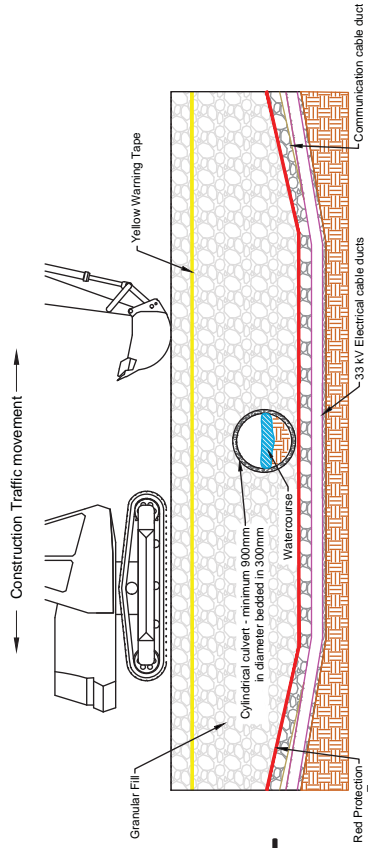
**Note:**  
 The damming and over-pumping method will typically be carried out at watercourses where a permanent crossing structure is being installed or where an existing culvert is being replaced.

All permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be at least 900mm in diameter regardless of the anticipated flood flow. 900mm culverts will be set into the river bed to a depth of 300mm and 1200mm culverts will be set in 500mm.

C1

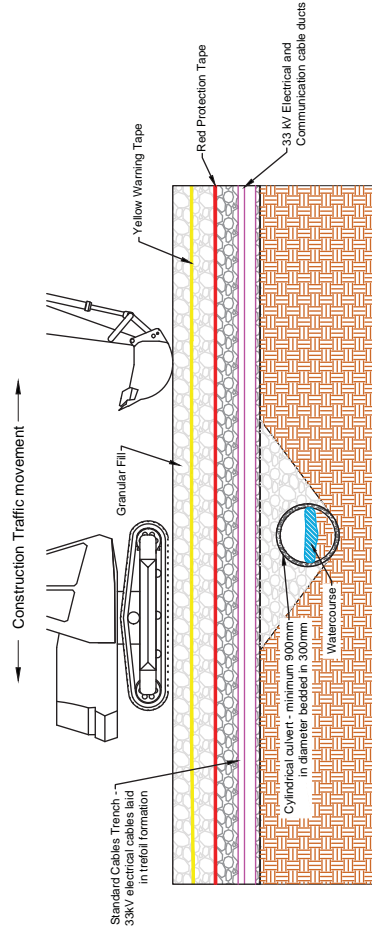


Cross Section View D - D of watercourse crossing C1 - Existing watercourse



Cross Section View of watercourse crossing types C1 - Cables trench under new permanent crossing structure

C1



Cross Section View of watercourse crossing C1 - Cables trench over new permanent crossing structure (Watercourse dammed and over-pumped)

C1

Title:

**Figure RW 5.18**

Watercourse Crossing Type C1 - New Permanent Structure

Note : Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type C1 (Total 5)**

Class 2 - EPA Blue Line Equivalent - Fisheries Value: WW4

Class 4 - Drain - No Fisheries Value: WW1, WW15, WW,24, WW25

**Description of Crossing Type C1**

- No existing crossing structure
- Instream Works
- Cable and Traffic crossing
- Installation of New Permanent watercourse crossing structure
- 33kV Cables and Ducting installed over or under new permanent watercourse crossing structure

REFERENCE DOCUMENT

Designed in conjunction with



Project: **UWF Related Works (RW)**

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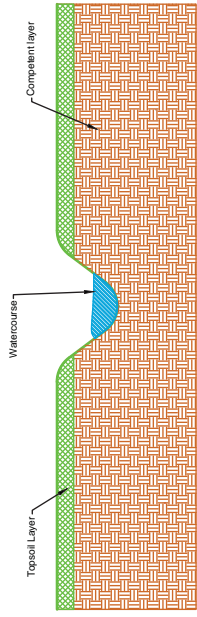
Company  
 Eco Power Limited  
 27/01/2018  
 11-Feb-18  
 A3

**Note:**

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.

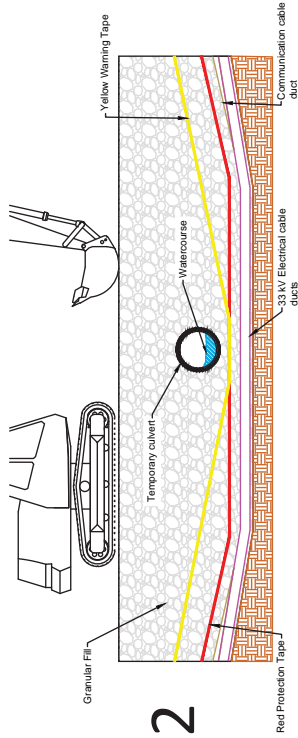
All permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be at least 900mm in diameter regardless of the anticipated flood flow. 900mm culverts will be set into the river bed to a depth of 300mm and 1200mm culverts will be set in 500mm.

C2

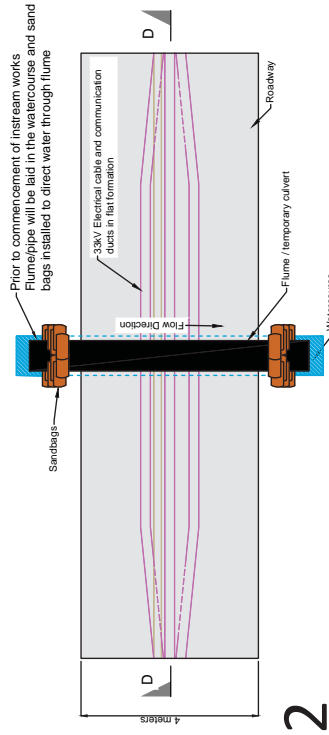


Cross Section View D - D of watercourse crossing C2 - Existing watercourse

Construction Traffic movement →



Cross Section View D - D of watercourse crossing types C2 - Cables trench under new temporary crossing structure



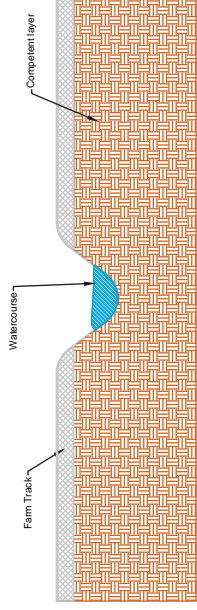
Plan View of watercourse crossing C2 - Cables trench under new temporary crossing structure

(Watercourse dammed and flume installed during instream works)

**Note:**

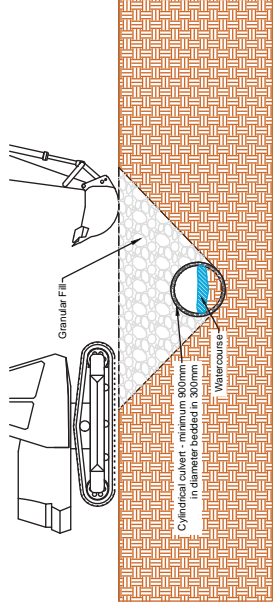
The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.

C4

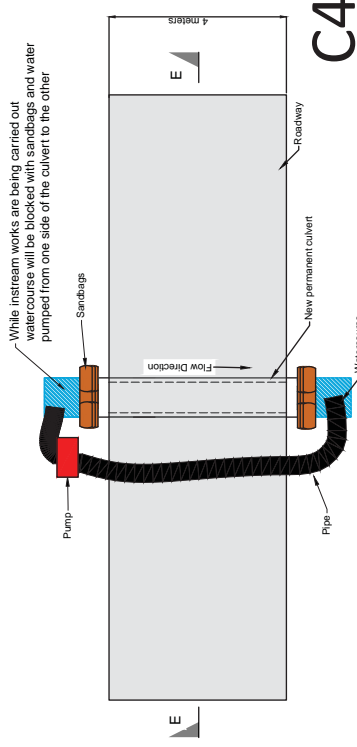


Cross Section View D - D of watercourse crossing W60 - Existing watercourse

Construction Traffic movement →



Cross Section View E - E of watercourse crossing types C4 - Traffic over new permanent crossing structure



Plan of watercourse crossing types C4 - Traffic over new permanent crossing structure

(Watercourse dammed and over pumped during instream works)

**Note:**

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.

All permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be at least 900mm in diameter regardless of the anticipated flood flow. 900mm culverts will be set into the river bed to a depth of 300mm and 1200mm culverts will be set in 500mm

Title:

**Figure RW 5.19**

Watercourse Crossing Type C2 - New Temporary Structure & Watercourse Crossing Type C4 - New Permanent Structure

Note :

Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type C2 (Total 5)**

Class 2 - EPA Blue Line Equivalent - Fisheries Value: WW7

Class 4 - Drain - No Fisheries Value: WW5, WW8, WW16, WW27

**Description of Crossing Type C2**

- No existing crossing structure
- Instream Works
- Cable and Traffic crossing
- Installation of New Temporary watercourse crossing structure
- 33kV Cables and Ducting installed under new temporary watercourse crossing structure

**Watercourse Crossing Type C4 (Total 3)**

Class 2 - EPA Blue Line Equivalent - Fisheries Value: WW22

Class 3 - Sub-Optimal - Low Fisheries Value: WW14

Class 4 - Drain - No Fisheries Value: WW13

**Description of Crossing Type C4**

- No existing crossing structure
- Instream Works
- Traffic crossing only
- Installation of New Permanent watercourse crossing structure
- No Cables or Ducting installed

Designed in conjunction with



Project:

**UWF Related Works (RW)**

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CB

Created by:

JB

Date:

11-Feb-18

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A3



Circle Pipe  
Engineering Limited  
Aria House, Pentlands 33A Business Park  
Dunfermline, Fife, KY11 1YB  
Leith - 016 7594 861 (Ext 261)  
Mobile - 075 999 5433 (Ext 1)

**ECOPOWER**

**Title:**  
**Figure RW 5.20**

Watercourse Crossing Type C3 - Internal  
Windfarm Cable trench and ducting only

**Note :**  
Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type C3 (Total 9)**

Class 1 - EPA Blue Line - Fisheries Value: WW19

Class 2 - EPA Blue Line Equivalent - Fisheries Value: WW28

Class 3 - Sub-Optimal - Low Fisheries Value: WW18

Class 4 - Drain - No Fisheries Value: WW3, WW9, WW10, WW17, WW20, WW26

**Description of Crossing Type C3**

- No existing crossing structure
- Instream Works
- Cable crossing only
- No watercourse crossing structure required
- 33kV Cables and Ducting installed under watercourse



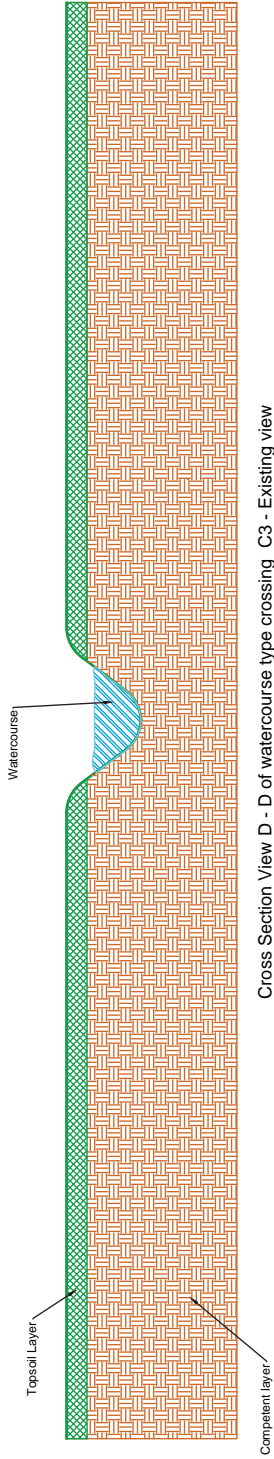
Designed in conjunction with

**Project:**  
**UWF Related Works (RW)**

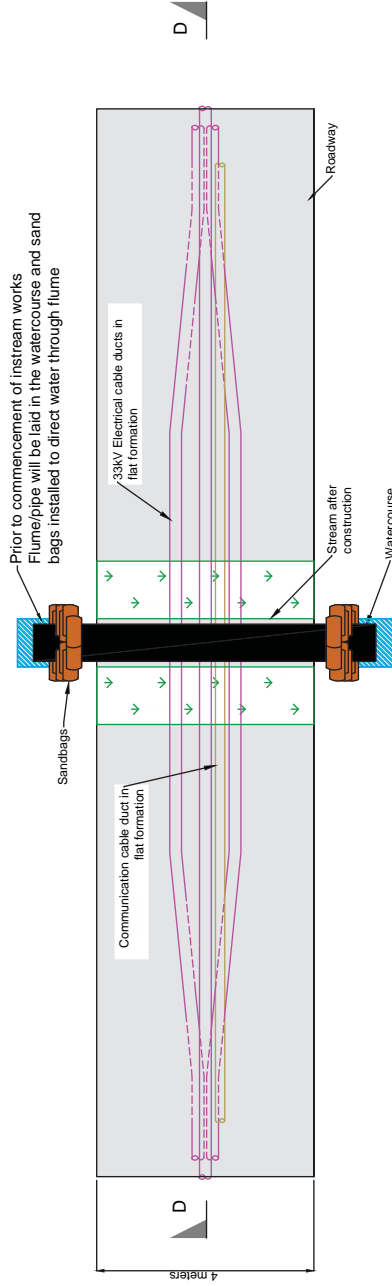
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**ECOPOWER**  
 Coastal Protection  
 Environmental Limited  
 2700 Hume, Porepunkah 5233, Mountaineer Park  
 Dallas Road, Kilsnoy - 5102 WY90  
 Leederville - 406-7704-846 (Cell 264)  
 Mobile - +351 999-5431498

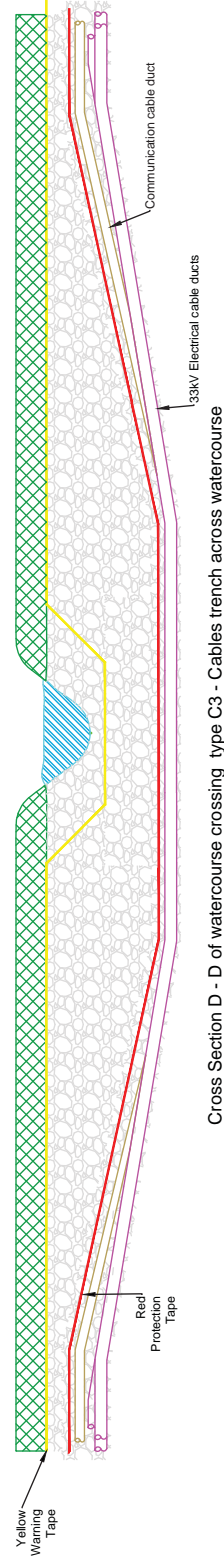


Cross Section View D - D of watercourse type crossing C3 - Existing view



Plan View of watercourse crossing type C3 - Cables trench across watercourse

(Watercourse dammed and over-pumped)



Cross Section D - D of watercourse crossing type C3 - Cables trench across watercourse

**Note:**

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.

The flume/pipe watercourse crossing method will also be used or 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.

Title:  
**Figure RW 5.21**

Watercourse Crossing Type E - Plan and  
Cross Section Views of Bailey Bridge

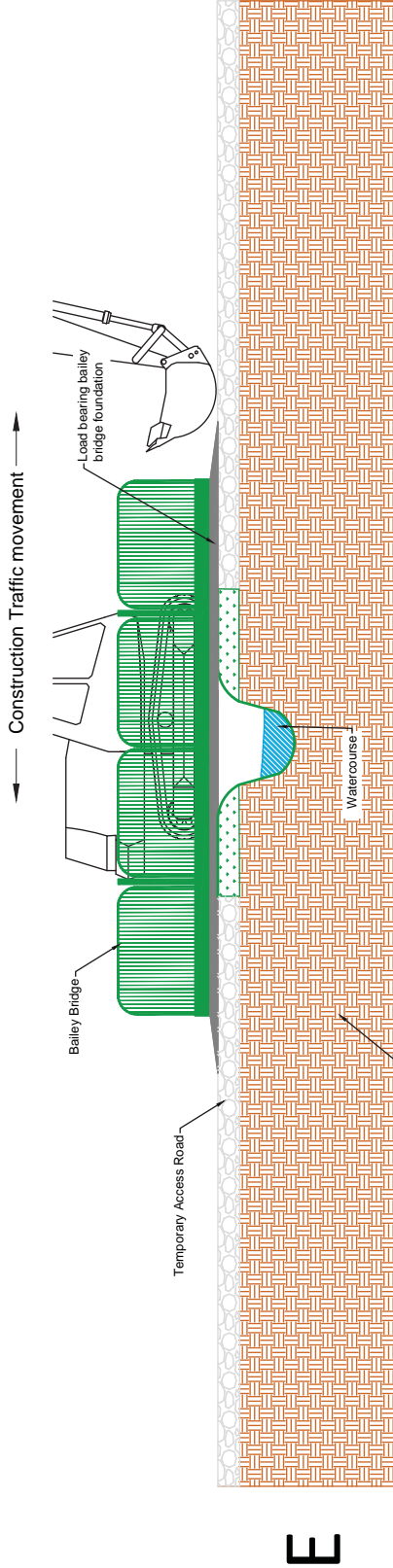
Note :  
Drawings not to scale. For illustration  
purposes only

**Watercourse Crossing Type E**

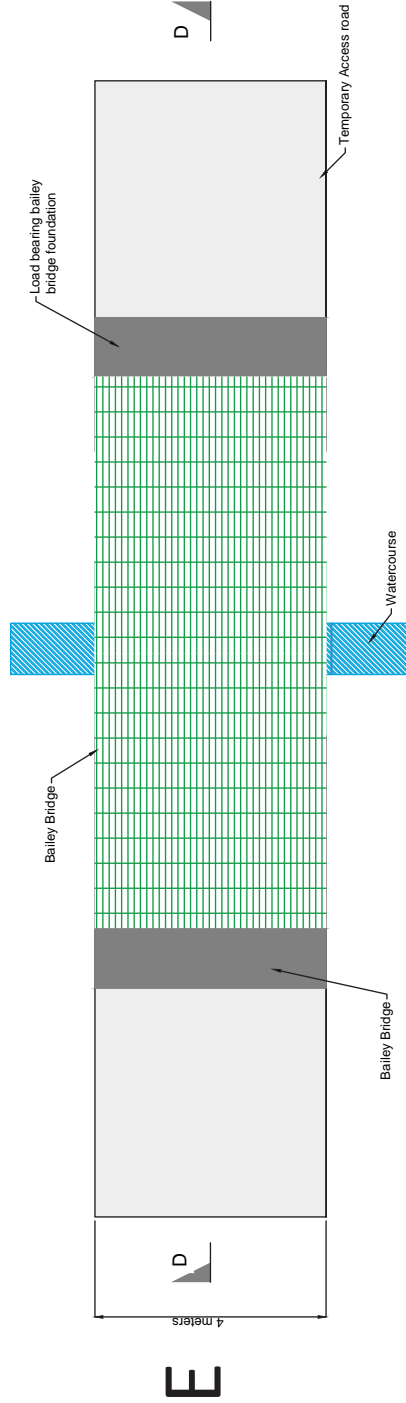
Used at C type water crossings where  
required

**Description of Crossing Type E**

- No existing crossing structure
- No instream Works
- Traffic crossing only
- No Cables or Ducting installed



Cross Section View D - D of watercourse crossing type E  
Bailey Bridge - (No Instream Works)



Plan View of watercourse crossing type E  
Bailey Bridge - (No Instream Works)

Project:  
**UWF Related Works (RW)**

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Company Name:  
Eco Power Limited  
Zoo House, Penrith Road, BSA Business Park  
Dunfermline, Fife, KY11 1YU  
London: +44 (0)20 7294 8400 (Ext. 264)  
Mobile: +353 (0)87 54031458

Title:

**Figure RW 5.22**

Watercourse Crossing Type F - New permanent clear-span bridge

Map Number:

N/A

Note :

Drawings not to scale. For illustration purposes only

**Watercourse Crossing Type F (Total 1)**

Class 2 - EPA Blue Line Equivalent - Fisheries Value: WW2

**Description of Crossing Type F**

- No existing crossing structure
- No Instream Works
- Internal Windfarm Cabling installed over watercourse using the consented UWF Clear span bridge
- Cable and Traffic crossing

Project:

**UWF Related Works (RW)**

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CB

Checked by:

JB

Date:

11-Feb-18

Sheet Size:

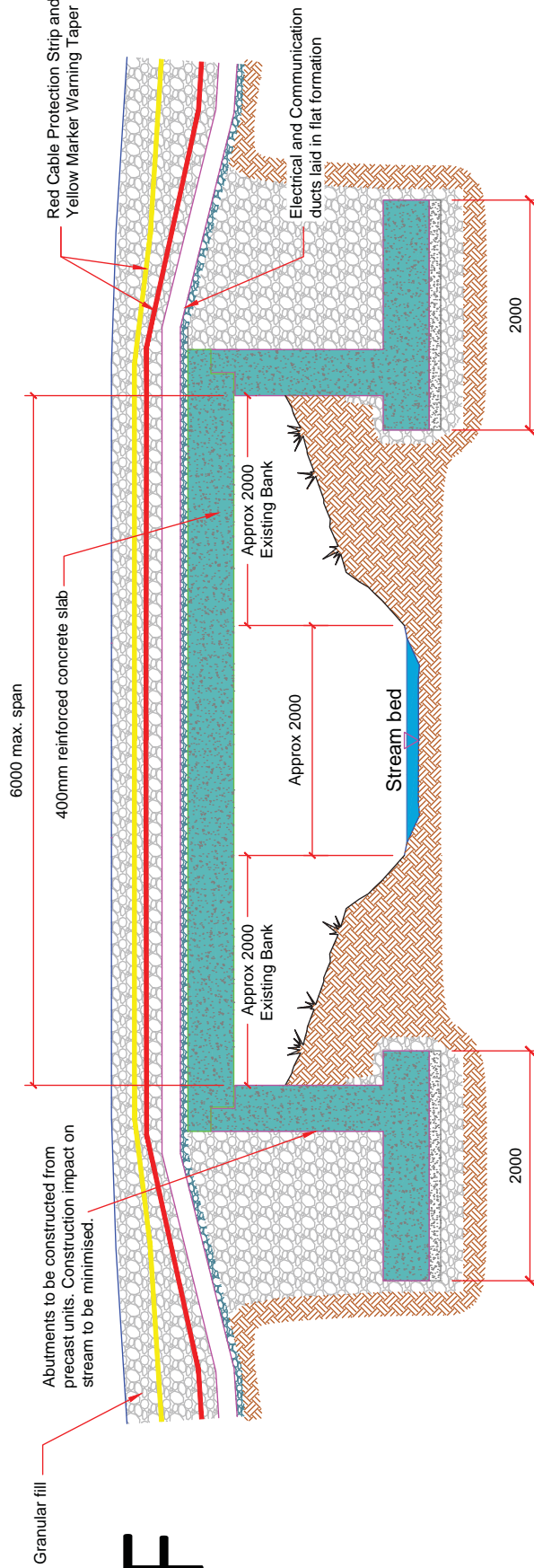
A3



**ECOPOWER**

Note:  
Slab to be designed to withstand all vehicular traffic loading.

**Permanent Crossing structure - Clear span bridge**



**F**



**Figure RW 5.23**  
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

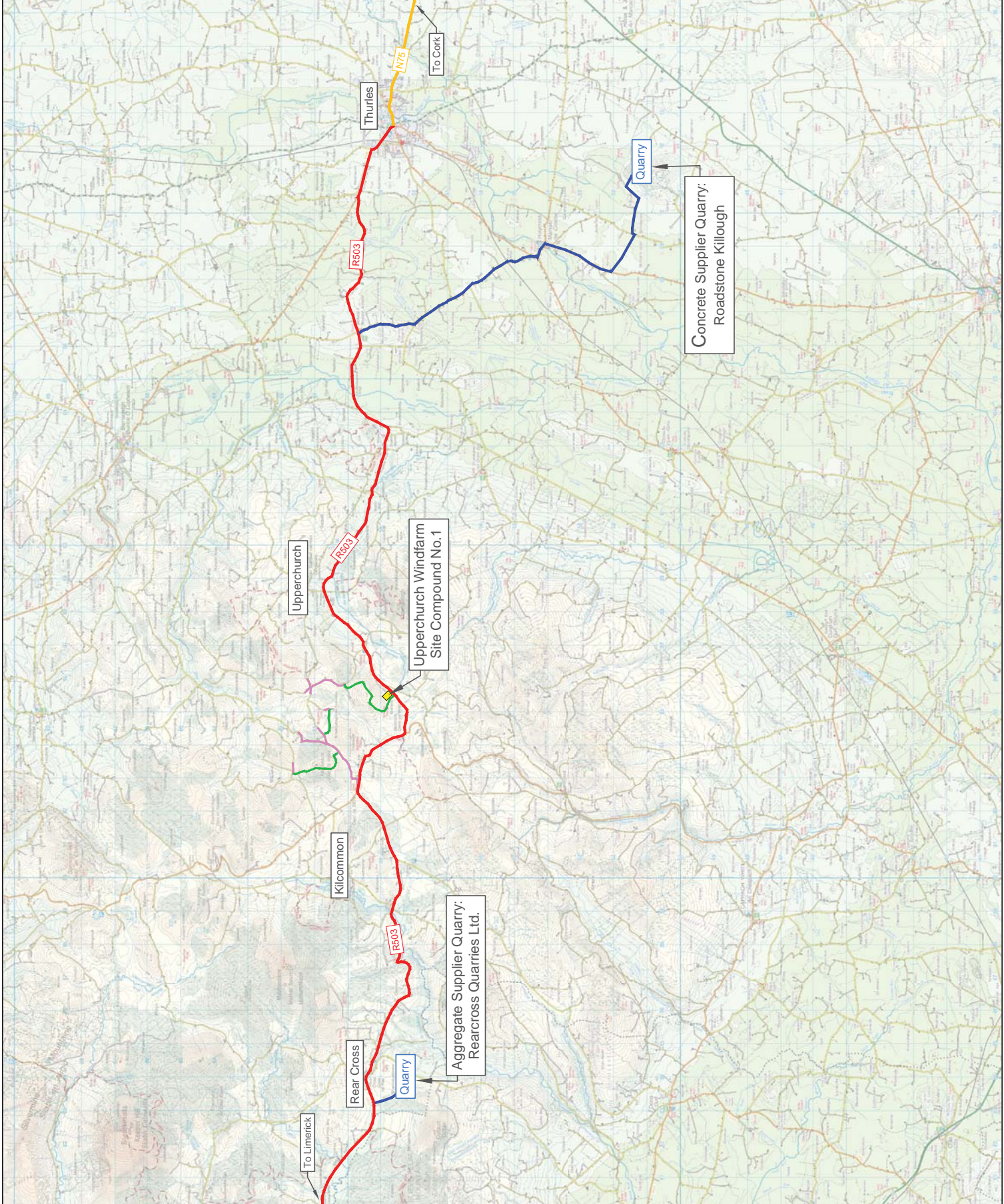


Project:  
UWF Related Works (RW)

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Asifia Butler  
Ecopower Developments Ltd  
Zeeac House,  
Purcellinch Business Park, Kilkenny  
TEL: +353 56 7750140  
MOB: +353 81 8805644



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

Map Number:  
Map 1 of 1

Legend:

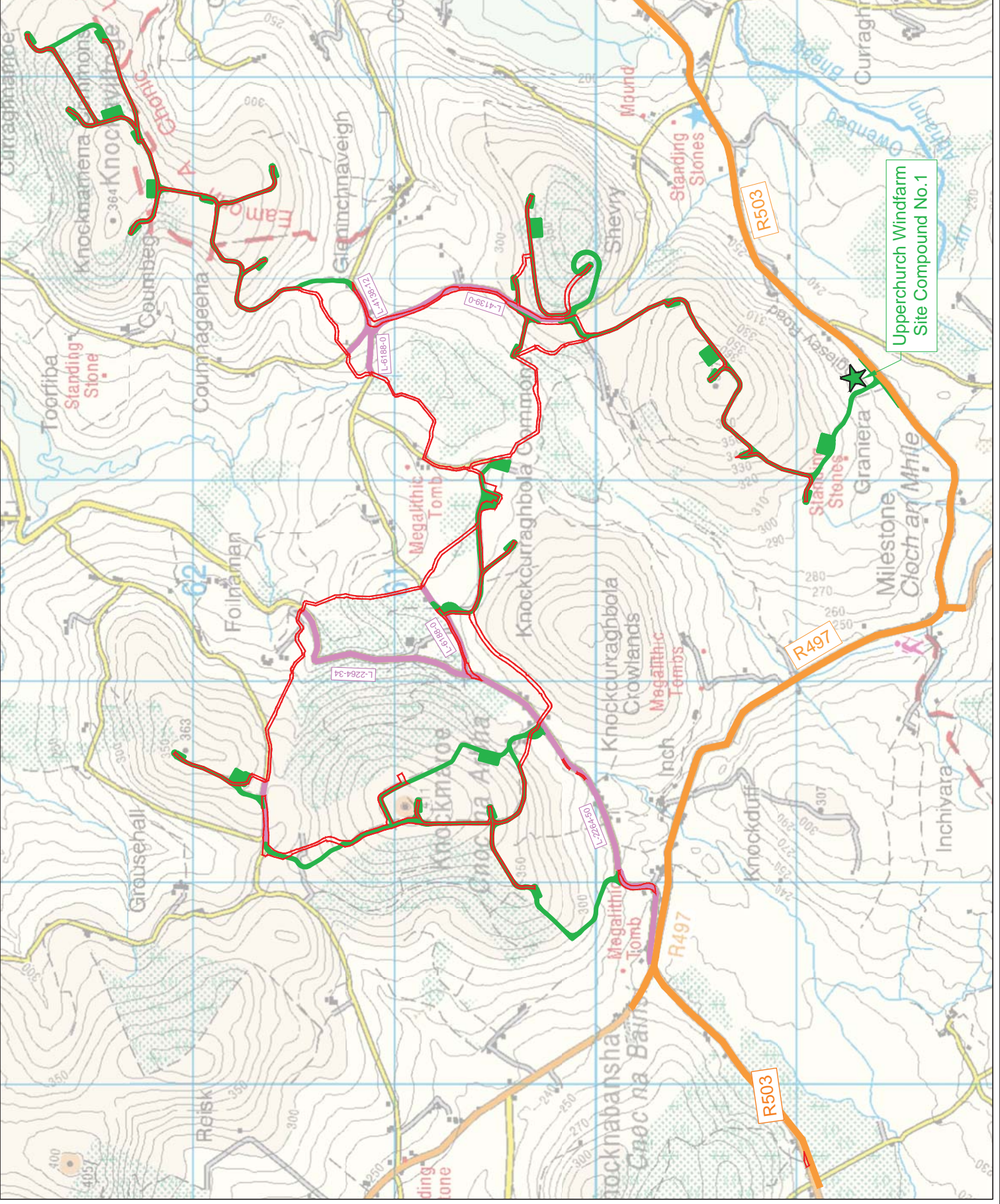
-  UWF Related Works Construction Works Area
-  Haul Route along local roads from the R503 or the Upperchurch Windfarm Site Compound No.1 to the UWF Related Works Areas
-  Consented UWF Roads
-  Upperchurch Windfarm Site Compound No.1
-  Regional Road
-  Public Road Number



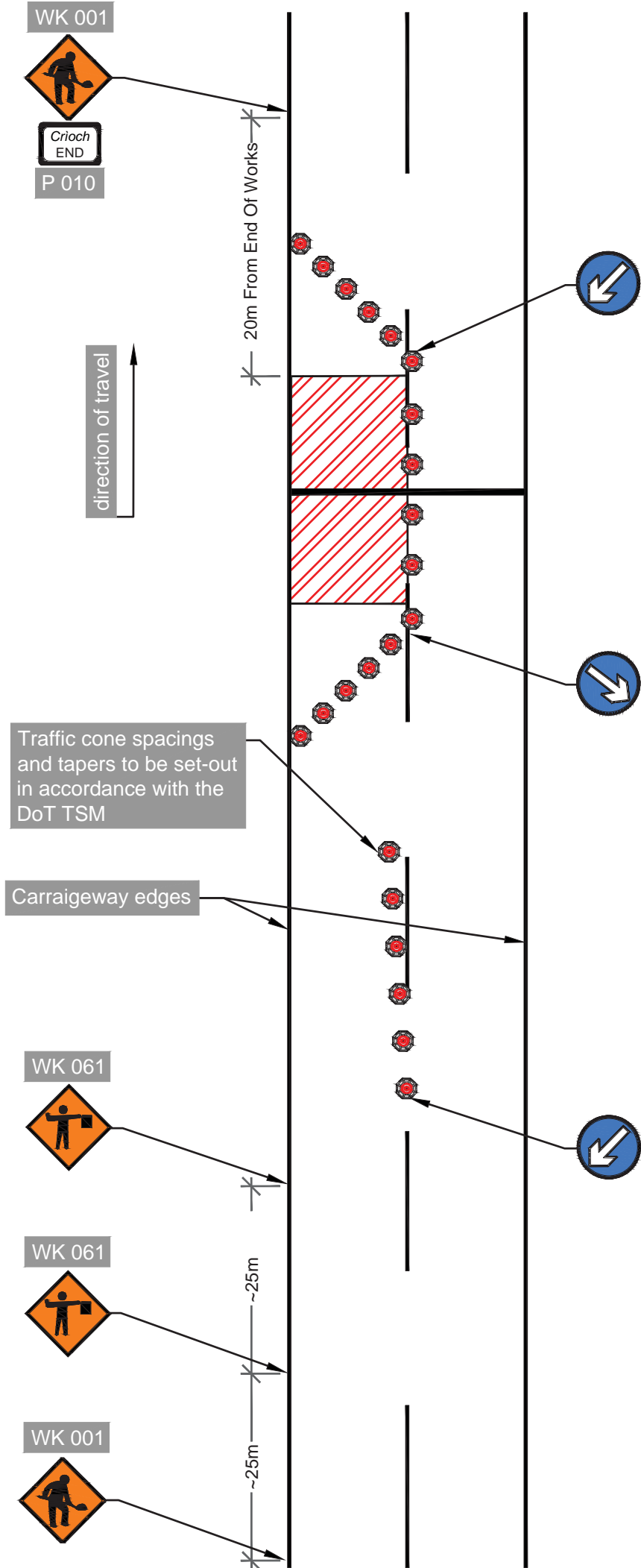
Project:  
UWF Related Works (RW)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	January 19	A3

Asif Bhatti  
Ecopower Developments Ltd  
Zeeo House,  
Purcellinch Business Park, Kilkenny  
TEL: +353 56 7750140  
MOB: +353 83 8805644

Upperchurch Windfarm  
Site Compound No.1



Title:  
Figure RW 5.25

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:
AB	JB	19-Feb-18	A3



Title:  
Figure RW 5.26

Operational Stage Land Use Change

Map Number:  
Map 1 of 1

Legend:

- Agricultural Lands to New Permanent Road
- Forestry to Permanent Road
- Forestry to Forestry Firebreak



Project:  
LWFF Related Works (RW)

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Aedín Butler  
 Ecology  
 Zeeac House  
 Poreillich Business Park, Kilkenny  
 TEL: +353 56 7750140  
 MOB: +353 83 8805644

**ECOPOWER**

Title:  
**Figure RW 5.27**  
**Cross Section of Hedgerow Removal and Reinstatement**

Map Number:  
N/A

Note :  
Drawings not to scale. For illustration purposes only

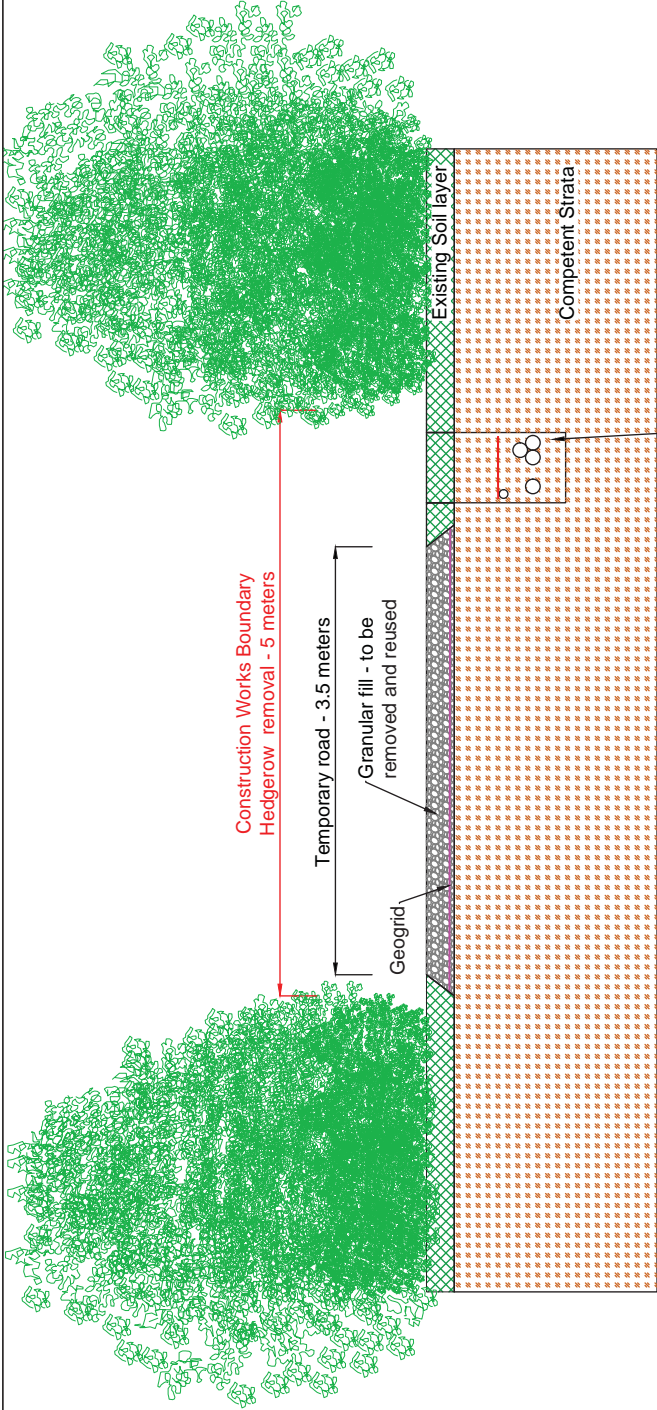
Designed in conjunction with



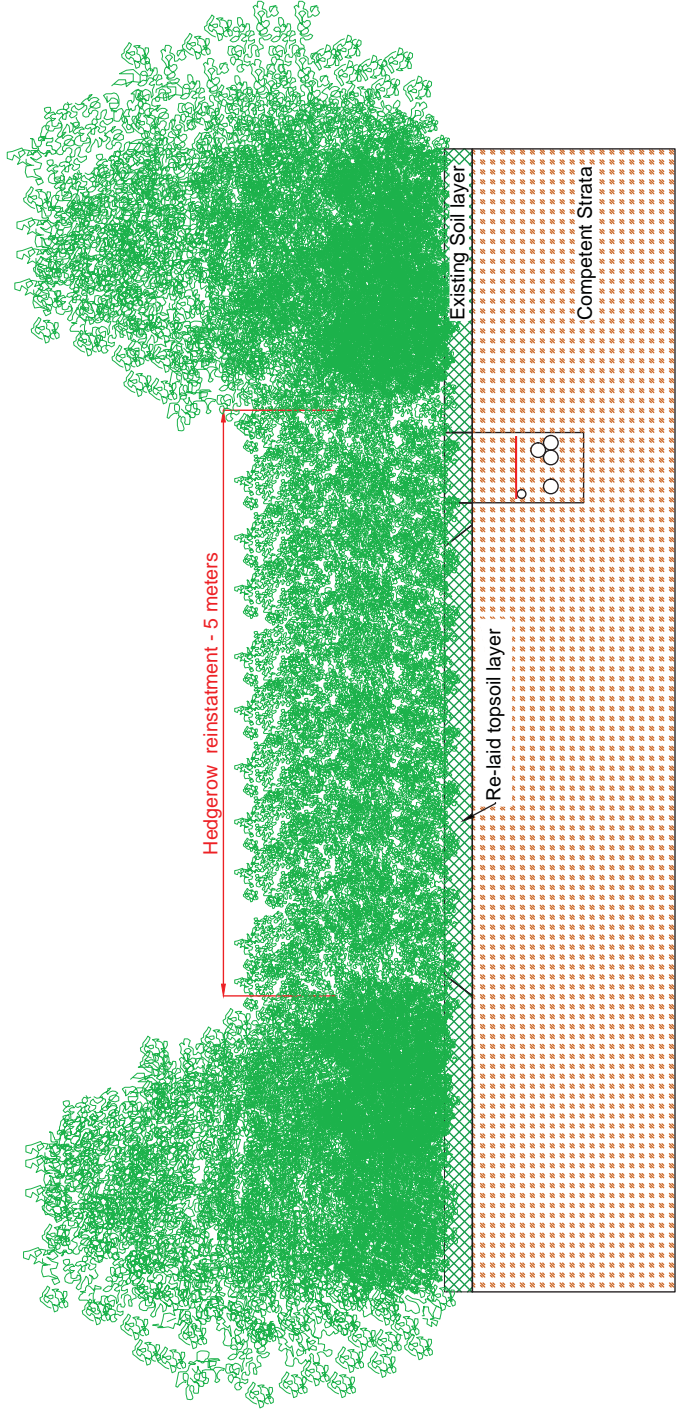
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**UWF Related Works (RW)**

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Cross Section of Hedgerow Removal and temporary access road - Construction Phase



Cross Section of Hedgerow Reinstatement and temporary access road - Post Construction

# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A5: Project Information**

### **Compiled Description of the consented Upperchurch Windfarm**



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## Appendix to Chapter 5: Description of Development (UWF Related Works)

### Appendix 5.5: Compiled Description of Upperchurch Windfarm

The data and descriptions in this appendix have informed Chapter 5: Description of Development (UWF Related Works) of the EIA Report. The information presented in this Appendix 5.5 is outlined below and the relevant element(s) of the Whole UWF Project are also identified.

Appendix	Title	Relevant EIAR
A.5.5	Compiled Description of Upperchurch Windfarm	Upperchurch Windfarm





## Appendix to Chapter 5: Description of Development

### Appendix 5.5: Compiled Description of Upperchurch Windfarm

#### A5.5 - 5.1 Introduction to Appendix 5.5

An application for planning permission for Upperchurch Windfarm (UWF) was made to Tipperary County Council in January 2013. The windfarm was permitted by Tipperary County Council in January 2014 and the permission was upheld by An Bord Pleanála in August 2014. The application was accompanied by an EIA Report (known as EIS at the time) and Natura Impact Statement. The full planning documents for consented UWF can be found in **Volume F: Whole UWF Project Reference Documents**.

This Compiled Description of Upperchurch Windfarm, has been compiled from information in the original 2013 UWF EIS, in the 2013 Reply to Further Information, in the additional information submitted during the planning process and planning conditions attaching to the Grant of Permission, in order to present a description of the development, in the final form, as has been granted permission. This compilation chapter has been prepared in the same format as the Description of the Development chapters (Main EIA Report Chapter 5's) for the UWF Grid Connection, the UWF Related Works and the UWF Replacement Forestry in particular Sections 5.2, 5.3, 5.4 and 5.5. For ease of cross referencing the number system used here is also the same, i.e. A5.5-5.2, A5.5-5.3 etc. Figures and drawings are included at the end of this compilation document, and are as submitted as part of the consented Upperchurch Windfarm Planning Application.

The data and descriptions in this appendix have informed the environmental factor evaluations in the EIAR Main Report, in relation to the evaluation of cumulative effects of the subject development together with the other elements of the Whole UWF Project and with other existing or consented projects or activities.

Upperchurch Windfarm (UWF) is described in this compilation chapter, in the following order:

Appendix Sections	5.5 Section Heading	Relevant Individual Project Element
A5.5-5.2	Characteristics of Upperchurch Windfarm (UWF)	Upperchurch Windfarm
A5.5-5.3	Life Cycle Stages of the UWF The durations and timing, main activities, personnel and material requirements for both the construction and operation stages. Any changes to the Project, such as decommissioning.	
A5.5-5.4	The use of natural resources, emissions and production of wastes for each stage.	
A5.5-5.5	The vulnerability of the Project to major accidents and natural disasters.	
A5.5-5.6	Figures and Mapping	

#### **List of Figures for Appendix 5.5**

Figure UWF-1: Location of Upperchurch Windfarm

Figure UWF 2: Wind Turbine Elevation

Figure UWF 3: Electrical Substation Compound Elevation View

Figure UWF 4: Proposed Internal Roads Details

Figure UWF 5: Site Entrance No. 1 (Graniera, R503)

Figure UWF 6: Turbine Component Haul Route

## **A5.5 - 5.2 Characteristics of Upperchurch Windfarm**

Upperchurch Windfarm (UWF) will comprise 22 No. wind turbines, 2 No. meteorological masts, 22 No. turbine foundation and crane hardstanding areas, site roads and an electrical substation.

### **A5.5 - 5.2.1 Purpose of Upperchurch Windfarm (UWF)**

These 22 No. wind turbines will produce 150 million kWh of green electricity, capable of supplying 23,000 houses in the region. The production of 150million kW/h per annum of green electricity will avoid the emission of 128,118 tonnes of greenhouse gases per annum which would have resulted from generating the same amount of electricity by fossil fuel plant. Unlike conventional power sources, the creation of electricity from the wind does not pollute the physical environment; it creates no contribution to climate change or acid rain and emits no radiation or nuclear waste.

### **A5.5 - 5.2.2 Location and overview description of UWF**

The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary.

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

#### **Relevant Figures (contained at the end of this Appendix 5.5)**

**Figure UWF-1: Location of Upperchurch Windfarm**

**A5.5 - 5.2.3 Characteristics of UWF**

Upperchurch Windfarm comprises:

- Consented UWF Turbines
- Consented UWF Substation
- Consented UWF Roads
- UWF Ancillary Works

**Note:** “Consented” prefixes each part of the already consented Upperchurch Windfarm in order to clearly identify the already consented elements of the whole windfarm project, throughout the project documents.

**A5.5 -5.2.3.1 Consented UWF Turbines**

Planning Permission has been received to develop 22 No. wind turbines of the three-bladed, tubular tower model, light grey in colour not exceeding an overall height of 126.6 metres and a hub height of 81.6 metres. The turbines will be constructed on concrete bases, 225m<sup>2</sup> in plan, with an adjacent concrete hardstand of 1040m<sup>2</sup> in plan area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to the Consented UWF Substation.

**Relevant Figures (contained at the end of this Appendix 5.5)**

Figure UWF 2: Wind Turbine Elevation

**A5.5 -5.2.3.2 Consented UWF Substation**

Planning Permission has been received to build an electrical substation at the windfarm, comprising an 110kV substation compound which includes a control building, main transformer and an end–mast enclosed in a compound by a palisade fence. The substation will measure 64m x 41m and will be 2624m<sup>2</sup> in plan area.

**Relevant Figures (contained at the end of this Appendix 5.5)**

Figure UWF 3: Electrical Substation Compound Elevation View

**A5.5 -5.2.3.3 Consented UWF Roads**

Planning Permission has been received to build 11.6km of windfarm access roads, comprising 8km of newly built, 5m wide roads and 3.6km of existing farm roads which will require upgrading and widening (average by 2m widening).

**Relevant Figures (contained at the end of this Appendix 5.5)**

Figure UWF 4: Proposed Internal Roads Details

**A5.5 -5.2.3.4 Consented UWF Ancillary Works****A5.5 -5.2.3.4.1 Meteorological Masts**

Planning Permission has been received to erect two meteorological masts with wind measuring equipment attached, not exceeding a height of 80 metres. One mast is permitted in Grousehall and the second in Knocknamena townlands.

**A5.5 -5.2.3.4.2 UWF Site Entrances**

Planning Permission has been received to develop 1 No. site entrance from the R503 Regional Road at Graniera, which is the main site entrance (No.1) and; 10 No. site entrances from Local Roads, through and around the site, which will provide access to the Consented UWF Roads and thereon to the wind turbines and substation.

Site Entrance No.1 at Graniera is an existing field gate on Regional Road R503. This entrance will be widened to satisfy the sightline requirements as set out in Table 10.1 of the North Tipperary County Development Plan 2010 (as amended).

During the operation phase, the other entrances from the Local Roads throughout the site will be used for operation and maintenance traffic, which will mainly be four wheel drive vehicles and vans. Site Entrance No.1 will be closed, except in the very occasional event of a replacement of a major component or for decommissioning the windfarm.

**Relevant Figures (contained at the end of this Appendix 5.5)****Figure UWF 5: Site Entrance No. 1 (Graniera, R503)****A5.5 -5.2.3.4.3 Watercourse Crossing**

The Upperchurch Windfarm site drains into streams that form the upper reaches of the Turraheen, Owenbeg, Clodiagh and Aughvana Rivers. One stream crossing will be required on the UWF site, to the north of Turbine No.4. Planning Permission has been received to construct a new permanent clear span bridge or bottomless culvert at this crossing point.

**A5.5 -5.2.3.4.4 Drainage System**

The Sediment and Erosion Plan, detailed in Appendix 15-I of the 2013 EIS, described the drainage measures which will be implemented during construction of UWF. The drainage plan will control erosion, minimise disturbance to the current hydrological regime and minimise suspended sediment loading to watercourses during construction.

Access tracks will be provided with drainage ditches to collect surface water runoff from the tracks and to ensure that road foundations are protected from standing water. Surface water drains will also be provided around hardstandings, foundations and the compound. Upslope drains will be constructed so as to keep clean water separate from runoff that may be contaminated by sediment. This is standard practice in the control of sediments in windfarm construction. Sediment traps will be used to ensure that all water discharged is clean.

**A5.5 -5.2.3.4.5 UWF Site Compounds**

Permission has been received to develop 2 No. site compounds, to be used during the construction phase of UWF. The location of these two site compounds is identified on **Figure UWF 1**.

Site Compound No. 1, will be the main site compound and is proposed for 170m inside of Site Entrance No. 1 (at Graniera). All construction and deliveries vehicles will access the site at Site Entrance No. 1. All vehicles will be fully clear of the public road before stopping at the compound. The compound will comprise sign-in hut; main site offices; parts storage area; employee/visitor parking; induction office; canteen (including self-contained fresh water tank and waste water tank); drying room; toilet cabin unit (including self-contained effluent tank and water storage tank); wheel wash area with siltation pond for wheel wash wastewater; concrete wash in a designated bunded and impermeable truck wash area with siltation pond for settling out of solids; and a bunded fuel storage area. Following construction, Site Compound No.1 and associated facilities will be removed and the area will be appropriately reinstated.

**Appendix 5.5: Compiled Description of Upperchurch Windfarm**

Site Compound No. 2 is proposed for an area around an unoccupied house, yard and outhouses, belonging to one of the windfarm landowners, in the centre of the site and 155m east of the windfarm sub-station compound. It is intended as a convenience area in the centre of the site. This smaller compound will comprise car parking and parts storage sheds. The unoccupied house will be converted to an office space, canteen and toilet facility for the windfarm construction personnel. This house already has water (ground water from a well) and sanitary facilities (septic tank).

**A5.5 -5.2.3.4.6 UWF Site Office**

Following construction, Site Compound No. 2 will be retained for use by the maintenance personnel for the operational phase of the Upperchurch Windfarm.

**A5.5 -5.2.3.4.7 Borrow Pits**

There are six borrow pits identified on the Upperchurch Windfarm site which will be used to quarry stone for the construction. Post construction, borrow pits will be backfilled and covered with topsoil and reseeded. The finished levels will follow the natural contours of the ground to prevent ponding and maintain the natural surface water flow. Depressions will be avoided to ensure surface water ponding does not occur.

**A5.5 -5.2.3.4.8 Forestry Felling**

Prior to construction, clear-felling of 4.4 hectares of conifer plantation will be required to facilitate the construction the proposed windfarm and associated infrastructure.

**A5.5 -5.2.3.4.9 Hedgerow Removal**

Approximately 980m of hedgerow along field boundaries will be removed as part of the construction of Upperchurch Windfarm infrastructure. 360m relates to suitable bat foraging habitat. To mitigate this loss of habitat, an equivalent amount of new hedgerow will be planted.

**A5.5 -5.2.3.4.10 Fencing**

The Consented UWF Substation will be fenced according to ESB regulation. There is no requirement for fencing of turbine areas as access can only be gained to the towers through a steel door which is locked at all times. There will be some agricultural fencing erected on the UWF site where required by the landowners and any existing fencing along farm boundaries will be restored.

During construction, buffer zones will be fenced off to protect environmental features, such as Recorded Monuments and watercourses. Sediment ponds will also require perimeter fencing and signage to ensure that there are no health and safety risks.

**A5.5 -5.2.3.4.11 Storage of Excavated Material**

Approximately 28,000m<sup>3</sup> of topsoil and peat will be excavated as part of the construction of UWF.

Temporary engineered deposition areas will be designated and designed to hold temporary stockpiles which will be located away from drains and watercourses. Soil will be formed into bunds along the access roads and around the crane hardstand areas. These bunds will be constructed to a maximum height of 1.0m with a width at base of 3.0m and side slopes of 2:1. Bunds and stockpiles at risk of erosion, will be protected by silt trapping apparatus such as a geo-textile silt fences to prevent contaminated runoff.

**A5.5 - 5.2.4 Environmental Project Measures which are part of the Consented UWF**

The consented Upperchurch Windfarm includes a number of mitigation and management measures which will prevent likely significant effects occur to the receiving environment. These measures will be implemented through two separate Environmental Management Plans for the UWF; one for the construction stage and one for the early operational stage. A copy of these Plans was submitted with the 2013 RFI documents.

The Construction Environmental Management Plan will include:

- Surface Water Management Plan
- Ecological Management Plan
- Waste Management Plan
- Traffic Management Plan
- Construction Phase Environmental Monitoring Schedule
- Environmental Management Procedures (EMP) for:
  - Site Environmental Training and Awareness Procedure
  - Environmental Emergency Response Plan
  - Wheel Wash and Dewatering Procedure
  - Concrete Control Procedure
  - Fuel and Oil Management Plan
  - Surface Water management Plan
  - Traffic Management Plan
  - Protection of Archaeological and Cultural Heritage
  - Management of Excavation and Spoil
  - Management of Borrow Pits
  - Waste Management Plan
  - Air, Dust and Noise Management Plan
  - Site Reinstatement Procedure (post construction)
  - Monitoring and Auditing Procedure
  - Environmental Accidents, Incidents and Corrective Actions Procedure
  - Environmental Complaints Procedure
  - Environmental Monitoring Committee Procedure

The Early Operational Phase Environmental Management Plan will include:

- Ecological Management (Post Construction)
- Operation Phase Environmental Monitoring Schedule
- Environmental Management Procedures (EMP) for:
  - UWF-EMP-OP-1: Monitoring and Auditing Procedure
  - UWF-EMP-OP-2: Site Reinstatement Procedure (post construction)
  - UWF-EMP-OP-3: Procedure for Ecological Management (Post Construction)

The following planning conditions, which formed part of the 2014 Grant of Permission will be included, as relevant, in the Environmental Management Plans:

- Condition-1: The development shall be carried out and completed in accordance with the plans and particulars lodged with the application.
- Condition-2: All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation shall be implemented in full.
- Condition-6: Prior to commencement of construction, details of the phasing of the construction works shall be agreed with the National Parks and Wildlife Service.
- Condition-10: The construction works shall be carried out in accordance with construction details submitted to the planning authority, including the Construction Management Plan.
- Condition-11: Wind Turbine noise arising from the development shall not exceed stated levels.
- Condition-12: Wind Turbine shadow flicker arising from the development shall not exceed stated levels.
- Condition-13: In the event that the development causes interference with telecommunications signals, effective measures shall be introduced to minimise interference.
- Condition-15: The management of drainage and surface water during the construction stage shall be in accordance with the details submitted in the Construction Management Plan, the Ecological Management Plan and the Environmental Management Plan. Furthermore revised drawings shall be submitted to the planning authority prior to commencement showing compliance with condition 15 regarding fuel storage, designated refuelling areas, wheel wash areas and concrete wash areas.
- Condition-16: There shall be no new provision for discharge of foul effluent on site without a prior grant of planning permission.
- Condition-17: Prior to construction between mid-March and mid-August, a survey for breeding hen harriers shall be carried out. Taking account of the results of this survey, no construction works shall be carried out within the above period within 500m of a pre nesting breeding site, except with the written approval of the National Parks and Wildlife Service.
- Condition-18: The Ecological Management Plan submitted shall be implemented in full. A timescale of enhancement of foraging areas, rush management, hedgerows enclosures and trees and land management shall be agreed with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement. A programme of ongoing surveys and monitoring in years 2 and 3 after commencement of the operation of the turbines shall be submitted and agreed in writing with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement.
- Condition-19: Details as outlined in the Ecological Management Plan shall be implemented. A timescale for implementation shall be submitted and agreed in writing with the planning authority following consultation with the National Parks and Wildlife Service prior to commencement.
- Condition-20: The developer shall facilitate the archaeological appraisal of the site and shall provide for the preservation, recording and protection of archaeological materials or features. This will allow for an onsite archaeologist, in consultation with the National Monuments Service and the National Museum of Ireland, to monitor groundworks and stop works in the event of any archaeological features or objects being uncovered during excavation works, and will ensure that any features or objects uncovered will be correctly recorded and/or preserved, in consultation with the National Monuments Service and the National Museum of Ireland.



**Appendix 5.5: Compiled Description of Upperchurch Windfarm**

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- Condition-21: Mitigations measures submitted for the protection of water quality shall be implemented in full and according to best practice guidelines. The works shall be supervised as set out in the Construction Management Plan. In the event of a water pollution incident or damage the relevant authorities shall be immediately notified and works cease until authorized to continue. A programme of hydrographic monitoring shall be carried out over a period commencing pre-construction and concluding in year 3 of the operational phase of the development.
- Condition-23: The developer shall lodge a cash deposit/bond to secure the reinstatement of public roads that may be damaged by the transport of materials to the site.

## A5.5 - 5.3 Life Cycle Stages of Upperchurch Windfarm

### A5.5 - 5.3.1 Construction Stage of Upperchurch Windfarm

#### A5.5 -5.3.1.1 Duration & Timing

The construction timetable is detailed in Table 1 below;

**Table 1: Duration and timing of the construction of the Upperchurch Windfarm**

Activities	Duration	Timing of Activities
<ul style="list-style-type: none"> <li>● Civil works</li> <li>● Delivery and erection of wind turbines</li> <li>● Electrical works</li> <li>● Commissioning of the electrical works.</li> </ul>	6 months	Projected Start Date: 2018/2019
<ul style="list-style-type: none"> <li>● Electrical Works               <ol style="list-style-type: none"> <li>1. (carried out in conjunction with the civil works)</li> </ol> </li> </ul>	4 months	
<ul style="list-style-type: none"> <li>● Turbine Erection and commissioning               <ol style="list-style-type: none"> <li>2. (turbines are normally installed when the majority of the civil works are completed)</li> </ol> </li> </ul>	16 weeks	

#### A5.5 -5.3.1.1.1 Construction Hours of Work

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

#### A5.5 -5.3.1.1.2 Scheduling of Works

To protect residential amenity, surface water quality and biodiversity, the following timing or scheduling of works will be implemented according to planning conditions No. 6 and No. 17 per;

**Condition No. 6:** Prior to commencement of construction, details of the phasing of the construction works shall be agreed in writing with the planning authority, following consultation with the National Parks and Wildlife Service. **Reason:** In the interest of the protection of the environment.

**Condition No. 17:** Prior to the carrying out of any construction works between mid-March and mid-August, a survey for breeding hen harriers shall be carried out by a competent, experienced ornithologist. The survey will cover the area within 500 metres of the works to be carried out during the above period. It will be the responsibility of the ornithologist to ensure that the survey methodology is sufficient to ensure that a hen harrier breeding site is not overlooked. Taking into account the results of this survey, no construction works shall be carried out within the above period within 500 metres of a pre nesting breeding site and/or nest, except with the written approval of the National Parks and Wildlife Service. **Reason:** In the interest of the protection of the environment and of the habitat of the hen harrier species.

**A5.5 -5.3.1.2 Construction Personnel**

During the construction stage, c.277 persons will be engaged in the civil, electrical, project management, legal and financial services, material supply and component deliveries for UWF, approximately 100 people will work on-site during construction.

**A5.5 -5.3.1.2.1 Construction Personnel Welfare Facilities**

Welfare facilities will be available at Site Compound No. 1 (adjacent to Site Entrance No. 1) and Site Compound No. 2 (in the centre of the site).

**A5.5 -5.3.1.3 Construction Stage Activities**

The Construction stage of the windfarm will include the following activities

- Clearance and construction of hard-core area for temporary compound and mobilisation of site offices including bunded area for fuel and diesel tanks.
- Construction of new access roads and hardstandings including installation of drainage per the Surface Water Management Plan.
- Installation of meteorological mast.
- Excavation of the turbine bases and storage of soil locally for backfilling and re-use.
- Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for turbine tower section. Construct shuttering and fix any ducts to be cast in. Pour and cure concrete for turbine bases. Excavate cable trenches; lay cables and backfill.
- Erect towers, nacelles and blades.
- Complete earthings to towers and complete backfilling to foundations.
- Construction of substation compound, install the electrical and telecom plant, test and commission the plant.
- Provide any gates, landscaping and signage and complete any site works outstanding.
- Reinstate the site including removal of the two temporary compounds; reinstatement and landscaping of the two temporary compound hardstands; reinstatement of road verges (use of soil); reinstatement of any temporary construction hardstands; reinstatement of the site borrow pits and; replacement and renewal of hedgerows.
- Provision of the as-constructed tip heights and co-ordinates of the turbines and wind monitoring mast to the planning authority and the Irish Aviation Authority.

**A5.5 -5.3.1.4 Use of Machinery and Equipment**

The machinery, equipment and tools to be used during construction are listed on Table 2.

**Table 2: Construction Machinery, equipment and tools**

Construction Machinery	Equipment and Tools
30-50T Excavators; Low ground pressure excavators (Bogmaster); Mobile cranes for construction; Cranes (1 main, 1 assist) Erection 120t to 800t; Dump trucks; Tractors and trailers; 12t Rollers; Crushers; Screener;	Rebar/shuttering/ precast units/concrete pipe/box culverts Double contained fuel bowsers; Diesel powered generators; and Water bowsers Hand tools Silt traps, silt fences Spill Kits Fencing Materials – post and wire

**A5.5 -5.3.1.5 Use of Hydrocarbons**

The plant and equipment that will be used during the construction stage will be run on hydrocarbons. Mobile equipment will require regular refuelling from a fuelling station which will be located in a designated impermeable bunded area, drained through an oil interceptor at Site Compound No.1 (adjacent to Site Entrance No. 1).

**A5.5 -5.3.1.6 Other Facilities - Fuel Storage**

According to **Planning Condition No. 15**: The management of drainage and surface water during the construction stage of the development shall be in accordance with the details submitted in the Construction Management Plan, the Ecological Management Plan and Environmental Management Plan.

Furthermore:

- (a) all oils and fuels shall be stored in an area bunded to 110% of the total volume of stored oils and fuels,
- (b) Re-fuelling or machine servicing shall take place only within designated impermeable bunded areas, which shall be drained through an oil interceptor,
- (c) a wheel wash shall be provided within the site, near the entrance to the public road, and
- (d) an appropriately sized facility shall be provided on site for concrete washings.

Revised drawings showing compliance with these requirements shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

**Reason:** In the interest of maintaining water quality.

Site Compound No. 1 will contain all the facilities listed from (a) to (d) above. Hydrocarbon use and storage during construction will be managed under a Fuel and Oil Management Plan.

**A5.5 -5.3.1.7 Imported Construction Materials**

The materials identified in Table 3 will be imported onto UWF site.

**Table 3: Quantities, type and source of construction materials**

Materials	Quantity	Likely Source of Materials
Aggregate (crushed stone)	4,010 No. loads.	Most expected to be won on-site with some capping stone grades imported from the local quarry at Shanballyedmond, Rear Cross
Reinforcing Steel (rebar)	15 No. loads	Various Irish Suppliers
Concrete	950 No. loads	Roadstone Killough, Co Tipperary
General building materials	5 No. loads	Various Irish Suppliers
Electrical plant and Switchgear	14 No. loads	EU Various Suppliers
Turbine towers	66 No. loads	Via Foynes Port
Turbine Nacelles	44 No. loads	Via Foynes Port
Turbine Blades	66 No. loads	Via Foynes Port
Generators, gearboxes and transformers	22 No. HGV loads	Via Foynes Port

**Relevant Figures (contained at the end of this Appendix 5.5)**

**Figure UWF 6: Turbine Component Haul Route**

**A5.5 -5.3.1.8 Construction Stage: Traffic Management**

The Appointed Contractor will prepare a detailed Traffic Management Plan prior to the works commencing. This Plan will be finalised in agreement with the Gardaí and the Local Authority.

**A5.5 -5.3.1.8.1 Construction Stage: 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, on specified haul routes. These haul routes have been agreed with the Area Roads Engineer.

**Other Construction Material**

Other materials, such as ducting, geotextile and other construction materials, will be transported to the Upperchurch Windfarm Site Compound No.1. From this point the construction vehicles will access the full site using newly built windfarm roadways, upgraded farm and forestry tracks and site entrances from the Local Road network within the site area.

**A5.5 - 5.3.2 Operational Stage of Upperchurch Windfarm**

**A5.5 -5.3.2.1 Duration and Timing of Operational Stage**

The duration and timing of the operational stage of the Upperchurch Windfarm, as per Condition 4 of the Grant of Permission (PL.22.243040) is set out in Table 4;

**Table 4: Duration of Operation Stage**

Description	Duration & Timing
Operating Upperchurch Windfarm	25 years from the date of commissioning of the wind turbines (Condition 4)

**A5.5 -5.3.2.2 Operational Personnel**

There will be 8 permanent jobs created in operation and maintenance activities, legal, electricity sales and asset management relating to UWF. Four maintenance personnel will be employed at the windfarm site to service, maintain and monitor the turbines for operational safety and performance.

**A5.5 -5.3.2.2.1 Welfare Facilities**

Following construction, Site Compound No. 2 will be retained for use by the maintenance personnel for the operational phase of the Upperchurch Windfarm. The unoccupied house will be converted to an office space, canteen and toilet facility for the maintenance personnel. This house already has water (ground water from a well) and sanitary facilities (septic tank).

**A5.5 -5.3.2.3 Operational Activities**

UWF will be maintained in good working order throughout the operational stage. The operational stage will involve:

- Daily remote monitoring of wind turbine performance by the owner’s operator,
- Visits by maintenance crews to carry out scheduled and unscheduled maintenance and repairs,
- Occasional replacement of major components,
- Monitoring and surveying of sensitive aspects of the local environment, and the establishment of the Upperchurch Hen Harrier Scheme, as set out in Appendix 5.6: Description of the UWF Other Activities.

**A5.5 -5.3.2.4 Use of Machinery and Equipment**

The machinery and equipment listed in Table 5 will be used during the operational stage.

**Table 5: Use of Machinery and equipment during the Operation Phase**

Machinery	Equipment	Materials
<ul style="list-style-type: none"> <li>• Light 4-wheel drive vehicle</li> <li>• Cranes and hoists for major component replacement and repairs</li> </ul>	<ul style="list-style-type: none"> <li>• Specialist electrical and mechanical tools</li> <li>• Testing equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Replacement turbine parts</li> <li>• Replacement electrical or communication parts</li> </ul>

**A5.5 -5.3.2.5 Use of Hydrocarbons**

A small volume of hydrocarbons will be used on the windfarm during operational activities and is limited to the diesel or petrol fuel used by the site vehicles and machinery and any mobile generators used. Mechanical oils and grease will be used during maintenance of the turbine and electrical equipment. These will be brought on-site and receptacles removed by the O&M personnel.

**A5.5 -5.3.2.6 Welfare & Other Facilities**

Site Compound No. 2 with a car parking area, parts storage sheds and a refurbished house (which includes already existing provisions for sanitary facilities) will be retained for use as the Upperchurch Windfarm Site Office during the operational phase. There will be no requirement for fuel storage during the operational stage, with any fuels being brought onto site as required.

**A5.5 - 5.3.3 Changes to the Upperchurch Windfarm**

In the Grant of Permission (PL.22.243040), Condition 4 outlines the duration of operation of the windfarm, and potential for decommissioning at the end of the operational period, and Condition 22 outlines the requirements for decommissioning of the Upperchurch Windfarm:

**Condition 4:** The permission shall be for a period of 25 years from the date of the commissioning of the wind turbines. The wind turbines and related ancillary structures shall then be decommissioned and removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period.

**Condition 22:** On full or partial decommissioning of the wind farm, or if the wind farm ceases operation for a period of more than one year, the wind monitoring mast, the turbines concerned and all decommissioned structures and equipment shall be removed, and foundations removed or covered with soil to facilitate re-vegetation, all to be completed to the written satisfaction of the planning authority within three months of decommissioning or cessation of operation.

**A5.5 -5.3.3.1 Decommissioning Activities (if required)**

Decommissioning will involve the removal of all the turbines, removal of the above ground turbine foundation elements and covering the hardstanding areas with topsoil and reseeded. Any roads or hardstands that are not required by the landowner for farm use, can be covered with topsoil and reseeded also. There is a significant amount of soil in the roadside bunds, excavated for road construction and drainage. This topsoil will be used to infill associated roadside drainage for elements being removed and the remaining soil will be used for hardstands and foundations. The topsoil will be replaced to re-establish the original depth and to match the original surface contours where possible. To minimise the environmental impact, the access roads of UWF were designed to use and upgrade suitable existing agricultural tracks. At the decommissioning stage the access roads can be removed, however it is expected that they will be retained in situ as an integral part of the infrastructure for use by the landowner as farm tracks. If it is decided at the time of decommissioning that tracks are to be removed, the underlying material will be treated to relieve compaction and / or to promote re-vegetation. This may include the careful manipulation of the soil or building up ground levels with additional topsoil.

Cabling will be isolated and left in-situ underground. The substation compound includes an ESB control room and a windfarm owned control room. It is most likely that the substation will remain after the wind farm site is reinstated. Any equipment associated with the wind farm side of the substation will be electrically isolated and removed off site and disposed of appropriately. If at the decommission stage the planning authority requests the substation is screened, a stand of conifer trees can be planted around the substation.

The wind farm infrastructure is predominantly located in areas of improved agricultural grassland. Any reseeded lands will be agreed with the landowner to ensure consistency with the surrounding land uses. In areas of felled forestry, acid and wet grass land, heath and bog, these areas will be allowed to naturally revegetate and be managed for nature conservation purposes. Monitoring of the reinstated areas will be undertaken following the completion of decommissioning works to confirm the successful reinstatement of the vegetation, the turbine foundation and hardstand areas and possibly the access tracks. A monitoring period, of two years, will allow for the observation of the reestablishment of the flora. This will ensure remedial action is taken as necessary, which may include further reseeded as required.



## A5.5 - 5.4 Use of Natural Resources Emissions and Waste

### A5.5 - 5.4.1 Use of Natural Resources

The resources which will be imported onto the Upperchurch Windfarm site or which will be obtained from within the site during the development of the Upperchurch Windfarm are described below.

To facilitate the evaluation of the use of natural resources for the whole UWF project, the information on the Use of Resources for the Upperchurch Windfarm is presented in the same format as the Use of Natural Resources for UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities.

#### A5.5 -5.4.1.1 Use of Resources: Land

In order to safely accommodate the construction works and construction traffic, the land requirement for the construction of the Upperchurch Windfarm is greater than for the operation of the Upperchurch Windfarm.

In total Upperchurch Windfarm works will take place on 56.3 hectares of land within construction works areas, as follows; 12.8ha of farm roads, 33.7ha of agricultural land, 9.8ha of forestry land. The use of the lands by the landowner will be controlled during construction for safety reasons.

Following construction, the lands within the construction works areas will be returned to the landowner for their own use with the exception of 6.4ha of lands at the hardstandings areas associated with the Consented UWF Turbines, the Consented UWF Substation and the meteorological masts, and the keyhole felled areas of forestry around the Consented UWF Turbines. Of these 6.4ha of lands; 2.6ha of agricultural lands and 3.5ha of forestry lands will change use to utility for the duration of the operation of the Upperchurch Windfarm; 0.3ha of agricultural land will permanently change use to utility at the Consented UWF Substation. Of the lands returned to use by the landowner; 2.3ha of these lands will change use from agricultural lands (1.5ha) or forestry lands (0.8ha) to access road.

6.1ha of lands associated with the hardstandings areas at the Consented UWF Turbines, the meteorological masts, and the keyhole felled areas of forestry around the Consented UWF Turbines will be returned to agricultural use (2.6ha) and forestry use (3.5ha).

#### A5.5 -5.4.1.2 Use of Resources: Biodiversity

##### A5.5 -5.4.1.2.1 Field Boundaries – Earthen Banks/Hedgerow/Trees

In total 980m of hedgerow/field boundaries will be removed to facilitate the construction of the UWF, of which 360m of hedgerow will be removed from works areas for the protection of bats. In order to provide alternative bat and bird habitat and **equivalent length of new hedgerow** will be planted, with native species, to mitigate this loss of habitat. Existing hedgerows in poor condition will be planted with native species to increase their ecological value.

##### A5.5 -5.4.1.2.2 Forestry Felling

In total 4.4 hectares of coniferous forestry will be permanently felled, under a felling license from the Forest Service. Forestry felling will be carried out prior to the construction works beginning and outside of the bird breeding season. No further forestry felling will be required during the operational stage.

**A5.5 -5.4.1.3 Use of Resources: Water****A5.5 -5.4.1.3.1 Potable Water and Non-Potable Water**

Bottled drinking water will be imported and stored in the canteen at Site Compound No.1. At Site Compound No.2, drinking water will be drawn from the existing well associated with the old house.

Non-potable water for hand washing or toilet flushing will be imported to Site Compound No.1 from a local municipal supply and stored in water holding tanks for the toilet and wash facilities. Non-potable water will be sourced from the existing well associated with the old house at Site Compound No.2.

Operational stage water requirements are limited to potable and non-potable water, both of which will be available at the Upperchurch Windfarm Site Office at Site Compound No.2, which is an existing dwelling which will be refurbished to accommodate the windfarm worker's welfare facilities. The decommissioning stage water requirements will be similar to the Operational Stage and will be provided at the Upperchurch Windfarm Site Office.

**A5.5 -5.4.1.3.2 Dewatering of Excavations**

It is likely that groundwater will need to be pumped from turbine excavations, mostly during very wet weather. De-watering, if required, will be carried out using mobile diesel generator water pumps. Water will be settled in a settlement pond and silt trap, before being released to the surrounding downslope vegetation. Dewatering will only be carried out at a flow rate that is within the capacity of the sediment pond.

**A5.5 -5.4.1.4 Use of Resources: Soils****A5.5 -5.4.1.4.1 Excavated Soils**

Construction of UWF will result in the removal of soil, subsoil, peat and rock in parts of the site in order to facilitate the construction of access roads, crane hard standings, substation compound and turbine bases. Approximately c.25,500m<sup>3</sup> of topsoil, c.79,600m<sup>3</sup> of subsoil and c.2,900m<sup>3</sup> of peat will be excavated from the works areas. It is estimated that up to 43,000m<sup>3</sup> of rock will be excavated from the on-site borrow pits to construct the Upperchurch Windfarm Roads and hardstanding areas.

**A5.5 -5.4.1.4.2 Permanent Storage**

It is estimated that up to 52,000m<sup>3</sup> of soils will be permanently stored in bunds along Consented UWF Roads and at Consented UWF Turbines hardstanding areas and around the met mast areas.

**A5.5 -5.4.1.4.3 Temporary Storage**

The remaining excavated material will be temporarily stored, within the construction works area. Topsoil, subsoil and rock will be stored separately, with as much surface vegetation left intact on the topsoil layer as possible. The excavated material will be used to backfill, reinstate and landscape the works areas.

**A5.5 -5.4.1.4.4 Imported Rock**

If additional rock to that won on the Upperchurch Windfarm site (higher grade for road capping for example) then this will be imported from the local Rear Cross Quarry.

**A5.5 -5.4.1.4.5 Operational/Decommissioning Stage**

No excavations of soils will be required during the routine operation of the Upperchurch Windfarm or during the decommissioning stage. The foundations will be left in situ to avoid disturbance of the lands. The soils stored in the bunds alongside Consented UWF Roads and at Consented UWF Turbines hardstands will be used to reinstate the turbine hardstanding areas, met mast areas.

**A5.5 - 5.4.2 Upperchurch Windfarm: Emissions**

The emissions associated with the Upperchurch Windfarm are described below.

To facilitate the evaluation of emissions associated with the whole UWF project, the information on Emissions for UWF is presented in the same format as the Emissions associated with UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities.

**A5.5 -5.4.2.1 Emissions****A5.5 -5.4.2.1.1 Dust**

Dust may arise during the construction stage, due to the transportation of aggregate to the Upperchurch Windfarm site, the movement of excavated material within the site and from stored excavated materials at the works areas, particularly during dry and windy weather. The potential for dust emissions and the effect on Air Quality has already been assessed by the An Board Pleanála Inspector. In the Inspector's Report 2014 no significant impacts to Air quality were identified and any dust impacts considered 'temporary in nature and confined to the immediate area'.

Excavations on UWF, and therefore dust emissions, during the operation or decommissioning stages will be negligible and will be limited to the roads and turbine hardstanding areas.

**A5.5 -5.4.2.1.2 Vehicle Exhausts**

During construction, operating machinery used during the construction stage will be run on hydrocarbons and will emit nitrogen dioxide and other greenhouse gas emissions during their operation. The potential for fugitive emissions from site machinery and increased traffic has already been assessed by the An Board Pleanála Inspector. In the Inspector's Report 2014 no significant impacts to Air quality are identified and any vehicle emission impacts are considered 'temporary in nature and confined to the immediate area'.

During operation, the presence of vehicles on UWF, and therefore nitrogen dioxide and other greenhouse gas emissions, during operation is negligible with a light four wheel drive vehicle used on site by maintenance crews, and occasionally the use of cranes and HGV's delivering replacement parts.

**A5.5 -5.4.2.1.3 Noise**

During construction, heavy machinery and vehicles which will be used at works areas during the construction stage will emit noise during their operation, noise will also be emitted from certain construction activities such as excavation or rock breaking or by mobile generators which may be used at work areas. The potential for noise emissions effects during the construction stage has already been assessed by the An Board Pleanála Inspector. The Inspector's Report 2014 states 'exceedance of permitted levels will occur during the construction phase ... but I note that there is no house within 200m of the construction works'.

During operation, the Consented UWF Turbines will emit noise during their operation. An evaluation of the likely noise impact of the Consented UWF Turbines has already been carried out by a competent expert, in accordance with methodology described in ETSU-R-97, Assessment and Rating of Noise from Wind Farms. The potential for noise emissions effects during the operational stage has already been assessed by the An Board Pleanála Inspector. The Inspector's Report 2014 states that 'the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario.'

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During decommissioning: Very low levels from dismantling activities and reinstatement works, no effects expected to local residents due to the low levels combined with the distances to nearest residences.

#### A5.5 -5.4.2.1.4 Vibration

Construction works, including excavations and the use of heavy machinery will cause low levels of ground vibration. The potential for vibration effects has already been appraised in the Revised Vibration Impact Assessment, 2013 EIS, where it state: 'Once operational there will be no significant sources of vibration' from UWF.

Once operational there will be no significant sources of vibration from UWF. There will be no sources of vibration during the decommissioning works.

#### A5.5 -5.4.2.1.5 Light

Construction activities will only be conducted during daylight hours. Therefore no lights are required at construction works areas at the Upperchurch Windfarm.

During operation, the turbines will be fitted with red coloured intermittent lighting. The potential for disturbance and collision effects on bats has already been evaluated in the EIS 2013, and considered 'not significant'.

All decommissioning activities will take place during daylight hours, no requirement for lights.

#### A5.5 -5.4.2.1.6 Electromagnetic Radiation:

No emissions of electromagnetic radiation will occur during the construction or decommissioning stages.

Operational Stage; Low frequency electrical and magnetic fields (EMF) will be present anywhere electricity is generated, distributed or used and therefore these fields are a common occurrence in everyday life. The operational Consented UWF Turbines will be a source of very low frequency (50Hz) electromagnetic fields. Electromagnetic radiation emissions will not be at levels to cause significant effects at the turbine locations, and no effects will occur at local residences.

**A5.5 - 5.4.3 Upperchurch Windfarm: Waste**

The wastes which will arise at UWF are described below. The greatest potential for waste occurs during the Construction stage of the windfarm. Wastes which result from the construction, operation and decommissioning of UWF will be managed under a Waste Management Plan.

**A5.5 -5.4.3.1 Waste Water**

During construction, self-contained toilets, with integrated waste water storage tanks, will be provided for construction workers at Site Compound No.1, Waste from toilets will be taken from site on a regular basis by approved contractors and disposed of in an authorised facility in accordance with best practice. At Site Compound No 2. an existing septic tank will be used to treat waste water at Site Compound No.2. .

During operation, Toilet facilities for operational personnel will be provided at the permanent Site Office (identified as Site Compound No.2 during construction). Waste water will be treated in the existing septic tank associated with the building.

Toilet facilities for decommissioning personnel will be provided at UWF Site Office (identified as Site Compound No.2 during construction). Waste water will be treated in the existing septic tank associated with the building.

**A5.5 -5.4.3.2 General Waste and Chemical Waste**

Construction phase waste may consist of hard-core, stone, concrete, steel reinforcement, shuttering timber and unused oil and diesel. Wastes will be segregated and stored in the allocated tanks, bins, skips or areas at Site Compound No.1. The Appointed Contractor must finalise all storage areas and organise the relevant licensed contractors for the appropriate waste collections. The Appointed Contractor will ensure all permits and licences are in place and maintain relevant copies in the site office.

Very small quantities of chemical waste may be generated during the construction stage, this waste is limited to solid waste oil, such as oily rags. Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling. The Appointed Contractor will ensure all permits and licences are in place and maintain relevant copies in the site office.

Wastes arising during the operating phase include but are not limited to lubricating oils, cooling oils and packaging from spare parts. The containment and disposal of such oils will be carried out in a safe manner by an approved contractor. Such operations will be carried out in accordance with the Waste Management (Hazardous Waste) Regulations, 1998 (as amended). The remaining wastes will all be removed from UWF and reused, recycled or disposed of in an authorised facility in accordance with best practice.

Wastes arising during decommissioning will include packaging, turbine and transformer oils and some fiberglass. All waste generated during the decommissioning phase will be taken off the UWF site and disposed of appropriately.

**A5.5 -5.4.3.3 Arisings**

No arisings will occur, as the construction of UWF will not involve the excavation of the public road network.

**A5.5 -5.4.3.4 Decommissioned Windfarm Components**

The electrical components and the decommissioned turbines can be sold as second hand plant, because these components have a designed life in excess of the wind farm planning permission; i.e. greater than 25 years. If they are not sold as s/h working plant then all steel and electrical plant can be recycled.

The blades are mainly made up of composite materials, which can be incinerated for electricity generation/direct heat or disposed of in landfill. Production methods for the blades in modern turbines principally involves the use of epoxy composites. This method helps to reduce emissions from organic solvents, thus appreciably reducing impact on the environment at the production and disposal stage.

General and hydrocarbon wastes generated during the decommissioning phase will be taken off site and disposed of in an appropriately licenced facility.

Welfare facilities for decommissioning personnel will be available at the Windfarm Site Offices at formerly Construction Site Compound No. 2.

## A5.5 - 5.5 The Vulnerability of UWF to Major Accidents and Natural Disasters

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

### A5.5 - 5.5.1 Vulnerability to Major Accidents

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

The consented Upperchurch Windfarm **is not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the windfarm, and small volumes of oils and grease used during turbine maintenance. Furthermore there are no Seveso sites in proximity to the UWF, the closest being Grassland Agro in Limerick and MSD (pharmaceutical) in Kilsheelan, near Clonmel, Co Tipperary.

### A5.5 - 5.5.2 Vulnerability to Natural Disasters (High Winds, Land slippage, Flooding)

**Natural disasters which could potentially affect the Upperchurch Windfarm include land slippage and flooding.** The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines. The risk classification tables are included in [Appendix 2.2: EIAR Descriptive Terminology](#).

#### A5.5 -5.5.2.1 High Winds

In recent years, high wind events including hurricane force winds, have become more frequent in Ireland, and have resulted in major damage and loss of life. However, it is considered that the Upperchurch Windfarm is **not vulnerable to high wind events**, as the wind turbines which will be installed at the Upperchurch Windfarm will all be the highest specification turbine (IEC Class 1A turbines), and will easily tolerate hurricane force winds. Due to the design of the windfarm (Class 1A turbines), it is considered that windfarm the likelihood of an accident occurring due to high winds is **Extremely Unlikely**.

#### A5.5 -5.5.2.2 Land-Slippage

It is considered that the Upperchurch Windfarm is **not vulnerable to land slippage**. During site investigations for the 2013 EIS, geotechnical surveys undertaken at the windfarm site, all parts of the site were examined, no stress indicators were identified and there is no evidence of historical peat slides in the area. The conclusions of the 2013 EIS were that there is a very low risk of slippage or landslides on the Upperchurch Windfarm site because of the stable sub-surface ground conditions and the absence of any significant peat coverage. Furthermore, the windfarm infrastructure is not considered vulnerable to land slippage due to the construction of the infrastructure in competent ground. Therefore it is considered that the likelihood of land slippage disaster occurring on the windfarm site is **Extremely Unlikely**.

**A5.5 -5.5.2.3 Flooding**

In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland. Where complete the Catchment Flood Risk Assessment and Management (CFRAM)<sup>1</sup> 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 Upperchurch Windfarm site and therefore the PFRA maps have been examined and these show that all of the construction works areas and permanent infrastructure (roads, turbine hardstands, substation compound) are located in Flood Zone C (Low Risk) – where the probability of flooding is low (less than 0.1% or 1 in 1,000). Therefore it is considered that the likelihood of flooding disaster affecting the Upperchurch Windfarm site is **Unlikely**.

**A5.5 - 5.5.3 Consequences of Natural Disasters Occurring**

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

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

Due to the low number of people living or working locally, the consequence of any high wind, flooding or land slippage events, if they did occur, is also considered to be **Limited**.

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

**A5.5 - 5.5.4 Overall Risk**

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

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

In relation to downstream water quality, due to the higher level of effect (Serious) on water quality a land slippage or flooding event could be a major emergency. According to the DoEHLG 2010 guidelines, both flooding and landslip events would be at the lowest extreme of 'major emergency'.

**A5.5 -5.5.4.1 Mitigation Measures**

The installation of the highest specification IEC Class 1A turbines at the Upperchurch Windfarm wite will ensure that high wind events do not cause turbine failure at the site.

No measures are required for land slippage risk. In relation to flooding, no instream works are required for the windfarm, with a clearspan bridge being constructed over the 1 no. stream onsite. In addition, flood

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<sup>1</sup> 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.



**Appendix 5.5: Compiled Description of Upperchurch Windfarm**

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attenuation measures are built into the project through drainage system design, these measures will prevent any increase in discharge rates and associated flooding risk, downstream of the windfarm.

Should a disaster occur, unconnected to the project but in the locality – the above mitigation measures already designed into the project will ensure that the project will not make the consequences of the event worst. In addition the presence of the project will not increase the likelihood of such an event occurring.

**A5.5 - 5.6      Figures and Mapping**



Figure UWF-1: Location of Upperchurch Windfarm

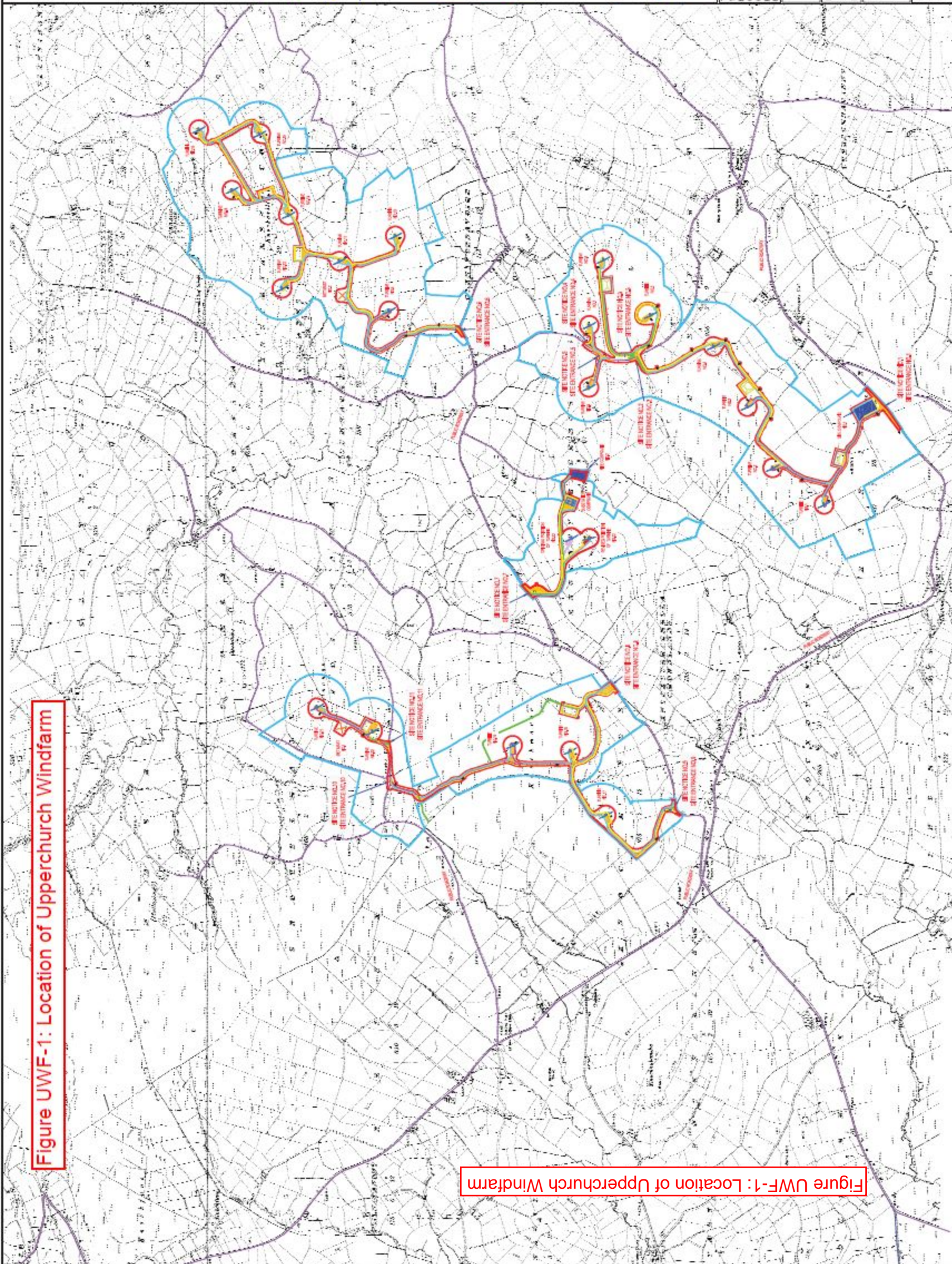


Figure UWF-1: Location of Upperchurch Windfarm



LEGEND

- P.U. roadways shown in purple
- Existing farm roadways in need of upgrading shown in green
- Unchanged windfarm roadways shown in orange

- Unchanged wind turbine locations shown in blue and unchanged crane and location shown in orange
- Old turbine locations and locations for the No.27 crane pad and approach road shown in red
- Revised layout and location for the No.27 crane pad and approach road shown in red
- Site compounds shown in blue
- Revised site boundary outlined in red
- Revised and Under Control of Applicant area shown in blue
- Meteorological mast

REFERENCE DOCUMENT

TITLE: Windfarm at Garbha / Shavy / Koochamagalla / Koochamara / Grouse / Cumme / Faghman / Gaochamagalla / Cummeagalla / Koochamara Common / Garbeg / Stobh, Upperchurch, Co. Kerry

DRAWING: SCALE: 1:10000

SITE LOCATION SHOWING REVISED LOCATION OF T22

DRAWING NUMBER: UWF-01/RF/17

DATE: 24/11/2013

Drawn by: Jack Bratt

Ecopower Developments Ltd  
 5 Sun Road, KERRY  
 Telephone: 051 7757140

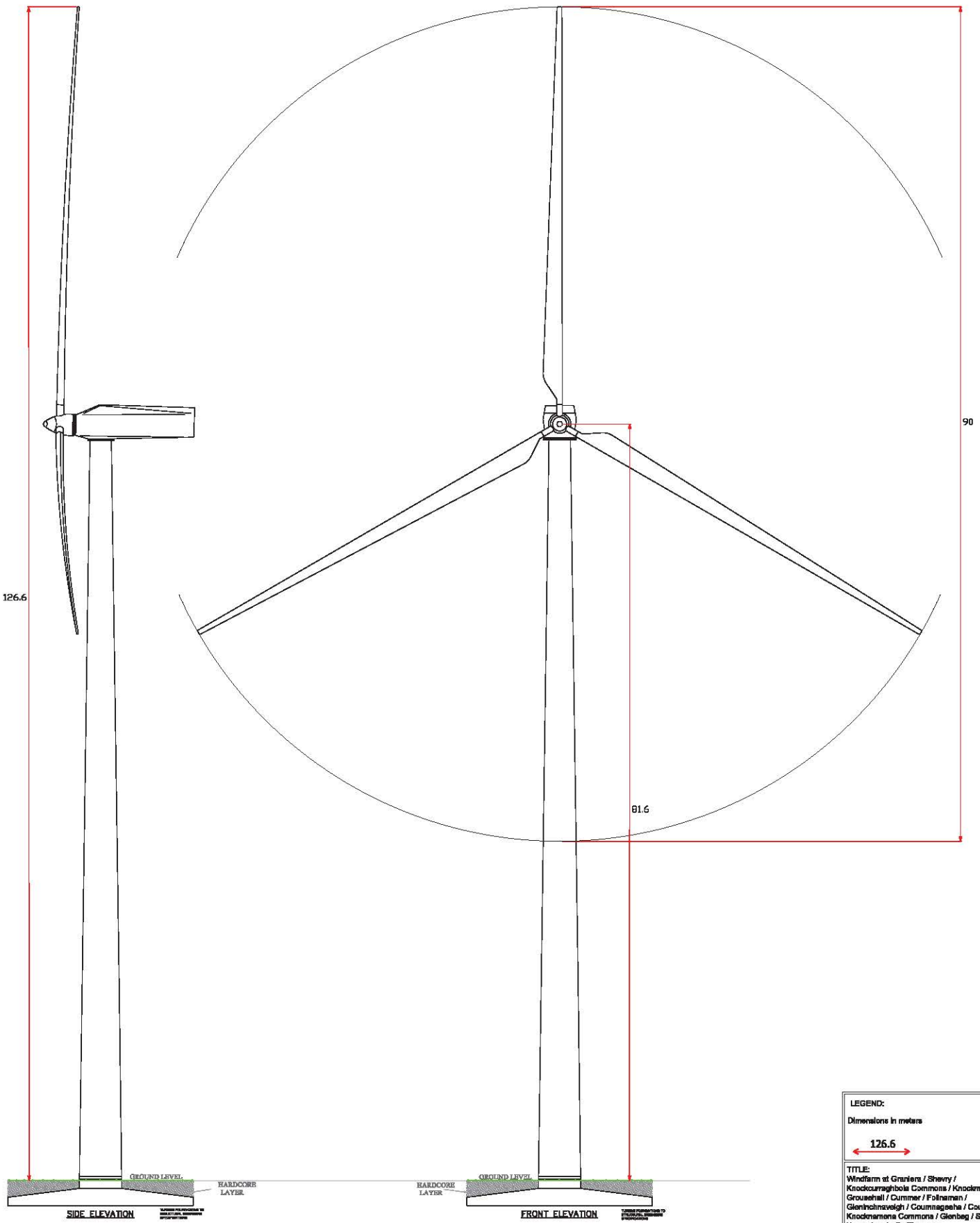
CE Licence Number: EN 0022815

Map Sheet Number: T003, T004, T005, T006

All maps are under license from Ordnance Survey

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Figure UWF-2: Wind Turbine Elevation



**LEGEND:**  
Dimensions in meters

126.6

**TITLE:**  
Windfarm at Graniers / Sherry / Knockcurraghbole Commons / Knockmaroe / Grousehall / Cummer / Foinaman / Gleninchisaveigh / Coumingsageaha / Cournbeg / Knockmarona Commons / Glenbeg / Sealdin, Upperchurch, Co. Tipperary

**DRAWING:**  
WIND TURBINE ELEVATIONS

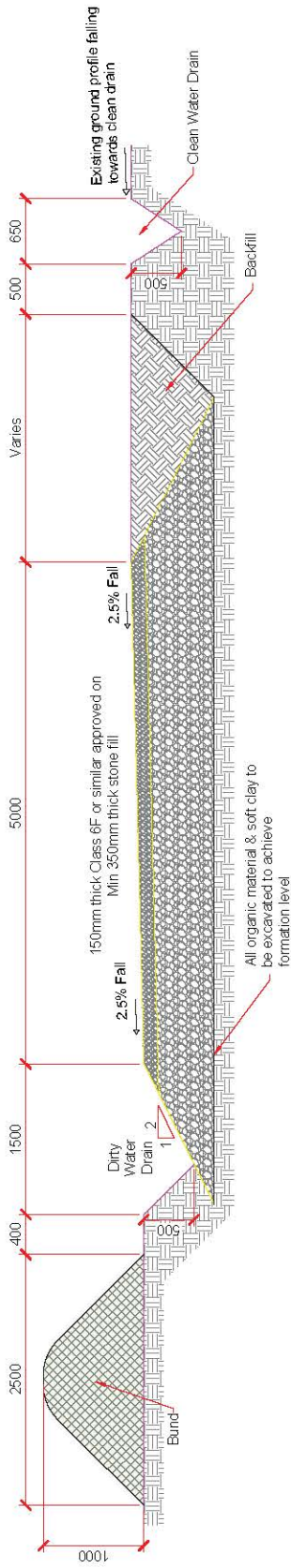
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**DRAWING NUMBER:**  
UWF-PA1-03

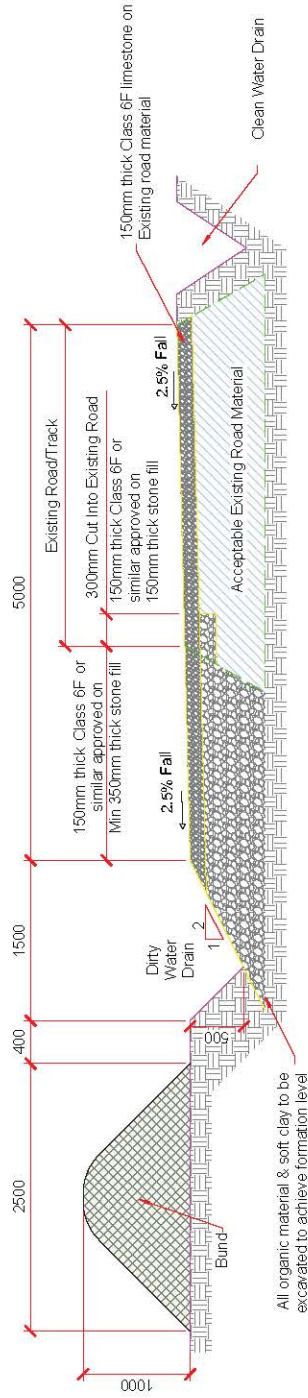
**DATE:** 13/12/12

**Drawn by:**  
Jack Brett  
Ecopower Developments Ltd  
8ton Road, Kilkenny  
Telephone: 050 7750140






Typical Excavated Access Track Detail Scale 1:50

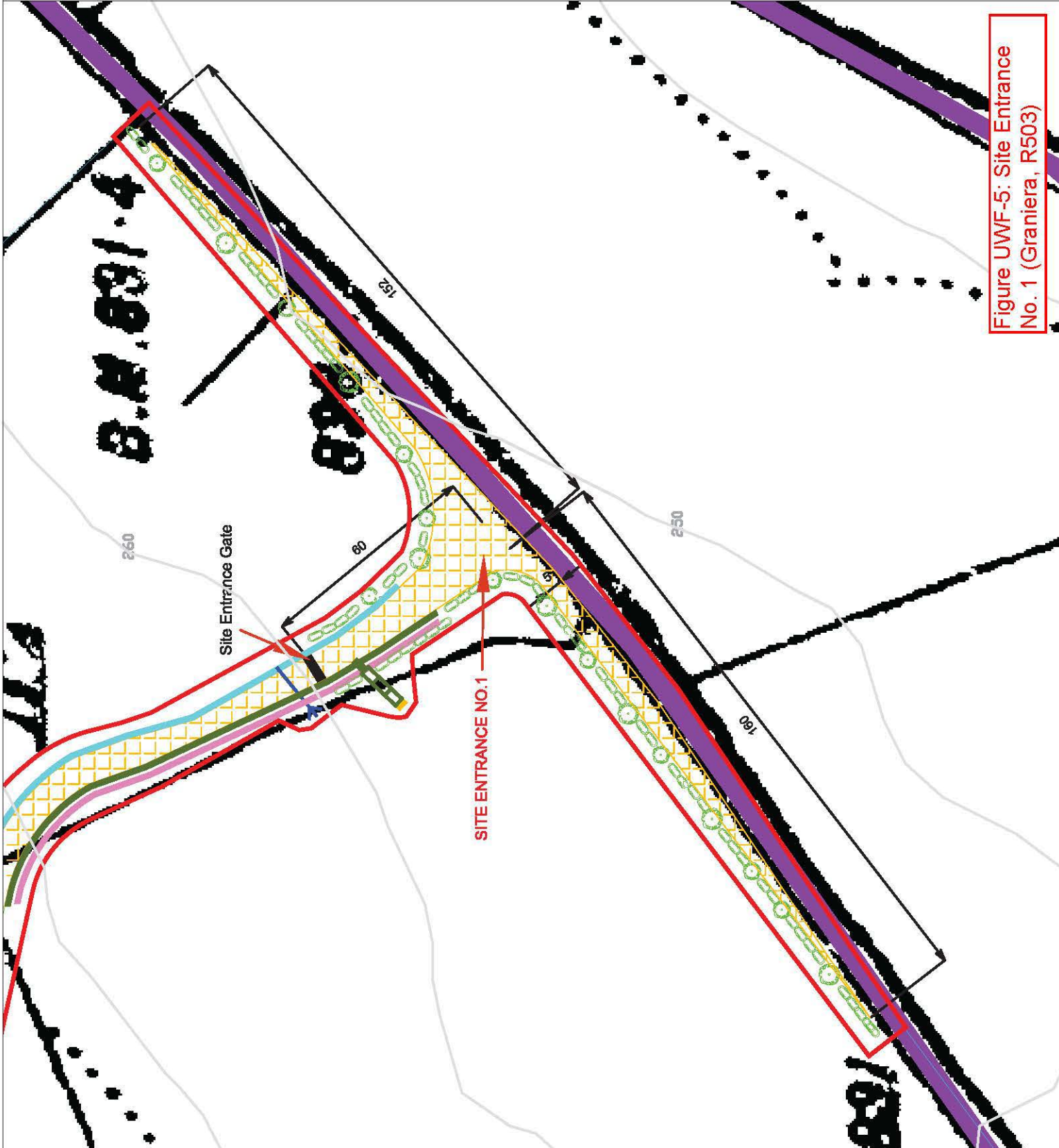


Typical Widening To Existing Access Track Detail Scale 1:50

Figure UWF-4: Proposed Internal Roads Details

Project		Upperchurch Wind Farm	
Rev.	Date	Description	by
A	13.06.12	Issued For Planning	PN TB JoL
Client		Ecopower Developments Ltd	
Scales (A3)		1:50	
Drawn	PN	13.05.2012	14708 - 5005
Checked	TB	13.05.2012	A
Title		Proposed Internal Road Details	
Malachy Walsh and Partners Consulting Engineers		Cork   Tralee   London   Limerick	
Drg No		14708 - 5005	
Rev.		A	

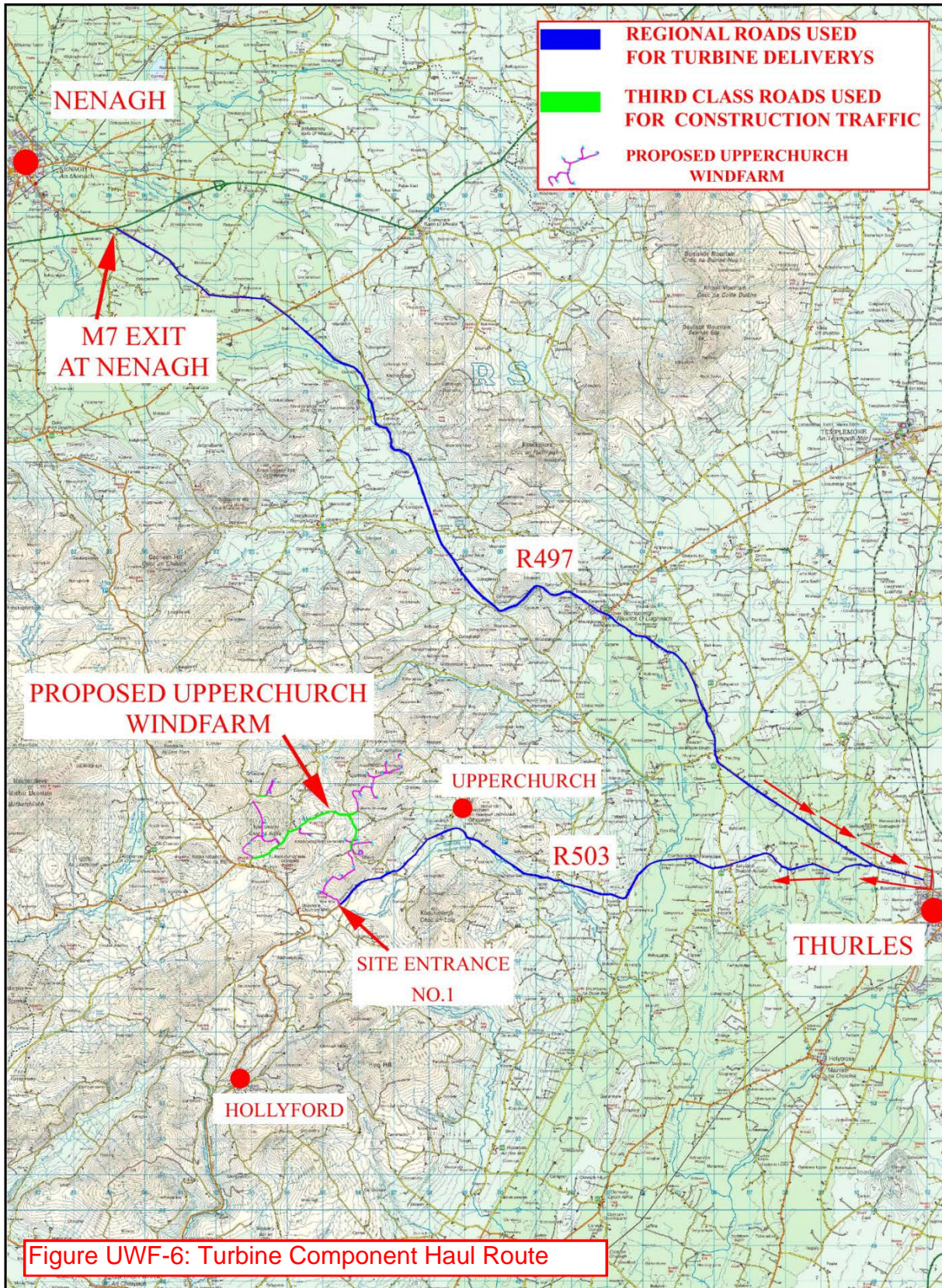
<p><b>LEGEND:</b></p> <p>Proposed new windfarm roadways hatched in orange</p> <p>Site Boundary outlined in red</p> <p>Public Roadway shown in purple</p> <p>Dimensions in meters</p> <p>Contour line with elevation in meters</p> <p>Hedge and trees planted post construction phase</p> <p>Clean water drain shown in light blue</p> <p>Dirty water drain shown in dark green</p> <p>Bund shown in pink</p> <p>Clean water cross drain with outlet weir</p> <p>Dirty water settling pond with outflow weir</p>	
<p>55</p> <p>150</p>	
<p><b>TITLE:</b></p> <p>Windfarm at Graniera / Shevry / Knockcurraghbolla Commons / Knockmaroe / Grousehall / Cummer / Foinaman / Gleninchnaiveigh / Courmnaageeha / Coumbeig / Knocknamena Commons / Glenbeg / Seskin, Upperchurch, Co. Tipperary</p>	
<p><b>DRAWING:</b></p> <p>Site Entrance No.1</p>	
<p><b>SCALE:</b> 1:1000</p>	
<p><b>DRAWING NUMBER:</b></p> <p>UWF-PA1-39</p>	
<p><b>DATE:</b> 19/12/2012</p>	
<p><b>Drawn by:</b></p> <p>Jack Brett Ecopower Developments Ltd Sion Road, Kilkenny Telephone: 056 7750140</p>	
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**Figure UWF-5: Site Entrance No. 1 (Graniera, R503)**



FIGURE 7-1: TURBINE COMPONENTS HAUL ROUTE



# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A6: Project Information**

#### **Description of UWF Replacement Forestry**



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## Appendix to Chapter 5: Description of Development (UWF Related Works)

### Appendix 5.4: Description of Development (UWF Replacement Forestry)

The data and descriptions in this appendix have informed Chapter 5: Description of Development (UWF Related Works) of the EIA Report. The information presented in this Appendix 5.4 is outlined below and the relevant element(s) of the Whole UWF Project are also identified.

Appendix	Title	Relevant EIAR
A.5.4	Description of Development (UWF Replacement Forestry)	UWF Replacement Forestry

To Revised EIAR Chapter 5: Description of Development (UWF Related Works)

---

# UWF Replacement Forestry

## Volume C2: EIAR Main Report

### Chapter 5

#### Description of Development (UWF Replacement Forestry)





## Contents

<b>5.</b>	<b><u>Description of the UWF Replacement Forestry .....</u></b>	<b><u>1</u></b>
<b>5.1.</b>	<b>Introduction to Chapter 5 .....</b>	<b>1</b>
<b>5.2.</b>	<b>Characteristics of UWF Replacement Forestry .....</b>	<b>2</b>
5.2.1.	Purpose of UWF Replacement Forestry.....	2
5.2.2.	Location and Overview Description of UWF Replacement Forestry .....	2
5.2.3.	Characteristics of UWF Replacement Forestry .....	3
5.2.3.1.	Planting Densities.....	3
5.2.3.2.	Native Woodland Type .....	3
5.2.3.3.	Species Mix, Composition and Layout .....	3
5.2.3.4.	Water Setback.....	4
5.2.3.5.	Fencing.....	4
5.2.3.6.	Permanent Entrance .....	4
5.2.4.	Environmental Protection Measures designed into the UWF Replacement Forestry.....	5
5.2.4.1.	Best Practice Measures.....	6
5.2.4.2.	Invasive Species Management Plan.....	6
5.2.4.3.	Monitoring .....	6
<b>5.3.</b>	<b>Life Cycle Stages of UWF Replacement Forestry .....</b>	<b>7</b>
5.3.1.	Planting Stage - UWF Replacement Forestry .....	7
5.3.1.1.	Duration & Timing.....	7
5.3.1.1.1.	Hours of Work.....	7
5.3.1.2.	Planting Personnel .....	7
5.3.1.3.	Welfare Facilities.....	7
5.3.1.4.	Planting Stage Activities.....	7
5.3.1.5.	Use of Machinery and Equipment .....	8
5.3.1.6.	Use of Hydrocarbons.....	8
5.3.1.7.	Other Facilities - Fuel Storage & Tool Storage .....	8
5.3.1.8.	Imported Planting Materials .....	8
5.3.1.9.	Water Quality Management .....	8
5.3.2.	Growth Stage – UWF Replacement Forestry .....	9
5.3.2.1.	Duration and Timing of Growth Stage .....	9
5.3.2.2.	Growth Stage - Personnel .....	9
5.3.2.3.	Operational Activities.....	9
5.3.2.4.	Use of Machinery and Equipment .....	9
5.3.2.5.	Use of Hydrocarbons.....	10



5.3.2.6.	Welfare Facilities.....	10
5.3.2.7.	Other Facilities - Fuel Storage & Tool Storage .....	10
5.3.3.	Changes to the Project.....	10
<b>5.4.</b>	<b>Use of Natural Resources, Emissions &amp; Waste .....</b>	<b>11</b>
5.4.1.	Use of Natural Resources.....	11
5.4.1.1.	Use of Resources: Land .....	11
5.4.1.2.	Use of Resources: Biodiversity.....	11
5.4.1.2.1.	Invasive Species Management.....	11
5.4.1.3.	Use of Resources: Water.....	11
5.4.1.4.	Use of Resources: Soils .....	12
5.4.2.	Emissions.....	13
5.4.3.	Waste .....	13
<b>5.5.</b>	<b>Vulnerability of the Project to Major Accidents and Risks to Human Health.....</b>	<b>14</b>
5.5.1.	Vulnerability to Major Accidents .....	14
5.5.2.	Vulnerability to Natural Disasters.....	14
5.5.2.1.	Land Slippage .....	14
5.5.2.2.	Flooding.....	14
5.5.3.	Overall Risk.....	15
<b>5.6.</b>	<b>Cumulative Descriptions .....</b>	<b>16</b>
5.6.1.	Description of the Other Elements of the Whole UWF Project.....	16
5.6.1.1.	Element 1: UWF Grid Connection .....	17
5.6.1.2.	Element 2: UWF Related Works.....	20
5.6.1.3.	Element 4: Upperchurch Windfarm.....	23
5.6.1.4.	Element 5: UWF Other Activities .....	25
5.6.2.	Cumulative Locational Context of all the Elements .....	27
5.6.3.	Secondary Projects.....	28
5.6.4.	Description of Other Projects and Activities.....	29
5.6.4.1	Existing Killonan to Nenagh 110kV Overhead Line .....	30
5.6.4.2	Existing Shannonbridge – Killonan 220kV Overhead Line .....	30
5.6.4.3	Consented Bunkimalta Windfarm.....	30
5.6.4.4	Consented Castlewaller Windfarm .....	30
5.6.4.5	Existing Milestone Windfarm.....	30
5.6.4.6	Operational Windfarms in the Republic of Ireland.....	31
5.6.4.7	Existing Communication Structures .....	31
5.6.4.8	Consented Project – Newport Distributor Road, Newport.....	31
5.6.4.9	Consented Project – Industrial Warehouse Units at Thurles.....	31

5.6.4.10	Consented Project - Thurles Regional Water Treatment Works .....	31
5.6.4.11	Consented Gortnahalla Turbine.....	32
5.6.4.12	Killuragh Digester Plant.....	32
5.6.4.13	Housing Development in Doon and Annacotty .....	32
5.6.4.14	Agricultural Developments .....	32
5.6.4.15	Activities – Forestry, Agriculture.....	32
5.6.4.16	Activity – Turf-Cutting.....	32

**LIST OF FIGURES**

<b>Figure No.</b>	<b>Figure Title</b>
Figure RF 5.1	Location of UWF Replacement Forestry on OSI Discovery Mapping
Figure RF 5.2	Planting Layout on Aerial Photography Mapping
Figure RF 5.3	Entrance for Replacement Forestry Lands

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

**LIST OF APPENDICES**

<b>Appendix No.</b>	<b>Appendix Title</b>
Appendix 5.1	UWF Replacement Forestry Best Practice Measures
Appendix 5.2	Invasive Species Management Plan
Appendix 5.3	Description of Development (UWF Grid Connection)
Appendix 5.4	Description of Development (UWF Related Works)
Appendix 5.5	Complied Description of Upperchurch Windfarm
Appendix 5.6	Description of the UWF Other Activities
Appendix 5.7	A Guide to Risk Assessment in Major Emergency Management Jan 2010.

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

**Glossary of Terms**

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

**List of Abbreviations**

<b>Abbreviation</b>	<b>Full Term</b>
<b>ABP</b>	An Bord Pleanála
<b>EDL</b>	Ecopower Developments Limited
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>EMP</b>	Environmental Management Plan
<b>EPA</b>	Environmental Protection Agency
<b>PD</b>	Ecopower <u>Project Design</u> Environmental Protection Measure developed by members of the EIAR Team
<b>RFI</b>	Response to Further Information
<b>SAC</b>	Special Area of Conservation
<b>SPA</b>	Special Protection Area (for wild birds)
<b>OCM</b>	Outline Construction Methodologies
<b>UWF</b>	Upperchurch Windfarm
<b>UGC</b>	Underground Cables



## 5. Description of the UWF Replacement Forestry

### 5.1. Introduction to Chapter 5

UWF Replacement Forestry is described in this chapter, in the following order:

Section 5.2	<ul style="list-style-type: none"> <li>• A Description of the Location and Characteristics of the subject development (UWF Replacement Forestry).</li> <li>• The Project Design Environmental Protection Measures incorporated into the design to avoid, prevent or reduce likely significant adverse effects on the environment.</li> </ul>
<p><b><u>The Development as described in Section 5.2</u></b></p> <p>At the conception of the Project, the design team evaluated the potential or likely significant effects of the subject development, on the receiving environment. Any potential or likely significant effects were avoided <u>by integrating mitigation measures into the fundamental design of the UWF Replacement Forestry</u>. Various measures, particularly options for mitigation by avoidance and mitigation by prevention, were considered; these included alternative locations, alternative designs and alternative processes. Once the chosen location, design and process was decided the proposal was examined for opportunities to incorporate further mitigation measures (generally mitigation by reduction) in the final iteration of the development to be evaluated in the EIA Report. <u>The development, as described in Section 5.2, is the final iteration of the UWF Replacement Forestry</u>. It is this final iteration that is examined in Chapters 6 to 17, for effects on the prescribed environmental factors, by the topic competent experts.</p>	
Section 5.3	<p>The durations and timing, main activities, personnel and material requirements for both the planting and growth stages.</p> <p>Any changes to the UWF Replacement Forestry such as felling and harvesting.</p>
Section 5.4	<p>The use of natural resources, emissions and production of wastes for each stage.</p>
Section 5.5	<p>The vulnerability of the UWF Replacement Forestry to major accidents and events and risks to human health.</p>
Section 5.6	<p>Cumulative Descriptions:</p> <p>For the purposes of cumulative assessment of the whole Upperchurch windfarm (UWF) project, a description of the other elements of the Whole UWF Project namely; UWF Grid Connection; UWF Related Works; the already consented Upperchurch Windfarm (UWF) and UWF Other Activities, is provided.</p> <p>For the purposes of a cumulative assessment with Other Existing or Consented Projects or Activities, a description of Other Existing or Consented Projects or Activities that were scoped in by the EIAR Team is also provided.</p>

## 5.2. Characteristics of UWF Replacement Forestry

UWF Replacement Forestry relates to the planting with forestry, of 6ha of agricultural lands. The replacement forestry will comprise native tree and shrub species planted in clusters, with unplanted wide ride lines provided, for the benefit of biodiversity.

### 5.2.1. Purpose of UWF Replacement Forestry

The UWF Replacement Forestry at Foilnaman will fulfil the replanting obligation which will arise from the felling of forestry for the development of the whole Upperchurch Windfarm project.

### 5.2.2. Location and Overview Description of UWF Replacement Forestry

The UWF Replacement Forestry lands are located in two adjoining parcels of agricultural lands in Foilnaman townland, near the village of Upperchurch in County. Tipperary. See Plate 5-1 below.

#### Relevant Volume C3 EIAR Figures

#### Figure RF 5.1: Location of UWF Replacement Forestry on OSI Discovery Mapping

Note: UWF Replacement Forestry is abbreviated throughout this chapter as RF. All the Figures Numbers are prefaced by RF per e.g. Figure RF 5.1

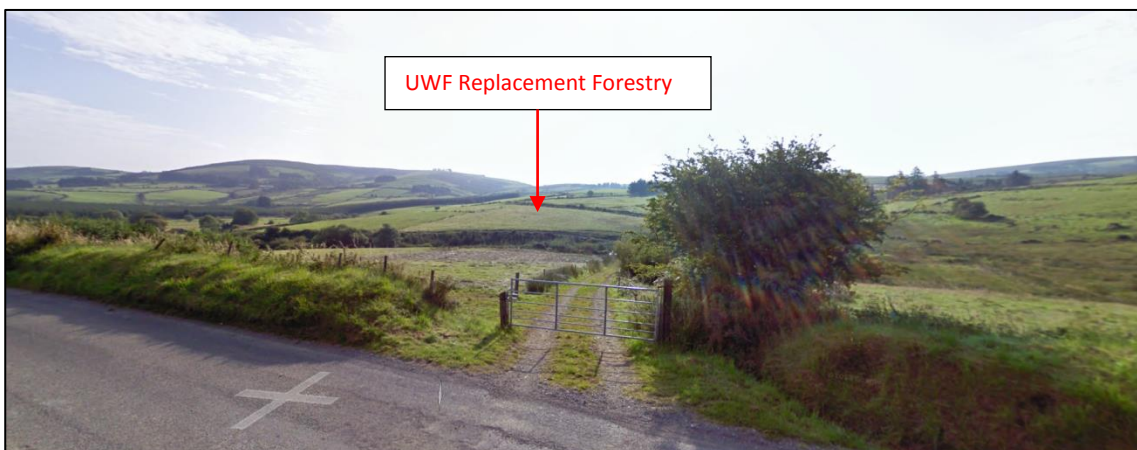


Plate 5-1: View of the UWF Replacement Forestry site from the entrance off the public road (EW10)

### 5.2.3. Characteristics of UWF Replacement Forestry

Six hectares (6ha) of agricultural grassland at Foilnaman townland will be planted with native woodland species, set in clusters of well-matched native species, and will be managed as permanent forest cover.

#### 5.2.3.1. Planting Densities

The UWF Replacement Forestry site will be planted with 20,000 saplings which equates to 3,300 stems per hectare<sup>1</sup>.

#### 5.2.3.2. Native Woodland Type

The UWF Replacement Forestry is located in improved agricultural grassland on the eastern hills of the Slievefelim to Silvermine Mountain upland area. Soils within the UWF Replacement Forestry lands comprise mainly peaty and poorly draining soils over sandstone and shale till. An Oak-Birch-Holly with Hazel Woodland (GPC9) is considered the most appropriate for the ground conditions.

All species which will be planted at the UWF Replacement Forestry site will be silviculturally compatible, native to the Island of Ireland, representative of the native wood land type Oak-Birch-Holly Hazel Woodland, and acceptable to the Forest Service.

#### 5.2.3.3. Species Mix, Composition and Layout

The lands will be planted with a mixture of tall trees and understory shrubs, and the design includes varied spacing between the clusters of trees and wide ride-lines between deeper areas of core woodland.

The predominant trees and shrubs associated with Oak-Birch-Holly Hazel Woodland are sessile oak, downy birch, ash, hazel, rowan & holly. Once established, the predominant ground flora will generally comprise species such as bramble, ivy, broad buckler-fern, wood sorrel, bluebell, violet, woodrush & wood avens. Dwarf shrubs are largely absent.

The planting mixture at the site will comprise: sessile oak (50%), with hazel (15%) and downy birch (10%) scattered throughout, and with wild cherry (5%) planted in groups of 5 to 10 trees. Scots pine (10%) planted in small pure groups on free-draining areas of the plot, particularly on slopes. Minor species (10%) to comprise *at least two of the following*, positioned alongside planned woodland edges & glades: hawthorn, holly, rowan, crab apple.

The UWF Replacement Forestry will be planted in accordance with Forest Service Department of Agriculture, Food & the Marine *Felling and Reforestation Policy (2017)*, and Guidance Documents – *Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards (2015)*, *Environmental Requirements for Afforestation (2016)* and *Management Guidelines for Ireland Native Woodlands (2017)*.

Ride-lines will be provided which will create an open space with tree-lined boundaries, which is much favoured by birds of prey during the day (e.g. hen harrier) and bats at night as hunting ground. A mixture of

<sup>1</sup> *Felling and Reforestation Policy* Forest Service Department of Agriculture, Food & the Marine (2017)



land cover – tall grasses, short grasses and scrub will be maintained under the planting and in the ride lines. Tree guards will be used to protect the saplings and young trees from rabbit damage.

#### **5.2.3.4. Water Setback**

A small stream within the Clodiagh River catchment flows through the western part of the lands. A setback distance of 10m will be established from this watercourse, and no planting works will take place within this area.

#### **5.2.3.5. Fencing**

The new native woodland will be protected from livestock through the erection of perimeter fencing around the afforestation lands.

#### **Relevant Volume C3 EIAR Figures:**

**Figure RF 5.2: Planting Layout on Aerial Photography Mapping**

#### **5.2.3.6. Permanent Entrance**

An existing agricultural entrance leading off the L-2264-34, will be used to access the chosen Replacement Forestry lands in Foilnahan. The existing sightlines at the entrance already comply with North Tipperary County Development Plan 2010 (as amended) Table 10.1: Sightline Requirements.

A separate application has been submitted to Tipperary County Council to change the use of this entrance from a farm entrance to a farm and forestry entrance. The application is part of the planning permission application for UWF Related Works to Tipperary County Council.

#### **Relevant Volume C3 EIAR Figures:**

**Figure RF 5.3 Entrance for Replacement Forestry Lands**

## 5.2.4. Environmental Protection Measures designed into the UWF Replacement Forestry

In order to prevent potential significant effects to Environmental Factors, the following mitigation (by design) measures are part of UWF Replacement Forestry;

The design of UWF Replacement Forestry includes the Project Design Environmental Protection Measures listed on Table 5-1, which were devised to avoid, prevent or reduce likely or potentially significant effects on the environment.

Relevant individual Project Design Environmental Protection Measures from the list below are duplicated in the **Environmental Factor topic chapters**, and the interaction of Project Design Environmental Protection Measures across the various Environmental Factors is provided in matrix format in **Chapter 18: Interaction of the Foregoing**.

**Table 5-1: Environmental Protection Measures as part of the UWF Replacement Forestry design**

PD ID	Environmental Protection Measure for UWF Replacement Forestry
RF-PD 01	All planting and maintenance activities will be carried out during daylight hours
RF-PD 02	The lands will be planted by hand, using spades and hand tools.
RF-PD 03	No pesticide or fertilizer will be used at the UWF Replacement Forestry site.
RF-PD 04	There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the site/
RF-PD 05	A water setback from the watercourse which flows through the site will be established during planting works. The setback will be 10m from the edge of the watercourse. No planting or other works will be carried out in this 10m wide buffer area. Native woodland will be planted beyond this distance in accordance with Silvicultural Standards for Native Woodland Establishment GP9 & GP10 (Department of Agriculture, Food and the Marine, 2015).
RF-PD 06	No planting works will take place within 500m of an active hen harrier nest, or active nesting activity, during the months of March to August. Additionally, during the winter season, October to February, planting works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
RF-PD 07	The lands will be protected from livestock by the perimeter fence.
RF-PD 08	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
RF-PD 09	All 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.
RF-PD 10	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken <u>while cubs are present in the holt</u> and NPWS will be notified immediately
RF-PD 11	No wheeled vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
RF-PD 12	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to

	Local Authorities and relevant Statutory Consultees.
RF-PD 13	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).
RF-PD 14	No construction works will be carried within 50m of an active sett during the main breeding season (December 1 <sup>st</sup> to June 30 <sup>th</sup> ).
RF-PD 15	Planting works in the environs of a known active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. 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.

#### 5.2.4.1. Best Practice Measures

In addition to the Project Design Measures listed above, the following Best Practice Measures will be implemented during the planting and maintenance of the UWF Replacement Forestry. The Best Practice Measures have been developed by the authors of the Water and Biodiversity topic chapters using industry best practice, and will afford further protection to the Environment. These Best Practice Measures are listed below and included in full in [Appendix 5.1: UWF Replacement Forestry Best Practice Measures](#).

RF-BPM-01	Monitoring of non-native invasive plant species
RF-BPM-02	Management of general non-native invasive species
RF-BPM-03	Best practice methods to ensure the protection of Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> )

#### 5.2.4.2. Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of the invasive species.

This plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to incursions and control existing invasive species populations. The Invasive Species Management Plan is included as [Appendix 5.2: Invasive Species Management Plan](#).

#### 5.2.4.3. Monitoring

An Environmental Clerk of Works will be employed during the planting stage to monitor the implementation of the environmental protection measures, listed above.

### 5.3. Life Cycle Stages of UWF Replacement Forestry

#### 5.3.1. Planting Stage - UWF Replacement Forestry

##### 5.3.1.1. Duration & Timing

**Table 5-2: Duration and Timing of the Planting Stage**

Planting Activities	Duration of the Planting Stage	Timing of Construction Activities
Planting of native woodland saplings species	1 month	October through to March to correspond to the dormant period of deciduous tree species.

##### Hours of Work

Normal planting times will be 07.00 to 19.00hrs Monday to Friday and 08.00 – 16.30hrs on Saturdays. All planting will be carried out during daylight hours.

##### 5.3.1.2. Planting Personnel

Tree planting will be carried out by 4 No. forestry professionals.

##### 5.3.1.3. Welfare Facilities

The facilities at the Upperchurch Windfarm, comprising offices, welfare, and canteen and parking facilities will be available to the planting personnel.

##### 5.3.1.4. Planting Stage Activities

Planting stage activities will involve the following works:

- The planting areas and ride lines will be marked out as per [Figure RF 5.2: Planting Layout on Aerial Photography Mapping](#).
- The perimeter of the lands, including the watercourse, will be fenced with livestock proof fencing.
- A spade will be used to dig a suitable sized hole at the appropriate spacing. The roots of the transplant stock will be placed in the hole and spread evenly.
- The soil dug from the hole will then be placed around the roots and the plant will be fastened in by compacting the soil using a spade and by foot.
- The plant will be checked to ensure it is upright and secure in the ground.
- Protective tree guards will be fitted to protect the young trees from rabbit damage.
- Livestock proof fencing will be erected around the perimeter of the new woodland.

### 5.3.1.5. Use of Machinery and Equipment

The main machinery, equipment and tools which will be required during the planting stage are listed in:

**Table 5-3: Planting Stage machinery, equipment and tools**

Planting Machinery
Four-wheel drive vehicle
Tractor with post-driver fitted
Planting Equipment and Tools
Planting spades
Fencing tools

### 5.3.1.6. Use of Hydrocarbons

Hydrocarbons will be used during planting activities and will be limited to the diesel or petrol fuel and mechanical oils used by the site vehicles and machinery.

### 5.3.1.7. Other Facilities - Fuel Storage & Tool Storage

There will be no requirement for either fuel or tool storage.

### 5.3.1.8. Imported Planting Materials

The materials, which will be brought onto the site, are listed in Table 5-4 along with details of the quantity and source of the materials.

**Table 5-4: Quantities, type and source of planting materials**

Materials	Quantity	Source of Materials
Tree Saplings – c.20,000	2 No. loads	Dundrum, Co Tipperary
Wooden fencing posts	2 No. loads	Arrabawn Co-Op, Reiska
Fencing – sheep wire / barbed wire, gate	2 No. loads	Arrabawn Co-Op, Reiska

### 5.3.1.9. Water Quality Management

All planting will be carried out by hand. No pesticides, fertilizers or herbicides will be used.

### 5.3.2. Growth Stage – UWF Replacement Forestry

Once planted, the trees will go through numerous stages of growth from seed to sapling, through to maturity, old age and eventual decay with natural regeneration occurring through the lifecycle of the native wood.

#### 5.3.2.1. Duration and Timing of Growth Stage

The UWF Replacement Forestry will be a permanent native woodland, of type GPC9, according to Native Woodland Establishment GPC9 and GPC10 Silvicultural Standards 2015.

**Table 5-5: Duration and Timing of the Growth Stage**

Description	Duration	Timing
Growth Stage of the UWF Replacement Forestry	Permanent	None
Maintenance Activities	2 days to 1 week per year.	Early Summer / Late Autumn

#### 5.3.2.2. Growth Stage - Personnel

2 No. personnel will be involved in annual inspections and maintenance of the new native wood.

#### 5.3.2.3. Operational Activities

The new wood will require more maintenance during the first five years of its growth than at later stages of growth. During the first five years, the wood will be inspected twice yearly and brambles and rough grasses removed from the area immediately around the tree trunks.

The tree guards, which will have been fitted during planting, will also be removed once the tree has outgrown them.

The level of light and mix of ground cover (tall grass, short grass & scrub) in the open space ride lines will be managed throughout the growth stage by thinning, clearing and controlled grazing.

#### 5.3.2.4. Use of Machinery and Equipment

Use of machinery and equipment and tools which will be limited to thinning operations and scrub clearance. No materials will be required during the Growth Stage.

**Table 5-5-6: Use of Machinery and Equipment during the Growth Stage**

Machinery	Equipment	Materials
4x4 vehicle for routine inspection	Trimming and scrub clearance tools	None
Small tractor for fence maintenance	Chainsaws and axes	

#### **5.3.2.5. Use of Hydrocarbons**

A small volume of hydrocarbons will be used during maintenance activities and is limited to the diesel or petrol fuel used for the occasional site vehicles and equipment.

#### **5.3.2.6. Welfare Facilities**

Due to the very low levels of activity, there will be no requirement for welfare facilities.

#### **5.3.2.7. Other Facilities - Fuel Storage & Tool Storage**

There will be no requirement for fuel storage. There will also be no requirement for tool storage facilities - all tools will be brought onto the UWF Replacement Forestry site as required.

### **5.3.3. Changes to the Project**

Other than thinning activities, natural maturation, old age and regeneration, no other changes to the native woodland are expected. The UWF Replacement Forestry will be permanent forest cover and will not be felled.

## 5.4. Use of Natural Resources, Emissions & Waste

### 5.4.1. Use of Natural Resources

The resources which will be imported onto the site or which will be obtained from within the site during planting and growth stage are described below.

#### 5.4.1.1. Use of Resources: Land

In total, 6ha of agricultural land will permanently change use to forestry.

#### 5.4.1.2. Use of Resources: Biodiversity

##### Planting and Growth Stages

In total 6ha of mixed species, native woodland will be created, which will comprise tall trees and understory shrubs, along with wide ride-lines, and a mix of tall grasses, short grasses and scrub land cover maintained during the growth stage. This will enhance biodiversity in the area.

New trees and shrubs will be set back at least 10m from the watercourse which runs through the western portion of the UWF Replacement Forestry lands.

The afforestation lands will be protected from livestock by the perimeter fence.

#### Invasive Species Management

Best Practice Measures will be employed during the planting of the UWF Replacement Forestry (see RF-BPM-01 and RF-BPM-02 in [Appendix 5.1 UWF Replacement Forestry Best Practice Measures](#)). These best practice measures includes; checking packaging for the presence of white toothed shrew and prior to arrival on site, thoroughly cleaning and drying the contractor's vehicles and equipment; high-pressure steam cleaning, with water hotter than 65 degrees Celsius, in addition to the removal of all vegetative material, of all vehicles and equipment involved in the planting of the new woodland.

In addition to the Best Practice Measures, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of the invasive species. This plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to incursions and control existing invasive species populations. The Invasive Species Management Plan is included as [Appendix 5.2: Invasive Species Management Plan](#).

#### 5.4.1.3. Use of Resources: Water

##### Planting Stage

All water requirements for welfare facilities and drinking purposes will be supplied at the Upperchurch Windfarm Site Office during the Planting Stage, no additional water will be required.

##### Growth Stage

There will be no requirements for water during the growth stage.



#### 5.4.1.4. Use of Resources: Soils

##### **Planting Stage**

Planting will be carried out by hand using spades, small localised patches of disturbed soil will occur at the sapling tree trunks.

##### **Growth Stage**

No soils or rock will be excavated during the growth stage.

## 5.4.2. Emissions

### Planting & Growth Stages

**Dust** will not arise, due to the absence of mechanical excavation of and storage of soils.

Very small quantities of **Vehicle Exhausts Fumes** will be emitted by vehicles and machinery during planting and occasional maintenance activities.

**Noise:** Vehicles, machinery and equipment to be used during planting and maintenance activities will emit some noise during their operation.

**Vibration:** Due to the type of machinery which will be used and the nature of the planting and growth activities - no vibration emissions are expected.

**Light:** No light emissions will occur as there will be no requirement to light any part of the UWF Replacement Forestry. All planting and maintenance activities will be carried out during daylight hours.

## 5.4.3. Waste

### Planting Stage

**Waste Water:** No waste water will occur at the UWF Replacement Forestry site. Toilet facilities at the Upperchurch Windfarm site office will be used by planting personnel.

**General Waste such** as packaging, and excess planting materials will be generated in small quantities during the Planting Stage. This waste will be removed from the lands and stored at a designated area at the Upperchurch Windfarm site office with other General Waste arising from the Upperchurch Windfarm operational activities. General waste will be collected by licensed collector - Arlo Group or other appropriately licensed operator and transported to their approved licensed facilities at Thurles, County Tipperary or other appropriately licensed facility.

**Arising's and Contaminated Material:** No arisings or contaminated materials are expected.

**Chemical waste:** No chemical wastes are expected.

### Growth Stage:

Waste will be minimal at the growth stage and confined to maintenance activities.

## 5.5. Vulnerability of the Project to Major Accidents and Risks to Human Health

Major accidents or natural disasters which have the potential to affect the UWF Replacement Forestry are described hereunder. The vulnerability (exposure and resilience) of the UWF Related Works to major accidents and disasters and the risk of these accidents or disasters is classified according to the *Guide to Risk Assessment in Major Emergency Management* (DoEHLG, 2010). This Guide is included as [Appendix 5.5 Volume C4: EIA Appendices](#).

### 5.5.1. Vulnerability to Major Accidents

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

The UWF Replacement Forestry is **not vulnerable to Major Accidents**, due to the negligible volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the planting and growth stages. Furthermore there are no Seveso sites in proximity to the UWF Replacement Forestry site, the closest being Grassland Agro in Limerick and MSD (pharmaceutical) in Kilsheelan, near Clonmel, Co Tipperary.

### 5.5.2. Vulnerability to Natural Disasters

The following natural disasters are considered; land slippage and flooding. The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines. The risk classification tables are included in [Appendix 5.5: A Guide to Risk Assessment in Major Emergency Management Jan 2010](#).

#### 5.5.2.1. Land Slippage

The UWF Replacement Forestry is **not vulnerable to land slippage** as the afforestation site is located on agricultural grassland which is inherently stable and no excavations will occur – planting will be carried out by hand.

#### 5.5.2.2. Flooding

In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland. Where complete the Catchment Flood Risk Assessment and Management (CFRAM)<sup>2</sup> 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 Replacement Forestry and therefore the PFRA maps have been consulted.

A Stage II Flood Risk Assessment was completed for the subject development by Hydro Environmental Services, a specialist hydrological and hydrogeological consultancy, who concluded that although a section of the UWF Replacement Forestry site is located in a mapped fluvial Flood Zone A (100-year flood zone),

<sup>2</sup> 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 will be no new permanent infrastructure (roads or watercourse crossing structures) required for the UWF Replacement Forestry. In addition, the planting will be carried out by hand with minimal disturbance to soil. The authors of the Flood Risk Assessment concluded that the UWF Replacement Forestry **is not vulnerable to flooding**.

### 5.5.3. Overall Risk

Should a disaster occur, unconnected to the project but in the locality – the UWF Replacement Forestry will not make the consequences of the event worst. In addition the presence of the UWF Replacement Forestry will not increase the likelihood of such an event occurring.

## 5.6. Cumulative Descriptions

**Table 5-7: UWF Replacement Forestry - Element 3 of the Whole UWF Project**

Element No.	The Subject Development	Composition of the Subject Development	Relevant Appendix Location for description of each element
3	<a href="#">The Subject Development</a> UWF Replacement Forestry (RF)	Replacement Forestry at Foilnaman	Current afforestation license application to Department of Agriculture, Food & the Marine

An **overview of Element 3, UWF Replacement Forestry**, the subject development, is provided in [Section 5.2.2](#) above. A **full description** of the subject development is provided in the **successive Sections 5.2 to 5.5**.

### 5.6.1. Description of the Other Elements of the Whole UWF Project

In order that a cumulative evaluation can be carried out for the UWF Replacement Forestry, an overview description is provided hereunder of all the other elements of the whole UWF project.

**Table 5-8: Element 1 and Element 3 to 5 of the Whole UWF Project**

	Element of the whole UWF project	Composition of each Element	Relevant Appendix Location for description of each element
1	UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Grid Connection Access Roads Grid Connection Ancillary Works	Appendix 5.1
2	UWF Related Works (RW)	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	Appendix 5.2
4	Upperchurch Windfarm (UWF)	Consented UWF Turbines Consented UWF Substation Consented UWF Roads UWF Ancillary Works	Appendix 5.3
5	UWF Other Activities (OA)	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	Appendix 5.4

#### **Relevant Volume C3 EIAR Figures:**

[Figure CE 1.1: Location of UWF Replacement Forestry and the Other Elements of the Whole UWF Project on OSI Mapping.](#)

An EIA Report has also been prepared to accompany concurrent planning applications to the relevant Competent Authorities, for the UWF Grid Connection and the UWF Related Works.

This information on these other elements of the whole UWF project can be found in the following locations;

- **Full EIA Report** or EIS (as appropriate) for **Elements 1, 2, and 4** in [Volume E: Reference Documents for Other Elements of the Whole UWF Project](#).
- **Description of each elements 1, 2, 4, and 5** (presented in a format similar to this chapter and with smaller scale reference mapping and figures) in [Appendix 5.1 to Appendix 5.4](#), see [Volume C4: EIAR Appendices](#).
- **Overview description of each elements 1, 2, 4, and 5** in this Section hereunder.

### 5.6.1.1. Element 1: UWF Grid Connection

An application for planning permission for UWF Grid Connection has been submitted directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006). The application is accompanied by an EIA Report.

The full **EIA Report including mapping and figures for UWF Grid Connection** is included in **Volume E: Reference Documents for Other Elements of the Whole UWF Project**.

An extract from Volume E of the **detailed description** of the UWF Grid Connection (presented in a format similar to 5.2 to 5.5 above) along with a **copy of the accompanying figures** is included in **Appendix 5.1: Description of Development (UWF Grid Connection)**.

**A summary overview of UWF Grid Connection is provided hereunder.**

#### 5.6.1.1.1. Location and Characteristics of UWF Grid Connection

The UWF Grid Connection will comprise of the following:

**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; lightning 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 provide access to Mountphilips Substation and the Joint Bay locations along the 110kV UGC, New Permanent Access Roads will be constructed. Permanent access will also include upgraded existing farm and forestry roads.

**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.

#### 5.6.1.1.2. UWF Grid Connection: Construction & Operation

**UWF Grid Connection Construction Phase:** All elements of the whole UWF project will be constructed at the same time. Construction of UWF is expected to commence in 2018/2019 and will take approx. 12 months. Approximately 100 persons will be engaged in the pre-construction, main construction, cable jointing and commissioning works for the UWF Grid Connection. 1050 No. loads of concrete; 455 No. loads of aggregate; 59 No. loads of hard core; and 108 No. loads of surface dressing (public road sections) will be imported from Roadstone Killough, Co Tipperary and Bunratty, Co Clare and Shanballyedmond, Rear Cross. 22 No. loads of general building materials including geotextile, and 126 No. loads of electrical plant and equipment including lattice towers, control building doors and switching gear, will be imported to the site from various suppliers throughout Ireland and the EU.

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

**UWF Grid Connection use of Natural Resources: Construction Phase –** There will be 39.1 hectares of **land** required for the construction works site. 1.3ha of **coniferous forestry** will be permanently felled. 45m of **hedgerow** and 30 No. of **trees** of varying maturity will be permanently removed to facilitate either a permanently widened entrance off the public road or a new permanent access road. These hedgerows and trees will be replaced immediately adjacent to the area. On a number of hedgerows, a specially designed bat crossing structure will be erected at new entrances. These structures will be timber frames with vegetation attached, which will provide a continuation of flight-line for bats during the works. 820m of hedgerows, which include trees of varying maturity, located close to works areas will be pruned to facilitate passage of machinery along works areas. c.700m of new hedgerow will be planted with locally sourced native species. **Water** required for welfare facilities will be brought onto site. Approximately 9,615m<sup>3</sup> of **topsoil**, 1,265m<sup>3</sup> of **peat**, 2,390m<sup>3</sup> of **subsoil** and 120m<sup>3</sup> of **rock** will be permanently excavated from the works areas. 660m<sup>3</sup> of spoil will also arise during excavations in public roads. 8,370m<sup>3</sup> of the excavated material will be permanently stored along the 110kV UGC works area as linear berms and remainder (5,020m<sup>3</sup>) will be reinstated within the works area. In addition, up to 11,140m<sup>3</sup> of soils will be temporarily excavated from the construction works area boundary, including from the cable trench and from the footprint of any excavated temporary stone roads and will be temporarily stored, within the construction works area, to backfill, reinstate and landscape the works areas.

**UWF Grid Connection use of Natural Resources: Operation Phase –** The Land required will reduce considerably to just 4.2ha of land permanently changing use - mainly comprising the footprint of the Mountphilips Substation and the footprint of any new access roads which will provide access to the Joint Bays. No further **forestry felling, hedgerow or tree pruning or removal** will be required during the operational stage. Non-potable **water** requirements will be provided at the Mountphilips Substation via a

rain water harvesting system, and drinking water will be brought onto site as needed. **No excavations of soils** will be required during the routine operation of the Grid Connection. Planned maintenance or unplanned repairs, if any occur are likely to involve the re-opening of the underground chambers, at Joint Bays. This work which will result in very small volumes of crushed stone and sand being temporarily removed from the area directly over the joint bay covers, stored adjacent to the Joint Bay, and re-used to reinstate the top of the Joint Bay following the completion of the repairs.

**UWF Grid Connection Emissions:** Dust, construction machinery exhaust, noise, vibration and light will be emitted during the construction stage, negligible levels are associated with the operation and maintenance activities. During operation, Mountphilips Substation will emit **noise** however this is unlikely to be audible above the existing background noise levels at nearest residence, which is 385m distant. The operational sub-station and 110kV underground cable will be a source of very low frequency (50Hz) **electromagnetic fields**.

**UWF Grid Connection Waste:** Waste water from construction stage welfare facilities will be contained in self-contained units and emptied by a licenced facility. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at the Temporary Compounds, C1, C2 and C3. Waste will be collected by an appropriately licensed waste contractor. Any wastes which result from the construction of the UWF Grid Connection will be managed under a specific **Waste Management Plan**. During operation, there will be minimal general and chemical waste during the Operational Stage, with any waste taken offsite by ESNB personnel.



### 5.6.1.2. Element 2: UWF Related Works

An application for planning permission for UWF Related Works has been submitted to Tipperary County Council. This application is accompanied by an EIA Report.

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

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

**A summary overview of UWF Related Works is provided hereunder.**

#### 5.6.1.2.1. Location and Characteristics of UWF Related Works

The UWF Related works comprises of the following:

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

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

**Realigned Windfarm Roads** to realign the consented UWF Roads at three locations;

The consented windfarm road to Turbine No.5 in Shevry is 560m in length, and it will replace this road in its entirety with a new road 230m in length through forestry. This will require forestry felling of 0.2ha.

The consented UWF road between Turbine No.19, Turbine No. 20 and Turbine No. 21, is 840m in length. It will replace 370m of this road with a new road also 370m in length. 220m of this road will be located on grassland field, with the remaining 150m in length located on existing farm road. The existing farm road section will be upgraded during construction works.

A short length (30m) of new access road will be between the consented UWF roads in Knockmaroe to the new Telecom Relay Pole.

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

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

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

#### 5.6.1.2.2. UWF Related Works: Construction & Operation

**UWF Related Works Construction Phase:** All elements of the whole UWF project will be constructed at the same time and is expected to commence 2018/2019 and will take approx. 12 months. 5 of the c.100 persons working directly on the Upperchurch Windfarm site will work on UWF Related Works. A specialist communication engineering crew, made up of c. 2 personnel, will be involved in the erection and set up of the Telecom Relay Pole. The UWF Related Works, 23 No. loads of concrete and 292 No. loads of aggregate will be transported to the site by HGV, from local suppliers. A further 2 No. loads of road surfacing material, 7 No. loads of hard core and 43 No. loads of specific building materials will also be imported to the site, from various suppliers in the Region.

**UWF Related Works Operational Phase:** UWF has been granted permission to operate for 25 years from the date of commissioning. UWF Related Works will operate for the same period as the windfarm. The personnel employed in O&M for the windfarm will also maintain the UWF Related Works.

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

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

**UWF Related Works Waste** UWF Related Works personnel will use the welfare facilities and waste facilities provided at the Windfarm Site Compound No. 1 and No. 2. At these facilities, waste water will be contained

in self-contained units and emptied by a licenced facility or, in the case of the Site Offices, will be treated in the existing septic tank. General and chemical waste will be segregated and stored in allocated tanks, bins, skips or areas at Site Compound No.1 and collected by an appropriately licensed waste contractor. There will be minimal general and chemical waste during the **Operational Stage**. This waste will be stored in a designated and secure area at the windfarm site offices and collected by an appropriately licenced operator. Welfare facilities for the O&M crew will be provided at the windfarm site offices. Any wastes which result from the construction, operation and decommissioning of UWF Related Works will be managed under the Waste Management Plan for the operating UWF.

### 5.6.1.3. Element 4: Upperchurch Windfarm

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

An application for planning permission for Upperchurch Windfarm (Consented UWF) was made to Tipperary County Council in January 2013. The windfarm was permitted by Tipperary County Council in January 2014 and the permission was upheld by An Bord Pleanála in August 2014. The application was accompanied by an EIA Report (known as EIS at the time) and Natura Impact Statement. The full planning documents for consented UWF can be found in [Volume E: Reference Documents for Other Elements of the Whole UWF Project](#).

#### 5.6.1.3.1. Overview of the Location and Characteristics of Upperchurch Windfarm

UWF will comprise 22 wind turbines with an overall height up to 126.6 metres, 2 meteorological masts with an overall height of up to 80 metres, turbine foundation and crane hardstanding areas, access roads and an electrical substation.

The Upperchurch Windfarm site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnahan, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin. This is an area 2km west of Upperchurch village and 18km to the west of Thurles, County Tipperary.

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

A document, with a **detailed description of the Upperchurch Windfarm**, has been compiled from the original 2013 Upperchurch Windfarm EIS, from the Reply to Further Information, the additional information submitted during the planning process and mitigation measures and planning conditions attaching to the Grant of Permission, to reflect a description of the development as it is now permitted. This compilation document has been prepared in the same format as the current application Chapter 5, for ease of cross referencing. The compilation document can be found in [Appendix 5.3: Compiled Description of Upperchurch Windfarm](#).

The full planning documents for consented UWF can be found in [Volume E: Reference Documents](#).

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

- **Consented UWF Turbines** - 22 No. wind turbines of the three-bladed, tubular tower model, light grey in colour and an overall height to blade tip upto 126.6m. The turbines will be constructed on concrete bases with an adjacent hard-core hardstand area. There is no requirement for fencing of turbine areas. The turbines will be connected by underground cables to the Consented UWF Substation.
- **Consented UWF Substation** - 110kV substation compound which includes a control building, main transformer and other electrical equipment enclosed in a compound by a palisade fence. The substation will measure 64m x 41m.
- **Consented UWF Windfarm Roads** - 11.6km of windfarm access roads will comprise 8km of newly built 5m wide roads and 3.6km of existing farm roads which will require upgrading and widening (by an average of 2m).
- **Consented Ancillary Works** - The main items of ancillary works will include, 2 No. meteorological masts up to 80m in height; 11 No. site entrances; 1 No. stream crossing; site drainage system; 2 No.

construction site compounds; 6 No. borrow pits from which most of the aggregate required will be won; forestry felling, hedgerow removal and reinstatement; excavation, storage and reinstatement of soils..

#### 5.6.1.3.2. Upperchurch Windfarm: Construction & Operation

**UWF Construction Phase:** All elements of the whole UWF project will be constructed at the same time.

Construction of UWF is expected to commence 2018/2019 and will take approx. 12 months. Approximately 277 persons will be engaged in the civil, electrical, project management, legal and financial services, material supply and component deliveries for the windfarm. Approximately 950 No. loads of concrete; 15 No. loads of reinforcing steel and 5 No. loads of general building materials and 212 No. loads of electrical plant and equipment (abnormal size loads) will be imported to the site by HGV. The abnormal turbine loads will be transported from Foynes Port.

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

**UWF use of Natural Resources:** 56.3 hectares of land within the construction works site will reduced to 6.4 ha during the operational phase; Approx. 108,000m<sup>3</sup> of excavated soils; 43,000m<sup>3</sup> of aggregate mostly won on-site and otherwise imported from local quarry at Shanballyedmond, Rear Cross; small amounts of potable and non-potable water, sourced at an existing well at the windfarm site offices in Site Compound No. 2; felling of 4.4 hectares of conifers; 960m of hedgerow removed.

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

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

#### 5.6.1.4. Element 5: UWF Other Activities

Although UWF Other Activities do not require planning permission, they do form part of the whole UWF project and therefore are included in the cumulative evaluation. A description of these activities, along with **mapping and figures** is included in [Appendix 5.4: Description of the UWF Other Activities](#).

An overview of UWF Other Activities is provided hereunder.

##### 5.6.1.4.1. Location and Activities of UWF Other Activities

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

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

**Monitoring Activities** will monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the UWF 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented UWF; and measures in the 2018 UWF Grid Connection EIA Report, the 2018 UWF Related Works EIA Report and the 2018 UWF Replacement Forestry EIA Report and associated UWF Grid Connection Environmental Management Plan and UWF Related Works Environmental Management Plans. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement.

**Overhead Line Activities** include re-sagging activities and fibre wrapping activities. The purpose of the re-sagging activities is to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters. The purpose of fibre wrapping is to provide a communication link to the newly installed Mountphilips Substation. The tension will be corrected on 2 no. Sections - i) between ESNB Angle Mast Structure No. 79 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and ii) between New Mountphilips End Mast No. 2 and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). Wrapping the overhead line with fibre optic cable from Killonan ESNB substation (just east of Limerick City) to Mountphilips substation. The Overhead Line Activities will be carried out according to

industry standard method statements, including standard health & safety and environmental management systems.

#### 5.6.1.4.2. UWF Other Activities: Construction & Operation

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

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

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

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

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

### 5.6.2. 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 the consented Upperchurch Windfarm.

The UWF Replacement Forestry is located adjacent to Other Elements of the Whole UWF Project, in particular:

- the UWF Other Activities (Upperchurch Hen Harrier Scheme)
- the consented Upperchurch Windfarm
- the UWF Related Works – Internal Windfarm Cabling

#### **Relevant Volume C3 EIAR Figures:**

Figure CE 1.2: UWF Related Works and the Other Elements of the Whole UWF Project in the Upperchurch Windfarm area.



### **5.6.3. Secondary Projects**

The development of the UWF Replacement Forestry is not expected to result in any secondary or consequential development.

In relation to the Other Elements of the Whole UWF Project, the addition of Mountphilips Substation (UWF Grid Connection) will add a new high voltage electrical substation in the Newport area. This may facilitate new connections to the Mountphilips substation in the future. There are no new connections planned at present.

### 5.6.4. Description of Other Projects and Activities

A cumulative evaluation of the effects of the subject development together with the Other Elements of the Whole UWF Project and Other Projects or Activities is presented in the Environmental Factor topic chapters.

Other Projects or Activities in the area were scoped using geographical and time-frame boundaries and conceptual site model exercises, see [Appendix 2.3: Scoping of Other Projects or Activities](#). The results of this scoping exercise is presented in Table 5-12, where Other Projects or Activities which have been scoped in for cumulative evaluation are listed in the left hand column of the matrix table, and the relevant Environmental Factor topic is identified in grey shading in the matrix.

**Table 5-9: List of Other Projects or Activities included in the Environmental Factor Cumulative Evaluation**

Project <i>(These projects are identified on Figure CE 2.1: Other Projects or Activities Scoped In for Evaluation in the Environmental Factor Topic Chapters)</i>	Population	Human Health	Biodiversity	Land	Soils	Water	Air	Climate	Built Services	Roads & Traffic	Cultural Heritage	Landscape
Existing Killonan to Nenagh 110kV Overhead Line									-			
Existing Shannonbridge – Killonan 220kV Overhead Line												
Consented Bunkimalta Windfarm												
Consented Castlewaller Windfarm												
Existing Milestone Windfarm (includes permitted turbine at Inchivara) currently under construction												
Operational Windfarms in the Republic of Ireland												
Existing Communication Structures - Foilnaman Mast - Cummermore Communications Pole												
Consented Project – Newport Distributor Road, Newport												
Consented Project - Industrial warehouse Units at Thurles												
Existing/consented Project - Thurles Regional Water Treatment Works												
Consented Gortnahalla Turbine												
Killuragh Digester Plant												
Housing Development in Doon and Annacotty												
Agricultural Developments - Milk Milking Parlour in Cappamore, Milking Parlour in Lisnagry, Slatted Sheds and Stores in Pallasgreen, Slatted Shed in Gortussa.												
Activity – Forestry												
Activity – Agriculture												
Activity –Turf-cutting												

A brief overview of each of the above listed projects is provided below. The location of each project in relation to the elements of the Whole UWF Project is identified on [Figure CE 2.1: Other Projects or Activities Scoped In for Cumulative Evaluation in the Environmental Factor topic chapters](#).

#### **5.6.4.1 Existing Killonan to Nenagh 110kV Overhead Line**

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

#### **5.6.4.2 Existing Shannonbridge – Killonan 220kV Overhead Line**

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

#### **5.6.4.3 Consented Bunkimalta Windfarm**

The Bunkimalta Windfarm is a consented 16-turbine windfarm, located on Coillte lands, c.2.5km to the north of the UWF Grid Connection at Bunkimalta, Bauraglanna, Lackabrack, Knockfune and Foilduff at, Keeper Hill, Co. Tipperary.

Bunkimalta Windfarm will comprise 16 wind turbines, each having a rated electrical output of approximately 2,500 - 3,000 kilowatts, access tracks, a fenced Electrical Transformer Station comprising a single-storey Control Building and Substation, an effluent treatment system, three anemometer masts, repository areas, borrow pits and all associated site works, above and below ground. Each wind turbine will comprise a tower up to a maximum of 100 metres high, with a diameter of about 4 metres at the base. Three blades, up to a maximum of 50 metres in length, will be attached.

The Bunkimalta Windfarm will connect to the National Grid via an already consented underground grid connection to the existing Nenagh Substation, on the outskirts of Nenagh town.

The Bunkimalta Windfarm could be constructed during the same period as the UWF Grid Connection and the Whole UWF Project. Bunkimalta Windfarm, when built, will be operational during the operational stage of the Whole UWF Project.

An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 13510035.

#### **5.6.4.4 Consented Castlewaller Windfarm**

The Castlewaller Windfarm is a 16-turbine windfarm, comprising 16 wind turbine generators (each with a maximum hub height of 100m, maximum rotor diameter of 90m, and with a total tip height of 145m), one permanent meteorological mast, 2 borrow pits, a sub-station including a control building, new internal access roads, upgrading of existing internal access roads, expansion of drainage system, turbine hardstands, wastewater holding tank, underground cables and ancillary works which is located along part of the 110kV UGC route in Castlewaller townland.

An Environmental Impact Statement and Natura Impact Statement accompanied the planning application 11/51/0251 for Castlewaller Windfarm.

Castlewaller Windfarm has not as yet secured a grid connection offer to connect to the National Grid from either Eirgrid or E.S.B Networks and therefore is not likely to be in construction at the same time as the construction of the Whole UWF Project.

#### **5.6.4.5 Existing Milestone Windfarm**

Milestone Windfarm is a consented 6-turbine windfarm located adjacent to the southwest of the consented Upperchurch Windfarm with 5 No. turbines consented under planning ref: 12510385 at Knockcurraghbola Commons, Knockcurraghbola Crownlands, Graniera, Shevry and 1 No. turbine consented

under planning ref: 1410 at Inchivara and Knockduff. When constructed, Milestone Windfarm will comprise of wind turbines each with a maximum tip height of 126m, along with new access tracks, and electrical substation, a borrow pit and associated works. The grid connection associated with the Milestone Windfarm is towards the south at ESNB Cauteen Station, to be cabled along the public road network. An Environmental Impact Statement accompanied the planning applications for Milestone Windfarm – Ref: 12510385 & 1410.

Milestone Windfarm is currently under construction with construction works expected to be completed before the commencement of the construction of the subject development or any of the other elements of the Whole UWF Project. Therefore there will be no overlap of construction periods.

Part of the landholding associated with the Milestone Windfarm occurs within one of the landholdings associated with the 110kV UGC element of the UWF Grid Connection, in Knockcurraghbola Commons townland.

#### **5.6.4.6 Operational Windfarms in the Republic of Ireland**

The Republic of Ireland has a generating capacity of 2,909.66 MW based on 233 windfarms.

#### **5.6.4.7 Existing Communication Structures**

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

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

#### **5.6.4.8 Consented Project – Newport Distributor Road, Newport**

Consented public road development at Newport, County Tipperary, comprising the demolition of two habitable dwellings and the provision of a distributor road between the R503 and local county road (Murroe Road) and associated site works including footpaths, lighting, cycle tracks and drainage, at Tullow, Newport County Tipperary. The road development is within the Newport River catchment and also located upstream of the Lower River Shannon SAC. Planning Ref: 07511157.

#### **5.6.4.9 Consented Project – Industrial Warehouse Units at Thurles**

The construction of 1 No. Light Industrial/Warehousing building (gross floor area 2360.6sq.m.) at Bawntameena, Nenagh Road, Thurles, along with a roundabout and access Road from Nenagh Road (R498) complete with necessary improvement works and road markings, a car park and loading areas and ancillary works; in addition the construction of a foul water pumping station and all associated works. Planning ref: 16600037.

#### **5.6.4.10 Consented Project - Thurles Regional Water Treatment Works**

The construction of a water treatment plant at Bohernacrusha, Killeenyarda, Holycross and outfall to the River Suir. The water treatment plant will consist of a water treatment and administration building, sludge dewatering building, ESB sub-station, generator & oil tank enclosure, raw water balancing tank, clear water tanks, sludge balancing tank, sludge thickening and sludge holding tank, washwater tank, sludge skip and emergency sludge storage area, chemical storage tanks, washwater storage tank and all associated site development and site excavation works above and below ground. Planning Ref: 16600877.

**5.6.4.11 Consented Gortnahalla Turbine**

Single wind generator with a maximum output set at 500kw, hub height 65m at Gortnahalla, near Upperchurch, Co Tipperary. Planning Ref: 12510368.

**5.6.4.12 Killuragh Digester Plant**

Development of a digester plant, associated ABP building and associated site works to process farm slurry and other organic material to provide renewable energy and fertilizer, in Killuragh, Pallasgreen, Co Limerick. Planning Ref: 111066.

**5.6.4.13 Housing Development in Doon and Annacotty**

Two housing developments: Construction of 25 no. houses consisting of 5 no. 4 bed detached dwellings, 20 no. 3 bed semi-detached dwellings, a bored well, entrance and roads together with associated site works and services at Bottle Hill, Doon, Co Limerick, Planning Ref: 16530; and Construction of 48 dwellings at Annacotty & construction of 240 dwellings in three areas/lots at Walkers Road, Annacotty, Co Limerick, Planning Ref: 137026 and 137094.

**5.6.4.14 Agricultural Developments**

Agricultural developments include a milk Milking Parlour in Cappamore, Co Limerick (Planning Ref: 15255), a Milking Parlour in Lisnagry, Co Limerick (Planning Ref: 15194), Slatted Sheds and Stores in Pallasgreen, Co Limerick (Planning Ref: 17133), and a Slatted Shed in Gortussa, Dundrum Co Tipperary (Planning Ref: 14600343).

**5.6.4.15 Activities – Forestry, Agriculture**

Agriculture and forestry are the predominant land uses in the area of the Whole UWF Project.

**5.6.4.16 Activity – Turf-Cutting**

Turbary (rights to cut turf) exists at Bleanbeg Bog immediately to the north of the UWF Grid Connection (110kV UGC) in the Castlewaller area.

**The above projects and activities are included in the cumulative evaluations in the Environmental Topic chapters – Chapters 6 to 17. The relevant Environmental Factor topic is identified on Table 5-9.**

Appendix to Chapter 5: Description of Development (UWF Related Works)

Appendix 5.4: Description of Development (UWF Replacement Forestry)

## **Figures and Mapping**




Title:  
Figure RF 5.1

Location of UWF Replacement  
Forestry on OSI Discovery Mapping

Map Number:  
Map 1 of 1

Legend

 UWF Replacement Forestry

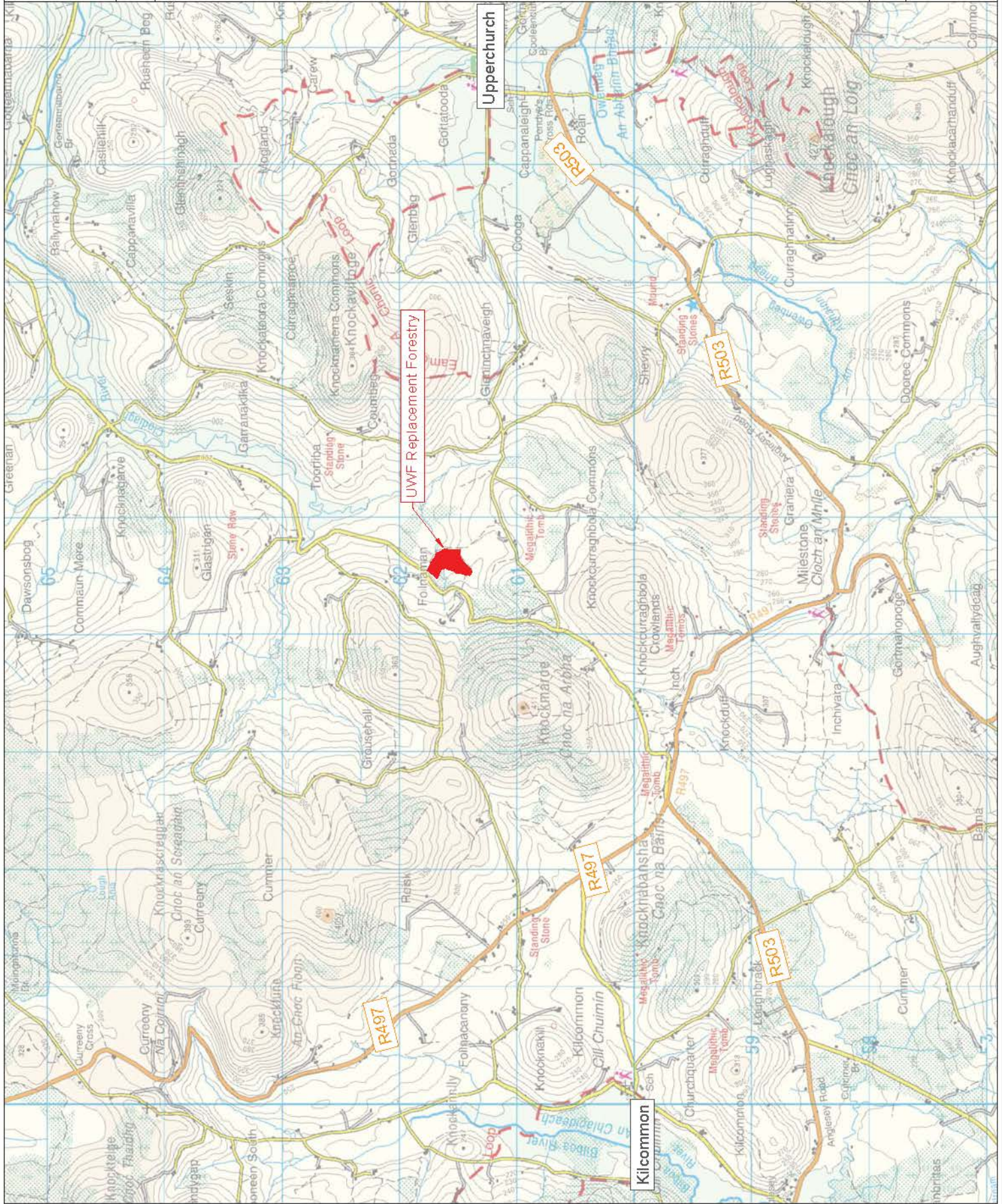


Project:  
UWF Replacement Forestry (RF)

Drawn By: AB  
Checked By: JB  
Date: 19-Feb-18  
Scale: A4



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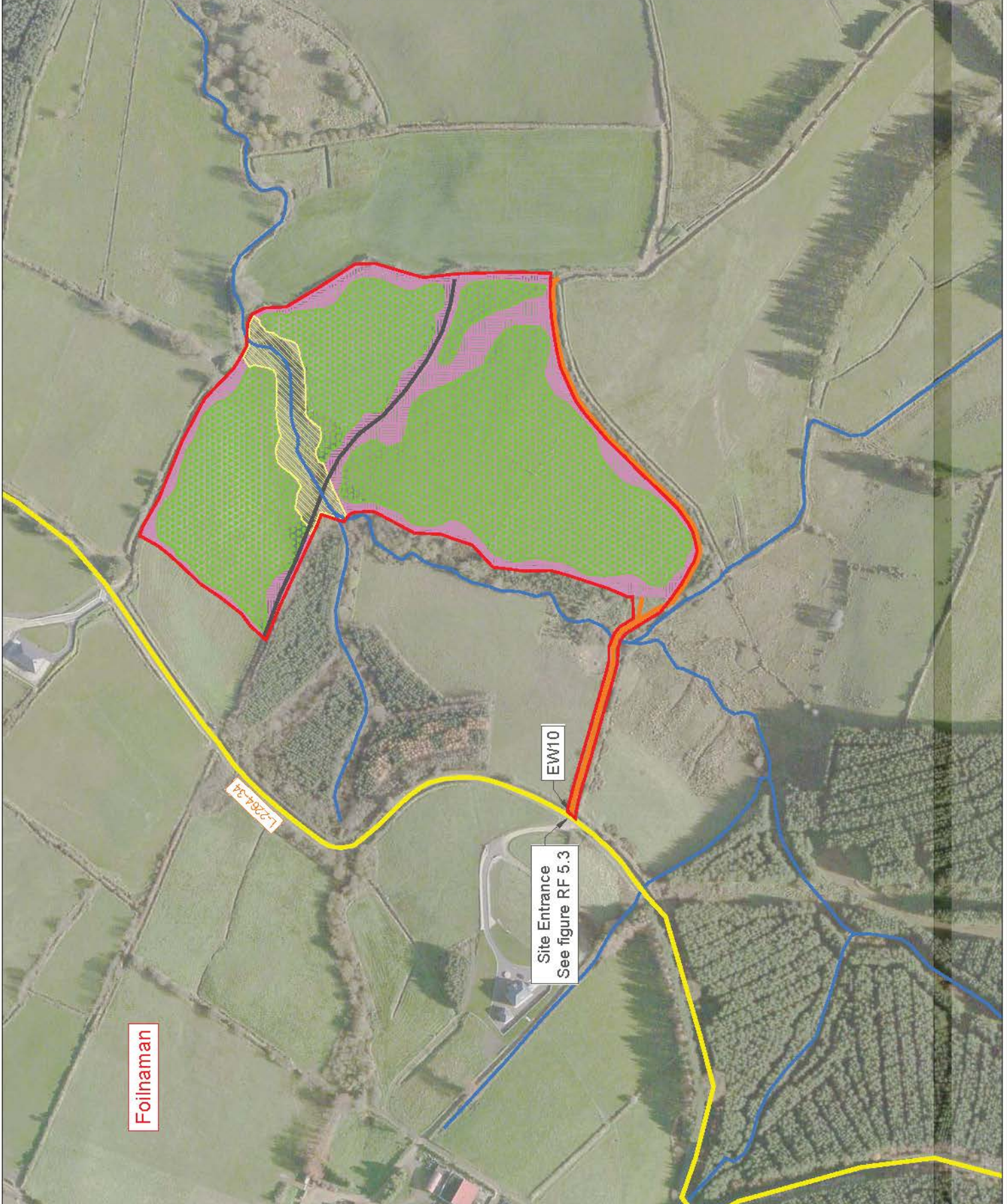
Title:  
Figure RF 5.2

Planting Layout on Aerial  
Photography Mapping

Map Number:  
Map 1 of 1

Legend:

-  Ride Lines
-  Planting Area
-  Riparian Zone
-  Site Boundary
-  Existing Access Road
-  Existing Hedgerows
-  Watercourse
-  Public Road
-  Site Entrance







Project:  
UWF Replacement Forestry (RF)

Drawn By:	AB	Checked By:	JB	Date:	19-F80-18	Sheet No.:	A4
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Title:  
**Figure RF 5.3**  
Entrance for Replacement  
Forestry Lands

Map Number:  
Map 1 of 1

Legend:

-  Public Road
-  Existing farm track
-  Public Road Number
-  Existing sightlines



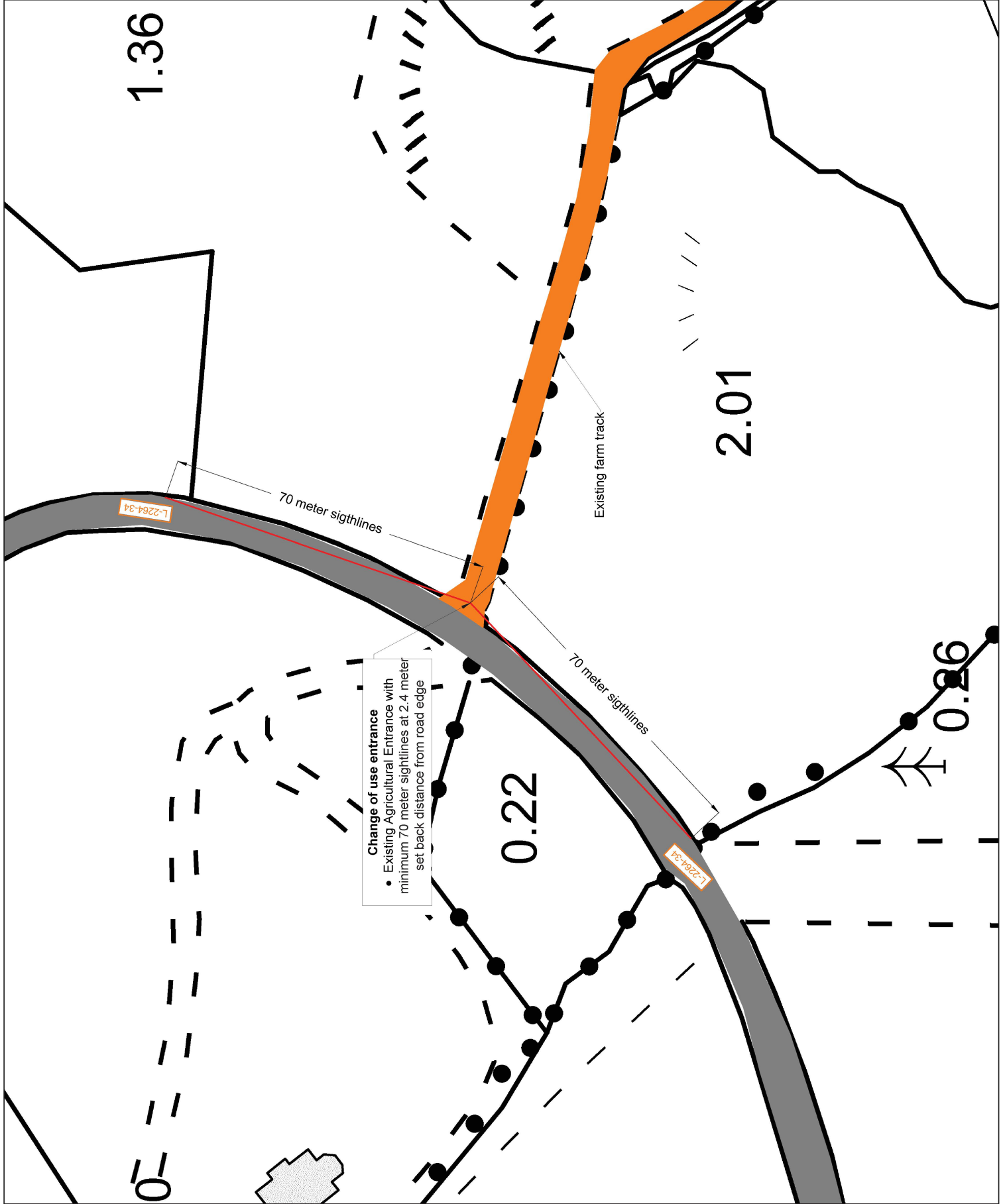
Project:  
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# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A7: Project Information**

### **Compiled Description of UWF Grid Connection**



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## Appendix to Chapter 5: Description of Development (UWF Related Works)

### Appendix 5.3: Description of Development (UWF Grid Connection)

The data and descriptions in this appendix have informed Chapter 5: Description of Development (UWF Related Works) of the EIA Report. The information presented in this Appendix 5.3 is outlined below and the relevant element(s) of the Whole UWF Project are also identified.

Appendix	Title	Relevant EIAR
A.5.3	Description of Development (UWF Grid Connection)	UWF Grid Connection



## **Appendix to Chapter 5: Description of Development**

### **Appendix 5.3 Compiled Description of UWF Grid Connection**



## Appendix to Chapter 5: Description of Development

### Appendix 5.3: Compiled Description of UWF Grid Connection

#### A5.3 - 5.1 Introduction to Appendix 5.5

##### A5.3 - 5.1.1 Previous UWF Grid Connection Application

An application was made directly to An Bord Pleanála under Section 182A (9) of the Planning and Development (Strategic Infrastructure) Act (2006) on 28<sup>th</sup> June 2018 (Ref: PL92.301959), for the grid connection element of Upperchurch Windfarm. The Upperchurch Windfarm Grid Connection development comprised a new 110kV substation at Mountphilips and c.30km of 110kV underground cabling to connect the permitted but not constructed Upperchurch Windfarm substation to a new 110kV substation at Mountphilips. The route of the underground cabling was a predominately cross country route along farm and forestry roads, and across farm and forestry lands. This application was refused on 17<sup>th</sup> December, 2018.

The Board's summary assessment states;

*The Board is not satisfied, based on the assessment and analysis set out in the Environmental Impact Assessment Report, that, in the consideration of potential alternatives route options, adequate weight has been given to biodiversity matters. It is considered that the selected route option will result in a significant intervention in the natural environment and adverse impacts to biodiversity. Lesser damaging alternatives are available that could avoid negative impacts on the environment with regard to biodiversity.*

*The Board is not satisfied that sufficient consideration has been provided regarding the routing of the cable in the local road network or consideration of alternative grid connection technologies such as overhead line alternatives. Furthermore, no information has been provided in relation to alternative connection locations where the windfarm could potentially connect to the national electricity grid.*

*The Board is not satisfied that, following mitigation, no significant residual negative impacts on the environment would remain as a result of the proposed development with respect to the hen harrier species. The proposed development may, therefore, have an unacceptable indirect effect on the environment.*

The Board's summary Appropriate Assessment states;

*The Board completed an appropriate assessment of the implications of the proposed development for the affected European Sites, namely the Lower River Shannon Special Area of Conservation (site: 002165), the Lower River Suir Special Area of Conservation (site code: 002137) and the Slievefelim to Silvermines Mountains Special Protection Area (site code: 004165) in view of the sites' Conservation Objectives.*

*Having regard to the scale and nature of the proposed development, in particular, the proposal to develop an underground cable through part of the Slievefelim to Silvermines Mountains Special Protection Area (site code: 004165) (with the single conservation objective to maintain or restore the favourable conservation condition of the hen harrier) and, notwithstanding the mitigation measures proposed by the applicant, there remains reasonable scientific doubt that the proposed development would not lead to a reduction or loss of suitable foraging habitat or to the disturbance of the hen harrier*

*within its sensitive roosting and breeding areas. The Board cannot, therefore, be satisfied that the proposed development, individually, or in combination with other plans or projects, would not adversely affect the integrity of this European Site in view of the site's Conservation Objectives. In such circumstances, the Board is precluded from granting permission and the proposed development would, therefore, be contrary to the proper planning and sustainable development of the area.*

### **A5.3 - 5.1.2 Revised UWF Grid Connection**

Following an examination of the Board's Inspector's Report, the route of the 110kV underground cabling is currently being re-designed, and the final revised Upperchurch Windfarm Grid Connection application will most likely consist of an underground cabling route predominately routed along the public road corridor. Otherwise the development is essentially and technically the same as the application previously proposed under PL92.301959. There will be no changes to the Mountphilips substation part of the application.

The assessment for the revised cable route along the public road corridor is well advanced because the EIA Report team are already very familiar with the development area and much of the data and assessment has already been carried out for the previous application. A revised application will be lodged, most likely directly to the Board, through the Strategic Infrastructure process (SID), within the coming months.

A description of the revised UWF Grid Connection is set out in this compilation chapter which has been prepared in the same format as the Description of the Development chapter for the subject development, in particular Sections 5.2, 5.3, 5.4 and 5.5. For ease of cross referencing the number system used here is also the same, i.e. A5.5-5.2, A5.5-5.3 etc. Figures and drawings are included at the end of this compilation document.

The data and descriptions in this appendix are sufficient to inform the environmental factor evaluations in the Revised EIAR Main Report, in relation to the evaluation of cumulative effects (with other elements of the Whole UWF Project and with Other Projects & Activities) of the subject development within the UWF Related Works cumulative evaluation study area.

### A5.3 - 5.1.3 Layout of this compilation appendix

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

Section 5.2	<ul style="list-style-type: none"> <li>• A Description of the Location and Characteristics of the subject development (UWF Grid Connection)</li> <li>• The Project Design Environmental Protection Measures incorporated into the design to avoid, prevent or reduce likely significant adverse effects on the environment.</li> </ul>
<p><b><u>The Development as described in Section 5.2</u></b></p> <p>At the conception of the UWF Grid Connection, the design team evaluated the potential or likely significant effects of the subject development, on the receiving environment. Any potential or likely significant effects were avoided <u>by integrating mitigation measures into the fundamental design of the UWF Grid Connection.</u> Various measures, particularly options for mitigation by avoidance and mitigation by prevention, were considered; these included alternative locations, alternative designs and alternative processes. Once the chosen location, design and process was decided the proposal was examined for opportunities to incorporate further mitigation measures (generally mitigation by reduction) in the final iteration of the development.</p>	
Section 5.3	The durations and timing, main activities, personnel and material requirements for both the construction and operation stages. Any changes to the UWF Grid Connection, such as decommissioning.
Section 5.4	The use of natural resources, emissions and production of wastes for each stage.
Section 5.5	The vulnerability of the UWF Grid Connection to major accidents and natural disasters.

## A5.3 - 5.2 Characteristics of the 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 Ancillary Works.

### A5.3 - 5.2.1 Purpose of UWF Grid Connection

The purpose of UWF Grid Connection is to connect the Consented UWF Substation at Upperchurch Windfarm (UWF) to the 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.

### A5.3 - 5.2.2 Location and overview description of UWF Grid Connection

**Mountphilips Substation:** The new substation is proposed for a location adjacent to the existing Killonan - Nenagh 110kV overhead line in agricultural grassland in Mountphilips townland, 2km north of Newport, 4km south of Birdhill, 17km north east of Limerick City and 23km west of the Upperchurch Windfarm. The new 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 circa. 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; lightning 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 Mountphilips Substation to Upperchurch Windfarm through the Consented UWF Substation, through the installation of underground cables in the public road corridor. The preliminary preferred route of the 110kV UGC, is a route 28.9km in length, following a generally west/east course along the Thurles to Newport Regional Road R503. The route starting at Mountphilips Substation is under a grassland field for 0.52km; under Local Road L2166-0 for 2.26km, under the Regional Road R503 for 23.14km; under the L2264-50 for 1.93km; the L6188-0 for 0.33km and under a Private Farm Road for 0.72km as far as UWF Substation. This route is through the townlands of Mountphilips, Coole, Freagh, Foildarrig, Newport, Tullow, Cooldrisla, Derryleigh, Kilnacappagh, Scraggeen, Derrygareen, Inchadrinagh, Knockancullenagh, Fanit, Lackamore, Toorenbrien Upper, Toorenbrien Lower, Reardnogy Beg, Reardnogy More, Shanballyedmond, Bournadomeeny, Coonmore, Foildarragh, Kilcommon, Loughbrack, Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons. The 110kV UGC will be installed in trenches, which will be laid with ducts through which the electrical cables and communications cables will be pulled. The cable lengths will be pulled through and joined together at Joint Bay locations, in joint bay chambers. The ducts will be surrounded by concrete and the trench backfilled with aggregate and the road surface will be reinstated according to Local Authority specifications. The only surface expression of the 110kV UGC will be the man-hole type covers over the Joint Bays and the over-ground identification marker posts and marker plates.

**UWF Grid Connection Ancillary Works** will support the construction of UWF Grid Connection and will include the construction of a new Permanent Entrance at Coole townland (including the provision of sightlines) and Permanent Access Road from the new entrance to the proposed substation at Mountphilips townland; construction and use of a Temporary Compound at Mountphilips; replacement of watercourse crossing structures; installation of drainage systems at Mountphilips Substation, around the Temporary Compound

and along the new Access Road; fencing; relocation of existing overhead and underground services; provision of electricity supply to Mountphilips substation; excavation and reinstatement and disposal of spoil; hedgerow/tree removal at Mountphilips and hedgerow replanting and site reinstatement.

**Relevant Figures (contained at the end of this Appendix 5.3)**

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

### A5.3 - 5.2.3 Characteristics of UWF Grid Connection

#### A5.3 -5.2.3.1 Mountphilips Substation

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

- Substation Compound measuring c.8930m<sup>2</sup> in area, and will contain a control building; 110kV busbars; circuit breakers; line disconnects; current and voltage measuring equipment; cable chairs; surge arresters; lightning protection monopoles (c.18m in height) and other electrical apparatus, underground cabling and access roads. Secure perimeter fencing comprising 2.7m high palisade security fencing, which will surround the Substation Compound and will include 4.8m wide entrance gates. A permanent surface water drainage network will be installed around the compound. The Mountphilips to Upperchurch 110kV UGC will connect to the electrical equipment in the compound from the north side of the compound.
- Control Building, measuring c.205m<sup>2</sup> in area, located inside the Substation Compound, and will contain circuit breakers, electrical metering equipment and other electrical equipment, communications and control equipment, and welfare facilities comprising a self-contained toilet and an integrated rainwater harvesting system.
- 2 No. End Masts and associated underground 110kV cables will be used to facilitate the connection of the Mountphilips Substation onto the existing Killonan – Nenagh 110kV overhead line (OHL). These End Masts will be constructed beneath the existing Killonan – Nenagh 110kV OHL and are identified as End Mast No.1 and End Mast No.2. The End Masts will be lattice towers and will each be c.16m in height. 110kV cables will connect to the Killonan side of the overhead line at End Mast No.1, be affixed to the mast and then through underground ducting to the Mountphilips compound, through the electrical equipment and control building and then back onto the overhead line via a second set of underground ducting to End Mast No.2, routed up and affixed to End Mast No.2 and onto the Nenagh side of the overhead line. The cables from End Mast No. 1 and End Mast No.2 will connect to the electrical equipment in the compound from the south side of the compound.



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

**Relevant Figures (contained at the end of this Appendix 5.3)**

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

### A5.3 -5.2.3.2 Mountphilips – Upperchurch 110kV UGC

Underground 110kV cabling works, referred to herein as the ‘Mountphilips to Upperchurch 110kV UGC’ or the ‘110kV UGC’, will connect the Mountphilips Substation to the Consented UWF Substation. The design of the Mountphilips – Upperchurch 110kV UGC complies with ESB Networks specifications and technical and operational requirements.

The 110kV UGC will comprise:

- Up to 28.9km each of 3 No. underground 110kV electrical cables and 2 No. underground communication cables; and copper cable (where required), each to be contained within ducting and laid in a trench (**Cable Trench**), 1.25m deep and 0.6m wide, along with semi-dry lean-mix concrete, red cable protection strip, yellow warning tape, protective plates (if required) and backfill material.
- Circa. 38 No. Joint Bays, comprising joint bay chambers, communication chambers and link box chambers, to be located underground. All Joint Bays will be located at least 25m from a Class 1 or Class 2 watercourse.
- Marker posts and marker plates as necessary,
- The connecting of the underground cables to the Mountphilips Substation, at one end, and the Consented UWF Substation at the other end of the 110kV UGC.

### A5.3 -5.2.3.3 Preliminary Preferred Route of 110kV UGC (January 2019)

The preliminary preferred 110kV UGC route is almost entirely along the Regional Road R503; with 3 No. short sections on Local Roads at the eastern extreme of the L-6188-0 in Knockcurraghbola Commons and the L-2264-50 in Knockmaroe townland and 1 No. section on the L-2166-0 in the western extreme from Newport town to the Mountphilips Substation Site Entrance in Coole townland.

One lane closures: The works on the public roads can be accommodated with one-lane closures. Traffic flow will be maintained using a stop/go system with flagmen.

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.



**Plate Error! No text of specified style in document.2: Examples of underground cable trench in public road**

#### **Relevant Figures (contained at the end of this Appendix 5.3)**

**Figure GC 5.1: Layout of the UWF Grid Connection on Discovery Mapping (Map 1-2)**

### **A5.3 -5.2.3.4 UWF Grid Connection Ancillary Works**

The UWF Grid Connection Ancillary Works will support the construction of UWF Grid Connection and will include the construction of a new Permanent Entrance at Coole townland (including the provision of sightlines) and Permanent Access Road from the new entrance to the proposed substation at Mountphilips townland; construction and use of a Temporary Compound at Mountphilips; replacement of watercourse crossing structures; installation of drainage systems at Mountphilips Substation, around the Temporary Compound and along the new Access Road; fencing; protection of existing underground services; provision of electricity supply to Mountphilips substation; excavation and reinstatement and disposal of spoil; hedgerow/tree removal at Mountphilips and hedgerow replanting and site reinstatement.

#### **A5.5 -5.2.3.4.1 New Entrance and Access Road to Mountphilips Substation**

A new permanent site entrance will be provided through an existing farm entrance off the L2166-0, for the Mountphilips Substation and Temporary Compound. For the construction stage, the existing farm entrance will be widened to 10m, with a visibility splay of 160m provided. The sightlines are based on the 85th percentile ambient traffic speed on the Local Road serving the access, as recorded during traffic count surveys. These sightlines will be provided through the partial removal of the roadside boundary and the pruning of any hedgerow or trees within the visibility splay. 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 on UWF Grid Connection, the operational stage sightlines, will satisfy the sightline requirements as set out in Table 10.1 of the North Tipperary County Development Plan 2010 (as amended), being reduced to 90m sightlines.

A new access road will be constructed from the new entrance, across a grassland field to provide access to the Mountphilips Substation and Temporary Compound. The road will be constructed of crushed stone over a layer of geotextile material and will incorporate permanent roadside drains including check dams and settlement ponds, where required, to slow down flow and settle suspended solids in water runoff. The new road will be bounded with new earthen berms which will be planted with a mix of grasses and native hedgerow species.

#### **Relevant Figures (contained at the end of this Appendix 5.3)**

**Figure GC 5.2: Layout of the UWF Grid Connection on Aerial Photography Mapping**

#### **A5.5 -5.2.3.4.2 Temporary Compound**

A temporary compound will be set up during the construction stage at Mountphilips Substation location, to support the construction of the substation and connection cable trench.

The temporary compound will be approximately 1090m<sup>2</sup> in area. The compound will accommodate parking, site offices, and canteen and welfare facilities along with designated storage areas for materials, wastes, oils and fuels.

**A5.5 -5.2.3.4.3 Watercourse Crossing**

The construction of the UWF Grid Connection will involve crossing a total of 63 No. watercourses, which range in size from rivers to drains as outlined on Table 5-2.

**Table 1: Watercourse Classifications at Crossing Points**

Class	Watercourse Description	Number
1	EPA mapped blue line, major river or stream (fisheries value)	10
2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	3
3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	25
4	Drain (no fisheries value)	25

The construction of the UWF Grid Connection will involve:

Crossing of 60 No. existing structures of which 12 No. are bridges, 48 No. are culverts and creating 2 No. new permanent culvert crossings and 1 No. new temporary crossing.

Construction of the 110kV UGC over bridges will be within the road surface. Some bridges may need remedial works to the existing bridge parapets.

In relation to culverts, the 110kV UGC will be laid either under or over the culverts. Any culverts that need to be replaced will be sized to cope with a minimum 100-year flood event. All pipe culverts will be at least 900mm in diameter regardless of the anticipated flood flow. 900mm culverts will be embedded into the bed of the watercourse to a depth of 300mm, while 1200mm culverts will be embedded to a depth of 500mm.

Any replaced culverts or any works to the parapets on bridges will be in accordance with the Office of Public Works (OPW) guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013).

**A5.5 -5.2.3.4.4 Drainage Networks****Drainage System at Mountphilips Substation and Entrance**

An **integrated drainage system** will be installed around the Substation Compound, the hardstanding area at the End Mast locations, the Temporary Compound and along the new access road to the substation. This integrated drainage system will keep 'clean' water upslope of the works separate from 'dirty' water runoff from construction works areas, while maintaining the existing drainage regime through the regular piping and release of clean water from the upslope side the works area to the downslope side. The integrated drainage system will include the installation of check dams, settlement ponds, clean water cross drains and outfall weirs. These parts of the drainage system will effectively avoid any contribution to flooding risk, minimise erosion, maintain drainage regimes, and minimise the amount of sediment entering downslope watercourses, through the attenuation (slow-down) of water flow rates and the settlement of suspended solids (sediment). The drainage system will be left in place for the operations phase. Settlement ponds will be removed following construction. The drainage system at temporary works locations will be removed.

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



**Drainage System for 110kV UGC trenching on the Public Road**

Existing roadside drainage which occurs close to road works associated with the Cables Trench will be piped to maintain flow if necessary.

The following Water Quality protection measures will be deployed for the drainage system during trenching in the Public Road.

- Construction works will be confined to the public road pavement.
- Along “sensitive areas” of the 110kv UGC route on the R503, work will only be completed during the spring/summer months when ground conditions are typically dryer. This will reduce the requirement for any excavation dewatering as a result of waterlogged soils. Sensitive areas are sections of the route on the R503 that are immediately upstream of the Lower River Shannon SAC (i.e. sensitive areas are sections where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)). There will be no storage of overburden within the Lower River Shannon SAC.
- Prior to cement works (i.e. backfilling trench and bridge parapet works), all existing roadside drains and other drainage pathways at sensitive areas will be temporarily blocked.
- 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 using a mobile water treatment train and then discharged via a silt bag along the roadside verge.
- All existing roadside drains/drainage pathways adjacent to the trench works area will be temporarily blocked to capture any pumped water / surface water runoff and a row of silt fencing will be placed along the downslope verge of the road.

**A5.5 -5.2.3.4.5 Fencing**

Fencing will be erected at Mountphilips during the construction and operation of the 110kV UGC per;

- Permanent timber post and rail fencing with gates will be erected along the new access road to the Mountphilips Substation;
- Temporary timber post and rail fencing with gates will be erected at the temporarily widened substation site entrance;
- Temporary goal posts to mark the location of overhead electricity and telephone lines along construction works areas.

**A5.5 -5.2.3.4.6 Other Underground Services**

Underground Services and utilities, including electricity infrastructure will be identified and maps of such services and utilities will be made available to the design and construction team. The service providers will be consulted and confirmatory surveys would be carried out ahead of works to identify any new services or incorrect mapping. A banksman will guard existing underground pipes during excavation works.

**A5.5 -5.2.3.4.7 Provision of electricity supply to Mountphilips Substation**

Mountphilips Substation will require a low voltage electricity supply, in order to energise and run electrical plant and general services at the compound. This supply will be taken from an overhead electrical line which passes through the 1<sup>st</sup> field, 105m from the substation entrance off the public road. The line is a 10kV overhead line carried on a standard wooden pole. The pole will be fitted with a transformer in order to transform the electricity to low voltage (230kV), which is suitable for use in the substation. The electricity

thus transformed will be cabled underground to the substation, 420m to the west, in a duct which will be laid alongside the 110kV UGC ducting.

#### *A5.5 -5.2.3.4.8 Storage of Excavated Materials*

The storage of excavated materials is limited to the excavations associated with the construction of Mountphilips Substation ground works; Access Road and 110kV trenching in grassland at Coole and Mountphilips. In total, approximately 26,280m<sup>3</sup> of soils will need to be excavated, comprising 2,600m<sup>3</sup> of **bitumen bound surface dressing**, 1,730m<sup>3</sup> of **base layer aggregate**, 2,470m<sup>3</sup> of **topsoil**, 17,180m<sup>3</sup> of **subsoil** and 2,300m<sup>3</sup> of **rock**. 3,770m<sup>3</sup> of the excavated material will be permanently stored along the substation access road and around the substation compound as a linear berm and 300m<sup>3</sup> of the excavated topsoil will be used to reinstate the temporary access road to the End Masts.

- The excavated material from the 110kV public road trenches will be classed as spoil and will amount to 22,210m<sup>3</sup>, all of which will be removed to a licensed waste facility.

#### *A5.5 -5.2.3.4.9 Reinstatement of Public Roads*

Along the 110kV UGC route on the public road, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken. 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. **Trenches within road pavements** will be reinstated in accordance with the Tii Guidelines on the Opening, Backfilling and Reinstatement of Openings in Public Roads.

#### *A5.5 -5.2.3.4.10 Reinstatement of Lands*

Following the completion of construction works in an area, with the exception of new permanent infrastructure, the lands and public road will be reinstated.

**Landholding boundaries** will be reinstated on their original alignment, where the new access road crosses 2 No. landholdings at Mountphilips Substation site.

### A5.3 - 5.2.4 Environmental Protection Project Design Measures (Mitigation Measures) designed into UWF Grid Connection

The design of UWF Grid Connection includes the Project Design Environmental Protection Measures (Mitigation Measures) listed on Table 5-3, which were devised to avoid, prevent or reduce likely or potentially significant effects on the environment.

**Table 2: Environmental Protection Measures as part of the UWF Grid Connection design**

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at 110kV UGC works locations on the public road networks. 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 <u>Knocknabansha</u> , Knockmaroe <u>Knockcurraghbola</u> Crownlands, and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm.
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.
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. Any works to culverts will be monitored by an aquatic archaeologist. Works to bridges will be monitored by a suitably qualified archaeologist.
PD09	The new permanent access road at 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.
PD10	Only precast concrete culverts or structures will be used at the watercourse crossing locations at Mountphilips and for any culvert replacements along the 110kV UGC. No batching of wet cement will take place on-site.
PD11	At Mountphilips Substation, 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 excavations, excavation dewatering and any culvert replacement works, 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	At Mountphilips Substation location, 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	At Mountphilips Substation location, temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD15	At Mountphilips Substation location, 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	At Mountphilips Substation location, where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse.
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound at Mountphilips Substation. All fuel will be stored in bunded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at the temporary compound in Mountphilips and at a distance greater than 50m from watercourses.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
PD22	In-stream works or culvert replacement 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 or culvert replacement 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).
PD24	All new permanent watercourse culverts and any replacement 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 2km 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 at the Mountphilips Substation entrance will take place outside of the bird breeding season <i>i.e.</i> not during the period of March to August inclusive.
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.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
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 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.
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 <sup>st</sup> to June 30 <sup>th</sup> ).
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 will not take place within 10m of sett entrances.
PD37	All construction works will be carried out during daylight hours. Security lighting will be used at the temporary compound. <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. (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.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD41	Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD44	Construction works will not be carried out within 150m of a school, during school hours.
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.
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 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 existing paved public roadways and over paved public bridges within the SAC boundary. Construction works will be confined to the public road pavement 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 excavations from public road trenches will be removed to landfill. Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
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 in the public road over bridges at these two locations. No instream works or culvert replacement works are proposed at any location within the SAC boundary.
PD55	<u>Lower River Shannon SAC:</u> Where dewatering of trenches or excavations is required along the R503 , there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag along the roadside verge
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 100m of the boundary of the Lower River Shannon SAC.

PD ID	Project Design (PD) Environmental Protection Measure (Mitigation Measures)
PD58	<u>Lower River Shannon SAC</u> : Construction works along sensitive areas (as define in PD59 below) of the route on the R503 will cease during heavy or prolonged rainfall events, and any open trenches will be covered. Use of weathering forecasting will be undertaking in advance of works.
PD59	Lower River Shannon SAC: Along “sensitive areas” of the 110kv route on the R503, work will only be completed during the spring/summer months when ground conditions are typically dryer. This will reduce the requirement for any excavation dewatering as a result of waterlogged soils.  Sensitive areas are sections of the route on the R503 that are immediately upstream of the SAC (i.e. sensitive areas are sections where the smaller watercourses being crossed drain directly into the Clare River (W8 – W31) and the Bilboa River (W41 – W48)).
PD60	Lower River Shannon SAC: All existing roadside drains/drainage pathways on the R503 adjacent to the trench works area will be temporarily blocked to capture any pumped water / surface water runoff and a row of silt fencing will be placed along the downslope verge of the road
PD61	<u>Lower River Shannon SAC</u> : A member of CIEEM and the Institute of Fisheries Management will be present for all concrete pours within the SAC overlapping sections to ensure Best Practice is followed and that concrete washouts take place into designated bins for offsite removal
PD62	<u>Lower River Shannon SAC</u> : Prior to cement works (i.e. backfilling trench and bridge parapet works), all existing roadside drains and other drainage pathways at sensitive areas along the R503 will be temporarily blocked
PD63	<u>Lower River Shannon SAC</u> : The sections of trenches that overlap the SAC along the R503 will be lined with an impermeable geotextile to prevent potential migration of cement from the trench base/sides

#### A5.3 -5.2.4.1 Environmental Management Plan

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

The Environmental Management Plan will include the list of Project Design Environmental Project Measures (listed above), along with the Best Practice Methods that are included at the end of topic Chapters 6 to 17. Management plans for Traffic, Waste, Surface Water Quality and Invasive Species are also included in the EMP.

## A5.3 - 5.3 Life Cycle Stages of the UWF Grid Connection

### A5.3 - 5.3.1 Construction Stage - UWF Grid Connection

#### A5.3 - 5.3.1.1 Duration & Timing

The construction timetable is detailed in Table 1 below;

**Table 5-4: Duration and timing of the construction of UWF Grid Connection**

Construction Activities	Duration of the Construction Stage	Timing of Construction Activities
Pre-Construction - detailed design, confirmatory surveys, hedgerow/tree removal or pruning etc.	3-6 months	Immediately prior to the commencement of the main construction period, or where seasonal timing is relevant to pre-confirmatory surveys or habitat works – during the appropriate season prior to works in the relevant sections of UWF Grid Connection
Main Civil and Electrical Construction Activities - Construction of Mountphilips Substation, UWF Grid Connection Ancillary Works	6 – 8 months	Projected Start Date: 2019
110kV UGC on the Public Road	4 months	Projected Start Date: 2019
Cable Jointing Activities	3 months	It is expected that the period associated with Cable Jointing will overlap with the period associated with the Main Construction Activities.
Electrical commissioning activities	3 months	Commissioning will take place after the Main Construction and Cable Jointing works are complete.

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

#### A5.5 -5.3.1.1.1 Construction Hours of Work

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

#### A5.5 -5.3.1.1.2 Scheduling of Works

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

- 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.
- Construction works will not be carried out within 150m of a school, during school hours.



- To reduce the potential for localised in-combination effects on surface water quality from the main potential sediment sources during construction works (i.e. excavations, Excavation Dewatering and any culvert replacement works), a phased approach will be undertaken during the construction works for these activities, where works within 50m of a Class 1 or Class 2 watercourse are required. The phased approach will only permit one of main potential sediment producing activities to be carried out at any one time within the local catchment to a watercourse.
- Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive.
- Any culvert replacement works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses.
- Any drilling activities required at the Anglesey Bridge will not be carried out during the months of May to July inclusive.
- No construction works will take place within 2km of an active hen harrier nest, or active nesting activity, during the breeding season (March to August). Additionally, during the roosting season, (October to February), construction works will only be carried out during the period between one hour after sunrise and one hour before sunset in areas within 1000m of an active winter roost.
- No construction works will be carried within 50m of an active main badger sett during the main breeding season (December 1<sup>st</sup> to June 30<sup>th</sup>).
- Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November.
- If an active otter holt (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.
- 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.

### A5.3 -5.3.1.2 Construction Personnel

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

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

#### A5.5 -5.3.1.2.1 Welfare Facilities

Self-contained temporary welfare facilities will be provided in the temporary construction site compound.

### A5.3 -5.3.1.3 Construction Stage Activities

Construction stage activities will involve the following main works:

- Pre-Construction Activities
- Construction Works Area Preparation
- Temporary Compound
- New access road and entrance for Mountphilips site
- Mountphilips Substation Compound
- New End Masts at Mountphilips Substation
- 110kV Trenching and Ducting
- 110kV Joint Bays and Associated Chambers
- 110kV Cable Pulling
- 110kV Cable Jointing
- Traffic Management
- Culvert Replacement
- Relocation of Overhead Lines and Underground Services
- Storage of Excavated Material in Berms

### A5.3 -5.3.1.4 Use of Machinery and Equipment

The main machinery, equipment and tools which will be required during the construction stage are listed in Table 5-5.

**Table Error! No text of specified style in document.3: Construction machinery, equipment and tools**

Construction Machinery	Construction Equipment and Tools
1 No. 90/200 tonne crane	1 No. Cement Mixer
6 No. 12ton excavators	1 No. Masonry cutting tool
6 No. 6ton excavators	6 No. De-Watering pumps
6 No. dump trucks	6 No. water pumps and associated pipes
6 No. Vibrating roller	6 No. Diesel generator
1 No. 14tn roller	Hand tools
4 No. trucks for waste removal	Sand bags
6 No. large vans	Silt traps and silt fences
1 No. Tarring vehicle	Oil absorbent booms
2 No. Cable Pulling machine	5 No. siltbuster units and skips
Jointing Containers	Wooden stakes and wooden fencing lats

### A5.3 -5.3.1.5 Use of Hydrocarbons

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

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

### A5.3 -5.3.1.6 Other Facilities - Fuel Storage & Tool Storage

**All fuels** required for construction activities will be stored in a designated location, away from main traffic activity, within the Temporary Compound. All fuel will be stored in banded, locked storage containers. Overnight parking of plant and machinery will only be permitted at the Temporary Compound.

### A5.3 -5.3.1.7 Imported Construction Materials

The construction materials, which will be brought onto the Grid Connection site, are listed in Table 5-6 along with details of the quantity and source of the materials.

**Table Error! No text of specified style in document.-4: Quantities, type and source of construction materials**

Materials	Quantity <sup>1</sup>	Source of Materials
Semi-dry Lean Mix Concrete	10,330m <sup>3</sup> / 1290 No. loads	Roadstone Killough, Co Tipperary Roadstone Bunratty, Co Clare
Aggregate (crushed stone) <sup>2</sup>	15,800m <sup>3</sup> / 1320 No. loads	Shanballyedmond, Rear Cross
Surface dressing (public road sections)	2,250 m <sup>3</sup> / 210 No. loads	Clare
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
Communication cabling and equipment	2 No. loads	EU
Joint bay chamber and cover	10 No. loads	Offaly
Communication chamber and cover	5 No. loads	Offaly
Link Box Chambers and cover	5 No. loads	Offaly
Earth Sheet Link Boxes and connections	5 No. loads	UK
Duct jointing collars and draw ropes	5 No. Loads	Cork
Profiles for ducting and chambers	5 No. Loads	Cork
HDPE Ducting	140 No. loads	Cork
HDPE Comms Ducting	80 No. loads	Cork
110kV electrical cable	29 No. loads	Cork
Fibre Optic communication cables	5 No. loads	Cork

<sup>1</sup> Based on use of stone on all temporary access roads

Materials	Quantity1	Source of Materials
Red cable protection strip	1 No. loads	Cork
Yellow warning tape	1 No. loads	Cork
Steel protection plate	1 No. loads (if required)	Birr, Co Offaly
Marker posts and plates	1 No. load	Dundrum, Co Dublin
General building materials	11 No. loads	Various Irish Suppliers
Reinforcing Steel	5 No. loads	Various Irish Suppliers
Geotextile/Geocell material	2 No. loads	Nenagh
Hedging and tree species	1 No. load	Established nurseries in Ireland or Scotland
Fencing materials, posts, rails, wire	1 No. load	Arrabawn Co-Op, Reiska

### A5.3 -5.3.1.8 Material and Delivery Traffic Haulage Route

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

#### **Aggregate and Concrete**

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 GC 5.35](#).

#### **Other Construction Material**

Other materials, such as ducting, geotextile and other construction materials, will be sourced from various suppliers and will be transported to the Temporary Compound via the national and regional road network as identified on [Figure GC 5.36](#).

This material will be stored at the Temporary Compound until required at works areas. Each day a smaller truck will be used to deliver the daily volume of ducting, cable protection strip, warning tape, duct jointing collars etc. to each active works area.

#### **Relevant Figures (contained at the end of this Appendix 5.3)**

[Figure GC 5.35: Haul Routes for Aggregate and Concrete Deliveries \(Overview Map\)](#)

[Figure GC 5.35: Haul Routes for Aggregate and Concrete Deliveries \(Map 1\)](#)

[Figure GC 5.36: Haul Route for Other Construction Materials & Equipment.](#)

### A5.3 -5.3.1.9 Traffic Management

#### A5.5 -5.3.1.9.1 Road Licences

Any road closures required 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.

#### A5.5 -5.3.1.9.2 Flagmen

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

#### A5.5 -5.3.1.9.3 Advance warning signage

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

#### A5.5 -5.3.1.9.4 Engagement with Local Residents regarding Traffic

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

#### A5.5 -5.3.1.9.5 Traffic Management Plan

A Traffic Management Plan will be included in the Environmental Management Plan.

### A5.3 - 5.3.2 Environmental Management Plan (EMP)

The purpose of the EMP is to communicate environmental control measures that apply to the development of the UWF Grid Connection to those with responsibility for carrying out works on site so that any likely significant adverse effects of the development on the receiving environment can be prevented.

The Environmental Management Plan will include the list of Project Design Environmental Project Measures (mitigation measures), along with Best Practice Methods.

Management plans for Traffic, Waste, Surface Water Quality and Invasive Species will also be included in the EMP.

### A5.3 - 5.3.3 Operational Stage

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

### A5.3 - 5.3.4 Duration and Timing

**Table Error! No text of specified style in document.-5: Duration and Timing of the Operation Phase of UWF Grid Connection**

Description	Duration
Operation of the UWF Grid Connection	The UWF Grid Connection will be operated on a <b>permanent</b> basis by ESB Networks.
Mountphilips Substation: <ul style="list-style-type: none"> <li>● Routine Monthly Inspections (c.2hrs)</li> <li>● Annual Maintenance</li> <li>● Daily Remote Monitoring,</li> </ul>	c. 2hrs for monthly inspections c.2 days for annual maintenance - equates to a total of c.5 days per year associated with on-site inspections and maintenance.
110kV UGC: <ul style="list-style-type: none"> <li>● Annual Inspection and testing at Joint Bay link boxes</li> </ul>	Up to 8 personnel days per year associated with on-site inspections and testing carried out by a 2 man crew.
110kV UGC: <ul style="list-style-type: none"> <li>● Planned maintenance and unplanned maintenance of the 110kV UGC - Infrequent, <u>if at all</u>, during the lifetime of the Grid Connection</li> </ul>	If maintenance is required – c.8 – 10 days per cable pulling, jointing and testing activity

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

### A5.3 - 5.3.5 Operational Personnel

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

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

### A5.3 - 5.3.6 Operational Activities

#### A5.3 -5.3.6.1 Mountphilips Substation

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

**Monthly Inspection:** will mainly involve the testing of the electrical equipment and apparatus and testing of the electrical, communications and control systems along with visual inspections of the Substation

Compound and Control Building. The security and condition of the surrounding palisade fence and entrance gates will also be inspected during these monthly visits.

Monitoring of the communication cables will be carried out remotely.

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

#### A5.3 -5.3.6.2 Mountphilips - Upperchurch 110kV UGC

##### **Annual Inspection:**

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

##### **Planned Maintenance**

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

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

##### **Unplanned Repairs**

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

**A5.3 - 5.3.7 Use of Machinery and Equipment**

The main machinery, equipment and tools which will be used during the operation of the Grid Connection are listed in Table 5-8.

**Table Error! No text of specified style in document.-6: Use of Machinery and Equipment during the Operation of the Grid Connection**

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

**A5.3 -5.3.7.1 Use of Hydrocarbons**

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

**A5.3 -5.3.7.2 Welfare Facilities**

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

**A5.3 -5.3.7.3 Other Facilities - Fuel Storage & Tool Storage**

Fuel and Tool Storage: There will be no requirement for fuel or tools storage facilities during operations.



### **A5.3 - 5.3.8 Changes to UWF Grid Connection**

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

## A5.3 - 5.4 Use of Natural Resources, Emissions & Wastes

The use of Natural Resources is limited to the underground cabling component of the KWF Grid Connection development.

### A5.3 - 5.4.1 Use of Natural Resources

The resources which will be imported onto the UWF Grid Connection site or which will be obtained from within the site during the development of the UWF Grid Connection are described below.

#### A5.3 -5.4.1.1 Use of Resources: Land

In order to safely accommodate the construction works and construction traffic, the land requirement for the construction of the UWF Grid Connection is greater than for the operation of the UWF Grid Connection.

##### A5.5 -5.4.1.1.1 Requirements for Land

**Construction Land Requirement:** In total construction works areas will be located on 30.0 hectares of land, as follows; 4.9ha of agricultural land, 1.0ha of forestry land and 24.1ha of public road.

**Operational Land Requirement:** Once the Development is constructed, the requirement for lands will reduce considerably to 2.0ha, comprising the footprint of the Mountphilips Substation, and the footprint of the access road.

##### A5.5 -5.4.1.1.2 Land use Change

As a result of the construction of the UWF Grid Connection less than 2.0ha of land will permanently change use;

- At the Mountphilips Substation site, 1.4ha of land will change ownership to ESB Networks, and this land will also change use from agricultural land to utility/hard-core surface/ access road,
- For the New Permanent Access Road to Mountphilips less than 0.6ha of grassland will change use to hard core access road.

#### A5.3 -5.4.1.2 Use of Resources: Biodiversity

##### A5.5 -5.4.1.2.1 Field Boundaries – Earthen Banks/Hedgerow/Trees

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

In total, 35m of hedgerow and 2 No. of trees of varying maturity will be permanently removed to facilitate a the widening of an existing entrance off the public road at Coole and for the new access road to the substation. Where hedgerow is removed to create **permanent sightlines** at the entrance, new hedgerow will be planted as near as possible to their original location behind the sightlines. Also, c.700m of new hedgerow will be planted alongside the new Access Road between the Site Entrance and Mountphilips Substation. All hedging will be locally sourced native hedgerow species.

**A5.5 -5.4.1.2.2 Forestry**

No felling of forestry is required.

**A5.3 -5.4.1.3 Invasive Species**

Packaging will be checked for the presence of white toothed shrew and prior to arrival on site, contractor's vehicles and equipment will be thoroughly cleaned and then dried. High-pressure steam cleaning, with water hotter than 65 degrees Celsius, in addition to the removal of all vegetative material, will be required for all vehicles and equipment involved in construction works.

An Invasive Species Management Plan will be implemented to prevent the spread of knotweed species, this Plan is included in the Environmental Management Plan.

**A5.3 -5.4.1.4 Use of Resources: Water****A5.5 -5.4.1.4.1 Potable Water**

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

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

**A5.5 -5.4.1.4.2 Non-potable water**

**During construction**, non-potable water for hand washing or toilet flushing will be imported to the Temporary Compound from a local municipal supply and stored in water holding tanks at the toilet block.

**During operation**, non-potable water for hand washing or toilet flushing will be supplied from a rainwater harvesting system which will be integrated into the Control Building at Mountphilips Substation during its construction (this **mitigation measure is part of the design of the UWF Grid Connection** and will avoid impacts to groundwater). The rainwater harvesting system will provide all of the water requirements for welfare facilities at the Mountphilips Substation during its operation.

## **A5.3 - 5.4.2 Use of Resources: Soils**

### **A5.3 -5.4.2.1 Public Road Arising's**

Approximately, 22,210m<sup>3</sup> of spoil will 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 a licenced operator and disposed of in a licenced facility.

### **A5.3 -5.4.2.2 Excavated Soils**

During the construction of the Mountphilips Substation and associated access, natural materials, such as topsoil, subsoil and rock, will arise from excavation works. Approximately 2,470m<sup>3</sup> of topsoil, 1570m<sup>3</sup> of subsoil and 30m<sup>3</sup> of rock will be excavated.

### **A5.3 -5.4.2.3 Permanent Storage**

All of the excavated material will be permanent stored, as follows:

- 3,770m<sup>3</sup> of the excavated material will be permanently stored as linear berms adjacent to the permanent access road and the Mountphilips Substation Compound and 300m<sup>3</sup> of the excavated topsoil will be used to reinstate the temporary access road to the End Masts.

### **A5.3 -5.4.2.4 Imported Rock**

Up to 15,800m<sup>3</sup> of graded crushed stone will be imported onto the UWF Grid Connection work areas from the local Rear Cross Quarry.

### **A5.3 -5.4.2.5 Operational Stage - Soil**

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

Planned maintenance or unplanned repairs, if any occur, on the 110kV UGC, is likely to involve the re-opening of the underground chambers, at Joint Bays. This work which will result in very small volumes of road surface material, and sand being temporarily removed from the area directly over the joint bay covers.

## A5.3 - 5.4.3 Emissions

The main potential for emissions arises during the Construction Stage.

### A5.3 -5.4.3.1 Dust

Dust may arise during the construction stage, due to the transportation of aggregate to site, movement of delivery vehicles; the movement of excavated material, and from stored excavated materials at the works areas at Coole/Mountphilips, particularly during dry and windy weather. During operation, the presence of excavations on-site, and therefore dust emissions, will be negligible – excavations, will generally only occur at Joint Bays during planned maintenance/unplanned repairs, which are expected to occur only very infrequently (if at all) during operation, and will involve the excavation of road surface and sand rather than soils.

### A5.3 -5.4.3.2 Vehicle Exhausts

During the construction stage, all of the machinery used will be run on hydrocarbons and will emit nitrogen dioxide and other greenhouse gas emissions. During the operational stage, the presence of vehicles on site, and therefore nitrogen dioxide and other greenhouse gas emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC.

### A5.3 -5.4.3.3 Noise

During the construction stage, heavy machinery and vehicles which will be used at works areas will emit noise during their operation, noise will also be emitted from certain construction activities such as excavations and road cutting or by mobile generators which may be used at work areas. During the operational stage, the presence of vehicles on site, and therefore noise emissions, will be negligible with a van or four wheel drive vehicle being used c.13 days per year, split roughly half and half between the Mountphilips Substation and the 110kV UGC.

### A5.3 -5.4.3.4 Vibration

Construction works, including excavations and the use of heavy machinery will cause low levels of ground vibration. **No blasting or piling** will occur at the UWF Grid Connection construction works areas. No vibration emissions are expected during the operation of the UWF Grid Connection.

### A5.3 -5.4.3.5 Light

Lighting will be used at the Temporary Compound at Mountphilips during construction and during operation at the Mountphilips Substation Compound to illuminate the Substation Compound, the Control Building. This lighting will use a cowled design along with motion-sensor and timer controlled lights which will not remain turned-on overnight. The 110kV UGC does not require any lighting.

### A5.3 -5.4.3.6 Electromagnetic Radiation

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

## A5.3 - 5.4.4 Waste

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

### A5.3 -5.4.4.1 Waste Water

During the construction stage, self-contained toilets, with integrated waste water storage tanks, will be provided for construction workers, at the Temporary Compound. Single self-contained, solar-powered toilets (portaloos) will also be provided at each of active works areas. The waste water storage tanks associated with the above toilet facilities will be emptied on a regular basis.

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

### A5.3 -5.4.4.2 General Waste

During the construction stage, materials such as pallets, packaging, and excess construction and building materials will be generated in small quantities at construction works areas. All individual waste streams will be identified at source, separated into recyclable and landfill waste and stored in a designated area at the Temporary Compounds.

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

### A5.3 -5.4.4.3 Chemical waste

During construction, very small quantities of chemical waste will be generated, this waste is limited to solid waste oil, such as oily rags. All chemical wastes will be stored in secure, banded and covered storage containers, in a designated secure part of the Temporary Compound.

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

### A5.3 -5.4.4.4 Arisings

During the construction stage, arisings from any excavations within the structure of the public road will consist of old chip, tar, subsoils and rock material. Arisings also include any contaminated soils from off-road construction works areas. No arisings are expected during the Operational Stage.

### A5.3 -5.4.4.5 Waste Management Plan

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

The **Waste Management Plan** will be included in **the Environmental Management Plan**.

## A5.3 - 5.5 Vulnerability of UWF Grid Connection to Major Accidents; Natural Disasters and Climate Change

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

### A5.3 - 5.5.1 Vulnerability to Major Accidents

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

The UWF Grid Connection is **not vulnerable to Major Accidents**, due to the minimal volumes of the Dangerous Substances which will be used, limited to small volumes of diesel fuel used by vehicles during the construction and operation of the UWF Grid Connection, and very small volumes of grease and sulphur hexafluoride (SF<sub>6</sub>) gas used at the Mountphilips Substation during its operation. Furthermore there are no Seveso sites in proximity to the UWF Grid Connection site, the closest being Grassland Agro in Limerick.

### A5.3 - 5.5.2 Vulnerability to Natural Disasters

**Natural disasters which could possibly affect the UWF Grid Connection include land slippage and flooding.** The likelihood of these natural disasters occurring is discussed below, with likelihood of the natural disaster occurring rated according to the DoEHLG 2010 Guidelines.

#### A5.3 -5.5.2.1 Land-slippage

The GSI mapped subsoils along the route of the UWF Grid Connection comprise mainly of sandstone tills and shale and sandstone tills. Given the stable nature of soils at Mountphilips Substation and the location of the vast majority of the 110kV UGC route along the carriageway of public roads, it is considered that there is a very low risk of land slippage, and the likelihood of a lands lippage event is **Extremely Unlikely**.

#### A5.3 -5.5.2.2 Flooding

In recent years, high rainfall events and subsequent flooding have become more frequent in Ireland. Permanent infrastructure for UWF Grid Connection relates to the Mountphilips Substation compound area, and the associated new access road. Runoff from these surfaces may result in increased flow in local watercourses. There are 2 no. permanent watercourse crossings along the route of the new access road. In addition, there are potentially 31 no. existing culverts under the public road which may need to be replaced. Due to the distributed nature of the works over a large geographical area, the fact that all permanent hardstanding will have runoff control measures and that all permanent culverts will be sized for peak flood flows (Project Design Measure), the magnitude of impact is considered to be Negligible, and the likelihood of a flooding disaster occurring is **Unlikely**.

### A5.3 - 5.5.3 Consequences of Natural Disasters Occurring

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

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

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

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

### A5.3 - 5.5.4 Overall Risk

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

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

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

### A5.3 - 5.5.5 Vulnerability to Climate Change

High rainfall events and subsequent flooding are now considered to be a consequence of climate change. Flooding is discussed in the previous section and a flooding disaster is considered **Unlikely** at this site.

Extreme weather such as that experienced in Ireland in recent years, both high temperatures and high winds, will not affect the cable which will be underground. The new Mountphilips Substation will not be vulnerable to these extremes because the electrical plant is designed to withstand temperature variability and exposure in the open countryside.

### A5.3 - 5.5.6 Mitigation Measures

In relation to water quality effects, along more sensitive areas of the 110kV UGC route on the R503, work will only be completed during the spring/summer months when ground conditions are typically dryer, which reduces any risk of flooding or land slippage and potential water quality effects.

Should a disaster occur, unconnected to the project but in the locality – environmental protection measures have already designed into the project (see Section A5.3-5.2.4 of this appendix) which will ensure that the project will not make the consequences of the event worst. In addition the presence of the project will not increase the likelihood of such an event occurring.



## A5.3 - 5.6 Outline Construction Methodologies (OCMs) UWF Grid Connection

The Outline Construction Methodologies for all of the main works and activities of UWF Grid Connection are presented below to provide information to assist the evaluation and assessment of the cumulative effects of the UWF Grid Connection. All Outline Construction Methodologies (OCMs) for UWF Grid Connection are listed in Table 1 and then presented individually. OCM Ref. from UWF Grid Connection May 2018 EIA Report retained for this list. OCMs that are not required for the proposed revised 110kV UGC route along the public road are deleted in the text below. Three new OCMs have been developed to reflect the routing of the 110kV (preliminary) on the public road network, these OCMs are numbered GC\_OCM\_22 to GC\_OCM\_25.

**Table 7: Revised List of Outline Construction Methodologies for the UWF Grid Connection (110kV public road route)**

OCM Ref:	OCM Title
GC_OCM_22	110kV Trenching & Ducting in the Public Road
GC_OCM_23	110kV Joint Bays and Associated Chambers in the Public Road
GC_OCM_24	110kV Trenching & Ducting in the Newport Bridge (W4) Tooreenbrien Bridge (W31) and Anglesey Bridge (W48)
GC_OCM_25	Trenching below culverts and replacing existing culverts at the watercourse crossings if damaged
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_10	New Permanent Access Road at Mountphilips Substation
GC_OCM_11	Temporary Access Roads to End Masts
GC_OCM_12	Permanent Site Entrance at Mountphilips Substation
GC_OCM_13	Temporary Compound at Mountphilips Substation
GC_OCM_15	Instream Works Preparation and Reinstatement at Mountphilips Substation
GC_OCM_17	Temporary Bailey Bridge
GC_OCM_20	Formation of Overburden Storage Berms at Mountphilips substation
GC_OCM_21	Reinstatement of Land at Mountphilips substation

<b>Outline Construction Methodology</b>		
<b>Title:</b>	110kV Trenching & Ducting in the Public Road	<b>Ref:</b> GC-OCM-22
<b>General Description</b>		
<p>A trench of c.1.25m deep, 0.6m wide will be dug in the road 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.</p> <p>Joint bays are locations where separate lengths of cable are joined together. These are required approximately every 600 - 800 m and will be located within the bounds of the road. Joint bay dimensions are typically in the order of 4.5m long, 2.0m wide and 1.2 m deep and are designed to be covered over and the road above is reinstated to its original surface.</p>		
<b>Duration</b>		
<ul style="list-style-type: none"> <li>• The civil contractor will complete 100 linear metres of trench per crew per day depending on the site conditions.</li> <li>• Up to 4 crews will work at any one time. It is anticipated that two trenching and ducting crews will be working on the cable route simultaneously for the entire construction period. The other 2 crews will be completing joint bays, water crossings and road reinstatement will be coordinated intermittently with the trenching and ducting crews throughout the construction phase.</li> <li>• Approximate duration 16-18 weeks.</li> </ul>		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 2-3 general operatives &amp; 1 Excavator Operator per crew</li> <li>• 1 geotechnical engineer/ appropriately competent person to supervise works in peatland (Variation 5A)</li> </ul>	<ul style="list-style-type: none"> <li>• 13 ton tracked excavator per crew</li> <li>• 1 tracked dumper and tractor and trailer per crew</li> <li>• 1 long reach, low ground pressure tracked excavator</li> <li>• 1 No. vibrating compaction plate per crew</li> <li>• Brush &amp; mandrel</li> </ul>	<ul style="list-style-type: none"> <li>• Blinding Concrete where necessary</li> <li>• Clause 804 Material</li> <li>• 150mm rock fill</li> <li>• 160mm and 125mm diameter uPVC ducting</li> <li>• Red cable marker strip Yellow marker warning tape</li> <li>• CGBM4 lean mix concrete</li> <li>• Duct spacers</li> <li>• Nylon ropes</li> </ul>
<b>Standard Methods for Trenching &amp; Ducting along the Public Road</b>		
<ol style="list-style-type: none"> <li>1. Traffic management plans arranged for each stage of the works.</li> <li>2. Each work area secured with adequate protective barriers and traffic signs and traffic management controls to the approval of the Engineer and as outlined in "Guidance for the Control and Management of Traffic at Road Works" and "Chapter 8 - Temporary Traffic Measures and Signs for Roadworks.</li> <li>3. Surface check carried out for underground services with appropriate equipment.</li> <li>4. Saw cut to full depth of existing asphalt/bitmac layers and/or concrete surfacing.</li> <li>5. The cable trench 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.</li> <li>6. Loading and removal of soil and road spoil will be carried out simultaneously, and disposed of in compliance with all relevant legislation to a site or sites to be selected by the contractor and agreed with the Tipperary County Council.</li> </ol>		

7. The trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained. Hand dig when within 500mm of services and around trees.
8. Where possible services will be crossed at right angles at a standard minimum 300mm vertical clearance between the ducts and the existing services to be crossed.
9. Where possible, a minimum distance of 500mm horizontal separation will be maintained between the edge of the power ducts and existing services.
10. A bedding layer of lean mix concrete will be placed at the bottom of the trench.
11. 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.
12. The ducts will be surrounded and covered with the lean mix concrete and concrete will then be compacted.
13. 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.
14. The top two ducts, which will contain the fibre optic cables, will then be installed by hand on top of the red cable marker.
15. The top ducts will then be surrounded and covered with lean mix concrete material and compacted.
16. Another layer of red cable protection strip will be placed on top.
17. 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.
18. Yellow warning tape, will be placed over the compacted Clause 804 backfill or sub-soil backfill.
19. Immediate reinstatement will be carried out using road surfacing material to surface level in accordance with arrangements with Tipperary County Council Roads Section and the Road Opening Licence for the works.
20. 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.
21. Clean and sweep adjacent public roadways and footpaths during and after the works

#### **Marker Posts**

22. Marker posts will have a centred lightning symbol, on engineering grade fluorescent yellow background.
23. 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.
24. Marker plates will be inserted where the grid connection cable runs in the centre of roadways and farm tracks. The siting of marker posts and plates will be dictated by ESNB as part of the detailed design process

#### **Reference Documents**

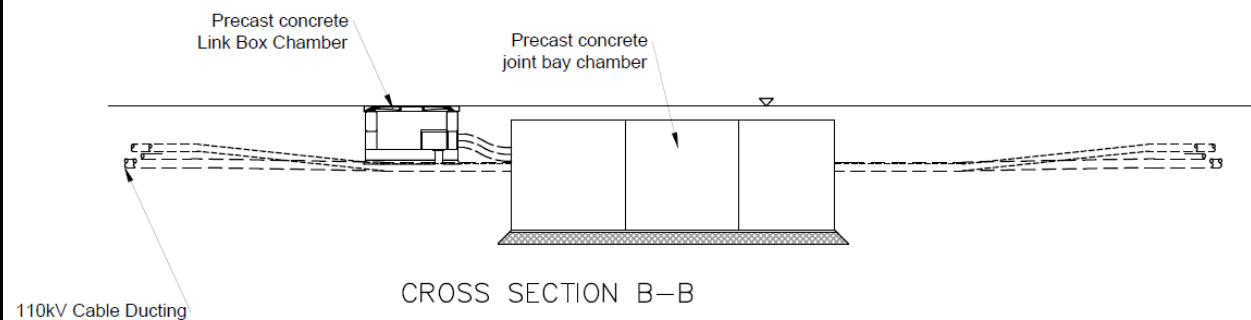
- ESB Specification
- Standard Trench Cross Section Trefoil Formation (PE424-D7001-001-003-005)
- Standard Trench Cross Section Flat Formation (PE424-D7001-001-005-002)
- EirGrid Specification

<b>Outline Construction Methodology</b>				
<b>Title:</b>	<b>110kV Joint Bays and Associated Chambers in the Public Road</b>		<b>Ref:</b>	<b>GC-OCM-23</b>
<b>Duration</b>				
2-3 days per joint bay location				
<b>Personnel</b>		<b>Materials</b>		<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 2-3 General Operatives</li> <li>• 1 Excavator Operator</li> </ul>		<ul style="list-style-type: none"> <li>• 360° tracked excavator</li> <li>• 1 no. tracked dumper or tractor and trailer</li> <li>• Water Pump &amp; Hoses</li> <li>• Compactor</li> </ul>		<ul style="list-style-type: none"> <li>• Bedding sand</li> <li>• Clause 804 Material</li> <li>• HDPE ducting</li> <li>• Precast Chamber Units</li> <li>• Link Box Chamber</li> <li>• Copper cable (for earthing of the link box and joint bay chamber)</li> <li>• Earth Rods</li> </ul>
<b>Standard Methods</b>				
<ol style="list-style-type: none"> <li>1. A pit will be excavated to a depth of c.2.5m, deep enough to accommodate the joint bay chamber.</li> <li>2. 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.</li> <li>3. 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.</li> <li>4. 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.</li> <li>5. The excavations around the precast concrete joint bays will be backfilled with granular fill and compacted in layers up to the existing ground level.</li> <li>6. The joint bays is backfilled with compacted layers of Clause 804 and the road surface temporarily reinstated until the cable installation stage.</li> <li>7. At a later date prior to cable installation and jointing, traffic management signage is reinstated and the site is secured. Three consecutive joint bays are re-excavated and the material stored appropriately for reuse.</li> <li>8. The cable is supplied in pre-ordered lengths on large cable drums. Installing one section of cable normally involves pulling three individual conductors into three separate ducts. The cable will be connected to a winch rope using a cable pulling stocking and swivel or a pulling head. A sponge may also be secured to the winch rope to disperse non- hazardous lubricant through the duct. Lubrication is also applied to the cable in the joint bay before it enters the duct.</li> <li>9. Once the two sections of cable (total of 6 conductors) are pulled into the joint bay, a jointing container is positioned over the joint bay and the cable jointing procedure is carried out in this controlled environment.</li> <li>10. Following the completion of jointing and duct sealing works in the joint bay, a compacted 200mm layer of sand is placed to the level of the cable joint base to provide vertical support.</li> <li>11. Additional layers of sand are installed and each layer is compacted until the sand is level with the top of the joint. An additional 250 mm compacted sand layer is installed above the cable.</li> <li>12. Cable protection strip is installed.</li> <li>13. Backfill of 300 mm of Clause 804 is placed to within 100 mm of the top of the joint bay wall.</li> <li>14. A 100mm layer of CBGM B is installed and compacted to be level with the top of the joint bay wall.</li> </ol>				

15. Permanent reinstatement including placement of warning tape at 250 mm depth below the finished surface, is carried out.
16. The joint bay chamber will have a precast concrete cover placed on top of the sand infill and the road is reinstated over the concrete cover. Steel manhole covers will be fitted to the communication chamber and earth sheath link chambers at the finished surface level for operational access.
17. The road around the Joint Bays will be reinstated by agreement with Tipperary County Council and under the arrangements of the Road Opening Licence.

**Reference Documents**

- ESB Specification  
ESB Specification 18153

**Relevant Drawings from Volume C3 EIAR Figures****Cross Section Views of 110kV UGC Joint Bays****Photographs**

<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>110kV Trenching &amp; Ducting in the Newport Bridge (W4) Tooreenbrien Bridge (W31) and Anglesey Bridge (W48)</b>	<b>Ref:</b> <b>GC-OCM-24</b>
<b>General Description</b>		
<p>This OCM deals with the trenching and ducting works within the structure of the bridge in the town of Newport (W4), the Tooreenbrien bridge over the Clare River (W31) and the Anglesey bridge (W48). The trench and ducting will be placed in the footpath of the Newport bridge (W4), and within the existing road structure of the Tooreenbrien and Anglesey bridges</p>		
<b>Duration</b>		
3 days per bridge		
<b>Personnel</b>	<b>Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• 5 general operatives &amp; 2 Excavator Operator</li> <li>• 1 geotechnical engineer</li> </ul>	<ul style="list-style-type: none"> <li>• 13 ton tracked excavator</li> <li>• 1 dumper and tractor and trailer</li> <li>• 1 No. vibrating compaction plate</li> <li>• Brush &amp; mandrel</li> <li>• Consaw</li> <li>• Hand tools</li> <li>• Traffic Cones</li> <li>• Compressor and airspades</li> <li>• Steel plates</li> <li>• Cable detector</li> </ul>	<ul style="list-style-type: none"> <li>• Concrete</li> <li>• Clause 804 Material</li> <li>• 150mm rock fill</li> <li>• 160mm and 125mm diameter uPVC ducting</li> <li>• Red cable marker strip Yellow marker warning tape</li> <li>• Duct spacers</li> <li>• Nylon ropes</li> <li>• Asphalt (W31 &amp; W48)</li> </ul>
<b>Standard Methods for Trenching &amp; Ducting along the Public Road</b>		
<p><b>Pre-commencement of work</b></p> <ul style="list-style-type: none"> <li>• Road Opening Licence will be in place for this section of works and conditions implement as required.</li> <li>• Approved Traffic Management Plans will be in position.</li> <li>• All staff will receive the Site Induction</li> <li>• All operatives will be fully trained and copies of training certificates will be available for inspection including: first aider; LUGS, TM, excavator driver; truck driver.</li> <li>• All operatives will wear the following PPE: safety boots, safety helmet and high visibility vest class 3. Additionally, safety wellington boots and gloves will be worn.</li> <li>• Cable detection tools will be used to accurately identify any possible unforeseen service locations on the ground and these will be marked. A copy of the existing service drawings will be obtained and available to view.</li> <li>• Vehicle routes will be carefully planned so that plant does not have to approach close to the edge of any excavation or interfere with traffic on the public road outside the work zone.</li> <li>• Welfare facilities will be in place in a suitable position to be agreed on site by Supervision.</li> <li>• The public will have been notified of the impending works and liaison with the public will take place on an ongoing basis.</li> </ul> <p><b>The works</b></p> <ul style="list-style-type: none"> <li>• Debris netting will be placed on the bridge parapets to prevent materials falling from the works on the three bridges into the Newport River, Clare River or Bilboa River.</li> <li>• At the Newport bridge, using compressor hammers the existing concrete footpath on the Northern Verge will be carefully removed and the sub layer of hardcore will be removed to form a trench to facilitate the laying of the uPVC ducting. Care will be taken not to interfere with any existing cables present. Excavated material will removed from site to landfill</li> </ul>		

- At the remaining two bridges the trench surface will be cut 0.6m wide using a con saw and material removed using excavator and hand tools. Excavated material will be removed from site to landfill.
- A blinding layer of concrete will be placed at the bottom of the trenches and ducting will be placed in position.
- Ducting will then be covered with concrete. Steel plates will be placed over the ducting and concrete and footpath and road surface detail will then be constructed to Tipperary County Council requirements. Warning and marker tapes will be installed as required by ESN in the trenches.

**It should be noted that the Newport River and the Anglesey Bridge forms part of the Lower River Shannon SAC. The following environment controls will be implemented**

***Measures to be in place before works commence:***

- Debris netting will be placed on the bridge parapets in order to prevent any materials from the works falling into the Newport River, Clare River and the Bilboa River
- All site personnel involved will receive an induction relating to the ducting.
- Personnel working on the duct are to be informed that, should there be any incident or observation of anything that may be considered as causing damage to the culvert or likely to cause adverse effects to the watercourses shall be reported to supervisor or project manager immediately.
- Personnel will be informed at the induction regarding the measures to take to prevent and limit any adverse effects.

***Measures to be in place during works:***

*Prevention of pollution to watercourses:*

- All equipment such as hand tools and footwear etc. will be cleaned thoroughly prior to work commencing work on the bridges.
- Tools and equipment will be cleaned off site
- All material removed from the trench will be taken away to licenced landfill.
- Chemicals will be stored in sealed containers in the compound or in vans prior to use.
- Excavated materials will not be stored near the watercourses.
- All plant will be maintained and any fuel drips will be attended to on an ongoing basis.
- Drip trays and spill kits will be available on site. Personnel will be trained in use of the spill kits.
- Should there be a requirement to use spill kit, all contaminated material will be removed to a licenced landfill.
- Silt traps will be placed around gullies.
- Plant and vehicles shall be properly maintained and shall not be left idling when not use.

*Fuel/Lubricant spillage from equipment:*

- Fuelling and lubrication will take place at least 50 m from the watercourse.
- Spill kits will be available. Personnel will be trained in use of same.
- Any fuels or lubricants will be stored in a bunded area with 110 % capacity
- Waste oils and hydraulic fluids will be collected, stored in sealed containers and disposed off site.

*Measure to control airborne materials:*

- Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
- There will be controlled access and egress.
- There is a 10km/hr speed limit in place for working plant.
- Access and egress points along with traffic carriageways will be regularly cleaned.
- All equipment will be washed and cleaned off site regularly

**Reference Documents**

- ESB Specification

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| <ul style="list-style-type: none"><li>• Standard Trench Cross Section Trefoil Formation (PE424-D7001-001-003-005)</li><li>• Standard Trench Cross Section Flat Formation (PE424-D7001-001-005-002)</li></ul> |
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<b>Outline Construction Methodology</b>		
<b>Title:</b>	Trenching below culverts and replacing existing culverts at the watercourse crossings if required	<b>Ref:</b> GC-OCM-25
<b>General Description</b>		
This OCM deals with the trenching and ducting works crossing under existing watercourse culverts within the public roadway.		
<b>Duration</b>		
1 day per culvert		
<b>Personnel</b>	<b>Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• 5 general operatives &amp; 1 Excavator Operator</li> <li>• 1 geotechnical engineer</li> </ul>	<ul style="list-style-type: none"> <li>• 13 ton tracked excavator</li> <li>• 1 dumper and tractor and trailer</li> <li>• 1 No. vibrating compaction plate</li> <li>• Brush &amp; mandrel</li> <li>• Consaw</li> <li>• Hand tools</li> <li>• Cones</li> <li>• Compressor and airspades</li> </ul>	<ul style="list-style-type: none"> <li>• Concrete</li> <li>• Clause 804 Material</li> <li>• 150mm rock fill</li> <li>• 160mm and 125mm diameter uPVC ducting</li> <li>• Red cable marker strip Yellow marker warning tape</li> <li>• CGBM4 lean mix concrete</li> <li>• Duct spacers</li> <li>• Nylon ropes</li> <li>• Asphalt (W31 &amp; W48)</li> <li>• Cable detector</li> </ul>
<b>Standard Methods for replacing culvert along the public road</b>		
<p><b>Pre-commencement of work</b></p> <ul style="list-style-type: none"> <li>• Road Opening Licence will be in place for this section of works and conditions implement as required.</li> <li>• Approved Traffic Management Plans will be in position.</li> <li>• All staff will receive the Site Induction</li> <li>• All operatives will be fully trained and copies of training certificates will be available for inspection including: first aider; LUGS, TM, excavator driver; truck driver.</li> <li>• All operatives will wear the following PPE: safety boots, safety helmet and high visibility vest class 3. Additionally, safety wellington boots and gloves will be worn.</li> <li>• Cable detection tools will be used to accurately identify any possible unforeseen service locations on the ground and these will be marked. A copy of the existing service drawings will be obtained and available to view.</li> <li>• Vehicle routes will be carefully planned so that plant does not have to approach close to the edge of any excavation or interfere with traffic on the public road outside the work zone.</li> <li>• Welfare facilities will be in place in a suitable position to be agreed on site by Supervision.</li> <li>• The public will have been notified of the impending works and liaison with the public will take place on an ongoing basis.</li> <li>• Spill kits will be available. Personnel will be trained in use of the same.</li> <li>• Any fuels or lubricants will be stored in bunded area with 110 % capacity.</li> <li>• Waste oils and hydraulic fluids will be collected, stored in sealed containers and disposed of off-site.</li> <li>• Any Invasive plants will be highlighted and fenced off.</li> <li>• All shall be made aware of the Environmental Screening</li> </ul>		
<b>The Works</b>		

- The trench either side of the watercourse crossing culvert will be excavated and the spoil from the excavation removed to licenced landfill.
- The ground beneath the culvert will then be removed using hand tools, air spades, the excavator and dumper.
- The pipes will then be placed in trefoil formation below the culvert.
- Lean Mix concrete will then be used to encase the cable ducts and the culvert.
- The trench will then be backfilled with Clause 804 or similar and compacted to asphalt level.
- The road surface detail will then be constructed to Tipperary County Council requirements. Warning and marker tapes will be installed as required by ESNB in the trench.
- If the culvert is damaged during the works the culvert will be replaced, by removing the culvert using an excavator and dropping a new culvert into place.
- If culvert replacement is required, sealed tonne bags will be filled with sand and placed at the upstream end of the works to dam the water flow. Water pumps will then be used to pump water through to the downstream side of the works. There will be a silt sock attached to the outlet hoses of the pumps.
- Sealed tonne sand bags will also be placed at the downstream works interface to prevent water entering the work area. There will also be a spare pump on standby in case of a breakdown.
- Culvert replacement 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
- New culvert put in place and the trench backfilled with Clause 804 or similar hardcore and compacted in layers. Warning and marker tapes will be installed as required by ESNB in the trench.
- The surface detail to road level will then be constructed to Tipperary County Council requirements.
- The sand bags will then be removed and the pumping equipment removed and the watercourse will be directed through the newly installed culvert.

***Before works commence:***

- All site personnel involved will receive an induction relating to the ducting. Required prevention methods to avoid damaging the culvert during the excavation beneath the culverts will be explained.
- Personnel working on the duct are to be informed that, should there be any incident or observation of anything that may be considered as causing damage to the culvert or likely to cause adverse effects to the watercourses shall be reported to supervisor or project manager immediately.
- Personnel will be informed at the induction regarding the measures to take to prevent and limit any adverse effects.

***Measures to be in place during works:***

*Prevention of pollution to watercourses:*

- Any Invasive plants close-by will be highlighted and fenced off.
- Tools and equipment will cleaned off site
- All material removed from the trench will be taken away to licenced landfill.
- Chemicals will be stored in sealed containers in the compound or in vans prior to use.
- Excavated materials will not be stored near the watercourses.
- All plant will be maintained and any fuel drips will be attended to on an ongoing basis.
- Drip trays and spill kits will be available on site. Personnel will be trained in use of the spill kits.
- Should there be a requirement to use spill kit, all contaminated material will be removed to a licensed landfill.
- Plant and vehicles shall be properly maintained and shall not be left idling when not use.

*Fuel/Lubricant spillage from equipment:*

- Fuelling and lubrication will take place at least 50 m from the watercourse.
- Spill kits will be available. Personnel will be trained in use of same.
- Any fuels or lubricants will be stored in a bunded area with 110 % capacity

- Waste oils and hydraulic fluids will be collected, stored in sealed containers and disposed off site.

**Measure to control airborne materials:**

- Loads of excavated material will be covered during transportation to prevent spillages of excavated material.
- There will be controlled access and egress.
- There is a 10km/hr speed limit in place for working plant.
- Access and egress points along with traffic carriageways will be regularly cleaned.
- All equipment will be washed and cleaned off site regularly.

**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)

<b>Outline Construction Methodology</b>			
<b>Title:</b>	<b>Pre-Construction Activities</b>		<b>Ref:</b> <b>GC-OCM-01</b>
<b>General Description</b>			
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.			
<b>Duration</b>			
Over a 6 month period prior to the commencement of the main construction stage			
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>▪ Main Contractor</li> <li>▪ Project Manager</li> <li>▪ Environmental Clerk of Works</li> <li>▪ Site Ecologist</li> <li>▪ Site Hydrologist</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Survey equipment</li> </ul>	
<b>Design and Management Activities</b>			
<ol style="list-style-type: none"> <li>1. The Project Manager, Main Contractor, and the Environmental Clerk of Works will be appointed.</li> <li>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,</li> <li>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,</li> <li>4. Method statements will be prepared by the Contractor. These method statements will be based on the Outline Construction Methodologies.</li> <li>5. Pre-construction monitoring and confirmatory surveys will be carried out by specialist engineering and environmental consultants</li> </ol>			
<b>Pre-Construction Windfarm Activities</b>			
<ol style="list-style-type: none"> <li>6. Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities,</li> <li>7. Pre-construction water quality monitoring surveys will be carried out.</li> <li>8. Pre-construction ecological confirmatory surveys will be carried out.</li> </ol>			
<u>END</u>			

<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>Construction Works Area Preparation</b>	<b>Ref:</b> <b>GC-OCM-02</b>
<b>General Description</b>		
Ahead of construction works in any particular area, the works areas will be set out ahead of construction machinery entering onto the lands		
<b>Duration</b>		
1 day to 1 week		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 2 civil works personnel</li> </ul>	<ul style="list-style-type: none"> <li>• GPS equipment</li> <li>• Hand tools</li> </ul>	<ul style="list-style-type: none"> <li>• 4 x 4 vehicle and trailer</li> <li>• Fencing posts</li> <li>• Fencing wire</li> <li>• Tape</li> <li>• Portable electric fencer</li> <li>• Goal posts</li> <li>• Signage</li> <li>• Wooden pegs</li> </ul>
<b>Standard Methods</b>		
<ol style="list-style-type: none"> <li>1. The route of the grid connection within the construction area will be marked out using GPS equipment and wooden pegs</li> <li>2. Construction areas will be set-out using GPS equipment.</li> <li>3. A detailed design will be done for the trench in the public road. Trench will be confined to the public road corridor, more specifically, the centre of carriageway.</li> <li>4. At Mountphilips, land will be temporarily fenced with wooden posts and wire or with electric fences if there is livestock present , and</li> <li>5. 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</li> <li>6. Confirmatory consultations with Irish Water, Eir and ESB and confirmatory ground surveys at service locations will be carried out ahead of works; 'The foreman will look out for underground pipes during excavations near services.</li> </ol>		
<u>END</u>		

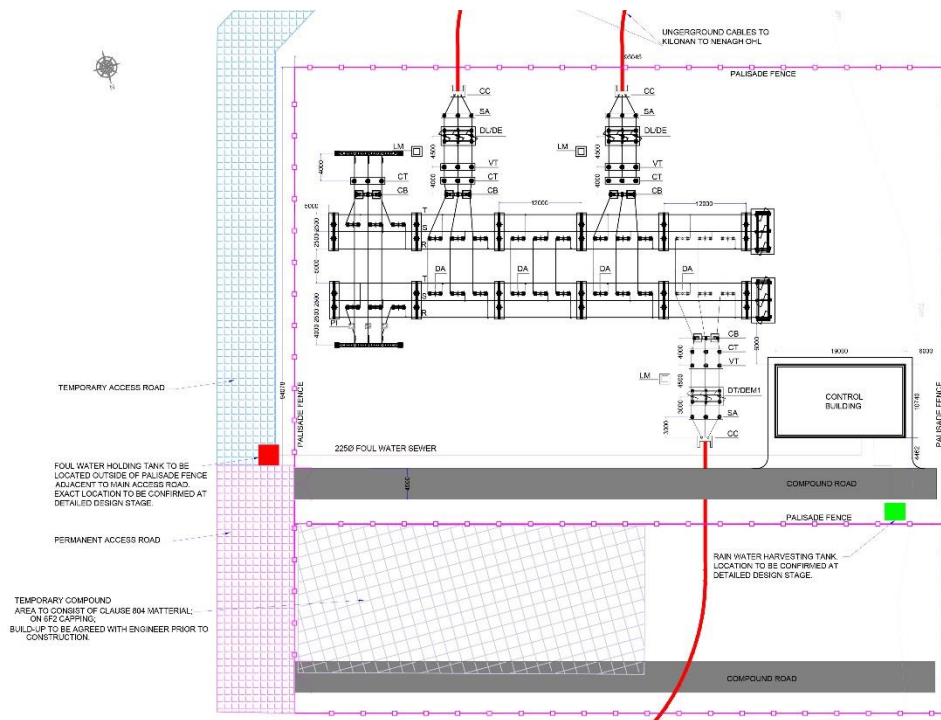
Outline Construction Methodology		
<b>Title:</b>	<b>Mountphilips Substation Compound</b>	<b>Ref:</b> <b>GC-OCM-03</b>
General Description		
<p>The proposed 110kV Mountphilips Substation will facilitate a loop-in connection to the existing Killonan – Nenagh 110kV overhead line (See also OCM-04). This 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.</p>		
Duration		
32 Weeks Approx.		
Personnel	Materials	Machinery & Equipment
<ul style="list-style-type: none"> <li>• 10 to 15 electrical personnel</li> <li>• 10 to 15 civil works personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Excavators</li> <li>• Dumpers / loaders</li> <li>• tractors and trailers</li> <li>• Crane</li> <li>• Hoist</li> <li>• Power Tools</li> <li>• Generator</li> <li>• Scaffolding</li> <li>• Vibrating roller</li> <li>• Substation Electrical Equipment</li> <li>• Cabling</li> </ul>	<ul style="list-style-type: none"> <li>• Clause 804</li> <li>• 6F2 capping stone</li> <li>• Paving.</li> <li>• Fencing</li> <li>• Geotextile</li> <li>• Concrete and concrete blocks</li> <li>• Roofing Timber and other building materials</li> <li>• Tiles and Cladding</li> <li>• Steel Doors</li> </ul>
Standard Methods		
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. A drainage system will be excavated and installed around the compound area.</li> <li>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 <b>OCM-020: Formation of Overburden Storage Berms</b>.</li> <li>5. A layer of geotextile material will be laid over the footprint of the compound.</li> <li>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.</li> <li>7. Each layer will be compacted using a vibrating roller.</li> <li>8. The compound will contain a control building measuring circa 19m x 11m, outdoor electrical equipment, lightening protection and internal access roads.</li> <li>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.</li> </ol>		

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 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**

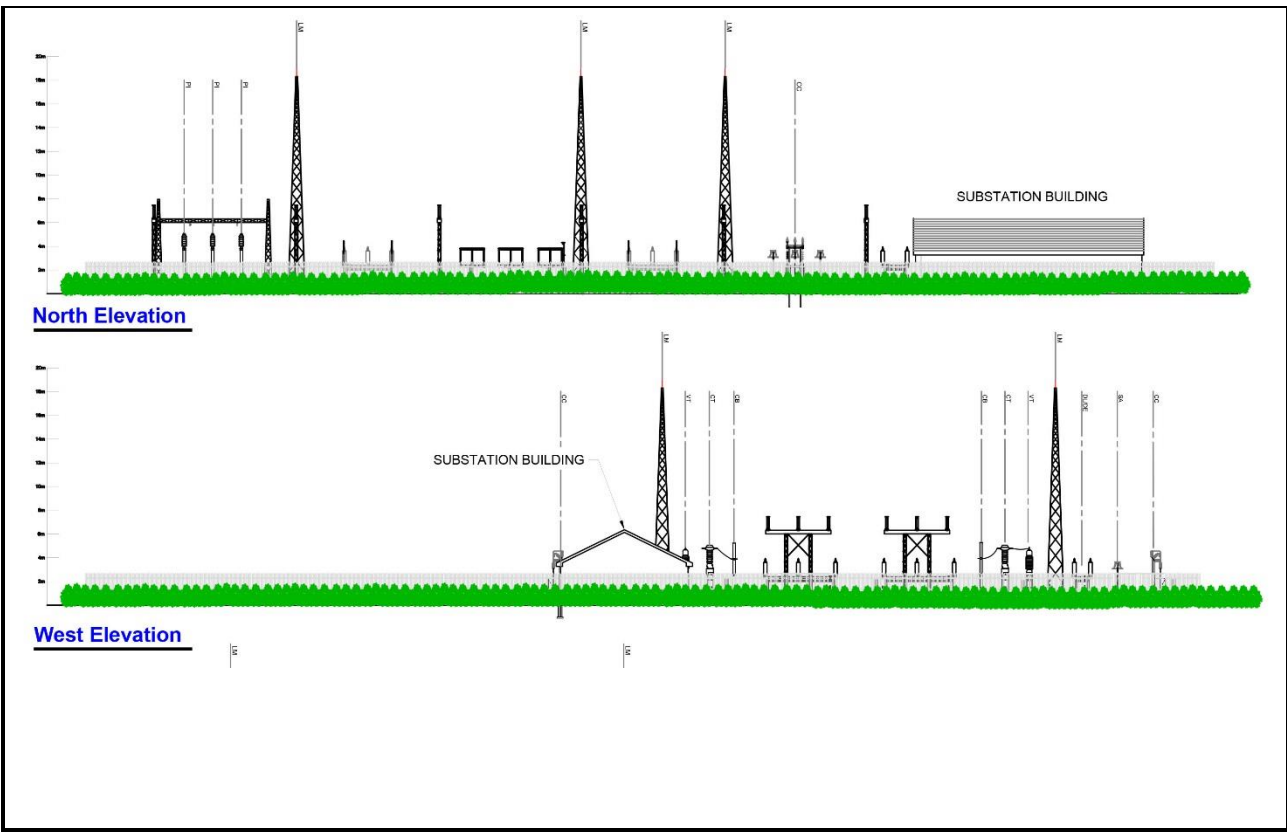
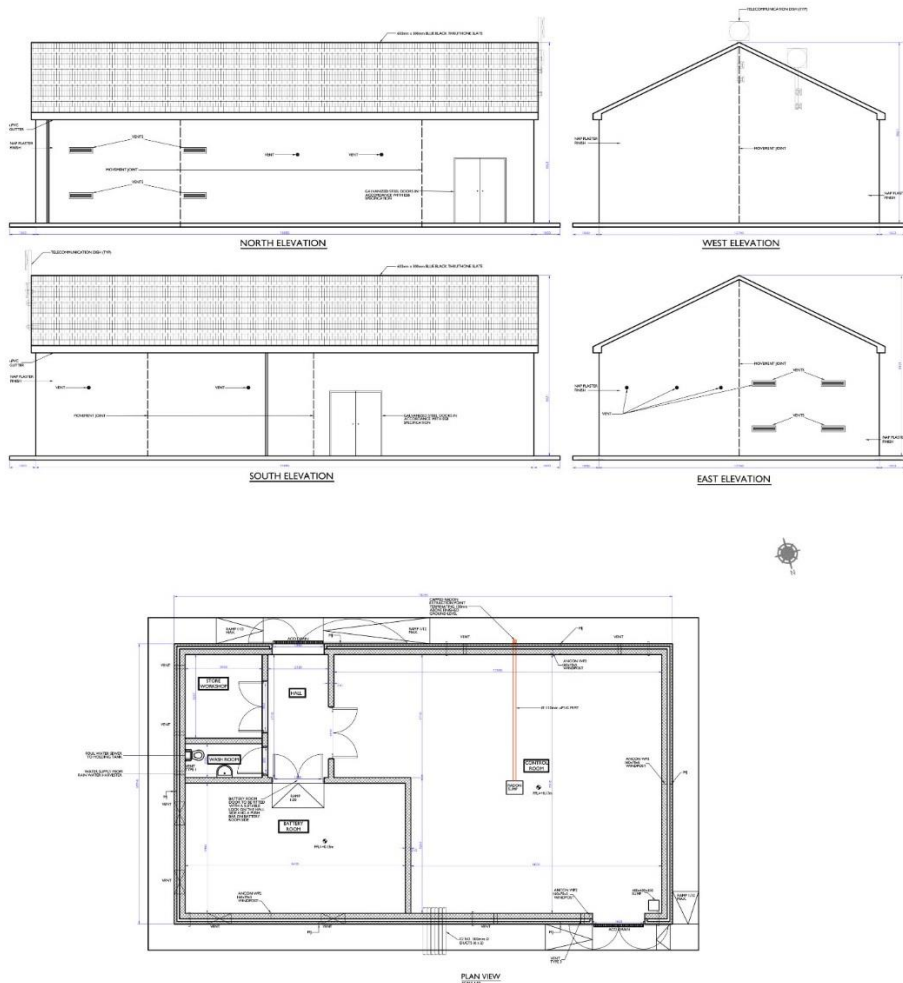


Figure GC 5.6: Plan and Elevation of the Control Building at Mountphilips Substation



Photographs





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

END

Outline Construction Methodology		
<b>Title:</b>	<b>New End Masts at Mountphilips Substation</b>	<b>Ref:</b> <b>GC-OCM-04</b>
General Description		
<p>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.</p>		
Duration		
<ul style="list-style-type: none"> <li>• Construction of end mast foundations – 7 days.</li> <li>• Erection of towers - 3 days, weather dependant</li> <li>• Cable jointing – 5 days per tower.</li> </ul>		
Personnel	Materials	Machinery & Equipment
<ul style="list-style-type: none"> <li>• 5 operatives</li> </ul>	<ul style="list-style-type: none"> <li>• 4x4 vehicle</li> <li>• Tractor and trailer</li> <li>• Crane Teleporter</li> <li>• Chains / small tools</li> <li>• Tracked Excavator</li> <li>• Tracked Dumper</li> </ul>	<ul style="list-style-type: none"> <li>• Lattice steel towers</li> <li>• Cable Interface platform</li> <li>• Insulators</li> <li>• Electrical Connections (Jumpering conductors)</li> <li>• Cable sealing ends</li> <li>• Concrete (foundation)</li> <li>• Copper/Aluminium Conductor</li> <li>• Aggregate</li> <li>• Concrete pipes 1m high 1.5m diameter</li> <li>• Reinforcing bars</li> </ul>
Standard Methods		
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. 1m x 1m shuttering will be installed around the individual legs of each tower and will protrude 300mm over ground level.</li> <li>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.</li> <li>5. Once the concrete is set the shuttering will be removed and the concrete will be allowed to cure for approx. 28 days.</li> <li>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.</li> <li>7. Once the concrete is sufficiently cured, work can commence on erecting the bases of the end masts.</li> <li>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.</li> <li>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.</li> <li>10. The overhead line will then be switched out (de-energised).</li> <li>11. The overhead line can then be moved off centre using stay wires and weights.</li> </ol>		

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

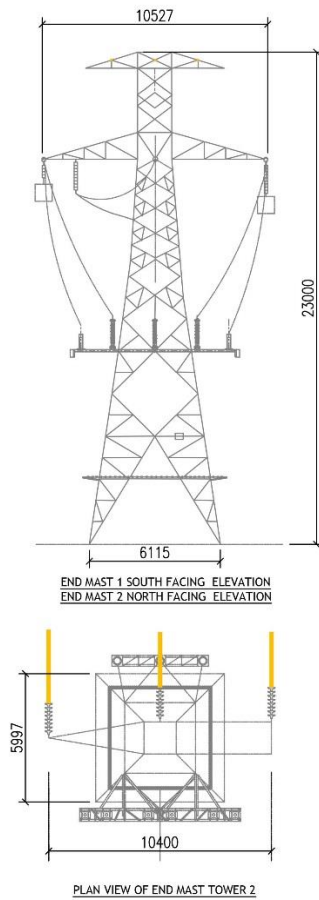
**Photographs**



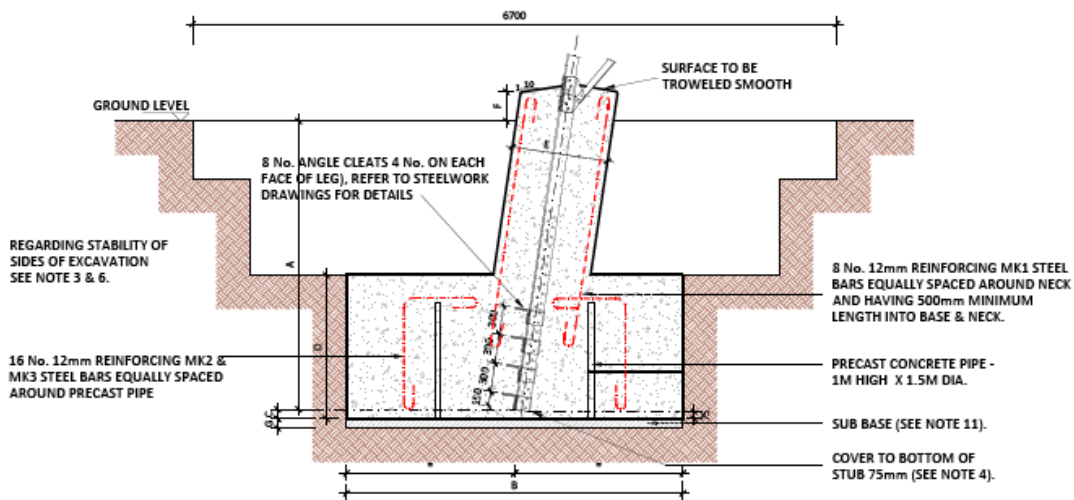
Typical tower base

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		
<b>Title:</b>	<b>110kV Trenching and Ducting</b>	<b>Ref: GC-OCM-05</b>
General Description		
<p>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</p>		
Duration		
<ul style="list-style-type: none"> <li>▪ The civil contractor carrying out the standard 110kV trenching and ducting will complete between 100 linear metres of trench per crew per day depending on the site conditions</li> <li>▪ Up to 6 crews will be working at any one time</li> <li>▪ Approximate duration 16-18 weeks.</li> </ul>		
Personnel	Materials	Machinery & Equipment
<ul style="list-style-type: none"> <li>• 2-3 general operatives &amp; 1 Excavator Operator per crew</li> <li>• 1 geotechnical engineer/ appropriately competent person to supervise works in peatland (Variation 5A)</li> </ul>	<ul style="list-style-type: none"> <li>• 13 ton tracked excavator per crew</li> <li>• 1 tracked dumper and tractor and trailer per crew</li> <li>• 1 long reach, low ground pressure tracked excavator</li> <li>• 1 No. vibrating compaction plate per crew</li> <li>• Brush &amp; mandrel</li> </ul>	<ul style="list-style-type: none"> <li>• Blinding Concrete where necessary</li> <li>• Clause 804 Material</li> <li>• 150mm rock fill</li> <li>• 160mm and 125mm diameter uPVC ducting</li> <li>• Red cable marker strip Yellow marker warning tape</li> <li>• CGBM4 lean mix concrete</li> <li>• Duct spacers</li> <li>• Nylon ropes</li> </ul>
Standard Methods		
<ol style="list-style-type: none"> <li>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.</li> <li>2. The trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained.</li> <li>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 <a href="#">GC.OCM-20: Formation of Overburden Storage Berms</a>. Public road excavations will be sent to Licence Landfill</li> <li>4. A bedding layer of lean mix concrete will be placed at the bottom of the trench.</li> <li>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.</li> <li>6. The ducts will be surrounded and covered with the lean mix concrete and concrete will then be compacted.</li> <li>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.</li> <li>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.</li> <li>9. The top ducts will then be surrounded and covered with lean mix concrete material and compacted.</li> <li>10. Another layer of red cable protection strip will be placed on top.</li> <li>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.</li> <li>12. Yellow warning tape, will be placed over the compacted Clause 804 backfill or sub-soil backfill.</li> <li>13. A final layer of Clause 804 or topsoil, as specified, will then be placed in the trench to ground level.</li> <li>14. For public road sections, immediate reinstatement will be carried out using road surfacing material to surface level.</li> </ol>		

15. For the forestry road section, the top of the trench will be backfilled using Clause 804.
16. 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**

17. Marker posts will have a centred lightning symbol, on engineering grade fluorescent yellow background.
18. 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.
19. The siting of marker posts and plates will be dictated by ESNB as part of the detailed design process

**Reference Documents**

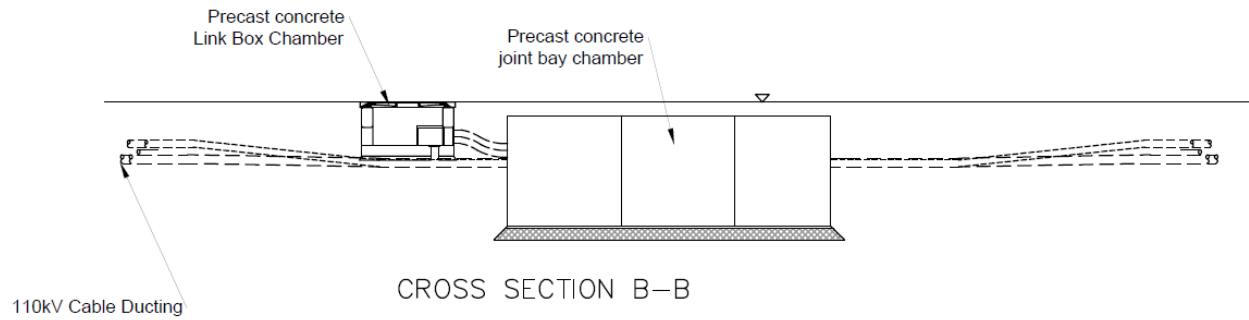
- ESB Specification
- Standard Trench Cross Section Trefoil Formation (PE424-D7001-001-003-005)
- Standard Trench Cross Section Flat Formation (PE424-D7001-001-005-002)

END

<b>Outline Construction Methodology</b>		
<b>Title:</b>	110kV Joint Bays and Associated Chambers	<b>Ref:</b> GC-OCM-06
<b>General Description</b>		
<p>Along the UWF Grid Connection route there will be circa.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.</p>		
<b>Duration</b>		
2-3 days per joint bay location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 2-3 General Operatives</li> <li>• 1 Excavator Operator</li> </ul>	<ul style="list-style-type: none"> <li>• 360° tracked excavator</li> <li>• 1 no. tracked dumper or tractor and trailer</li> <li>• Water Pump &amp; Hoses</li> <li>• Compactor</li> </ul>	<ul style="list-style-type: none"> <li>• Bedding sand</li> <li>• Clause 804 Material</li> <li>• HDPE ducting</li> <li>• Precast Chamber Units</li> <li>• Link Box Chamber</li> <li>• Copper cable (for earthing of the link box and joint bay chamber)</li> <li>• Earth Rods</li> </ul>
<b>Standard Methods</b>		
<ol style="list-style-type: none"> <li>1. A pit will be excavated to a depth of c.2.5m, deep enough to accommodate the joint bay chamber.</li> <li>2. 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.</li> <li>3. 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.</li> <li>4. 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.</li> <li>5. The excavations around the precast concrete joint bays will be backfilled with granular fill and compacted in layers up to the existing ground level.</li> <li>6. 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.</li> <li>7. 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.</li> <li>8. 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.</li> <li>9. The work area around the Joint Bays will be reinstated.</li> </ol>		
<b>Reference Documents</b>		
<ul style="list-style-type: none"> <li>• ESB Specification</li> <li>• ESB Specification 18153</li> </ul>		

**Relevant Drawings from Volume C3 EIAR Figures**


**Extract from Figure GC 5.9: Cross Section Views of 110kV UGC Joint Bays**



END



<b>Outline Construction Methodology</b>		
<b>Title:</b>	110kV Cable Pulling	<b>Ref:</b> GC-OCM-07
<b>General Description</b>		
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.		
<b>Duration</b>		
Site specific, 1 day per cable section between joint bays depending on conditions		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 4 electrical personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Cable Winch and four wheel drive vehicle.</li> <li>• Nylon Ropes &amp; Rope Guide Roller.</li> <li>• Swivel Link.</li> <li>• Drum trailer and tractor.</li> </ul>	<ul style="list-style-type: none"> <li>• Cable attachment lugs</li> <li>• 110kV Electrical Cable</li> <li>• Fibre optical cable</li> <li>• Cable Pulling stockings</li> </ul>
<b>Standard Methods</b>		
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>4. Rope guide rollers will be placed at the duct opening to guide the cable into the duct.</li> <li>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.</li> <li>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.</li> <li>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</li> </ol>		
<b>Variation 7A: Cable Jointing at a later date</b>		
<ol style="list-style-type: none"> <li>8. 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</li> </ol>		
<u>END</u>		

<b>Outline Construction Methodology</b>		
<b>Title:</b>	110kV Cable Jointing	<b>Ref:</b> GC-OCM-08
<b>General Description</b>		
Cable jointing is carried out at the joint bays in order to join two lengths of cable.		
<b>Duration</b>		
Circa 2 days per joint bay		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 3 Cable Jointers</li> </ul>	<ul style="list-style-type: none"> <li>• Tractor Unit and trailer with Hi-Ab or City Crane</li> <li>• Heating blankets</li> <li>• Hand tools</li> <li>• Jointing Container</li> <li>• 1 Excavator Operator</li> <li>• 360° tracked excavator</li> <li>• 1 no. tracked dumper or tractor and trailer</li> </ul>	<ul style="list-style-type: none"> <li>• Sand for pipe bedding</li> <li>• Cement-bound sand</li> <li>• Sand bags</li> </ul>
<b>Standard Method</b>		
<ol style="list-style-type: none"> <li>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,</li> <li>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.</li> <li>3. After the cables are heated the cable jointing procedure will be carried out,</li> <li>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.</li> <li>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.</li> <li>6. Testing will then be carried out on the joint once it is fully supported by the sand base.</li> <li>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,</li> <li>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.</li> <li>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.</li> <li>10. The ground over and around the joint bay location will then be reinstated.</li> </ol>		
<b>Photographs</b>		
		
<p><b>Typical HV cable jointing container</b></p>		
<p><u>END</u></p>		

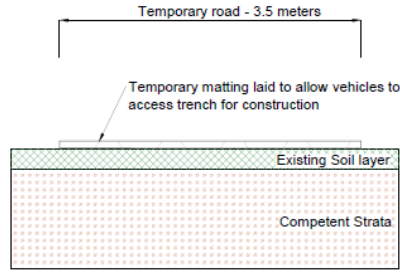
<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>New Permanent Access Road at Mountphilips Substation</b>	<b>Ref:</b> <b>GC-OCM-10</b>
<b>General Description</b>		
New permanent access road 3.5m in width, will be constructed to provide vehicular access to Mountphilips Substation		
<b>Duration</b>		
Mountphilips Substation access road, c.100m/day		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Site Engineer</li> <li>• Crew size: 3 operatives</li> <li>• Excavator Operator</li> <li>• Site Ecologist</li> </ul>	<ul style="list-style-type: none"> <li>• 4x4 vehicle</li> <li>• Wheeled dumper or Track dumper (6 to 8 tons)</li> <li>• 360° tracked excavator.</li> <li>• Vans</li> <li>• Vibrating Roller</li> <li>• Tree harvester</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-cast culverts</li> <li>• 50mm crushed stone</li> <li>• Geotextile</li> <li>• Granular fill as per design</li> </ul>
<b>Standard Method</b>		
<ol style="list-style-type: none"> <li>1. The route of the new access road will be marked out using GPS equipment and wooden pegs by the site engineer.</li> <li>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. Goal posts will be erected under overhead electricity and telephone lines.</li> <li>3. 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.</li> <li>4. Geotextile material will be installed where necessary (subject to site conditions).</li> <li>5. A minimum sub-base will be laid which will consist of 200mm of crushed stone and compacted in layers.</li> <li>6. A surface layer of granular fill will then be laid and compacted. A vibrating roller will compact each layer.</li> <li>7. The surface of the new road will be finished with a 1% gradient to allow water run-off.</li> </ol>		
<b>Relevant Drawings from Volume C3 EIAR Figures</b>		
<b>Extract from</b>		
<p style="color: red;">Figure GC 5.14: Cross Section of New Permanent Access Roads outside Slievefelim to Silvermines SPA</p>		
<b>END</b>		

<b>Outline Construction Methodology</b>			
<b>Title:</b>	Temporary Access Road to End Masts	<b>Ref:</b>	<b>GC-OCM-11</b>
<b>General Description</b>			
A temporary access roads will provide access to End Mast No.1 and No2 at Mountphilips. The temporary access road will be circa 3.5m in width.			
<b>Duration</b>			
Temporary road to End Mast – 340 meters. Duration 2 days			
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>• Site Engineer</li> <li>• Crew size: 3 operatives 1 Excavator Operator</li> </ul>	<ul style="list-style-type: none"> <li>• 4x4 vehicle</li> <li>• Excavator</li> <li>• Vans</li> <li>• Vibrating roller</li> <li>• Wheeled or tracked dumper</li> </ul>	<ul style="list-style-type: none"> <li>• Geotextile</li> <li>• Plastic Mats / Aluminium Panel Tracks</li> <li>• Pre-cast culverts</li> <li>• 50mm crushed stone</li> </ul>	
<b>Standard Method - 3.5m wide excavated stone road</b>			
<ol style="list-style-type: none"> <li>1. The alignment of the temporary road will be marked out by the site engineer.</li> <li>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 <b>GC.OCM-20: Formation of Overburden Storage Berms</b>, for later use during reinstatement works along the footprint of the temporary access road.</li> <li>3. The depth and width of soil removal will be kept to a minimum.</li> <li>4. A layer of geotextile material will be laid over the excavated ground</li> <li>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.</li> <li>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. .</li> </ol>			
<b>Standard Method - 3.5m wide floating stone road</b>			
<ol style="list-style-type: none"> <li>7. The alignment of the temporary road will be marked out by the site engineer.</li> <li>8. A layer of geotextile material will be laid over the ground, and extend slightly beyond, the footprint of the road</li> <li>9. 50mm crushed stone will then be overlaid on the geotextile and compacted in suitable layers using a vibrating roller.</li> <li>10. 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..</li> </ol>			
<b>Standard Method - Temporary bog mat or panel track road</b>			
<ol style="list-style-type: none"> <li>11. The alignment of the temporary road will be marked out by the site engineer.</li> <li>12. A layer of geotextile material will be laid over the ground, and extend slightly beyond, the footprint of the road</li> <li>13. Plastic or aluminium mats will be laid over the geotextile.</li> <li>14. Once the works necessitating the temporary road is complete the matting and geotextile will be removed from the site.</li> </ol>			

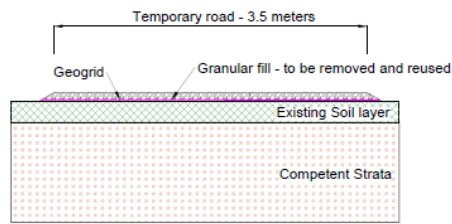
**Relevant Drawings from Volume C3 EIAR Figures**

**Extract from**

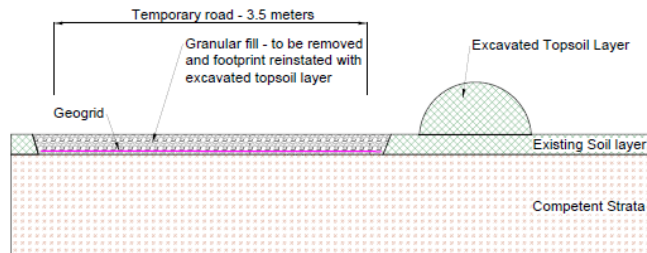
**Figure GC 5.17: Cross Section Views of Temporary Access Road (3 types)**



Cross Section of temporary access road - Matting



Cross Section of temporary access road - Floating road



Cross Section of temporary access road - cut and fill

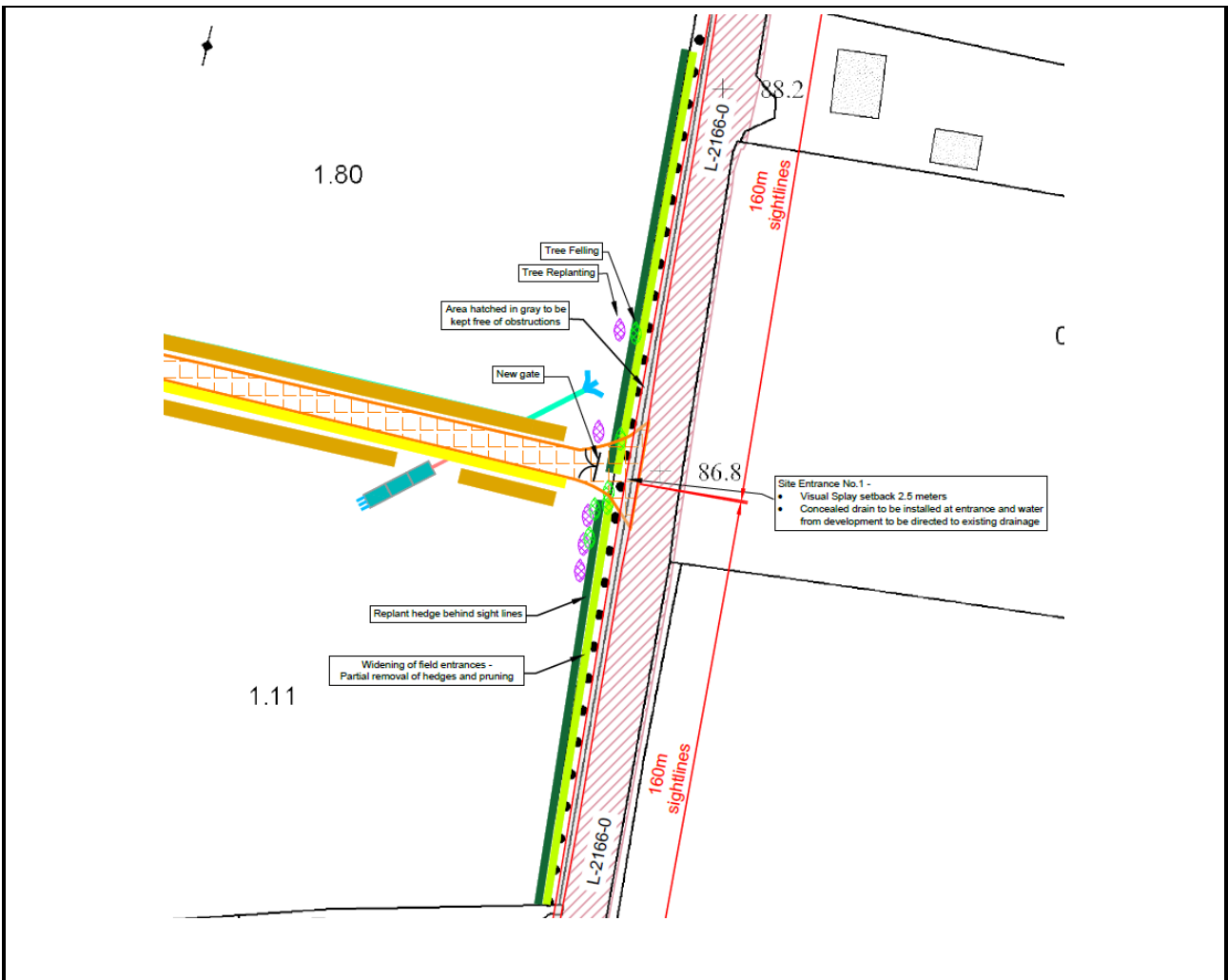
**Photographs**



**Temporary Aluminium Panel Tracks**

END

Outline Construction Methodology			
<b>Title:</b>	Permanent Site Entrance at Mountphilips Substation		<b>Ref:</b> GC-OCM-12
<b>General Description</b>			
The site entrance to Mountphilips 110kV Substation at Coole and to Mountphilips Temporary Construction will be permanently widened and roadside hedgerows will be removed to achieve sightlines at these entrances.			
<b>Duration</b>			
1 day			
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 3 crews</li> <li>• Crew size: 3 workers</li> <li>• Traffic flagmen</li> </ul>	<ul style="list-style-type: none"> <li>• 4x4 vehicle</li> <li>• 1 dumper per crew</li> <li>• 1 excavator per crew</li> <li>• Chains / hand tools</li> <li>• Vibrating rollers</li> </ul>	<ul style="list-style-type: none"> <li>• 50mm Crushed Stone</li> <li>• Geotextile</li> <li>• Gates</li> <li>• Timber posts</li> <li>• Rail fence</li> <li>• Granular fill</li> <li>• Fencing materials</li> <li>• Silt fences</li> </ul>	
<b>Standard Method - Permanent Site Entrances, E1 at Coole</b>			
<ol style="list-style-type: none"> <li>1. Prior to works at the entrances commencing, traffic management controls will be put in place and flagmen deployed</li> <li>2. The roadside fencing and hedgerows will be cleared back until adequate sightlines are achieved,</li> <li>3. Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary</li> <li>4. Any hedgerows or trees removed during widening of the entrance will be replaced behind the new sightlines.</li> <li>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.</li> <li>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.</li> <li>7. The new verge at each side of the widened site entrance will covered with soil and reseeded.</li> </ol>			
<b>Relevant Drawings from Volume C3 EIAR Figures</b>			
Extract from Figure GC 5.20: Plan View of Permanent Site Entrances E1 at Coole (Mountphilips Substation & Temporary Compound)			



Photographs



Existing entrance at Coole for Mountphilips Substation

END

Outline Construction Methodology		
<b>Title:</b>	<b>Temporary Compound-at Mountphilips Substation</b>	<b>Ref: GC-OCM-13</b>
<b>General Description</b>		
<p>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. 1 No. temporary compound will be set up at 110kV Mountphilips Substation.</p>		
<b>Duration</b>		
1 day		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 3 crews</li> <li>• 2-3 General Operatives per crew</li> <li>• 1 Excavator operator per crew.</li> </ul>	<ul style="list-style-type: none"> <li>• 1 excavator per crew</li> <li>• 1 no. dumper or tractor and trailer per crew.</li> </ul>	<ul style="list-style-type: none"> <li>• Stone</li> <li>• Geotextile</li> <li>• Security fencing</li> <li>• Lighting</li> <li>• Portable Cabins</li> </ul>
<b>Standard Methods</b>		
<ol style="list-style-type: none"> <li>8. The temporary site compound area will be marked out.</li> <li>9. A drainage system will be excavated and installed around the compound area.</li> <li>10. 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.</li> <li>11. A layer of geotextile material will then be laid over the footprint of the compound,</li> <li>12. 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.</li> <li>13. Security fencing will be erected around the compound and access gates will be installed at the entrances.</li> <li>14. Portable cabins to be used for site offices, canteen and toilets will be delivered to the compound and set up.</li> <li>15. Bunded storage units will be installed in the compound.</li> <li>16. Parking areas will be marked out and signage will be erected.</li> <li>17. Goalposts will be erected under any overhead lines, and</li> <li>18. Cowled lighting will be installed around the compound area</li> </ol>		
<u>END</u>		



<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>Instream Works Preparation and Reinstatement</b>	<b>Ref:</b> <b>GC-OCM-15</b>
<b>General Description</b>		
<p>Instream works will be required at W1, W2 and W3 watercourse crossing locations at Mountphilips in order to install ducts and cabling and 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.</p>		
<b>Duration</b>		
1-2 Days per location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 3-4 operatives</li> </ul>	<ul style="list-style-type: none"> <li>• Wheeled or Tracked dumper</li> <li>• 360° tracked excavator</li> <li>• Mobile water pumps and hoses</li> <li>• 4 x 4 vehicle and trailer</li> </ul>	<ul style="list-style-type: none"> <li>• Sand Bags containing washed sand</li> <li>• Geotextile membrane</li> <li>• Straw bales</li> <li>• Flume pipes</li> <li>• Splash plate</li> <li>• Silt Buster</li> <li>• Washed round stones</li> </ul>
<b>Standard Method 1: Dam &amp; Overpump work</b>		
<p>19. A dam will be constructed, upstream of the works location, using sand bags containing washed sand.</p> <p>20. 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.</p> <p>21. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</p> <p>22. The works (outlined in <a href="#">GC.OCM-16 Instream Works</a>) can then be carried out in the dry bed.</p> <p>23. 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.</p> <p>Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.</p>		
<b>Standard Method 2: Dam &amp; Flume work</b>		
<ol style="list-style-type: none"> <li>1. The flume pipe(s) will be set out on the bed of the watercourse.</li> <li>2. A dam will be constructed using sand bags so that all the flow is diverted through the flume pipe(s).</li> <li>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.</li> <li>4. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works location to minimise sedimentation</li> <li>5. The works (outlined in <a href="#">GC.OCM-16 Instream Works</a>) will be carried out under/around the flume pipe(s).</li> <li>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.</li> </ol>		

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**

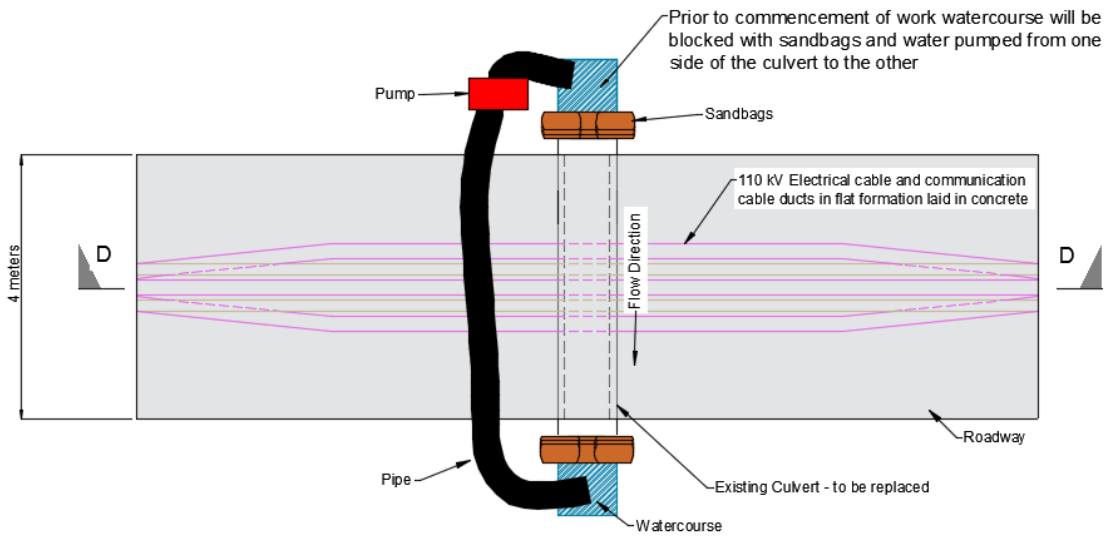


**PVC Flume Pipes**

**Relevant Drawings from Volume C3 EIAR Figures**

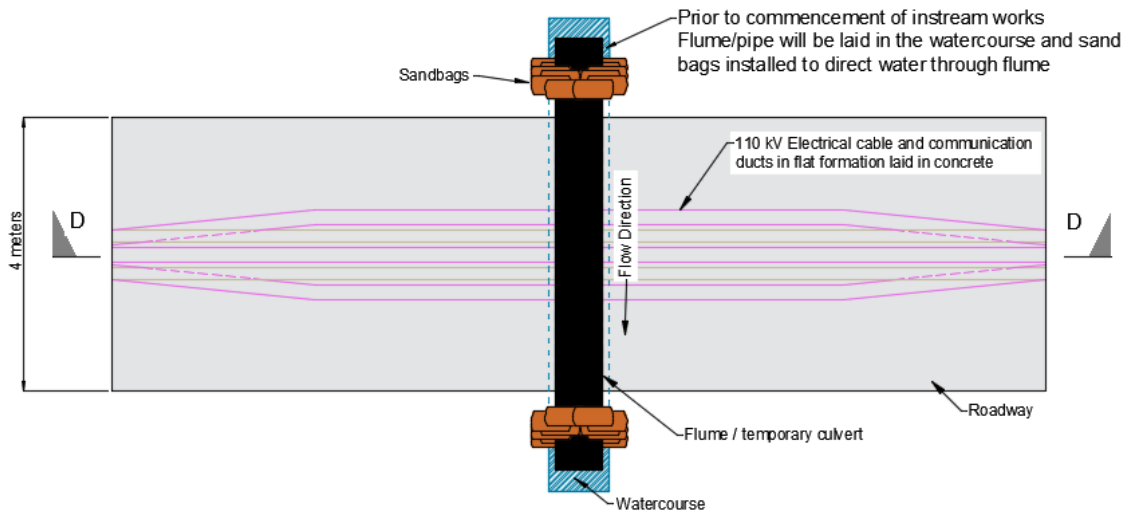
**Extract from Figure GC 5.25:**

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

<b>Outline Construction Methodology</b>		
<b>Title:</b>	Instream Works	<b>Ref:</b> GC.OCM-16
<b>General Description</b>		
Trenching and ducting and the construction of access roads and associated crossing structures will involve instream works at W1, W2 and W3 watercourse crossing locations at Mountphilips in order to install cabling and install new permanent or temporary crossing structures, or to facilitate the construction of new access roads.		
<b>Duration</b>		
1-2 Days per location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 3-4 operatives</li> </ul>	<ul style="list-style-type: none"> <li>• Wheeled or Tracked dumper.</li> <li>• 360° tracked excavator</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Pipe Culvert</li> <li>• Box Culvert</li> <li>• Cable Ducting &amp; trenching materials</li> <li>• Dry Lean mix concrete</li> <li>• Siltbuster</li> <li>• 50mm stone</li> </ul>
<b>Standard Methods: Trenching &amp; Ducting</b>		
<p>24. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-15 Instream Works Preparation and Reinstatement.</p> <p>25. 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>26. 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.</p> <p>27. 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>28. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.</p>		
<b>Variation 16A: Installation of New Culvert Structure W2 and W3</b>		
<p>29. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-15 Instream Works Preparation and Reinstatement.</p> <p>30. 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.</p> <p>31. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.</p> <p>32. 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>		

- 33. The dam is removed and the watercourse can flow through the new culvert.
- 34. Crushed stone will then be laid over the culvert and built up in layers to provide vehicular access above the watercourse.

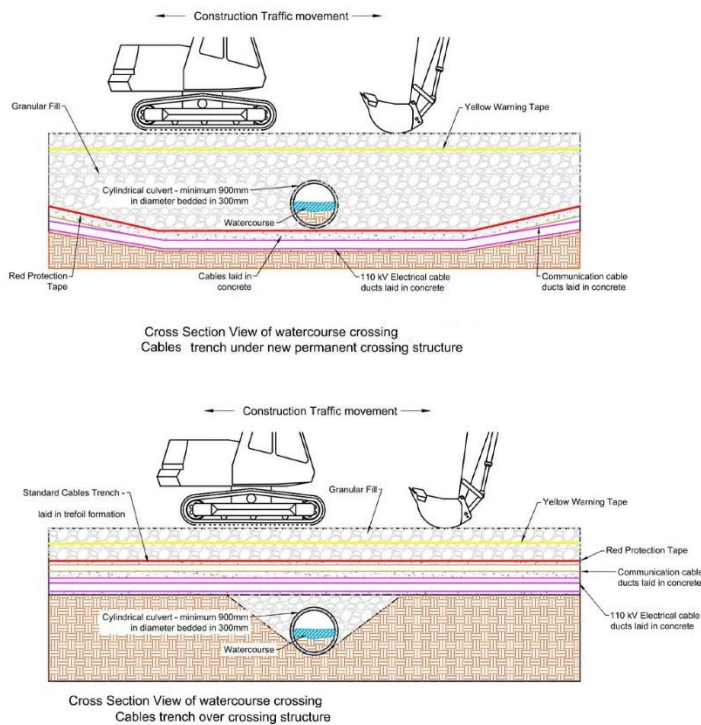
**Variation 16C: Installation of Temporary Culverts at W1**

- 35. The works will take place in a dry stream bed, following damming methods outlined in GC.OCM-15 Instream Works Preparation and Reinstatement.
- 36. 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.
- 37. A 900mm flume pipe culvert will be placed along the stream bed.
- 38. 50mm stone will be laid over the culvert and built up in layers to provide vehicular access across the watercourse.
- 39. 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.
- 40. The watercourse will then be reinstated as per GC.OCM-15 Instream Works Preparation and Reinstatement.

**Relevant Drawings from Volume C3 EIAR Figures**

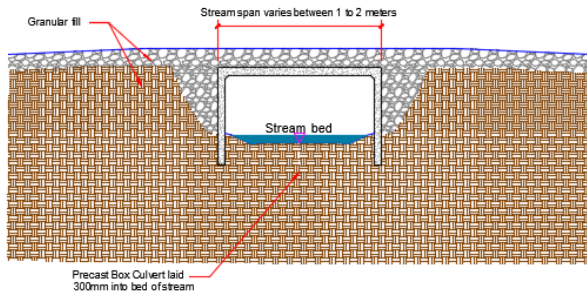
**Extract from Figure GC 5.26:**

Cables under crossing structures & Cables over crossing structures

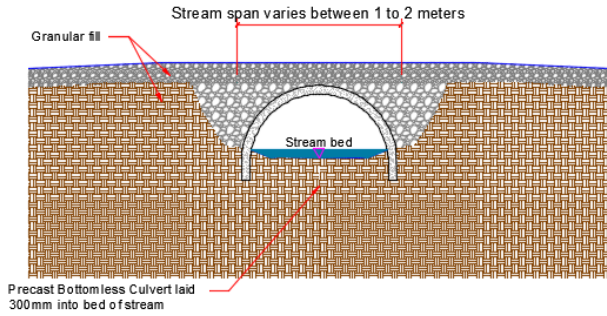


**Extract from Figure GC 5.26:**

Box Culverts and Bottomless Box Culverts



Permanent Crossing structure - Bottomless Box Culvert

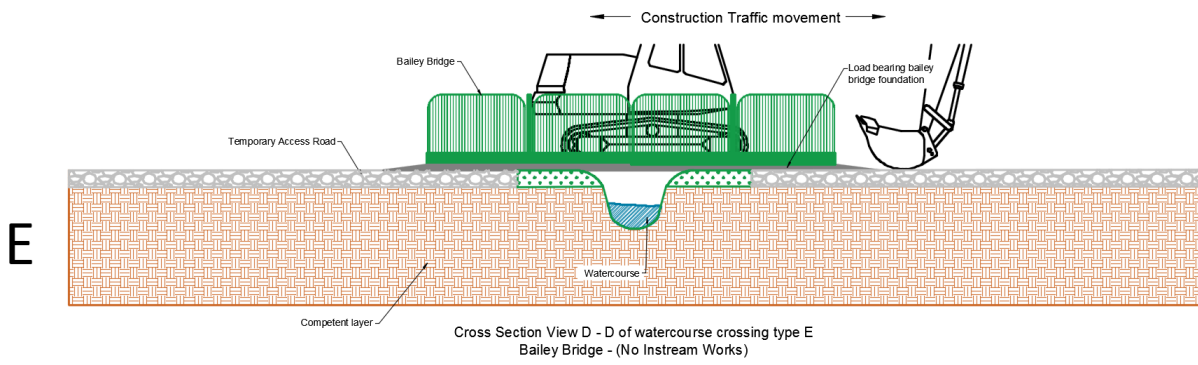


Permanent Crossing structure - Bottomless Box Culvert

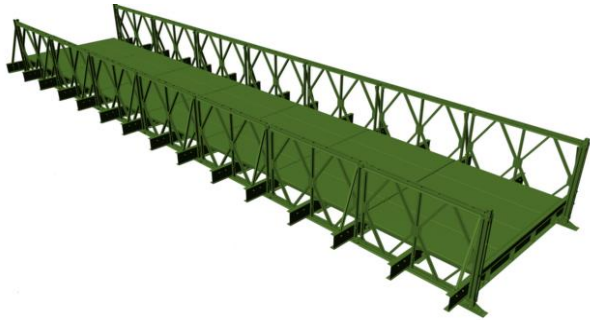
END

<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>Temporary Bailey Bridge</b>	<b>Ref:</b> <b>GC-OCM-17</b>
<b>General Description</b>		
<p>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.</p>		
<b>Duration</b>		
0.5 – 1 day per location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
Site engineer 2-3 operatives	Granular fill Clause 804 stone Geotextile Bridge or bridge components	City Crane / Hi-Ab Hand tools Tractor and low loader Tracked Excavator
<b>Standard Methods</b>		
<p>41. A temporary access road will be constructed in advance of the arrival of the Bailey bridge as per GC-OCM_11: Temporary Access Roads.</p> <p>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.</p> <p>The bridge will be delivered to the crossing point on a low loader.</p> <p>The bridge will be assembled using hand tools and lifted into place using the city crane or Hi-Ab.</p> <p>When the grid connection works are complete and the bridge is no longer required the bridge will be disassembled and removed from site.</p> <p>The stone will be removed from the bearing pads and the excavated soil reinstated and reseeded</p>		
<b>Reference Documents</b>		
Groundforce Bridge – Temporary Bridge ( <a href="https://www.vpgroundforce.com/ire/temporary-bridges/">https://www.vpgroundforce.com/ire/temporary-bridges/</a> )		
<b>Relevant Drawings from Volume C3 EIAR Figures</b>		

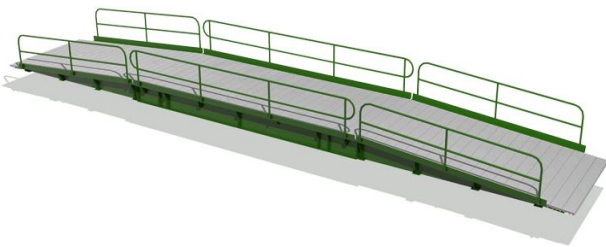
Extract from Figure GC 5.32: Watercourse Crossing Type E –Temporary Portable Bailey Bridge



Photographs



Typical Bailey Bridge



Typical Bailey Bridge

END



<b>Outline Construction Methodology</b>			
<b>Title:</b>	<b>Formation of Overburden Storage Berms at Mountphilips substation</b>	<b>Ref:</b>	<b>GC-OCM-20</b>
<b>General Description</b>			
Overburden will result from excavations for the UWF Grid Connection at Mountphilips substation. This overburden will be temporarily and permanently stored in berms			
<b>Duration</b>			
For the duration of the construction works			
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>• 2 operatives</li> <li>• 1 grounds person</li> </ul>	<ul style="list-style-type: none"> <li>• 1 Excavator</li> <li>• 1 Dump truck</li> </ul>	<ul style="list-style-type: none"> <li>• Grass seed</li> </ul>	
<b>Standard Methods</b>			
<p>42. 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.</p> <p>43. 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.</p> <p>44. The sides will be battered at angles of 45 degrees or less and a light covering of topsoil/subsoil will be added.</p> <p>45. Permanent berms will be seeded with grass seed.</p>			
<u>END</u>			

<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>Reinstatement of Land at Mountphilips Substation</b>	<b>Ref:</b> <b>GC-OCM-21</b>
<b>General Description</b>		
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 reinstated to their former condition and returned to the landowner.		
<b>Duration</b>		
1 – 4 days per location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• Crew size: 3 workers</li> </ul>	<ul style="list-style-type: none"> <li>• 4x4 vehicle</li> <li>• 13 Ton digger</li> <li>• Sub-soiler plough</li> <li>• Levelling harrow</li> </ul>	<ul style="list-style-type: none"> <li>• Native grass, heather, tree and hedge-row species – seeds/seedlings</li> </ul>
<b>Standard Methods</b>		
<p>46. 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 truck</p> <p>47. The construction works area will, where required, be sub-soiled using a sub-soil plough to loosen any compacted areas.</p> <p>48. Sub-soil will be spread using the excavator</p> <p>49. Topsoil will be spread evenly over the subsoil to surface level using an excavator.</p> <p>50. 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.</p> <p>51. All stones in excess of 50mm will be removed from the surface.</p> <p>52. The soil will be seeded with grasses and native species common to the surrounding vegetation.</p> <p>53. Fertilizer will be spread on any sections of improved grassland</p> <p>54. The lands will remain fenced until sufficiently revegetated, at which time all fencing will be removed off-site..</p>		
<b>Variation 21A: Reinstating hedgerows and treelines</b>		
<p>55. Boundaries where hedgerow and trees were removed during construction works will be replanted with a mix of native hedgerow species.</p> <p>56. New hedgerows and trees will be fenced to protect from damage by livestock.</p> <p>57.</p>		
<b>Variation 21B: Reinstating fencing and walls</b>		
<p>58. Boundaries where timber fences and stone walls and banks currently exist will be reinstated to their former condition.</p> <p>59. Former timber fencing will be replaced with new timber fencing.</p> <p>60. Stone walls will be replaced using the original stone</p> <p>61. Earthen banks will be replaced and replanted with grass or hedgerow, as appropriate for the location</p>		
<b>Reference Documents</b>		
<ul style="list-style-type: none"> <li>• ESB/IFA Code of Practice for Survey, Construction &amp; Maintenance of Overhead lines in relation to the rights of landowners</li> </ul>		
<u>END</u>		

## A5.3 - 5.7 Best Practice Measures

The Best Practice Measures (BPM) for the construction and early operation stage of UWF Grid Connection are listed below. This list has been amended from that included with the 2018 EIAR, to reflect the preliminary preferred route along the public road for the 110kV UGC. The BPMs that are not required because of the proposed change in the 110kV route are crossed out in the text and the numbering is retained from the EIAR May 2018 for UWF Grid Connection.

**Table 8: Revised (January 2019) 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-04	Measures for Protection of Surface Water Quality during Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
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-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden at Mountphilips Substation
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

BPM No.	BPM Title
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-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

<b>GC-BPM-01</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.</b>
<b>Environmental Commitment</b>	
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.	
<b>Relevant Watercourse Crossing Points</b>	
<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>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>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<p>Monitor weather conditions.</p> <p>Supervise excavation works and drainage works as required.</p>
<b>Surface Water Quality Protection Measures</b>	
<p>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);</p> <p>Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>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;</p>	

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;

At Mountphilips Substation site 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) . Silt fencing will also be placed downslope of the outfall;

Where dewatering of trenches or excavations is required along the R503 , there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated using a mobile water treatment train and then discharged via a silt bag along the roadside verge

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

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

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.

<b>GC-BPM-02</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.</b>
<b>Environmental Commitment</b>	
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.	
<b>Relevant Watercourse Crossing Points</b>	
The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed. <u>Relevant Watercourse Crossing Points: W1</u> 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.	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.
<b>Surface Water Quality Protection Measures</b>	
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

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

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.



<b>GC-BPM-04</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Replacing an Existing Culvert.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts from sediment input during replacing an existing culvert crossing. Typically this work will be undertaken where there is a requirement to replace an existing culvert under the public road	
<b>Work Sections/Locations</b>	
Culvert replacement locations	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.
<b>Surface Water Quality Protection Measures</b>	
<p>Replacing 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);</p> <p>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);</p> <p>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;</p> <p>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;</p> <p>Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;</p> <p>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;</p> <p>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;</p> <p>All disturbed ground on verges will be re-seeded at the soonest opportunity to prevent erosion;</p> <p>There will be no batching or storage of cement allowed at the watercourse crossing;</p> <p>There will be no refuelling allowed within 100m of the watercourse crossing; and,</p> <p>All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.</p>	
<b>References</b>	
<p>IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.</p> <p>NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</p>	

<b>GC-BPM-05</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.</b>	
<b>Environmental Commitment</b>		
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).		
<b>Work Sections/Locations</b>		
50m from watercourse		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.	
<b>Surface Water Quality Protection Measures</b>		
<p>Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;</p> <p>Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;</p> <p>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;</p> <p>Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;</p> <p>Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;</p> <p>In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;</p> <p>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;</p> <p>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;</p>		

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.

<b>GC-BPM-07</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.</b>	
<b>Environmental Commitment</b>		
Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.		
<b>Work Sections/Locations</b>		
110kV UGC Mountphilips Substation		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Monitor weather conditions. Ensure best practice storage and use of Cement Based Compounds.	
<b>Measures along the 110kV UGC</b>		
<p>No wet-cement products will be used along the grid connection route</p> <p>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;</p> <p>No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;</p> <p>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;</p> <p>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,</p> <p>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.</p>		
<b>Measures at Mountphilips Substation and End Masts</b>		
<p>No batching of wet-cement products will occur on site (Project Design Measure).</p> <p>Ready-mixed supply of wet concrete products will be used and pre-cast products will be used for watercrossing structures and joint bays;</p> <p>No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;</p>		

Where concrete will be delivered on site, only the chute will need to be cleaned, using the smallest volume of water practicable. Cement wash water will be collected in a sealed, temporary lagoon which will be placed at least 50m from a watercourse;

No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be tanked and removed from the site to a suitable, non-polluting, discharge location;

Weather forecasting will be used to plan dry days for pouring concrete;

The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

### **Monitoring Measure**

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

### **References**

IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

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

CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.

<b>GC-BPM-08</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals</b>	
<b>Environmental Commitment</b>		
Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.		
<b>Work Sections/Locations</b>		
Construction works area boundary		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Monitor weather conditions. Ensure best practice use and storage of fuels, oils and chemicals on-site.	
<b>Manage of on-site refueling</b>		
<p>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;</p> <p>The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;</p> <p>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;</p> <p>Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;</p> <p>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,</p> <p>There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.</p>		
<b>Storing fuel properly</b>		
Fuels stored on site will be minimised. Storage areas, which will be located at the temporary compound, will be bunded appropriately for the fuel storage volume for the time period of the construction (Project Design Measure).		
<b>Monitoring Measure</b>		
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.		

<b>Avoid leakage from plant and tools</b>
The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.
<b>Contingency for spillages</b>
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.
<b>References</b>
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

<b>GC-BPM-09</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk</b>	
<b>Environmental Commitment</b>		
Prevention of flooding at watercourse crossings due to undersized culverts / bridges.		
<b>Work Sections/Locations</b>		
Watercrossings locations		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Ensure appropriate culvert/bridge design. Supervise the construction works.	
<b>Surface Water Quality Protection Measures</b>		
<p>All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);</p> <p>A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;</p> <p>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);</p> <p>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.</p>		
<b>References</b>		
<p>The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).</p> <p>OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.</p> <p>NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</p>		



<b>GC-BPM-11</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Surface Water Quality Protection Measures during Permanent Storage of Overburden at Mountphilips Substation</b>	
<b>Environmental Commitment</b>		
Prevention of significant surface water quality impacts during Permanent Storage of Overburden.		
<b>Work Sections/Locations</b>		
Mountphilips Substation		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.	
<b>Surface Water Quality Protection Measures</b>		
<p>At Mountphilips Substation location, temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.</p> <p>Sloping ground and areas with wet ground conditions will be avoided;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,</p> <p>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.</p>		
<b>References</b>		
<p>IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</p> <p>NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes</p> <p>CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites;</p>		

<b>GC-BPM-12</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Monitoring of nesting and roosting Hen Harrier (<i>Circus cyaneus</i>)</b>
<b>Environmental Commitment</b>	
To identify and monitor breeding Hen Harrier	
<b>Work Sections/Locations</b>	
2km buffer of UWF Grid Connection construction works areas.	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Scheduling of construction activities
Project Ecologist	Carrying out of surveys to Best Practice guidance for nesting Hen Harrier. Must be aware of the best practice guidance listed in References below.
<b>Surveying of nesting and roosting Hen Harrier</b>	
<p>Monthly surveys following (SNH) guidance will be undertaken by a suitably qualified Ornithologist</p> <p>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 . 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.</p> <p>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.</p> <p>These surveys (both breeding and roosting) will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter (Project Design Measure).</p> <p>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.</p> <p>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.</p> <p>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.</p>	
<b>Construction Works Restrictions</b>	
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 2km of an active hen harrier breeding attempt or active nesting activity, during the breeding season (March to August).

### Compliance Monitoring

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

### 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>

<b>GC-BPM-13</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Minimising the effects of lighting on bats</b>
<b>Environmental Commitment</b>	
To avoid displacement or disturbance of bats arising from the use of artificial lighting.	
<b>Work Sections/Locations</b>	
150m around all UWF Grid Connection construction works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Scheduling of works
Project Ecologist	<p>The Project Ecologist will liaise with NPWS throughout the construction stage and early operational stage.</p> <p>Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.</p> <p>Must be aware of the best practice guidance listed in References below.</p>
<b>Design principles for lighting</b>	
<p>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.</p> <p>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.</p> <p>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.</p> <p>All construction works will be carried out during daylight hours (Project Design Measure).</p> <p>Security lighting will be used at compound. <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).</p> <p>Lights would be operational for 30 seconds and would then switch off automatically.</p>	

Additionally, lights will be directed only onto the required area, in conjunction with the ECoW, the Contractor will choose lighting in accordance with Guidance Notes for the Reduction of Obtrusive Light GN01-2011 when deciding on lighting;

Low UV-lighting bulbs, such as low-UV LEDs or low / high pressure sodium lamps will be used. Mercury or metal halide bulbs will not be used.

### References

Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation guidance. University of Bristol

Bat Conservation Trust (2008). Bats and the Built Environment Series: Bats and Lighting in the UK

Bat Conservation Ireland (2010). Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers

<b>GC-BPM-14</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Protection of potential tree and bridge bat roosts</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
Tree felling locations, bridges along haul routes and works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Scheduling of construction activities
Project Ecologist	<p>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.</p> <p>The Project Ecologist will liaise with NPWS throughout.</p> <p>Monitoring felling and pruning works on trees with bat suitability.</p> <p>Must be aware of the best practice guidance listed in References below.</p>
<b>Survey Measures for Potential Tree Roosts</b>	
<p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p>	
<b>Tree Felling measures</b>	
<p>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.</p> <p>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</p>	

restrictions on felling works, fitting of exclusion tubes at roost entrances), and apply to the NPWS for a derogation licence. Any bats will be permanently excluded from the tree before felling, and replacement roosting opportunities (i.e. bat boxes) will be provided.

If a tree of moderate or high suitability is surveyed and no bats are recorded, then it will be felled immediately. It will be cut in sections by a tree surgeon, and all sections with crevices or cavities will be lowered carefully to the ground and left undisturbed for 48 hours before removal.

### Derogation Licenses

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

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

Structures which were previously identified as having no potential for bats (no suitable crevices) (Grade 0; Billington and Norman, 1997) will require a visual inspection to confirm that the previous assessment remains valid and no suitable crevices have formed in the intervening period. If the structure remains unsuitable for bats, no additional surveys are required.

All bridges which were previously identified as having evidence of bats or suitable crevices for bats (Grade 1 to 3; Billington and Norman, 1997) will have a visual inspection (using lights, fiberscope, etc.) and bat detector surveys (to be undertaken throughout the duration of the night and include dusk emergence and dawn swarming periods) will be undertaken prior to the commencement of bridge maintenance/upgrade works to determine if bats are using the structure at the time of any works.

If no bats are found to be present during the surveys but suitable crevices are present, these will be temporarily blocked in advance of works to ensure bats do not occupy the structure in the intervening period.

If bats are found in any bridges, the Project Ecologist will develop a case-specific mitigation strategy (e.g. seasonal restrictions on works, fitting of exclusion valves at roost entrances, blocking of unoccupied crevices) and apply to the NPWS for a derogation license for the proposed works.

If undertaken, any maintenance/upgrade works will include the conservation of a number of the most suitable crevices in the bridge structure as part of the works programme. If the complete loss of all suitable crevices is unavoidable, mitigation measures in the form of bat boxes and/or bat tubes will be erected on the bridge to provide alternative roosting opportunities. The number and placement of the bat boxes and/or tubes will be determined by a bat specialist.

### References

National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.

Billington, G.E. and Norman, G.M. (1997). A Report on the Survey and Conservation of Bat Roosts in Bridges in Cumbria. Kendal, English Nature

Kelleher, C. and Marnell, F. (2006). *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

<b>GC-BPM-15</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Bats – Post Construction Monitoring</b>
<b>Environmental Commitment</b>	
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	
<b>Work Sections/Locations</b>	
Bat roost identified during baseline evaluations, Bat Crossing locations in field boundaries along the works area	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Ecologist	Post-construction activity surveys. Liaising with NPWS. Must be aware of the best practice guidance listed in References below.
<b>Operational Surveys</b>	
<p>Post-construction activity surveys will be carried out annually by the Project Ecologist</p> <p>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,</p> <p>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.</p> <p>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</p> <p>At the end of this period, if necessary, recommendations will be made on further survey requirements following consultation with NPWS.</p> <p>Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.</p>	
<b>References</b>	
<p>National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.</p> <p>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</p> <p>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.</p>	



<b>GC-BPM-16</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Monitoring of non-native invasive plant species.</b>
<b>Environmental Commitment</b>	
Monitoring of non-native invasive plant species.	
<b>Work Sections/Locations</b>	
All construction works sections and operational stage wayleave areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Ecologist	Implementation of surveying Must be aware of the best practice guidance listed in References below.
Avoid adverse effects of the introduction and spread of non-native invasive species	
<p>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.</p> <p>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.</p> <p>The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage.</p> <p>The measures included in the Invasive Species Management Plan will be implemented.</p>	
<b>References</b>	
<p>National Roads Authority (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority, Dublin.</p> <p>EMP for UWF Grid Connection - Invasive Species Management Plan.</p>	

<b>GC-BPM-17</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Best practice measures for the removal of vegetation during construction.</b>
<b>Environmental Commitment</b>	
To ensure the protection of species using hedgerow and scrub habitat during the construction phase.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Manager	Inform Project Ecologist of any requirement to clear scrub or remove hedgerows during the nesting and breeding season (1 <sup>st</sup> March to 31 <sup>st</sup> August inclusive).
Construction Manager	Scheduling of construction activities
Project Ecologist	The Project Ecologist will be aware of all areas of hedgerow and scrub habitat which require removal during the construction phase, giving particular regard to the statutory restrictions on vegetation clearance, (the relevant statutory provisions are listed in References)
<b>Measures to ensure protection of species using hedgerow and scrub habitat</b>	
<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 1<sup>st</sup> March to 31<sup>st</sup> August, inclusive.</p> <p><b>Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.</b></p> <p>The following approach will be taken in order to comply with the Wildlife Acts:</p> <p>Where practical, vegetation clearance will be carried out outside of the restricted period (1<sup>st</sup> March to 31<sup>st</sup> August).</p> <p>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.</p> <p>Construction works practices will incorporate fire prevention measures at all works areas</p>	
<b>References</b>	
<p>Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000;</p> <p>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).</p>	

<b>GC-BPM-18</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice for the protection and preservation of tree roots during the construction phase</b>	
<b>Environmental Commitment</b>		
To ensure the protection and preservation of tree roots during the pre-construction and during construction phase.		
<b>Work Sections/Locations</b>		
All sections		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Scheduling of construction activities	
Project Ecologist	<p>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.</p> <p>Must be aware of the best practice guidance listed in References below.</p>	
To ensure the protection and preservation of tree roots during the pre-construction and during construction phase		
<p>All works within a Root Protection Area (RPA) (see NRA guidance (2006) for calculation of the RPA) will be supervised by the Project Ecologist.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>		

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.

<b>GC-BPM-19</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Disturbance to and/or displacement of nesting Common Kingfisher (<i>Alcedo atthis</i>).</b>
<b>Environmental Commitment</b>	
To avoid disturbance/displacement of nesting Kingfisher throughout the construction phase of the development.	
<b>Work Sections/Locations</b>	
All watercourse crossing locations	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Manager	Scheduling of construction activities
Project Ecologist	Carrying out surveying to Best Practice guidance. Must be aware of the best practice guidance listed in References below.
<b>Avoid disturbance and/or displacement of nesting Kingfisher during pre-construction and during construction phase of the development.</b>	
<p>Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins <i>et al</i>, 2010),</p> <p>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).</p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p>	
<b>Other Riparian Bird Species</b>	

During Kingfisher surveys, all crossing locations will also be surveyed to confirm the presence or absence of other aquatic/riparian species such as Dipper, Grey Wagtail.

If present at watercourse crossing locations, Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000 will be fully adhered with

### References

Cummins, S., Fisher, J., McKeever, R.G., McNaghten, L., and Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher (*Alcedo atthis*) and other riparian birds on six SAC river systems in Ireland. National Parks and Wildlife Service and BirdWatch Ireland.

[https://www.npws.ie/sites/default/files/publications/pdf/Cummins\\_et\\_al\\_2010\\_Kingfisher\\_survey.pdf](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 (*Alcedo atthis*) and other riparian birds II. Office of Public Works and BirdWatch Ireland.

<http://www.opw.ie/en/media/Issue%20No.%2012%20%20EcIA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf>

<b>GC-BPM-20</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Monitoring of Identified Badger Setts</b>	
<b>Environmental Commitment</b>		
Monitoring of identified Badger setts during the operational phase of the development.		
<b>Work Sections/Locations</b>		
All areas within 50m of constructions works		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Project Ecologist	Must be aware of the best practice guidance listed in References below.	
<b>Monitoring of identified Badger setts during the operational phase of the development.</b>		
<p>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.</p> <p>Surveys will be undertaken annually, of any identified badger setts in Operational Years 1, 2, 3, 4 and 5.</p> <p>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).</p> <p>Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.</p>		
<b>References</b>		
<p>National Roads Authority (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority, Dublin.</p> <p>National Roads Authority (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.</p>		

<b>GC-BPM-21</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Disturbance and/or physical injury to Other Mammals</b>
<b>Environmental Commitment</b>	
To avoid disturbance and/or physical injury to other mammals throughout the pre-construction, during construction and operational phases of the development.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Scheduling of construction activities.
Project Ecologist	Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.  Must be aware of the best practice guidance listed in References below.
<b>Construction Stage Surveying</b>	
<p>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.</p> <p>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;</p> <p>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.</p>	
<b>Measures to avoid/minimise disturbance effects to pine martin</b>	
<p>In the event of the confirmation of pine martin breeding/resting places specific measures will include:</p> <p>Marking exclusion zones around any confirmed pine marten dens;</p> <p>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,</p> <p>No construction works will be carried out within the exclusion zones in the breeding season (March-June inclusive);</p> <p>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.</p>	



<b>Measures to avoid/minimise disturbance effects to pine martin and red squirrel</b>
<p>In the event of the confirmation of red squirrel breeding/resting places specific measures will include:</p> <p>Marking 50m exclusion zones around any confirmed breeding red squirrel dreys;</p> <p>If monitoring confirms the drey is not used for breeding, smaller protection zones will be required (5m or to the nearest neighbouring tree);</p> <p>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);</p> <p>Avoiding felling any trees containing red squirrel dreys, if unavoidable, the destruction of a red squirrel drey will require an NPWS licence.</p> <p>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;</p> <p>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.</p>
<b>Measures to avoid/minimise disturbance effects to Irish hare, hedgehog, Irish stoat, pine martin, red squirrel</b>
<p>Construction machinery will not exceed 20km/hour on site access roads.</p>
<b>References</b>
<p>Scottish Natural Heritage (2012). Protected Species Advice for Developers – Pine Marten. <a href="http://www.snh.gov.uk/docs/A1959323.pdf">http://www.snh.gov.uk/docs/A1959323.pdf</a>.</p> <p>Scottish Natural Heritage (2012). Protected Species Advice for Developers – Red Squirrel. <a href="http://www.snh.gov.uk/docs/A1959329.pdf">http://www.snh.gov.uk/docs/A1959329.pdf</a>.</p>

<b>GC-BPM-22</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Management of general non-native invasive species.</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Requiring supply companies to clean delivery vehicles before entering the site to gain access to works area  Obtaining and keeping a record of delivery companies cleaning of vehicles  Training flagmen in the appropriate method of vehicle cleaning
Flagmen	Cleaning of delivery vehicles exiting the site with suitable disinfectant  Maintaining a record of all vehicles cleaned and equipment, disinfectant used.
Project Ecologist	Carrying out spot checks on flagmen during cleaning of delivery vehicles.  Must be aware of the best practice guidance listed in References below.
<b>Inspection and Cleaning of Delivery Vehicles</b>	
<p>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 &gt; 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).</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>	

plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site of operation, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day.

No removed material or run-off will be allowed to enter a water body of any sort.

Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually.

Records of supplies and cleaning of delivery vehicles will be kept by the flagmen, and will be regularly inspected by the Environmental Clerk of Works.

Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.

### **Measures at or in watercourses**

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

All footwear used, or to be used, in streams or rivers will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards. This does not apply to footwear use in wetlands or peatland areas.

Any observations of mass mortality of Crayfish will be reported to the relevant authorities within 1 hour of evidence being found.

### **Measures for white toothed shrew**

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

### **References**

<http://www.fisheriesireland.ie/Research/invasive-species.html>

<http://www.nonnativespecies.org/checkcleandry/>

<b>GC-BPM-23</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice methods to ensure the protection of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).</b>	
<b>Environmental Commitment</b>		
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.		
<b>Work Sections/Locations</b>		
All construction works areas		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Scheduling of construction activities	
Project Ecologist	<p>Must be aware of the locations of all previously identified habitats suitable for breeding amphibian along the route corridor.</p> <p>Monitor the construction activities when working adjacent to amphibian breeding habitat to ensure that mitigation measures are strictly adhered to at all times.</p> <p>Must be aware of the best practice guidance listed in References below.</p>	
<b>To avoid effects on the breeding habitat of common frog and smooth newt</b>		
<p>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.</p> <p>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;</p> <p>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;</p> <p>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.</p>		
<b>References</b>		
National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.		

<b>GC-BPM-24</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)</b>	
<b>Environmental Commitment</b>		
To avoid effects on Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> ) during the pre-construction and construction phase.		
<b>Work Sections/Locations</b>		
All sections		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Scheduling of construction activities	
Project Ecologist	Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.  Must be aware of the best practice guidance listed in References below.	
<b>To avoid effects on Viviparous lizard.</b>		
<p>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.</p> <p>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.</p> <p>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.</p>		
<b>References</b>		
NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.		

<b>GC-BPM-26</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Local Employment and Local Sourcing</b>	
<b>Environmental Commitment</b>		
Where feasible, to source contracts, materials and workforce locally during the construction stage of the UWF Grid Connection		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Where possible, to operate a local bias when recruiting employees and sourcing materials.  Develop a Local Employment and Local Sourcing Policy	
Community Liaison Officer (CLO)	Management of local employment and resources database Engage with service businesses in the area ahead of construction works  Monitor the recruitment and training of local employees in line with Policy	
<b>Increasing potential for local sourcing and local employment</b>		
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		

<b>GC-BPM-27</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Landowner and Land-user Liaison</b>	
<b>Environmental Commitment</b>		
To keep landowners up-to-date with relevant construction works		
<b>Work Sections/Locations</b>		
All works locations on agricultural and forestry lands		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<p>To provide accurate information to the Community Liaison Officer regarding construction schedules</p> <p>To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer</p>	
Community Liaison Officer	<p>To manage the interests of the Owner at all times with regard to landowner issues</p> <p>To lead the day-to-day communication with landowners</p> <p>To be available and accessible to landowners</p> <p>To inform, advise, assist landowners and to communicate with the contractor on behalf of the landowner or user</p> <p>To oversee the resolution of any issues in relation to landowners</p> <p>Manage the coordination of land restoration works</p> <p>Assist the Project Manager in the completion of snag lists and the works area boundaries following reinstatement.</p>	
Environmental Clerk of Works	<p>To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer</p>	
<b>Landowner and Land-User Liaison Measures</b>		
<p>Landowners will be engaged with early and ahead of works</p> <p>A telephone number for the Landowner Liaison Officer will be provided</p> <p>Good mapping and an explanation of the mapping will be provided</p> <p>Landowners will be contacted ahead of works taking place on their lands</p> <p>Landowners will be dealt with honestly and fairly</p> <p>Queries from landowners will be dealt with promptly and courteously</p> <p>Restrictions to lands during construction will be minimised and access points to interconnected lands, including walking routes, will be provided</p> <p>Local walking groups or other land users will be kept up-to-date with the construction works schedule</p> <p>Any works in close proximity or crossing a waymarked trail will not be scheduled during the same period as a walking festival or event</p>		
<b>References</b>		
Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)		

<b>GC-BPM-28</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Minimising Disturbance and Damage to Land</b>
<b>Environmental Commitment</b>	
To minimise disturbance to and damage of agricultural and forestry lands	
<b>Work Sections/Locations</b>	
All works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	To fence all active construction works areas
Community Liaison Officer	<p>Manage the interests of the Project Promoter at all times with regard to landowner issues</p> <p>Lead the day-to-day communication with landowners</p> <p>Supervise the fencing of lands</p> <p>Manage the coordination of land restoration works in accordance with GC-OCM-21: Reinstatement of Land</p> <p>Assist the Project Manager in the completion of snag lists and the of works area boundaries following reinstatement.</p>
Environmental Clerk of Works	To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer
<b>Minimising Disturbance and Damage to Land Measures</b>	
<p>Landowners will be contacted ahead of works taking place on their lands</p> <p>Construction works areas will be fenced ahead of works on a landholding</p> <p>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</p> <p>Construction personnel will only enter on lands to carry out authorised works</p> <p>Construction personnel will take due care and attention to minimise damage to land or livestock</p> <p>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</p> <p>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</p> <p>Lands under construction works areas will be left in as good (or better) condition than before works began</p> <p>Restrictions to lands during construction will be minimised and access points to interconnected lands will be provided</p>	
<b>References</b>	
Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)	



<b>GC-BPM-29</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Minimising Dust Emissions From Site Activities</b>	
<b>Environmental Commitment</b>		
Minimise dust emissions from site activities		
<b>Work Sections/Locations</b>		
All construction works locations		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	Provide site induction to site personnel and contractors regarding the dust control measures	
<b>Training and Communication</b>		
<p>Provide site induction to site personnel and contractors regarding the dust control measures</p> <p>Community engagement before works commence will be carried out.</p> <p>The name and contact details of the Community Liaison Officer and Environmental Clerk of Works will be displayed on the informational signage at the temporary compounds. The CLO and the ECoW will be the point of contact regarding air quality and dust issues.</p>		
<b>Measures to minimize dust emissions</b>		
<p>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.</p> <p>Any road that is likely to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.</p> <p>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.</p> <p>Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.</p> <p>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.</p> <p>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.</p> <p>Permanent stockpiles of soils will be reseeded as soon as practical following placement.</p>		

If dust issues start to occur, refer to 'Guidance on the Assessment of Dust from Demolition and Construction' for additional measures put in place to avoid any significant impacts.

Provide site induction to site personnel and contractors regarding the dust control measures

### **References**

Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011)

Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

<b>GC-BPM-30</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Traffic Management Measures</b>
<b>Environmental Commitment</b>	
Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.	
<b>Responsibilities</b>	
Project Manager	Consult with Tipperary County Council Consult with Gardaí Contractor arrangements regarding speed limits, alert beacons, haulage routes etc. Oversee the implementation of the Traffic Management Plan
Design Engineer	Design sight lines at 3 no. permanent entrances. Design adequate drainage at permanent site entrances
Construction Manager	Install information, direction and warning signage in advance of road works, site entrances and along haul routes Implement the Traffic Management Plan
Environmental Clerk of Works	Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures
Community Liaison Officer	Act as point of contact with local community, Keep the local community informed of construction and road works in their area
<b>Traffic Management Measure</b>	
<b>Communication and Information</b>	
<p>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;</p> <p>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.</p> <p>The Construction Manager will erect an information sign at each at the site entrances to the Temporary Compound. These signs will give an overview of the construction traffic timetable; the contact numbers for</p>	

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 85<sup>th</sup> 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 compound 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 Compound and the temporary site access points.

There will be onsite parking for all construction personnel at the main compound.

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).

Construction works in Knocknabansha, Knockmaroe Knockcurraghbola Crownlands, and Knockcurraghbola Commons townlands, which are within 350m of local residences, will not take place at the same time as either the UWF Related Works or Upperchurch Windfarm.

#### 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 Temporary Compound 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)

<b>GC-BPM-31</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Measuring Operational EMF Emissions</b>
<b>Environmental Commitment</b>	
<b>Work Sections/Locations</b>	
Mountphilips Substation and 110kV UGC route	
<b>Responsibility of</b>	<b>Role/Duty</b>
Operational Manager – UWF	Ensure operational EMF emissions are measured
<b>Measuring Operational EMP Emissions</b>	
<p>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: <del>local road in Castlewaller</del>, local road in <del>Bealaclave</del>, <del>Kilcommon</del> village, local road crossing in Knockmaroe/Knockcurraghbola.</p> <p>Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the 2018 EIA Report.</p>	
<b>References</b>	
UWF Grid Connection EIA Report (2018)	

<b>GC-BPM-32</b>	<b>Best Practice Measure</b>	
<b>Title:</b>	<b>Measuring Operational Electricity Production</b>	
<b>Environmental Commitment</b>		
<b>Work Sections/Locations</b>		
Consented Upperchurch Windfarm Substation		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Operational Manager – UWF	Record annual electricity production levels	
<b>Measures to minimize dust emissions</b>		
Recording and reporting of the annual renewable electricity production of the operational UWF.		
<b>References</b>		
UWF Grid Connection EIA Report (2018)		

<b>GC-BPM-33</b>	<b>Best Practice Measure</b>
<b>Title:</b>	<b>Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts during the Mountphilips Substation and End Mast Construction Works.	
<b>Work Sections/Locations</b>	
The proposed Mountphilips Substation compound and end masts.	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.
<b>Surface Water Quality Protection Measures</b>	
<p>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;</p> <p>A minimum 30 metre vegetative buffer zone will be maintained between the substation works area and the stream to the west of the site;</p> <p>There will be no storage of material / equipment, excavated overburden or overnight parking of machinery inside the 30m buffer zone;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>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;</p> <p>Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;</p> <p>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;</p> <p>Silt fencing will be placed along the base of the berms until they have vegetated and stabilised;</p>	



As construction advances, there will be 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

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.

Appendix to Chapter 5: Description of Development (UWF Related Works)

Appendix 5.3: Description of Development (UWF Grid Connection)

## **Figures and Mapping**

To Revised EIAR Chapter 5: Description of Development (UWF Related Works)

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**Title:**  
Figure GC 5.1  
Location of the UWF Grid Connection  
on Discovery Mapping  
(Overview & Maps 1 to 2)

**Map Number:**  
Overview Map on Discovery Mapping

- Legend:**
- UWF Grid Connection
  - WB Watercourse Crossing Locations
  - L-2284-50 Road Identification Numbers



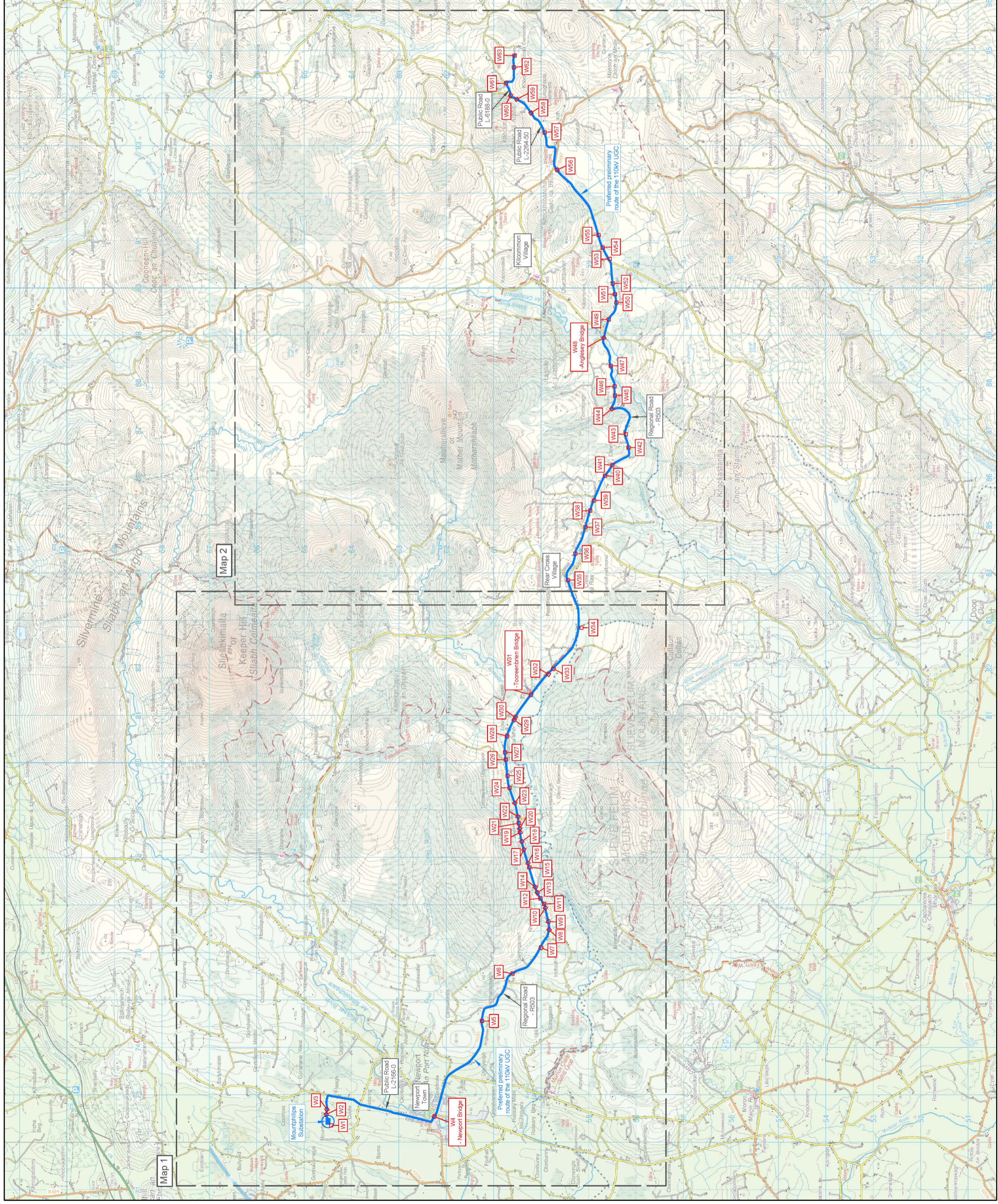
**Project:**  
UWF Grid Connection (GC)

Drawn by	Checked by	Date	Sheet Size
AB	JB	January 19	A3



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Title:  
Figure GC 5.1

Location of the UWF Grid Connection  
on Discovery Mapping  
(Overview & Maps 1 to 2)

Map Number:  
Map 1 of 2

Legend:

- UWF Grid Connection
- Watercourse Crossing Locations
- L-2166-0 Road Identification Numbers



Project:

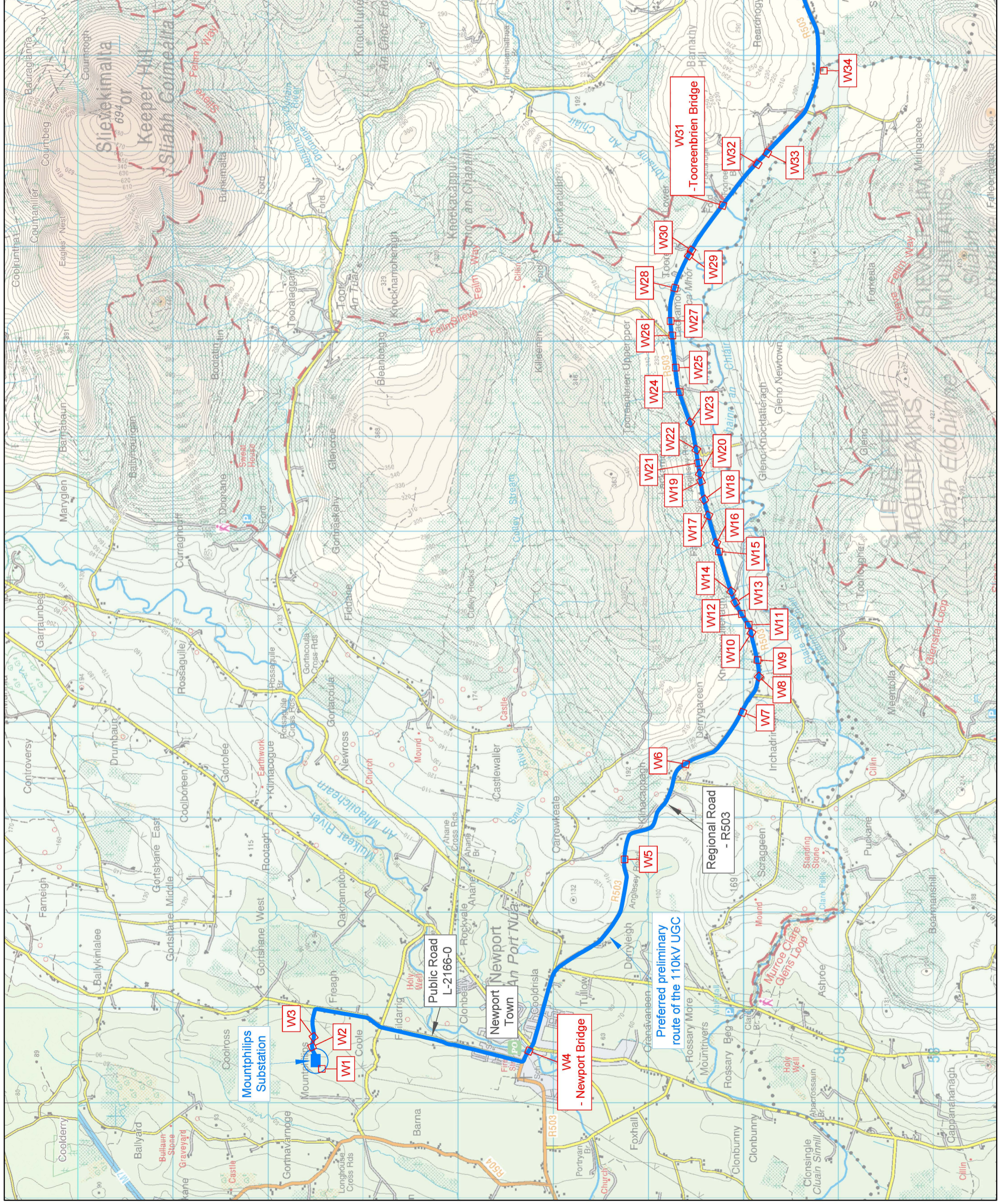
UWF Grid Connection (GC)

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AB	JB	January 19	A3



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Title: Figure GC 5.1  
Location of the UWF Grid Connection on Discovery Mapping (Overview & Maps 1 to 2)

Map Number: Map 2 of 2

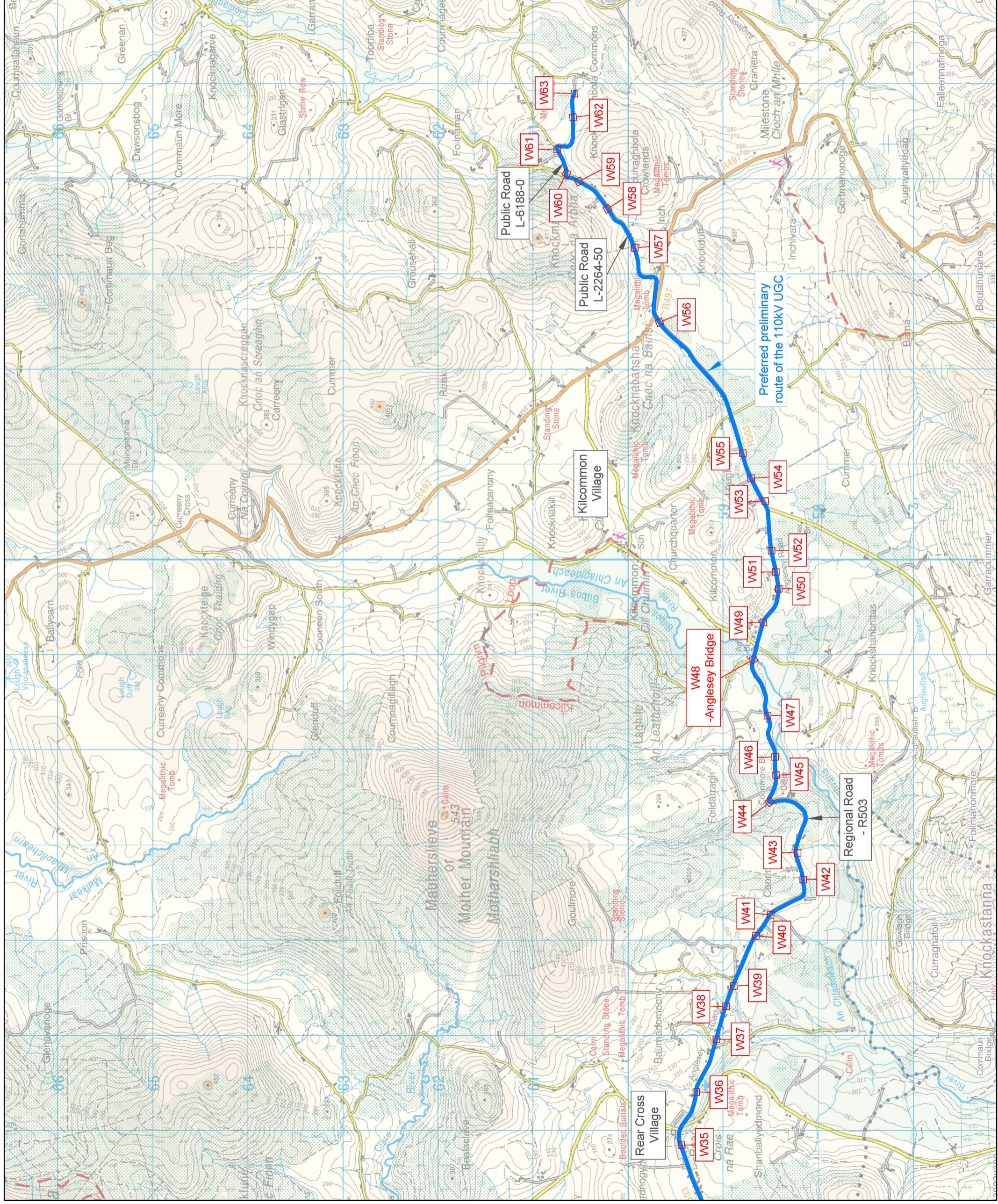
- Legend:
- UWF Grid Connection
  - W41 Watercourse Crossing Locations
  - R2264-50 Road Identification Numbers



Project: UWF Grid Connection (GC)

Drawn by: AB	Checked by: JB	Date: January 19	Sheet Size: A3
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






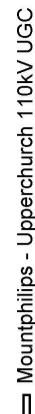






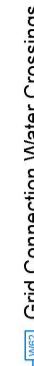






Title:  
Figure GC 5.2

Layout of the UWF Grid Connection on  
Aerial Photography Mapping (Map 1)

Map Number:  
Map 1 of 1

Legend:

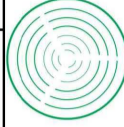
-  Existing Nenagh to Killoonan 110kV OHL
-  End Masts
-  End Masts temporary crane hardstands
-  Underground Cable from Nenagh to Killoonan 110kV OHL into Mounthillips Substation
-  110kV Substation Compound
-  110kV Substation Control Building
-  Temporary Compound
-  Mounthillips - Upperchurch 110kV UGC
-  Dirty water drain
-  Settlement Pond
-  Clean water drain
-  Drainage Berm
-  Permanent Berm
-  Permanent hedge/tree removal
-  Grid Connection Water Crossings
-  Watercourse
-  Public Road
-  Public Road Number
-  Townlands



Project:

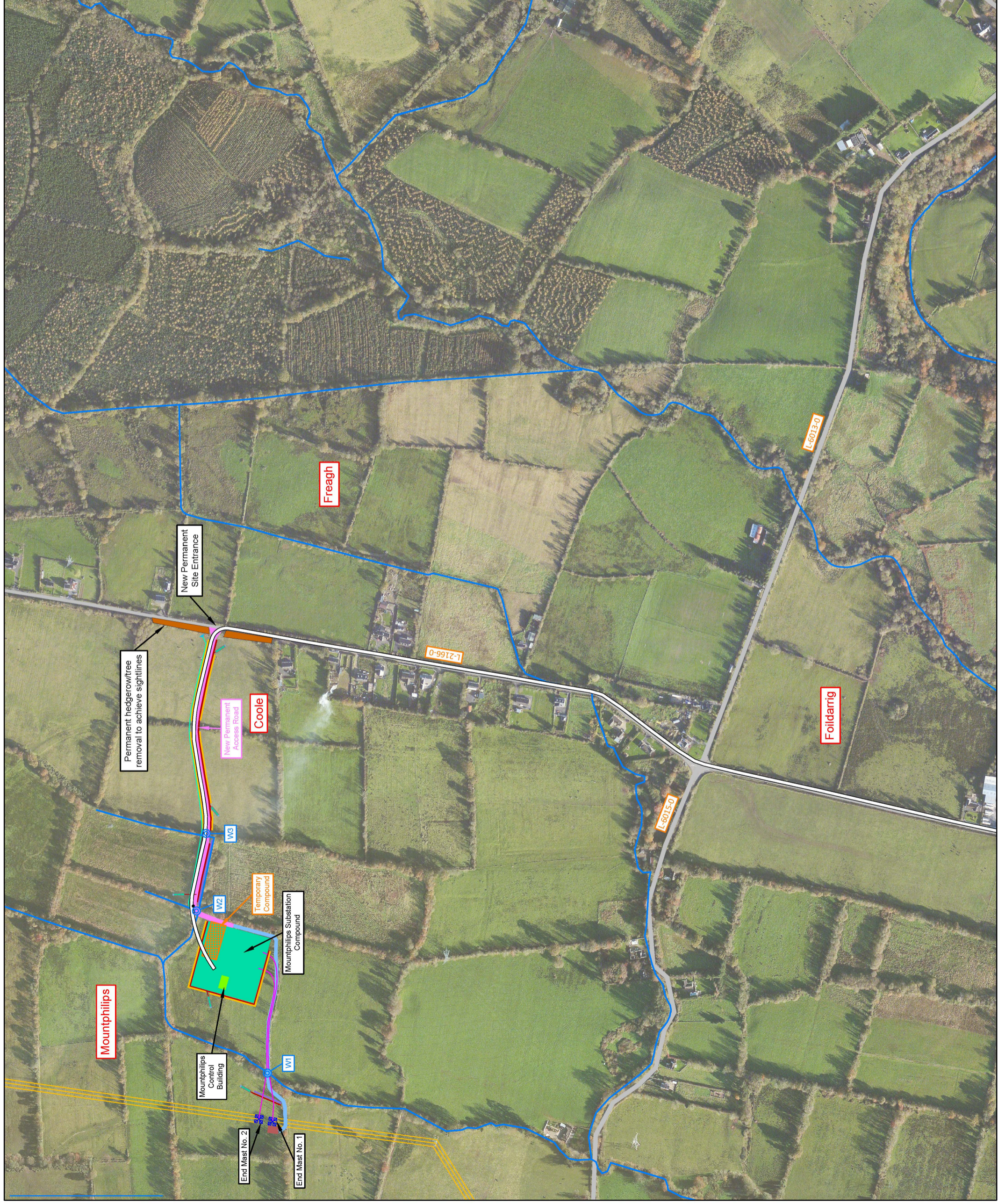
UWF Grid Connection (GC)

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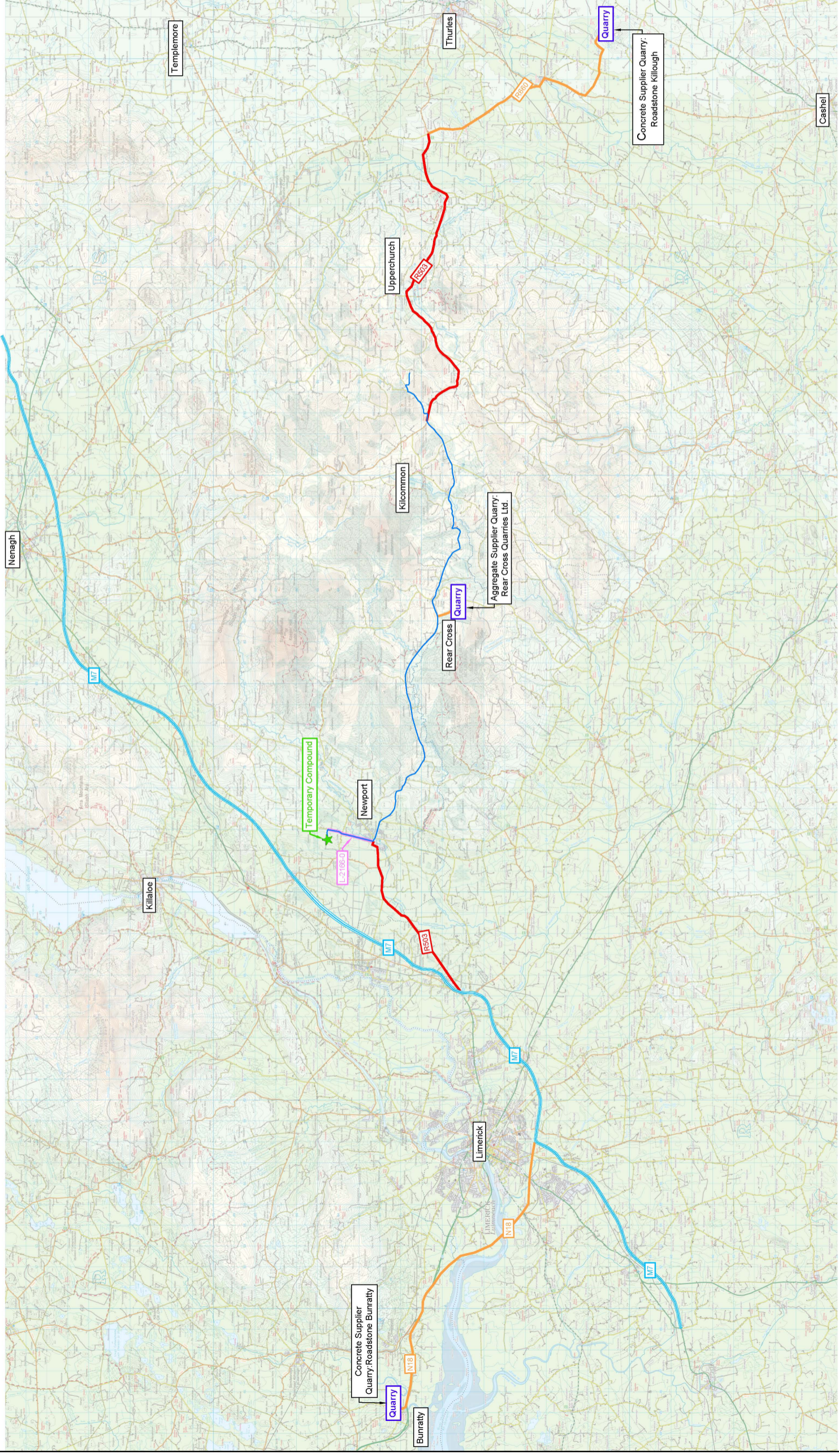
**ECOPOWER**



Title:  
**GC 5.35**  
Haul Routes for Aggregate and  
Concrete Deliveries  
(Overview Map & Map 1)

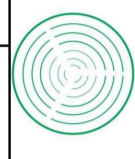
Map Number:  
Overview Map

- Legend:
- UWF Grid Connection
  - Regional Road
  - Haul Route from Local Quarries
  - ★ Temporary Compound
  - Haul Route along local road
  - L-2165-0 Local Road Numbers



Project:  
UWF Grid Connection (GC)

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**EKOPOWER**



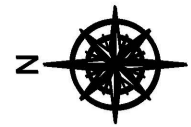
Title:  
**GC 5.35**

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

Map Number:  
Map 1 of 1

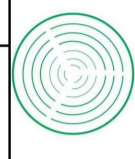
Legend:

- UWF Grid Connection
- Regional Road
- Haul Route from Local Quarries
- ★ Temporary Compound
- Haul Route along local road
- L-2166-0 Local Road Numbers



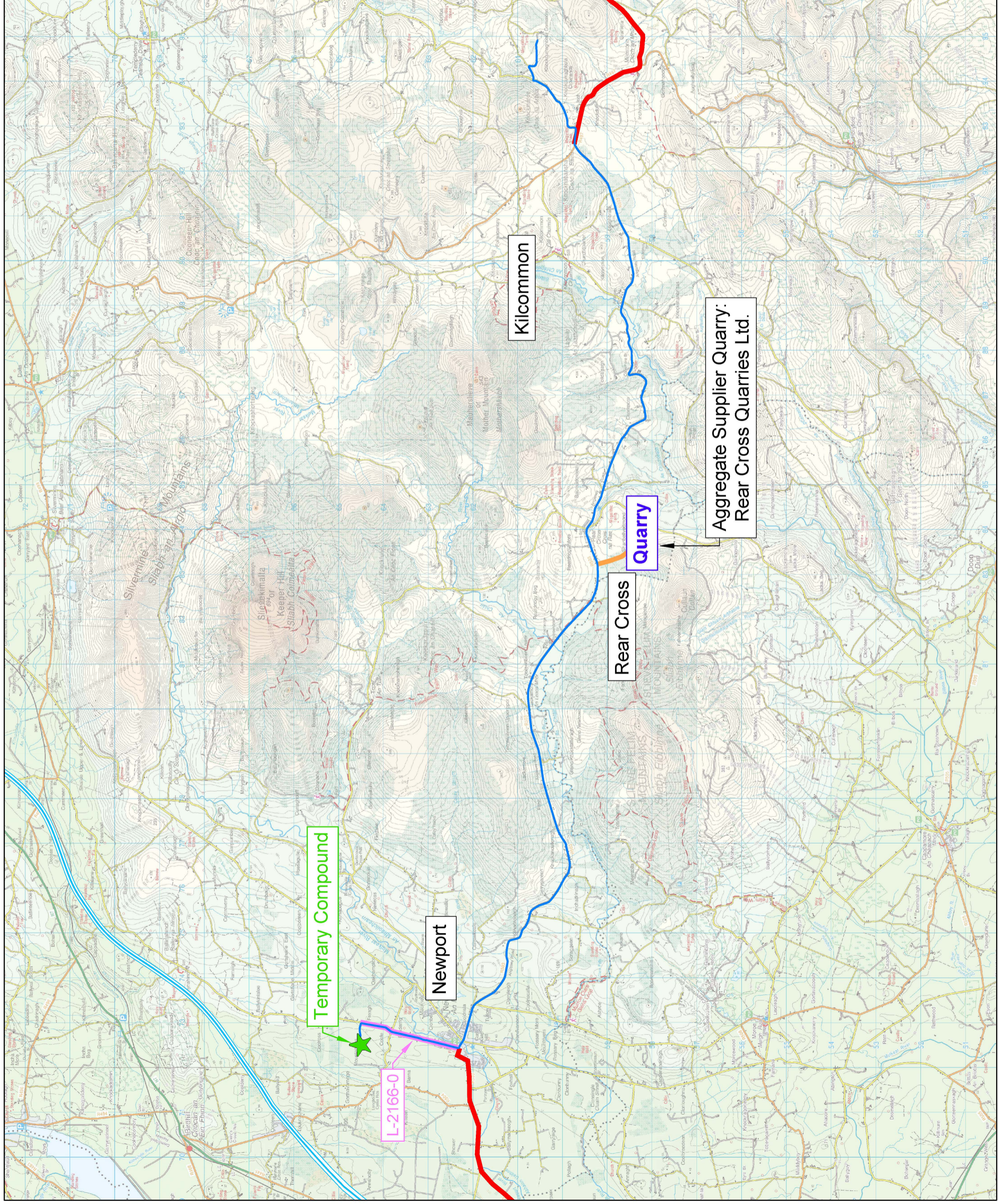
Project:  
UWF Grid Connection (GC)

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**ECOPOWER**



**Kilcommon**

**Aggregate Supplier Quarry:  
Rear Cross Quarries Ltd.**

**Quarry**

**Rear Cross**

**Newport**

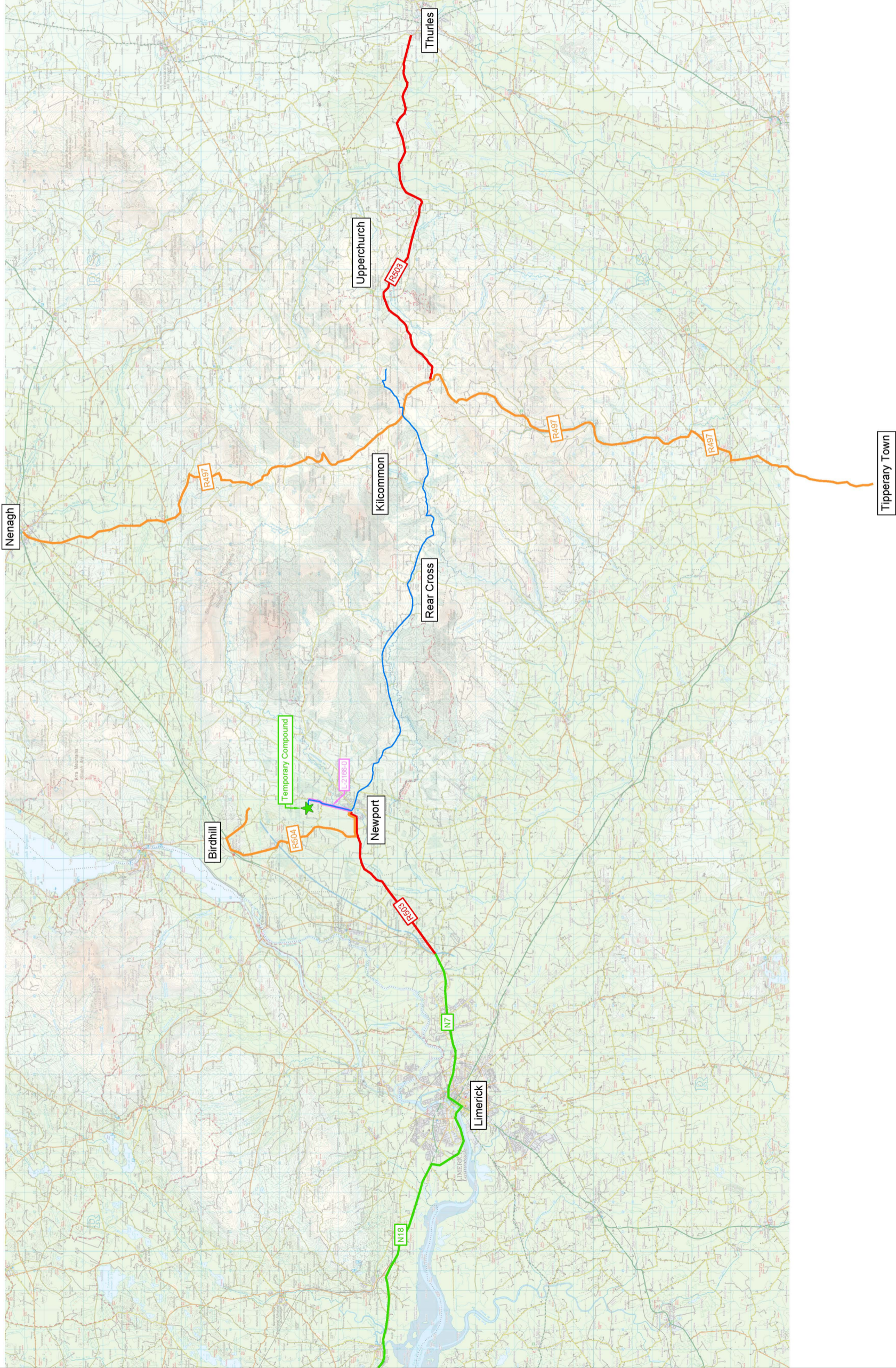
**Temporary Compound**

**L-2166-0**

Title:  
**GC 5.36**  
Haul Route for Other Construction  
Materials & Equipment

Map Number:  
Map 1 of 1

- Legend:
- UWF Grid Connection
  - Haul Route from Adjacent Town or City along a Regional Road to the R503
  - Regional Road R503
  - ★ Temporary Compound
  - Haul Route along local roads
  - Local Road Numbers



Project:  
UWF Grid Connection (GC)

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# **UWF Related Works**

## **Revised Appropriate Assessment Report For UWF Related Works**

**January 2019**

### **Appendix A8: Project Information**

### **Description of UWF Other Activities**



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## Appendix to Chapter 5: Description of Development (UWF Related Works)

### Appendix 5.6: Description of UWF Other Activities

The data and descriptions in this appendix have informed Chapter 5: Description of Development (UWF Related Works) of the EIA Report. The information presented in this Appendix 5.6 is outlined below and the relevant element(s) of the Whole UWF Project are also identified.

Appendix	Title	Relevant EIAR
A.5.6	Complied Description of UWF Other Activities	UWF Other Activities

To Revised EIAR Chapter 5: Description of Development (UWF Related Works)

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## Appendix to Chapter 5: Description of Development

### Appendix 5.6: Description of UWF Other Activities

#### A5.6 -5.1 Introduction to Appendix 5.6

UWF Other Activities do not form part of the permission applications, however they do form part of the Whole UWF Project and therefore this description has been prepared to facilitate the cumulative evaluation.

This Description of UWF Other Activities has been prepared in the same format as the Description of Development chapters (Main EIA Report Chapter 5's) for the UWF Grid Connection, the UWF Related Works and the UWF Replacement Forestry in particular Sections 5.2, 5.3, 5.4 and 5.5.

For ease of cross referencing the number system used here is also the same, i.e. A5.6-5.2, A5.65-5.3 etc. Figures and mapping are included at the end of this appendix.

The data and descriptions in this appendix have informed the environmental factor evaluations in the EIAR Main Report, in relation to the evaluation of cumulative effects of the subject development together with the other elements of the Whole UWF Project and with other existing or consented projects or activities.

UWF Other Activities are described in this appendix, in the following order:

Appendix Sections	Section Heading	Relevant Individual Project Element
A5.6-5.2	Characteristics of UWF Other Activities including environmental protection measures	UWF Grid Connection UWF Related Works UWF Replacement Forestry Upperchurch Windfarm
A5.6-5.3	Life Cycle Stages The durations and timing, main activities, personnel and material requirements during construction, operation and decommissioning stages (relative to the Other Elements of the Whole UWF Project)	
A5.6-5.4	The use of natural resources, emissions and production of wastes	
A5.6-5.5	Figures and Mapping	UWF Replacement Forestry
	<i>Note: Section 5.6 of the EIAR Main Report Chapter 5 relates to Vulnerability to Major Accidents and Natural Disasters. As the UWF Other Activities do not relate to works or the development of lands or infrastructure, it is considered that their vulnerability to these events is not applicable.</i>	



## A5.6 -5.2 Characteristics of UWF Other Activities

UWF Other Activities include the following activities:

- Haul Route Activities;
- Overhead Line Activities;
- Upperchurch Hen Harrier Scheme; and
- Monitoring Activities.

### A5.6 -5.2.1 Purpose of UWF Other Activities

**Haul Route Activities** to facilitate the transportation of turbine components to the Upperchurch Windfarm site.

**Upperchurch Hen Harrier Scheme** to enhance and protect foraging habitat for hen harrier in the vicinity of Upperchurch Windfarm, in order to fulfil planning condition No.18, attaching to the consented Upperchurch Windfarm.

**Monitoring Activities** to monitor the Whole UWF Project for compliance with the environmental protection measures and mitigation measures detailed in the UWF 2013 EIS and 2013 RFI (including the Construction Environmental Management Plan for Upperchurch Windfarm and the Ecological Management Plan for Upperchurch Windfarm); Planning Conditions attaching to the already consented UWF; and measures in the 2018 UWF Grid Connection EIA Report, the 2018 UWF Related Works EIA Report and the 2018 UWF Replacement Forestry EIA Report and associated UWF Grid Connection Environmental Management Plan and UWF Related Works Environmental Management Plans. Monitoring will also involve the supervision and recording of key construction activities, and monitoring of progress of land reinstatement.

**Overhead Line Activities:** to correct the tension of the existing overhead line, following the installation of the UWF Grid Connection End Masts, so that the lines are held within predefined tension parameters and fibre wrapping to provide a communication link to the newly installed Mountphilips Substation.

### A5.6 -5.2.2 Location and overview description of UWF Other Activities

The **Haul Route Activities** relate to the laying of matting over verges at up to 5 No. locations, removal of street furniture (mainly signposts) at 13 No. locations and the trimming of up to 960m of hedgerow/trees at up to 15 No. locations on the national and regional road network along the turbine component haul route between Foynes Port in Co Limerick and the junction of the R503 and R497 Regional Roads in Knockmaroe townland. Note: the Haul Route Activities are also referred to as Ancillary Haul Route Activities in this EIA Report.

The **Upperchurch Hen Harrier Scheme** is located in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on a mixture of wet grassland and improved grassland between the Slievefelim to Silvermines SPA and the already consented Upperchurch Windfarm. Activities associated with the Scheme includes once off activities such as planting of hedgerows and trees; enhancement of riparian corridors and scrub/wood areas and the fencing off of watercourses and newly planted trees and shrubs. These activities will create new habitat and protect and enhance existing habitat.

The Scheme also includes long-term farm management practices such as management of rush coverage, livestock grazing and the control of the use of lime, fertilizers and burning of gorse, amongst others, which will result in the long term maintenance of hen harrier habitat. Nine local landowners are signed-up to the Scheme.

**Overhead Line Activities** are associated with the existing overhead 110kV line between Killonan ESNB Station (just east of Limerick City) and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips Substation). These activities will be carried out by ESNB or ESNB contractors. Activities include (a) re-sagging/correcting the tension using puller/tensioner machines at Angle and End Masts and stringing wheels at Intermediary Structures, and (b) Wrapping of the overhead line with fibre-optic cable (called fibre wrapping) using an aerial crawler fibre wrap machine.

**Monitoring Activities** relate to water quality monitoring; ecology surveys for habitats, vegetation, birds, bats, badgers; otters; invasive species monitoring; archaeological monitoring; reinstatement monitoring; Falling Weight Deflectometer confirmatory surveys of public road condition; noise and shadow flicker monitoring and reporting; monitoring, auditing, visual inspections and supervision during the Whole UWF Project preconstruction, construction and operational stages. Monitoring Activity locations relate to all works areas associated with the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm locations.

**Relevant Figures (contained at the end of this Appendix 5.6)**

Figure OA 1: Location of UWF Other Activities on OSI Mapping

**A5.6 -5.2.3 Characteristics of UWF Other Activities****A5.6 -5.2.3.1 Haul Route Activities**

Haul Route Activities will be carried out on the public road network between Foynes Port in Co Limerick and the junction of the R503 and R497 Regional Roads in Knockmaroe townland.

The Haul Route Activities are located along the Upperchurch Windfarm turbine component haul route and will facilitate the transport of abnormal loads associated with the transport of turbine blades and towers to the windfarm through the laying of matting over verges at up to 5 No. locations, removal and replacement of street furniture (mainly signposts) at up to 13 No. locations and the trimming of up to 960m of hedgerow/trees at up to 15 No. locations, as outlined in Table 1.

The use of heavy duty geotextile matting will facilitate the delivery of the component without any requirement for excavation works and without causing any damage to the verge soils. The matting will provide sufficient carrying capacity to allow the trailers carrying the turbines components to pass.

**Table 1: Description of Haul Route Activities**

Activity ID	Description of the Haul Route Activity
HA1	Removal of street furniture at T-Junction on N69 at Foynes Port, Co Limerick
HA2	Removal of street furniture and laying of matting on the roundabout on the N69 at Clarina, near Limerick City
HA3	Removal of street furniture at roundabout on the N18, on the Dock Road at Bunlicky, Limerick
HA4	Removal of street furniture at roundabout on the N18, on the Dock Road at Ballykeefe, Limerick
HA5	Removal of street furniture and laying of matting on the verge at the M7 Exit 25 at Knockalton Upper, near Nenagh, County Tipperary
HA6	Removal of street furniture and laying of matting the roundabout at the M7 Exit 25/R498 at Knockalton Upper, near Nenagh, County Tipperary
HA7	Vegetation trimming of the roadside boundary on the R498 at Sallypark, Co. Tipperary
HA8	Vegetation trimming of the roadside boundary on the R498 at Bigpark, Co. Tipperary
HA9	Vegetation trimming of the roadside boundary on the R498 at Bigpark, Co. Tipperary
HA10	Vegetation trimming of the roadside boundary on the R498 at Bigpark, Co. Tipperary
HA11	Vegetation trimming of the roadside boundary on the R498 at Bigpark, Co. Tipperary
HA12	Removal of street furniture and vegetation trimming on the R498 at Glennanoge, Co. Tipperary
HA13	Removal of street furniture and laying of matting at the Killinane junction of the R498 with the R503 in Thurles
HA14	Removal of street furniture at a roundabout on the R498 at Racecourse in Thurles
HA15	Vegetation trimming of the roadside boundary on the R503 at Ballynahow, Co. Tipperary
HA16	Vegetation trimming and laying of matting on the R503 at Ballynahow, Co. Tipperary
HA17	Removal of street furniture and vegetation trimming on the R503 at Drumminnagleagh, Co. Tipperary
HA18	Removal of street furniture and vegetation trimming on the R503 at Rosmilt, Co. Tipperary
HA19	Removal of street furniture and vegetation trimming on the R503 at Ballyboy, Co. Tipperary
HA20	Vegetation trimming of the roadside boundary on the R503 at Gortnaskehy, Co. Tipperary
HA21	Removal of street furniture and vegetation trimming on the R497 at Knockduff, Co. Tipperary
HA22	Vegetation trimming of the roadside boundary on the R497 at Knockmaroe, Co. Tipperary
HA23	Removal of street furniture and vegetation trimming on the R497 and L2264-50 Knockmaroe, Co. Tipperary

**Relevant Figures (contained at the end of this Appendix 5.6)**

Figure OA 2: Haul Route Activities (8 maps)

**A5.6 -5.2.3.2 Upperchurch Hen Harrier Scheme**

As required by Condition No.18, the promoters of Upperchurch Windfarm will develop the Upperchurch Hen Harrier Scheme which, as detailed in the 2013 RFI will provide and enhance foraging habitat for hen harrier on agricultural grassland, in the vicinity of the Slievefelim to Silvermines SPA. Nine local landowners are signed-up to the Scheme covering 128 hectares and the participating landowners will be compensated for implementing a set of habitat improvement measures for foraging hen harrier on their lands. (Note: Upperchurch Windfarm is located outside the SPA).

**Upperchurch Windfarm 2014 Grant of Permission (PL.22.243040) Condition No. 18:**

- (a) *The Ecological Management Plan submitted to the planning authority on the 21 day of November, 2013, shall be implemented in full. Details including timescale, and monitoring shall be agreed with the planning authority following consultation with the National parks and Wildlife service.*
- (b) *A timescale for the provision of the enhanced foraging areas including rush managements, the provision of additional hedgerows enclosures for native scrub and trees and measures by landowners in relation to spreading, burning, interference with drainage, retention of hedgerows, restrictions on use of poisons and new forestry plantation shall be agreed with the planning authority following consultation with the National parks and Wildlife service prior to the commencement of development works on the site.*
- (c) *A programme of on-going surveys and monitoring of the species in years 2 and 3 after the commencement of the operation of the turbines shall be submitted to, and agreed in writing with the planning authority, following consultation with the National parks, and prior to the commencement of development works on the site.*

**Reason:** *In the interest of the protection of the environment and the protection of the foraging habitat of the hen harrier species.*

The Upperchurch Hen Harrier Scheme is based on the NPWS Hen Harrier Scheme for farmers. This scheme (NPWS Scheme) has now finished, however, the Upperchurch Hen Harrier Scheme will bring about a very similar scheme in the Upperchurch area, which is set out in detail in the Ecological Management Plan (EcMP), to be found in the 2013 RFI in the Reference Documents volume with the planning application.

Activities associated with the Upperchurch Hen Harrier Scheme includes once off activities such as planting of hedgerows and trees; enhancement of riparian corridors and scrub/wood areas and the fencing off of watercourses and newly planted trees and shrubs. These activities will create new habitat and protect and enhance existing habitat. The Scheme also includes long-term farm management practices such as management of rush coverage, livestock grazing and the control of the use of lime, fertilizers and burning of gorse, amongst others, which will result in the long term maintenance of hen harrier habitat. Training and development for those farmers involved will be conducted, and the success of the Scheme will be monitored throughout the lifetime of the associated Upperchurch Windfarm.

**Relevant Figures (contained at the end of this Appendix 5.6)**

Figure OA 3: Upperchurch Hen Harrier Scheme – Layout on Aerial Photography Mapping

**A5.6 -5.2.3.3 Overhead Line Activities**

Overhead line activities are associated with the existing overhead 110kV line between Killonan ESNB Station (just east of Limerick City) and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips Substation).

These activities will be carried out by ESNB or ESNB contractors.

Activities include will involve (a) re-sagging/correcting the tension, and (b) fibre-wrapping.

**Re-sagging:** The connection of Upperchurch Windfarm to the National Grid will cause a change in the configuration of the existing line between the new End Mast locations and the nearest Angle Masts, which will require line tension correction, or re-sagging, on 2 no. Sections:

- i) between ESNB Angle Mast Structure No. 78 (c.200m south of Mountphilips substation) to New Mountphilips End Mast No. 1 and
- ii) between New Mountphilips End Mast No. 2 and ESNB Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation).

Re-sagging will be carried out using puller/tensioner machines at Angle and End Masts and stringing wheels at Intermediary Structures.

**Fibre-wrapping:** One of the conductors (wires) on the line between Killonan ESNB Station to Mountphilips Substation will also be wrapped with fibre optic cable, using an aerial crawler fibre wrap machine

The activities will be carried out according to industry standard method statements, including standard health & safety and environmental management systems.

**Relevant Figures (contained at the end of this Appendix 5.6)**

Figure OA 4: Overhead Line Activities – Layout on OSI Discovery Mapping

**A5.6 -5.2.3.4 Characteristics of Monitoring Activities**

Monitoring Activities will be carried out during the construction, operation and decommissioning stages. Monitoring relates to UWF Grid Connection, UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and the UWF Other Activities, and includes the following:

- Inspections and maintenance of sediment and erosion control measures
- Water quality monitoring
- Hydrographic monitoring and reporting after rainfall events
- FWD and video survey of the local road network
- Preconstruction hen harrier, badger, otter, curlew, bat and marsh fritillary surveys
- Monitoring of pre-construction management of marsh fritillary habitat
- Archaeological monitoring of initial groundworks
- Supervision of the vegetative planting of the UWF Grid Connection Concealed Access Roads,
- Annual monitoring and assessment of re-vegetation and recovery success at construction works areas
- Annual hen harrier, badger and bat surveys, including fatality searches
- Invasive species monitoring
- On-going annual monitoring of the Upperchurch Hen Harrier Scheme
- Monitoring of compliance with planning condition No. 11 for Upperchurch Windfarm ( operating windfarm noise)
- Monitoring of compliance with planning condition No. 12 for Upperchurch Windfarm ( operating windfarm shadow flicker)
- Monitoring the implementation of and compliance with the environmental planning conditions and commitments in the 2013 EIS, 2013 RFI, including the EMP for the Upperchurch Windfarm
- Monitoring the implementation of and compliance with the environmental commitments (including the Surface Water, Traffic, Waste and Invasive Species Management Plans) in the UWF Grid Connection Environmental Management Plan and UWF Related Works Environmental Management Plan, and any additional requirements conditioned with a grant of planning permission.
- Monitoring the implementation of and compliance with the environmental protection measures set out in UWF Replacement Forestry EIA Report (Volume C2: EIAR Main Report: Chapter 5 and Volume C4: EIAR Appendices: Appendix 5.1 and Appendix 5.2) and any additional requirements conditioned with the afforestation license.
- Monitoring the implementation of and compliance with the environmental protection measures for UWF Other Activities set out in Section A5.6 -5.2.4 below. Monitoring compliance with these measures will be through the relevant UWF construction and operational stage Environmental Management Plans, the UWF Grid Connection Environmental Management Plan and the UWF Related Works Environmental Management Plan – for example compliance with environmental protection measures which relate to Overhead Line Activities will be carried out through the UWF Grid Connection Environmental Management Plan.

These monitoring and survey activities will be carried out both prior to and during, the construction of Upperchurch Windfarm, UWF Related Works, UWF Grid Connection and prior to and during the planting of UWF Replacement Forestry. Monitoring activities also relate to the operational stage of the Elements, and to the decommissioning stage of the Upperchurch Windfarm and UWF Related Works where relevant.

**A5.6 -5.2.4 Environmental Protection Measures for UWF Other Activities**

- Except with the approval of the National Parks and Wildlife Service: no activities will be carried out within 500 metres of an active hen harrier nest or nesting attempt; no activities will be carried out within 30m of an active main badger set or within 150m of an active otter holt.
- In order to prevent disturbance to breeding birds, tree trimming for Haul Route Activities will be conducted outside of the bird breeding season.
- Invasive Species monitoring in the form of confirmatory surveys will be carried out during the construction stage of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm to identify any infestations within or close to the relevant UWF Other Activity locations. Surveys will focus always on the activity location plus 7m and will be carried out ahead of any activities taking place. The measures included in the Invasive Species Management Plan for UWF Grid Connection and UWF Related Works will be implemented – See Volume D of the planning applications for these Elements.
- To minimise disturbance or displacement to lands, landowners will be contacted ahead of activities taking place on their lands and personnel involved in Overhead Line Activities or the Upperchurch Hen Harrier Scheme will ensure that the lands are left in at least as good condition than before the activity began. Activities will be carried out with minimum interference to land or livestock.
- In order to protect water quality, Overhead Line Activities, Haul Route Activities and Upperchurch Hen Harrier Scheme activities which occur within 50m of a watercourse will be carried out during a dry spell of weather; a minimum buffer of 5m will be maintained between the activity and the watercourse where possible; straw bales will be placed between the activity location and the watercourse if there is a risk of sediment runoff from the activity (such as tree planting); all machinery or equipment used will be steam-cleaned before use at the location and checked for oil leaks prior to use; no refuelling of machinery or equipment will take place with 100m of a watercourse; access matting such as bog mats will be used in wet/boggy areas to provide access to vehicles, and any ground rutted by vehicles associated with UWF Other Activities will be repaired through loosening the compacted soil under any ruts with fork; any disturbed ground will be re-seeded immediately following the completion of the activity at a location.

These environmental protection measures will be implemented as part of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm and will be incorporated into their respective Environmental Management Plans. For example, measures listed above which are relevant to Overhead Line Activities will be monitored through the UWF Grid Connection Environmental Management Plan.

## A5.6 -5.3 UWF Other Activities during Life Cycle Stages

### A5.6 -5.3.1.1 Duration & Timing

**Table 5-1: Duration and timing of the construction of the Upperchurch Windfarm**

Activities	Duration	Timing of Activities
<b>Haul Route Activities:</b> Laying of Matting	15 mins per location 1 day to put down, and 1 day to take up	Prior to commencement of turbine component haulage
<b>Haul Route Activities:</b> Street furniture and signage removal and reinstatement	15 mins to 4 hours per location	Immediately prior to the arrival of turbine components at the location, with reinstatement after the passage of the turbine components.
<b>Haul Route Activities:</b> Tree Trimming along public road corridor	15 mins per location 1 day to carry out	In order to prevent disturbance to breeding birds, tree trimming will be conducted outside of the bird breeding season
<b>Upperchurch Hen Harrier Scheme</b> – initial once-off activities	2 – 3 months	Trees and shrubs will be planted during the dormant period October to March, fencing around new plants will be carried out at the same time. A tractor will only be used during dry weather in the riparian area.
<b>Upperchurch Hen Harrier Scheme</b> – farming practices	On-going	None
<b>Monitoring Activities</b> Inspections and maintenance of sediment and erosion control measures	1hr – 1 week	6 months Post construction
<b>Monitoring Activities</b> Monthly Water monitoring	6 hrs	1st year Post construction
<b>Monitoring Activities</b> Hydrographic monitoring and reporting after rainfall events	6hr	3 years Post construction
<b>Monitoring Activities</b> Monitoring and care of Concealed Access Roads during the establishment phase	3 hours per month	First 18 months post construction
<b>Monitoring Activities</b> Annual monitoring and assessment of re-vegetation and recovery success	6 hrs	5 years Post construction
<b>Monitoring Activities:</b> Survey of invasive species locations	1 hour per location	Immediately prior to works in an area, and prior to the delivery of turbine components.
<b>Monitoring Activities</b> Annual bird, badger and bat surveys	1hr – 2 weeks per survey	3 years Post construction



including fatality searches		
<b>Monitoring Activities</b> On-going annual monitoring of the Upperchurch Hen Harrier Scheme	c. 5 days per survey	Operational Stage Annually monitoring and reporting to NPWS for the first five years, and then every 2 to 3 years from Yr6 onwards
<b>Monitoring Activities</b> Monitoring compliance with planning conditions, EIS/EIAR/EMP commitments	Ongoing observations throughout the construction stage – carried out by the Environmental Clerk of Works and throughout the operational (and where relevant decommissioning) stage by the Environmental Manager	Entire Life Cycle
<b>Monitoring Activities</b> Monitoring of compliance with planning condition No. 11 for Upperchurch Windfarm ( operating windfarm noise)	c.2 months	Report to be submitted within 6 months of commissioning of UWF
<b>Monitoring Activities</b> Monitoring of compliance with planning condition No. 12 for Upperchurch Windfarm ( operating windfarm shadow flicker)	Ongoing by computer software	Report to be submitted within 12 months of commissioning of UWF
<b>Overhead Line Activities</b> Re-sagging/tensioning	2 ‘straights’ and 11 structures	Following connection of Mountphilips substation.
<b>Overhead Line Activities</b> Fibre wrapping	1 day per ‘straights’ i.e. 17 days	Prior to connection of Mountphilips substation.

**A5.6 -5.3.1.2 UWF Other Activities Personnel**

In total c.50 personnel will be required to carry out the UWF Other Activities as per:

- **Haul Route Activities** will require a 3-man crew for each type of activity – mat laying, street furniture removal and tree trimming.
- The **Upperchurch Hen Harrier Scheme** will be implemented by the 9 landowners involved in the Scheme.
- The **Monitoring Activities** will be carried out by c.16 individual expert engineering and environmental consultants.
- **Overhead Line Activities** will be carried out by small teams of up to 8 overhead linesmen for both re-sagging and fibre wrapping.

A5.5 -5.3.1.2.1 Welfare Facilities

The Upperchurch Windfarm construction stage Site Compound No. 1 and the operational stage site office containing welfare and canteen facilities will be available to personnel carrying out UWF Other Activities.

### A5.6 -5.3.1.3 Activities

#### A5.5 -5.3.1.3.1 Haul Route Activities

Haul Route Activities will involve the following activities:

**Trimming of roadside vegetation** within the road corridor, using a tractor mounted hedge trimmer to trim any protruding vegetation along the haul route roadside hedgerows, where required. Flag men will control and manage traffic on both sides of the tractor.

**Laying of matting** by hand at roundabouts and verges. This will involve covering the relevant part of the verge along the public road corridor with heavy duty geotextile or rigid geocell material or aluminium or plastic matting, which will be secured in place. When the turbine component deliveries are complete the matting will be removed.

**Street furniture removal** will involve the following activities: Immediately prior to the passage of turbine components being delivered to the consented Upperchurch Windfarm, the street furniture will be removed from its sockets, and stored safely nearby. Immediately after the passage of the convoy, the street furniture will be refitted into its sockets as before. This will be done for every turbine component delivery that requires the road signage to be temporarily removed.

#### A5.5 -5.3.1.3.2 Upperchurch Hen Harrier Scheme Activities

##### Initial Once-Off Activities

- Planting of 2.2 hectares of tree and shrub species in scrub areas, improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs, which will improve cover for hen harrier;
- Erection of 4.8km livestock-proof fencing on newly planted or improvement planting areas to prevent damage by livestock, which will improve hen harrier habitat quality;
- Attachment of fence markers to electric fences in the areas, which will improve visibility of electric fences to hen harrier; and
- Planting of 1.4km of woody scrub species along riparian corridors and fencing of watercourse corridors to prevent access to the watercourses by livestock, which will enhance the quality of riparian habitats.

##### On-Going Farming Practices

- Management of rush coverage with controlled grazing and rush cutting starting in year 3, and thereafter as required, to achieve 30 – 70% rush coverage in fields, which will improve cover for hen harrier;
- During the first 2 years of the Plan, stocking levels between 0.6 and 1.6 LU (livestock units) per hectare which will maintain the appropriate sward within fields and not allow excessive stands of scrub or rush to dominate. To be reviewed at the start of Year 3;

##### Restrictions to farming practices

- No excavation of drains, which will allow improved grassland swards to revert back to wet grassland and more semi-natural grassland habitats;
- Limiting spreading of fertilizer and/or lime to every 4 – 5 years;
- No burning of gorse, scrub or heather to improve land cover;
- No removal of hedgerows, or new forestry plantation;

- No recreational off-roading with vehicles; and
- No use of poisons or stupefying baits.

#### Educational Measures

Hen harrier workshops will be delivered by the project ecologist at the initiation of the scheme to all landowners participating in the plan as well as those involved in the Upperchurch Windfarm development. The aim of the workshop will be to advise on the importance of the conservation of the hen harrier and the proper and full implementation of the Scheme, and to fully explain the measures and the restrictions set down in the Scheme.

#### Monitoring of the Scheme

The continual monitoring of the Hen Harrier scheme especially in the early years when measures are initiated, is crucial for the plan to be fully successful. Annual inspections will be carried out for the first 5 years of the scheme, by the project ecologist. The project ecologist shall assess the alternative habitats, raise any specific issues which need to be addressed and discuss with landowners any further measures required. A report will be prepared annually and submitted to National Parks and Wildlife Services for comment. Inspections and reporting will take place every 2 to 3 years from Year 6 onwards.

#### A5.5 -5.3.1.3.3 Overhead Line Activities

Overhead Line Activities will include the following activities;

- The Overhead Line Activities will be carried out during a planned outage of the overhead line.
- Access: The relevant sections of the Killonan to Nenagh overhead line are across open farmland and near Killonan, around the perimeter of an industrial estate. In order to gain access to the ESNB structures for ESNB contractor crews and equipment, the local public road network in the vicinity of the line will be used and from there they will gain access through private land, utilising existing private track or road, wherever possible. This access already exists at each location for line maintenance and no change to the established access is anticipated.
- Re-sagging: the intermediary ESNB Structure Nos. 79, and 80 to 89 will be climbed and fitted with stringing wheels, in order to facilitate the re-sagging activity. Puller/tensioner equipment will be positioned at the bases of Mountphilips End Mast No. 1 and No. 2 and Angle Mast ESNB Structure No. 78 and No. 90. The tension will be corrected on all 3 No. conductors (wires) between the structures, using the puller/tensioner equipment. Once the tension is corrected, the stringing wheels will be removed.
- Fibre-wrapping: 1 No. conductor (wire) on the overhead line between the Killonan Station and the new Mountphilips Substation will be wrapped with fibre-optic cable. Intermediary structures between angle masts, will be climbed and stringing wheels will be fitted. The aerial crawler fibre wrap machine will be set up at an Angle Mast structure and will wrap the wire as far as the next Angle Mast, where it will be set up once more for the next 'straight'. Following the fibre wrapping of the overhead line between Angle Masts, the intermediary structures will be climbed once more and the stringing wheels removed.

**A5.5 -5.3.1.3.4 Monitoring Activities**

Monitoring Activities will involve the following activities:

- Pre-construction confirmatory surveys of public road condition,
- Pre-construction confirmatory ecological surveys of habitats, hen harrier, curlew, bats, badgers, otters and marsh fritillary;
- Pre-construction management of Marsh Fritillary (butterfly) habitat
- Construction stage collection of water samples and monitoring of water quality, archaeology, invasive species, monitoring of works, monitoring of vegetation of Concealed Access Roads, monitoring of reinstatement of lands and
- Monitoring and auditing of compliance with the UWF Construction Environmental Management Plan, UWF Ecological Management Plan, UWF Grid Connection Environmental Management Plan, and UWF Related Works Environmental Management Plan;
- Early operational UWF monitoring to include adherence to the UWF Ecological Management Plan; the UWF Surface Water Management Plan including inspections and maintenance of sediment and erosion control measures and water sampling; hydrographic monitoring and reporting after rainfall events, monitoring and assessment of re-vegetation and recovery success; bird surveys; fatality survey for badger and bat. In addition, compliance with planning conditions for UWF in relation to noise and shadow flicker requires that results of monitoring be submitted and agreed with the planning authority.
- Monitoring of the Upperchurch Hen Harrier Scheme annually in Years 1 to 5 and thereafter every 2 or 3 years, and associated reporting to NPWS.

**A5.6 -5.3.1.4 Use of Equipment and Tools**

The main equipment and tools which will be required are listed in

**Table 5-2 Equipment and tools**

<b>Equipment</b>	<b>Tools</b>
<b>Haul Route Activities</b> - tractor with mounted hedge trimmers	- hand tools
<b>Upperchurch Hen Harrier Scheme</b> - tractor will pole driver attached - tractors for rush cutting and land cover management	- spades - slash hooks - hand tools
<b>Monitoring Activities</b> - FWD survey machine	- bat detectors - cameras - containers - noise monitoring equipment
<b>Overhead Line Activities</b> - Puller/Tensioner - Teleporter - Fibre wrap crawler - Crew cab 4X4 - Van - Climbing and Electrical Safety Equipment	- Stringing wheels - Chains/hand tools

**A5.6 -5.3.1.5 Use of Hydrocarbons**

Very small volumes of hydrocarbons will be used during UWF Other Activities and will be limited to the diesel or petrol fuel and mechanical oils used by vehicles and machinery.

**A5.6 -5.3.1.6 Other Facilities - Fuel Storage & Tool Storage**

There will be no requirement for either fuel or tool storage.

**A5.6 -5.3.2 Imported Materials**

The materials, which will be brought onto the UWF Other Activities areas, are listed in Table 5-3 along with details of the quantity and likely source of the materials.

**Table 5-3: Quantities, type and source of construction materials**

<b>Materials</b>	<b>Quantity</b>	<b>Likely Source of Materials</b>
Geotextile material / matting	1 No. load	Nenagh, Co Tipperary / Cork
Native trees and shrubs and peat for topdressing Concealed Access Roads (if required)	2 No. loads	Established nurseries in Ireland or Scotland
Wooden posts, fencing wire	7 No. loads	Arrabawn Co-Op, Reiska
Fibre optic cable spools/cassettes	14.7km on 17 drums	EU Region

**A5.6 -5.4 UWF Other Activities: Use of Natural Resources, Emissions and Waste****A5.6 -5.4.1 UWF Other Activities: Use of Natural Resources****A5.6 -5.4.1.1 Use of Resources: Land**

No requirement for lands or change of use of lands due to the UWF Other Activities.

**A5.6 -5.4.1.2 Use of Resources: Water**

All water requirements for welfare facilities will be supplied at the temporary construction stage compound associated with the Upperchurch Windfarm during the construction stage and at the Upperchurch Windfarm site office during the operational (and if relevant decommissioning) stages. Bottled drinking water will be carried with personnel.

**A5.6 -5.4.1.3 Use of Resources: Soils**

Haul Route Activities: No excavation or other disturbance of soils are required.

Upperchurch Hen Harrier Scheme: any initial planting will be carried out by hand using spades, small localised patches of disturbed soil will occur at the sapling tree root areas.

Monitoring Activities: No excavation or other disturbance of soils are required.

Overhead Line Activities: No mechanical excavations are required.

**A5.6 -5.4.1.4 Use of Resources: Biodiversity**

Haul Route Activities: Up to 960m of roadside boundary hedges/treelines will be trimmed, outside of the general bird breeding season.

Upperchurch Hen Harrier Scheme: in total, 2.2ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow will be enhanced or created during initial activities. In total 128 hectares of agricultural lands will be management for the benefit of hen harrier, protecting foraging habitat in the vicinity of the Slievefelim to Silvermines SPA.

Monitoring Activities: monitoring and auditing will ensure compliance with the Environmental Management Plans and Ecological Management Plans for Upperchurch Windfarm, UWF Grid Connection, UWF Related Works and with the environmental protection measures for UWF Replacement Forestry and UWF Other Activities; monitoring will include confirmatory surveys for birds, mammals and invertebrates, surveys for invasive species, the reinstatement of lands at felling locations and construction works areas, monitoring of construction works, monitoring of the planting of heather and grasses in the UWF Grid Connection Concealed Access Roads; monitoring the development of hen harrier foraging habitat under the Upperchurch Hen Harrier Scheme, the timing of works and the implementation of environmental protection measures, all of which will protect biodiversity in the area.

Overhead Line Activities: The activities will be carried out according to electrical industry standard method statements, including standard health & safety and environmental management systems and adherence to guidelines set by IFI for water quality protection, all of which will protect biodiversity in the area.

**A5.6 -5.4.2 UWF Other Activities: Emissions**

**Dust** will not arise, due to the absence of mechanical excavation of and storage of soils.

**Vehicle Exhausts Fumes** will be emitted by vehicles and machinery during planting and some monitoring activities but the amounts will be negligible.

**Noise:** Machinery and vehicles which will be used during planting and monitoring activities will emit noise during their operation, but the levels will be negligible.

**Vibration:** FWD survey of the public road network will emit low levels of vibration, but the levels will be negligible.

**Light:** No light emissions will occur.

**Electromagnetic Radiation:** No emissions of electromagnetic radiation will occur.

**A5.6 -5.4.3 UWF Other Activities: Waste**

**Waste Water:** No waste water will occur at UWF Other Activities locations. Toilet facilities at the temporary construction stage compound associated with the Upperchurch Windfarm during the construction stage and at the Upperchurch Windfarm site office during the operational (and if relevant decommissioning) stages will be available to personnel involved in UWF Other Activities.

**General Waste:** such as excess geotextile material and packaging, will be generated in very small quantities. This waste will be removed from the activity location and stored at a designated area at the the temporary construction stage compound associated with the Upperchurch Windfarm during the construction stage and at the Upperchurch Windfarm site office during the operational (and if relevant decommissioning) stages. General waste will be collected by an appropriately licensed operator.

**Chemical waste:** No chemical wastes are expected.

With the exception of Overhead Line Activities, the wastes from UWF Other Activities will be managed under the construction stage Waste Management Plans for the consented Upperchurch Windfarm as relevant. During the operational stage, waste related to UWF Other Activities will be managed under the Upperchurch Windfarm's **Waste Management Plan**. Overhead line activities will be managed by the System owner (ESBN) who will have their own waste management commitments and plans.

**A5.6 -5.5 Figures and Mapping**





Title:  
**Figure OA 1**  
Location of UWF Other  
Activities on OSI Mapping

Map Number:  
Map 1 of 1

Legend:

Ancillary Haul Route Activities

Street Furniture Removal

Vegetation Trimming

Mating Overlay

Identification Number (HA1 - HA23)

Haul Route

Upperchurch Hen Harrier Scheme

Agricultural lands included in the  
Upperchurch Hen Harrier Scheme

Overhead Line Activities

Overhead 110KV Line between Killonan  
ESBN Station and Structure No.90

Public Road Numbers

Monitoring Activity locations relate to the works  
areas associated with UWF Grid Connection,  
UWF Related Works and Upperchurch Windfarm.



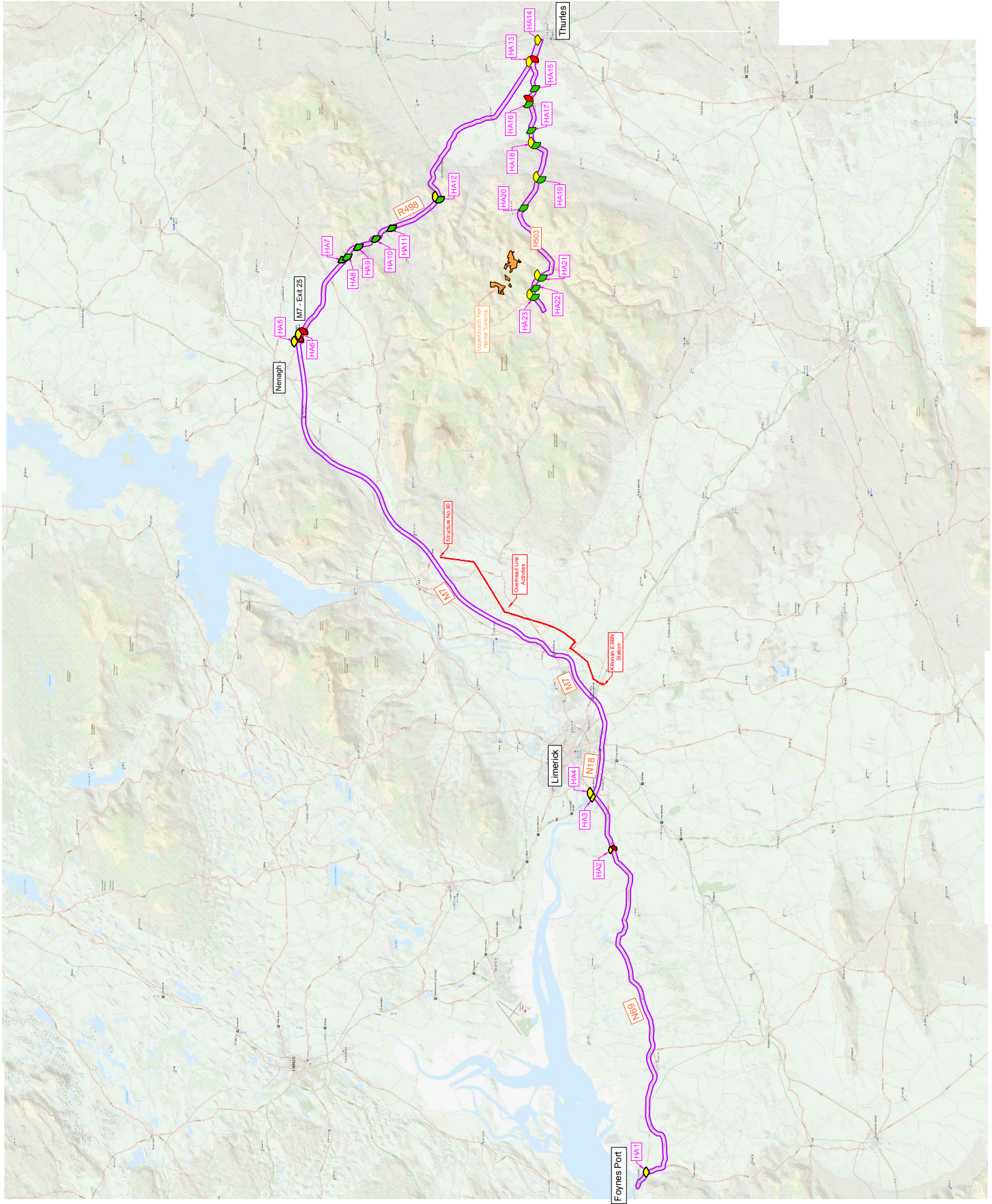
Project:  
UWF Other Activities (OA)

Drawn by: AB  
Checked by: JB  
Date: 19-Feb-18  
Sheet Size: A4



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**ECOPOWER**



Title:  
**Figure OA 2**

Haul Route Activities (8 maps)

Map Number:  
Map 1 of 8

Legend:

Haul Route Activities:  
Street Furniture Removal

Haul Route Activities:  
Matting

Direction of which the photo has been taken



Project:  
UWF Other Activities (OA)

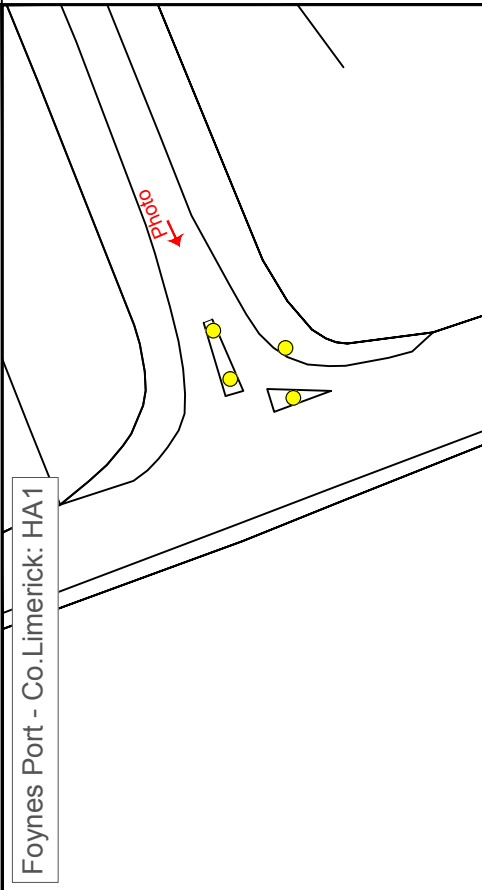
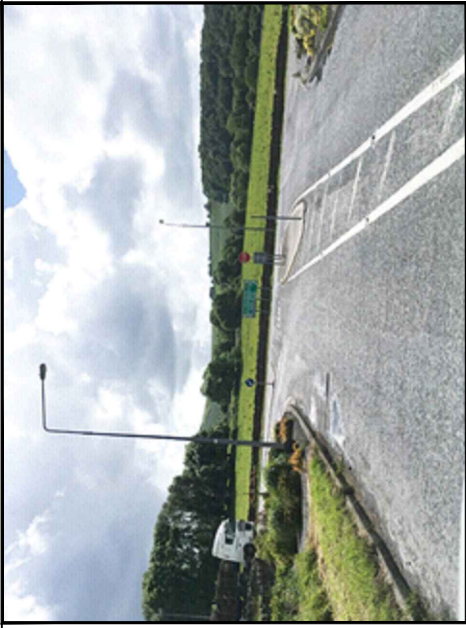
Drawn by:  
AB JB

Date:  
19-Feb-18

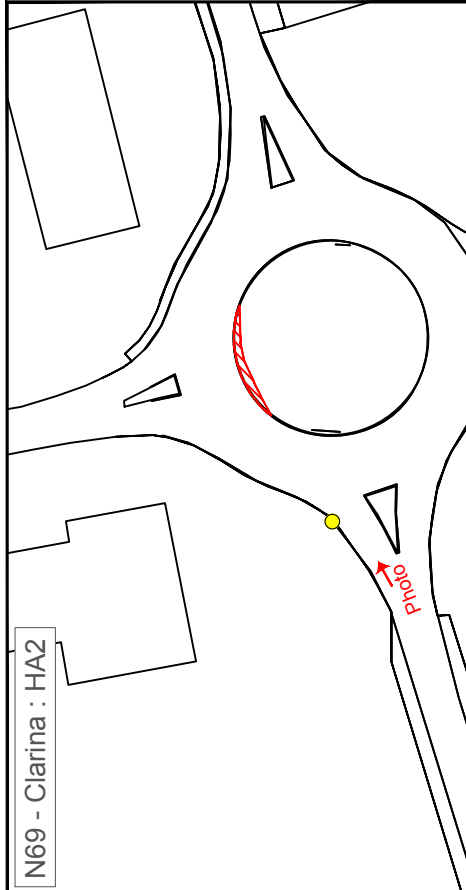
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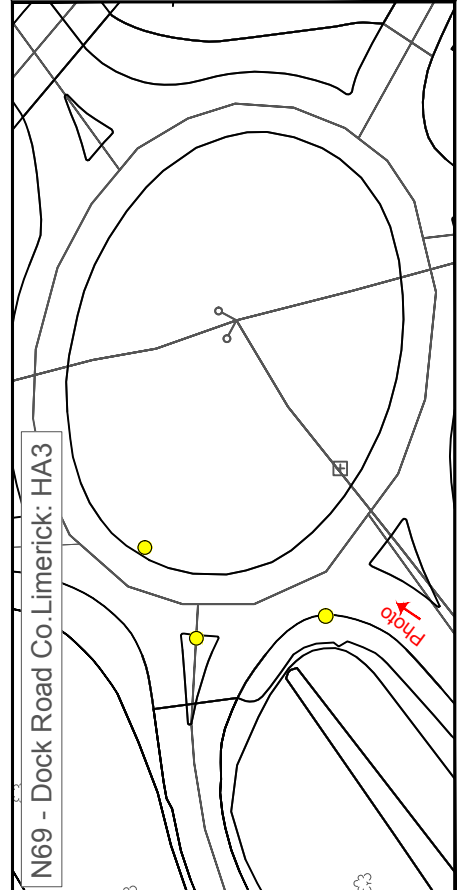
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Foynes Port - Co. Limerick: HA1

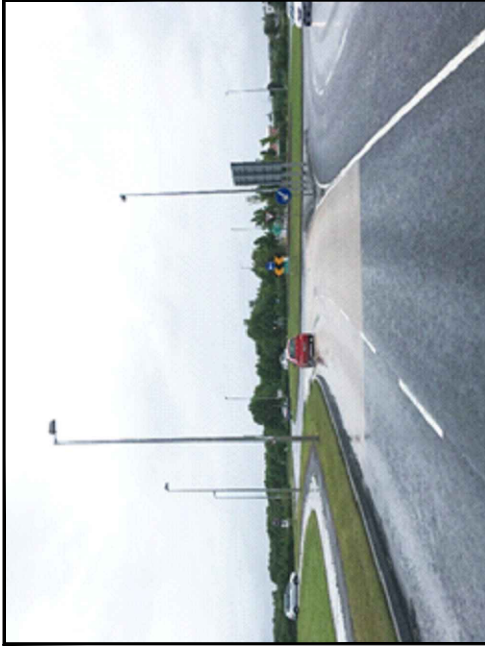
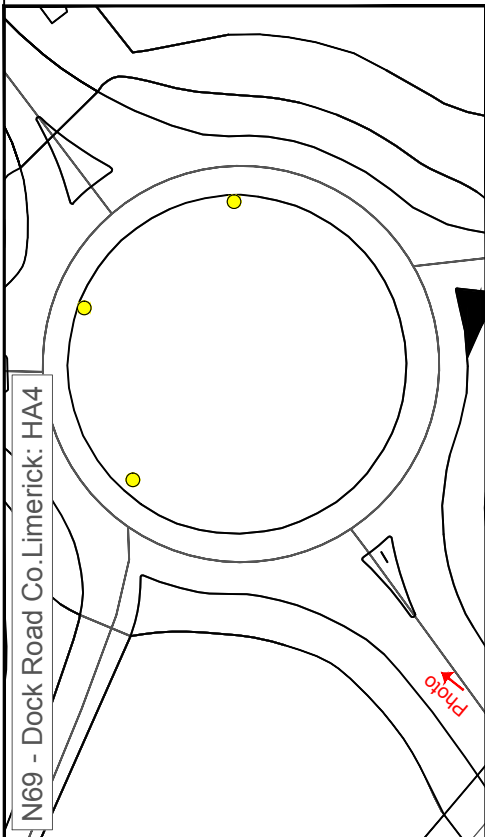


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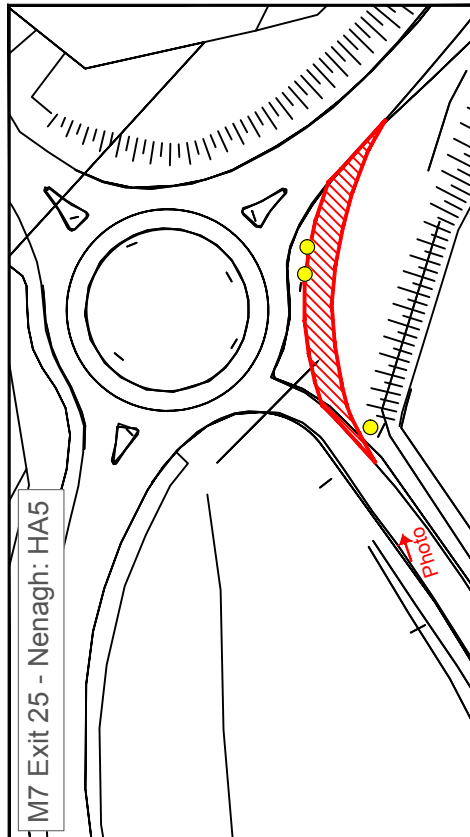


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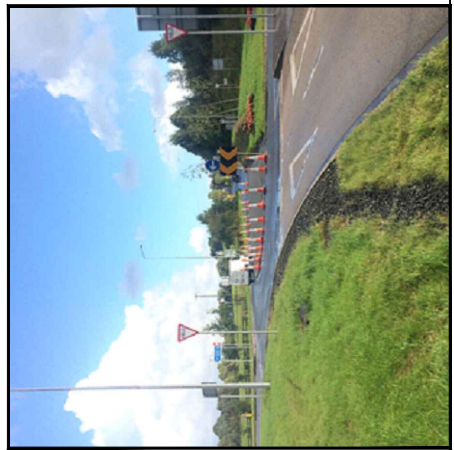
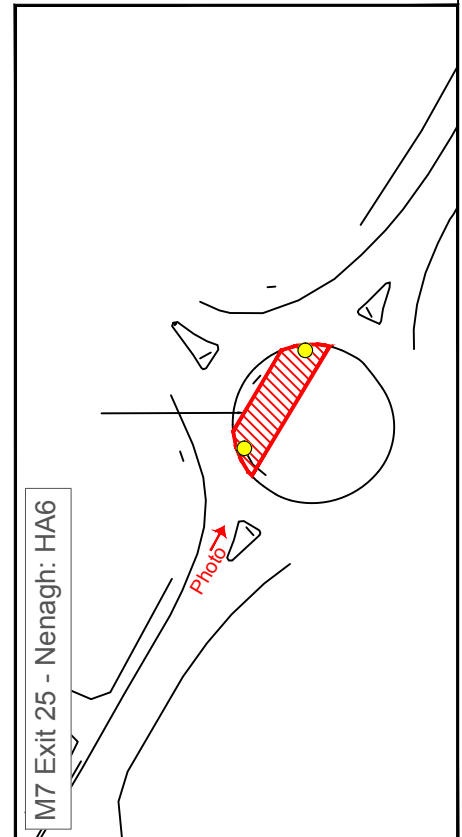
N69 - Dock Road Co.Limerick: HA4



M7 Exit 25 - Nenagh: HA5



M7 Exit 25 - Nenagh: HA6



Title:  
Figure OA 2

Haul Route Activities (8 maps)

Map Number:  
Map 2 of 8

Legend:

● Haul Route Activities:  
Street Furniture Removal

▨ Haul Route Activities:  
Matting

↔ Direction of which the photo has been taken



Project:

UWF Other Activities (OA)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	19-Feb-18	A4



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Title:  
**Figure OA 2**  
Haul Route Activities (8 maps)

Map Number:  
Map 3 of 8

Legend:

Haul Route Activities:  
Vegetation Trimming

Direction of which the photo has been taken

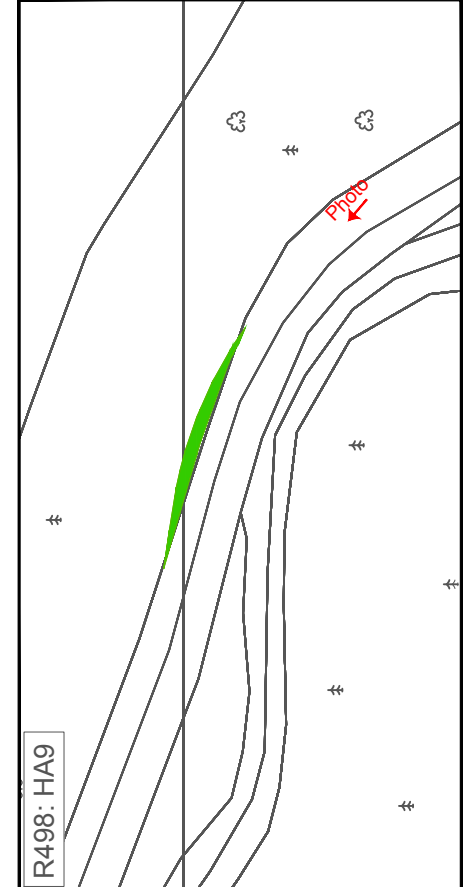
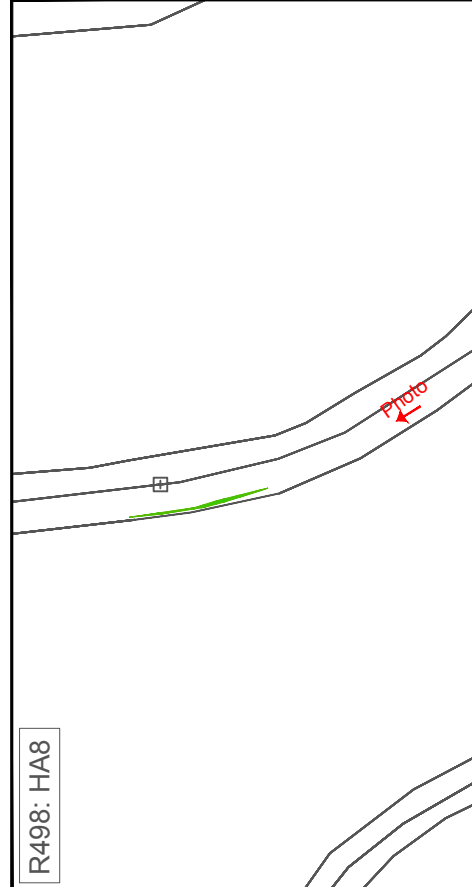
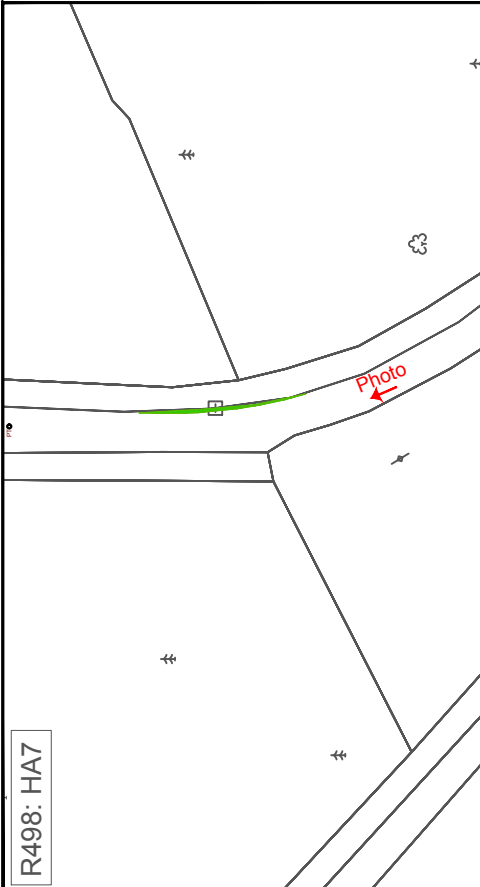
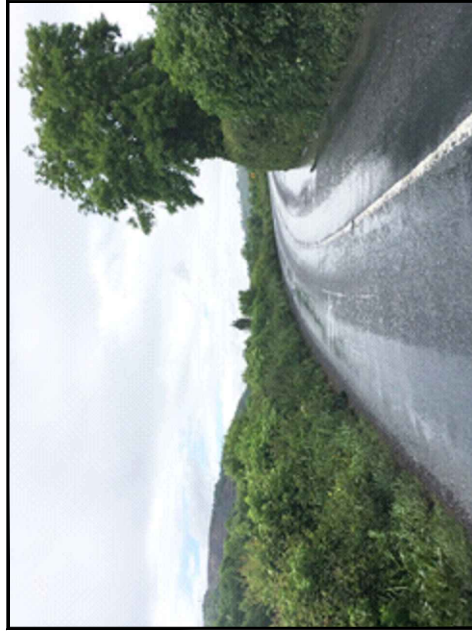
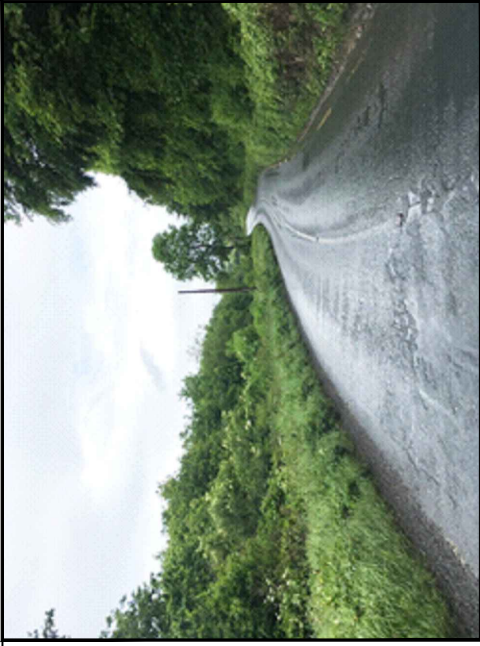


Project:  
UWF Other Activities (OA)

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Checked by: JB  
Date: 19-Feb-18  
Sheet Size: A4



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R498: HA7

R498: HA8

R498: HA9

Title:  
**Figure OA 2**  
Haul Route Activities (8 maps)

Map Number:  
Map 4 of 8

Legend:

- Haul Route Activities:
- Street Furniture Removal
- Haul Route Activities:
- Vegetation Trimming

Direction of which the photo has been taken



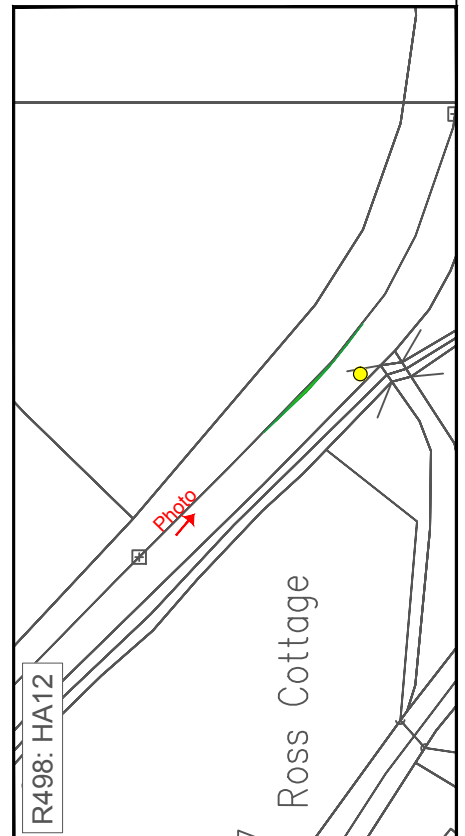
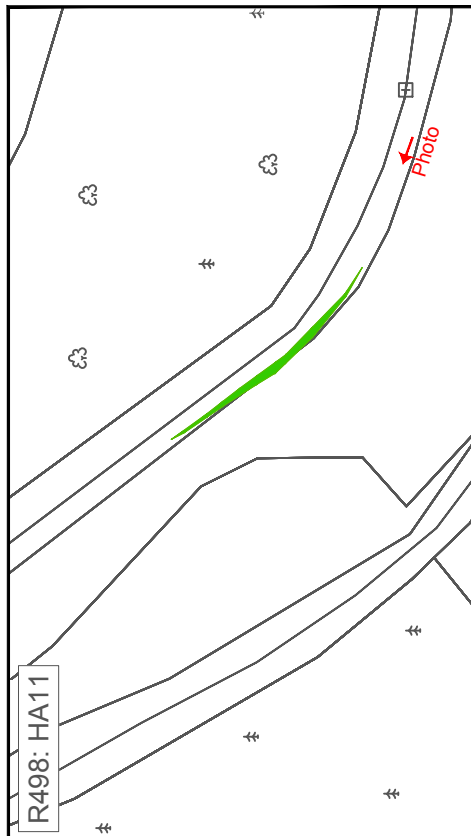
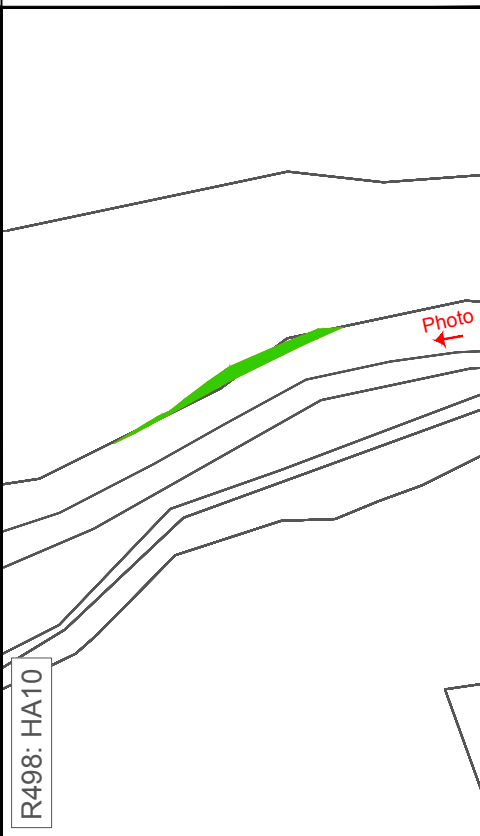
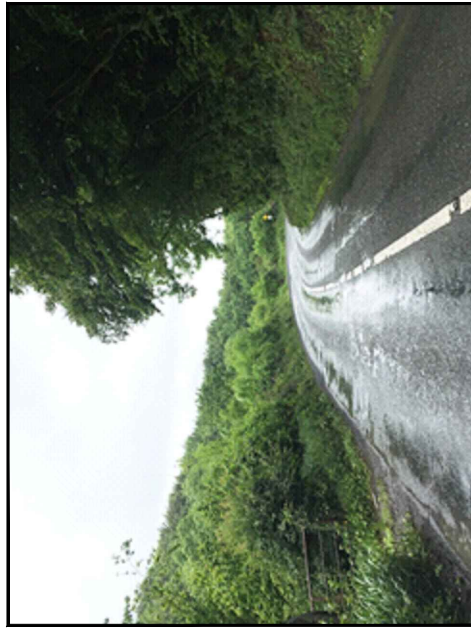
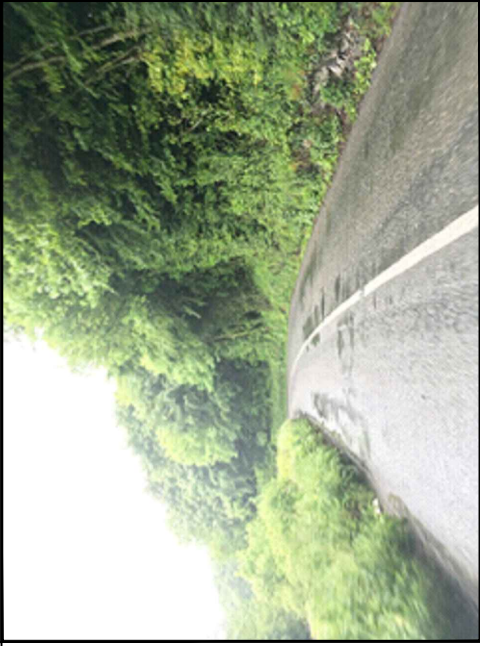
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UWF Other Activities (OA)

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AB	JB	19-Feb-18	A4



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**Title:**  
**Figure OA 2**  
 Haul Route Activities (8 maps)

**Map Number:**  
 Map 5 of 8

**Legend:**

- Haul Route Activities: Street Furniture Removal
- Haul Route Activities: Matting
- Haul Route Activities: Vegetation Trimming

↖ Photo Direction of which the photo has been taken



**Project:**

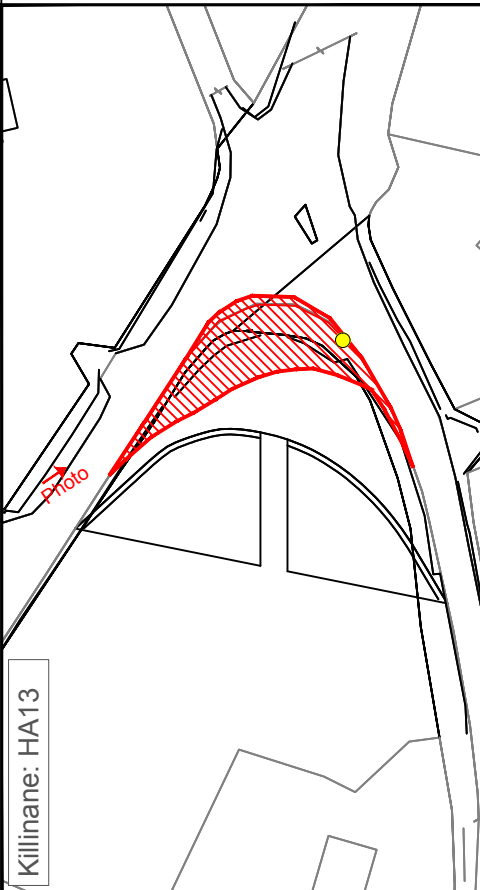
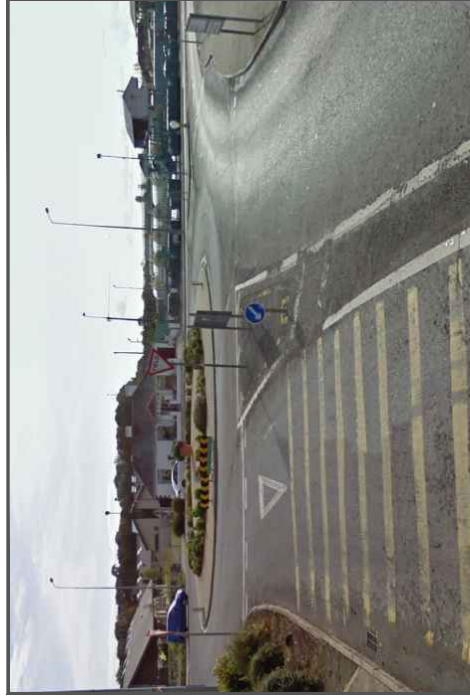
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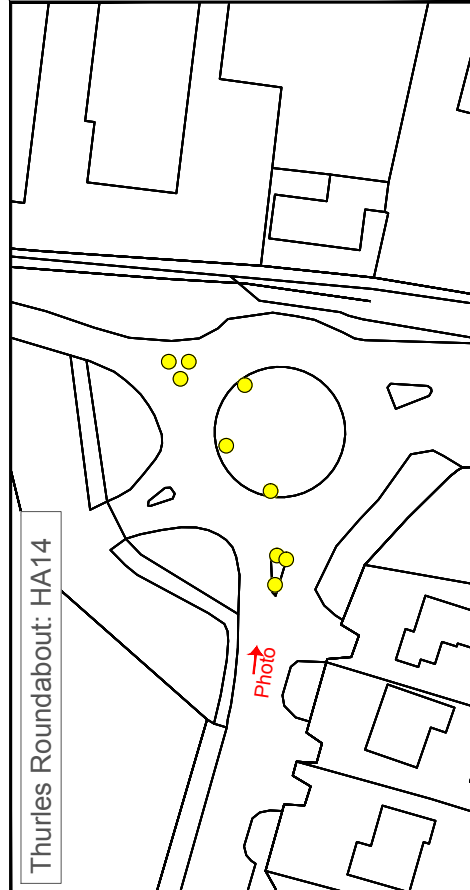


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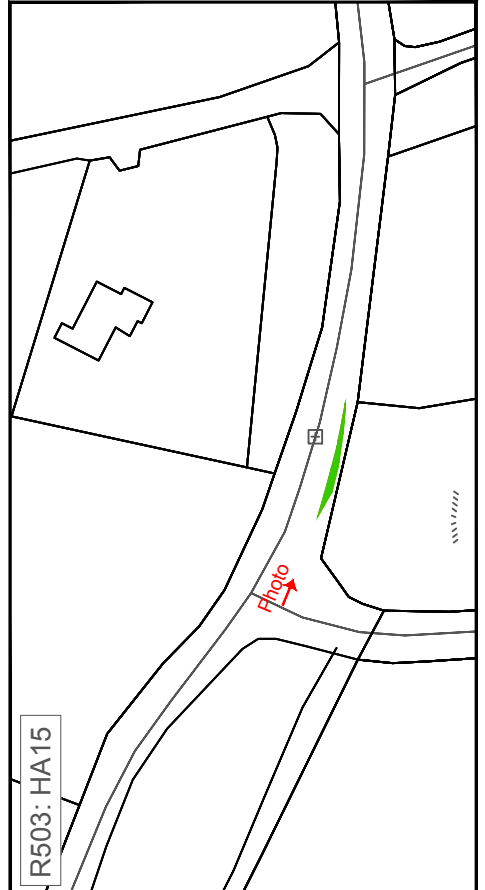
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 TEL: +353 56 7790140  
 MOB: +353 83 8805644



Killinane: HA13



Thurles Roundabout: HA14



R503: HA15

Title:  
**Figure OA 2**  
Haul Route Activities (8 maps)

Map Number:  
Map 6 of 8

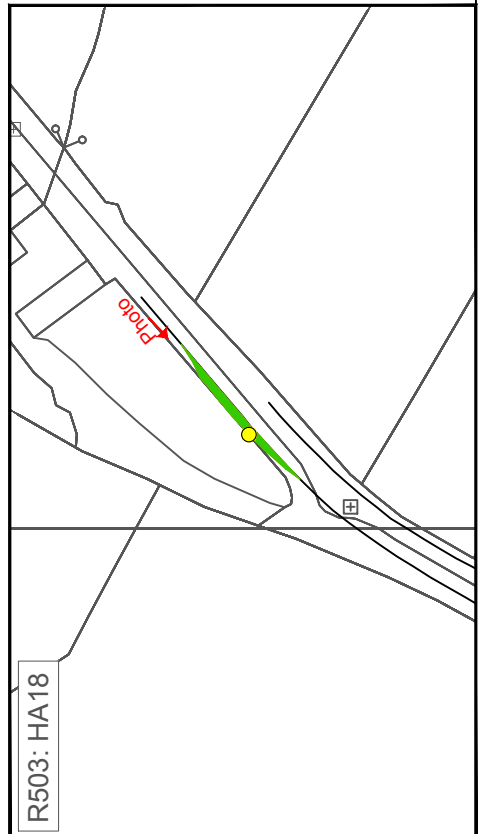
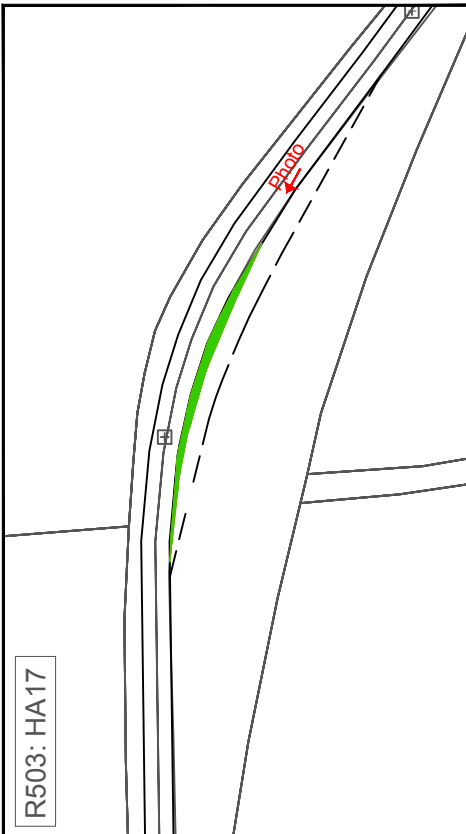
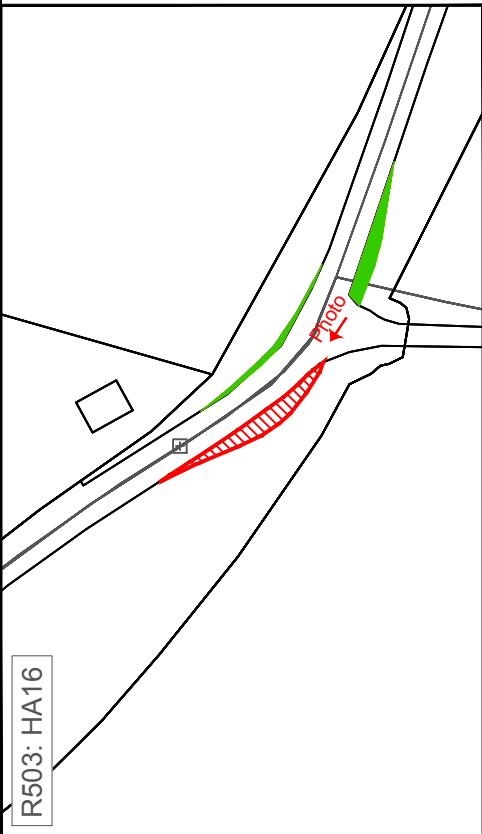
Legend:

- Haul Route Activities:  
Street Furniture Removal
- Haul Route Activities:  
Matting
- Haul Route Activities:  
Vegetation Trimming
- Direction of which the photo has been taken



Project:  
UWF Other Activities (OA)

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Title:  
**Figure OA 2**

Haul Route Activities (8 maps)

Map Number:  
Map 7 of 8

Legend:

- Haul Route Activities:
- Street Furniture Removal
- Haul Route Activities: Vegetation Trimming

→ Direction of which the photo has been taken

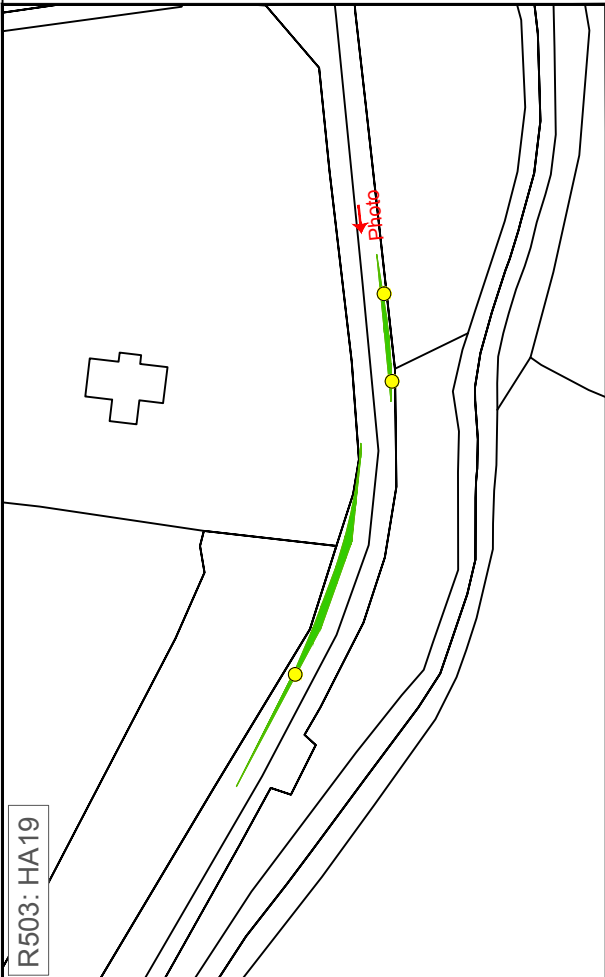
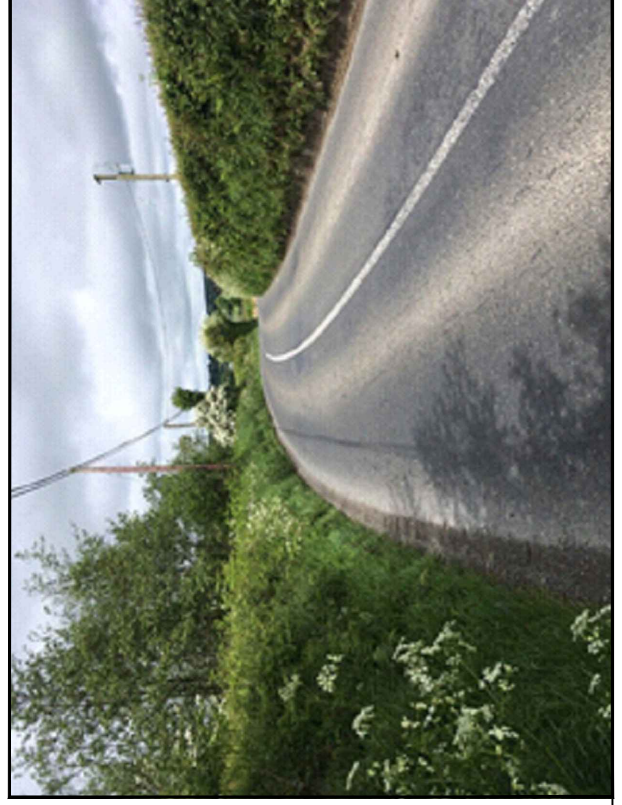
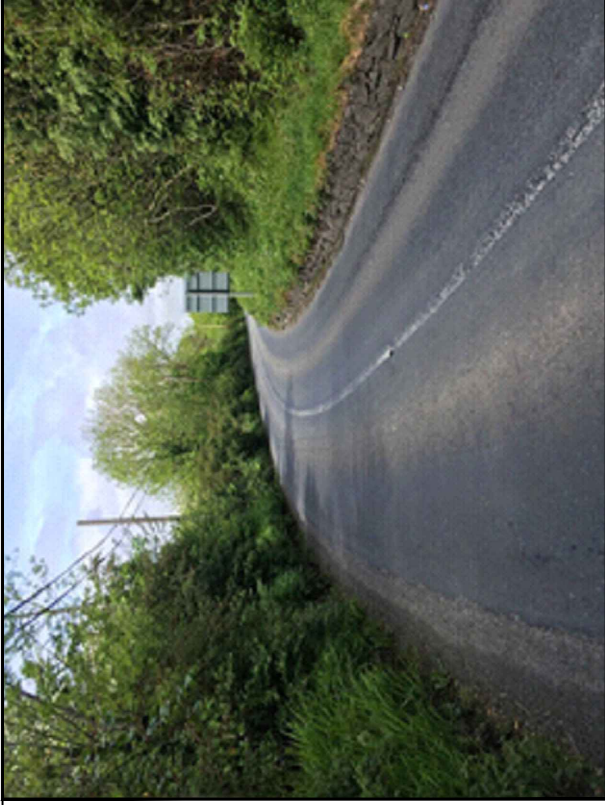


Project:  
UWF Other Activities (OA)

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Date: 19-Feb-18  
Sheet Size: A4



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Title:  
**Figure OA 2**  
Haul Route Activities (8 maps)

Map Number:  
Map 8 of 8

Legend:

- Haul Route Activities:  
Street Furniture Removal
- Haul Route Activities:  
Vegetation Trimming

Direction of which the photo has been taken

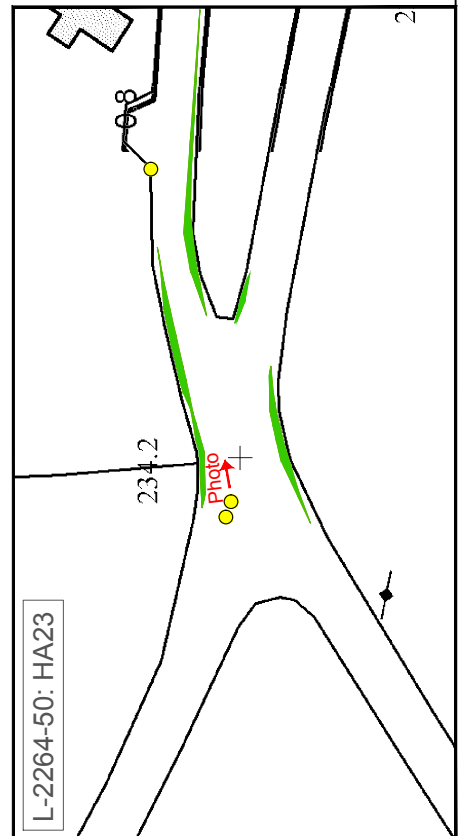
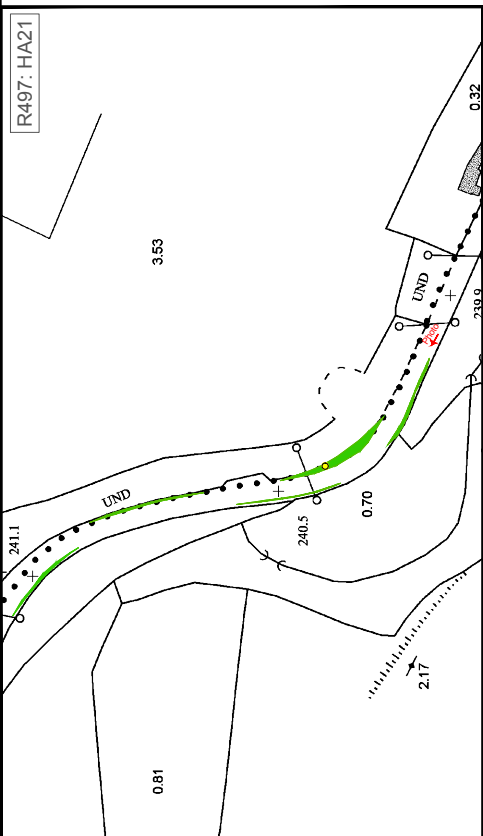
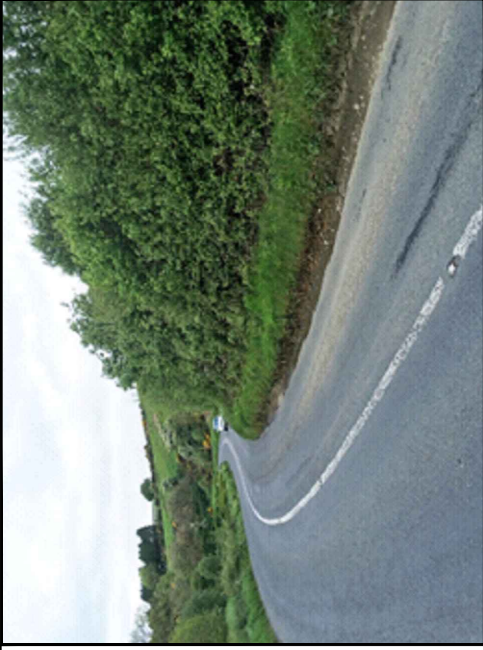


Project:  
UWF Other Activities (OA)

Drawn by:	AB	Checked by:	JB	Date:	19-Feb-18	Sheet Size:	A4
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Title:  
**Figure OA 3**  
Upperchurch Hen Harrier Scheme -  
Layout on Aerial Photography Mapping

Map Number:  
Map 1 of 1

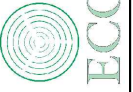
Legend:

- Hedgerow Planting
- Fencing of Riparian Area
- Tree Planting
- Agricultural lands included in the Upperchurch Hen Harrier Scheme
- Silverfeilm - Silvermines SPA
- Consented Upperchurch Windfarm Turbines
- Consented Upperchurch Windfarm Turbine Identification
- 250m Radius from each Consented Windfarm Turbine
- Upperchurch Hen Harrier Scheme Identification

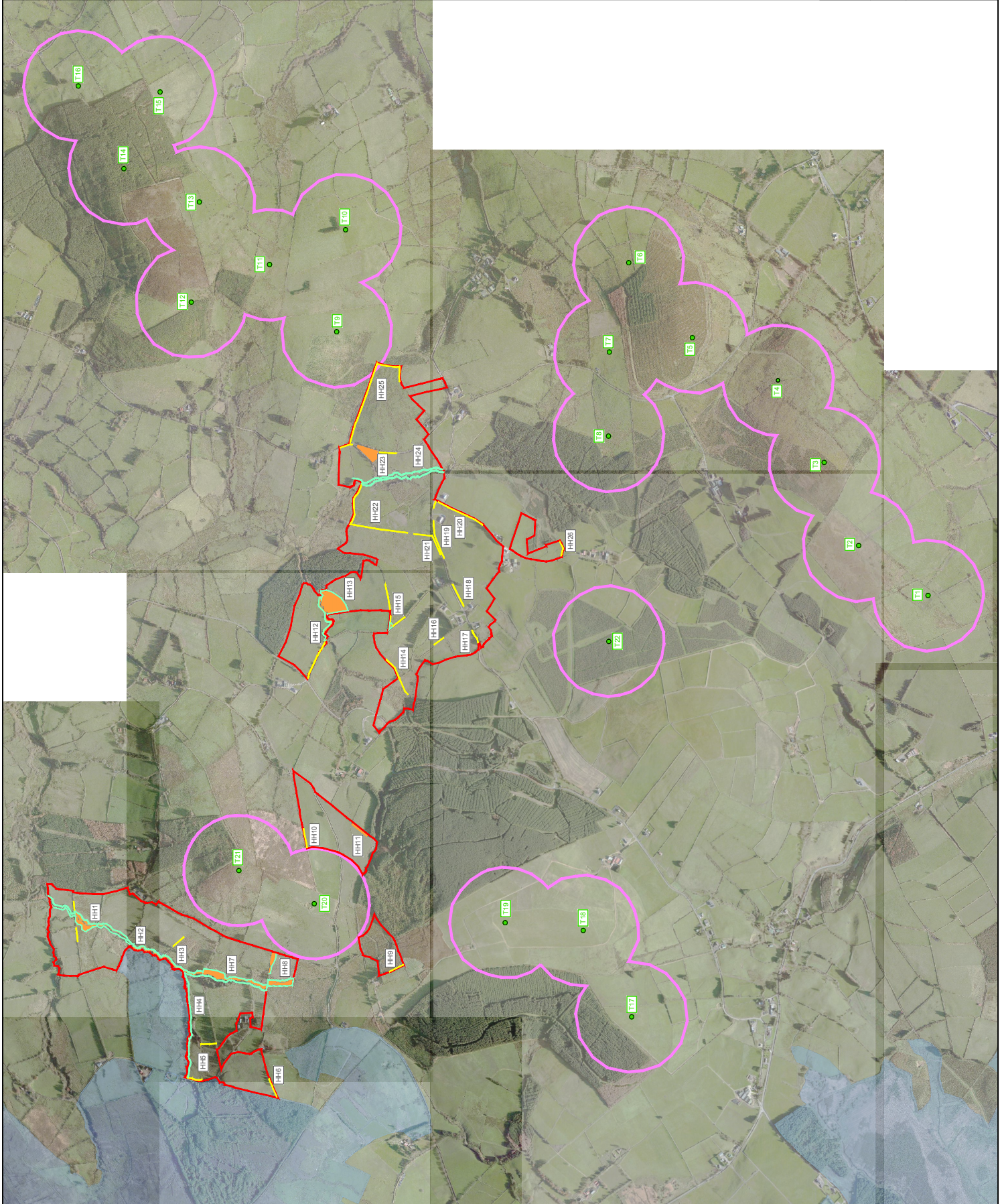


Project:  
UWF Other Activities (OA)

Drawn by:	Checked by:	Date:	Sheet Size:
AB	JB	19-Feb-18	A4



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**Title:**  
**Figure OA 4**  
Overhead Line Activities -  
Layout on OSI Discovery Mapping

**Map Number:**  
Map 1 of 1

**Legend:**

- Overhead 110kV Line between Killonan  
ESBN Station and Structure No.90
- Angle Mast
- Intermediate Structure
- P78 Structure Identification Number (P1 - P90)
- Mountphilips Substation

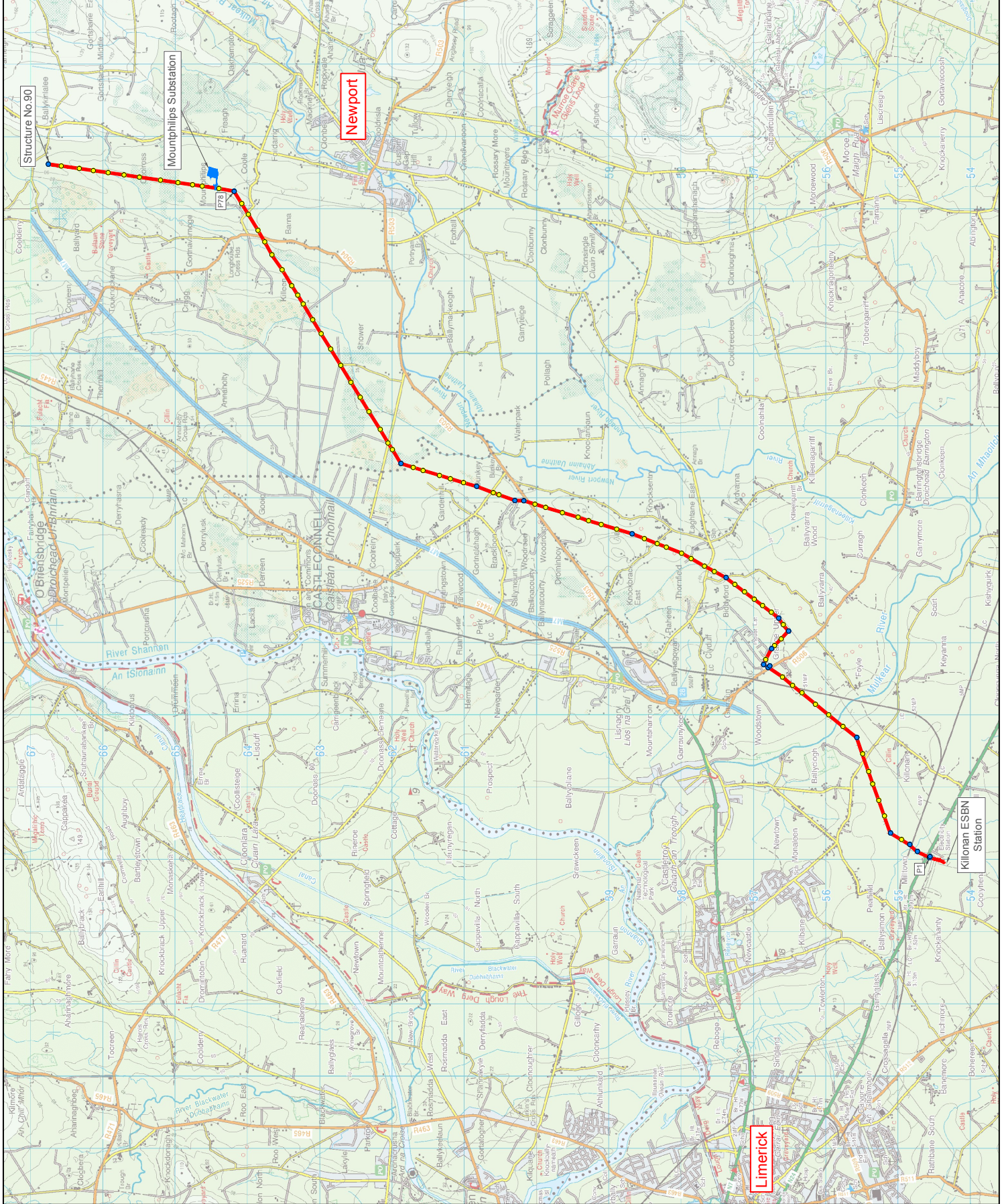


**Project:**  
UWF Other Activities (OA)

**Drawn by:** AB  
**Checked by:** JB  
**Date:** 19-Feb-18  
**Scale:** A4



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**UWF RELATED WORKS**

**VOLUME D**

**REVISED ENVIRONMENTAL MANAGEMENT  
PLAN**



**ECOPOWER**

## Contents

<b>1.</b>	<b>Introduction to the EMP .....</b>	<b>1</b>
1.1.	Objectives of the EMP .....	1
1.2.	Purpose of the EMP .....	1
1.2.1.	Scope of the EMP .....	1
1.3.	Structure of the EMP .....	2
<b>2.</b>	<b>General Project Description .....</b>	<b>3</b>
2.1.	Purpose of UWF Related Works .....	3
2.2.	Location and overview description of UWF Related Works .....	3
2.3.	Main Construction Stage Activities.....	4
2.4.	Classification and Grouping of Works Locations for this EMP .....	5
2.5.	Other Elements of the Whole UWF Project.....	6
2.5.1.	Cumulative Locational Context of all the Elements .....	6
2.6.	Other Activities in the vicinity of the UWF Related Works.....	6
<b>3.</b>	<b>Contractors &amp; Personnel .....</b>	<b>7</b>
3.1.	Organisational Structure and Hierarchy.....	7
3.1.1.	Construction Stage .....	7
3.2.	Contact Details .....	8
3.2.1.	Construction Stage Contact Details.....	8
3.3.	Duties & Responsibilities .....	9
3.3.1.	Project Promoter .....	9
3.3.2.	Project Team Members – Construction Stage.....	9
3.4.	Environmental Awareness Training .....	14
3.4.1.	EMP and Contractual Requirements Briefing.....	14
3.4.2.	Environmental Induction Training.....	14
3.4.3.	Task Specific Training – Tool Box Talks.....	14
3.5.	Communication .....	15
3.5.1.	Internal Communication.....	15
3.5.2.	External Communication with the Public .....	15
<b>4.</b>	<b>Environmental Commitments .....</b>	<b>17</b>
4.1.	Reference Documents.....	18
<b>5.</b>	<b>Environmental Protection Measures .....</b>	<b>19</b>
5.1.	Mitigation Measures .....	20
5.2.	Management Plans.....	24
5.3.	Schedule of Works Requirements .....	25

<b>5.4.</b>	<b>Environmental Survey Requirements .....</b>	<b>26</b>
<b>5.5.</b>	<b>Best Practices Measures .....</b>	<b>29</b>
<b>5.6.</b>	<b>Application of Environmental Protection Measures .....</b>	<b>31</b>
<b>6.</b>	<b>Environmental emergency response measures .....</b>	<b>33</b>
<b>7.</b>	<b>Monitoring .....</b>	<b>35</b>
7.1.1.	Environmental Clerk of Works.....	35
7.1.2.	Compliance Auditing .....	35
7.1.3.	Reporting .....	35
7.1.4.	Corrective Actions .....	36
<b>8.</b>	<b>Records &amp; Reporting .....</b>	<b>37</b>
<b>8.1.</b>	<b>Non-Compliance Record Sheet .....</b>	<b>37</b>
<b>8.2.</b>	<b>Register of Non-Compliance issued .....</b>	<b>38</b>
<b>8.3.</b>	<b>Environmental Training Record Sheet.....</b>	<b>39</b>
<b>8.4.</b>	<b>Register of Environmental Training .....</b>	<b>40</b>
<b>8.5.</b>	<b>Environmental Incident Record Sheet.....</b>	<b>41</b>
<b>8.6.</b>	<b>Register of Environmental Incidents .....</b>	<b>42</b>
<b>8.7.</b>	<b>Environmental Complaint Record Sheet.....</b>	<b>43</b>
<b>8.8.</b>	<b>Register of Environmental Complaints.....</b>	<b>44</b>
<b>8.9.</b>	<b>Control of Spread of Alien Species Record Sheet.....</b>	<b>45</b>
<b>9.</b>	<b>Mapping &amp; Figures.....</b>	<b>46</b>



**LIST OF TABLES**

Table No.	Table Title	Pages
Table 1	Structure of the EMP	Page 2
Table 2	Project Promoters Contacts	Page 8
Table 3	Main Contractors Contacts	Page 8
Table 4	Third Party Contacts	Page 8
Table 5	List of Environmental Commitments (ECs)	Page 16
Table 6	List of Reference Documents	Page 17
Table 7	List of Environmental Protection Measures - Project Design	Page 19
Table 8	List of Environmental Protection Measures - Management Plans	Page 22
Table 9	Surveying included as part of Project Design Environmental Protection Measures and Best Practice Measures	Page 24
Table 10	List of Environmental Protection Measures - Best Practice Measures	Page 27
Table 11	Application of Environmental Protection Measures during the Construction Stage	Page 29
Table 12	Classification of Construction Works Sections	Page 45

**LIST OF FIGURES**

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 Grid Connection and the Other Elements of the Whole UWF Project on OSI Mapping
Figure RW EMP 5	UWF Grid Connection and the Other Elements of the Whole UWF Project in the vicinity of Upperchurch Windfarm
Figure RW EMP 6	UWF Grid Connection and the Other Elements of the Whole UWF Project in Knockabansha, Knockmaroe, Knockcurraghbola Commons and Knockcurraghbola Crownlands.

**LIST OF DOCUMENTS TABBED TO THIS EMP**

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



## 1. Introduction to the EMP

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

### 1.1. Objectives of the EMP

The objectives of the EMP are to:

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

### 1.2. Purpose of the EMP

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

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

#### 1.2.1. Scope of the EMP

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

##### 1.2.1.1. Review and Update of the EMP

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

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

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

### 1.3. Structure of the EMP

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

**Table 1: Structure of the EMP**

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

## 2. General Project Description

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

The UWF Related Works proposal comprises of the following parts:

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

### 2.1. Purpose of UWF Related Works

**Internal Windfarm Cabling:** to connect the Consented UWF Turbines to the Consented UWF Substation.

**Realigned Windfarm Roads:** to realign two lengths of Consented UWF Roads and to provide access to a new telecom relay pole.

**Haul Route Works:** to facilitate the haulage of turbine components to the Upperchurch Windfarm site.

**Telecom Relay Pole: to be erected in order to carry telecoms relay equipment,** which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseefin Mast. The Telecom Relay Pole will fulfil Condition No. 18 of the planning conditions associated with the Upperchurch Windfarm.

**RW Ancillary Works:** will facilitate the construction of the UWF Related Works.

**Note: the Consented UWF Turbines, Consented UWF Roads and the Consented UWF Substation refer to components of Upperchurch Windfarm (UWF).**

### 2.2. Location and overview description of UWF Related Works

The **Internal Windfarm Cabling** will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnaageha, 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. Lughtseefin 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 Activities	Construction	Stage
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Construction stage activities will involve the following main works:

<ul style="list-style-type: none"> <li>Pre-Construction Activities</li> </ul>	<ul style="list-style-type: none"> <li>Instream Works Preparation and Reinstatement</li> </ul>
<ul style="list-style-type: none"> <li>Construction Works Area Preparation</li> </ul>	<ul style="list-style-type: none"> <li>Instream Works</li> </ul>
<ul style="list-style-type: none"> <li>Temporary Site Entrances</li> </ul>	<ul style="list-style-type: none"> <li>Bailey Bridge</li> </ul>
<ul style="list-style-type: none"> <li>Realigned Windfarm Roads</li> </ul>	<ul style="list-style-type: none"> <li>Relocation of Overhead Lines</li> </ul>
<ul style="list-style-type: none"> <li>Temporary Access Roads</li> </ul>	<ul style="list-style-type: none"> <li>Felling of Forestry</li> </ul>
<ul style="list-style-type: none"> <li>Haul Route Works</li> </ul>	<ul style="list-style-type: none"> <li>Overburden Storage Berms</li> </ul>
<ul style="list-style-type: none"> <li>Telecom Relay Pole</li> </ul>	<ul style="list-style-type: none"> <li>Reinstatement of Land</li> </ul>
<ul style="list-style-type: none"> <li>Internal Windfarm Cabling</li> </ul>	

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

#### **2.4. Classification and Grouping of Works Locations for this EMP**

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

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

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

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



## 2.5. Other Elements of the Whole UWF Project

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

### **Relevant EMP Figures:**

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

### 2.5.1. Cumulative Locational Context of all the Elements

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

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

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

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

### **Relevant EMP Figures:**

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

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

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

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

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

### 3. Contractors & Personnel

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

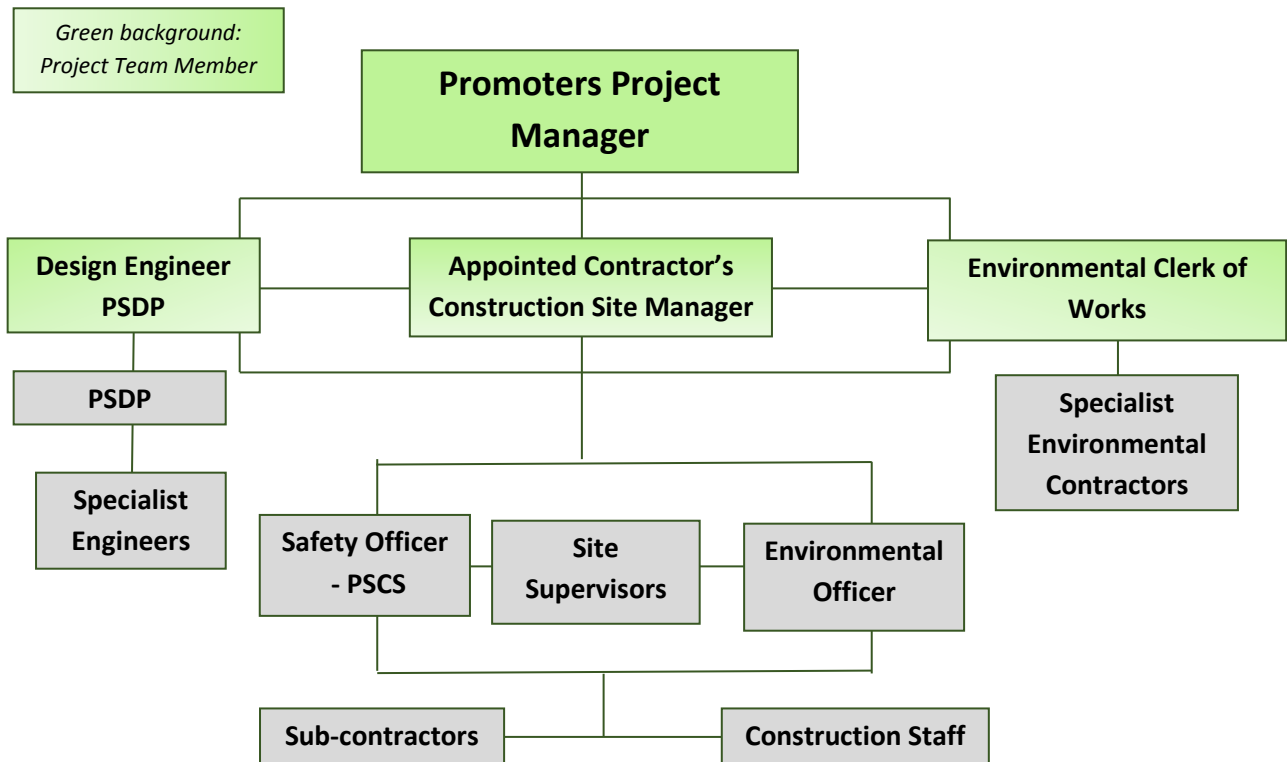
The construction Project Manager and Main Contractor will be appointed by the Promoter prior to commencement of the works. On appointment, the Project Manager and the Main Contractor will be required by the Project Promoter to update the outline organisational structure, the specific duties, roles and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

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

#### 3.1. Organisational Structure and Hierarchy

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

##### 3.1.1. Construction Stage



**3.2. Contact Details**

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

**3.2.1. Construction Stage Contact Details**

**Table 2: Project Promoters Contacts**

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

**Table 3: Main Contractors Contacts**

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

**Table 4: Third Party Contacts**

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

### 3.3. Duties & Responsibilities

#### 3.3.1. Project Promoter

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

#### 3.3.2. Project Team Members – Construction Stage

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

##### 3.3.2.1. Project Promoters Project Manager

A Project Manager is appointed by the Project Promoter to manage and oversee the entire project.

The Project Manager's responsibilities include, but are not limited to, the following:

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

##### 3.3.2.2. Construction Site Manager

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

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

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

#### 3.3.2.3. Design Engineer

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

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

#### 3.3.2.4. Environmental Clerk of Works

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

##### 3.3.2.4.1. General

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

##### 3.3.2.4.2. Compliance Auditing

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

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

#### 3.3.2.4.3. Detailed Method Statements

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

#### 3.3.2.4.4. Third Party Consultations

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

#### 3.3.2.4.5. Licensing

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

#### 3.3.2.4.6. Specialist environmental contractors

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

#### 3.3.2.4.7. Environmental Induction Training and Environmental Tool Box Talks

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

#### 3.3.2.4.8. Environmental Incidents/Spillages

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

#### 3.3.2.5. Other Roles

##### 3.3.2.5.1. Project Supervisor Construction Stage - PSCS

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

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

##### 3.3.2.5.2. Community Liaison Officer

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

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

3.3.2.5.3. <b>Specialist Environmental Contractors</b>
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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 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. <b>All site personnel</b>
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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 (January 2019). This List will be updated with any additional environmental commitments arising from the Reference Documents in Section 4.1 below.

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

Environmental Commitment	Source	Implemented By: Construction Manager/ Env. Clerk of Works / Project Manager / Other	Method by which the EC will be met
The Project Promoter is committed to implementing the <b>Project Design Measures</b> 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 <b>Traffic Management Plan</b> .	EMP, Tab 3	Project Team	Traffic Management Plan
The Project Promoter is committed to implementing the <b>Surface Water Management Plan</b> .	EMP, Tab 4	Project Team Site Ecologist Site Hydrologist	Surface Water Management Plan
The Project Promoter is committed to implementing the <b>Invasive Species Management Plan</b> .	EMP, Tab 5	Project Team Site Ecologist	Invasive Species Management Plan
The Project Promoter is committed to implementing the <b>Waste Management Plan</b> .	EMP, Tab 6	Project Team	Waste Management Plan
The Project Promoter is committed to implementing <b>Best Practice Measures</b> 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 <b>monitoring</b> 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

Environmental Management Plan for UWF Related Works

#### 4.1. Reference Documents

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

**Table 6: List of Reference Documents**

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

## 5. Environmental Protection Measures

The current Environmental Protection Measures comprise:

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

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

## 5.1. Mitigation Measures

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

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a safe and efficient manner.
PD03	Construction works in <a href="#">Knocknabansha</a> , Knockmaroe, <a href="#">Knockcurraghbola Crownlands</a> 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. <a href="#">Where excavations occur in areas of archaeological potential such as fording points and associated marsh lands and watercourses all excavated material will be spread out and metal detected (under licence to National Monuments Service) as part of the finds retrieval strategy.</a>
PD09	New permanent access roads ( <a href="#">Realigned Windfarm Roads</a> ) will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound ( <a href="#">Consented Upperchurch Windfarm Site Compound No.1</a> ). 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	<del>If works are programmed to begin in the Hen Harrier breeding season (March to August) Confirmatory hen harrier breeding surveys will be completed, before such works, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter.</del> No construction works <a href="#">for UWF Related Works</a> will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the <a href="#">hen harrier</a> 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, <del>where possible</del> . 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.



PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD34	Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 10-12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. NWPS will be notified immediately if the sett previously identified is confirmed as active or if a further active sett is located within 50 meters of the footprint of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005).
PD35	No construction works will be carried within 50m of an active sett during the main breeding season (December 1 <sup>st</sup> to June 30 <sup>th</sup> ).
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 <a href="#">the Consented Upperchurch Windfarm Site Compound No.1 compounds</a> . All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD38	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys.
PD39	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal. <a href="#">(Note. It is not expected that any trees with moderate or high suitability will be felled).</a>
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. <a href="#">Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.</a>
PD42	Installation of bat crossing structures at severed hedgerows, proximate to areas of high bat activity or roost locations. And following the completion of construction works, the replanting of these severed

PD ID	Schedule of Project Design Environmental Protection Measure (MITIGATION MEASURES)
	hedgerows with <u>at least the same number of</u> semi-mature <del>shrubs/trees (like for like)</del> <u>Irish-sourced, native trees</u> and <del>limits on</del> <u>no</u> temporary <u>construction works area</u> 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**

<b>Title:</b>	Scheduling of Works
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Manager	Liaising with the Construction Manager, Environmental Clerk of Works and Site Ecologist regarding temporal restrictions
<b>Scheduling of Works included as Project Design Environmental Protection Measures</b>	
PD01	All construction works will be carried out during daylight hours.
PD03	Construction works in <a href="#">Knocknabansha</a> , Knockmaroe, <a href="#">Knockcurraghbola Crownlands</a> 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	<del>If works are programmed to begin in the Hen Harrier breeding season (March to August) Confirmatory hen harrier breeding surveys will be completed, before such works, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter.</del>  No construction works <a href="#">for UWF Related Works</a> will take place <del>within 500m of an active hen harrier breeding attempt or active nesting activity,</del> during the <a href="#">hen harrier</a> 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, <del>where possible</del> . 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 <sup>st</sup> to June 30 <sup>th</sup> ).
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.  <a href="#">(Note. It is not expected that any trees with moderate or high suitability will be felled).</a>

Environmental Management Plan for UWF Related Works

#### 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	<del>If works are programmed to begin in the Hen Harrier breeding season (March to August)</del> Confirmatory hen harrier breeding surveys will be completed, <del>before such works</del> , such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter.

Measure ID	Project Design Environmental Project Measure/Best Practice Measure Survey Description
	No construction works <u>for UWF Related Works</u> will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the <u>hen harrier</u> breeding season (March to August).
PD27 RW-BPM-12	During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.
RW-BPM-06	Surveying of drainage and ground conditions before and during tree felling activities. Water sampling at main watercourse downstream of felling post-felling.
RW-BPM-13	All known bat roosts within 150m of the construction works areas will be subject to confirmatory survey prior to the onset of construction works in order to identify any changes in the interim period since baseline establishment.
RW-BPM-15	Post-construction activity surveys will be carried out annually by the Project Ecologist, roost surveys on roosts identified as part of baseline evaluation will be carried out under Licence within the suitable survey season as per Best Practice. All hedgerow locations subject to Bat Crossing Structures and reinstatement measures will also be surveyed by a suitably qualified Bat expert within the suitable survey season as per Best Practice.
RW-BPM-16	Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies; and identify any other infestations close to the construction works areas or operational stage maintenance works areas.
RW-BPM-17	Where practical, vegetation clearance will be carried out outside of the restricted breeding bird period (1 <sup>st</sup> March to 31 <sup>st</sup> August). Where clearance is required within the closed season, a survey will be carried out by the Project Ecologist for the presence of active birds' nests (i.e. nests with eggs or young birds).
RW-BPM-19	Kingfisher: Surveys will be undertaken between March and April (early visit) and again between May and June (late visit) of the construction year and will be targeted at confirming breeding attempts and/or nest locations along rivers within 300m of works area boundary (No nests were located within 300m during baseline surveys). All crossing locations will be also be surveyed to confirm Kingfisher suitability both in terms of nest banks and suitable bankside vegetation at the time of construction. During Kingfisher surveys, all crossing locations will also be surveyed to confirm the presence or absence of other aquatic/riparian species such as Dipper, Grey Wagtail.
RW-BPM-20	Survey of identified badger setts within 50 m of either side of the construction works area boundary to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the period following the completion of construction. Surveys will be undertaken annually in Operational Years 1, 2, 3, 4 and 5.
RW-BPM-21	Red Squirrel/Pine Martin: Confirmatory surveys (of suitable habitat) for the presence/absence of these protected species or their breeding/resting places within 50m of the construction works area will be undertaken prior to the commencement of vegetation and/or hedgerow clearance and excavations. Confirmatory surveys to check for any new dens/dreys that may have arisen between the time of the original survey and start of works will be carried out by the Project Ecologist. On-going survey of any dreys within 50m of works areas to monitor the breeding status of the drey, (red squirrels can move dreys during the breeding season, so a non-breeding drey could change status).
RW-BPM-23	Common Frog/Smooth Newt: Should construction activities be scheduled for areas proximal to previously identified habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be carried out at those locations to confirm the presence/absence of breeding adults and/or spawn.
RW-BPM-24	As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a spot-check confirmatory survey by

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

## 5.5. Best Practices Measures

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

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

BPM ID	Best Practice Measure
RW-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
RW-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
RW-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
RW-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
RW-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
RW-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
RW-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
RW-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
RW-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
RW-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier ( <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 Outline Construction Methodologies (OCMs)
Watercourse Crossing Locations (Class 1 and 2, fisheries value)	PD1, PD3, PD5, PD7, PD8, PD10, PD11, PD12, PD13, PD14, PD16, PD17, PD18, PD20, PD22, PD23, PD24, PD25, PD26, PD27, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-05, BPM-06, BPM-07, BPM-08, BPM-09, BPM-11, BPM-12, BPM-13, BPM-16, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-27, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-04, OCM-05, OCM-08, OCM-09, OCM-10, OCM-11
Watercourse Crossing Locations (Class 3 and 4 - sub-optimal or no fisheries value)	PD1, PD3, PD5, PD7, PD8, PD10, PD11, PD12, PD13, PD14, PD16, PD17, PD18, PD20, PD24, PD26, PD27, PD29, PD30, PD31, PD32, PD33, PD34, PD35	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-05, BPM-06, BPM-07, BPM-08, BPM-09, BPM-11, BPM-12, BPM-13, BPM-16, BPM-18, BPM-19, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-27, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-04, OCM-05, OCM-08, OCM-09, OCM-10, OCM-11
Public Roads	PD1, PD2, PD3, PD4, PD7, PD8, PD12, PD17, PD18, PD21, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD44	Surface Water Management Plan Traffic Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-16, BPM-21, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-29, BPM-30, BPM-31, BPM-32	OCM-01-, OCM-02, OCM-03, OCM-06, OCM 08
Agricultural Lands	PD1, PD3, PD4, PD6, PD7, PD8, PD9, PD12, PD13, PD14, PD15, PD16, PD17, PD18, PD20, PD26, PD27, PD28, PD29, PD30, PD31, PD32, PD33, PD34, PD35, PD36, PD38, PD39, PD40, PD41, PD42, PD43, PD51, PD58, PD62, PD63, PD64	Surface Water Management Plan Waste Management Plan Invasive Species Management Plan	BPM-02, BPM-03, BPM-04, BPM-09, BPM-11, BPM-12, BPM-16, BPM-17, BPM-18, BPM-19, BPM-21, BPM-22, BPM-23, BPM-24, BPM-25, BPM-26, BPM-28, BPM-29, BPM-30, BPM-31, BPM-32, BPM-33, BPM-34	OCM-01, OCM-02, OCM-04, OCM-05, OCM-06, OCM-08, OCM-12, OCM-13, OCM-14, OCM-15,

Environmental Management Plan for UWF Related Works

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

## 6. Environmental emergency response measures

### Environmental Emergency Procedure for Oil/Fuel Spillage

#### Work Sections/Locations

All parts of the construction works area boundary

Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> <li>Ensuring that all personnel are trained in emergency procedure for oil/fuel spillage</li> <li>Ensuring that all construction site plant, machinery and vehicles are equipped with spill kits</li> <li>Alerting the Environmental Clerk of Works of the oil/fuel spillage.</li> </ul>

#### 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 Management Plan for UWF Related Works

Environmental Emergency Procedure for significant pollution occurrence in local surface waters	
<b>Work Sections/Locations</b>	
All parts of the construction works area boundary	
Responsibility of	Role/Duty
Construction Manager	<ul style="list-style-type: none"> <li>Will inform the Environmental Clerk of Works of any observed issues.</li> </ul>
Environmental Clerk of Works	<ul style="list-style-type: none"> <li>Will notify an appropriate person in Tipperary County Council.</li> </ul>
<b>Incidents involving oil spillage</b>	
<p>In the unlikely event of a significant pollution occurrence in local surface waters relating to the works then the following protocol will be adopted:</p> <ul style="list-style-type: none"> <li>Water quality monitoring will be undertaken visually, and the Construction Manager will have informed the Environmental Clerk of Works of any observed issues</li> <li>If the source is from the works then the Environmental Clerk of Works will notify an appropriate person in Tipperary County Council</li> <li>Work will not continue again until the source of the pollution is identified and eliminated</li> </ul>	

## 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
<p><b><u>Contractor or Subcontractor Details:</u></b></p> <p>Contractor Name:</p> <p>Contact Name:</p> <p>Telephone:</p>		
<p><b><u>Nature of Non-Compliance</u></b> (specify Environmental Protection Measure breached)</p>    		
<p><b><u>Time Specified for becoming compliant:</u></b></p>  		
<p><b>Contractor or Subcontractor's confirmation of receipt of NCR</b></p> <p>Yes <input type="checkbox"/>      No <input type="checkbox"/></p> <p>Contractors or Subcontractors signature: _____</p> <p>Date of Signing: _____</p>		

Environmental Management Plan for UWF Related Works





**8.3. Environmental Training Record Sheet**

Environmental Training Record Sheet		
<b>Training Title:</b>		
Description		
External Trainers <input type="checkbox"/>	Name of Company:	
Internal Instruction <input type="checkbox"/>	Name and Signature of Trainer:	
Date:		
Duration of Training:		
Name	Job Title	Signature (Employee receiving training)

Environmental Management Plan for UWF Related Works

**8.4. Register of Environmental Training**

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

Environmental Management Plan for UWF Related Works

**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: _____			

Environmental Management Plan for UWF Related Works

**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
<b>Complainants Details (if known)</b>		
Name: _____ Address: _____		
Telephone Number: _____		
Mode of Complaint: _____ (e.g. telephone/letter/verbal/via statutory body)		
<b>Nature of Complaint (e.g. Water pollution/Dust/Noise/Fuel Spill)</b>		
<b>Response to Complaint</b> (including investigation findings, corrective actions/preventative action taken if required)		
<b>Corrective/Preventative Action Taken/Contingency Measures Employed</b>		
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

**8.9. Control of Spread of Alien Species Record Sheet**

<b>Contractor/Employee Name:</b>	
Contractor Equipment List: (list all main equipment cleaned)	
Construction Location: (tick as appropriate)	<ul style="list-style-type: none"> <li>• <input type="checkbox"/></li> <li>• <input type="checkbox"/></li> </ul> (Specify exact location)
Cleaning Location (specify location where cleaning took place, e.g. name of garage)	
Method of Cleaning (Specify nature of cleaning e.g. High-pressure steam, manual removal of vegetation, high pressure power hose, disinfection etc.)	
Date of Cleaning:	
Contractor Declaration:	
I hereby declare that all equipment used at the construction location indicated above has been thoroughly cleaned in accordance with the cleaning methodology set out above before entering the construction site. The machine I am using has not left site and re-entered since it was cleaned.	
Signed: _____	Date: _____

Environmental Management Plan for JWF Related Works



## 9. Mapping & Figures

The following mapping and figures are included:

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

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

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

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

Table 12: Classification of Construction Works Sections

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

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

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

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

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

**Map Number:**  
Map 1 of 1

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

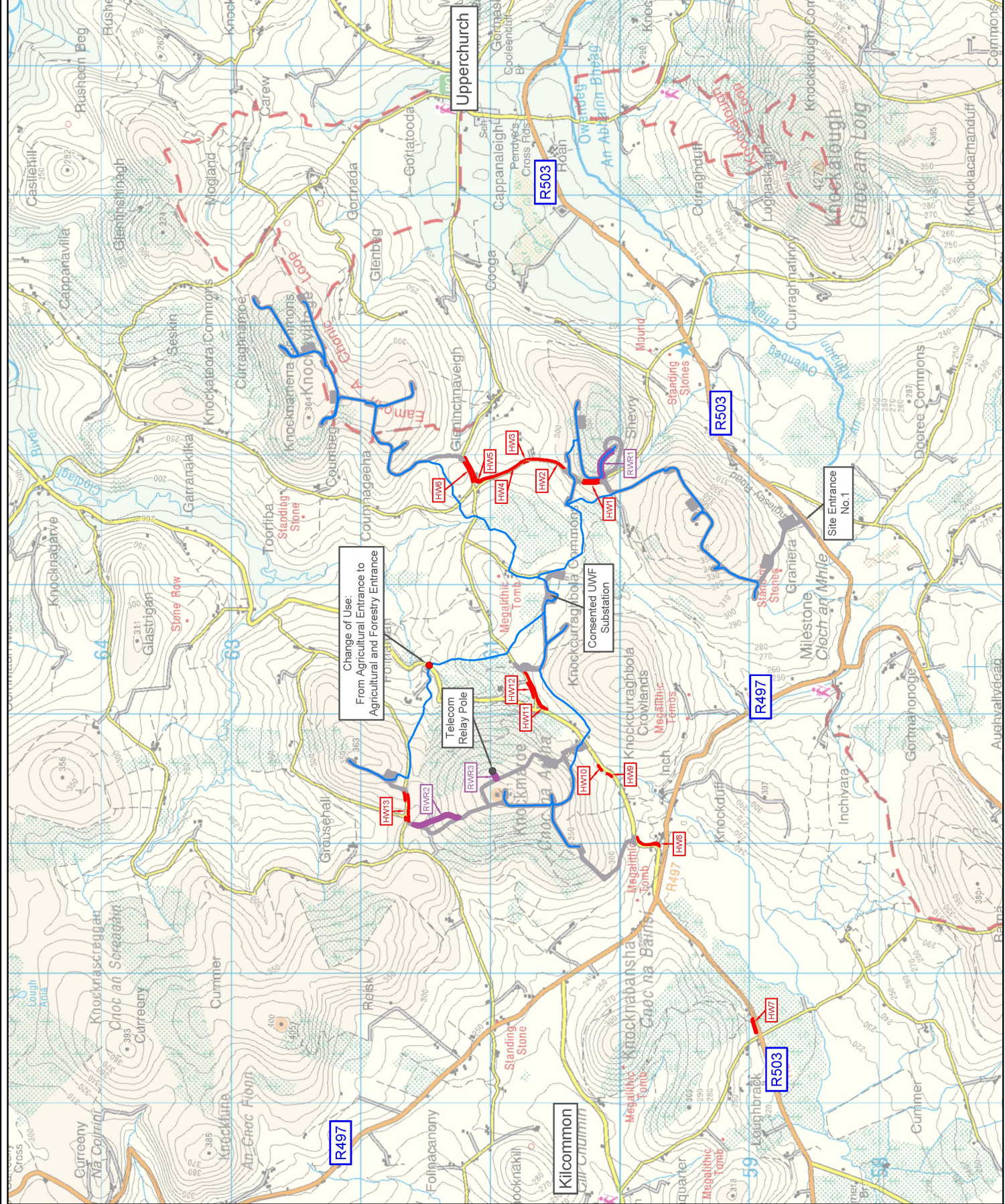


**Project:**  
UWF Related Works (RW)

**Drawn by:** AB  
**Checked by:** JB  
**Date:** January 19  
**Sheet size:** A4



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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)


 Section numbers (SW1 - SW84)

 Section numbers for Haul  
Route Works (HW1 - HW13)

 Section numbers for Realigned  
Windfarm Roads

 Townlands

 Water Crossings

 Road Crossings



Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	January 19	Sheet size:	A4
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**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

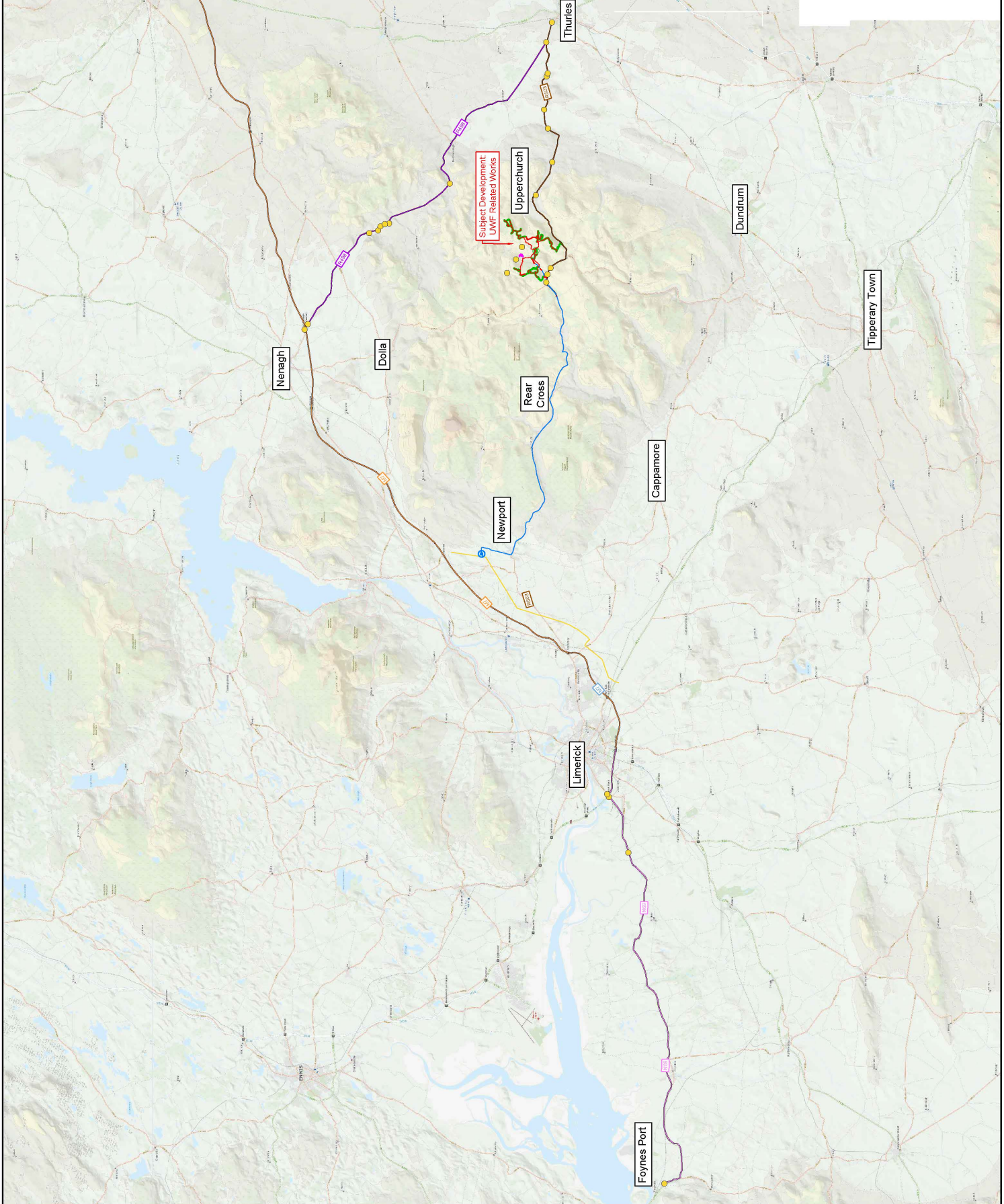
**Other Elements of the Whole UWF Project:**

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



**Project:**  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	January 19	Sheet Size:	A4
Aerie Butler Environmental Developments Ltd 4005 Road Purcellinch Business Park, Kilkenny TEL: +353 86 7759140 MOB: +353 83 8806641							




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 Cabling

 Telecom Relay Pole


**UWF Grid Connection:**


 UWF Grid Connection


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 UWF Replacement Forestry

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
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
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 -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 Related Works (RW)

Drawn by:  
AB

Checked by:  
JB

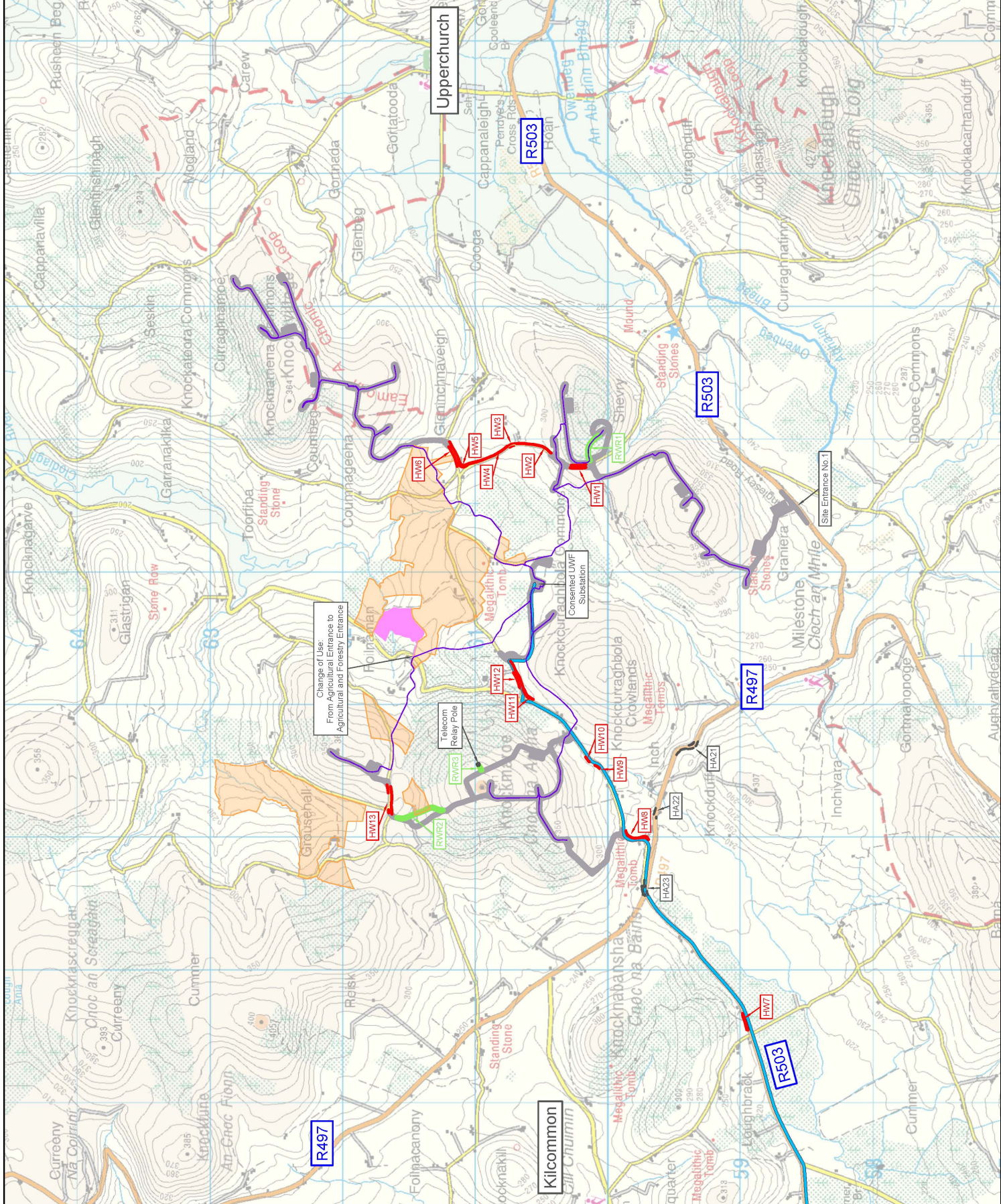
Date:  
January 19

Sheet Size:  
A4



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**Title:**  
Figure RW EMP 6

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

Map Number:

Map Overview on OSI Mapping

**Legend:**

UWF Related Works: **(Subject Development)**

— Haul Route Works  
 Haul Route Works Numbers (HW8 - HW12)  
 Realigned Windfarm Road  
 Realigned Windfarm Road Numbers (RWR2 - RWR3)

— Internal Windfarm Cabling  
 Telecom Relay Pole  
 Temporary hedge/tree removal & pruning  
 Permanent hedge/tree removal & pruning

Related Works Water Crossings  
 Bat Crossing Location  
 Related Works Road Crossings  
 Related Works Site Entrance

UWF Grid Connection:  
 UWF Grid Connection  
 UWF Replacement Forestry  
 UWF Replacement Forestry

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

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

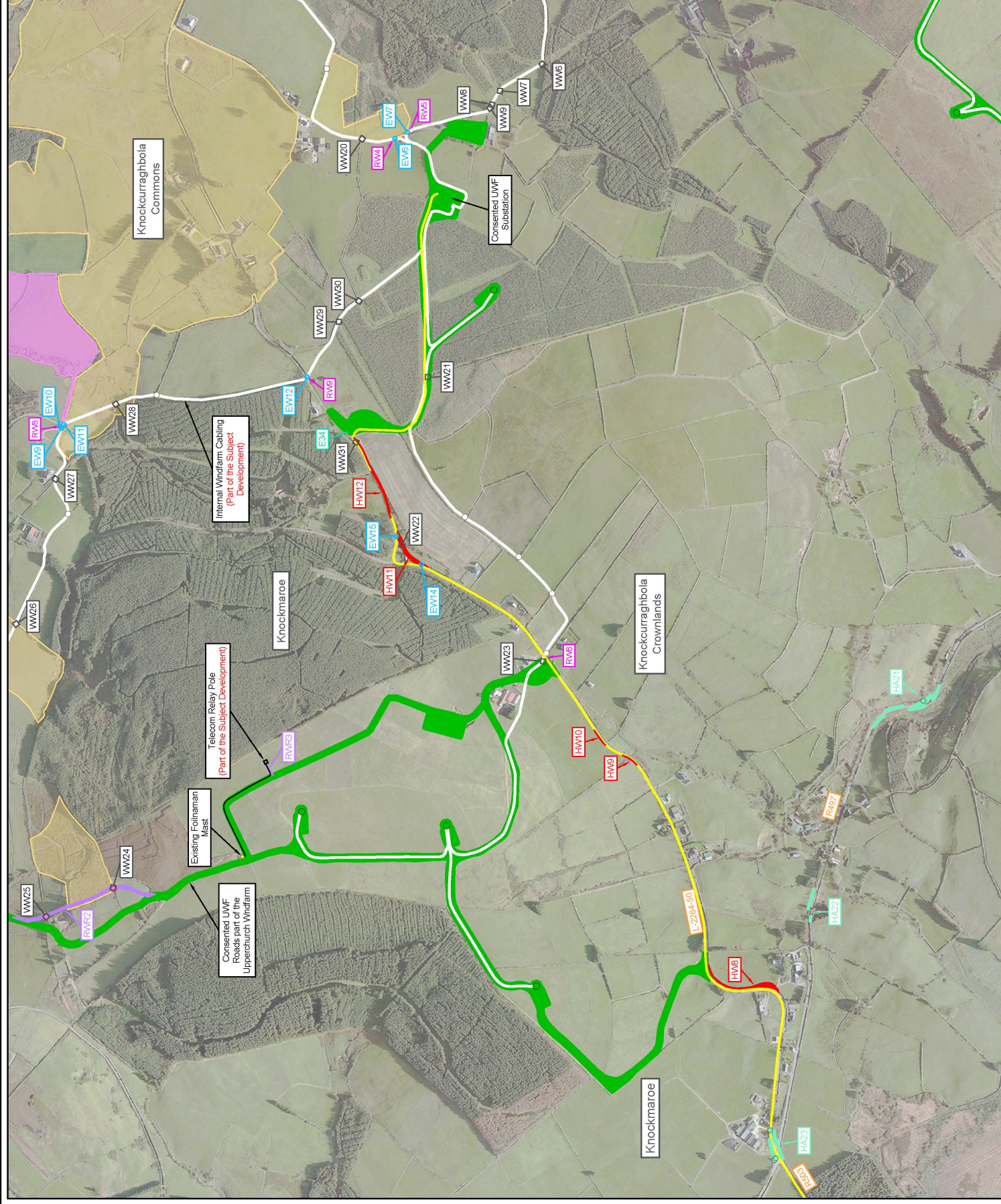
Watercourse  
 Regional Road Number



Project:  
UWF Related Works (RW)

Drawn by:	AB	Checked by:	JB	Date:	January 19	Sheet size:	A4
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**UWF RELATED WORKS**

**VOLUME D  
REVISED ENVIRONMENTAL  
MANAGEMENT PLAN**

**Tab 1  
Grant of Permission  
including Planning Conditions**

**(post planning consent)**



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# UWF RELATED WORKS

## VOLUME D REVISED ENVIRONMENTAL MANAGEMENT PLAN

### Tab 2

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



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# UWF RELATED WORKS

## Tab 3 Traffic Management Plan



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## Table of Contents

<b>1</b>	<b>Traffic Management Plan (public roads)</b> .....	<b>5</b>
<b>1.1</b>	<b>Introduction</b> .....	<b>5</b>
1.1.1	Objective of the Traffic Management Plan.....	5
1.1.2	Scope of TMP.....	5
1.1.3	Responsibilities.....	6
<b>1.2</b>	<b>Overview of UWF Related Works</b> .....	<b>7</b>
<b>1.2.1</b>	<b>Purpose of the UWF Related Works</b> .....	<b>7</b>
1.2.2	Description of the Characteristics of the UWF Related Works.....	7
<b>1.3</b>	<b>Overview of the Construction Stage of the UWF Related Works</b> .....	<b>8</b>
1.3.1	Construction Process.....	8
1.3.2	Duration & Timing.....	8
1.3.3	Construction Hours of Work.....	8
1.3.3.1	Scheduling of Works.....	8
1.3.4	Road Works Locations.....	9
1.3.5	Telecom Relay Pole.....	10
1.3.6	RW Ancillary Works.....	11
1.3.6.1	Site Entrances.....	11
1.3.6.2	Change of Use of Existing Agricultural Entrance to Agricultural and Forestry Entrance..	11
1.3.6.3	Temporary Site Entrances.....	11
1.3.6.4	Temporary Access Roads.....	12
1.3.7	Construction Material Haulage Routes.....	13
1.3.7.1	Delivery Vehicles - Axles.....	14
1.3.8	Reinstatement of Public Roads.....	14
<b>1.4</b>	<b>Traffic Management Measures</b> .....	<b>15</b>
1.4.1	Hazards Identified.....	15
1.4.2	Signage.....	15
1.4.2.1	Information Signs.....	15
1.4.2.2	Directional Signage.....	15
1.4.2.3	Warning Signage.....	16
1.4.3	On-going communication with Tipperary County Council Roads Section.....	16
1.4.4	Traffic Management Measures.....	16
<b>1.5</b>	<b>Emergency Services</b> .....	<b>19</b>
<b>1.6</b>	<b>Figures and Mapping</b> .....	<b>20</b>

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

Figure No.	Figure Title
Figure RW TMP 1:	Location of the Related Works on OSI Discovery Mapping
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 Upperchurch Windfarm 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’.

**LIST OF TABLES**

Table No.	Table Title	Page No.
Table 1	Duration and timing of the construction of the UWF Related Works	8
Table 2	Description of Haul Route Works	9
Table 3	Temporary Site Entrances for UWF Related Works	11
Table 4	Quantities, type and source of construction materials	13
Table 5	Emergency Contact Numbers	19

# 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 3<sup>rd</sup> party road works or events, which could affect the timing, route or control measures for construction material deliveries.

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

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

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

## 1.2 Overview of UWF Related Works

UWF Related Works, comprises the following elements:

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

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

### 1.2.1 Purpose of the UWF Related Works

The purpose of the Related Works are as follows:

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

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

### 1.2.2 Description of the Characteristics of the UWF Related Works

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

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

## 1.3 Overview of the Construction Stage of the UWF Related Works

### 1.3.1 Construction Process

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

### 1.3.2 Duration & Timing

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

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

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

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

### 1.3.3 Construction Hours of Work

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

#### 1.3.3.1 Scheduling of Works

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

- Construction works will be carried out during daylight hours.

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

### 1.3.4 Road Works Locations

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

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

**Table 2: Description of Haul Route Works**

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



In summary, the above Haul Route Works include widening of roadside verges for 1710m in total; temporary removal and reinstatement of 1035m of hedgerow and earthen banks which form roadside boundaries; permanent removal of 25m of roadside boundary and the construction of 290m temporary access roads on private lands.

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

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

**Relevant Volume C3 EIAR Figures:**

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

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

**Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

RW.OCM-06: Haul Route Works

### 1.3.5 Telecom Relay Pole

The Telecom Relay Pole will comprise a wooden pole, up to 18m in height, with relay equipment attached to the top of the pole. A small compound, 5m X 5m in size, will enclose the relay pole, along with a ground based outdoor cabinet 2m high, 1.2m long and 1m wide and ancillary equipment. The compound will be fenced with 2.4m high palisade fencing; a native hedgerow will be planted on the berm created from the excavations. A communications and low voltage (LV) electricity supply will be cabled 300m to the compound, from the existing supply at the Foilnaman mast. The connection will be by underground cables which will be laid under Realigned Windfarm Road RWR3 and Upperchurch Windfarm Road.

**Relevant Volume C3 EIAR Figures:**

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

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

**Relevant Appendix 5.1 UWF Related Works Outline Construction Methodology:**

RW.OCM-07: Telecom Relay Pole

**1.3.6 RW Ancillary Works**

**1.3.6.1 Site Entrances**

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

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

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

**Relevant Volume C3 EIAR Figures:**

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

**1.3.6.3 Temporary Site Entrances**

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

**Table 3: Temporary Site Entrances for UWF Related Works**

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

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

In summary, 4 No. of the temporary site entrances will be through existing farm or forestry entrances. The remaining 10 No. will 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 <sup>3</sup> / 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 <sup>3</sup> / 285 No. loads	Shanballyedmond, Rear Cross
Hard core for temporary public road surface	50m <sup>3</sup> / 7 No. loads	Clare
Surface dressing asphalt (public road sections)	12m <sup>3</sup> / 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 85<sup>th</sup> 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
<b>Environmental Commitment</b>				
Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.				
<b>Responsibilities</b>				
Project Manager	<ul style="list-style-type: none"> <li>• Consult with Tipperary County Council</li> <li>• Consult with Gardaí</li> <li>• Contractor arrangements regarding speed limits, alert beacons, haulage routes etc.</li> <li>• Oversee the implementation of the Traffic Management Plan</li> </ul>			
Construction Manager	<ul style="list-style-type: none"> <li>• Install information, direction and warning signage in advance of road works, site entrances and along haul routes</li> <li>• Implement the Traffic Management Plan</li> </ul>			
Environmental Clerk of Works	<ul style="list-style-type: none"> <li>• Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures</li> </ul>			
Community Liaison Officer	<ul style="list-style-type: none"> <li>• Act as point of contact with local community,</li> <li>• Keep the local community informed of construction and road works in their area</li> </ul>			
<b>Traffic Management Measure</b>				
Communication and Information				
<ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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 85<sup>th</sup> percentile traffic speeds, or the posted limit, whichever is the higher.</li> </ul>				
Measures for Delivery Personnel				
<ul style="list-style-type: none"> <li>• These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.</li> <li>• 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.</li> <li>• 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.</li> </ul>				



<ul style="list-style-type: none"> <li>• 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.</li> <li>• All material deliveries will have a maximum axle load of 12 tonnes per axle.</li> </ul>
<p><b>Measures for Site Personnel</b></p>
<ul style="list-style-type: none"> <li>• 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.</li> <li>• There will be onsite parking for all construction personnel at the Site Compound No.1.</li> <li>• There will be no parking of any vehicles on the public road.</li> </ul>
<p><b>Protection of the Public Road Network from Surface water run-off</b></p>
<ul style="list-style-type: none"> <li>• 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.</li> </ul>
<p><b>Measures for Local Residents</b></p>
<ul style="list-style-type: none"> <li>• All construction works will be carried out during daylight hours (<b>Project Design Measure</b>).</li> <li>• 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 (<b>Project Design Measure</b>).</li> <li>• 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.</li> <li>• 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 (<b>Project Design Measure</b>).</li> </ul>
<p><b>Measures to minimize debris on road</b></p>
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• The road sweeper will keep the roads at sites entrances clean and clear of mud and debris</li> </ul>
<p><b>Road Repair and Reinstatement</b></p>
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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,</li> <li>• 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.</li> <li>• 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.</li> <li>• Any road repairs if required following the end of the construction stage will be by arrangement with Tipperary County Council.</li> </ul>
<p><b>References</b></p>

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

## 1.5 Emergency Services

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

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

**Table 5: Emergency Contact Numbers**

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

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

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

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

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

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

**1.6 Figures and Mapping**

Title:  
Figure RW TMP 1

Location of UWF Related Works  
on OSI Discovery Mapping

Map Number:  
Map 1 of 1

Legend:

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

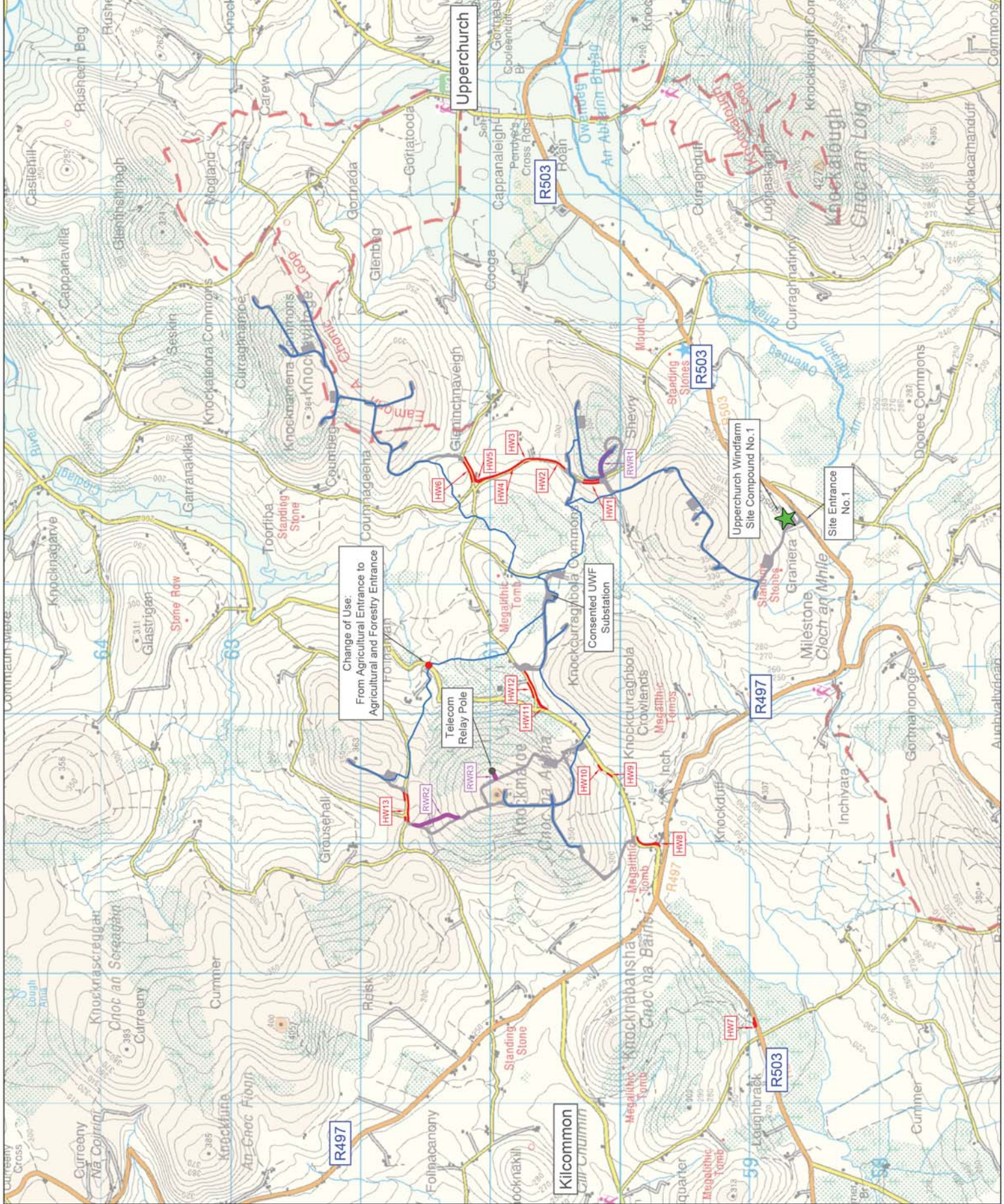


Project:  
UWF Related Works (RW)

Drawn by	AB	Checked by	JB	Date	29-Mar-16	Sheet Size	A3
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**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

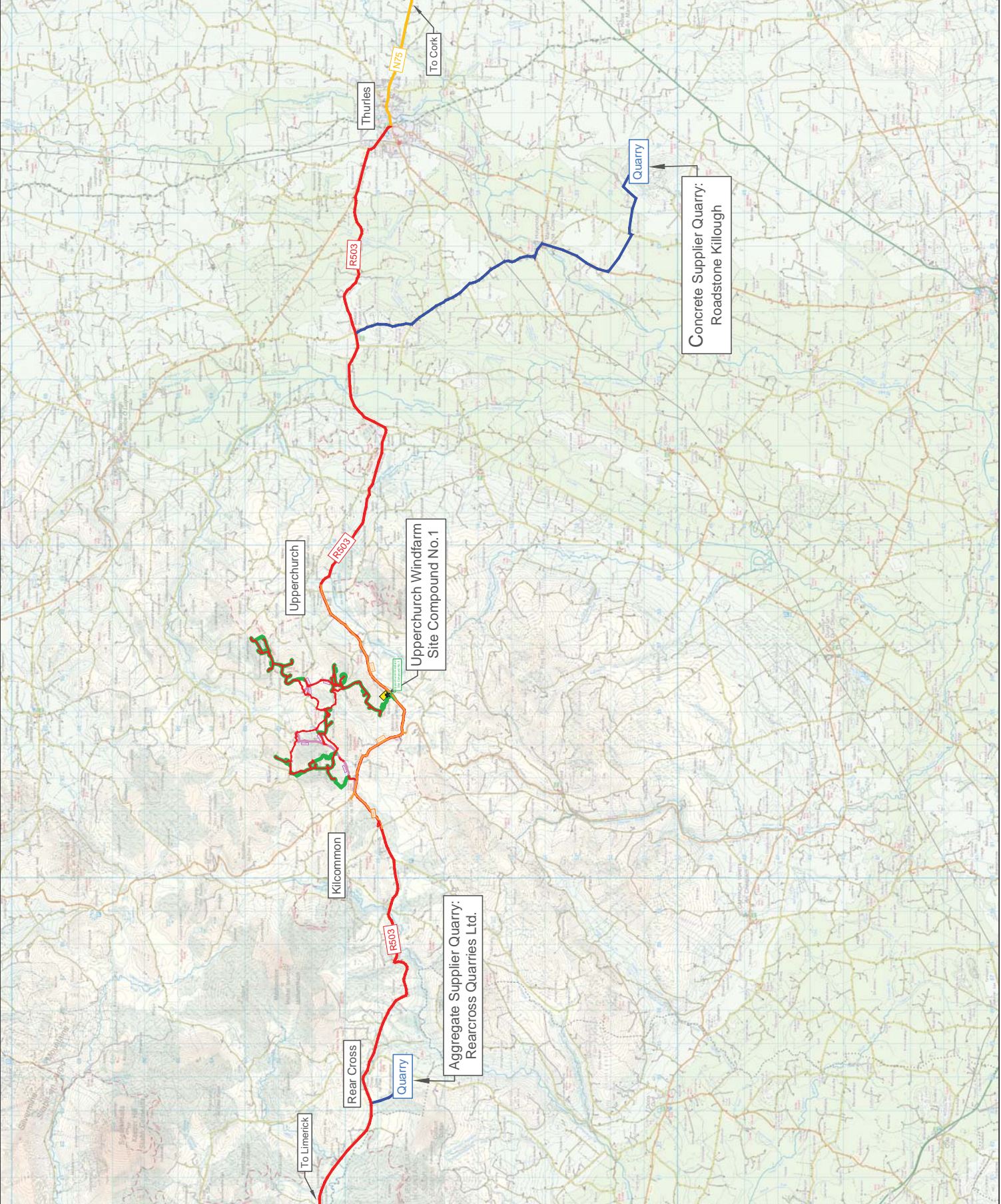


Project:  
UWF Related Works (RW)

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Title:  
Figure RW TMP 3

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

Map Number:  
Map 1 of 1

Legend:

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

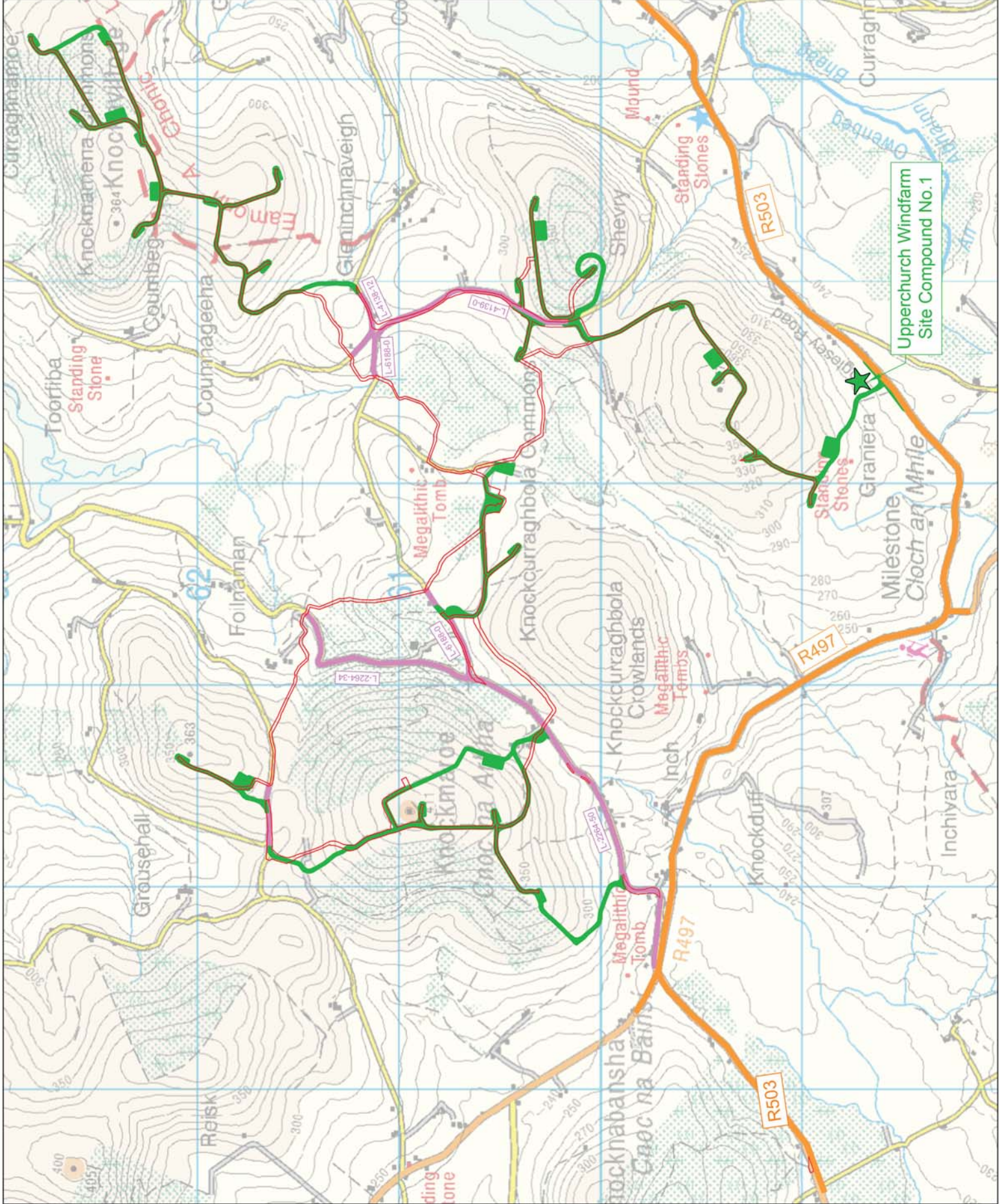
Project:  
UWF Related Works (RW)

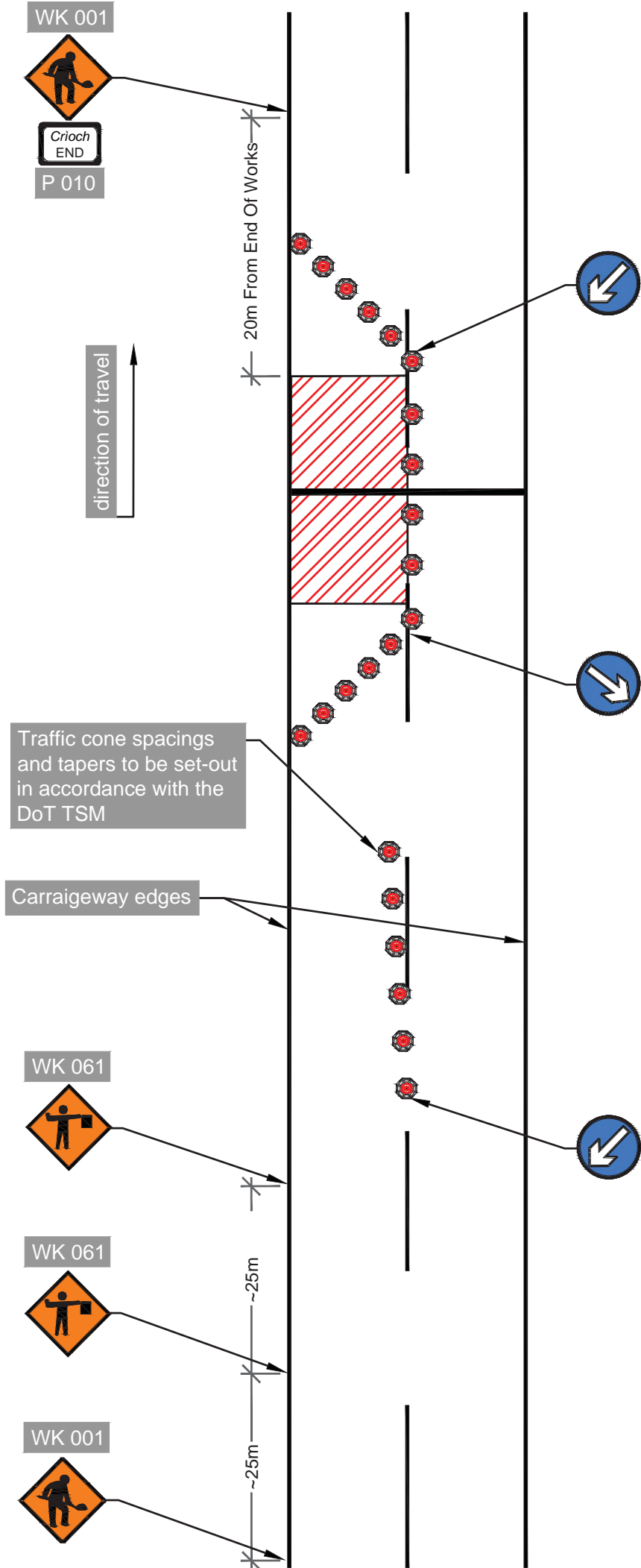
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**ECOPOWER**





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)

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**UWF RELATED WORKS**

**VOLUME D  
REVISED ENVIRONMENTAL  
MANAGEMENT PLAN**

**Tab 4  
Surface Water Management Plan**



**ECOPOWER**

January 2019





## 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

<b>DOCUMENT TITLE:</b>	<b>UWF RELATED WORKS –CONSTRUCTION PHASE SURFACE WATER MANAGEMENT PLAN</b>
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<b>PROJECT NUMBER:</b>	<b>P1299-2</b>
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<b>CURRENT REVISION NO:</b>	<b>P1299-2 - REV 0 – FINAL REPORT</b>
<b>AUTHOR(S):</b>	<b>MICHAEL GILL DAVID BRODERICK</b>
<b>SIGNED:</b>	  <hr/> <b>Michael Gill B.A., B.A.I., M.Sc., Dip. Geol., MIEI Managing Director – Hydro-Environmental Services</b>
<p><b>Disclaimer:</b>  <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>	

**TABLE OF CONTENTS**

**1. INTRODUCTION ..... 4**

1.1 BACKGROUND..... 4

1.2 DEVELOPMENT DESCRIPTION ..... 5

1.3 SITE DESCRIPTION AND TOPOGRAPHY ..... 6

1.4 OUTLINE OF THE SURFACE WATER MANAGEMENT PLAN ..... 6

1.5 SWMP REPORT STATUS ..... 6

1.6 RELAVANT LEGISLATION & GUIDANCE ..... 6

**2. EXISTING HYDROLOGICAL REGIME..... 9**

2.1 INTRODUCTION ..... 9

2.1.1 Existing Geological Regime..... 9

2.1.2 Existing Hydrogeological Regime..... 9

2.1.3 Existing Hydrological Regime ..... 9

2.1.4 Local Drainage Features ..... 10

2.1.5 Flood Risk Assessment ..... 10

2.1.6 Designated Sites ..... 13

**3. SURFACE WATER MANAGEMENT & POLLUTION PREVENTION ..... 14**

3.1 PROJECT DESIGN MEASURES..... 14

3.1.1 Introduction ..... 14

3.1.2 Project Design Measures..... 14

3.1.3 Phasing of Works..... 15

3.2 BEST PRACTICE MEASURES ..... 16

3.3 INTERACTION WITH CONSENTED WINDFARM DRAINAGE ..... 17

3.4 EMERGENCY RESPONSE MEASURES ..... 17

**4. WATER RELATED MONITORING PLAN..... 18**

4.1 DRAINAGE INSPECTION & MAINTENANCE..... 18

4.2 SURFACE WATER QUALITY MONITORING ..... 18

4.2.1 Field Monitoring ..... 18

4.2.2 Sampling Locations..... 19

4.2.3 Laboratory Analysis ..... 19

4.2.4 Monitoring Frequency ..... 20

4.2.5 Surface Water Monitoring Reporting..... 20

**5. FIGURES..... 21**

**FIGURES**

FIGURE SWMP 1 LOCAL HYDROLOGY MAP

FIGURE SWMP 2 WATERCOURSE CROSSING LOCATIONS – MAP 1

FIGURE SWMP 3 SURFACE WATER QUALITY MONITORING LOCATIONS – MAP 1

**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

TABLE C WATER RELATED PROJECT DESIGN MEASURES

TABLE D WATER RELATED BEST PRACTICE MEASURES

TABLE E PARAMETER SUITE FOR SURFACE WATER QUALITY MONITORING

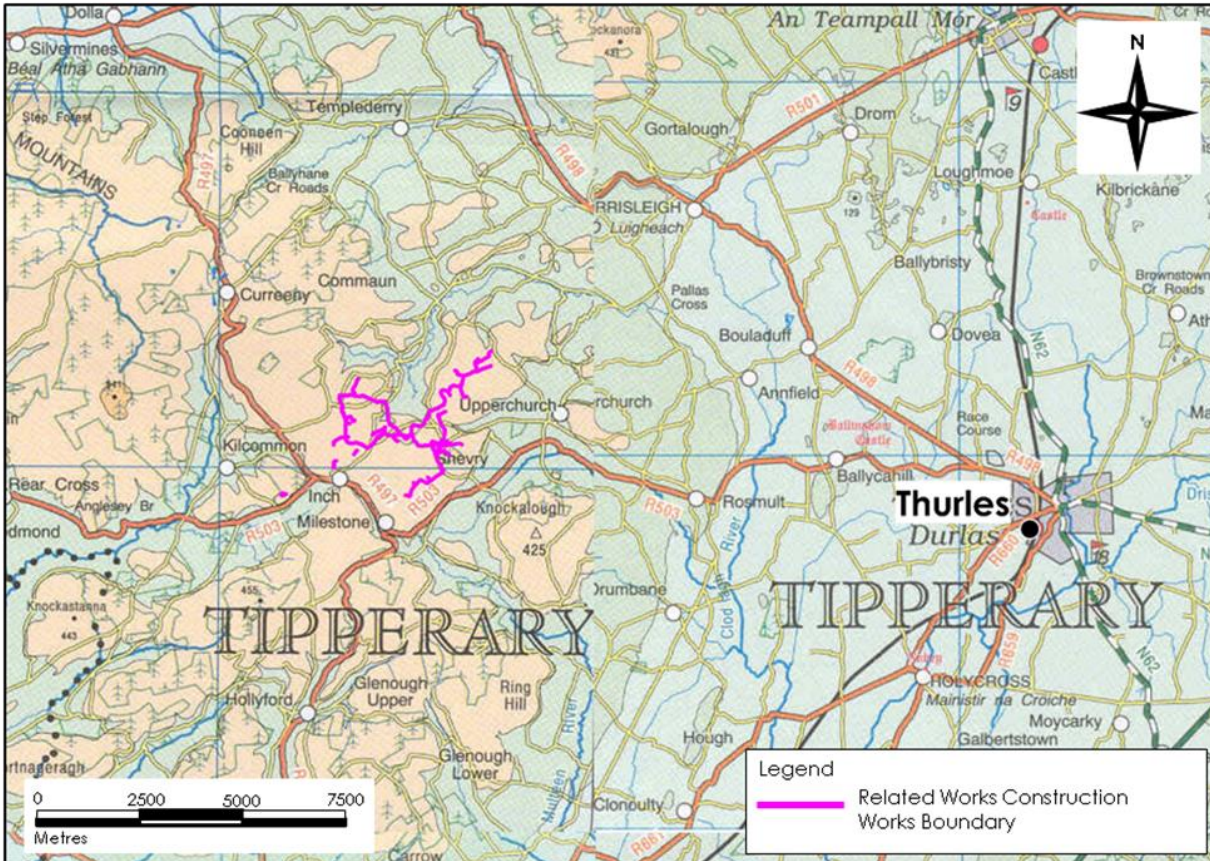
**APPENDICES**

APPENDIX I WATER RELATED BEST PRACTICE MEASURES

# 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 (EIA) 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 EIA.

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

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

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

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

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

## 1.2 DEVELOPMENT DESCRIPTION

The UWF Related Works comprises the following main proposed elements:

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

The Internal Windfarm Cabling will connect the Consented UWF Turbines to the Consented UWF Substation, through the installation of underground cables in agricultural; forestry lands; and across public roads; in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, 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 Foilnaman Mast. The Relay Pole will be contained within a small compound, and a low voltage power and communications supply will be provided from the existing Foilnaman Mast. A short length of access road, Realigned Windfarm Road will provide access to the Telecom Relay Pole from the Consented UWF Road network.

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

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

### 1.3 SITE DESCRIPTION AND TOPOGRAPHY

The UWF Related Works are located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knocknabansha, Knockmaroe, Grousehall, Cummer, Foilnaman, 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 RELEVANT LEGISLATION & GUIDANCE

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

#### 1.6.1.1 Relevant legislation

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

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

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

### 1.6.1.2 Drainage and Water Quality Management Guidance Documentation

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

- Watercourse crossing works guidance
  - Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters;
  - NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes; and,
  - Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board.
- Pollution Prevention Guidance Notes (PPGs):
  - PPG01 General guide to the prevention of water pollution;
  - PPG02 Above ground oil storage tanks;
  - PPG05 Works in near or liable to affect watercourses;
  - PPG06 Working at construction and demolition sites;
  - PPG07 Refuelling Facilities;
  - PPG11 Preventing pollution at industrial sites;
  - PPG18 Control of spillages and fire fighting run-off;
  - PPG20 Dewatering underground ducts and chambers;
  - PPG21 Pollution Incident Response Planning;
  - PPG23 Maintenance of Structures over Water; and,
  - PPG26 Pollution Prevention Storage and Handling of Drums & Intermediate Bulk Containers.
- Construction Industry Research and Information Association (CIRIA):
  - CIRIA Report C502 Environmental Good Practice on Site;
  - CIRIA Report C532 Control of Water Pollution from Construction Sites;
  - CIRIA Report C648 Control of Pollution from Linear Construction Project; Technical Guidance;
  - CIRIA Handbook C650 Environmental good practice on site;
  - CIRIA Handbook C651 Environmental good practice on site checklist;
  - CIRIA Report C609 - SuDS – hydraulic, structural & water quality advice; and,
  - CIRIA Report C697 – The SuDS Manual.
- Forestry related guidance *(these guidelines below provide drainage management recommendations for roads (very similar to those proposed for the related works construction))*



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

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

## 2. EXISTING HYDROLOGICAL REGIME

### 2.1 INTRODUCTION

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

#### 2.1.1 Existing Geological Regime

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

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

#### 2.1.2 Existing Hydrogeological Regime

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

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

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

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

#### 2.1.3 Existing Hydrological Regime

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

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

Four of the 13 no. Haul Route Works areas are located in the River Shannon catchment while the remainder (9 no. locations) are located within the River Suir catchment. The Telecom Relay Pole and the Realignment Windfarm Roads are in the River Suir catchment.

Within the River Shannon catchment, the UWF Related Works exist within the regional Mulkear River catchment. The local surface water body within the Mulkear River catchment that the UWF Related Works is in is the Bilboa River (refer to **Table A** below). A Local hydrology map is attached below as **Figure SWMP 1**.

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

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

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

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

### 2.1.4 Local Drainage Features

A detailed survey of all proposed watercourse crossings along the UWF Related Works was completed as part of the EIA 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
	<b>Total</b>	<b>32</b>

### 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).

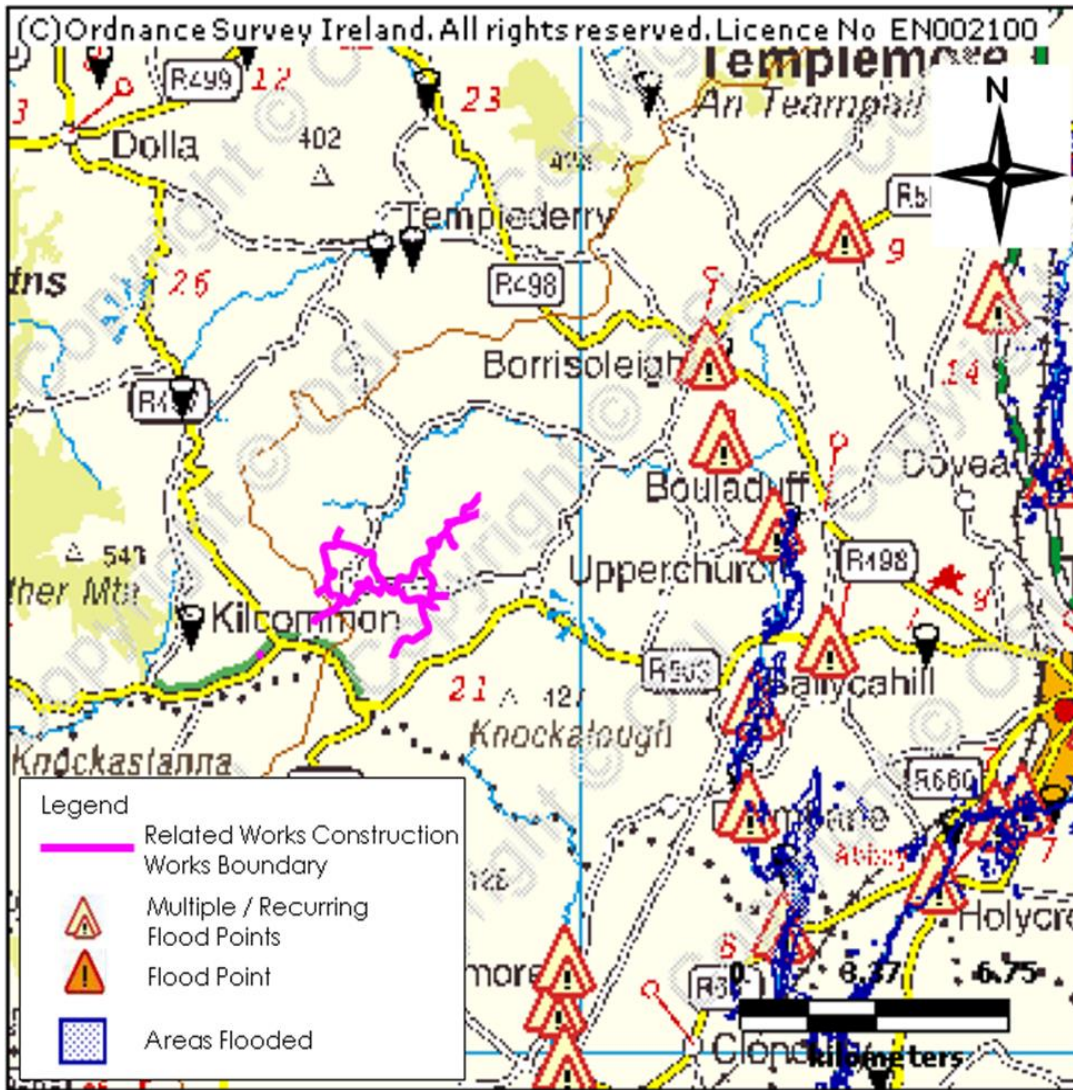


Figure B below). The closest mapped recurring flooding event is more than 15km downstream in the Clodiagh River.

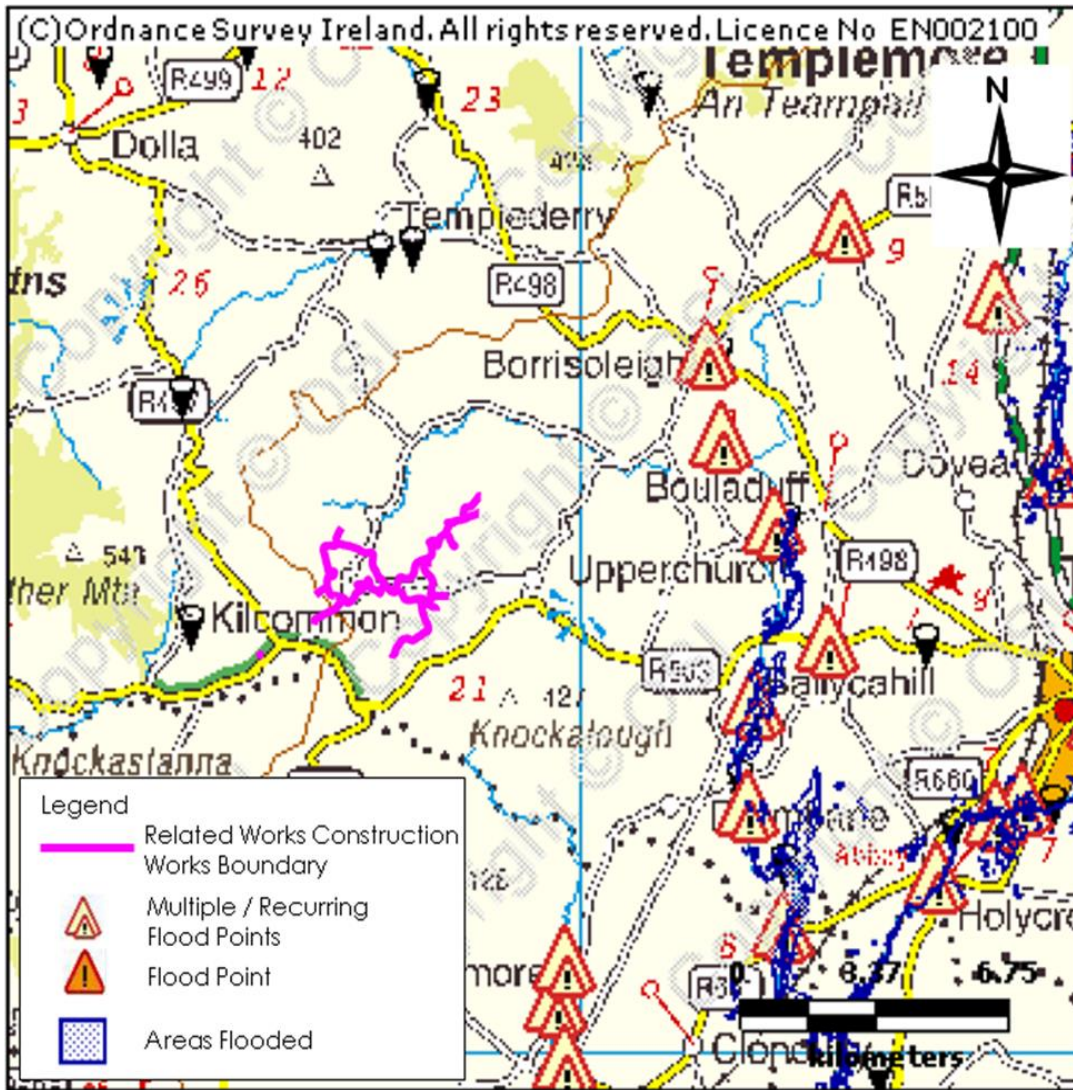


Figure B: OPW Flood Hazard Mapping ([www.floods.ie](http://www.floods.ie))

Where complete the Catchment Flood Risk Assessment and Management (CFRAM)<sup>1</sup> 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/](http://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.

<sup>1</sup> 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 Mitigation Measures

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

**Table C:** Water Related Project Design Mitigation Measures

PD No. / Impact Source	Project Design Measures
Sediment / Suspended Solids	
PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD22	In-stream works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD23	In-stream works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping, flume (pipe) or channel diversion methods.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
Oils and Fuels	
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the

	temporary compound. All fuel will be stored in bunded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from watercourses and where there is an existing hard-core surface in place.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells.
Cement Based Compounds	
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
Flood Risk	
PD09	New permanent access roads will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD25	All new permanent culverts on Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of in-stream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.

### 3.1.3 Phasing of Works

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

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

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

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

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



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

### 3.2 BEST PRACTICE MEASURES

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

**Table D:** Water Related Project Design Mitigation Measures

BPM No.	Best Practice Measure Title
RW-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
RW-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
RW-BPM-03*	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Use
RW-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
RW-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
RW-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
RW-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
RW-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
RW-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
RW-BPM- 10	Surface Water Quality Protection Measures During Temporary Storage of Overburden
RW-BPM- 11	Surface Water Quality Protection Measures during Permanent Storage of Overburden

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

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

### 3.3 INTERACTION WITH CONSENTED WINDFARM DRAINAGE

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

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.

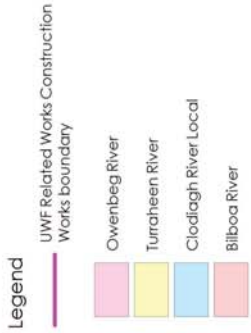
#### 4.2.5 Surface Water Monitoring Reporting

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



**HYDRO ENVIRONMENTAL SERVICES**

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fax: +353 (0)58 44244  
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web: [www.hydroenvironmental.ie](http://www.hydroenvironmental.ie)

Client: Ecopower Development Ltd.

Job: UWF Related Works

Title: Local Hydrology Map

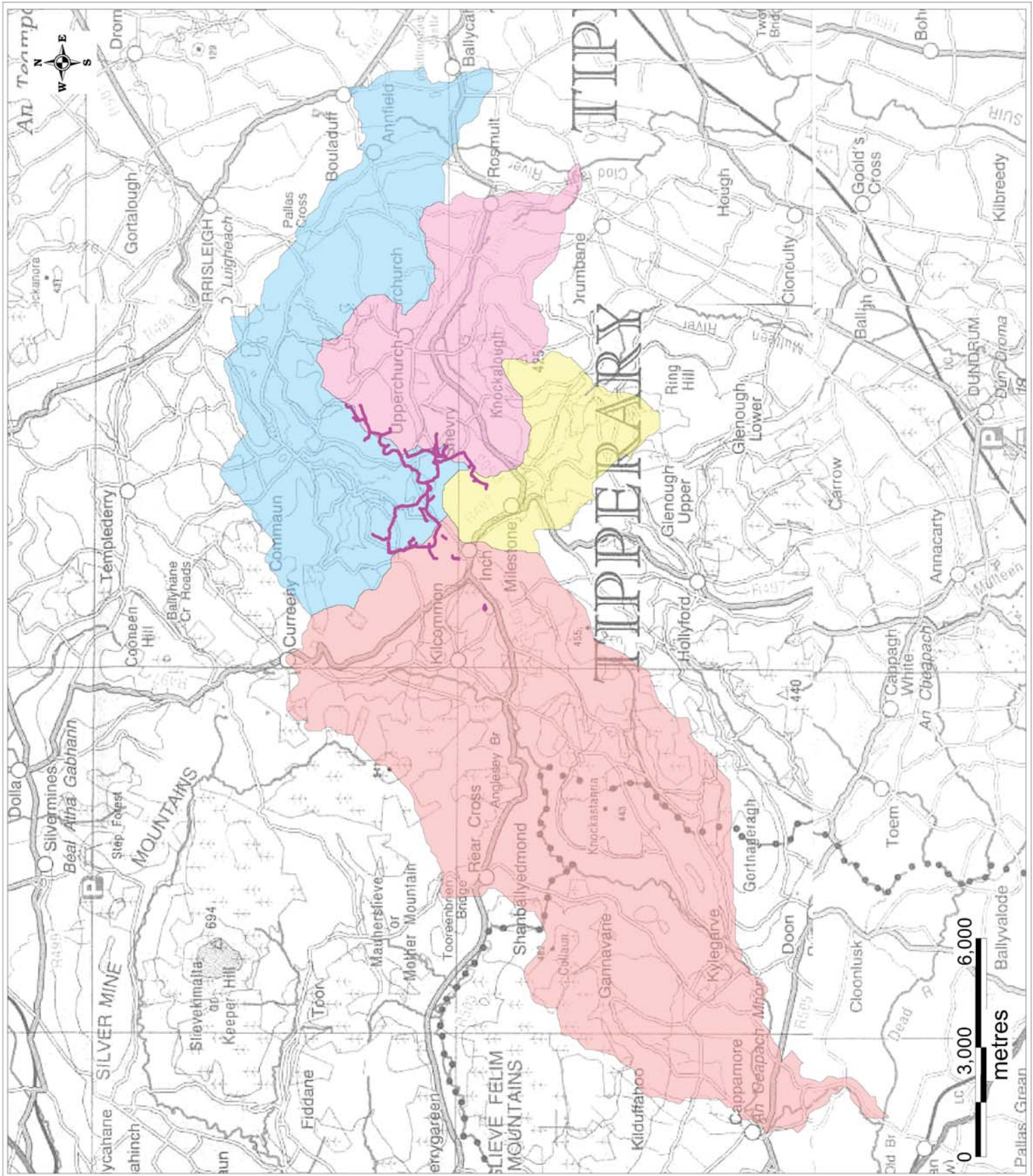
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Drawing No: P1299-2-0318-F-SWMP-1-A3-0A

Sheet Size: A3  
Project No: P1299-2

Scale: 1:100,000  
Drawn By: GD

Date: 27/03/2018  
Checked By: MG



- Legend**
- UWF Related Works Construction Works Boundary
  - Permanent Access Roads
  - Temporary Access Roads
  - Watercourse
  - Watercourse\_Crossing\_Class\_Type
  - Class 1\_EPA BlueLine
  - Class 2\_EPA BlueLine Equivalent
  - Class 3\_Sub Optimal
  - Class 4\_Drainage Ditch

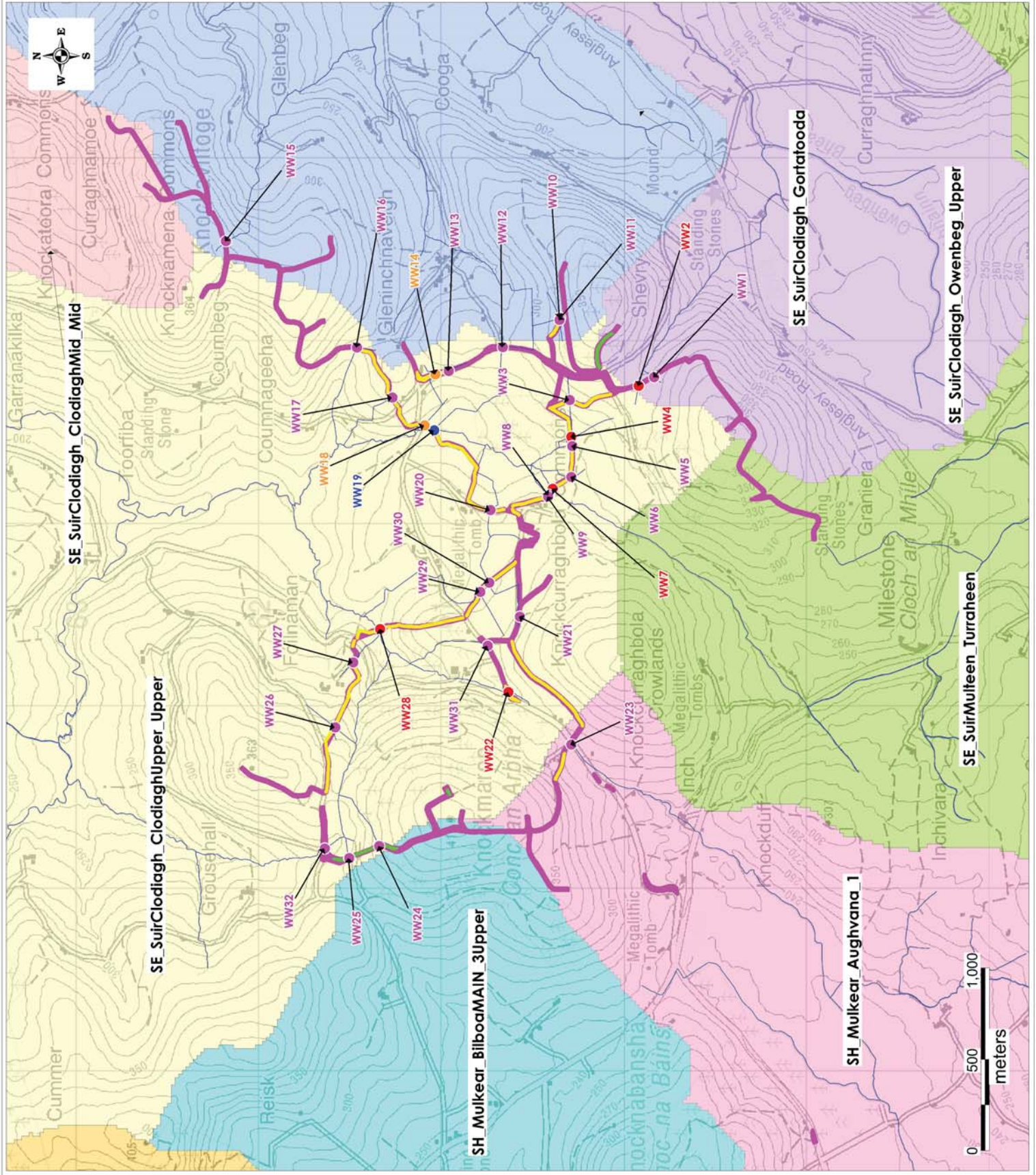
\*Note: WW - Related Works Watercourse Crossing

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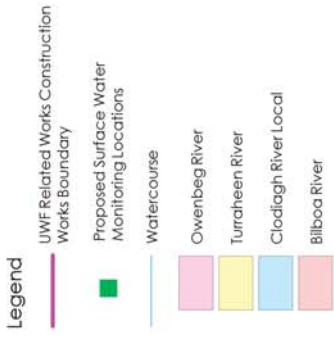
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Client: Ecopower Developments Ltd.	
Job: UWF Related Works	
Title: Watercourse Crossing Location Map	
Figure No: Figure SWMP 2	
Drawing No: P1299-4-0119-FRW-11-2-2-A3-0A	
Sheet Size: A3	Project No: P1299-4
Scale: 1:20,000	Drawn By: GD
Date: 29/01/2019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





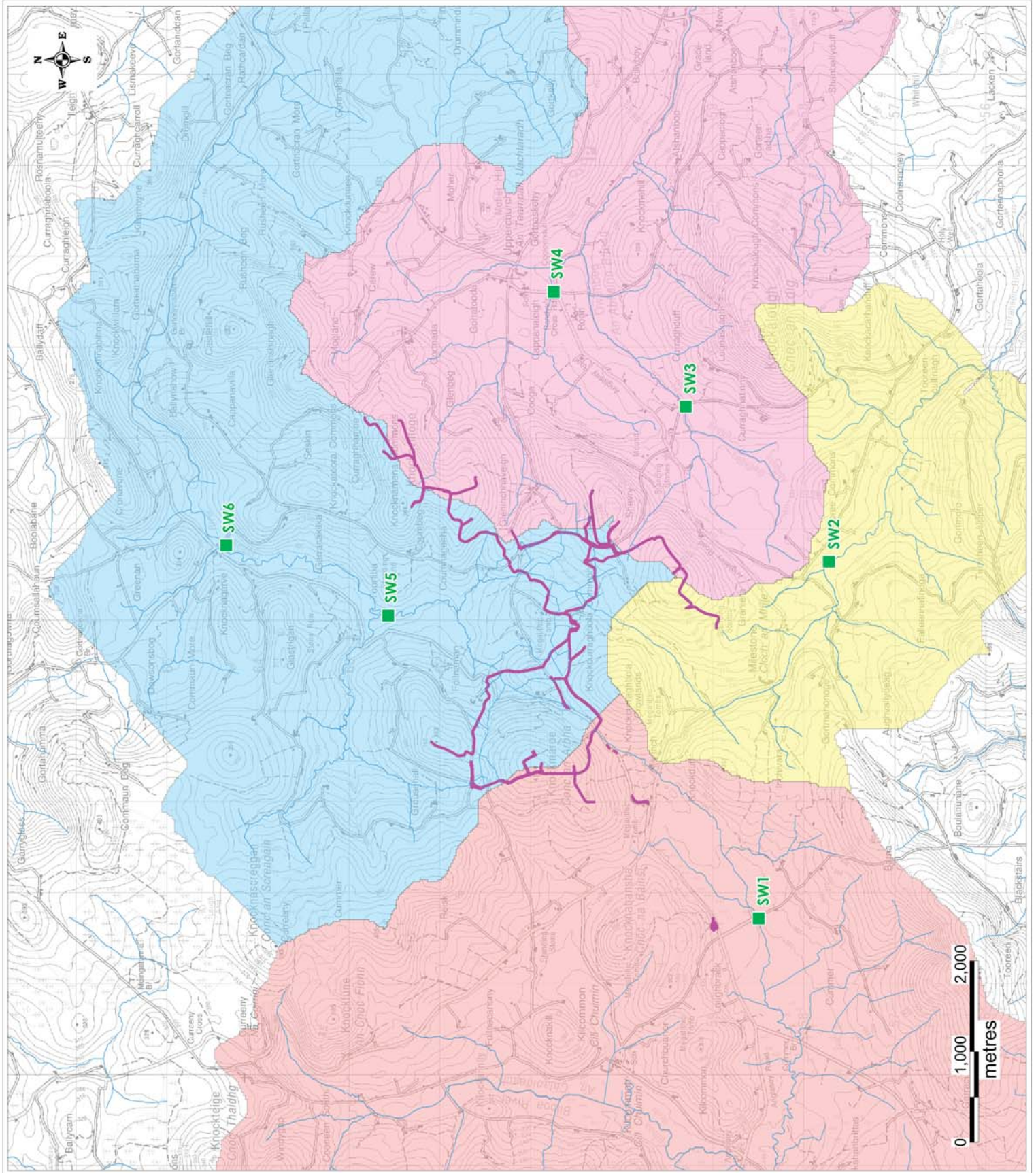


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Client: Ecopower Development Ltd.
Job: UWF Related Works
Title: Surface Water Quality Monitoring Locations Map
Figure No: Figure SWMP 3
Drawing No: P1299-2-0318-F-SWMP-3-A3-0A
Sheet Size: A3
Project No: P1299-2
Scaler: 1:45,000
Drawn By: GD
Date: 27/03/2018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



# APPENDIX I

## WATER RELATED BEST PRACTICE MEASURES

<b>BPM No.</b>	<b>BPM Title</b>
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'.

<b>RW-BMP-01</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.</b>	
<b>Environmental Commitment</b>		
<ul style="list-style-type: none"> <li>• Prevention of significant surface water quality impacts at watercourse crossings due to in-stream works.</li> <li>• Prevention of significant morphological impacts at watercourse crossings due to open trench works.</li> </ul>		
<b>Relevant Watercourse Crossing Points</b>		
<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> <b>WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.</b></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> <b>WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</b></p>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works as required.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• Watercourse bed excavation works will only commence once the stream flow is isolated from the proposed trench excavation area;</li> <li>• 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</li> </ul>		

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.

<b>RW-BMP-02</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.</b>	
<b>Environmental Commitment</b>		
<ul style="list-style-type: none"> <li>• Prevention of significant surface water quality impacts during watercourse crossing works in-stream works.</li> <li>• Prevention of significant morphological impacts at watercourse crossings due to in-stream works.</li> </ul>		
<b>Relevant Watercourse Crossing Points</b>		
<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> <b>WW5, WW7, WW8, WW16 and WW27</b></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> <b>WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</b></p>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);</li> <li>• Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat</li> </ul>		

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.

<b>RW- BMP-03</b>	<b>Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used.</b>	
<b>Environmental Commitment</b>		
<p>Prevention of significant surface water quality impacts at stream crossings due to in-stream works.</p> <p>(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)</p>		
<b>Work Sections/Locations</b>		
No planned location, BPM included on a precautionary basis		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Firstly, the works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• Watercourse bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;</li> <li>• 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</li> </ul>		



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.

<b>RW-BMP-04</b>	<b>Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert.</b>	
<b>Environmental Commitment</b>		
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.		
<b>Work Sections/Locations</b>		
Existing culverts will be replaced at the following locations: <u>Relevant Watercourse Crossing Points: <b>WW12, WW21 and WW31</b></u>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• 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);</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;</li> <li>• 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;</li> <li>• 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;</li> <li>• All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;</li> <li>• There will be no batching or storage of cement allowed at the watercourse crossing;</li> <li>• There will be no refuelling allowed within 100m of the watercourse crossing; and,</li> <li>• All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.</li> </ul>		
<b>References</b>		

- 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.

<b>RW- BMP-05</b>	<b>Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.</b>	
<b>Environmental Commitment</b>		
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).		
<b>Work Sections/Locations</b>		
<ul style="list-style-type: none"> <li>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</li> <li>Trench excavations and access road construction will be within 50m of a watercourse at UWF Related Works sections <b>HW11 and HW12</b>.</li> </ul>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Supervise excavation works and drainage works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;</li> <li>Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;</li> <li>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;</li> <li>Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;</li> <li>Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;</li> <li>In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;</li> <li>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;</li> <li>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;</li> <li>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);</li> <li>The check dams / silt fencing arrangements will be placed every 10m;</li> <li>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;</li> <li>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;</li> <li>Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of</li> </ul>		

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.

<b>RW-BMP-06</b>	<b>Surface Water Quality Protection Measures During Tree Felling Works.</b>	
<b>Environmental Commitment</b>		
Prevention of significant surface water quality impacts from sediment/nutrient input during coniferous tree felling.		
<b>Work Sections/Locations</b>		
<ul style="list-style-type: none"> <li>Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24</li> </ul>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Supervise tree felling works and drainage works.</li> </ul>	
<b>Pre-felling surveys</b>		
<ul style="list-style-type: none"> <li>Inspection of main drainage ditches and outfalls will be completed during wet periods, and well in advance of the proposed felling works;</li> <li>Another full inspection of the proposed felling area will be completed by the Construction Manager one day in advance of the proposed felling works;</li> <li>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;</li> <li>Inspection of all areas reported as having unusual ground conditions; and,</li> <li>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).</li> </ul>		
<b>Protection of watercourses during felling works</b>		
<ul style="list-style-type: none"> <li>Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;</li> <li>Checking and maintenance of roads and culverts will be undertaken by the Construction Manager throughout the felling operation;</li> <li>No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and watercourse crossing points;</li> <li>Drains which flow from the areas to be felled will have temporary silt traps installed;</li> <li>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;</li> <li>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;</li> <li>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;</li> <li>Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;</li> <li>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;</li> <li>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;</li> <li>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.</li> </ul>		

**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.

<b>RW-BMP-07</b>	<b>Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.</b>	
<b>Environmental Commitment</b>		
Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.		
<b>Work Sections/Locations</b>		
<ul style="list-style-type: none"> <li>• Internal Windfarm Cabling – public road crossing locations and</li> <li>• Telecom Relay Pole - foundations</li> </ul>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Ensure best practice e storage and use of Cement Based Compounds.</li> </ul>	
<b>Related Works</b>		
<ul style="list-style-type: none"> <li>• No wet-cement products will be used in the 110kV grid connection trench (Project Design Measure);</li> <li>• 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;</li> <li>• No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;</li> <li>• 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;</li> <li>• 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,</li> <li>• 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.</li> </ul>		
<b>Measures at the Mono-Pole Mast</b>		
<ul style="list-style-type: none"> <li>• No batching of wet-cement products will occur on site (Project Design Measure).</li> <li>• Ready-mixed supply of wet concrete products and pre-cast products will be used for watercrossing structures;</li> <li>• No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;</li> <li>• 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;</li> <li>• 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;</li> <li>• Weather forecasting will be used to plan dry days for pouring concrete;</li> <li>• The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.</li> </ul>		
<b>Monitoring Measure</b>		
<ul style="list-style-type: none"> <li>• 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.</li> </ul>		



**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.

<b>RW-BMP-08</b>	<b>Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals.</b>
<b>Environmental Commitment</b>	
Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.	
<b>Work Sections/Locations</b>	
<ul style="list-style-type: none"> <li>Construction works area boundary</li> </ul>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Ensure best practice use and storage of fuels, oils and chemicals on-site.</li> </ul>
<b>Manage of on-site refueling</b>	
<ul style="list-style-type: none"> <li>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;</li> <li>The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;</li> <li>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;</li> <li>Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;</li> <li>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,</li> <li>There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.</li> </ul>	
<b>Storing fuel properly</b>	
<ul style="list-style-type: none"> <li>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).</li> </ul>	
<b>Monitoring Measure</b>	
<ul style="list-style-type: none"> <li>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.</li> </ul>	
<b>Avoid leakage from plant and tools</b>	
<ul style="list-style-type: none"> <li>The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.</li> </ul>	
<b>Contingency for spillages</b>	
<ul style="list-style-type: none"> <li>An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan (Section 6).</li> <li>Spill kits will be available to deal with any accidental spillage in and outside the refuelling area; and,</li> <li>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.</li> </ul>	

**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

<b>RW-BMP-09</b>	<b>Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk</b>	
<b>Environmental Commitment</b>		
Prevention of flooding at watercourse crossings due to undersized culverts / bridges.		
<b>Work Sections/Locations</b>		
Relevant Watercourse Crossing Points: <b>WW1, WW13, WW15, WW24 and WW25</b> (Class 4 water crossings), also <b>WW14</b> (Class 3 water crossings), also <b>WW2, WW4 and WW22</b> (Class 2 water crossings).		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Ensure appropriate culvert/bridge design.</li> <li>• Supervise the construction works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);</li> <li>• A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;</li> <li>• 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);</li> <li>• 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),</li> <li>• As agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission.</li> </ul>		
<b>References</b>		
<ul style="list-style-type: none"> <li>• The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).</li> <li>• OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.</li> <li>• NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</li> </ul>		

<b>RW- BMP-10</b>	<b>Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts during Temporary Storage of Overburden.	
<b>Work Sections/Locations</b>	
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>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>• 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 (<b>Project Design Measure</b>);</li> <li>• Sloping ground and areas with wet ground conditions / ponding will be avoided;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• During periods of heavy rainfall a sheet of polyethene or a geotextile will be used to cover the overburden to prevent erosion; and,</li> <li>• 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</li> <li>• NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,</li> <li>• CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.</li> </ul>	

<b>RW-BMP-11</b>	<b>Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas.</b>	
<b>Environmental Commitment</b>		
Prevention of significant surface water quality impacts during Permanent Storage of Overburden.		
<b>Work Sections/Locations</b>		
Permanent overburden storage will be located at the following locations: - <u>Telecom Relay Pole</u> - <u>Realigned Windfarm Roads</u>		
<b>Responsibility of</b>	<b>Role/Duty</b>	
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>	
<b>Surface Water Quality Protection Measures</b>		
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Sloping ground and areas with wet ground conditions will be avoided;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,</li> <li>• 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.</li> </ul>		
<b>References</b>		
<ul style="list-style-type: none"> <li>• IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</li> <li>• NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,</li> <li>• CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.</li> </ul>		

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# UWF RELATED WORKS

## VOLUME D

### Revised ENVIRONMENTAL MANAGEMENT PLAN

#### Tab 5

#### Invasive Species Management Plan



ECOPOWER



# INVASIVE SPECIES MANAGEMENT PLAN

## UWF RELATED WORKS, COUNTY TIPPERARY



**Revised January 2019**

INIS Environmental Consultants Ltd  
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**Table of Contents**

EXECUTIVE SUMMARY

INTRODUCTION

DATA COLLECTED

RESULTS

APPENDIX R1 - ILLUSTRATIVE PLATES

APPENDIX R2 - BIOSECURITY MEASURES

APPENDIX R3 - INFESTATION INFORMATION

## ACRONYMS

<b>EA</b>	Environment Agency (UK)
<b>EPA</b>	Environmental Protection Agency (Ireland)
<b>HK</b>	Himalayan knotweed ( <i>Persicaria wallichii</i> )
<b>JKW</b>	Japanese knotweed ( <i>Fallopia japonica</i> )
<b>NPWS</b>	National Parks and Wildlife Service
<b>RH</b>	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 a site assessment of one locations where Japanese knotweed infestation was recorded by Inis field ecologists during habitat assessments as part of their work on UWF Related Works.

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

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

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

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

## INTRODUCTION

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

Invasive non-native species are any animal or plant introduced (deliberately or 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 the invasive plant infestation location and complete an assessment of the infestation. The site assessment by Dr. Giaquinto confirmed the presence of Japanese knotweed (*Fallopia japonica*) at one location.

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

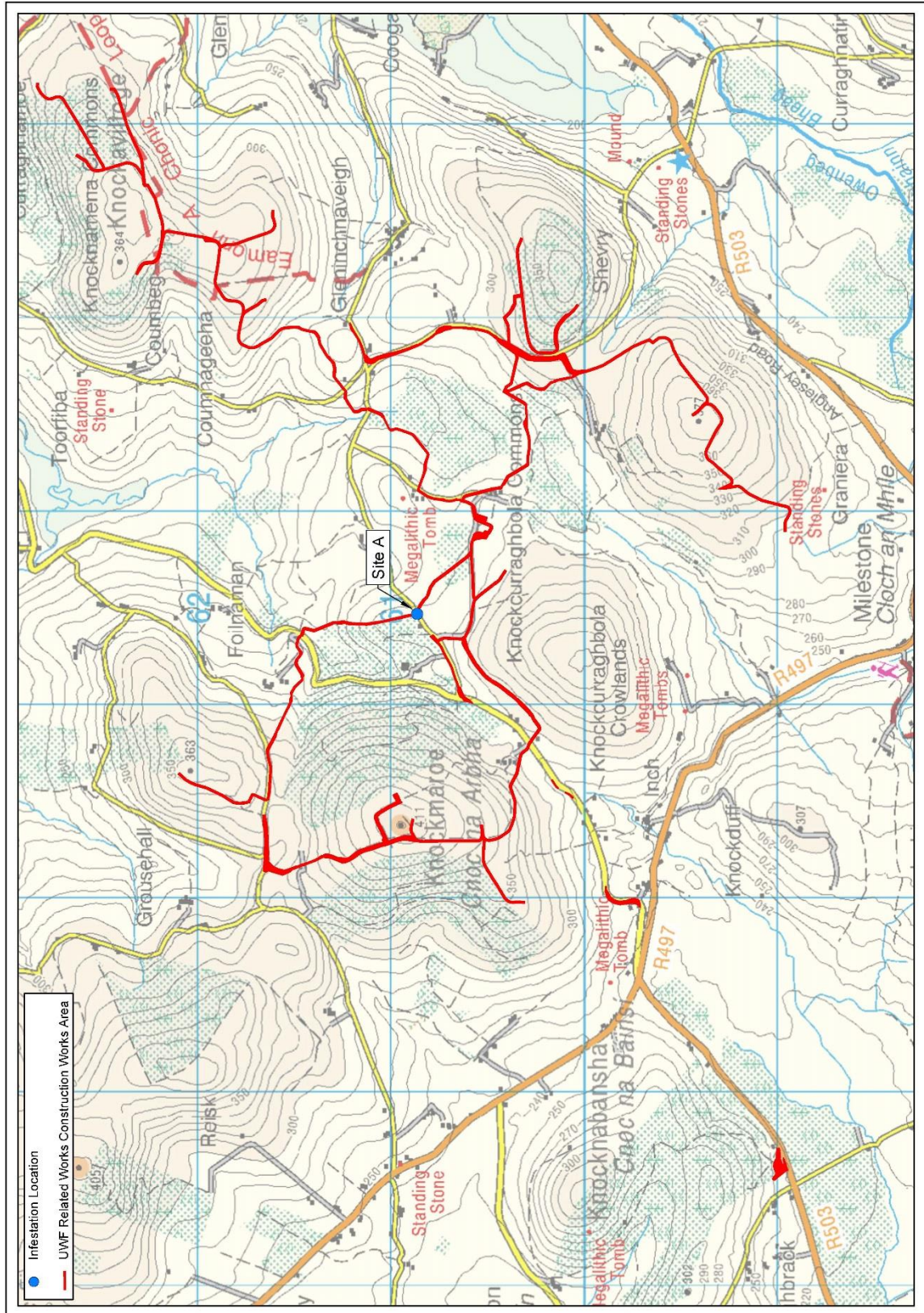
- most appropriate for the location;
- most likely to be effective;
- maintains compliance with EU and national legislation and guidelines pertaining to the control of invasive non-native plant species

## DATA COLLECTED

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

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





## RESULTS

<b>INFESTATION NUMBER</b>	<b>Site A</b>
<b>INFESTATION TYPE</b>	Japanese knotweed ( <i>Fallopia japonica</i> )
<b>INFESTATION LOCATION</b>	594434 E 660905 N (ITM)

**DESCRIPTION**

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

**RECOMMENDATION**

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

**LOCATION MAP- SITE 6**

**Plate 6 Location of Infestation: Site A**

APPENDIX R1  
ILLUSTRATIVE PLATE

<p><b>1</b></p>		<p><b>Site A</b> Young, isolated Japanese knotweed infestation by farm gate.</p>
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## APPENDIX R2

### BIOSECURITY MEASURES

#### **Biosecurity measures**

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

1. A full time invasive species specialist will be appointed to monitor key stages in construction, particularly when soil excavation begins near infested areas. The invasive species specialist will have a 'stop works' authority;
2. The full time invasive species specialist will design and provide a toolbox talk, to all workers, on invasive plant species on the project;
3. The invasive species specialist will assist in designing all access/transit points that are proximal to any infestation and, where possible, will cordon off all infested areas to include a buffer zone ( $\leq 7$  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_ht_(m)	BC	BC_no/m2	BCSz	Cane_d(cm)	Cane_age_no	Dispersed	Risk_cause	soil_type	Previ_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	s40cm	3cm	24	no	prox to forestry track	woodland	no
3	JKW	21000	massive	3m	mature	4	s40cm	3cm	varies	yes	prox to track, LM	farmland	cutting
4	JKW	20	no	2.5	mature	2	s40cm	3cm	18	no	prox to forestry track	woodland	no
5	JKW	21000	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	2500	no	3	y few	1	s30	1-3cm	varies	yes	natural dispersal	mead verge	cutting

## LEGEND

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

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

**UWF RELATED WORKS**

**VOLUME D**  
**Revised ENVIRONMENTAL**  
**MANAGEMENT PLAN**

**Tab 6**  
**Waste Management Plan**



**ECOPOWER**





## Table of Contents

<b>1</b>	<b>Waste Management Plan.....</b>	<b>1</b>
<b>1.1</b>	<b>Introduction .....</b>	<b>1</b>
1.1.1	Objective of the Waste Management Plan.....	1
1.1.2	Scope of WMP .....	1
1.1.3	Responsibilities .....	1
<b>1.2</b>	<b>Overview of UWF Related Works .....</b>	<b>2</b>
1.2.1	Purpose of the UWF Related Works .....	2
1.2.2	Description of the Characteristics of the UWF Related Works.....	2
<b>1.3</b>	<b>Construction Waste &amp; Material Arising .....</b>	<b>3</b>
<b>1.4</b>	<b>Management of construction waste/materials.....</b>	<b>4</b>
1.4.1	Waste Collection – Arlo Group .....	4
1.4.2	Excavated materials arising .....	4
1.4.3	General Building Materials – concrete, timber, steel, packaging etc.....	4
1.4.4	Canteen Wastes/WC facilities.....	5
1.4.1	Hazardous materials .....	5
1.4.2	Training & Communication .....	5
<b>1.5</b>	<b>Waste Auditing.....</b>	<b>6</b>
1.5.1	Waste Audit Report .....	7
<b>1.6</b>	<b>Figures and Mapping .....</b>	<b>8</b>

**LIST OF FIGURES– included at the end of this Plan**

<b>Figure No.</b>	<b>Figure Title</b>
Figure RW WMP 1	Location of the UWF Related Works on OSI Discovery Mapping

**LIST OF TABLES**

<b>Table No.</b>	<b>Table Title</b>
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 WMP

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

### 1.1.3 Responsibilities

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

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

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

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

## 1.2 Overview of UWF Related Works

UWF Related Works, comprises the following elements:

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

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

### 1.2.1 Purpose of the UWF Related Works

The purpose of the UWF Related Works are as follows:

- Internal Windfarm Cabling: to connect the Consented UWF Turbines to the Consented UWF Substation.
- Realigned Windfarm Roads: to realign two lengths of Consented UWF Roads and to provide access to a new Telecom Relay Pole.
- Haul Route Works: to facilitate the haulage of turbine components to the Upperchurch Windfarm site.
- Telecom Relay Pole: to be erected in order to carry telecoms relay equipment, which will mitigate communication links impacts from operational Consented UWF Turbines on the communication signals between Foilnaman Mast and Laghtseeфин 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 <b>excavated soil and rocks</b> 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 Upperchurch Windfarm Site Compound. The licensed operator, will collect and transfer the skips/receptacles of both recyclable and non-recyclable wastes as they are filled. Upperchurch Windfarm Site Compound will also accommodate the temporary site offices and WC facilities and this area will be secured by fencing and manned security 24/7 to prevent unauthorised access.

### **1.4.1 Waste Collection – Arlo Group**

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

General waste, waste water and 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 Upperchurch Windfarm Site Compound. When full, the skips will be collected by authorised waste contractor, Arlo Group.

#### 1.4.4 Canteen Wastes/WC facilities

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

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

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

#### 1.4.1 Hazardous materials

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

#### 1.4.2 Training & Communication

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

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



## 1.5 Waste Auditing

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

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

**Table 2: Waste Details to be Provided**

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

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

### 1.5.1 Waste Audit Report

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

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

**Table 3: Measured waste quantities and costs**

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

(Sample relates to General Building Materials – separate record forms will be compiled in respect of each waste material and excavated soil & stone arising).

Final details of the quantities and types of construction waste arising from the Project will be forwarded to the Environment Section, Tipperary County Council.

## 1.6 Figures and Mapping



# UWF RELATED WORKS

## Tab 7 Revised Best Practice Measures



ECOPOWER

January 2019

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

BPM No.	BPM Title
RW-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
RW-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
RW-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
RW-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
RW-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
RW-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
RW-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
RW-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
RW-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
RW-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
RW-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
RW-BPM-12	Monitoring of nesting and roosting Hen Harrier ( <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	
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.</b>
<b>Environmental Commitment</b>	
<ul style="list-style-type: none"> <li>• Prevention of significant surface water quality impacts at watercourse crossings due to in-stream works.</li> <li>• Prevention of significant morphological impacts at watercourse crossings due to open trench works.</li> </ul>	
<b>Relevant Watercourse Crossing Points</b>	
<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><b>Relevant Watercourse Crossing Points: WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.</b></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><b>Relevant Watercourse Crossing Points: WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</b></p>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works as required.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• Watercourse bed excavation works will only commence once the stream flow is isolated from the proposed trench excavation area;</li> <li>• 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</li> </ul>	



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	
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.</b>
<b>Environmental Commitment</b>	
<ul style="list-style-type: none"> <li>• Prevention of significant surface water quality impacts during watercourse crossing works in-stream works.</li> <li>• Prevention of significant morphological impacts at watercourse crossings due to in-stream works.</li> </ul>	
<b>Relevant Watercourse Crossing Points</b>	
<p>The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.</p> <p><b>Relevant Watercourse Crossing Points: WW5, WW7, WW8, WW16 and WW27</b></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><b>Relevant Watercourse Crossing Points: WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.</b></p>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>• 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);</li> <li>• Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);</li> <li>• 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;</li> </ul>	

- 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	
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts at stream crossings due to in-stream works.	
<b>Work Sections/Locations</b>	
No planned location, BPM included on a precautionary basis	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>● Monitor weather conditions.</li> <li>● Supervise excavation works and drainage works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>● 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);</li> <li>● Firstly, the works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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);</li> <li>● 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;</li> <li>● 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;</li> <li>● Watercourse bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;</li> <li>● 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;</li> <li>● Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;</li> </ul>	

- 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	
<b>Title:</b>	<b>Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert.</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
Existing culverts will be replaced at the following locations: Relevant Watercourse Crossing Points: <b>WW12, WW21 and WW31</b>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Supervise excavation works and drainage works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>• 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);</li> <li>• 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);</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• 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;</li> <li>• Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;</li> <li>• 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;</li> <li>• 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;</li> <li>• All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;</li> <li>• There will be no batching or storage of cement allowed at the watercourse crossing;</li> <li>• There will be no refuelling allowed within 100m of the watercourse crossing; and,</li> <li>• All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.</li> <li>• NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</li> </ul>	

RW-BPM-05 Best Practice Measure	
<b>Title:</b>	<b>Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.</b>
<b>Environmental Commitment</b>	
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).	
<b>Work Section/Location</b>	
<ul style="list-style-type: none"> <li>Trench excavations and access road construction will run over / adjacent / parallel to Class 1 or Class 2 watercourses at UWF Related Works sections <b>SW12, SW24, SW25, SW26, SW27, SW28, SW52, RW3, SW53, SW54, SW55, SW67, SW68 and HW11;</b></li> </ul>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Supervise excavation works and drainage works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;</li> <li>Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;</li> <li>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;</li> <li>Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;</li> <li>Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;</li> <li>In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;</li> <li>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;</li> <li>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;</li> <li>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);</li> <li>The check dams / silt fencing arrangements will be placed every 10m;</li> <li>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;</li> <li>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;</li> <li>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;</li> <li>All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;</li> <li>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;</li> </ul>	

- 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	
<b>Title:</b>	<b>Surface Water Quality Protection Measures During Tree Felling Works.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts from sediment/nutrient input during coniferous tree felling.	
<b>Work Sections/Locations</b>	
<ul style="list-style-type: none"> <li>Coniferous tree block felling will be required at the following locations: RWR1/SW16 and SW24</li> </ul>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Supervise tree felling works and drainage works.</li> </ul>
<b>Pre-felling surveys</b>	
<ul style="list-style-type: none"> <li>Inspection of main drainage ditches and outfalls will be completed during wet periods, and well in advance of the proposed felling works;</li> <li>Another full inspection of the proposed felling area will be completed by the Construction Manager one day in advance of the proposed felling works;</li> <li>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;</li> <li>Inspection of all areas reported as having unusual ground conditions; and,</li> <li>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).</li> </ul>	
<b>Protection of watercourses during felling works</b>	
<ul style="list-style-type: none"> <li>Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;</li> <li>Checking and maintenance of roads and culverts will be undertaken by the Construction Manager throughout the felling operation;</li> <li>No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and watercourse crossing points;</li> <li>Drains which flow from the areas to be felled will have temporary silt traps installed;</li> <li>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;</li> <li>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;</li> <li>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;</li> <li>Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;</li> <li>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;</li> <li>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;</li> <li>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.</li> </ul>	

<b>Post-felling surveys</b>
<ul style="list-style-type: none"><li>• 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).</li></ul>
<b>References</b>
<ul style="list-style-type: none"><li>• Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;</li><li>• Coillte (2009): Forest Operations &amp; Water Protection Guidelines;</li><li>• Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures; and,</li><li>• Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.</li></ul>

RW-BPM-07 Best Practice Measure	
<b>Title:</b>	<b>Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.	
<b>Work Sections/Locations</b>	
<ul style="list-style-type: none"> <li>• Internal Windfarm Cabling – public road crossing locations and</li> <li>• Telecom Relay Pole - foundations</li> </ul>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Monitor weather conditions.</li> <li>• Ensure best practice e storage and use of Cement Based Compounds.</li> </ul>
<b>Protection Measures</b>	
<ul style="list-style-type: none"> <li>• No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;</li> <li>• 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;</li> <li>• No batching of wet-cement products will occur on site (Project Design Measure).</li> <li>• No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;</li> <li>• 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;</li> <li>• 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;</li> <li>• Weather forecasting will be used to plan dry days for pouring concrete;</li> <li>• The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.</li> </ul>	
<b>Monitoring Measure</b>	
<ul style="list-style-type: none"> <li>• 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.</li> <li>• NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</li> <li>• CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006)</li> <li>• CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.</li> </ul>	

RW-BPM-08 Best Practice Measure	
<b>Title:</b>	<b>Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals.</b>
<b>Environmental Commitment</b>	
Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.	
<b>Work Sections/Locations</b>	
<ul style="list-style-type: none"> <li>Construction works area boundary</li> </ul>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Monitor weather conditions.</li> <li>Ensure best practice use and storage of fuels, oils and chemicals on-site.</li> </ul>
<b>Manage of on-site refueling</b>	
<ul style="list-style-type: none"> <li>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;</li> <li>The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;</li> <li>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;</li> <li>Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;</li> <li>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,</li> <li>There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.</li> </ul>	
<b>Storing fuel properly</b>	
<ul style="list-style-type: none"> <li>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).</li> </ul>	
<b>Monitoring Measure</b>	
<ul style="list-style-type: none"> <li>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.</li> </ul>	
<b>Avoid leakage from plant and tools</b>	
<ul style="list-style-type: none"> <li>The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.</li> </ul>	
<b>Contingency for spillages</b>	
<ul style="list-style-type: none"> <li>An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan (Section 6).</li> <li>Spill kits will be available to deal with any accidental spillage in and outside the refuelling area; and,</li> <li>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.</li> </ul>	
<b>References</b>	

- 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	
<b>Title:</b>	<b>Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk</b>
<b>Environmental Commitment</b>	
Prevention of flooding at watercourse crossings due to undersized culverts / bridges.	
<b>Work Sections/Locations</b>	
Relevant Watercourse Crossing Points: <b>WW1, WW12, WW13, WW15, WW21, WW24, WW25 and WW31</b> (Class 4 water crossings), also <b>WW14</b> (Class 3 water crossings), also <b>WW2, WW4 and WW22</b> (Class 2 water crossings).	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>● Ensure appropriate culvert/bridge design.</li> <li>● Supervise the construction works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>● All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);</li> <li>● A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;</li> <li>● 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);</li> <li>● 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),</li> <li>● As agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>● The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).</li> <li>● OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.</li> <li>● NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.</li> </ul>	

<b>RW-BPM-10 Best Practice Measure</b>	
<b>Title:</b>	<b>Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts during Temporary Storage of Overburden.	
<b>Work Sections/Locations</b>	
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>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>● Monitor weather conditions.</li> <li>● Supervise excavation works and drainage works</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>● 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 (<b>Project Design Measure</b>);</li> <li>● Sloping ground and areas with wet ground conditions / ponding will be avoided;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● During periods of heavy rainfall a sheet of polyethene or a geotextile will be used to cover the overburden to prevent erosion; and,</li> <li>● 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>● IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</li> <li>● NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,</li> <li>● CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.</li> </ul>	

<b>RW-BPM-11 Best Practice Measure</b>	
<b>Title:</b>	<b>Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas.</b>
<b>Environmental Commitment</b>	
Prevention of significant surface water quality impacts during Permanent Storage of Overburden.	
<b>Work Sections/Locations</b>	
Permanent overburden storage will be located at the following locations: - <u>Telecom Relay Pole</u> - <u>Realigned Windfarm Roads</u>	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>● Monitor weather conditions.</li> <li>● Supervise excavation works and drainage works.</li> </ul>
<b>Surface Water Quality Protection Measures</b>	
<ul style="list-style-type: none"> <li>● 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);</li> <li>● Sloping ground and areas with wet ground conditions will be avoided;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● 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;</li> <li>● The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,</li> <li>● 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>● IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;</li> <li>● NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,</li> <li>● CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.</li> </ul>	



<b>RW-BPM-12 Best Practice Measure</b>	
<b>Title:</b>	<b>Monitoring of nesting and roosting Hen Harrier (<i>Circus cyaneus</i>)</b>
<b>Environmental Commitment</b>	
To identify and monitor breeding Hen Harrier	
<b>Work Sections/Locations</b>	
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.	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>Carrying out of surveys to Best Practice guidance for nesting Hen Harrier.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Surveying of nesting and roosting Hen Harrier</b>	
<ul style="list-style-type: none"> <li>Monthly surveys following (SNH) guidance will be undertaken by a suitably qualified Ornithologist</li> <li>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.</li> <li>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.</li> <li>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).</li> <li>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.</li> <li>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.</li> <li>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.</li> </ul>	
<b>Construction Works Restrictions</b>	
<ul style="list-style-type: none"> <li>No construction works for UWF Related Works will take place during the breeding season March to August (Project Design Measure).</li> <li>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).</li> </ul>	
<b>Compliance Monitoring</b>	
<ul style="list-style-type: none"> <li>The temporal exclusion zone will be monitored by a suitably qualified Ornithologist.</li> <li>The Ornithologist will have 'stop works' authority.</li> </ul>	

- 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>

<b>RW-BPM-13 Best Practice Measure</b>	
<b>Title:</b>	<b>Minimising the effects of lighting on bats</b>
<b>Environmental Commitment</b>	
To avoid displacement or disturbance of bats arising from the use of artificial lighting.	
<b>Work Sections/Locations</b>	
150m around all UWF Related Works construction works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Scheduling of works</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>• The Project Ecologist will liaise with NPWS throughout the construction stage and early operational stage.</li> <li>• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Design principles for lighting</b>	
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• All construction works will be carried out during daylight hours (Project Design Measure).</li> <li>• 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).</li> <li>• Lights would be operational for 30 seconds and would then switch off automatically.</li> <li>• 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;</li> <li>• 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation guidance. University of Bristol</li> <li>• Bat Conservation Trust (2008). Bats and the Built Environment Series: Bats and Lighting in the UK</li> <li>• Bat Conservation Ireland (2010). Bats &amp; Lighting: Guidance Notes for Planners, engineers, architects and developers</li> </ul>	

<b>RW-BPM-14 Best Practice Measure</b>	
<b>Title:</b>	<b>Protection of potential tree and bridge bat roosts</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
Tree felling locations, bridges along haul routes and works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>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.</li> <li>The Project Ecologist will liaise with NPWS throughout.</li> <li>Monitoring felling and pruning works on trees with bat suitability.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Survey Measures for Potential Tree Roosts</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>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).</li> <li>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.</li> <li>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.</li> </ul>	
<b>Tree Felling measures</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>	
<b>Derogation Licenses</b>	
<ul style="list-style-type: none"> <li>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.</li> </ul>	
<b>Avoid effects on bats through disturbance or destruction of potential bridge roosts.</b>	
<ul style="list-style-type: none"> <li>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</li> </ul>	

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.

<b>RW-BPM-15 Best Practice Measure</b>	
<b>Title:</b>	<b>Bats – Post Construction Monitoring</b>
<b>Environmental Commitment</b>	
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	
<b>Work Sections/Locations</b>	
Bat roost identified during baseline evaluations, Bat Crossing locations in field boundaries along the works area	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Ecologist	<ul style="list-style-type: none"> <li>• Post-construction activity surveys.</li> <li>• Liaising with NPWS.</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Operational Surveys</b>	
<ul style="list-style-type: none"> <li>• Post-construction activity surveys will be carried out annually by the Project Ecologist</li> <li>• 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,</li> <li>• 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.</li> <li>• 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</li> <li>• At the end of this period, if necessary, recommendations will be made on further survey requirements following consultation with NPWS.</li> <li>• Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.</li> <li>• 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</li> <li>• 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.</li> </ul>	

RW-BPM-16 Best Practice Measure	
<b>Title:</b>	<b>Monitoring of non-native invasive plant species.</b>
<b>Environmental Commitment</b>	
Monitoring of non-native invasive plant species.	
<b>Work Sections/Locations</b>	
All construction works sections and operational stage wayleave areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Ecologist	<ul style="list-style-type: none"> <li>• Implementation of surveying</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
Avoid adverse effects of the introduction and spread of non-native invasive species	
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage.</li> <li>• The measures included in the Invasive Species Management Plan will be implemented.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• National Roads Authority (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority, Dublin.</li> <li>• EMP for UWF Related Works - Invasive Species Management Plan.</li> </ul>	

<b>RW-BPM-17 Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice measures for the removal of vegetation during construction.</b>
<b>Environmental Commitment</b>	
To ensure the protection of species using hedgerow and scrub habitat during the construction phase.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Manager	<ul style="list-style-type: none"> <li>Inform Project Ecologist of any requirement to clear scrub or remove hedgerows during the nesting and breeding season (1<sup>st</sup> March to 31<sup>st</sup> August inclusive).</li> </ul>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>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)</li> </ul>
<b>Measures to ensure protection of species using hedgerow and scrub habitat</b>	
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 1 <sup>st</sup> March to 31 <sup>st</sup> August, inclusive.	
<b>Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.</b>	
The following approach will be taken in order to comply with the Wildlife Acts:	
<ul style="list-style-type: none"> <li>Where practical, vegetation clearance will be carried out outside of the restricted period (1<sup>st</sup> March to 31<sup>st</sup> August).</li> <li>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.</li> <li>Construction works practices will incorporate fire prevention measures at all works areas</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000;</li> <li>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).</li> </ul>	



<b>RW-BPM-18 Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice for the protection and preservation of tree roots during the construction phase</b>
<b>Environmental Commitment</b>	
To ensure the protection and preservation of tree roots during the pre-construction and during construction phase.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
To ensure the protection and preservation of tree roots during the pre-construction and during construction phase	
<ul style="list-style-type: none"> <li>• All works within a Root Protection Area (RPA) (see NRA guidance (2006) for calculation of the RPA) will be supervised by the Project Ecologist.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• The advice of a qualified arborist will be sought if larger roots that influence anchorage of the tree need to be severed.</li> </ul>	

- 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.

<b>RW-BPM-19 Best Practice Measure</b>	
<b>Title:</b>	<b>Disturbance to and/or displacement of nesting Common Kingfisher (<i>Alcedo atthis</i>).</b>
<b>Environmental Commitment</b>	
To avoid disturbance/displacement of nesting Kingfisher throughout the construction phase of the development.	
<b>Work Sections/Locations</b>	
All watercourse crossing locations	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>Carrying out surveying to Best Practice guidance.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Avoid disturbance and/or displacement of nesting Kingfisher during pre-construction and during construction phase of the development.</b>	
<ul style="list-style-type: none"> <li>Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins <i>et al</i>, 2010),</li> <li>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).</li> <li>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.</li> <li>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).</li> <li>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.</li> <li>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.</li> </ul>	
<b>Other Riparian Bird Species</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>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</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>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.</li> <li><a href="https://www.npws.ie/sites/default/files/publications/pdf/Cummins_et_al_2010_Kingfisher_survey.pdf">https://www.npws.ie/sites/default/files/publications/pdf/Cummins_et_al_2010_Kingfisher_survey.pdf</a></li> <li>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. <a href="http://www.opw.ie/en/media/Issue%20No.%2012%20%20EclA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf">http://www.opw.ie/en/media/Issue%20No.%2012%20%20EclA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf</a></li> </ul>	

<b>RW-BPM-20 Best Practice Measure</b>	
<b>Title:</b>	<b>Monitoring of Identified Badger Setts</b>
<b>Environmental Commitment</b>	
Monitoring of identified Badger setts during the operational phase of the development.	
<b>Work Sections/Locations</b>	
All setts identified in baseline surveys	
<b>Responsibility of</b>	<b>Role/Duty</b>
Project Ecologist	<ul style="list-style-type: none"> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Monitoring of identified Badger setts during the operational phase of the development.</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>Surveys will be undertaken annually in Operational Years 1, 2, 3, 4 and 5.</li> <li>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).</li> <li>Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>National Roads Authority (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority, Dublin.</li> <li>National Roads Authority (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.</li> </ul>	

<b>RW-BPM-21 Best Practice Measure</b>	
<b>Title:</b>	<b>Disturbance and/or physical injury to Other Mammals</b>
<b>Environmental Commitment</b>	
To avoid disturbance and/or physical injury to other mammals throughout the pre-construction, during construction and operational phases of the development.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities.</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Construction Stage Surveying</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>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;</li> <li>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.</li> </ul>	
<b>Measures to avoid/minimise disturbance effects to pine martin</b>	
<p>In the event of the confirmation of pine martin breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> <li>Marking exclusion zones around any confirmed pine marten dens;</li> <li>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,</li> <li>No construction works will be carried out within the exclusion zones in the breeding season (March-June inclusive);</li> <li>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.</li> </ul>	
<b>Measures to avoid/minimise disturbance effects to pine martin and red squirrel</b>	
<p>In the event of the confirmation of red squirrel breeding/resting places specific measures will include:</p> <ul style="list-style-type: none"> <li>Marking 50m exclusion zones around any confirmed breeding red squirrel dreys;</li> <li>If monitoring confirms the drey is not used for breeding, smaller protection zones will be required (5m or to the nearest neighbouring tree);</li> <li>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);</li> <li>Avoiding felling any trees containing red squirrel dreys, if unavoidable, the destruction of a red squirrel drey will require an NPWS licence.</li> <li>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;</li> </ul>	

- 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>.

<b>RW-BPM-22 Best Practice Measure</b>	
<b>Title:</b>	<b>Management of general non-native invasive species.</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Requiring supply companies to clean delivery vehicles before entering the site to gain access to works area</li> <li>• Obtaining and keeping a record of delivery companies cleaning of vehicles</li> <li>• Training flagmen in the appropriate method of vehicle cleaning</li> </ul>
Flagmen	<ul style="list-style-type: none"> <li>• Cleaning of delivery vehicles exiting the site with suitable disinfectant</li> <li>• Maintaining a record of all vehicles cleaned and equipment, disinfectant used.</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>• Carrying out spot checks on flagmen during cleaning of delivery vehicles.</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Inspection and Cleaning of Delivery Vehicles</b>	
<ul style="list-style-type: none"> <li>• 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 &gt; 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).</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• No removed material or run-off will be allowed to enter a water body of any sort.</li> <li>• Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually.</li> <li>• 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.</li> <li>• Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.</li> </ul>	
<b>Measures at or in watercourses</b>	
<ul style="list-style-type: none"> <li>• 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.</li> </ul>	

- 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/>



<b>RW-BPM-23 Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice methods to ensure the protection of common frog (<i>Rana temporaria</i>) and smooth newt (<i>Triturus (Lissotriton) vulgaris</i>).</b>
<b>Environmental Commitment</b>	
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.	
<b>Work Sections/Locations</b>	
All construction works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>• Must be aware of the locations of all previously identified habitats suitable for breeding amphibian along the works area.</li> <li>• Monitor the construction activities when working adjacent to amphibian breeding habitat to ensure that mitigation measures are strictly adhered to at all times.</li> <li>• Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>To avoid effects on the breeding habitat of common frog and smooth newt</b>	
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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;</li> <li>• 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;</li> <li>• 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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.</li> </ul>	

<b>RW-BPM-24 Best Practice Measure</b>	
<b>Title:</b>	<b>Best practice methods to ensure the protection of Viviparous lizard (<i>Lacerta (Zootoca) vivipara</i>)</b>
<b>Environmental Commitment</b>	
To avoid effects on Viviparous lizard ( <i>Lacerta (Zootoca) vivipara</i> ) during the pre-construction and construction phase.	
<b>Work Sections/Locations</b>	
All sections	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>To avoid effects on Viviparous lizard.</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.</li> </ul>	

<b>RW-BPM-25 Best Practice Measure</b>	
<b>Title:</b>	<b>Measures to ensure the protection of Marsh Fritillary (<i>Euphydryas aurinia</i>)</b>
<b>Environmental Commitment</b>	
To avoid effects on Marsh Fritillary / Marsh Fritillary habitat during the pre-construction and construction phase.	
<b>Work Sections/Locations</b>	
UWF Related Works: SW13 and other suitable habitat within 50m of construction works areas.	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Scheduling of construction activities</li> </ul>
Project Ecologist	<ul style="list-style-type: none"> <li>Carrying out of Confirmatory Survey of suitable habitat</li> <li>Monitor the construction works when working adjacent to Marsh Fritillary habitat to ensure that mitigation measures are strictly adhered to at all times.</li> <li>Must be aware of the best practice guidance listed in References below.</li> </ul>
<b>Pre-Construction Surveying measures for Marsh Fritillary</b>	
<ul style="list-style-type: none"> <li>Confirmatory survey of the distribution of Devil’s-bit Scabious (larval food plant of Marsh Fritillary) (project design measure)</li> <li>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</li> <li>Surveys will be completed within 12 months prior to the commencement of the construction stage, within the correct seasonal period as per Best Practice.</li> </ul>	
<b>Measures for the protection of Marsh Fritillary at different times of their life-cycle</b>	
<ul style="list-style-type: none"> <li>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).</li> </ul>	
<b>Post-Construction Surveying measures for Marsh Fritillary</b>	
<ul style="list-style-type: none"> <li>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,</li> <li>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.</li> <li>Results will be made available to the Local Authority and relevant statutory consultees, in the form of an annual report.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.</li> </ul>	

RW-BPM-26 Best Practice Measure	
<b>Title:</b>	<b>Local Employment and Local Sourcing</b>
<b>Environmental Commitment</b>	
Where feasible, to source contracts, materials and workforce locally during the construction stage of the UWF Related Works	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>• Where possible, to operate a local bias when recruiting employees and sourcing materials.</li> <li>• Develop a Local Employment and Local Sourcing Policy</li> </ul>
Community Liaison Officer (CLO)	<ul style="list-style-type: none"> <li>• Management of local employment and resources database</li> <li>• Engage with service businesses in the area ahead of construction works</li> <li>• Monitor the recruitment and training of local employees in line with Policy</li> </ul>
Increasing potential for local sourcing and local employment	
<ul style="list-style-type: none"> <li>• Contact local business ahead of works and contracts being awarded, so that the main contactors are aware of the services and materials available locally</li> <li>• Management of local employment and resources database</li> <li>• Engage with service businesses in the area ahead of construction works</li> <li>• Monitor the recruitment and training of local employees in line with Policy</li> </ul>	

<b>RW-BPM-27 Best Practice Measure</b>	
<b>Title:</b>	<b>Landowner and Land-user Liaison</b>
<b>Environmental Commitment</b>	
To keep landowners up-to-date with relevant construction works	
<b>Work Sections/Locations</b>	
All works locations on agricultural and forestry lands	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>To provide accurate information to the Community Liaison Officer regarding construction schedules</li> <li>To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer</li> </ul>
Community Liaison Officer	<ul style="list-style-type: none"> <li>To manage the interests of the Owner at all times with regard to landowner issues</li> <li>To lead the day-to-day communication with landowners</li> <li>To be available and accessible to landowners</li> <li>To inform, advise, assist landowners and to communicate with the contractor on behalf of the landowner or user</li> <li>To oversee the resolution of any issues in relation to landowners</li> <li>Manage the coordination of land restoration works</li> <li>Assist the Project Manager in the completion of snag lists and the works area boundaries following reinstatement.</li> </ul>
Environmental Clerk of Works	<ul style="list-style-type: none"> <li>To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer</li> </ul>
<b>Landowner and Land-User Liaison Measures</b>	
<ul style="list-style-type: none"> <li>Landowners will be engaged with early and ahead of works</li> <li>A telephone number for the Landowner Liaison Officer will be provided</li> <li>Good mapping and an explanation of the mapping will be provided</li> <li>Landowners will be contacted ahead of works taking place on their lands</li> <li>Landowners will be dealt with honestly and fairly</li> <li>Queries from landowners will be dealt with promptly and courteously</li> <li>Restrictions to lands during construction will be minimised and access points to interconnected lands, including walking routes, will be provided</li> <li>Local walking groups or other land users will be kept up-to-date with the construction works schedule</li> <li>Any works in close proximity or crossing a waymarked trail will not be scheduled during the same period as a walking festival or event</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)</li> </ul>	

<b>RW-BPM-28 Best Practice Measure</b>	
<b>Title:</b>	<b>Minimising Disturbance and Damage to Land</b>
<b>Environmental Commitment</b>	
To minimise disturbance to and damage of agricultural and forestry lands	
<b>Work Sections/Locations</b>	
All works areas	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>To fence all active construction works areas</li> </ul>
Community Liaison Officer	<ul style="list-style-type: none"> <li>Manage the interests of the Project Promoter at all times with regard to landowner issues</li> <li>Lead the day-to-day communication with landowners</li> <li>Supervise the fencing of lands</li> <li>Manage the coordination of land restoration works in accordance with RW-OCM-14: Reinstatement of Land</li> <li>Assist the Project Manager in the completion of snag lists and the of works area boundaries following reinstatement.</li> </ul>
Environmental Clerk of Works	<ul style="list-style-type: none"> <li>To respond in a timely manner to any feedback, queries or advice received from the Community Liaison Officer</li> </ul>
<b>Minimising Disturbance and Damage to Land Measures</b>	
<ul style="list-style-type: none"> <li>Landowners will be contacted ahead of works taking place on their lands</li> <li>Construction works areas will be fenced ahead of works on a landholding</li> <li>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</li> <li>Construction personnel will only enter on lands to carry out authorised works</li> <li>Construction personnel will take due care and attention to minimise damage to land or livestock</li> <li>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)</li> <li>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</li> <li>Lands under construction works areas will be left in as good (or better) condition than before works began</li> <li>Restrictions to lands during construction will be minimised and access points to interconnected lands will be provided</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>Code of Practice in relation to access to land and/or premises (ESB Networks - Document No: DOC-110602-ACP)</li> </ul>	

<b>RW-BPM-29 Best Practice Measure</b>	
<b>Title:</b>	<b>Minimising Dust Emissions From Site Activities</b>
<b>Environmental Commitment</b>	
Minimise dust emissions from site activities	
<b>Work Sections/Locations</b>	
All construction works locations	
<b>Responsibility of</b>	<b>Role/Duty</b>
Construction Manager	<ul style="list-style-type: none"> <li>Provide site induction to site personnel and contractors regarding the dust control measures</li> </ul>
<b>Training and Communication</b>	
<ul style="list-style-type: none"> <li>Provide site induction to site personnel and contractors regarding the dust control measures</li> <li>Community engagement before works commence will be carried out.</li> <li>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.</li> </ul>	
<b>Measures to minimize dust emissions</b>	
<ul style="list-style-type: none"> <li>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.</li> <li>Any road that is likely to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.</li> <li>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.</li> <li>Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary.</li> <li>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.</li> <li>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.</li> <li>Permanent stockpiles of soils will be reseeded as soon as practical following placement.</li> <li>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.</li> <li>Provide site induction to site personnel and contractors regarding the dust control measures</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII, 2011)</li> <li>Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)</li> </ul>	

<b>RW-BPM-30 Best Practice Measure</b>	
<b>Title:</b>	<b>Traffic Management Measures</b>
<b>Environmental Commitment</b>	
Manage traffic to ensure that construction traffic will travel safely and efficiently along the public road network.	
<b>Responsibilities</b>	
Project Manager	<ul style="list-style-type: none"> <li>• Consult with Tipperary County Council</li> <li>• Consult with Gardaí</li> <li>• Contractor arrangements regarding speed limits, alert beacons, haulage routes etc.</li> <li>• Oversee the implementation of the Traffic Management Plan</li> </ul>
Construction Manager	<ul style="list-style-type: none"> <li>• Install information, direction and warning signage in advance of road works, site entrances and along haul routes</li> <li>• Implement the Traffic Management Plan</li> </ul>
Environmental Clerk of Works	<ul style="list-style-type: none"> <li>• Weekly auditing to ensure the compliance with and the effectiveness of the Traffic Management Measures</li> </ul>
Community Liaison Officer	<ul style="list-style-type: none"> <li>• Act as point of contact with local community,</li> <li>• Keep the local community informed of construction and road works in their area</li> </ul>
<b>Traffic Management Measure</b>	
<b>Communication and Information</b>	
<ul style="list-style-type: none"> <li>• 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;</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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 85<sup>th</sup> percentile traffic speeds, or the posted limit, whichever is the higher.</li> </ul>	
<b>Measures for Delivery Personnel</b>	
<ul style="list-style-type: none"> <li>• These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.</li> <li>• 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.</li> <li>• 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.</li> </ul>	



- 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 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)

<b>RW-BPM-31 Best Practice Measure</b>	
<b>Title:</b>	<b>Measuring Operational EMF Emissions</b>
<b>Environmental Commitment</b>	
<b>Work Sections/Locations</b>	
Internal Windfarm Cabling	
<b>Responsibility of</b>	<b>Role/Duty</b>
Operational Manager – UWF	<ul style="list-style-type: none"> <li>• Ensure operational EMF emissions are measured</li> </ul>
<b>Measuring Operational EMF Emissions</b>	
<ul style="list-style-type: none"> <li>• A confirmatory survey of Electromagnetic Field emissions from locations along the Internal Windfarm Cabling will be carried out by a competent engineer. The locations along the Internal Windfarm Cabling will include the following 9 No. local road crossings in Knockmaroe/Knockcurraghbola Crownlands, Knockcurraghbola Commons and Foilnaman.</li> <li>• Reporting by the competent engineer of the compliance of operational EMF emission levels with the levels predicted in the Revised EIA Report (2019).</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>• UWF Related Works Revised EIA Report (2019)</li> </ul>	

RW-BPM-32 Best Practice Measure	
<b>Title:</b>	<b>Measuring Operational Electricity Production</b>
<b>Environmental Commitment</b>	
<b>Work Sections/Locations</b>	
Consented Upperchurch Windfarm Substation	
<b>Responsibility of</b>	<b>Role/Duty</b>
Operational Manager – UWF	<ul style="list-style-type: none"> <li>● Record annual electricity production levels</li> </ul>
<b>Measures to minimize dust emissions</b>	
<ul style="list-style-type: none"> <li>● Recording and reporting of the annual renewable electricity production of the operational UWF.</li> </ul>	
<b>References</b>	
<ul style="list-style-type: none"> <li>● UWF Related Works Revised EIA Report (2019)</li> </ul>	

**UWF RELATED WORKS**

**VOLUME D  
REVISED ENVIRONMENTAL  
MANAGEMENT PLAN**

**Tab 8  
Outline Construction Methodologies for  
the UWF Related Works**



**ECOPOWER**



## Outline Construction Methodologies for the UWF Related Works

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

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

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

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

<b>Outline Construction Methodology</b>			
<b>Title:</b>	<b>Pre-Construction Activities</b>	<b>Ref:</b>	<b>RW-OCM-01</b>
<b>General Description</b>			
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.			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>Over a 6 month period prior to the commencement of the main construction stage</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>Main Contractor</li> <li>Project Manager</li> <li>Environmental Clerk of Works</li> <li>Site Ecologist</li> <li>Site Hydrologist</li> </ul>		<ul style="list-style-type: none"> <li>Survey equipment</li> </ul>	
<b>Standard Design and Management Activities:</b>			
<ol style="list-style-type: none"> <li>The Project Manager, Main Contractor, and the Environmental Clerk of Works will be appointed.</li> <li>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.</li> <li>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.</li> <li>Method statements will be prepared by the Contractor. These method statements will be based on the Outline Construction Methodologies.</li> <li>Pre-construction monitoring and confirmatory surveys will be carried out by specialist engineering and environmental consultants.</li> </ol>			
<b>Pre-Construction Windfarm Monitoring Activities:</b>			
<ol style="list-style-type: none"> <li>Road condition monitoring surveys, the first of which will take place prior to the commencement of construction activities.</li> <li>Pre-construction water quality monitoring surveys, will be carried out</li> <li>Pre-construction ecological confirmatory surveys.</li> </ol>			
<b>End</b>			



<b>Outline Construction Methodology</b>			
<b>Title:</b>	Construction Works Area Preparation	<b>Ref:</b>	<b>RW-OCM-02</b>
<b>General Description</b>			
Ahead of construction works in any particular area, the works areas will be set out before construction machinery enters onto the lands.			
<b>Duration</b>			
1 day per works area.			
<b>Personnel</b>		<b>Materials Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>2 civil works personnel</li> </ul>		<ul style="list-style-type: none"> <li>• Hand tools</li> <li>• GPS Equipment</li> <li>• Fencing posts</li> <li>• Fencing wire</li> <li>• Marker Tape</li> <li>• Portable electric fencer</li> <li>• Goal posts</li> <li>• Signage</li> <li>• Wooden pegs</li> <li>• 4 x 4 vehicle and trailer</li> </ul>	
<b>Standard Methods:</b>			
<ol style="list-style-type: none"> <li>4. Construction areas will be set-out using GPS and other surveying equipment.</li> <li>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.</li> <li>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.</li> <li>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.</li> </ol> <p>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.</p>			
<b>End</b>			

<b>Outline Construction Methodology</b>			
<b>Title:</b>	<b>Temporary Site Entrances</b>		<b>Ref:</b> <b>RW-OCM-03</b>
<b>General Description</b>			
<p>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</p>			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>• Half day to one day per entrance</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>• Crew size: 3 operatives</li> <li>• Wheeled dumper or Track dumper</li> <li>• Vibrating Roller</li> <li>• 360° tracked excavator</li> <li>• Chains / hand tools</li> <li>• Chainsaw/Hedge Trimmers</li> <li>• Traffic management signage</li> <li>• Traffic Flagmen</li> </ul>		<ul style="list-style-type: none"> <li>• 50mm crushed stone</li> <li>• Geotextile matting</li> <li>• Granular fill</li> <li>• Gates</li> <li>• Timber posts</li> <li>• Rail fence</li> <li>• Wire fencing mesh</li> <li>• Silt fence</li> <li>• Timber Bog Mats / Aluminium Panel Tracks (where required)</li> <li>• Precast concrete culverts</li> </ul>	
<b>Standard Methods</b>			
<ol style="list-style-type: none"> <li>1. Prior to works at the entrances commencing, traffic management controls will be put in place and flagmen deployed. The roadside hedgerows at site entrances will be cut back or cleared where required to increase visibility when entering / exiting.</li> <li>2. Temporary fencing will be erected and boundary wire mesh fencing will be used to improve visibility if necessary.</li> <li>3. The roadside verge will be excavated down to a suitable formation level. Excavated material will be stored in berms along the construction works areas. These berms will be constructed as per <b>RW-OCM-14 Overburden Storage Berms</b>.</li> <li>4. A base layer of stone, followed by a final layer of capping stone will be laid over the excavated verge. A vibrating roller will be used to compact each layer.</li> <li>5. The final capping layer will be profiled to the existing road surface level and will provide a suitable surface for trucks delivering turbine components etc. to pass over.</li> <li>6. Existing drainage channels will be kept clean at all times. Where required, they will be piped in culverts to maintain the existing flows.</li> <li>7. Silt traps will be located along drains to stop suspended sediment from entering waterways.</li> <li>8. .</li> </ol>			

- 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

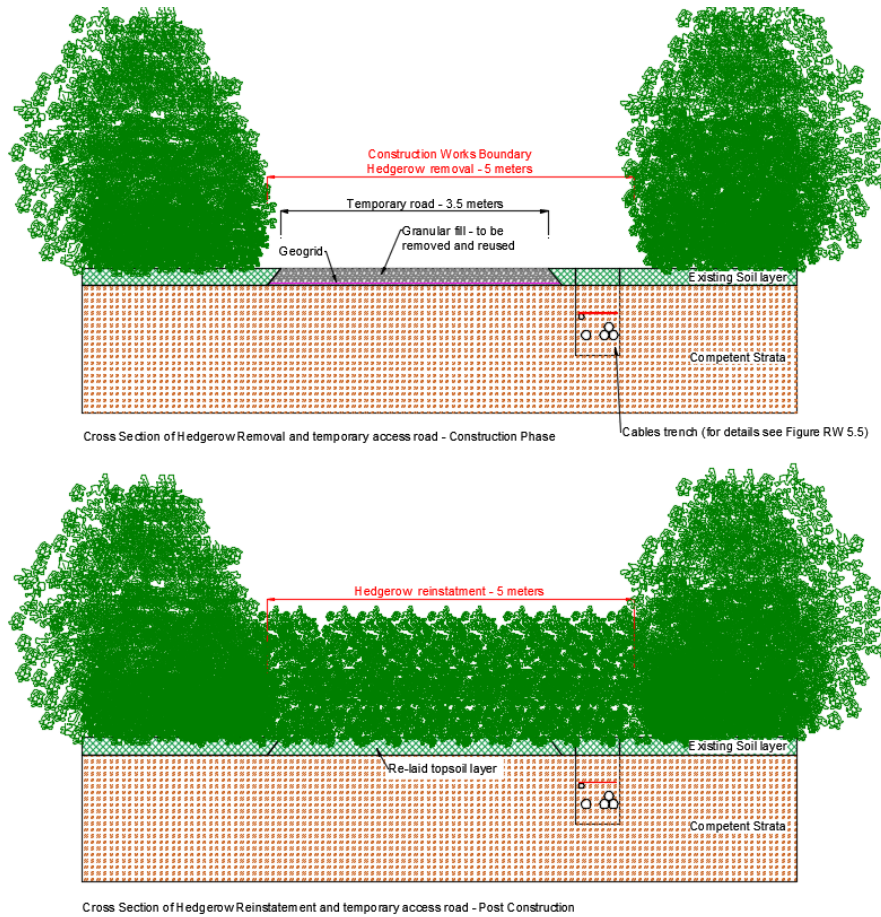
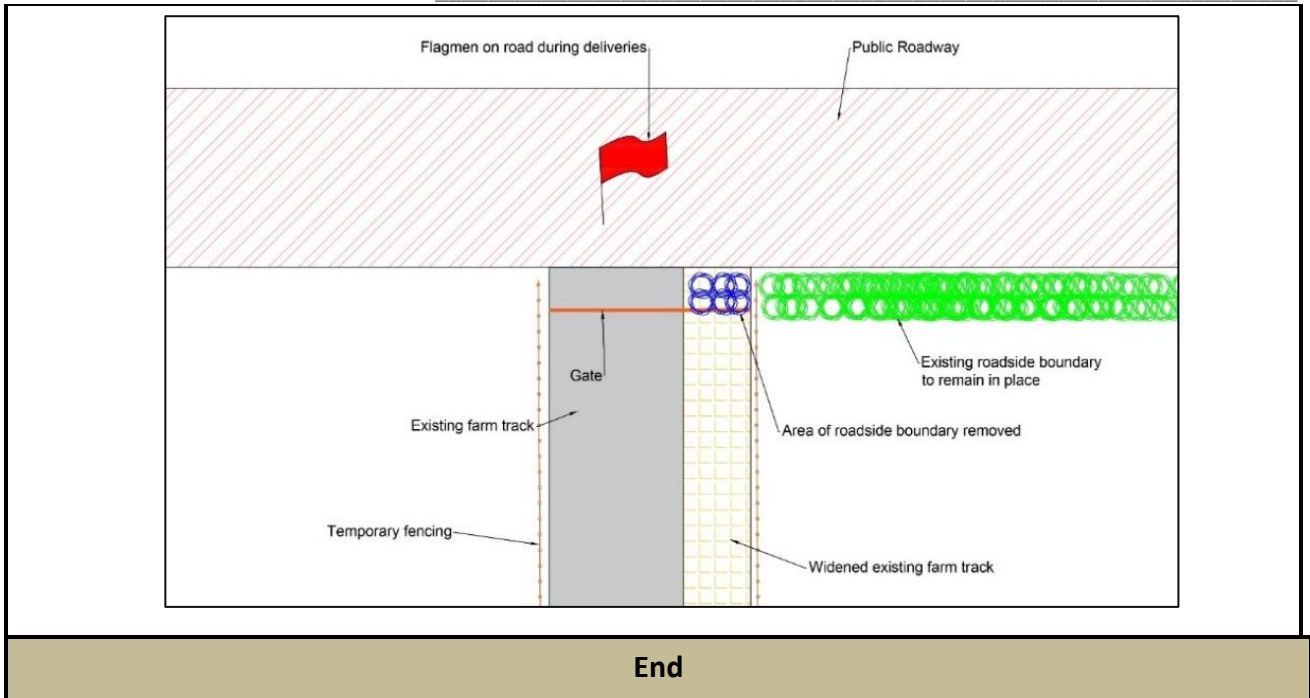


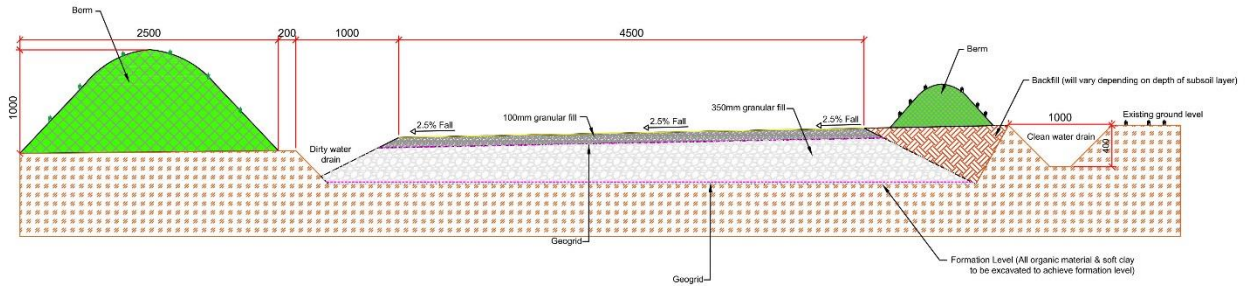
Figure RW 5.14: Plan View of Typical Temporary Site Entrance



<b>Outline Construction Methodology</b>	
<b>Title:</b>	<b>Realigned Windfarm Roads</b>
<b>Ref:</b>	<b>RW-OCM-04</b>
<b>General Description</b>	
<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 &amp; 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>	
<b>Duration</b>	
Site Specific, c.100m/day	
<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• Crew size: 4 operatives</li> <li>• Site engineer</li> <li>• Site Ecologist</li> <li>• Wheeled or tracked dumper</li> <li>• 360° tracked excavator</li> <li>• Vibrating Roller</li> <li>• Tree harvester</li> <li>• Timber trucks</li> </ul>	<ul style="list-style-type: none"> <li>• 50mm crushed stone</li> <li>• Granular fill</li> <li>• Geotextile matting</li> <li>• Wooden pegs</li> <li>• Wooden posts</li> <li>• Fencing wire/tape</li> </ul>
<b>Standard Methods</b>	
<ol style="list-style-type: none"> <li>1. The route of the Realigned Windfarm Roads will be marked out using GPS equipment and wooden pegs by the site engineer.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. Geotextile matting will be laid out where necessary (subject to site conditions).</li> <li>6. A minimum sub-base will be laid which will consist of 350mm deep layer of 50mm crushed stone.</li> <li>7. A surface layer will be laid which will consist of 100mm compacted granular fill to accommodate HGV traffic.</li> <li>8. A vibrating roller will compact the stone in layers.</li> <li>9. The surface of the new road will be finished with a 1% gradient to allow water run-off.</li> </ol>	

Relevant Drawings from Volume C3 EIAR Figures

Figure RW 5.8: Cross Section of Realigned Windfarm Road



End

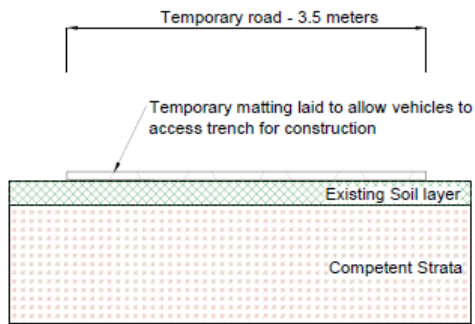
<b>Outline Construction Methodology</b>	
<b>Title:</b>	<b>Temporary Access Roads</b>
<b>Ref:</b>	<b>RW-OCM-05</b>
<b>General Description</b>	
<p>Temporary access roads will provide access to off-road construction work locations and will be circa 3.5m in width.</p>	
<b>Duration</b>	
<ul style="list-style-type: none"> <li>• Site specific, c.150m length per day</li> </ul>	
<b>Personnel, Machinery &amp; Equipment</b>	
<ul style="list-style-type: none"> <li>• Site Engineer</li> <li>• Crew size: 3 operatives</li> <li>• 1 Excavator Operator</li> </ul>	<ul style="list-style-type: none"> <li>• Wooden pegs</li> <li>• 50mm Crushed Stone</li> <li>• Geotextile matting</li> <li>• Plastic Mats / Aluminium Panel Tracks</li> <li>• Pre-cast culverts</li> <li>• Vibrating roller</li> </ul>
<b>Standard Methods (based on a 3.5m wide stone road)</b>	
<ol style="list-style-type: none"> <li>1. The alignment of the temporary road will be marked out with pegs by the site engineer.</li> <li>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 <b>RW-OCM-14: Overburden Storage Berms</b>, for later use during reinstatement works along the footprint of the temporary access road.</li> <li>3. The depth and width of topsoil removal will be kept to a minimum.</li> <li>4. A layer of geotextile material will be laid over the excavated ground.</li> <li>5. A layer of 200mm deep of 50mm stone will then be overlaid on the geotextile and compacted in layers using a vibrating roller.</li> <li>6. Reinstatement will take place when the works necessitating the temporary road have been completed.</li> <li>7. The layer of stone and geogrid will be removed and either re-used to form a further section of temporary road or disposed of to a licensed landfill. The area will be reinstated using the soil from the berm adjacent to the road, which will be reseeded.</li> </ol>	
<b>Standard Methods (based on a 3.5m wide using aluminum / plastic matting)</b>	
<ol style="list-style-type: none"> <li>1. The alignment of the temporary road will be marked out with wooden pegs by the site engineer.</li> <li>2. Plastic / Aluminium mats will be laid along the marked route.</li> <li>3. When the works necessitating the temporary road have been completed. The matting will be taken up and either re-used to form a further section of temporary road or disposed of to a licensed landfill.</li> </ol>	



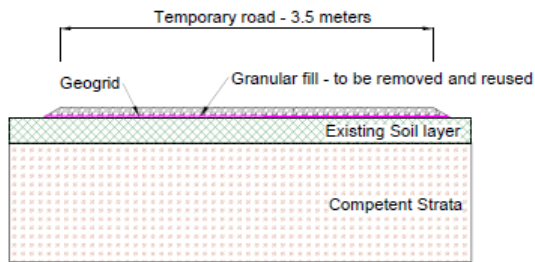
Temporary Aluminium Panel Tracks

Relevant Drawings from Volume C3 EIAR Figures

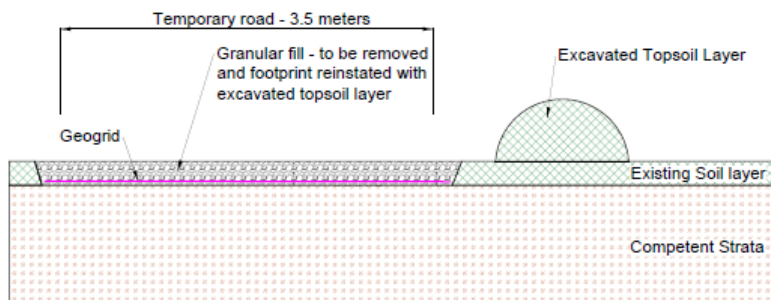
Figure RW 5.15: Cross Section of Temporary Access Roads



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



<b>Outline Construction Methodology</b>	
<b>Title:</b>	<b>Haul Route Works</b>
<b>Ref:</b>	<b>RW-OCM-06</b>
<b>General Description</b>	
<p>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.</p>	
<b>Duration</b>	
<ul style="list-style-type: none"> <li>It will take 2 crews, 4 weeks to complete the works</li> </ul>	
<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>Site Engineer</li> <li>2 tracked excavators</li> <li>Dumper truck</li> <li>Hedge cutter mounted on tractor</li> <li>Mobile hoists</li> <li>Chainsaws</li> <li>Vibrating roller</li> <li>1 No. JCB mounted auger drill</li> </ul>	<ul style="list-style-type: none"> <li>Wooden pegs</li> <li>Geotextile</li> <li>Signage sockets</li> <li>Traffic management signage</li> <li>Aluminum / plastic mats</li> <li>50mm crushed stone</li> <li>Telephone poles</li> </ul>
<b>Standard Methods for Road Widening into the Verge and Roadside Boundary</b>	
<ol style="list-style-type: none"> <li>Traffic management protocols will be put in place before any works commence.</li> <li>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.</li> <li>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.</li> <li>A layer of 50mm stone will then be placed and compacted to road level in the excavated verge/boundary area.</li> <li>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.</li> </ol> <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>	
<b>Standard Methods for Temporary Road Construction from the Public Road into Private Lands</b>	
<ol style="list-style-type: none"> <li>Traffic management protocols will be put in place before any works commence</li> <li>The public road will be widened into the verge and the roadside boundary removed to provide an access point to the new temporary road.</li> </ol>	

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

#### **Standard Methods for Relocation of Telephone Poles**

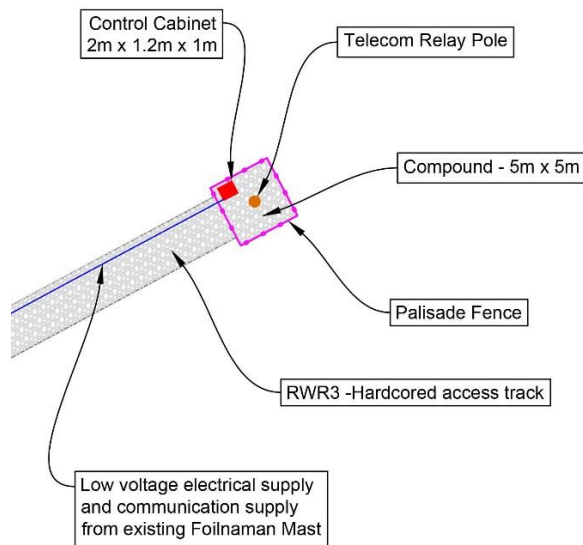
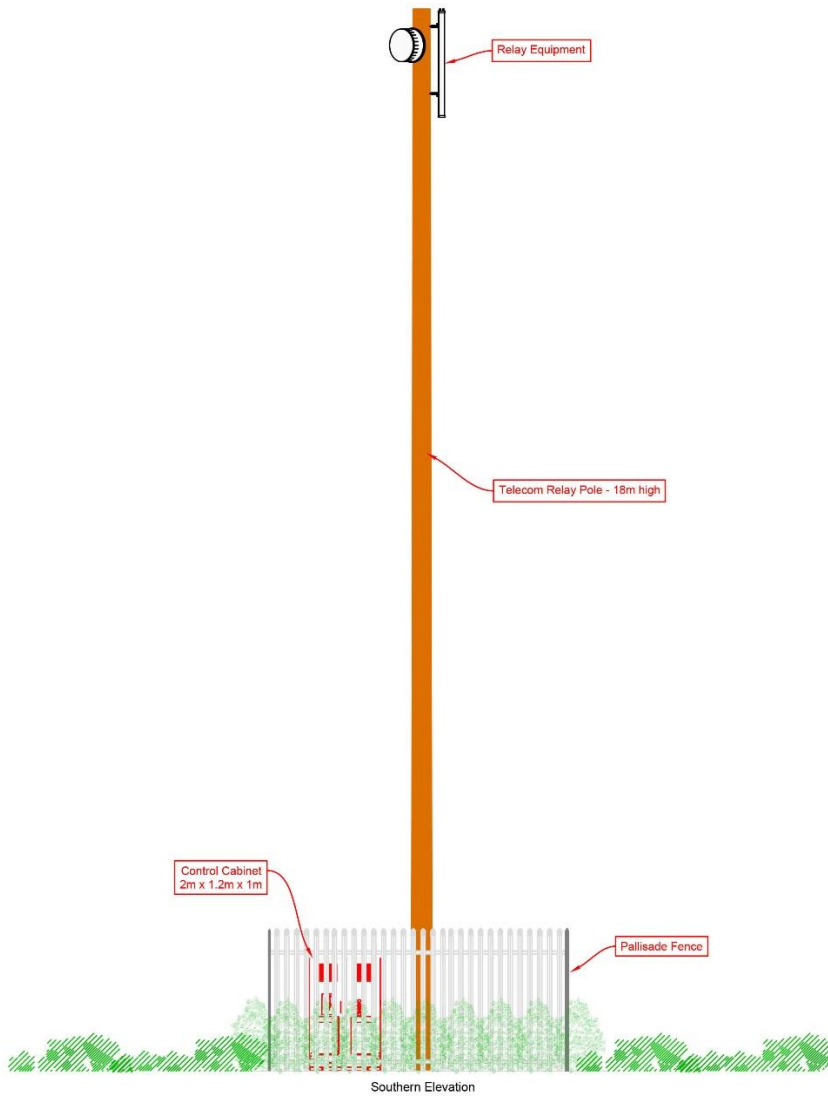
1. Any telephone poles that are located within footprint of the widened haul route will need to be relocated.
2. The telephone wires or lines will be disconnected from the telephone network.
3. The telephone wire or lines will be disconnected from the pole.
4. The pole will then be cut down using a chainsaw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

**End**

<b>Outline Construction Methodology</b>			
<b>Title:</b>	Telecom Relay Pole	<b>Ref:</b>	<b>RW-OCM-07</b>
<b>General Description</b>			
<p>A Telecom Relay Pole, up to 18m in height, which will support the installation of telecoms relay dishes, which will be used to relay telecoms signals around Upperchurch Windfarm in the event that the consented UWF wind turbines interfere with the existing telecoms signals. The Telecom Relay Pole will be erected in a secure compound, which will be 5m x 5m (25m<sup>2</sup>) in area.</p>			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>• 2 days</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>• 3 No. installation crew</li> <li>• 1 No. JCB mounted auger drill</li> <li>• Mobile hoist</li> <li>• 1 Excavator</li> <li>• Vibrating roller</li> <li>•</li> </ul>		<ul style="list-style-type: none"> <li>• 1 No. 20m wooden pole</li> <li>• 50mm Crushed Stone</li> <li>• Telecoms dishes (Receivers and Transmitters)</li> <li>• Underground electrical cable and connection equipment</li> <li>• Ground equipment</li> <li>• Native grass, heather, tree and hedgerow species – seeds/seedlings</li> </ul>	
<b>Standard Methods</b>			
<ol style="list-style-type: none"> <li>1. The location of the Telecom Relay Pole and 5m x 5m compound area will be pegged out.</li> <li>2. Topsoil will be excavated from the footprint of the compound area and stored in an adjacent berm.</li> <li>3. A layer of 50mm crushed stone will be overlaid and compacted on the compound area.</li> <li>4. A 2m deep hole will be auger drilled at the Telecom Relay Pole proposed location in the centre of the compound.</li> <li>5. The pole will be inserted into the hole and backfill will be compacted in layers around the pole to fasten it in and make secure.</li> <li>6. An underground electrical cable to provide electrical power from the existing Foilnaman Mast to the relay equipment will be installed.</li> <li>7. Telecoms dishes will be installed on the pole which will allow any telecom signals affected by the wind turbines to be redirected away from the turbines to/from the Foilnaman Mast, thus avoiding any interference with the signals.</li> <li>8. Secure palisade fencing with an entrance gate will be erected around the compound</li> <li>9. Ground equipment will be installed, and connections between the Telecoms Relay Pole and the existing Foilnaman Masts will be commissioned.</li> <li>10. A low hedgerow, comprising native tree and shrub species will be planted around the compound</li> <li>11. The overburden storage berm will be seeded with native grass species.</li> </ol>			

**Relevant Volume C3 EIAR Figures:**

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



End

Outline Construction Methodology

<b>Title:</b>	<b>Internal Windfarm Cabling</b>	<b>Ref:</b>	<b>RW-OCM-08</b>
<b>General Description</b>			
<p>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.</p>			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>• Approx. 100m per crew per day, Circa 3 months in total</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>• Three crews of 2-3 general operatives and 1 excavator operator per crew</li> <li>• Archaeologist</li> <li>• 3 No. Wheeled dumper or Track dumpers (6 to 8 tons)</li> <li>• 3 No. 360° tracked excavators</li> <li>• Brush &amp; mandrel</li> <li>• Cable winch</li> </ul>		<ul style="list-style-type: none"> <li>• 125mm diameter uPVC ducting</li> <li>• Red cable marker strip</li> <li>• Yellow marker warning tape</li> <li>• Marker Plates and Posts</li> <li>• Road surfacing material</li> <li>• Granular fill</li> <li>• silt fenceing</li> </ul>	
<b>Standard Methods: Installing cable ducting.</b>			
<ol style="list-style-type: none"> <li>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.</li> <li>2. The trench floor will be graded, smoothed and trimmed when the required 1250mm depth and 600mm width have been obtained.</li> <li>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.</li> <li>4. Three ducts, through which the electrical cables will be pulled, will be installed by hand in trefoil formation as detailed on the design drawings. Spacers will be used as appropriate to establish horizontal duct spacing.</li> <li>5. When installed, the ducts will be surrounded and covered with the suitable backfill from the excavated material which will be compacted in layers.</li> <li>6. Red cable marker strips will be placed on the compacted backfill directly over the bottom row of ducts which will contain the electrical cables.</li> <li>7. The top duct, through which the fibre optic cable will be pulled, will then be installed by hand onto the compacted backfill.</li> <li>8. The top duct will then be surrounded and covered with backfill material, in accordance with the drawings, and compacted.</li> <li>9. Another layer of red cable protection strip will be placed on top of the compacted backfill.</li> <li>10. The backfill will then be laid to within 300mm of the ground surface and compacted.</li> <li>11. Yellow warning tape, will be placed over the compacted backfill.</li> </ol>			

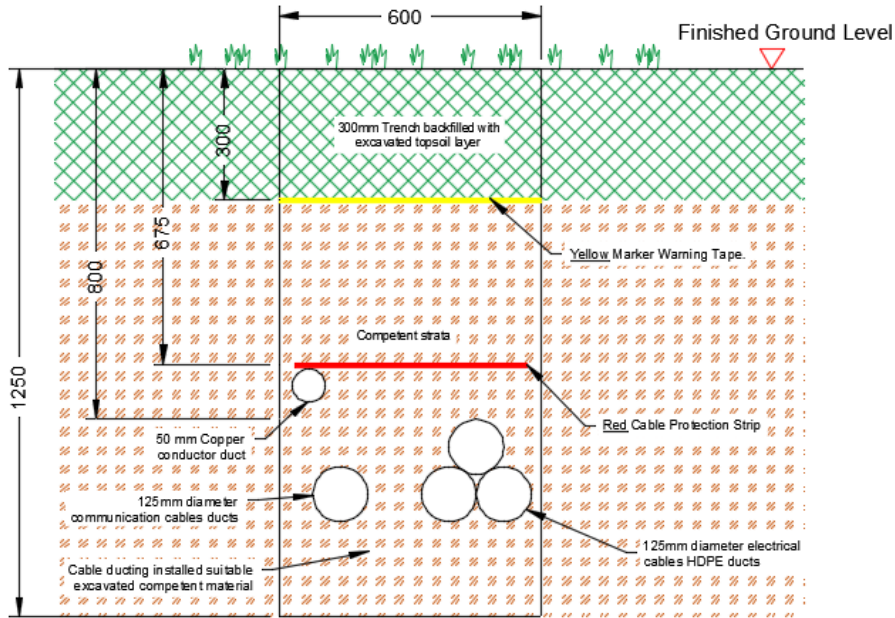
12. A final layer of topsoil, as specified, will then be placed in the trench to ground level.
13. Land will be reinstated follows the methods outlined in **RW-OCM-15 Reinstatement of Lands**.
14. For public road crossings, the trench will be backfilled using granular fill to within 300mm of the top 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.

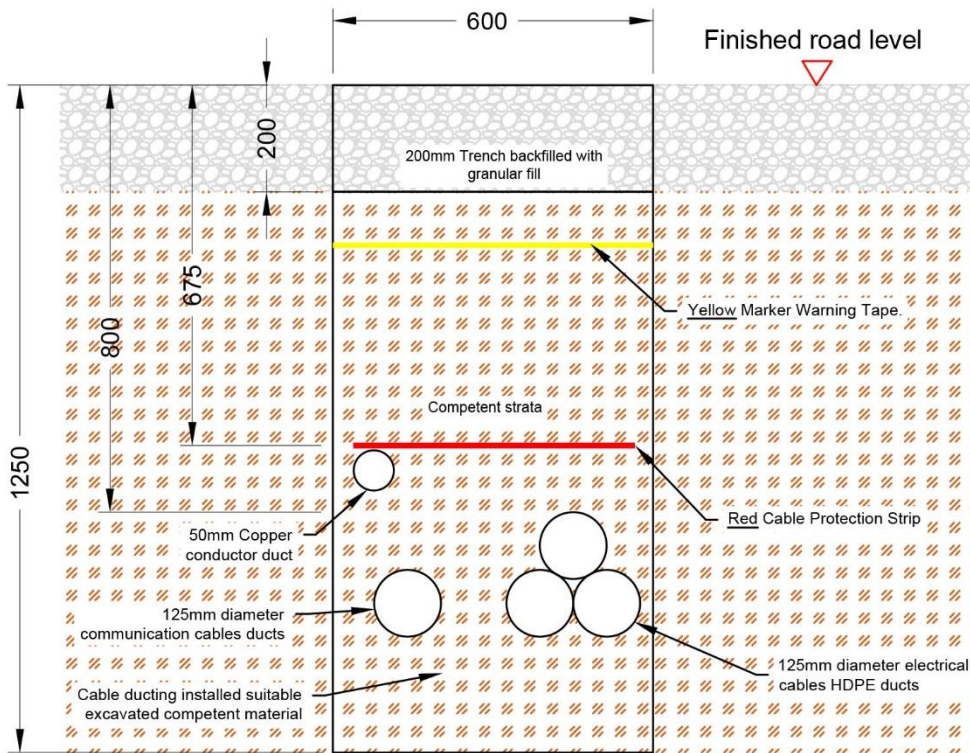
#### **Relevant Volume C3 EIAR Figures:**

**Figure RW 5.5: Cross Section of Internal Windfarm Cables Trench**



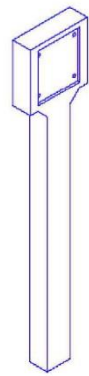
33kV CABLES TRENCH - TYPICAL SECTION THROUGH AGRICULTURAL LANDS AND FORESTRY LANDS

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

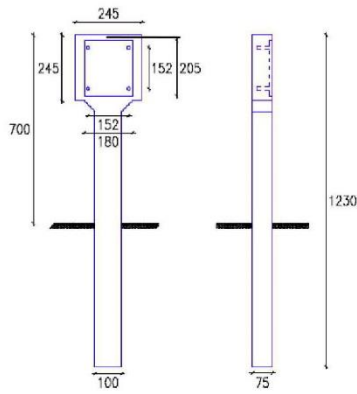


33kV CABLES TRENCH - TYPICAL SECTION THROUGH REALIGNED WINDFARM ROADS OR CONCENTED UWF WINDFARM ROADS





3D View



Front Elevation

Side Elevation

TYPICAL MARKER POST AND MARKER PLATE DIMENSIONS

End

<b>Outline Construction Methodology</b>		
<b>Title:</b>	<b>Instream Works Preparation and Reinstatement</b>	<b>Ref:</b> <b>RW-OCM-09</b>
<b>General Description</b>		
<p>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.</p>		
<b>Duration</b>		
1-2 Days per location		
<b>Personnel</b>	<b>Materials</b>	<b>Machinery &amp; Equipment</b>
<ul style="list-style-type: none"> <li>• 3-4 operatives</li> </ul>	<ul style="list-style-type: none"> <li>• Wheeled or Tracked dumper</li> <li>• 360° tracked excavator</li> <li>• Mobile water pumps and hoses</li> <li>• 4 x 4 vehicle and trailer</li> </ul>	<ul style="list-style-type: none"> <li>• Sand Bags containing washed sand</li> <li>• Geotextile membrane</li> <li>• Straw bales</li> <li>• Flume pipes</li> <li>• Splash plate</li> <li>• Silt Buster</li> <li>• Washed round stones</li> </ul>
<b>Standard Method 1: Dam &amp; Overpump work</b>		
<ol style="list-style-type: none"> <li>1. A dam will be constructed, upstream of the works location, using sand bags containing washed sand.</li> <li>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.</li> <li>3. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</li> <li>4. The works (outlined in <b>RW.OCM-10 Instream Works</b>) can then be carried out in the dry bed.</li> <li>5. If required, a temporary sump will be established and used to collect any leakages of water from the dam. This water will be removed by pumping to an infiltration trench or settlement pond if the soil is not saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released. Following the completion of works at the watercourse, the dam will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.</li> </ol>		
<b>Standard Method 2: Dam &amp; Divert work</b>		
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>7. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works to minimise sedimentation effects.</li> <li>7. The works (outlined in <b>RW.OCM-10 Instream Works</b>) can then be carried out in the dry stream bed.</li> <li>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</li> </ol>		

saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released.

- 8. Following the completion of works at the watercourse, the dam will be removed, the diversion channel filled in using previously excavated materials and the original watercourse reinstated as per Instream Reinstatement outlined below.

**Standard Method 3: Dam & Flume work**

- 9. The flume pipe(s) will be set out on the bed of the watercourse.
- 10. A dam will be constructed using sand bags so that all the flow is diverted through the flume pipe(s).
- 11. A splash plate will be placed at the downstream end of the flume pipe where the water re-enters the watercourse in order to prevent erosion of the stream bed.
- 12. Silt traps, such as geotextile membrane, straw bales etc. will be placed downstream of the in-stream works location to minimise sedimentation
- 13. The works (outlined in **RW.OCM-10 Instream Works**) will be carried out under/around the flume pipe(s).
- 14. If required, a temporary sump will be established and used to collect any additional water. This water will be removed by pumping to an infiltration trench or settlement pond if the soil is not saturated, otherwise the water will be pumped to a suitable water treatment train, such as a Siltbuster, where any sediment will be allowed settle before the water is released.
- 15. Following the completion of works at the watercourse, the dam and flume pipes will be removed and the watercourse reinstated as per Instream Reinstatement outlined below.

**Standard Method: Instream Reinstatement**

- 16. Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the watercourse is achieved. Measures will include bank stabilisation using boulder armour or willow/brush bank protection, reinstatement of bank slopes and character, the creation of compound channels where necessary, reinstatement of instream flow features such as boulder substrates, pool/riffle sequences or spawning cobbles and planting to stabilise banks, to add flood protection and to provide a riparian buffer.

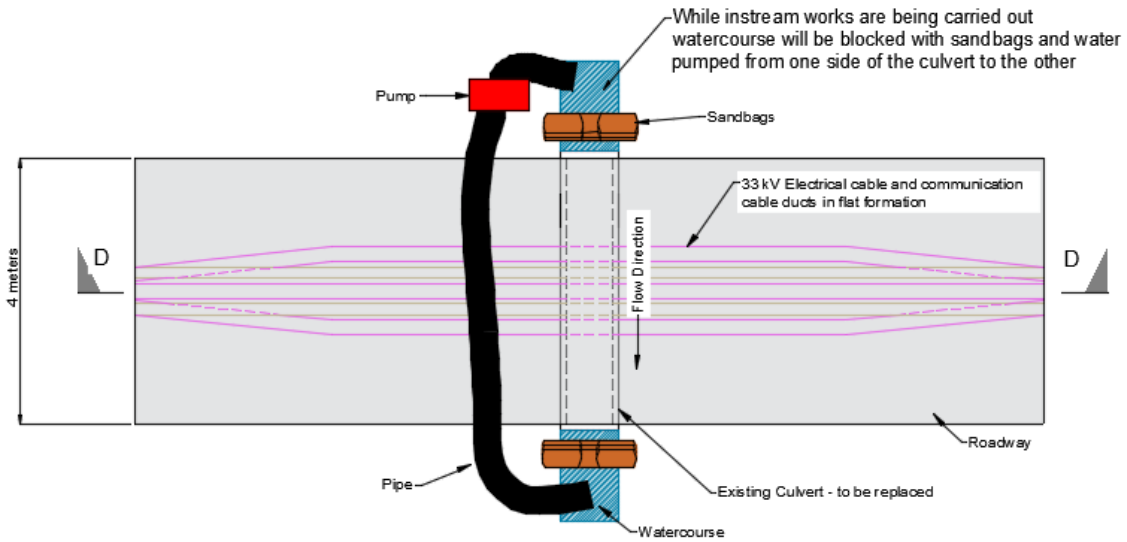
**Photographs**



PVC Flume Pipes

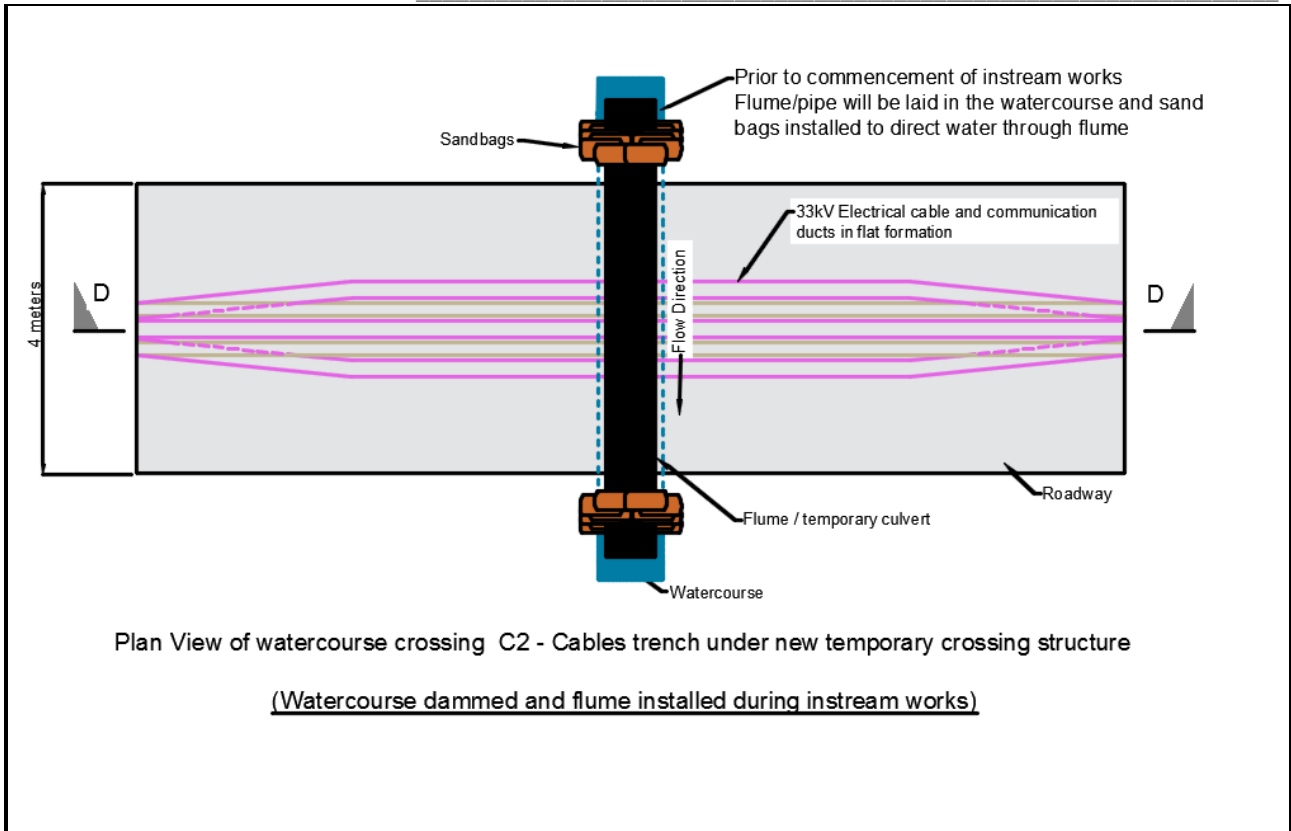
Relevant Drawings from Volume C3 EIAR Figures

Extract from Figure RW 5.17:  
Dam & Overpump Work



Plan View of watercourse crossing type B1 - Cable ducts laid in flat formation under replaced structure

Extract from Figure RW 5.19:  
Dam & Flume Work



END

**Outline Construction Methodology**

<b>Title:</b>	<b>Instream Works</b>	<b>Ref:</b>	<b>RW.OCM-10</b>
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**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"> <li>Site engineer</li> <li>3-4 operatives</li> </ul>	<ul style="list-style-type: none"> <li>Wheeled or Tracked dumper.</li> <li>360° tracked excavator</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Pipe Culvert</li> <li>Box Culvert</li> <li>Cable Ducting &amp; trenching materials</li> <li>Dry Lean mix concrete</li> <li>Siltbuster</li> <li>50mm stone</li> </ul>

**Standard Methods: Trenching & Ducting**

- The works will take place in a dry stream bed, following damming methods outlined in [RW.OCM-09 Instream Works Preparation and Reinstatement](#).
- 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.
- A trench will be excavated in the dry stream bed and cable ducts will be laid using the methods outlined in [RW\\_OCM\\_08: Internal Windfarm Cabling](#). The excavated materials will be stored further than 10m from the watercourse on flat ground or within a local hollow area. A containment berm will be placed downslope of the

excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse. The river gravel/spawning gravel at the surface of the excavation will be stored separately from the excavated subsoil material.

12. Once the ducting has been installed, the trench will be backfilled to within 200mm of the watercourse bed level using the temporarily stored excavated material and the separated river gravel/spawning gravel will then be used to backfill the trench up to the existing stream bed level.
13. Once the stream bed is appropriately re-instated the dam will be removed thus restoring the stream to its original condition.
- 14.

#### Standard Methods: Replacement of existing culvert

15. The works will take place in a dry stream bed, following damming methods outlined in [RW.OCM-09 Instream Works Preparation and Reinstatement](#).
16. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
17. The old culvert will be dug out and removed using an excavator.
18. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.
19. Where pipe culverts are being installed, 900mm culverts will be used and will be set 300mm into the stream bed. If 1200mm culverts are required, these will be installed 500mm into the original stream bed level. Where a box culvert is used, the culvert will be bottomless and the walls of the culvert will be placed at the sides of the watercourse, 300mm into the streambed.
20. River gravels will then be placed into the pipe culverts to a depth of c.300mm in the 900mm pipes, to a depth of c.500mm in the 1200mm pipes or to a depth of 300mm where excavation had taken place to set in the walls of the box culvert.
21. The dam is removed and the watercourse can flow through the new culvert.
22. Works can then take place above the culvert without the risk of sediments being released into the watercourse.

#### Variation 14A: Installation of New Culvert Structure and Roadway Crossing.

23. The works will take place in a dry stream bed, following damming methods outlined in [GC.OCM-09 Instream Works Preparation and Reinstatement](#).
24. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the culvert location and will be temporarily stored in a designated area greater than 10m from the watercourse.
25. A new HDPE culvert or precast concrete pipe culvert or box culvert will be installed in the watercourse.
26. Where pipe culverts are being installed, 900mm culverts will be used and will be set 300mm into the stream bed. If 1200mm culverts are required, these will be installed 500mm into the original stream bed level. Where a box culvert is used, the culvert will be bottomless and the walls of the culvert will be placed at the sides of the watercourse, 300mm into the streambed.
27. The dam is removed and the watercourse can flow through the new culvert.
28. Crushed stone will then be laid over the culvert and built up in layers to provide vehicular access above the watercourse.

#### Variation 14B: Installation of Cable Ducting together with New or Replaced Culvert Structures

29. The cable ducting will either be laid under the watercourse as per the Standard Method Trenching and Ducting described above and a culvert installed as per Variation 14A above or alternatively, in the case where there is enough depth of cover between the new culvert and the existing ground level, the cable can be installed above culvert structure.

#### Variation 14C: Installation of Temporary Culverts

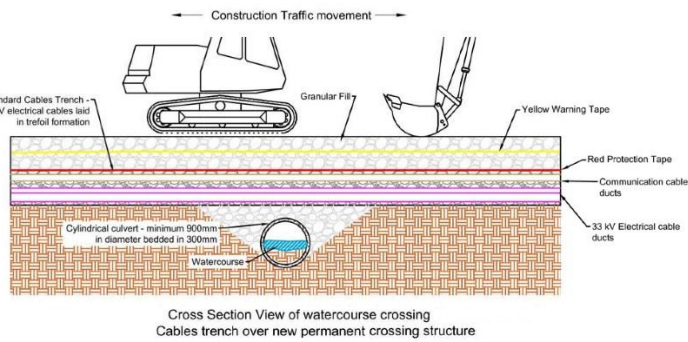
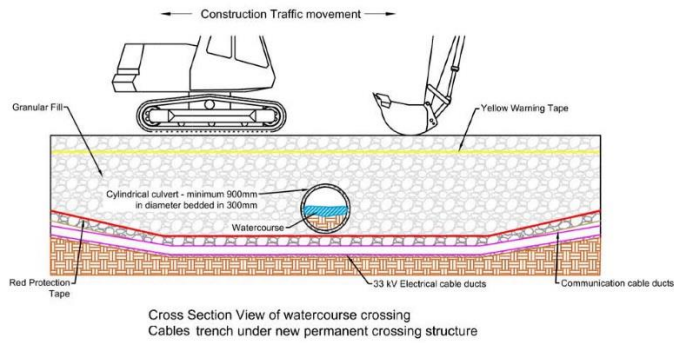
30. The works will take place in a dry stream bed, following damming methods outlined in [RW.OCM-09 Instream Works Preparation and Reinstatement](#).
31. Where applicable, under the supervision of an aquatic ecologist, spawning gravels will be removed at the watercourse crossing location and will be temporarily stored in a designated area greater than 10m from the watercourse.
32. A 900mm flume pipe culvert will be placed along the stream bed.

33. 50mm stone will be laid over the culvert and built up in layers to provide vehicular access across the watercourse.
34. When the culvert is no longer required, it will be removed by damming the watercourse as outlined in [RW.OCM-09 Instream Works Preparation and Reinstatement](#), removing the stone and lifting the culvert from the stream.
35. The watercourse will then be reinstated as per [RW.OCM-09 Instream Works Preparation and Reinstatement](#).

Relevant Drawings from Volume C3 EIAR Figures

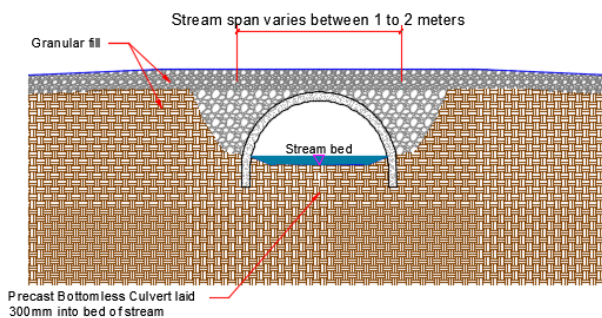
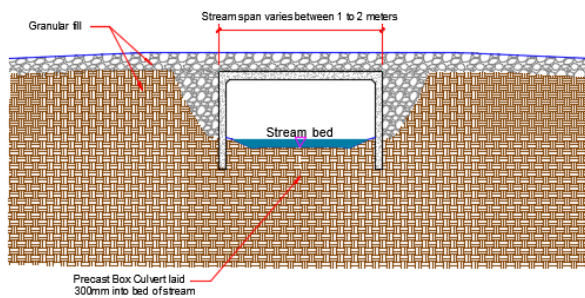
Extract from Figure RW 5.18:

Cables under crossing structures & Cables over crossing structures



Extract from Figure RW 5.18:

Box Culverts and Bottomless Box Culverts

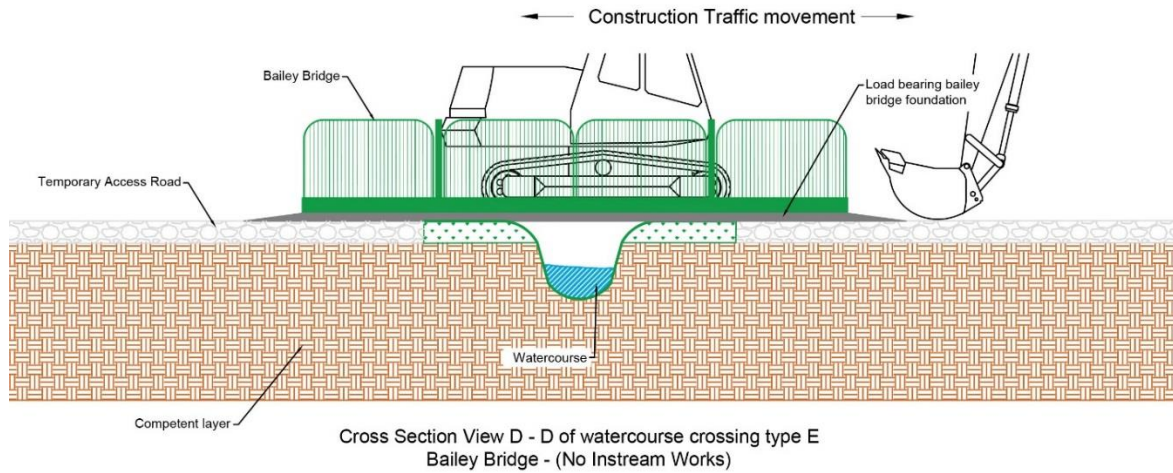




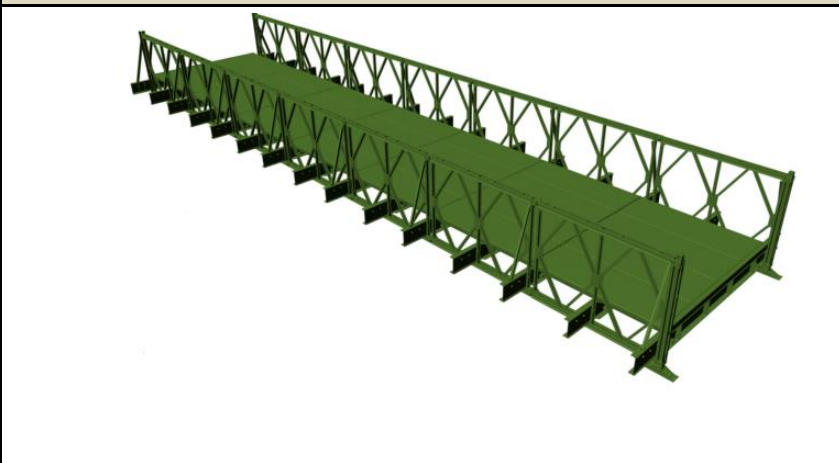
<u>END</u>	
<b>Outline Construction Methodology</b>	
<b>Title:</b>	<b>Bailey Bridge Installation</b>
<b>Ref:</b>	<b>RW-OCM-11</b>
<b>General Description</b>	
Bailey bridges will be used to provide temporary crossing points over watercourses. They will be installed outside of the July – September period 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.	
<b>Duration</b>	
0.5 – 1 day per location	
<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>• Site engineer</li> <li>• 2-3 operatives</li> <li>• City Crane / Hi-Ab</li> <li>• Hand tools</li> <li>• Tractor and low loader</li> <li>• Tracked Excavator</li> </ul>	<ul style="list-style-type: none"> <li>• Steel frames</li> <li>• Bearing pads</li> <li>• Clause 804 stone</li> <li>• Granular fill</li> <li>• Geotextile</li> </ul>
<b>Standard Methods</b>	
<ol style="list-style-type: none"> <li>1. A temporary access road will be constructed in advance of the arrival of the Bailey bridge .</li> <li>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.</li> <li>3. The bridge will be delivered to the crossing on a low loader.</li> <li>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.</li> <li>5. When the works are complete and the bridge is no longer required the bridge will be disassembled and removed from site.</li> <li>6. The stone from the bearing pads and temporary road will be removed and the excavated soil reinstated and reseeded.</li> </ol>	

**Relevant Volume C3 EIAR Figures**

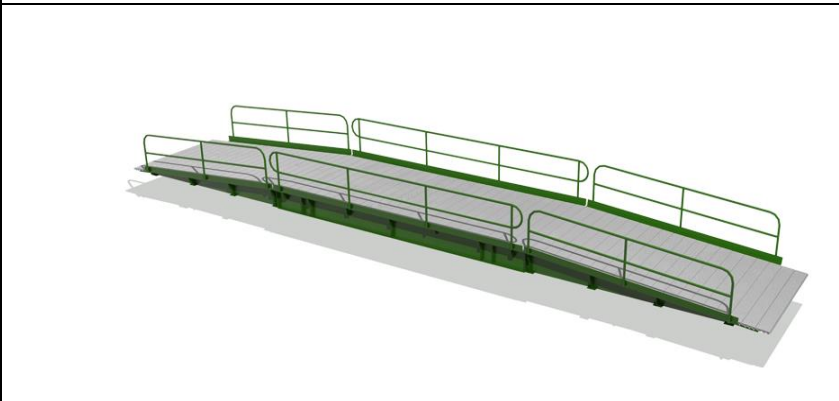
Figure RW 5.21: Watercourse Crossing Type E – Plan and Cross Section Views of Bailey Bridge



**Relevant Plan Drawings/Photographs**



Typical Bailey Bridge



Typical Bailey Bridge

**References**

- Groundforce Bridge – Temporary Bridge (<https://www.vpgroundforce.com/ire/temporary-bridges/>)

End

**Outline Construction Methodology**

<b>Title:</b>	Upgrading Existing Private Roads to Windfarm Access Roads	<b>Ref:</b>	<b>RW.OCM-12</b>
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**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

<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
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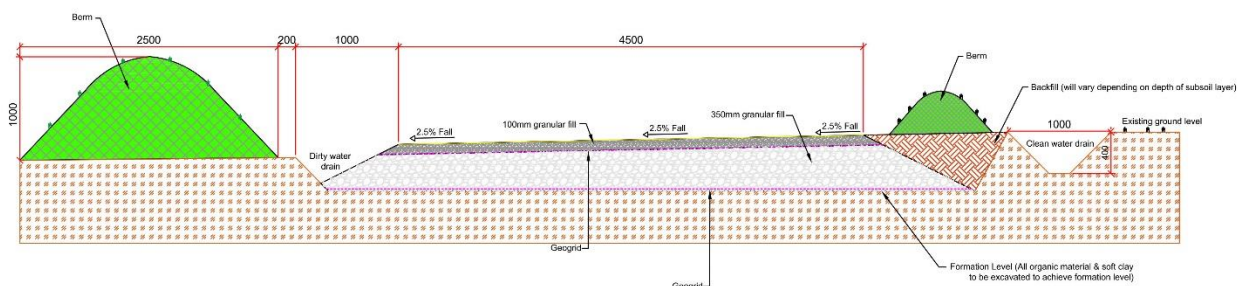
- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Wheeled dumper or Track dumper (6 to 8 tons)</li> <li>• 360° tracked excavator (13 Ton normally)</li> <li>• Hand tools</li> <li>• Crew size: 3 operatives</li> <li>• Vibrating roller</li> </ul> | <ul style="list-style-type: none"> <li>• 6" Stone</li> <li>• Geotextile</li> <li>• Granular Fill as per design</li> </ul> |
|---|---|

**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**

<b>Title:</b>	<b>Overburden Storage Berms</b>	<b>Ref:</b>	<b>RW.OCM-13</b>
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**General Description**

Overburden will result from an excess of excavated material from the Windfarm Related Works areas during the construction works which will be permanently or temporarily stored in overburden storage berms. The berms will mainly be located adjacent to Realigned Windfarm Roads or the Haul Route Works areas and will be constructed to a 2:1 width/height ratio.

**Duration**

- For the duration of the works

<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
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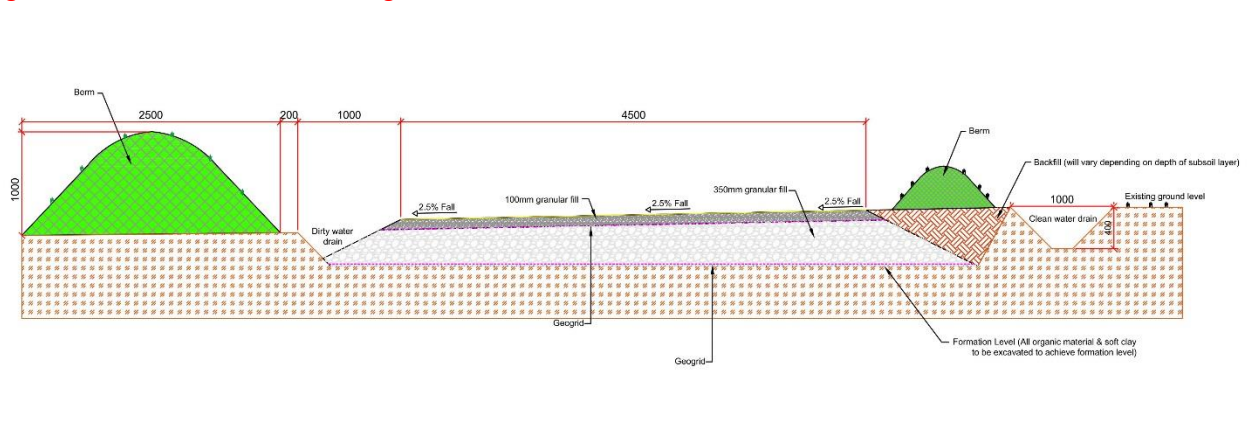
- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• 1 Excavator</li> <li>• 1 Dump truck</li> </ul> | <ul style="list-style-type: none"> <li>• Grass seed</li> </ul> |
|---|--|

**Standard Methods**

1. During the construction of the Realigned Windfarm Roads or the Haul Route Works the excavated material will be used to construct a new bank adjacent to the works area at a sufficient set-back distance.
2. When the overburden material is tipped from the dump truck an excavator will place the material along the selected berm path and shape it to a height of 1 m and to whatever width is required for the amount of overburden required to be stored in the vicinity.
3. The sides will be battered at angles of 45 degrees or less and a light covering of topsoil/subsoil will be added.
4. Permanent berms will be reseeded with grass seed.

**Relevant Plan Drawings/Photographs**

**Figure RW 5.8: Cross Section of Realigned Windfarm Road**



**End**



<b>Outline Construction Methodology</b>			
<b>Title:</b>	Reinstatement of Land	<b>Ref:</b>	<b>RW-OCM-14</b>
<b>General Description</b>			
<p>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.</p>			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>1 – 4 days depending on location</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>Crew size: 3 workers</li> <li>13 Ton digger</li> <li>Dump truck</li> <li>Sub-soiler plough</li> <li>Levelling harrow</li> </ul>		<ul style="list-style-type: none"> <li>Native grass, heather, tree and hedgerow species – seeds/seedlings</li> <li>Fertilizer</li> <li>Fencing posts and wire</li> </ul>	
<b>Standard Methods : Reinstating lands</b>			
<ol style="list-style-type: none"> <li>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.</li> <li>The construction works area will, where required, be sub-soiled using a sub-soil plough to loosen any compacted areas.</li> <li>Sub-soil will be spread using the excavator</li> <li>Topsoil will be spread evenly over the subsoil to surface level using an excavator.</li> <li>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.</li> <li>All stones in excess of 50mm will be removed from the surface.</li> <li>The soil will be seeded with grasses and native species common to the surrounding vegetation.</li> <li>Fertilizer will be spread on any sections of improved grassland</li> <li>The lands will remain fenced until sufficiently revegetated, at which time all fencing will be removed off-site.</li> </ol>			
<b>Standard Methods: Reinstating hedgerows and treelines</b>			
<ol style="list-style-type: none"> <li>Boundaries where hedgerow and trees currently exist will be replanted with a mix of native hedgerow species or a new treeline as appropriate.</li> <li>New hedgerows and trees will be fenced to protect from damage by livestock.</li> <li>Earthen banks will be replaced and replanted with grass or hedgerow, as appropriate for the location</li> </ol>			
<b>Standard Methods: Reinstating fencing and walls</b>			
<ol style="list-style-type: none"> <li>Boundaries where timber fences and stone walls and banks currently exist will be reinstated to their former condition.</li> <li>Former timber fencing will be replaced with new timber fence</li> </ol>			

3. Stone walls, in particular old townland boundary walls will be replaced using the original stone

**References**

- ESB/IFA Code of Practice for Survey, Construction & Maintenance of Overhead lines in relation to the rights of landowners

**End**

<b>Outline Construction Methodology</b>			
<b>Title:</b>	<b>Internal Windfarm Cabling - Cable Pulling &amp; Jointing</b>	<b>Ref:</b>	<b>RW-OCM-15</b>
<b>General Description</b>			
<p>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.</p>			
<b>Duration</b>			
<ul style="list-style-type: none"> <li>• Site specific, half day to 1 day per cable section between joint bays depending on conditions.</li> </ul>			
<b>Personnel, Machinery &amp; Equipment</b>		<b>Materials</b>	
<ul style="list-style-type: none"> <li>• Cable Winch and four wheel drive vehicle</li> <li>• 3 operators</li> <li>• Rope Guide Roller</li> <li>• Cable Jacks</li> <li>• Swivel Link</li> <li>• Drum trailer and tractor</li> <li>• four wheel drive vehicle</li> </ul>		<ul style="list-style-type: none"> <li>• Cable attachment lugs</li> <li>• 110kV Electrical Cable</li> <li>• Fibre optical cable</li> <li>• Nylon rope</li> </ul>	
<b>Standard Methods – Cable Pulling</b>			
<ol style="list-style-type: none"> <li>1. The cables will be jointed approx. 900m apart at locations where c.5m of trench is temporarily left open to allow access to the ducts for the cable pulling and jointing operation.</li> <li>2. A gap of c.4m is left in the ducting at 900m intervals to give access to the cable ducts. The cable drums will be transported to the open trench locations using a tractor and drum trailer. The cable winch will be transported using a four wheel drive vehicle and will be parked at the next section of open trench along the cable route.</li> <li>3. Nylon ropes will be blown through the ducts and the winch wire rope will be attached to this rope and pulled from the winch to the drum location.</li> <li>4. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or using a pulling head fitted by the cable manufacturer.</li> <li>5. Rope guide rollers will be placed at the duct opening to guide the cable into the duct.</li> <li>6. The cable winch will pull the cable from the location where the cable drum is located, through the ducts until it reaches the winch location.</li> <li>7. Once the pulled cable has reached the winch, the cable is cut and prepared for jointing.</li> </ol>			
<b>Standard Methods – Cable Jointing</b>			
<ol style="list-style-type: none"> <li>1. Jointing works will involve the joining of the cables using hand held equipment ensuring the area and cable is kept clean from any dust or dirt.</li> <li>2. The various layers of the cable will be jointed separately with a final layer of heat shrink protection placed over the joint using a blow torch.</li> <li>3. Following the completion of jointing, the cable will be covered with sand and the trench will be infilled with the previously excavated material from the trench.</li> <li>4. Testing will then be carried out on the joint and the joint location will be logged for future reference.</li> <li>5. A cable protection strip is placed over the cable joint and another layer of protection strip will be placed 400mm below the finished ground level. Yellow warning tape will be placed in the trench circa. 300mm below the ground surface.</li> </ol>			
<b>End</b>			



<b>Outline Construction Methodology</b>	
<b>Title:</b>	<b>Forestry Felling</b>
<b>Ref:</b>	<b>RW-OCM-16</b>
<b>General Description</b>	
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.	
<b>Duration</b>	
<ul style="list-style-type: none"> <li>It will take 3 days to complete the required felling.</li> </ul>	
<b>Personnel, Machinery &amp; Equipment</b>	<b>Materials</b>
<ul style="list-style-type: none"> <li>One forestry harvester</li> <li>One timber forwarder machine</li> <li>Timber lorries</li> <li>Chainsaws</li> </ul>	
<b>Standard Methods</b>	
<ol style="list-style-type: none"> <li>The trees will be cut and de-limbed using a forestry harvester machine.</li> <li>The harvester will cut the trees in various length assortments as required.</li> <li>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.</li> <li>All harvesting and extraction will be done in accordance with the Forestry Service Harvesting and Environmental Guidelines.</li> </ol>	
<b>Relevant Volume C3 EIAR Figures</b>	
None	
<b>End</b>	



**UWF RELATED WORKS**

**VOLUME D  
ENVIRONMENTAL MANAGEMENT PLAN**

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



**ECOPOWER**

