UPPERCHURCH WINDFARM

ENVIRONMENTAL MANAGEMENT PLAN

2021

UPDATED TO INCLUDE THE

PROPOSED LARGER TURBINES & MET MASTS

ECOPOWER

April 2021

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1. Introduction to the EMP

This updated Environmental Management Plan (EMP) has been prepared for the Upperchurch Windfarm and includes the Proposed Larger Turbines and Met Masts amendment. This amendment is subject of a current planning application to An Bord Pleanála (May 2021).

The updated EMP is based on the original Preliminary Environmental Management Plan for Upperchurch Windfarm (Malachy Walsh & Partners, 2013) and describes the approach to environmental management during the construction and 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 Upperchurch Windfarm to those with responsibility for carrying out works or activities 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 operational stage of the Upperchurch Windfarm.

1.2.1.1. Review and Update of the EMP

To facilitate the practical implementation of environmental management at the Upperchurch Windfarm construction site, the structure and layout of this 2021 EMP has been updated to align with the structure and layout of the more recent EMPs for UWF Related Works (2019) and UWF Grid Connection (2019).

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 Upperchurch Windfarm development to ensure it contains the latest relevant information, Environmental Commitments and Environmental Protection Measures.

Planning consent for Proposed Larger Turbines and Met Masts at the authorised Upperchurch Windfarm is being currently 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.

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 Upperchurch Windfarm, including purpose and location, main construction activities and classification of works locations. An overview of the other elements of the Whole UWF Project and other Activities in the area is also included.
Section 3	Contractors & Personnel	An outline of the type of contractors and personnel who will be involved in the project, including duties and responsibilities of key personnel, the training which will be provided and communication procedures which will be put in place.
Section 4	Environmental Commitments	An outline of the Environmental Commitments for the project and the Reference Documents, from which the Environmental Commitments arise.
Section 5	Environmental Protection Measures	The Environmental Protection Measures by which the Environmental Commitments will be implemented, including Mitigation Measures, Environmental Management Procedures, Management Plans, and Survey Requirements & Monitoring Schedule.
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, and application of Environmental Performance Indicators.
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 Upperchurch Windfarm (including the Proposed Larger Turbines and Met Masts)

2. General Project Description

An overview of the Upperchurch Windfarm is provided below, the full description of the project is provided in Chapter 1: The Proposed Larger Turbines and Met Masts at Authorised Upperchurch Windfarm Environmental Impact Assessment Report (EIAR) 2021

The Upperchurch Windfarm comprises of the following parts:

- Wind turbines
- Electrical Substation
- Windfarm Roads
- Crane Hardstanding Areas & Turbine Foundations
- Windfarm Ancillary Works

2.1. Purpose of Upperchurch Windfarm

The purpose of Upperchurch Windfarm is to generate renewable electricity from the wind resource. This electricity will be transported to the windfarm electrical substation at Knockcurraghbola Commons.

2.2. Location and overview description of Upperchurch Windfarm

The Authorised Upperchurch Windfarm comprises 22 No. wind turbines, 2 No. met masts, 22 No. turbine foundation and crane hardstanding areas, site roads and an electrical substation. The 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.

Authorised Wind Turbines: The authorised turbines will be of the generic three-bladed up-wind rotor, horizontal axis, tubular tower turbines with active pitch regulated variable speed operation. The towers will be of tubular steel design, tapering from the base to the top where the nacelle will be mounted. The blades which are made of fiberglass reinforced epoxy, are also tapered to tip, with serrated trailing edges to reduce noise. The nacelle at the top of each turbine tower will contain the generator and control unit, which will be designed for computer controlled monitoring of all major functions of the turbine. The nacelle will have effective sound insulation which will ensure minimal noise emissions. Access to the tower is via a staircase located outside on the hardstand and a secure hinged door into the tower. The authorised turbines would have a generation capacity of 2MW to 3MW.

Proposed Larger Turbines: An application for larger turbines and met masts at the authorised Upperchurch Windfarm is the subject of a current Strategic Infrastructure Development application to An Bord Pleanála (May 2021). The proposed larger turbines will be of the same design as the authorised turbines but with longer blades and a taller hub. The proposed larger turbines will have a generation capacity in the 3.5MW to 4.2MW range.

Windfarm Met Masts: The Authorised Upperchurch Windfarm includes 2 no. Met Masts with a height of 80m and of tubular tower design. It is also proposed (May 2021) to replace the 2 no. authorised 80m high tubular tower met masts with maximum in height, 93.5m lattice tower masts.

Windfarm Electrical Substation: The windfarm substation was authorised as part of the Upperchurch Windfarm in 2014 (Planning Ref. 13/520003), with amendments to the substation granted permission in 2020

(Planning Ref. 20/1048). There is no change to the location of the substation - the amended substation is within the previously authorised substation hard cored area. The windfarm substation consists of a hardcore compound yard 3107m² in area (68.64m x 45.27m), surrounded by palisade fencing with entrance gates. Inside the palisade fence, in the hardcore compound yard are 2 No. control buildings with self-contained welfare facilities to be installed; electrical equipment and apparatus, a lightening protection monopole; and underground and overhead cabling.

Windfarm Roads: The authorised windfarm site access roads comprise of 11.6km of windfarm access roads, including 8km of newly built 5m wide roads and 3.6km of existing farm roads, which will require upgrading and widening (average by 2m widening).

Crane Hardstanding and Turbine Foundations: Construction of 22 No. hard-core hardstanding areas, is authorised adjacent to each wind turbine location to facilitate erection of the turbine during the construction phase and maintenance works during the operational phase. These authorised hardstands are 1470m^2 in plan area. Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground surface. The turbines require the construction of foundations comprising concrete, steel reinforcement and aggregate, designed to engineer's specifications depending on the turbine model chosen. The foundation design will be dictated by the turbine manufacturer and a typical foundation size for larger turbines is shown in UWF-PA1 01 as 20m in diameter and 2.7m in depth. The typical horizontal and vertical extent of the authorised turbine foundations is shown in UWF PA1 01. UWF PA1 01 can be found in the planning drawings which accompany the 2021 planning application to An Bord Pleanála.

The authorised crane hardstanding areas and the authorised turbine foundations can accommodate the proposed larger turbines. The authorised hardstanding areas are adequately sized to cater for larger turbines and the concrete, steel and aggregates required for the larger turbine foundations will be in line with the requirements for the authorised turbines.

Ancillary Works include site entrances, watercourse crossing, drainage system, site compounds, borrow pits, forestry felling, hedgerow removal and fencing, as per:

- one site entrance from the R503 Regional Road at Graniera, which is the main site entrance (No.1), and ten site entrances from Local Roads, through and around the site which will provide access to various parts of the authorised windfarm;
- one stream crossing will be required on the windfarm site, to the north of Turbine No.4. The Authorised windfarm includes the construction of a new permanent clear span bridge or bottomless culvert at this crossing point;
- Drainage measures will be implemented during construction of Upperchurch Windfarm, including surface water drains, upslope and downslope of works areas which will keep clean water separate from runoff from construction works areas that may be contaminated by sediment; and sediment control measures (such as silt traps and settlement ponds) to ensure that all water discharged is clean;
- two site compounds, to be used during the construction phase of Upperchurch Windfarm. Site Compound No. 1 will be the main compound during the construction phase. Following construction, Site Compound No.2 will be retained for use as a site office by the maintenance personnel for the operational phase of the Upperchurch Windfarm;
- six borrow pits authorised on the Upperchurch Windfarm site which will be used to quarry stone for construction. Post construction, borrow pits will be backfilled and covered with topsoil and reseeded;

- clear-felling of 4.4 hectares of conifer plantation prior to construction is authorised to facilitate the construction of Upperchurch Windfarm and associated infrastructure;
- removal of c.980m of hedgerow along field boundaries. 360m relates to suitable bat foraging habitat. To mitigate this loss of habitat, an equivalent amount of new hedgerow will be planted as part of the authorised development; and
- Erection of fencing - the Windfarm Substation will be fenced according to ESB regulation. There will also be some agricultural fencing erected/replaced on the windfarm site either as required by the landowners, for Health & Safety reasons or to protect environmental/cultural heritage features.

Windfarm Haul Routes: Construction traffic is authorised to access the windfarm site from the R503 (Thurles to Limerick Regional Road) at Graniera, south of the site. Access for construction and operational traffic throughout the site will be from Local Roads at Knockmaroe, Knockcurraghbola Commons and Gleninchnaveigh, with road crossings on the Local Roads at Shevry and Knockcurraghbola Commons generally in the centre of the site and also on the Local Road at Grousehall, generally to the north of the site.

Relevant Figures *(included in Section 9 of this EMP):*

Figure PLT 1.1: Location of the Authorised Upperchurch Windfarm (including the Proposed Larger Turbines and Met Masts)

Figure PLT 1.3: Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (OSI Discovery Mapping)

Figure PLT 1.4: Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (Aerial Photography)

2.3. Main Construction Stage Activities

Construction stage activities will involve the following main works:

• Pre-Construction Activities	• Overburden Storage Berms
• Site Compounds	• Turbine Foundations – excavation, steel reinforcement
• Site Entrances	• Turbine Foundations – pouring of concrete
• Construction Works Area Preparation	• Windfarm Substation civil works
• Windfarm Roads	• Electrical Works
• New clear-span Bridge at WW2	• Wind turbine delivery and erection
• Felling of Forestry and Removal of Hedgerows	• Reinstatement of Lands
• Crane Hardstanding areas	• Hedgerow planting and enhancement

2.3.1. Method Statements

Method statements are used to explain project requirements through planned systems of work including work instructions for site staff and construction personnel. They are prepared for activities identified in the civil engineering and electrical works (outlined in the table above). Method statements are issued to all responsible personnel and those involved with the specified activity.

Upon appointment, detailed method statements will be prepared by the appointed Contractor, prior to the commencement of the wind farm construction. Method Statements will be job-specific for the main activities, and will describe the task, the responsible personnel, the risks and the required controls or mitigation measures. They have supporting drawings and documentation as required. The Appointed Contractor will apply a standard format for all statements.

Method Statements will also be relevant to site safety and be attached to the site safety file for the project. However, any Method Statements relevant to environmental protection will be developed and appended to the EMP and communicated with the appropriate personnel. A register of Method Statements required throughout the project will be maintained in the site office.

As the project progresses, new activities or amendments will also require Method Statements. Method Statements may also be revised based on new information or improvements on site.

2.3.2. Construction Schedule

Construction of Upperchurch Windfarm is expected to commence in 2022 and will take approx. 12/18 months. The Contractor appointed to the construction of the project will be responsible for preparing a detailed construction schedule, taking account of any relevant planning conditions, seasonal requirements and health and safety considerations.

The detailed construction schedule will include a sequence of elements such as;

- Clearance and construction of hardcore area for temporary compound and mobilisation of site offices.
- Construction of bunded area for fuel and diesel tanks.
- Construction of new access roads and hardstandings.
- Construction of drainage per Surface Water Management Plan.
- Installation of meteorological masts.
- 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, removing shutters thereafter.

2.4. Other Elements of the Whole UWF Project

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

Relevant EMP Figures:

Figure PLT 1.2: Location of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts)

The following table lists all the Elements of the Whole UWF Project, a summary composition of each element and the corresponding planning references.

Table 2: Whole UWF Project

Element of the whole UWF project	Composition of each Element	Planning Status and Competent Authority for each Element
Upperchurch Windfarm	22 No. Wind Turbines up to 126.6m tip height; 2 No. met masts; access roads; electrical substation and ancillary works	Authorised by ABP on 06.08.2014 (File Ref. 22.243040 Tipperary County Council Ref. 13/51/0003).
Upperchurch Windfarm Includes – **2020 Amendments to the Authorised Electrical Substation**	Amendment to layout and design of the substation authorised as part of Upperchurch Windfarm under planning ref 13/510003	Authorised by Tipperary County Council under Planning Reference 20/1048 on 10.12.2020.
Subject Application - Proposed Amendment for Larger Turbines & Met Masts	Amendments to authorised turbines and masts to larger wind turbines (up to 152m tip height) and taller met masts (up to 93.5m) and change in mast design	**This herein Strategic Infrastructure Development Application to An Bord Pleanála.**
UWF Related Works	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works	Authorised by ABP on 08.02.2021 File Ref. PL.92.303634)
UWF Grid Connection	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Ancillary Works at Mountphilips Substation site	Authorised by ABP on 08.02.2021 (File Ref. PL.92. 306204).

Element of the whole UWF project	Composition of each Element	Planning Status and Competent Authority for each Element
UWF Replacement Forestry	Replacement Forestry at Foilnaman	Afforestation license granted by the Minister for Agriculture, Food and the Marine on 07/11/2018. Forest Owner Number FO138819C. Contract Number CN81893.
UWF Other Activities	Haul Route Activities Upperchurch Hen Harrier Scheme Monitoring Activities Overhead Line Activities	n/a

2.4.1. Locational Context of the Other Elements in relation to Upperchurch Windfarm

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 UWF Other Activities).

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

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

- The majority of the UWF Related Works (Internal Windfarm Cabling) overlaps the Windfarm Roads and connect into the authorised Windfarm Substation,
- The UWF Related Works - Realigned Windfarm Roads, Haul Route Works and Telecom Relay Pole, are located in the immediate vicinity of various parts of the Upperchurch Windfarm,
- The UWF Grid Connection connects into the authorised Windfarm Substation,
- UWF Replacement Forestry and UWF Other Activities (Upperchurch Hen Harrier Scheme) are both located in the vicinity of Upperchurch Windfarm, although neither overlap the windfarm site.

2.5. Other Activities in the vicinity of the Upperchurch Windfarm

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

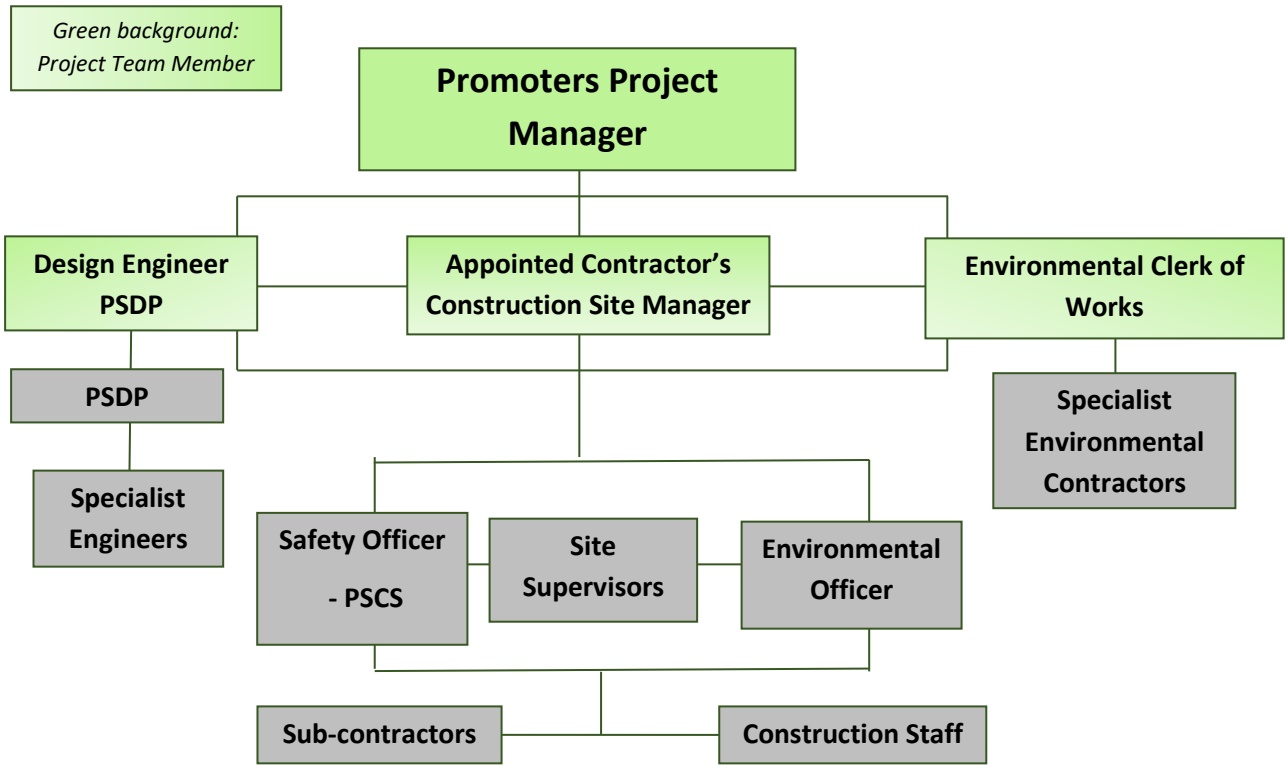
The construction Project Manager and Main Contractor will be appointed by the Promoter prior to commencement of the works. On appointment, the Project Manager and the Main Contractor will be required by the Project Promoter to update the outline organisational structure, the specific duties, roles and 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 Upperchurch Windfarm 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 3 to 5 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 3: Project Promoters Contacts

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

Table 4: 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 5: 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 Upperchurch Windfarm has overall responsibility for the implementation of the environmental commitments and of environmental management of the works during construction and operation.

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, and 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 Protection 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 and activities where there is a risk of environmental damage, by incorporating relevant Environmental Protection 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 Protection 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 Upperchurch Windfarm 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 4.1 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 Environmental Protection Measures; 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 Protection 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 Protection Measures.
- Liaising with the Construction Site Manager in reviewing and updating the Method Statements where Environmental Protection 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 Protection 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 Protection 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 Upperchurch Windfarm;
- Liaising with the Environmental Clerk of Works on local community concerns relating to the environment;
- Keeping the local community informed of project progress and any construction activities which may cause inconvenience to them.

3.3.2.5.3. Specialist Environmental Contractors

Project Ecologist

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

- Advising the Environmental Clerk of Works, Project Manager, Construction Manager and Project Promoter on relevant wildlife/environmental legislation and aid in the development of practical solutions
- carrying out the habitat and species surveys during the appropriate periods
- aiding with the implementation of biodiversity related planning conditions
- monitoring and aiding with the implementation of biodiversity related Environmental Protection Measures
- monitoring vegetation clearance
- monitoring the success of the re-vegetation work

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) and Sediment & Erosion Control Plan;
- Carrying out of site inspections in accordance with the SWMP
- carrying out of water quality monitoring prior to, during and post construction

Project Archaeologist

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

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

3.3.2.5.4. All site personnel

All site personnel are responsible for:

- Adhering to the relevant Environmental Protection 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 Protection 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 Protection 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 Protection 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 Protection Measures) has been devised for a works activity, all site personnel involved in that activity will receive a toolbox talk outlining the Environmental Protection 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 Upperchurch Windfarm 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 Protection 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 Protection Measures to the attention of all site personnel.

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

3.5.2. External Communication with the Public

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

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

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

4. Environmental Commitments

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

The current List of Environmental Commitments, listed in Table 6 below, arises from the Proposed Larger Turbines and Met Masts at Authorised Upperchurch Windfarm Environmental Impact Assessment Report (April 2021). This List will be updated with any additional environmental commitments arising from the Reference Documents in Section 4.1 below.

Table 6: 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 **Mitigation Measures** WF-MM-01 to WW-MM-53	EIAR 2021, Ch.14	Project Team and specialist environmental and engineering experts	Incorporation of the Mitigation Measures listed in Section 5.1 below into Method Statements/ Management Plans/ Environmental Management Procedures/ Schedule of Works/ Surveying Requirements.
The Project Promoter is committed to implementing the **Additional Mitigation Measures for the Proposed Larger Turbines and Met Masts**	EIAR 2021, Ch.14	Project Promoter and specialist environmental and engineering experts	Incorporation of the Additional Mitigation Measures listed in Section 5.2 below into Method Statements/Management Plans/ Environmental Management Procedures/ Schedule of Works/ Surveying Requirements.
The Project Promoter is committed to implementing the **Environmental Management Procedures**	EMP, Tab3	Project Team Site Ecologist Site Hydrologist Site Archaeologist	Environmental Management Procedures
The Project Promoter is committed to implementing the **Traffic Management Plan.**	EMP, Tab 4	Project Team	Traffic Management Plan
The Project Promoter is committed to implementing the **Surface Water Management Plan** and the **Sediment & Erosion Control Plan.**	EMP, Tab 5 Tab 6	Project Team Site Ecologist Site Hydrologist	Surface Water Management Plan Sediment & Erosion Control Plan
The Project Promoter is committed to implementing the **Waste Management Plan.**	EMP, Tab 7	Project Team	Waste Management Plan
The Project Promoter is committed to implementing the **Invasive Species Management Plan.**	EMP, Tab 8	Project Team Site Ecologist	Invasive Species Management Plan

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 **Ecological Management Plan**	EMP, Tab 9	Project Team Site Ecologist	Ecological Management Plan
The Project Promoter is committed to **monitoring** the development to check that the project is in practice, conforming to the predictions made in the EIA Report.	EIAR 2021, Ch.14	Project Team and specialist environmental and engineering experts	EMP Compliance Record Sheets Environmental Surveying Requirements (monitoring arrangements)

4.1. Reference Documents

The List of Environmental Commitments will be updated with any relevant changes to the Reference Documents, listed in Table 7.

Table 7: List of Reference Documents

Reference Document Title	Location
Grant of Permission including Planning Conditions • Authorised Upperchurch Windfarm (Planning Ref. 13/520003) • Authorised amendments to the windfarm electrical substation (Planning Ref. 20/1048) • Current application for Proposed Larger Turbines and Met Masts amendments to the authorised windfarm	Tab 1
Feedback from consultations with Statutory Bodies and Other Parties	Tab 2
Proposed Larger Turbines and Met Masts at Authorised Upperchurch Windfarm Environmental Impact Assessment Report (April 2021)	Accompanied the 2021 planning application
Construction Contract Documents	Tab 10
Method Statements	Tab 11

5. Environmental Protection Measures

The current Environmental Protection Measures comprise:

- Upperchurch Windfarm Mitigation Measures WF-MM-01 to WW-MM-53
- Additional Mitigation Measures for the Proposed Larger Turbines and Met Masts ,
- Environmental Management Procedures
- Management Plans: – Traffic, Surface Water, Sediment & Erosion Control, Waste, Invasive Species, and an Ecological Management Plan,
- Schedule of Works Requirements, and
- Environmental Survey Requirements (monitoring arrangements).

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. Upperchurch Windfarm Mitigation Measures

Table 8: Schedule of Upperchurch Windfarm Mitigation Measures

Upperchurch Windfarm Mitigation Measure (WF-MM)	
WF-MM-01	With exception of one stream crossing (250m to north of T4), no roads or turbine foundations occur within 50m of a watercourse. The stream crossing method statement will be designed in consultation with Inland Fisheries Ireland – South Eastern River Basin District and Shannon River Basin District prior to initiation of construction works
WF-MM-02	Where construction activities intercept the 50m hydrological buffer zone, the following mitigation will used to prevent any potential impacts: ▪Construction activities in the hydrological buffer zones will be avoided during or after prolonged rainfall or an exceptional rainfall event. Work will cease entirely near watercourses when it is evident that pollution is likely to occur. ▪Culverts will be installed at locations where land drains are intercepted and will be diverted into the clean water drains. The culverts will be designed to facilitate the large flows that may occur following intense or prolonged rainfall events.
WF-MM-03	Limestone or similar quality stone will be used to cap the new access road network and the upgraded existing roads.
WF-MM-04	All associated tree felling will be undertaken using good working practices as outlined by the Forest Service in their 'Forestry Harvesting and Environment Guidelines' (2000) and the 'Forestry and Water Quality Guidelines ' (2000). Measures will include the protection of the riparian zones, installation of buffered drainage outfalls, installation of drains and silt traps as soon as possible once felling has been completed, and a regime of continued monitoring of silt traps and drainage outfalls will be implemented. All excess felled brash will be removed off site to avoid release and runoff of phosphorous into sensitive watercourses.
WF-MM-05	No construction activities will take place during or after prolonged rainfall or an exceptional rainfall event.
WF-MM-06	Culverts will be installed at locations where land drains are intercepted and designed to facilitate the large flows associated with intense or prolonged rainfall events.
WF-MM-07	Method statements for stream crossing, culverts and drainage will be developed in consultation with Inland Fisheries Ireland prior to initiation of construction works.
WF-MM-08	A continuous silt fence will be installed down slope from the works area where construction shall take place within 100m of a watercourse. This will act as a physical impediment to any material or run-off reaching the stream and will be installed prior to the commencement of site excavations for each section. Effective and adequate temporary silt fences will be erected on the watercourse side to trap sediment particles when work is taking place during a prolonged wet weather period or intense rainfall event. The silt fences will be inspected regularly to ensure that the integrity of the structure remains intact and fit for purpose throughout the construction phase of the proposal.
WF-MM-09	During the construction phase, excavations will be backfilled as soon as is possible to prevent any infiltration of potentially polluting compounds to the subsurface.
WF-MM-10	Any water ingress that may be encountered in the weathered bedrock / mineral subsoils during the construction phase will be intercepted by an interceptor drain and diverted to the constructed drainage system for pollution control attenuation prior to discharge. Any pumping or dewatering of excavations or the drainage system will be well planned and pumped water will be treated in the

Upperchurch Windfarm Mitigation Measure (WF-MM)	
	adequate settlement pond and silt trap. No freshly pumped water will be permitted to enter the existing drainage network directly or be pumped out onto adjacent habitat.
WF-MM-11	A Concrete Control Procedure will be implemented, and will include the following measures: ▪Trucks that deliver concrete to site will be washed out at the supplier's facilities and not on site. ▪The only cement washing that will need to occur on site is the hand washing of the chutes at the rear of the cement trucks after the cement has been deposited. ▪A concrete washout area will be designated away from drains and watercourses for washing out the chutes; ▪A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase; ▪Run-off from wind turbine foundation concrete pours shall not be permitted to enter the watercourses and shall be contained within the foundation excavations and designated areas that are suitably sited and designed; ▪Large volumes of concrete water will be pumped into a skip to settle out; settled solids will be appropriately disposed of off-site. The total volume will be reduced by only permitting concrete chutes to be washed on site. ▪Raw or uncured waste concrete / cementitious material will be disposed of by removal from the site; ▪The amount of in-situ concreting required will be minimised and ready-mix suppliers will be used in preference to on-site batching;
WF-MM-12	A wheel wash area will be provided and the resultant waste water will be diverted to a siltation pond for settling out of solids.
WF-MM-13	During the construction phase, a self-contained portable toilet with an integrated waste holding tank will be used on site for toilet facilities. This will be maintained by the service contractor on a regular basis and will be removed from the site on completion of the construction phase.
WF-MM-14	Any introduced semi-natural (road building materials) or artificial (PVC piping, cement materials, electrical wiring etc.) will be taken off site at the end of the construction phase. Any accidental spillage of solid state introduced materials will be removed from the site.
WF-MM-15	Temporary facilities will be provided on the proposed site for construction traffic parking, temporary site offices and storage areas
WF-MM-16	Materials, containers, stockpiles and waste, however temporary, will be stored at designated areas, as follows: ▪Away from drains and any watercourses or drains; ▪Fuel oils etc. will be stored in a sheltered area well removed from aquatic zones • Under cover to prevent damage from the elements • In secure areas • Well away from moving plant, machinery and vehicles ▪All containers will be stored upright and clearly labelled.
WF-MM-17	During the construction phase, excavation of the soils in the localised area around the turbine locations and new access roads will be kept to a minimum, to ensure minimal disturbance of the natural soil conditions.
WF-MM-18	All excavated earth materials will be either re-used in an environmentally appropriate and safe manner, e.g. used for landscaping, or removed from the development site at the end of the construction phase.

Upperchurch Windfarm Mitigation Measure (WF-MM)	
WF-MM-19	Drains will be established to effectively drain grounds prior to excavation or earthworks of each section of road. Such drains will be positioned at an oblique angle to slope contours to ensure ground stability;
WF-MM-20	All site excavations and construction will be supervised by a suitably qualified engineer. The contractor's method statement will be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations.
WF-MM-21	Vehicular movements will be restricted to the footprint of the development. This implies that machinery will be kept on the site roads and hardstanding areas and aside, from advancing excavations, avoid moving onto areas not delineated on the site drawing.
WF-MM-22	A suitably qualified ecologist will be engaged to oversee the Ecological Management Plan over the life time of the wind farm. All site actions and monitoring measures will be required to be undertaken by the developer and under the supervision of the ecologist to achieve the objectives of the plan.
WF-MM-23	In order to mitigate the loss of potential foraging habitat for hen harrier, due to the construction of the wind farm at Upperchurch, 128 Hectares of habitat will be management adjacent to the area of development to the benefit of hen harrier. The Upperchurch Hen Harrier Scheme will involve the planting, with native species, of approximately 2.8km of new hedgerows. This habitat management will be implemented and management through the Upperchurch Hen Harrier Scheme which will form part of the Ecological Management Plan.
WF-MM-24	The layout of Upperchurch Windfarm has been designed to ensure that there is a sufficient buffer between windfarm infrastructure and the natural watercourses and streams within the study area. The layout of the turbines and the route of the access roads was also based on the results of site investigations, and for the most part the turbines and roads have been located on the least ecologically sensitive areas found during the investigations.
WF-MM-25	Replanting 360m of new hedgerow. Existing hedgerows in poor condition will be planted with native species to increase their ecological value. The location of new hedgerow shall be identified by the project ecologist prior to construction. Native species will be replanted within the proposed new hedgerows. Success of establishment will be monitored in early operational phase. Existing hedgerows in poor condition will be planted with native species to increase their ecological value.
WF-MM-26	As a result of permanent felling works areas surrounding the windfarm infrastructure will be bare - these areas will be incorporated into an Ecological Management Plan for the site.
WF-MM-27	Areas of existing conifer plantation will require permanent felling, in order to accommodate wind farm infrastructure and the erection of turbines. A large part of the felled area will not be required to accommodate the elements of wind farm infrastructure. This area will be allowed to naturally regenerate and be managed for nature conservation purposes. The main aim is to restore the conditions that allow wet heath, upland blanket bog, wet grassland and scrub vegetation to recover on these felled areas, within the site. In the event that the natural establishment of vegetation is slow, it is proposed to harvest seeds from purple-moor grass (*Molinia caerulea*) and other suitable species from a suitable location outside the site, and plant them within the bare felled areas.
WF-MM-28	Exposed areas of the site that are slow to re-vegetate will be replanted with suitable vegetation. This will be decided by the developer in consultation with the project ecologist near the end of the construction phase

Upperchurch Windfarm Mitigation Measure (WF-MM)	
WF-MM-29	The different tree felling methods will have an influence on the success of the restoration, and felling be undertaken, with prior consultation with the project ecologist. Restoration will be achieved by the felling of conifer trees and blocking selected drains, to locally increase the water table.
WF-MM-30	The following measures are designed to reduce the predicted impacts on bird populations: ▪ Pre-construction monitoring will be undertaken within the site, and will continue during the construction phase. ▪ Vegetation clearance, including the felling of trees, scrub and hedgerow, will be undertaken outside the breeding bird period (1st March to the 31st of August). ▪Work will begin before the breeding season begins to ensure that incubating birds or birds with young are not displaced by work commencing during the breeding season. ▪Damage to or loss of trees will be kept to a minimum, during the construction phase. ▪Machinery will be kept on roads and hardstanding areas, and aside from advancing roads, will not move onto habitats beyond the proposed development footprint, in order to prevent unnecessary damage or disturbance.
WF-MM-31	Intermittent lighting is less likely to cause species to collide with turbines. The use of "white lights" on the turbines will be avoided. Any form of lighting on the turbines or other structures will have to be agreed in advance with the Irish Aviation Authority.
WF-MM-32	To minimise risk to bat populations a 50 m buffer will be maintained around any feature (trees, hedges) into which no part of the turbine intrudes. No turbine blade tip is within 50m buffer of bat habitat features (trees, hedge). Hedgerows in proximity to be removed to maintain this buffer. The amount of hedgerow removal required will be identified by the project ecologist prior to construction.
WF-MM-33	Native species (including hawthorn, blackthorn, hazel and oak) will be planted within new hedgerows to increase their value as foraging habitat to bats. Native species offer higher quality habitat for invertebrates the main prey item for bat species. All planting and hedgerow reinstatement will be carried out following the guidelines and recommended methodology reference in Knowles, (1995) and JNCC, (2001). Gaps within existing hedgerows shall be planted with native species to encourage the use of hedgerows as flight paths.
WF-MM-34	Bat boxes shall be erected within the study area, at suitable locations deemed favourable, as a result of the pre- and post-construction bat surveys.
WF-MM-35	No works to bridges along haulage routes are required. However, the following measure is included in the Ecological Management Plan (2013): If any local bridge is to be strengthened, prior to use for haulage of construction materials for this development, it shall first be surveyed for bat presence, prior to any upgrading or maintenance works. Any maintenance or upgrading works, including pressure grouting or re-pointing of bridges, shall only proceed after an inspection of the structure for potential bat roosts, and will be in accordance with best practice guidelines and statutory procedures, (see National Roads Authority 2006a/2006b).
WF-MM-36	No mature trees require felling along haulage routes. However, the following measure is included in the Ecological Management Plan (2013): Mature trees that require felling should along haulage routes should also be surveyed for potential bat roosts bats. Any mitigation measures carried out to mitigate the potential impact to bats along haulage routes will be conducted under the terms of an appropriate NPWS wildlife derogation licence.
WF-MM-37	Pre and post construction monitoring of badger activity within the site will be carried out as part of the management of the site, implemented through the ecological management plan. Construction shall also be limited to the footprint of the windfarm development and the planning boundary thus

Upperchurch Windfarm Mitigation Measure (WF-MM)	
	maintaining the existing buffer between the windfarm development and the old setts recorded during the survey. If a new badger sett is discovered during construction works particularly vegetation clearance. Works shall be suspending within 50m of any newly discovered badger sett during the breeding season (December to June inclusive) and 30m outside the breeding season (July to November inclusive) pending an activity survey, consultation with the local NPWS Wildlife Ranger and receipt of a badger derogation licence.
WF-MM-38	A number of number of suitable settlement ponds are kept in situ once construction has been completed. These ponds will be modified to provide optimum habitat for dragonfly and damselfly species and other insects, birds and amphibians. Health and safety issues will have to be taken into consideration with fencing and signs recommended to alert people to potential dangers. The settlement ponds will be modified to have very gently sloping sides, providing extensive areas of very shallow water. If the pond is large enough, it will have a deep central area at least 1-1.5 m deep.
WF-MM-39	An Environmental Monitoring Committee will be established for the construction phase of the Upperchurch Windfarm. The Committee shall include representatives of the developer, North Tipperary County Council, Inland Fisheries Ireland, the project Ecologist, and representatives of the local community. Monthly meetings will be held and issues such as project progress, works planned for the month ahead, e.g. scheduled concrete pours of bases, results of construction noise monitoring, traffic or haulage schedules and any community issues or queries will be discussed.
WF-MM-40	To minimise the concentration of dust generated during construction of the development, the following measures will be implemented: the selection of construction materials for the onsite road network so as to ensure that particles are not blown around the site, this includes the use of aggregate of not less than 5mm grade and to also ensure that surface dressing be compressed quickly. In addition to reduce impacts on air quality concrete brought to the site will be poured directly, haulage trucks will not be over filled and also that site machinery and vehicles onsite will not be left running unnecessarily.
WF-MM-41	Construction phase noise: Best practice in the form of BS5228 –1&2:2009, Code of Practice for the Control of Noise and Vibration on Construction and Open Sites should be adopted during the construction phase in order to minimise the noise generated by construction activities and nuisance to neighbours.
WF-MM-42	No blasting will occur during the construction of the Upperchurch Wind Farm
WF-MM-43	Noise reduced control modules will be installed in the turbines and will be used where necessary to reduce noise emissions in order to ensure that the permitted noise levels are not exceeded during the operation of the windfarm.
WF-MM-44	Shadow Flicker occurrence will be logged in real-time, for the first two years of operation, to determine the actual shadow flicker duration at 6 no. neighbouring dwellings (*identified in the EIS 2013*) to ensure that the effect will not exceed 30 hours per annum. In the unlikely event that it is found that the 30 hours per annum limit will be exceeded, the offending turbine will be shut down during the time that it would cause the effect at the particular dwelling in question for the remaining part of that year.
WF-MM-45	Cultural Heritage: Due to the possibility of the survival of sub-surface archaeological deposits or finds within the development area, it is recommended that all groundworks associated with the proposed development be archaeologically monitored under licence to the National Monuments Service.

Upperchurch Windfarm Mitigation Measure (WF-MM)	
WF-MM-46	Cultural Heritage: It is recommended that a buffer-zone where development is precluded, be instituted around the Recorded Monument in the proposed development area. This should measure a minimum of 30m around the site. In addition no site offices, depots or storage facilities should be placed within these buffer zone.
WF-MM-47	Detailed pre-construction condition survey with county council engineer - Identify those sections of road which may require strengthening or realignment and as a basis for agreeing remedial works to be carried out by the developer with North Tipperary County Council on completion of the project.
WF-MM-48	Site Entrance No. 1 will be designed so that the component delivery trucks will be able to completely clear the R503 before they reach the gates of the construction site. This entrance will be closed on completion of the construction phase and will only be used during the operational phase in the case of a necessary replacement of a major component or for decommissioning the windfarm. 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.
WF-MM-49	In the interest of road safety during the construction stage, measures regarding traffic control will be implemented. In order to mitigate for increased road usage, deliveries of heavy equipment or oversized loads to the site will be timed to cause minimal disturbances to the residents and users of the local roads. Road authorities will also be informed of the planned road use, and transportation of oversized loads will be co-ordinated with the local authorities and Garda.
WF-MM-50	The promoter will at all times ensure that inconvenience to local people is minimised and will schedule traffic flow to achieve this.
WF-MM-51	Provision of a Relay Site at the windfarm to realign any affected telecommunication links around the wind turbines. *(Note: this mitigation measures was later developed as the UWF Related Works Telecoms Relay Pole).*
WF-MM-52	Landscape & Visual Impact - turbines: Matt non-reflective finishes will be used on all turbine components; ▪Transmission lines between individual turbines and the substation will be placed underground; ▪Counter rotation of blade sets will be avoided; ▪The number and extent of new access tracks will be kept to a minimum and properly landscaped immediately following completion of works. Such landscaping will include reinstating original vegetation along verges and repairing any wheel ruts; ▪Special care will be taken to preserve any features, which contribute to the landscape character of the study area. Any damage to existing hedgerows from transporting the turbines will be rectified; and ▪Turbines will be the same size as existing turbines in the area
WF-MM-53	Landscape & Visual Impact – windfarm substation: A high standard of design will be applied to all structures associated with the substation considering not only its function but also the aesthetic quality, in order to minimise any sense of intrusion. The proposed development will provide colour harmony and adequate screening of the substation using berms covered with scrub and ground vegetation in order to mitigate its impact.

5.2. Additional Mitigation Measures for the Proposed Larger Turbines & Met Masts

With the exception of the additional mitigation measures described below, all of the mitigation measures and monitoring arrangements which were proposed in 2013 as part of the original Upperchurch Windfarm application and form part of the planning conditions attached to the Grant of Permission for Upperchurch Windfarm will be implemented for the Proposed Larger Turbines and Met Masts.

5.2.1. Additional mitigation measure for Leisler's bat on Upperchurch Windfarm (Operational Stage)

2013 EIS/RFI Mitigation Measure: To minimise risk to bat populations a 50 m buffer will be maintained around any feature (trees, hedges) into which no part of the turbine intrudes. No turbine blade tip is within 50m buffer of bat habitat features (trees, hedge). Hedgerows in proximity to be removed to maintain this buffer. Use of white lights on top of the turbines will be avoided, and pre and post construction monitoring of bats along with fatality searches will be carried out.

2021 Additional Mitigation Measures: While the proposed larger turbines will not result in an increased significance of impact to bats (evaluated as slight to moderate in the Upperchurch Windfarm EIS 2013, and remaining slight to moderate significance for the Proposed Larger Turbines), two additional mitigation measures are added to this Proposal in order to alleviate the slightly increased risk to the species of Leisler's bat in the windfarm area:

1. Reduce the rotational speed of the turbine blades when idling so they do not exceed 2RPM, in line with best practice. It is noted that this measure will not result in any loss of energy output produced by the turbine. (SNH, 2019). This mitigation measure has been shown to significantly reduce collision risk to bats (Arnett *et al*. 2011, 2013; SNH, 2019). The implementation of this measure will ensure that the significance of the residual impact to Leisler's bat will not be materially greater than the authorised impact.
2. Adoption of the SNH best practice guidance 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' (2019) during the construction, operation and decommissioning of the Upperchurch Windfarm. This includes post-construction monitoring using dogs to search for bat carcasses around the turbine locations.

5.2.2. Additional Mitigation Measure for Shadow Flicker Occurrence (Operational Stage)

2013 EIS Mitigation Measure: Shadow Flicker occurrence will be logged in real-time, for the first two years of operation, to determine the actual shadow flicker duration at 6 no. neighbouring dwellings (identified in the EIS 2013) to ensure that the effect will not exceed 30 hours per annum. In the unlikely event that it is found that the 30 hours per annum limit will be exceeded, the offending turbine will be shut down during the time that it would cause the effect at the particular dwelling in question for the remaining part of that year.

2021 Additional Mitigation Measure: The promoter commits to the installation of Shadow Flicker Control Modules as a mitigation measure, to ensure that shadow flicker does not exceed the permitted levels of 30 hours per year or 30 minutes per day at dwellings, either from Upperchurch Windfarm alone, or cumulatively with Milestone Windfarm. Additionally, the promoter commits to set the Shadow Flicker Control Modules to eliminate shadow flicker completely at the relevant turbine(s) should a complaint regarding shadow flicker be received from a house within the study area. This will eliminate shadow flicker at the house in question.

5.3. Environmental Management Procedures

The following procedures, listed in Table 9, were included in the 2013 Preliminary Environmental Management Plan for Upperchurch Windfarm.

Table 9: Environmental Management Procedures

Ref:	Procedure:
EMP-1	Site Environmental Training and Awareness Procedure
EMP-2	Environmental Emergency Response Plan
EMP-3	Wheel Wash and Dewatering Procedure
EMP-4	Concrete Control Procedure
EMP-5	Fuel and Oil Management Plan
EMP-6	Surface Water management Plan
EMP-7	Traffic Management Plan
EMP-8	Protection of Archaeological and Cultural Heritage
EMP-9	Management of Excavation and Spoil
EMP-10	Management of Borrow Pits
EMP-11	Waste Management Plan
EMP-12	Air, Dust and Noise Management Plan
EMP-13	Site Reinstatement Procedure (post construction)
EMP-14	Monitoring and Auditing Procedure
EMP-15	Environmental Accidents, Incidents and Corrective Actions Procedure
EMP-16	Environmental Complaints Procedure
EMP-17	Environmental Monitoring Committee Procedure

These procedures will form part of the EMP, and will be continually updated where necessary. These procedures can only be amended by improvement with regards to environmental protection and must take cognisance of all mitigation measures recommended in the EIAR 2021. Furthermore, these procedures may be updated or amended pending specific conditions attached to planning permission.

The Environmental Management Procedures are included in Tab 3 of this EMP

5.4. Management Plans

The Management Plans are listed in Table 10 below, and included in full in **Tab 4 to 9** of this EMP.

Table 10: List of Environmental Protection Measures - Management Plans

Management Plan	Tab
Traffic Management Plan	Tab 4
Surface Water Management Plan	Tab 5
Sediment & Erosion Control Plan	Tab 6
Waste Management Plan	Tab 7
Invasive Species Management Plan	Tab 8
Ecological Management Plan	Tab 9

5.5. Schedule of Works Requirements

Table 11: Schedule of Works Requirements

ENVIRONMENTAL PROTECTION MEASURE – SCHEDULING OF WORKS	
Title:	**Scheduling of Works**
Responsibility of	**Role/Duty**
Project Manager	Liaising with the Construction Manager, Environmental Clerk of Works and Site Ecologist regarding temporal restrictions
Scheduling of Works included as Project Design Environmental Protection Measures	
WF-MM-02	Construction activities in the hydrological buffer zones will be avoided during or after prolonged rainfall or an exceptional rainfall event. Work will cease entirely near watercourses when it is evident that pollution is likely to occur.
WF-MM-05	No construction activities will take place during or after prolonged rainfall or an exceptional rainfall event.
WF-MM-30	▪ Vegetation clearance, including the felling of trees, scrub and hedgerow, will be undertaken outside the breeding bird period (1st March to the 31st of August). ▪ Work will begin before the breeding season begins to ensure that incubating birds or birds with young are not displaced by work commencing during the breeding season.
WF-MM-37	If a new badger sett is discovered during construction works particularly vegetation clearance. Works shall be suspending within 50m of any newly discovered badger sett during the breeding season (December to June inclusive) and 30m outside the breeding season (July to November inclusive) pending an activity survey, consultation with the local NPWS Wildlife Ranger and receipt of a badger derogation licence.
Upperchurch Windfarm Grant of Permission Conditions PL22.243040	Condition 17 - Prior to the carrying out of any construction works between mid-March and mid-August, a survey for breeding hen harriers shall be carried out by a competent, experienced ornithologist. The survey will cover the area within 500 metres of the works to be carried out during the above period. It will be the responsibility of the ornithologist to ensure that the survey methodology is sufficient to ensure that a hen harrier breeding site is not overlooked. Taking into account the results of this survey, no construction works shall be carried out within the above period within 500 metres of a pre nesting breeding site and/or nest, except with the written approval of the National Parks and Wildlife Service.

5.6. Environmental Survey Requirements

The surveys and monitoring arrangements which form part of the planning conditions attached to the Grant of Permission for Upperchurch Windfarm are listed in Table 12.

Table 12: Surveying included as part of Project Design Environmental Protection Measures and Best Practice Measures

Upperchurch Windfarm Monitoring Arrangement (WF-MA)	
WF-MA-01	Pre-construction public road condition survey
WF-MA-02	Pre-felling bird survey to be carried out to ensure that potential nesting birds are not impacted if felling is carried out within the breeding bird season (April to July).
WF-MA-03	Pre-Construction Breeding Bird Surveys.
WF-MA-04	Pre-construction Bat Surveys
WF-MA-05	Pre-construction terrestrial mammal surveys, particularly, for badger, to determine whether the sett layout that was encountered, has altered
WF-MA-06	Water quality monitoring will take place during the construction phase of the Upperchurch Windfarm. Water quality in the streams and outflow from end points of the drainage system will be monitored by sampling and testing on a regular basis during different weather conditions. This monitoring along with the visual monitoring outlined below will help to ensure that the mitigation measures that are in place to protect water quality are working. The scope of this monitoring will be developed in consultation with Inland Fisheries Ireland.
WF-MA-07	Daily Checks of Sediment & Erosion Controls during the construction phase
WF-MA-08	Weekly Site Audit - Fuel & Oil Storage inspection
WF-MA-09	Weekly Site Audit - Material and Waste Storage
WF-MA-10	Archaeological Monitoring during construction
WF-MA-11	Construction Noise Monitoring - Noise monitoring will be undertaken during the construction phase to ensure any limits set down by the planning authority are complied with.
WF-MA-12	Water Quality - Q-Sampling during Years 1 and 2
WF-MA-13	Monitoring Concrete Pours
WF-MA-14	Routine inspection and maintenance of constructed drainage and of the sediment and erosion control measures will take place regularly during the operational life of the project.
WF-MA-15	A Water Quality Monitoring Programme will be implemented. Monitoring will be carried out in years 1 and 2 of operation to determine if water quality has been impacted. Monitoring of water quality parameters will be conducted monthly in Year 1. If thresholds are not exceeded in Year 1, then the effort may be reduced in Year 2. The scope of this monitoring will be developed in consultation with Inland Fisheries Ireland. Water sampling will include biological water quality analysis - Q sampling; and physio-chemical water quality analysis.
WF-MA-16	Post-Construction Bird Surveys for 3 years – comprising ▪ Vantage point surveys ▪ Use of the hen harrier habitat area (Upperchurch Hen Harrier Scheme area) ▪ Transect surveys, and ▪ Fatality searches. The full scope and timing of these surveys will be in consultation with NPWS prior to the completion of the construction phase
WF-MA-17	Post-Construction Badger Surveys Years 1 to 3
WF-MA-18	Post-Construction Bat Surveys Years 1 to 3, including fatality searches

WF-MA-19	Post-Construction Fatality Survey
WF-MA-20	Hen Harrier Habitat Monitoring – Annually Years 1 to 5
WF-MA-21	Vegetation Monitoring: The process of blanket bog and wet heath establishment, as well as the establishment of wet grassland, scrub and wet heath areas within the felled areas, will be monitored by setting up a number of permanent vegetation monitoring quadrats. These will be surveyed during years 1, 2, 3 and 5. At the end of the 5-year vegetation monitoring, the data will be analysed and long-term monitoring or management will be proposed, if necessary.
WF-MA-22	Habitat Monitoring: Site visits by an appointed ecologist will be made to Upperchurch Wind Farm during the same years as the vegetation monitoring, in order to assess the status of the habitats at the site and whether any adjustment of the management plan is necessary
Upperchurch Windfarm Grant of Permission Conditions PL22.243040	Condition 17 - Prior to the carrying out of any construction works between mid-March and mid-August, a survey for breeding hen harriers shall be carried out by a competent, experienced ornithologist. The survey will cover the area within 500 metres of the works to be carried out during the above period. It will be the responsibility of the ornithologist to ensure that the survey methodology is sufficient to ensure that a hen harrier breeding site is not overlooked. Taking into account the results of this survey, no construction works shall be carried out within the above period within 500 metres of a pre nesting breeding site and/or nest, except with the written approval of the National Parks and Wildlife Service.
Upperchurch Windfarm Grant of Permission Conditions PL22.243040	Condition 18 (c) - A programme of ongoing surveys and monitoring of the species in years 2 and 3 after the commencement of the operation of the turbines shall be submitted to, and agreed in writing with the planning authority, following consultation with the National parks, and prior to the commencement of development works on the site.
Upperchurch Windfarm Grant of Permission Conditions PL22.243040	Condition 21 (b) - A programme of hydrographic monitoring after rainfall events shall be carried out at the applicant's expense over a period commencing pre construction and concluding in year 3 of the operational phase of the proposed development. The results of the monitoring and reports arising shall be made available to the planning authority, Fisheries Ireland and the National Parks and wildlife Service.

6. Environmental Emergency Response Measures

Environmental Emergency Procedure for Oil/Fuel Spillage

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

Incidents involving oil spillage

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

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

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

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

- Spill kit waste materials will be collected from the compound by a specialised hydrocarbon and hazardous waste service provider with a valid waste collection permit for reprocessing at a EPA waste licensed facility.

Environmental Emergency Procedure for significant pollution occurrence in local surface waters

Work Sections/Locations

All parts of the construction works area boundary

Responsibility of	Role/Duty
Construction Manager	• Will inform the Environmental Clerk of Works of any observed issues.
Environmental Clerk of Works	• Will notify an appropriate person in Tipperary County Council.

Incidents involving oil spillage

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

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

7. Monitoring

Adverse effects on the environment due to the development of the Upperchurch Windfarm 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 Upperchurch Windfarm (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 Upperchurch Windfarm. The audits will record the:

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

7.1.3. Reporting

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

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

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

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

- Environmental Public Complaint Record
- Register of Environmental Public Complaints

7.1.4. Corrective Actions

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

CARs may be raised as a result of:

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

All Corrective Action Requests will be numbered and logged.

8. Records & Reporting

8.1. Non-Compliance Record Sheet

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

8.2. Register of Non-Compliance issued

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

8.3. Environmental Training Record Sheet

Environmental Training Record Sheet			
Training Title:			
Description			
External Trainers ☐		Name of Company:	
Internal Instruction ☐		Name and Signature of Trainer:	
Date:			
Duration of Training:			
Name	**Job Title**	**Signature** **(Employee receiving training)**	

8.4. Register of Environmental Training

Register of Environmental Training								
Date	Training Title	Training Description	External Trainers	Name of Training Company	Name of Trainer	Duration	Name of Trainee	Job Title of Trainee

8.5. Environmental Incident Record Sheet

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

8.6. Register of Environmental Incidents

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

8.7. Environmental Complaint Record Sheet

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

8.8. Register of Environmental Complaints

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

8.9. Control of Spread of Alien Species Record Sheet

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

9. Mapping & Figures

The following mapping and figures are included:

Figure No.	Figure Title
Figure PLT 1.1	Location of the Authorised Upperchurch Windfarm (including the Proposed Larger Turbines and Met Masts)
Figure PLT 1.2	Location of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts)
Figure PLT 1.3	Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (OSI Discovery Mapping)
Figure PLT 1.4	Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (Aerial Photography)

Figure PLT 1.1 Location of the Authorised Upperchurch Windfarm (including the Proposed Larger Turbines and Met Masts)

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint

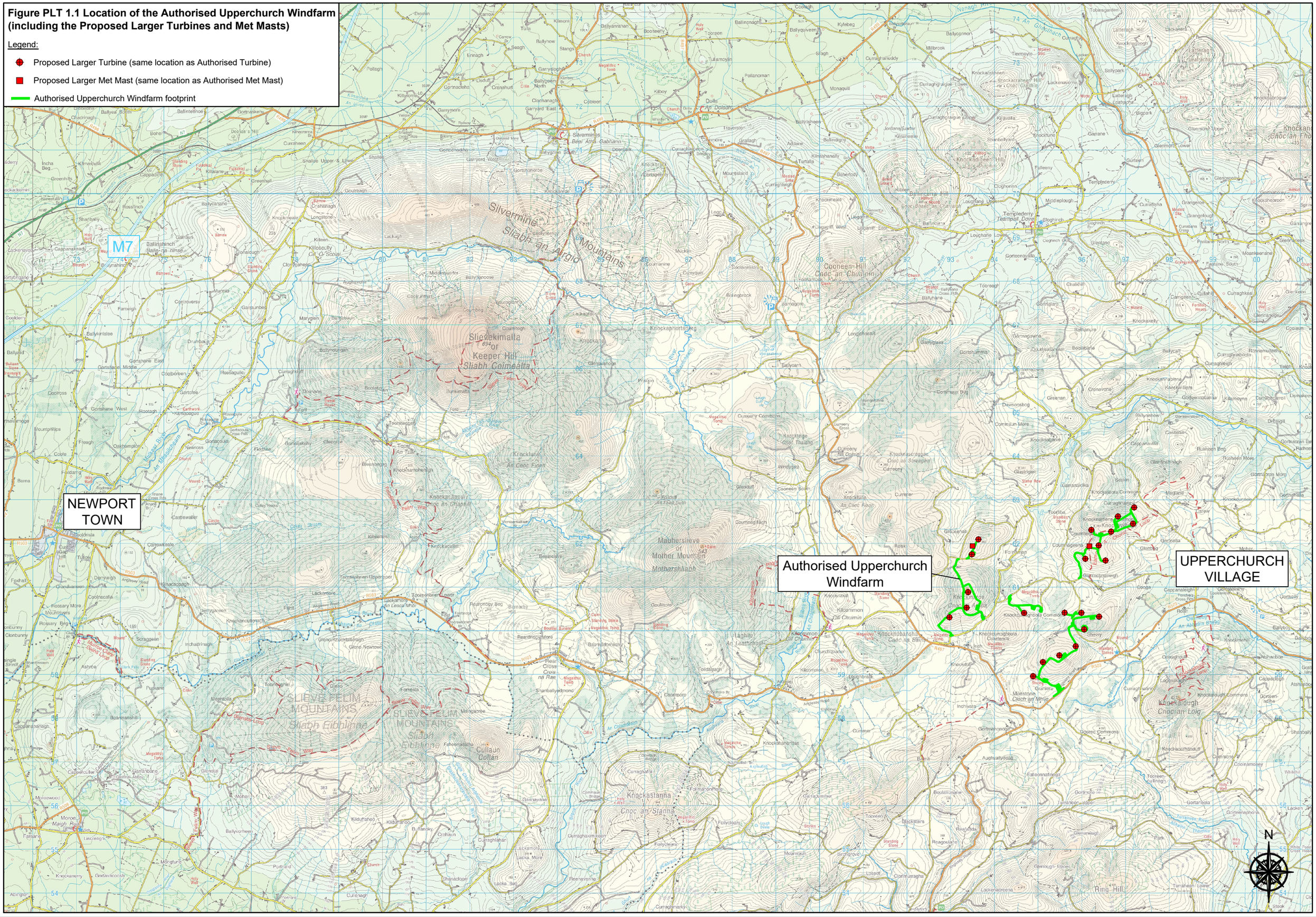


Figure PLT 1.2 Location of the Whole UWF Project (including the Proposed Larger Turbines and Met Masts)

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint
- Authorised UWF Related Works
- Authorised UWF Grid Connection
- Authorised UWF Replacement Forestry
- UWF Other Activities:
  Note: UWF Other Activities (Monitoring Activities) are not specifically shown on this Figure - this Activity occurs at all of the Whole UWF Project locations

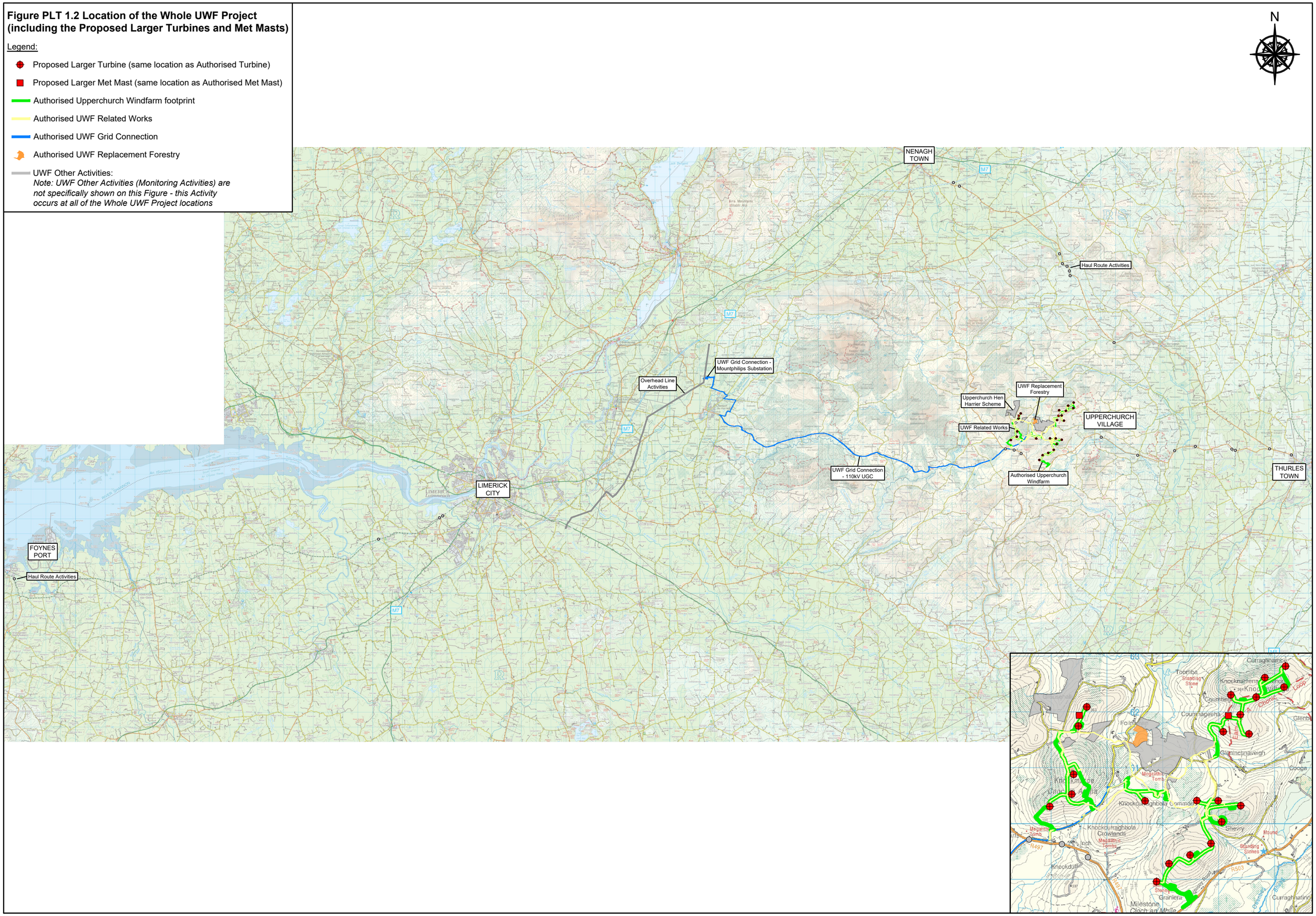
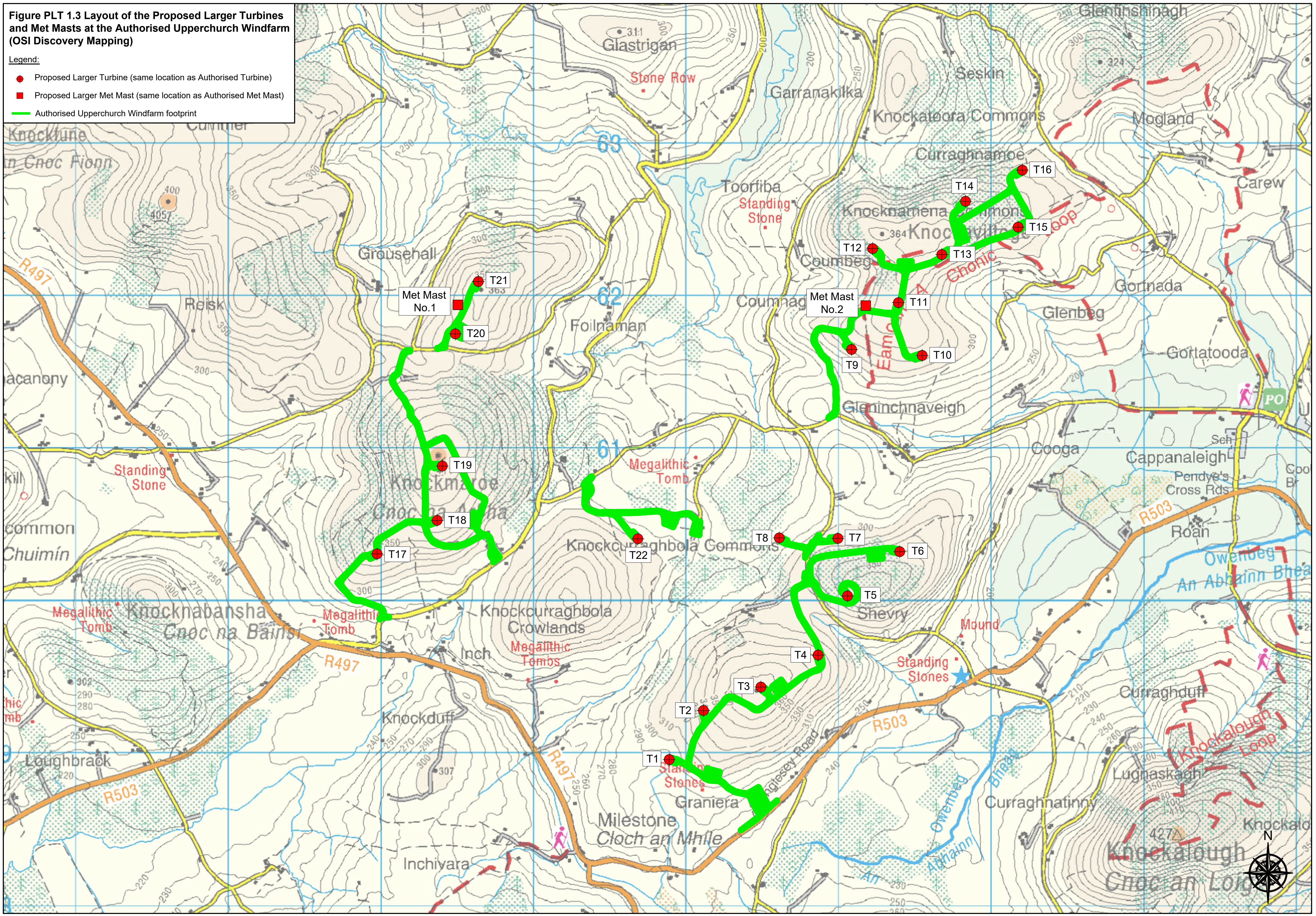


Figure PLT 1.3 Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (OSI Discovery Mapping)

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint



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T21
T22
Met Mast No.1
Met Mast No.2
Glastrigan
Stone Row
Garranakilka
Seskin
Knockatoora Commons
Glenfinshinagh
Mogland
Curraghnamoe
Toorfiba
Standing Stone
Knocknamena Commons
Coumbeg
Gortnada
Glenbeg
Gortatooda
Glenlnchnaveigh
Cooga
Cappanaleigh
Pendy's Cross Rds
Roan
Carew
Foilnaman
Grousehall
Reisk
Knockfune
Knockmaroe
Megalithic Tomb
Knockcurraghbola Commons
Knockcurraghbola Crowlands
Megalithic Tombs
Knocknabansha
Cnoc na Bainsí
Inch
Knockduff
Loughbrack
Inchivara
Milestone
Cloch an Mhíle
Graniera
Standing Stones
Shevry
Mound
Curraghduff
Lugnaskagh
Curraghnatinny
Knockalough
Knockalough Loop
Owenbeg
An Abhainn Bheag
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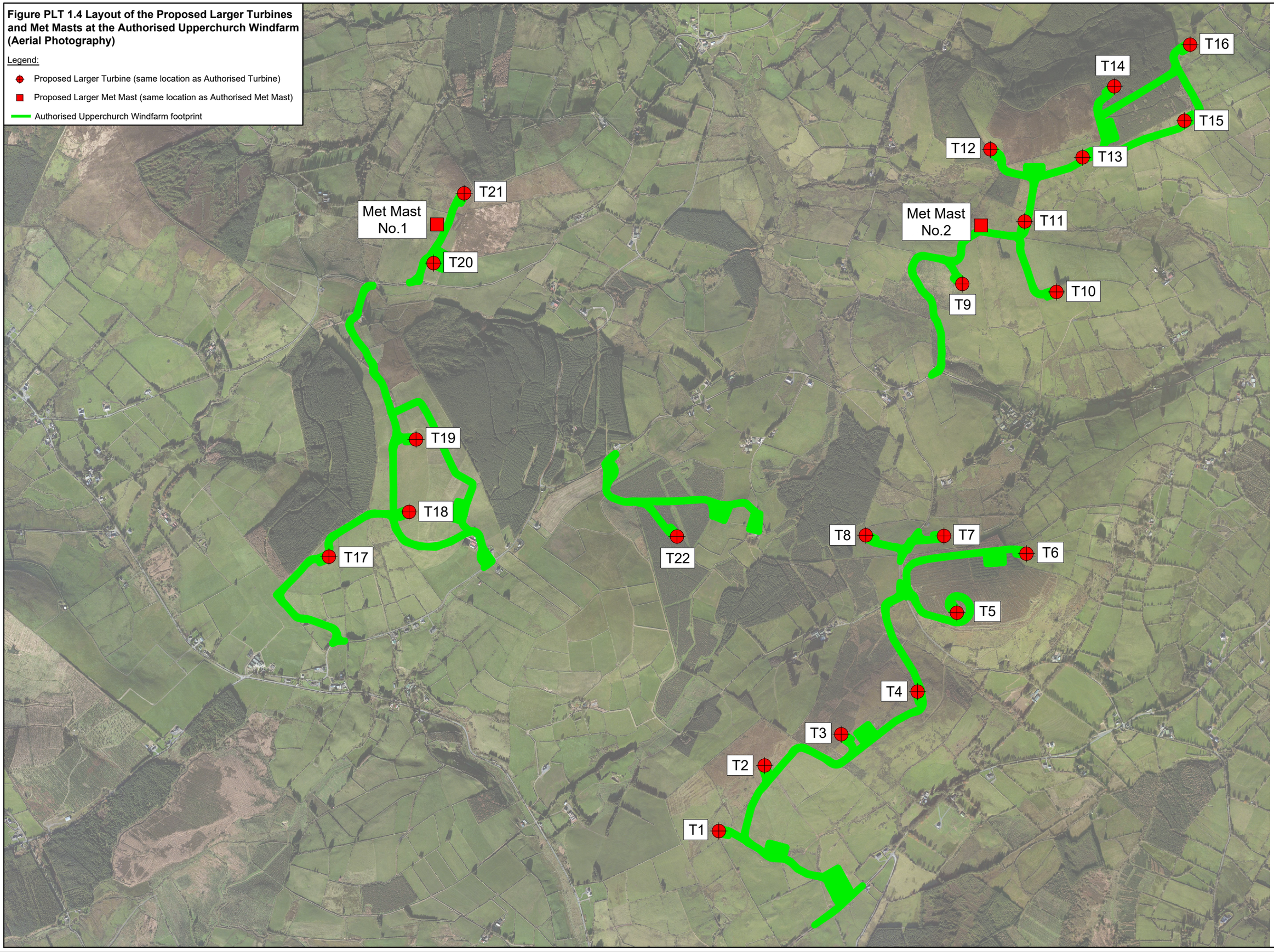
R503
N

Figure PLT 1.4 Layout of the Proposed Larger Turbines and Met Masts at the Authorised Upperchurch Windfarm (Aerial Photography)

Legend:

- Proposed Larger Turbine (same location as Authorised Turbine)
- Proposed Larger Met Mast (same location as Authorised Met Mast)
- Authorised Upperchurch Windfarm footprint



UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 1
Grant of Permission including Planning Conditions

- Authorised Upperchurch Windfarm (Planning Ref. 13/520003)
- Authorised amendments to the windfarm electrical substation (Planning Ref. 20/1048)
- *(if consented)* Current application for Proposed Larger Turbines and Met Masts amendments to the authorised windfarm

ECOPOWER

April 2021

Our Ref: PL 22.243040
P.A.Reg.Ref: 13/510003
Your Ref:

An Bord Pleanála

Ecopower Developments Limited,
Sion Road,
Kilkenny,
Co. Kilkenny

13 AUG 2014

Appeal **Re:** 10 year permission for 22 wind turbines,2 no.meteorological masts with wind measuring equipment attached, access roads, electrical substation compound, control buildings and ancillary works. Graniera Shevry, Knockcurraghbola Upperchurch, Co. Tipperary.

Dear Sir/Madam,

An order has been made by An Bord Pleanála determining the above-mentioned appeal under the Planning and Development Acts 2000 to 2014. A copy of the order is enclosed.

In accordance with section 146(5) of the Planning and Development Act 2000, as amended, the Board will make available for inspection and purchase at its offices the documents relating to any matter falling to be determined by it, within 3 days following the making of its decision. The documents referred to shall be made available for a period of 5 years, beginning on the day that they are required to be made available. In addition, the Board will also make available the Inspector's Report, the Board Direction and Board Order in respect of the matter on the Board's website (www.pleanala.ie). This information is normally made available on the list of decided cases on the website on the Wednesday following the week in which the decision is made.

The Public Access Service for the purpose of inspection/purchase of file documentation is available on weekdays from 9.15am to 5.30pm (including lunchtime) except on public holidays and other days on which the office of the Board is closed.

In cases where a grant of (full) planning permission is notified by the Board, it is policy to include a copy of the Department of the Environment and Local Government's Leaflet PL11 - **Guide to the Building Control System** and a copy of the Health and Safety Authority's leaflet **Safety and Health on Construction Projects - The Role of Clients** with the notification. These leaflets are issued at the request of the above bodies.

Yours faithfully,

Rita Donnelly
Executive Officer

Encl:

BP 100LN.ltr

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An Bord Pleanála

PLANNING AND DEVELOPMENT ACTS 2000 TO 2014

Tipperary County

Planning Register Reference Number: 13/510003

An Bord Pleanála Reference Number: PL 22.243040

APPEAL by The Upperchurch Kilcommon Wind Awareness Group of Grousehall, Milestone, Thurles, County Tipperary and by others against the decision made on the 27th day of January, 2014 by North Tipperary County Council to grant subject to conditions a permission to Ecopower Developments Limited of Sion Road, Kilkenny, County Kilkenny in accordance with plans and particulars lodged with the said Council.

PROPOSED DEVELOPMENT: Erection of 22 number wind turbines, overall height of up to 126.6 metres, two number meteorological masts up to 80 metres in height with wind measuring equipment attached, access roads, electrical substation compound and control buildings and ancillary site works at Graniera/Shevry/Knockcurraghbola Commons/Knockmaroe/Grousehall/ Cummer/Foilnaman/Gleninchnaveigh/Coumnageeha/Coumbeg/Knocknamena Commons/Glenbeg/Seskin, Upperchurch, County Tipperary. The application is for 10 year permission. (As amended by the revised public notice received by the planning authority on the 27th day of November, 2013).

DECISION

GRANT permission for the above proposed development in accordance with the said plans and particulars based on the reasons and considerations under and subject to the conditions set out below.

MATTERS CONSIDERED

In making its decision, the Board had regard to those matters to which, by virtue of the Planning and Development Acts and Regulations made thereunder, it was required to have regard. Such matters included any submissions and observations received by it in accordance with statutory provisions.

REASONS AND CONSIDERATIONS

In coming to its decision, the Board had regard to the following:

(a) National policy on renewable energy as outlined in the National Climate Change Strategy 2007 – 2012,

(b) Sustainable Development – A Strategy for Ireland, includes emphasis on the use of renewable resources,

(c) the National Spatial Strategy 2002 – 2020,

(d) the Wind Energy Development Guidelines for Planning Authorities published by the Department of the Environment, Heritage and Local Government in June 2006,

(e) the provisions of the North Tipperary County Development Plan 2010-2016,

(f) the North Tipperary Landscape Character Assessment 2009 which assesses the area of the proposal as having capacity to accommodate development without undue deterioration of its scenic quality,

(g) the North Tipperary Wind Capacity Strategy and Outline Landscape Strategy 2009 which identifies the subject site as having adequate wind resources for wind farm development,

(h) the pattern of existing development and land uses within the vicinity of the site,

(i) the nature of the proposed development and the current established uses on the site,

(j) the submissions made in connection with the planning application and the appeal, and

(k) the report of the Inspector.

The Board completed an Environmental Impact Assessment of the proposed scheme, which considered, inter alia, the Environmental Impact Statement submitted with this application, submissions made in the course of the planning application and the appeal including the further information submitted to the planning authority on the 27th day of November, 2013, and the report, assessment and conclusions of the Inspector in relation to the environmental impacts of the scheme which are noted. The Board considered that, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, the proposed development would not have a significant effect on the environment.

The Board completed an Appropriate Assessment in relation to potential impacts of the proposed development on Natura 2000 Sites and having regard to the Natura Impact Statement submitted, to the further submissions and responses to same submitted during the course of the planning application and the appeal including in particular the further information submitted to the planning authority on the 27th day of November, 2013, and the Inspector's report and submissions on file which are noted, the Board concluded that, on the basis of the information available, the proposed development, either individually or in combination with other plans or projects, would not adversely affect the integrity of the any European site in view of the site's conservation objectives.

The Board considered that, subject to compliance with the conditions set out below, the proposed development would not seriously injure the amenities of the area or of property in the vicinity, would not be prejudicial to public health and would be acceptable in terms of traffic safety and convenience. The Board further considered that, notwithstanding the cumulative visual impact of the proposal that the receiving landscape was such that the proposal would be acceptable. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area.

CONDITIONS

1. The development shall be carried out and completed in accordance with the plans and particulars lodged with the application, as amended by the further plans and particulars submitted to the planning authority on the 27th day of November, 2013, except as may otherwise be required in order to comply with the following conditions. Where such conditions require details to be agreed with the planning authority, the developer shall agree such details in writing with the planning authority prior to commencement of development and the development shall be carried out and completed in accordance with the agreed particulars.

   Reason: In the interest of clarity.

2. All environmental mitigation measures set out in the Environmental Impact Statement, Natura Impact Statement and associated documentation submitted by the applicant to the planning authority and An Bord Pleanála, shall be implemented in full, except as may otherwise be required in order to comply with the following conditions.

Reason: In the interest of protection of the environment.

3. The period during which the development hereby permitted may be carried out shall be ten years from the date of this Order.

Reason: Having regard to the nature of the proposed development, the Board considers it appropriate to specify a period of validity of this permission in excess of five years.

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.

Reason: To ensure satisfactory reinstatement of the site upon cessation of the project.

5. This permission shall not be construed as any form of consent or agreement to a connection to the national grid or to the routing or nature of any such connection.

Reason: In the interest of clarity.

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.

7. (a) The wind turbines including masts and blades, and the wind monitoring mast, shall be finished externally in a light grey colour.

(b) Cables within the site shall be laid underground.

(c) The wind turbines shall be geared to ensure that the blades rotate in the same direction.

(d) No advertising material shall be placed on, or otherwise be affixed to, any structure on the site without a prior grant of planning permission.

Reason: In the interest of visual amenity.

8. Details of the materials, colours and textures of all the external finishes to the proposed building shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

Reason: In the interest of the visual amenities of the area.

9. The proposed wind turbines erected on the site shall not exceed an overall height to 126.6 metres and a hub height of 81.6 metres.

Reason: In the interest of clarity.

10. The proposed construction works on the site shall be carried out in accordance with construction details submitted to the planning authority on the 7th day of January, 2013 and as further amended on the 27th day of November, 2013, including the Construction Management Plan, and the mitigation measures contained therein.

Reason: In the interest of safety and of the prevention of pollution.

11. Wind turbine noise arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed the greater of:-

(a) 5 dB(A) above background noise levels or

(b) 43 dB(A) $L_{90,10min}$
when measured externally at dwellings or other sensitive receptors.

Prior to commencement of development, the developer shall submit to and agree in writing with the planning authority a noise compliance monitoring programme for the subject development. All noise measurements shall be carried out in accordance with ISO Recommendation R 1996 "Assessment of Noise with Respect to Community Response," as amended by ISO Recommendations R 1996-1. The results of the initial noise compliance monitoring shall be submitted to, and agreed in writing with, the planning authority within six months of commissioning of the wind farm.

Reason: In the interest of residential amenity.

12. (a) The proposed development shall be fitted with appropriate equipment and software to suitably control shadow flicker at nearby dwellings, in accordance with details which shall be submitted to, and agreed in writing with, the planning authority prior to the commencement of development.

(b) Shadow flicker arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed 30 hours per year or 30 minutes per day at dwellings that are existing or permitted or at other sensitive receptors.

(c) A report shall be prepared by a suitably qualified person in accordance with the requirements of the planning authority, indicating compliance with the above shadow flicker requirements at dwellings.

Within 12 months of commissioning of the proposed wind farm, this report shall be submitted to, and agreed in writing with, the planning authority.

Reason: In the interest of residential amenity.

13. In the event that the proposed development causes interference with telecommunications signals, effective measures shall be introduced to minimise interference with telecommunications signals in the area. Details of these measures, which shall be at the developer's expense, shall be submitted to, and agreed in writing with, the planning authority following consultation with the relevant authorities.

Reason: In the interest of protecting telecommunications signals and of residential amenity.

14. Details of aeronautical requirements shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development, following consultation with the Irish Aviation Authority. Prior to commissioning of the turbines, the developer shall inform the planning authority and the Irish Aviation Authority of the as-constructed tip heights and co-ordinates of the turbines and wind monitoring mast.

Reason: In the interest of air traffic safety.

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.

16. There shall be no new provision for discharge of foul effluent on site without a prior grant of planning permission.

Reason: In the interest of public health.

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.

18. (a) The Ecological Management Plan submitted to the planning authority on the 27th 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 ongoing surveys and monitoring of the species in years 2 and 3 after the commencement of the operation of the turbines shall be submitted to, and agreed in writing with the planning authority, following consultation with the National parks, and prior to the commencement of development works on the site.

Reason: In the interest of the protection of the environment and the protection of the foraging habitat of the hen harrier species.

19. Details relating to the protection of other species including bats and badgers as outlined in the Ecological Management Plan submitted to the planning authority on the 27th day of November, 2013, shall be implemented. A timescale for the implementation of the measures outlined shall be submitted to, and agreed in writing with, the planning authority prior to the commencement of development works on the site and following consultation with the National Parks and Wildlife Service.

Reason: In the interest of the protection of the environment and listed species

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 which may exist within the site. In this regard, the developer shall:

(a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development, and

(b) employ a suitably-qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works.

The assessment shall address the following issues:

(i) the nature and location of archaeological material on the site, and

(ii) the impact of the proposed development on such archaeological material.

A report, containing the results of the assessment, shall be submitted to the planning authority and, arising from this assessment, the developer shall agree in writing with the planning authority details regarding any further archaeological requirements (including, if necessary, archaeological excavation) prior to commencement of construction works.

In default of agreement on any of these requirements, the matter shall be referred to An Bord Pleanála for determination.

Reason: In order to conserve the archaeological heritage of the area and to secure the preservation (in-situ or by record) and protection of any archaeological remains that may exist within the site.

21. (a) Mitigation measures outlined in the Environmental Impact Statement, Natura Impact Statement and other documentation submitted to the planning authority 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 to a receiving watercourse, the relevant statutory authorities shall be immediately notified and works cease until authorized to continue by the planning authority.

(b) A programme of hydrographic monitoring after rainfall events shall be carried out at the applicant's expense over a period commencing pre construction and concluding in year 3 of the operational phase of the proposed development. The results of the monitoring and reports arising shall be made available to the planning authority, Fisheries Ireland and the National Parks and wildlife Service.

Reason: In order to protect and assess the water quality of the receiving watercourses and to ensure that no adverse effect arises to affect the integrity of a Natura 2000 site.

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.

Reason: To ensure satisfactory reinstatement of the site upon full or partial cessation of the project.

23. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or such other security as may be acceptable to the planning authority, to secure the reinstatement of public roads that may be damaged by the transport of materials to the site, coupled with an agreement empowering the planning authority to apply such security or part thereof to the satisfactory reinstatement of the public road. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.
Reason: In the interest of traffic safety and the proper planning and sustainable development of the area.

24. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or such other security as may be acceptable to the planning authority, to secure the satisfactory reinstatement of the site upon cessation of the project, coupled with an agreement empowering the planning authority to apply such security or part thereof to such reinstatement. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.

Reason: To ensure satisfactory reinstatement of the site.

25. The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000, as amended. The contribution shall be paid prior to the commencement of development or in such phased payments as the planning authority may facilitate and shall be subject to any applicable indexation provisions of the Scheme at the time of payment. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to An Bord Pleanála to determine the proper application of the terms of the Scheme.

Reason: It is a requirement of the Planning and Development Act 2000, as amended, that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act, as amended, be applied to the permission.

Member of An Bord Pleanála
duly authorised to authenticate
the seal of the Board.

Dated this 12th **day of** August **2014.**

Comhairle Contae Thiobraid Árann
Tipperary County Council

Comhairle Contae Thiobraid Árann,
Oifigí Cathartha,
Cluain Meala,
Co. Thiobraid Árann
Tipperary County Council,
Civic Offices, Clonmel,
Co. Tipperary

Comhairle Contae Thiobraid Árann,
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Tipperary County Council,
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TO: Pat Brett c/o Ecopower Developments Ltd
Zetec House
Purcellsinch IDA Business Park
Dublin Road
Kilkenny

REF NO: 20/1048

PLANNING & DEVELOPMENT ACT 2000 (as amended)
PLANNING & DEVELOPMENT REGULATIONS 2001 (as amended)
NOTIFICATION OF A GRANT OF PERMISSION
SUBJECT TO CONDITIONS

DEVELOPMENT: amendments to Upperchurch Windfarm Electrical Substation, authorised under An Bord Pleanala Ref No PL.22.243040; Tipperary County Council REF: NO. 13/510003. The amendments consist of: (a) Increase in size of the Substation compound yard; (b) Change to the layout of Electrical equipment in the substation compound yard; (c) Change in size, deisgn and increase in height of the two Control Buildings and (d) ancillary works. The application is accompanied by an Appropriate Assessment Report (Stage 1 - Screening) and Screening for Environmental Impact Assessment (EIA) Report

LOCATION: Knockcurraghbola Commons Co. Tipperary

PERMISSION was granted on 10/12/2020 for the development described above subject to the Notification of Decision to grant PERMISSION made on 05/11/2020

You are hereby advised that unless the development described is carried out by 11/08/2024, this permission will cease to have effect.

SIGNED ON BEHALF OF
DIRECTOR OF SERVICES Mr. Rayford

PLEASE RETAIN THIS DOCUMENT CAREFULLY AS COPIES COST A FEE OF €5.00

TIPPERARY COUNTY COUNCIL

PLANNING AND DEVELOPMENT ACT 2000, (as amended)

NOTIFICATION OF DECISION TO GRANT PERMISSION
WITH CONDITIONS

TO: Pat Brett, C/o Ecopower Developments Ltd
Zetec House
Purcellsinch IDA Business Park
Dublin Road
Kilkenny

Ref No. 201048

Application Received: 16/09/2020

In pursuance of the powers conferred upon them by the above mentioned Acts, Tipperary County Council has by Order dated 5/11/2020 decided to grant you PERMISSION for development of land namely:- **amendments to Upperchurch Windfarm Electrical Substation, authorised under An Bord Pleanala Ref No PL.22.243040; Tipperary County Council REF: NO. 13/510003. The amendments consist of: (a) Increase in size of the Substation compound yard; (b) Change to the layout of Electrical equipment in the substation compound yard; (c) Change in size, deisgn and increase in height of the two Control Buildings and (d) ancillary works. The application is accompanied by an Appropriate Assessment Report (Stage 1 - Screening) and Screening for Environmental Impact Assessment (EIA) Report at Knockcurraghbola Commons Co. Tipperary.**

FOR THE REASON(S) STATED IN SCHEDULE 1 AND SUBJECT TO THE CONDITION(S) STATED ON SCHEDULE 2 (1 TO 2, PAGES 1 TO 1)

If there is no appeal against the said decision, a Grant of PERMISSION in accordance with the Decision will be issued after the expiration of the period within which an appeal may be made to An Bord Pleanala. (See Footnote).
It should be noted that until a Grant of a Permission has been issued the development in question is NOT AUTHORISED.
The applicant is advised that unless the development described above is carried out within five (5) years from the date of Grant of PERMISSION, planning permission will cease to have effect. See Section 40 of the Planning and Development Act, 2000.

FOOTNOTE: An appeal against a decision of a Planning Authority under the Planning and Development Acts 2000 - 2010 may be made to An Bord Pleanala, 64 Marlborough Street, Dublin 1 (Tel. (01) 8588100). All Appeals either by the applicant or a third party must be received by An Bord Pleanala within four weeks beginning on the date of the making of the Decision by the Planning Authority. Appeals posted within the permitted period but received after the latest date will be invalid. (Note: Where the latest date for receipt of an Appeal falls on a day when the offices of the Board are closed (Week-Ends, Public Holidays, etc.), the latest date for receipt will be the next day on which the offices are open).
An appeal must be made in writing and be accompanied by (a) the name and address of the applicant, (b) the subject matter of the Appeal, (c) the full grounds of appeal and the reasons, considerations and arguments on which they are based, (d) the appropriate fee as set out on attached schedule, and (e) in the case of a third party appeal, the acknowledgement from this Planning Authority of receipt of submissions/observations made by the third party. Any appeal which does not meet all the legal requirements will be invalid and cannot be considered by the Board. Further details are available on the Board's Website **www.pleanala.ie**

A commercial development means development for the purposes of any professional, commercial or industrial undertaking, development in connection with the provision for reward of services to persons

Tipperary County Council

Schedule of Conditions – File Reference Number 201048

SCHEDULE ONE

It is considered that the development complies with the policies and objectives of the North Tipperary County Development Plan 2010, as varied and that the development does not have an adverse impact upon the character of the area or the amenities of adjoining properties.

SCHEDULE TWO

1. Save where modified by the following conditions, the proposed development shall be carried out and completed in accordance with the permission granted under PL Ref. 13/510003 (ABP Ref. PL.22.243040) save as modified by the drawings and documentation submitted with the planning application on 16/09/2020.
   REASON: To clarify the terms of the permission.

2. During development works, the developer shall ensure that material from the site is not spread or deposited on the public roadway and shall maintain the roadway in a clean, tidy and safe condition. In addition, appropriate advance warning signs shall be erected, in accordance with proposals, which shall have the prior written consent of the Planning Authority.
   REASON: To prevent any traffic hazard or nuisance from such material.

Grant of Permission and Planning Conditions for the Proposed Larger Turbines and Met Masts at Authorised Upperchurch Windfarm

(to be inserted if consented)

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 2
Feedback from consultations with Statutory Bodies and Other Parties

(post consent)

ECOPOWER

April 2021

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 3
Environmental Management Procedures

ECOPOWER

April 2021

Environmental Management Procedures

Environmental Management Procedures

Ref:	Procedure:
EMP-1	Site Environmental Training and Awareness Procedure
EMP-2	Environmental Emergency Response Plan
EMP-3	Wheel Wash and Dewatering Procedure
EMP-4	Concrete Control Procedure
EMP-5	Fuel and Oil Management Plan
EMP-6	Surface Water management Plan
EMP-7	Traffic Management Plan
EMP-8	Protection of Archaeological and Cultural Heritage
EMP-9	Management of Excavation and Spoil
EMP-10	Management of Borrow Pits
EMP-11	Waste Management Plan
EMP-12	Air, Dust and Noise Management Plan
EMP-13	Site Reinstatement Procedure (post construction)
EMP-14	Monitoring and Auditing Procedure
EMP-15	Environmental Accidents, Incidents and Corrective Actions Procedure
EMP-16	Environmental Complaints Procedure
EMP-17	Environmental Monitoring Committee Procedure

EMP-1: Site Environmental Training and Awareness Procedure

Purpose

To describe measures for the training of all site personnel in the protection of the environment and the relevant controls.

Scope

All site personnel and construction teams which may influence environmental impacts.

Responsibility

Project Manager

Site Agent

Construction personnel

Procedure

An initial site environmental induction and ongoing training will be provided to communicate the main provisions of this Environmental Management Plan to all site personnel.

Two-way communication will be encouraged to promote a culture of environmental protection.

The following outlines some of the information which must be communicated to site staff;

- Environmental procedures of the EMP
- Environmental buffers and exclusion zones
- Housekeeping of materials and waste storage areas
- Environmental Emergency Response Plan

Environmental training records are to be retained in the site office.

Details of Induction and Training to be finalised by Appointed Contractor

EMP-2: Environmental Emergency Response Plan

Purpose

To describe measures for the prevention of an environmental accident or incident and the response required to minimise such an event

Scope

All site activities which pose a potential threat to the environment by way of an unplanned event (accident or incident)

Responsibility

Project Manager

Environmental Emergency Response Plan Manager – *to be nominated*

Environmental officer

Site Agent, Construction personnel & all site personnel

All personnel are to be inducted in the provisions of the **Environmental Emergency Response Plan.**

Procedure

In the event of an environmental emergency, all personnel will react quickly and adhere to this procedure (*to be finalised by Contractor)*. The following outlines some of the information, on the types of emergency, which must be communicated to site staff;

- Release of hazardous substance - Fuel or oil spill
- Concrete spill or release of concrete
- Flood event – extreme rainfall event
- Environmental buffers and exclusion zones breach
- Housekeeping of materials and waste storage areas breach
- Stop works order due to environmental issue or concern (threat to archaeological or ecological feature)
- Fire on site (cross-reference site Safety Emergency Plan as appropriate)

If any of the above situations occur; the **Plan** is activated. The Plan manager must be immediately informed and report to the scene. The Plan manager must be aware of the;

- Nature of the situation – brief description of what has happened
- Location of the incident
- Whether any spill has been released
- Whether the situation is under control

Details of Environmental Emergency Response Plan to be finalised by Appointed Contractor. Full details of the actual procedure to include the chain of responsibility, the location of controls (spill kits etc) and the response required to each situation above and any additional scenarios.

EMP-3: Wheel Wash and Dewatering Procedure

Purpose

To describe measures for the protection of watercourses from dirty water from vehicles

Scope

All site vehicle movements and dewatering systems

Responsibility

Project Manager

Site Agent

Construction personnel

Procedure

The Appointed Contractor will reduce the potential for the roads being dirtied by heavy vehicle traffic, by including the following:

- A wheel wash area will be provided and the resultant waste water will be diverted to a siltation pond for settling out of solids.
- Any pumping, dewatering system will be well planned and pumped water will be treated in the adequate settlement pond and silt trap.

Details of site wheel wash and dewatering procedure to be finalised by Appointed Contractor

EMP-4: Concrete Control Procedure

Purpose

To describe measures for the protection of watercourses from concrete spills or washings

Scope

All site concrete wash-out areas and concrete pour areas

Responsibility

Project Manager

Site Agent

Construction personnel

Procedure

It is important to prevent concrete from entering waterways within and in close proximity to the site and always to prevent it entering watercourses. Concrete will be used for construction of the turbine foundations and the site control building and the following measures will be implemented:

- Trucks that deliver concrete to site will be washed out at the supplier's facilities and not on site.
- The only cement washing that will need to occur on site is the hand washing of the chutes at the rear of the cement trucks after the cement has been deposited.
- Designate a concrete washout area away from drains and watercourses for washing out the chutes;
- A designated trained operator experienced in working with concrete will be employed during the concrete pouring phase;
- Run-off from wind turbine foundation concrete pours shall not be permitted to enter the watercourses and shall be contained within the foundation excavations and designated areas that are suitably sited and designed; and
- Large volumes of concrete water can be pumped into a skip to settle out; settled solids will need to be appropriately disposed of off-site. The total volume will be reduced by only permitting concrete chutes to be washed on site.

Details of concrete control to be finalised by Appointed Contractor including information on location of wash out area etc.

EMP-5: Fuel and Oil Management Plan

Purpose

To describe measures for the management of all fuels on site for the protection of watercourses from any spills

Scope

All site fuel storage and refuelling activities

Responsibility

Project Manager

Site Agent

Construction personnel

Procedure

The Appointed Contractor will implement a fuel management plan which will incorporate the following elements:

- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, away from drains and open water;
- Fuel containers must be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores;
- Ancillary equipment such as hoses, pipes must be contained within the bund;
- Taps, nozzles or valves must be fitted with a lock system;
- Fuel and oil stores including tanks and drums must be regularly inspected for leaks and signs of damage;
- Only designated trained operators are authorised to refuel plant on site and emergency spill kits will be present at equipment for all refuelling events;
- Procedures and contingency plans will be set up to deal with an emergency accidents or spills; and
- An emergency spill kit with oil boom, absorbers etc. is to be kept on site in the event of an accidental spill.

Details of fuel and oil management plan to be finalised by Appointed Contractor

EMP-6: Surface Water Management Procedure

Purpose

To describe measures for the management of all surface water and run-off on the site, for the protection of watercourses

Scope

All site construction areas, and excavation and works footprint. All requirements of the Surface Water Management Plan

Responsibility

Project Manager

Site Agent

Geotechnical Engineer

Environmental Officer

Project Ecologist

Construction personnel

Procedure

The Surface Water Management Plan will be implemented and will outline clear responsibilities in terms of the monitoring and maintenance of all surface water controls.

Key Surface Water Management features incorporate the following elements:

- Implement erosion control to prevent runoff flowing across exposed ground and becoming polluted by sediments;
- Intercept and divert clean water runoff away from construction site runoff to avoid cross-contamination of clean water with soiled water;
- Implement sediment control to slow down runoff allowing suspended sediments to settle in situ particularly on roads;
- When working at each stage and section (e.g. access road, each turbine base, etc) of the development the associated erosion and sediment controls at each section will be put in place prior to construction of each section of road. Access roads will need to be constructed to access the proposed site for drains, sediment traps and settling ponds. The associated erosion and sediment controls will be constructed alongside these roads and in a conscientious manner to ensure that the potential risk to water quality is minimised;
- Minimise the area of exposed ground by maintaining existing vegetation that would otherwise be subject to erosion in the vicinity of the wind farm infrastructure and keeping excavated areas to a minimum;
- No work will take place within 50m buffer zones of watercourses except for clear span bridges or culverts and associated road construction;

- All construction method statements will be developed in consultation with Inland Fisheries Ireland – Shannon River Basin District and South Eastern River Basin District;
- Avoid working near watercourses during or after prolonged rainfall or an intense rainfall event and cease work entirely near drains when it is evident that pollution is occurring (refer to Environmental Emergency Response Plan included above as EMP-2);
- Install a series of silt fences or other appropriate silt retention measure where there is a risk of erosion runoff to watercourses from construction related activity particularly if working during prolonged wet weather period or if working during intense rainfall event;
- Implement sediment control measures that includes for the prevention of runoff from adjacent intact ground that is for the separation of clean and 'dirty' water;
- Install appropriate silt control measures such as silt-traps, check dams and sedimentation ponds;
- Provide recommendations for public road cleaning where needed particularly in the vicinity of drains; and
- Controls need to be regularly inspected and maintained otherwise a failure may result, such as a build up of silt or tear in a fence, which could lead to water pollution so controls must work well until the vegetation has re-established; inspection and maintenance is critical after prolonged or intense rainfall.

Details of Surface Water Management procedure to be finalised by Appointed Contractor – to include responsibilities for monitoring and maintenance of the constructed mitigation measures and silt fences etc.

EMP-7: Traffic Management Procedure

Purpose

To describe measures for the management of all traffic, including construction traffic and oversized loads, for the minimisation of disturbance and nuisance to the local community.

Scope

All site construction areas, approach roads to the site, and the turbine haulage route.

Responsibility

Project Manager

Site Agent

Construction personnel

Sub-contractors as appropriate

Delivery personnel

Procedure

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.

- The plan must include provision for communicating with the community, the Gardaí and the Local Authority.
- Details of site access and any site traffic rules must be included, including security, parking, loading and unloading, required speed or other relevant details.
- Details of the turbine component delivery and any road closures etc must be provided.
- Programme of maintenance and upkeep of public roads to be described.
- Site operating hours (including delivery) to be outlined.

Details of Traffic Management Plan to be finalised by Appointed Contractor

EMP-8: Protection of Archaeological and Cultural Heritage Procedure

Purpose

To describe measures for the management and protection of archaeological and cultural heritage on the site

Scope

All site construction works and areas, particularly groundworks and excavation, and known archaeological features

Responsibility

Project Manager

Site Agent

Construction personnel

Sub-contractors as appropriate

Project Archaeologist

Procedure

The Appointed Contractor will maintain the buffer to known archaeological features and communicate this with all site personnel. The buffer will be maintained by the use of a fence to limit access to the known feature. An Archaeologist will be appointed under license for the monitoring duties throughout the project.

The following must be adhered to;

- All groundworks associated with the proposed development will be archaeologically monitored under licence to the National Monuments Service.
- All works must be immediately stopped under the order of the appointed Archaeologist should archaeological remains or features be uncovered.
- A buffer-zone, where development is precluded, will be instituted around the Recorded Monument in the proposed development area.
- This will measure a minimum of 30m around the feature and it will be fenced off.
- In addition no site offices, depots or storage facilities should be placed within any of these buffer zones.

Details of Archaeological Protection to be finalised by Appointed Contractor

EMP-9: Management of Excavation and Spoil

Purpose

To describe measures for the management of all excavation and storage of earth materials and spoil on the site

Scope

All site construction areas, approach roads to the site, and the turbine haulage route.

Responsibility

Project Manager

Site Agent

Construction personnel

Geotechnical Engineer

Sub-contractors as appropriate

Procedure

The Appointed Contractor will prepare a detailed Excavation and Spoil Management Plan prior to the works commencing to ensure all measures relating to excavation, stockpiling and drainage are described – for appropriate management and the protection of watercourses.

For the management of excavation and spoil, the Contractor will;

- Implement Surface Water Management Plan (install drainage infrastructure) prior to excavation and include areas dedicated to spoil storage with the drainage infrastructure.
- Ensure all spoil and excavated materials to be stored in the dedicated areas only.
- Stockpiles will be covered with plastic sheeting to reduce sediment in runoff.
- Stockpiles and adjacent features of drainage infrastructure will be monitored and maintained appropriately.

Details of Excavation and Spoil Management to be finalised by Appointed Contractor

EMP-10: Management of Borrow Pits

Purpose

To describe measures for the management of all excavation, storage and drainage of borrow pit locations

Scope

All borrow pits on site and associated controls

Responsibility

Project Manager

Site Agent

Construction personnel

Geotechnical Engineer

Sub-contractors as appropriate

Procedure

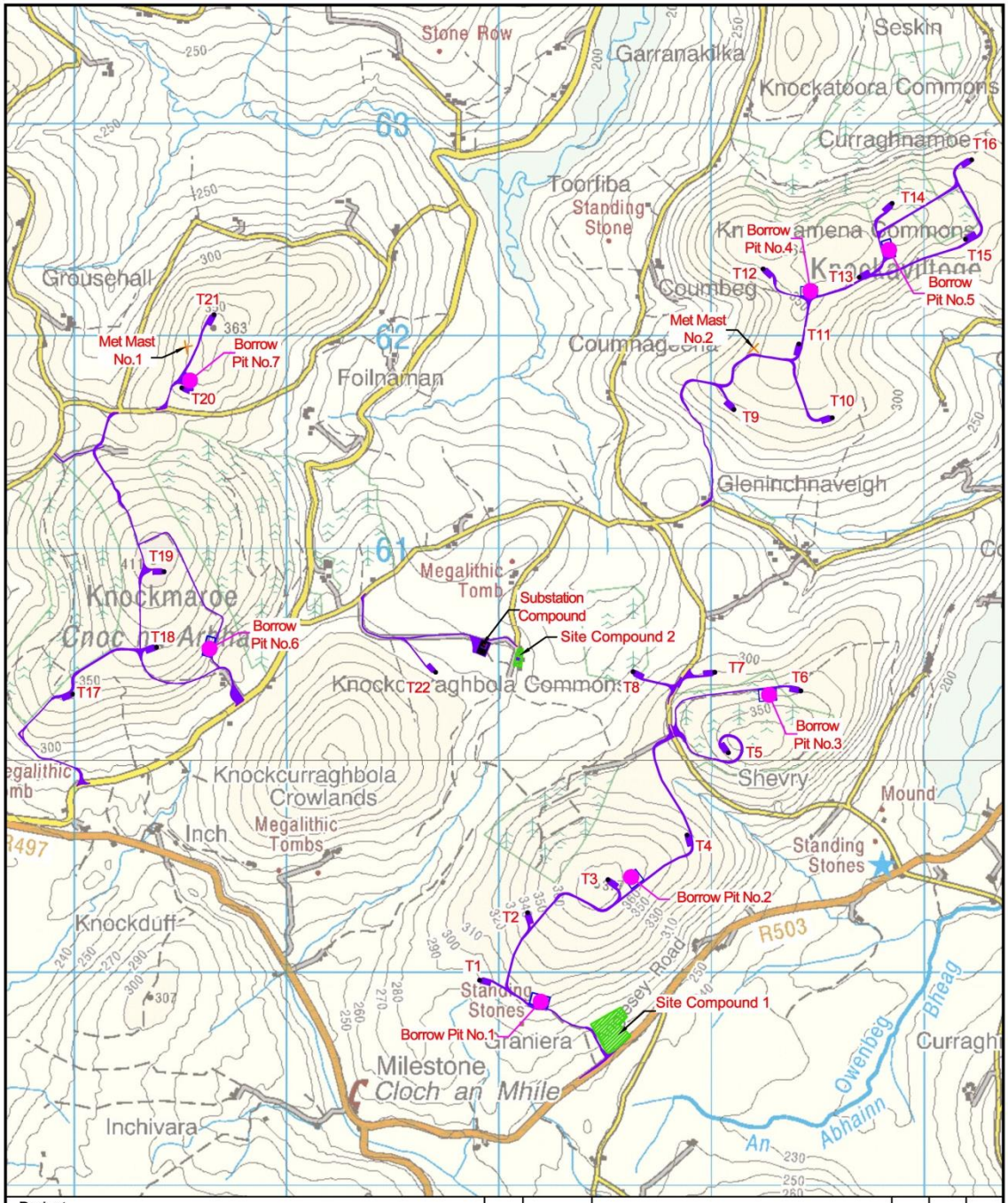
The Appointed Contractor will prepare a detailed Borrow Pit Management Plan prior to the works commencing to ensure all measures relating to excavation, stockpiling and drainage are described – for appropriate management and the protection of watercourses.

For the management of the borrow pits, the Contractor will;

- Implement Surface Water Management Plan (install drainage infrastructure) prior to borrow pit excavation.
- Reinstate the site borrow pits at the end of the construction phase.
- Surface Water Management to include any areas of stockpile and exposed ground associated with borrow pit activities.
- If required, any water from excavations to be pumped to the drainage infrastructure, of the Surface Water Management Plan.
- No works to be carried out within 50m buffer zones of watercourses.

The location of the borrow pits is presented in Drawing 15388-SK01 to follow.

Details of Borrow Pit Management to be finalised by Appointed Contractor



A	21.11.13	Issued For Information	JK	HBR	HBR
Rev.	Date	Description	by	ch'd	app

Project

Upperchurch Wind Farm

Title

Borrow Pit Locations

Client

Ecopower Developments Ltd

Malachy Walsh and Partners

Consulting Engineers

Cork | Tralee | London | Limerick

Scales (A4)	1:25,000	
Drawn	JK	21.11.13
Checked	HBR	21.11.13

Drg. No. 15388- SK01

Rev. A

EMP-11: Waste Management Plan

Purpose

To describe measures for the management of all wastes associated with the construction of the wind farm.

Scope

All site construction areas, activities and phases, including all welfare facilities

Responsibility

Project Manager

Site Agent

Construction personnel

Sub-contractors as appropriate - Service personnel

Procedure

The Appointed Contractor will prepare a detailed Waste Management Plan prior to the works commencing. This Plan will include detail of all allocated waste storage areas, waste segregation and detail any records to be maintained.

The following wastes may be generated during the construction of the project;

- Construction waste (materials, timber, steel etc)
- Waste fuels; oil / diesel
- Paper / cardboard
- Non-hazardous office and canteen waste
- Wastewater from office and welfare facilities

Wastes must be segregated and stored in the allocated tanks, bins, skips or areas. The Appointed Contractor must finalise all storage areas and organise the relevant licensed contractors for the appropriate waste collections. The Appointed Contractor must ensure all permits and licences are in place and maintain relevant copies in the site office. Wastewater from holding tanks must be collected by an appropriate licensed contractor. Construction materials must be stored and managed in a way which promotes waste minimisation, including segregating materials for re-use as appropriate.

Details of Waste Management Plan to be finalised by Appointed Contractor

EMP-12: Air Dust and Noise Management Plan

Purpose

To describe measures for the management of impacts on air quality, nuisance dust and construction noise impacts

Scope

All site construction areas, activities and phases, and all construction personnel

Responsibility

Project Manager

Site Agent

Construction personnel

Sub-contractors as appropriate - Service personnel

Procedure

The Appointed Contractor must prepare a Management Plan to ensure that impacts to air and from noise are minimised. The following measures will be communicated to all staff on site.

- All Plant and Machinery will be maintained to ensure noise and air emissions are negated.
- Construction personnel must not leave any Plant and Machinery running unnecessarily.
- To reduce dust and particles blown around site, aggregate of not less than 5mm grade will be used in construction materials for the onsite road network

If required, additional dust suppression measures may be implemented in prolonged, dry and windy spell including standard dust suppression (spraying) if relevant.

Details of Air Dust and Noise Management to be finalised by Appointed Contractor

EMP-13: Site Reinstatement Procedure

Purpose

To describe measures for the reinstatement of the site upon completion of the construction works (not the decommissioning and aftercare at end of project life)

Scope

All site areas, infrastructure, borrow pits and exposed areas; any other temporary construction areas

Responsibility

Project Manager

Site Agent

Construction personnel

Project Ecologist

Procedure

The Appointed Contractor will prepare a Site Reinstatement Plan to ensure the site is reinstated after the works.

The plan will include;

- Removal of the two temporary compounds
- Reinstatement and landscaping of the two temporary compound hardstands
- Details of landscaping and use of spoil
- Reinstatement of road verges (use of soil)
- Reinstatement of any temporary construction hardstands
- Reinstatement of the site borrow pits
- Natural re-vegetation policy
- Monitoring and assessment of re-vegetation and recovery success

The planting of new hedgerows is included in the Ecological Management Plan and may also be included as part of the post-construction reinstatement works. Exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation – in consultation with the Project Ecologist.

Details of Site Reinstatement to be finalised by Appointed Contractor in consultation with the Project Ecologist

EMP-14: Monitoring and Auditing Procedure

Purpose

To describe measures for environmental monitoring during the construction works and audit of control measures to ensure environmental protection

Scope

All monitoring activities of the aspects related to the project

Responsibility

Project Manager

Environmental Officer

Construction personnel

Project Ecologist

Project Archaeologist

Procedure

All mitigation measures, any planning conditions and relevant construction methods will be monitored on site. The Appointed Contractor will provide Audit Checklists to ensure regular checks of the site's control measures for the ongoing protection of the environment.

Monitoring is to be carried in adherence with the following;

- Protection of Archaeological and Cultural Heritage Procedure
- Surface Water Management Plan
- Ecological Management Plan
- Fuel and Oil Management Plan
- Waste Management Plan
- Construction Noise Monitoring (in line with recommended mitigation measures)

Checklists for daily, weekly or monthly site audits must be finalised by the Appointed Contractor and the relevant personnel informed of their duties. Checklists should include (but are not limited to) confirmation that fuel is stored appropriately, waste management rules are adhered to, all environmental buffers are maintained, sediment and erosion control measures of the Surface Water Management Plan are in place and functioning and concrete wash-out procedure is being followed. Checklists should be finalised with the Final Contractor's EMP.

All environmental records, including completed checklists, will be retained at the site office.

Details of Monitoring Procedure and Checklists to be finalised by Appointed Contractor in consultation with the Project Ecologist

EMP-15: Environmental Accidents, Incidents and Corrective Actions Procedure

Purpose

To describe measures for the recording, investigation and close-out of any environmental accidents or incidents on the site

Scope

All activities, personnel and sub-contractors operating on the site during the construction of the Upperchurch Wind Farm

Responsibility

Project Manager

Environmental Officer

Construction personnel

Project Ecologist

Project Archaeologist

Sub-contractors

Procedure

Any environmental accidents and incidents occurring on site during the works must be reported, recorded and investigated. Any corrective actions must be put in place and closed out after an accident or incident occurs.

This procedure will be updated (*by the Appointed Contractor*) to include the relevant personnel responsibilities and reporting structure and the finalised procedure must be communicated to all personnel.

Environmental accidents and incidents may include, but are not limited to;

- Accidents involving large spill of fuel or concrete from delivery truck (emergency response required)
- Spills of fuel and oil (minor)
- Waste or rubbish left around the site (not in dedicated waste areas)
- Breach of any buffers (archaeological, ecological, watercourse)
- Failure of any control measures (e.g. silt fences collapsed in a storm)
- Concrete chute wash out in a non-dedicated area
- Unplanned vehicle movement off the access tracks
- Unplanned vehicle movement within a buffer zone

If an environmental accident or incident occurs, personnel must inform *Project Manager/Environmental Officer/Nominated Person* immediately.

Once the situation is under control, the environmental accident or incident must be recorded and the cause investigated. Any remedial action required must be taken to mitigate any damage and prevent a reoccurrence.

Corrective actions must be communicated to personnel and sub-contractors where relevant – particularly where it results in a change in procedure.

Details of Environmental Accidents, Incidents and Corrective Actions Procedure, including a chain of responsibility, to be finalised by Appointed Contractor and communicated to all personnel and sub-contractors

EMP-16: Environmental Complaints Procedure

Purpose

To describe measures for the recording and resolving complaints by third parties, including local residents or members of the public

Scope

All activities, personnel and sub-contractors operating on the site during the construction of the Upperchurch Wind Farm

Responsibility

Project Manager

Site Agent

Environmental Officer

Procedure

Any environmental complaints received, whether internal or external, must be recorded and investigated. Immediate action must be taken as relevant to resolve environmental complaints to avoid any nuisance to the local community or environmental damage.

This procedure includes;

- Recording of any complaints to a Site Log
- Follow up by the relevant site representative – Environmental Officer
- Remedial measures where required
- Ongoing communication with complainant to confirm resolution
- Any required training or communication with site personnel and sub-contractors as a result

Details of Environmental Complaints Procedure to be finalised by Appointed Contractor

EMP-17: Environmental Monitoring Committee Procedure

Purpose

To describe measures for the establishment of an Environmental Monitoring Committee during the construction of the wind farm

Scope

To facilitate a committee which will meet and discuss all site activities and any environmental issues or perceived issues which may affect the local community

Responsibility

Project Manager

Site Agent

Environmental Officer

Procedure

An Environmental Monitoring Committee will be established for the construction phase of the Upperchurch Wind Farm. The Committee shall include representatives of the developer, North Tipperary County Council, Inland Fisheries Ireland, the project Ecologist, and representatives of the local community.

Ecopower Developments have successfully organised an Environmental Monitoring Committee for the construction stages of both Raheen Barr Windfarm and Derrynadivva Windfarm in County Mayo, to foster open communication during the construction of projects.

The Environmental Monitoring Committee will conduct the following;

- Hold monthly meetings throughout the construction project
- Agreement on actions required in relation to any site environmental issues
- Follow-up of any items raised or discussed at previous meetings

The meeting agenda can include updates on;

- Project progress and phases
- Works planned for the month ahead, e.g. scheduled concrete pours of bases
- Environmental monitoring results, e.g. noise and water monitoring results
- Traffic or haulage schedules
- Any community issues or queries

Details of the establishment of the Environmental Monitoring Committee to be finalised upon commencement of the construction project

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 4

Traffic Management Plan

ECOPOWER

April 2021

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 Upperchurch Windfarm 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;

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

1.1.3 Responsibilities

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

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

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

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

1.2 Traffic Management Measures

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

1.2.1 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.

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

1.2.2 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.

1.2.2.1 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.

1.2.2.2 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 Upperchurch Windfarm will have clear directional signs and this signage will be relocated to indicate the location of the Upperchurch Windfarm as the works progress.

1.2.2.3 Warning Signage

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

1.2.3 On-going communication with Tipperary County Council Roads Section

The Project Manager for the construction of Upperchurch Windfarm 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.

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

1.2.4 Traffic Management Measures

Traffic management control measures are included below. The control measures identified will be implemented during the construction of the Upperchurch Windfarm.

Traffic Management Measures			
Title:	**Traffic Management Measures**	**Ref:**	

Environmental Commitment

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

Responsibilities

Project Manager	• Consult with Tipperary County Council • Consult with Gardaí • Contractor arrangements regarding speed limits, alert beacons, haulage routes etc. • Oversee the implementation of the Traffic Management Plan
Construction Manager	• Install information, direction and warning signage in advance of 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 works in their area

Traffic Management Measure

Communication and Information

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

Measures for Delivery Personnel

- These Traffic Management Measures will be part of the induction to all haulage companies delivering to site.
- All machinery entering the site will have working rotating beacons and these beacons will be activated to indicate to other traffic of their intention to enter or exit the site.
- All companies delivering aggregate, concrete or other materials to works areas will be instructed to use the designated haul routes and will be informed of designated delivery hours for routine deliveries.
- A speed limit of 50km/hr on the Local Roads between the R503 and R497 and the site entrances will be implemented and communicated to the companies delivering materials to site.
- All material deliveries will have a maximum axle load of 12 tonnes per axle.

Measures for Site Personnel

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

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

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

Measures for Local Residents

- All construction works will be carried out during daylight hours
- 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 UWF Related Works**.**

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 Upperchurch Windfarm 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

- Along construction materials haulage routes, confirmatory condition surveys involving pre-construction and post-construction inspections, high definition video surveys and FWD surveys will be undertaken along the routes of concentrated construction traffic between the R503 and the site entrances on the local road network. Whilst it is not expected to occur, any damage to structures or road pavements will be repaired to at least as good a condition as pre-works, and on damaged sections of roads where the Surface Curvature Index (SCI), measured during FWD testing, is greater than 250, full-width surface overlay will be carried out.
- Any road repairs if required following the end of the construction stage will be by arrangement with Tipperary County Council.

References

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

1.3 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 the table below;

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.

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 5

Surface Water Management Plan

ECOPOWER

April 2021

Malachy Walsh and Partners

Engineering and Environmental Consultants

Surface Water Management Plan

For

Upperchurch Wind Farm

On behalf of

ECOPOWER DEVELOPMENTS LIMITED

15388

November 2013

Job number	Revision	Prepared by	Checked by	Status	Date
15388-6005	B	Helen Burman-Roy	Monica Kane	Final	26/11/2013

MWP ENVIRONMENT AND PLANNING

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1 SURFACE WATER MANAGEMENT PLAN

1.1 INTRODUCTION

The purpose of this document is to outline the surface water management procedures for the construction of the Upperchurch Wind Farm in Co. Tipperary. The proposed wind farm consists of 22 no. wind turbines, of overall height up to 126.6m, 2 no. meteorological masts up to 80m in height, access roads, substation and compound, and all ancillary site works.

On 28th February 2013, North Tipperary County Council (NTCC) issued a Request for Further Information which included the provision of a Surface Water Management Plan (SWMP). This SWMP is based on the particulars previously submitted to NTCC by Ecopower Developments Limited in support of the wind farm planning application.

1.2 SCOPE

The Surface Water Management Plan for the wind farm was prepared taking into consideration the drainage information gathered during the Environmental Impact Assessment and the Sediment and Erosion Plan designed as part of the wind farm proposal. This document includes information on the main impacts and primarily describes the measures for sediment and erosion control. Reference is made to management controls relating to fuel and oil, concrete and vehicles. However, these measures have been included in the Environmental Management Plan and cross-reference is made to the relevant procedures.

This Surface Water Management Plan must be reviewed and implemented in accordance with the drawings included in the Appendix.

1.3 SITE DESCRIPTION

The site is located within a series of small hills or drumlins to the west of Upperchurch village and 18 kilometres to the west of Thurles. The hills are at elevations of between 363mOD and 411mOD and the peaks are generally at heights of 100m above the intervening lower terrain.

The Slievefelim to Silvermines Mountains SPA lies to the west of the site. Most of the site is within the South Eastern River Basin District and drains to the Owenbeg, Turraheen and Clodiagh Rivers and ultimately to the River Suir. The remaining part of the site at the south western extremity is within the Shannon River Basin District and drains to the Aughvana River and ultimately to the Mulkear River.

The area is underlain by Silurian Metasediments and Volcanics with subsoils consisting of Devonian / Carboniferous sandstone and shale till. Some rock outcropping occurs, most notably at the northeast

part of the site. The area originally had shallow peat land cover but most of it has been reclaimed by deep ploughing and converted to pasture. The remaining peat areas are used for commercial forestry.

Overall it is a landscape much altered by human activity.

2 IMPACT OF THE WIND FARM DEVELOPMENT

2.1 INTRODUCTION

A Hydrological Impact Assessment was completed during the project Environmental Impact Assessment and was included as Chapter 15 of the Environmental Impact Statement. The assessment was based on a desk study, site walkover and investigation, legislative requirements and relevant Guidelines of the National Roads Authority and the Environmental Protection Agency. The assessment identified constraints, which informed the final wind farm design, including a 50m buffer to watercourses. The impacts outlined below are potential in the absence of mitigation measures.

2.2 CHARACTERISTICS OF THE PROPOSAL

The development is characterised by the following civil engineering works which will be undertaken to provide the necessary infrastructure to complete the wind farm:

- Excavation for the construction of 22 turbine bases with a minimum depth of 2.00m and 225m^2 plan area and hardstands with and excavation depth of 0.60m and 1,040m^2 plan area;
- Erection of 22 turbines with hub heights of up to 85m and maximum tip height of up to 126.60m;
- Construction of an electrical sub-station compound with excavation depth of 0.60m and 2,624m^2 plan area;
- Construction of 8.0km of 5.00m wide new roads;
- Widening and upgrading of 3.9km of existing farm roads (average 2m widening);
- Construction of a surface water drainage system along the road edges; and
- Importation of stone from local quarries for construction of access roads and hard standings.

A key component of the proposal is the surface water drainage system, as managed by the Sediment and Erosion Control Plan designed by Malachy Walsh and Partners.

2.3 SURFACE WATER AND DRAINAGE

The proposed site drains into streams that form the upper reaches of the Turraheen, Owenbeg, Clodiagh and Aughvana Rivers. The first three of these rivers form part of the South Eastern River Basin District and ultimately join the River Suir to the southeast. The Aughvana River, which forms part of the Shannon River Basin District, joins the Mulkear River and ultimately flows into the River Shannon to the east of Limerick City.

There are some EPA sampling stations in the vicinity of the proposed site as follows:

- The nearest sampling station on the Clodiagh River is at a bridge to the north of Castlehill (ING coordinates E: 198173, N: 165027), 5km downstream of the site and 2.4km to the north of turbine T16.
- The nearest sampling station on the Turraheen River (ING coordinates E: 197600, N: 155900) is 4km downstream of the site and 4km to the southeast of turbine T01.
- The nearest sampling station on the Owenbeg River is at a bridge on the local road immediately to the south of the R503 at Upperchurch (ING coordinates E: 198577, N: 160362) and 2.2km to the east of turbine T06.

The site drains to the different rivers as follows:

- The area around turbines T01 and T02 drains towards the west to an unnamed tributary of the Turraheen River.
- The area around turbines T03, T04, T05 and T06 drains to the southeast to the Owenbeg River and its tributaries.
- The area around turbines T07, T08 and T09 drains to the north to the streams that form the upper reaches of the Clodiagh River.
- The area around turbines T10, T11, T13 and T15 drains to the south and southeast to tributaries of the Owenbeg River.
- The area around turbines T12, T14 and T16 drain to the west and north to the Clodiagh River.
- The area around turbines T17 and T18 drains south to an unnamed tributary of the Aughvana River. This is the only part of the overall site that forms part of the Shannon River Basin District.
- The remaining areas around turbines T19, T20, T21 and T22 drain in different directions to unnamed tributaries of the Clodiagh River to the north.

2.4 SURFACE WATER FLOW

2.4.1 Interruption of existing drainage patterns

The existing drainage network on site, associated with wind farm tracks and natural streams, has some potential to be impacted upon by the construction phase of the wind farm. Excavation of new drainage channels, and modifications to the existing surface water drainage network to link new infrastructure has the potential to impact on surface water flow. There is a potential for moderate negative impacts to occur to surface water flows. However, the development of the Upperchurch wind farm will not have a significant impact provided mitigation measures are implemented.

2.5 SURFACE WATER QUALITY

2.5.1 Release of suspended solids

The mains risks to water quality arise from the following;

- Release of suspended solids, particularly from peat soils;
- Nutrient release from transported or suspended sediments;
- Nutrient release from brash from tree felling to facilitate the works.

There is a risk that suspended solids and nutrient release entering watercourses which would have a negative impact on the water quality of streams/rivers and an impact on aquatic ecology (see **Chapter 13 Ecological Impact Assessment**). Given the permeable nature of the existing soil and the small number of streams draining the site, the potential for a significant impact to surface water quality within the receiving catchments is low. Provided mitigation measures are implemented, the development of the Upperchurch wind farm will not have a significant impact.

2.5.2 Risk of pollution from hydrocarbon release

The construction of the wind farm infrastructure requires the use of mechanical plant and equipment. The use of plant on site introduces a risk of potential spillage of oils or hydrocarbons from vehicle and plant either working on site or delivering materials or equipment to site. Provided mitigation measures are implemented, the development of the Upperchurch wind farm will not have a significant impact.

2.5.3 Risk of pollution from cement

There is a risk of spillage and run off from cement trucks delivering concrete to site during the placing of concrete, but also in the washing out of chutes. The spillage of cementitous material into a watercourse would significantly impact on the pH of the water and thus impact on water quality. However, the development of the Upperchurch wind farm will not have a significant impact provided mitigation measures are implemented.

2.5.4 Risk of pollution from water sanitation

A risk of ground water pollution can occur where adequate toilet facilities are not provided on site. However, the development of the Upperchurch wind farm will not have a significant impact provided mitigation measures are implemented.

2.5.5 Risk of pollution from tree felling

In order to construct the proposed wind farm, felling of existing maturing conifer trees and clearing of young plantation will be required around turbines T3, T05, T9, T12, T14 and T22. The risk to water quality from felling comes from the brash and needles that remain from the felling process. Brash, if left on site, will eventually lose it needles and break down to effectively form a localised store of phosphorous.

In summary, there is a potential for minor-moderate negative impacts to occur to surface water quality due to tree felling. However, the development of the Upperchurch wind farm will not have a significant impact provided mitigation measures are implemented.

2.6 IMPACT TO THE LOWER RIVER SUIR SAC

Most of the Upperchurch site is within the South Eastern River Basin District and drains to the Owenbeg River and ultimately to the River Suir. The River Suir Catchment covers a large area of 3,546km2, which represents approximately 4% of the land area of the island of Ireland. The catchment includes extensive lowland areas, particularly along the major river valleys such as those of the Suir, the Aherlow, the Multeen and the Anner; and upland areas including parts the Comeragh Mountains, the Knockmealdown Mountains and the Galtee Mountains, rising to an altitude of 919m at Galtymore.

An Appropriate Assessment was undertaken to determine the significance of impacts on Natura 2000 sites. The assessment included the Lower River Suir cSAC (site code 002137). The Appropriate Assessment Screening (Stage 1) determined mitigation measures would be required to eliminate any risk to water quality. Therefore, the assessment was progressed to an Appropriate Assessment Natura Impact Statement (Stage 2).

The primary mitigation recommended was the provision of the Sediment and Erosion Control Plan. The main aspects of the plan are outlined hereunder:

- Reduce changes in run-off regimes
- Control surface water run-off within and its effects outside the site
- Protect aquatic environments
- Separate clean water from construction activity effected water
- Appropriately design and specify the provision of sediment series ponds and silt traps
- Prevent all sediment associated pollution entering watercourses and groundwater

The result of the Appropriate Assessment is that no adverse impact is expected to arise to Natura 2000 Sites as a result of the proposed development. With mitigation measures in place, no significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed Upperchurch Windfarm.

3 MANAGEMENT CONTROLS AND MITIGATION MEASURES

3.1 MITIGATION BY AVOIDANCE

A process of *'mitigation by avoidance'* was undertaken by the EIA team during the design of the turbine and associated infrastructure layout. A 50m constraints buffer was applied to all streams within the site during the project design phase. There will be no roads or turbine foundations within 50m of a watercourse, except at the necessary stream crossing. The internal road crosses a stream at one location: 250m to the north of T04.

The stream crossing method statement will be designed in consultation with Inland Fisheries Ireland – South Eastern River Basin District and Shannon River Basin District prior to initiation of construction works. A clear span bridge will be used to cross this stream (See Drawing No. 15388-5005 attached in Appendix 1).

There will be no diversion, infilling or dewatering of existing surface water drainage as part of the proposed development; therefore no mitigation is required.

3.2 MITIGATION BY MANAGEMENT CONTROL

Management Controls for the protection of water quality have been included in the EIS as Mitigation Measures and included as environmental procedures in the *preliminary* Environmental Management Plan.

These controls include managing fuel on site, concrete washings and dirt transported from vehicles. These measures are controlled by the following procedures:

- Site Environmental Training and Awareness Procedure (EMP-1)
- Environmental Emergency Response Plan (EMP-2)
- Wheel Wash and Dewatering Procedure (EMP-3)
- Concrete Control Procedure (EMP-4)
- Fuel and Oil Management Procedure (EMP-5)
- Monitoring and Auditing Procedure (EMP-14)

3.3 MITIGATION BY DESIGN

A Sediment and Erosion Control Plan has been prepared as part of the wind farm design and will be implemented to prevent sediment and pollutant runoff into the local watercourses during the construction phase. The plan is designed to separate clean water run-off and 'dirty' water run-off, to mimic the natural hydrology with maximum recharge to the water table. This minimises the volume of contaminated water that has to be cleaned before it is released from the outflow weirs and dispersed across the existing vegetation.

4 SEDIMENT AND EROSION CONTROL PLAN

4.1 INTRODUCTION

Sediment such as peat, clay and silt can cause significant pollution during the construction phase of civil engineering projects due to erosion of exposed soil by surface water runoff. This plan has been prepared to control runoff and prevent erosion during the construction phase of the Upperchurch Wind Farm. The implementation of sediment and erosion control measures is essential in preventing sediment pollution. Erosion control is intended to prevent runoff flowing across exposed ground and

becoming polluted with sediments while sediment control is designed to slow runoff (Murnane et al., 2006).

The sediment and erosion plan is compiled with regard to:

- Knowledge of the site's environmental conditions;
- Previous construction experience with wind farm developments in similar upland environments;
- Previous experience of environmental constraints and issues from construction in other wind farms in similar environmental conditions;
- Mitigation measures outlined in other EIS Chapters most notably the Hydrological Impact Assessment (Chapter 15); and
- A number of technical guidance and best management practice manuals.

The following site specific information was used to compile the sediment and erosion plan:

- High resolution aerial photography;
- OSi 10m Contour data;
- Wind farm infrastructure layout (turbines, sub-station, roads and ancillary development);
- Hydrology maps (watercourses and buffer zones);
- Soil and land use maps; and
- Modified Bilham Tables of rainfall intensity, duration and frequency.

4.2 CONTROL OF SEDIMENT AND EROSION

This plan has been designed to cause minimal disturbance to the current hydrological regime and minimise suspended sediment loading. Reduction of sediment loading is important as the site drains to a number of streams and rivers immediately to the north, east and south that ultimately drain to the River Suir and to the Mulkear River (a tributary of the River Shannon). Therefore, mitigation measures are required to protect against suspended solid loading of headwater drainage during the construction stage of the project.

The plan will be implemented early in the construction phase, prior to the site clearance works, to control increased runoff and associated suspended solids loads in discharging waters from the development areas. The plan can be implemented in phases as work progresses through the site. The events and locations with the highest potential for sediment runoff include:

- During and after heavy rainfall events or prolonged rainfall;
- Areas where construction activities (earthworks) are taking place;
- Steep slopes;
- Temporary stockpiles;
- Borrow pits;
- Areas of exposed ground;
- During bridge or drain works (e.g. during implementation of the drainage network) and
- Clear felling.

The proposed drainage layout and sediment control details are shown on the following drawings which are included with the drawing pack submitted as part of the further information:

- 15388-5001 Proposed Drainage Layout - Sheet 1 of 3
- 15388-5002 Proposed Drainage Layout - Sheet 2 of 3
- 15388-5003 Proposed Drainage Layout - Sheet 3 of 3
- 15388-5004 Proposed Site Drainage Details
- 15388-5006 Proposed Internal Road Details

It is likely that a clear span bridge will be used for the stream crossing and a standard drawing is also included in Appendix 1 at the end of the report:

- 15388-5005 Proposed Clear Span Bridge Detail

It is proposed to combine sediment and erosion control measures to reduce the pollution runoff from the site during the construction phase of the Upperchurch Wind Farm. It is important to reduce erosion of soil and peat where possible to prevent sediment suspension in runoff.

No work will take place within 50m buffer zones of watercourses except for the clear span bridge and the drain culverts and associated road construction. All construction method statements will be developed in consultation with Inland Fisheries Ireland – Shannon River Basin District and South Eastern River Basin District. Construction activities in the hydrological buffer zones will be avoided during or after prolonged rainfall or an exceptional rainfall event. Work will cease entirely near watercourses when it is evident that pollution is likely to occur. Culverts will be installed at locations where land drains are intercepted and will be diverted into the clean water drains. The culverts will be designed to facilitate the large flows that may occur following intense or prolonged rainfall events.

Generally, the footprint of the works area of a wind farm development represents only a small proportion of the overall catchment area intercepted by the site. Unless appropriate measures are put in place the works area can potentially contaminate the runoff from the upstream catchment, creating an excessive volume of contaminated water which is then difficult to manage. The aim of this sediment and erosion plan is t**o intercept the clean water runoff from the upstream catchment and to isolate it from the contaminated water flowing from the works areas**. This minimises the volume of contaminated water that has to be cleaned before it is dispersed across the existing vegetation via the outflow weir.

4.3 PROTECTION OF CLEAN WATER FROM THE UPSTREAM CATCHMENT

A fundamental principle of the design of the sediment and erosion plan is that clean water flowing in the upstream catchment, including overland flow and flow in existing streams, is not contaminated by silt from the works area. The single existing stream crossing will be crossed using a clear span bridge. New drains will be constructed to collect overland flow that is intercepted by the works areas or by the site roads. These will be constructed on the uphill side of the works and piped to the downhill side,

bypassing the works areas, thereby preventing contamination with construction related runoff water. However, this will cause the normally dispersed flow to be concentrated at specific discharge points downstream of the works. In order to disperse the flow each clean water drain will be terminated in a discharge channel running parallel to the ground contours that will function as a weir to disperse the flow over a wider area of vegetation. This will prevent erosion of the ground surface and will attenuate the flow rate to the downstream receiving waters. The resultant diversion of clean water runoff will ensure that the sediment and erosion control measures will only need to deal with construction related runoff.

4.4 TREATMENT OF WATER FROM THE WORKS AREAS

Runoff from the works areas will be isolated from the clean catchment runoff by means of a series of open drains that will be constructed on the down-hill side of the works. These drains will be directed to settlement ponds that will be constructed throughout the site, downhill from the works areas. The ponds have been designed to a modular size to cater for a single turbine hard standing area or a 1,000m^2 area of internal access road. Each drain will incorporate a series of check dams that will attenuate the flow and provide storage for the increased runoff from exceptional rainfall events. Where larger areas of runoff have to be catered for at a single discharge point the size of the settlement lagoon will be increased pro rata. At locations where fine silt particles, less than 20 microns in size, are present in the runoff, larger settlement ponds will be required. Proprietary clarifiers may be used as an alternative, with the addition of flocculants where necessary.

Excavation of drains will cause an initial drawdown of the water table in the immediate vicinity at locations where it is above the drain invert. The clay layers will have low permeability and the underlying till will have moderate permeability. Some seepage can occur from these layers but, based on site investigation information, is expected to be minimal. The volume and rate of flow from this source are unlikely to be significant or to exceed the capacity of the settlement ponds which are designed for extreme storm events.

Dewatering of turbine base excavations can result in significant flow rates to the drainage and settlement system if high capacity pumps are used. In order to avoid the need for pumping it is proposed to provide drainage channels from the excavations so as to prevent a build up of water. Where this is not feasible, dewatering should only be carried out at a flow rate that is within the capacity of the sediment ponds

The design of the settlement ponds in outlined below.

4.5 SETTLEMENT PONDS

Drains carrying construction site runoff will be diverted into settlement ponds that reduce flow velocities, allowing silt to settle and reducing the sediment loading. Settlement ponds have been designed as a three-stage tiered system and this has been proven to work effectively on wind farm construction sites. The three-stage system also facilitates effective cleaning with minimal contamination of water exiting the pond. The settlement ponds have been designed with regard to the following:

- Size of construction area and associated runoff flow rate (clean water from the surrounding catchment will be diverted away from construction area);
- Modified Bilham Tables for rainfall intensity and duration;
- Expected sedimentation rates; and
- Character of the impermeable areas (runoff coefficients).

Settlement ponds will require inspection and cleaning when necessary. This will be carried out under low or zero flow conditions so as not to contaminate the clean effluent from the pond. The water level would first be lowered to a minimum level by pumping without disturbing the settled sediment. The sediment would then be removed by mechanical excavator and disposed of in areas designated for deposition of spoil. Ponds will also require perimeter fencing and signage to ensure that there are no health and safety risks.

Contaminated runoff can be generated on the site access roads, construction compounds, sub-station sites and turbine hard standing areas and is mainly due to excavation for the infrastructure or movement of delivery vehicles and on-site traffic. A modular approach has been adopted for the design of the settlement ponds which have been sized to cater for a catchment area of 1,000m^2 works area. This is equivalent to a road length of 200m or the area of a typical turbine hard standing.

Generally, high intensity rainfall events have a short duration and lower intensity rainfall events tend to have a longer duration. The Bilham Table for statistical rainfall events demonstrates that exceedance probability decreases as intensity or duration increases. The runoff control measures for the wind farm site have been designed in the context of storm events of varying duration and intensity. The settlement ponds have been designed to cater for a maximum continuous flow rate associated with a medium-intensity rainfall event. Higher intensity runoff will be attenuated by the open drain collection system which provides temporary storage and limits the rate at which it enters the settlement ponds. This is achieved by the use of check dams within the open drains as described elsewhere in this document. Longer duration storms of 24 hours or more generally have very low intensity and are not critical in terms of the runoff rates that they generate. Since the design is for the construction phase only, no additional allowance has been made for possible increase in rainfall intensity due to climate change in the future. While the roadways are vulnerable to erosion during the construction and early operational phase (generally within the first 6 months post construction), it is not considered that they are vulnerable during the majority of the operational phase. The main source of sediment runoff from the roads is fine sediment, or fines as they are commonly known. Fines occur as a result of the physical impact of the constant HGV traffic during the construction phase. It is the crushing of the road stone from this impact that generates the fines, which become suspended in water during or after a rainfall event.

In contrast, there will be no HGV traffic during the operational phase, where light vehicles may visit the site intermittently as required for maintenance. This type and volume of traffic has virtually no physical impact on the road and will generate negligible amounts of fine sediment. Therefore, roads are virtually free of fines during the operational phase of the wind farm. Furthermore, the Sediment and Erosion Plan, outlined in this document, has been designed to mimic the natural hydrology, in isolation from natural watercourses, and with no release to any watercourse on the site.

4.5.1 Design flow rate

The modular settlement ponds are designed to operate effectively for the runoff rate associated with a continuous high rainfall event of 20mm/hour. This is equivalent to a 60 minute duration storm event with a 5-year return period (M5-60) or a 25 minute duration storm event with a 1-year return (M1-25).

The design runoff rate is calculated using the formula:

$Q = c\,i\,A$

where c is the runoff coefficient

i is the rainfall intensity in m/sec and

A is the catchment surface area in m^2

A runoff coefficient of 0.70 is assumed for the hardcore surface. For a rainfall intensity of 20mm/hour and an area of 1,000m^2 the runoff rate is:

$Q = 0.70 \times (0.02/3600) \times 1{,}000\ m^3/sec$

$= 0.0039\ m^3/sec$ (3.90 litres/sec)

4.5.2 Pond surface area

The main design parameter for the settlement pond is the water surface area. The required surface area is the design flow rate in m^3/sec divided by the particle settlement velocity (V_s) in m/sec (Area = $Q/V_s\ m^2$). The particle settlement velocity is determined using the formula derived by Stokes in 1851 as follows:

$V_s = 2\,r^2\,(D_p - D_f) / (9\,n)$

where V_s is the particle settling velocity (m/sec)

r is the radius of the particle (metres),

D_p is the density of the particles (kg/m^3);

D_f is the density of the fluid (kg/m^3),

n is the viscosity of the fluid (0.000133 kg sec/m^2 @ 10°C).

For a particle density of 2,700kg/m^3 and diameter of 20 microns the settlement velocity V_s is 0.000284m/sec.

The required settlement pond surface area is

$A = Q/V_s$

$= 0.0039/0.000284$

$= 13.70m^2$

Theoretically the pond depth is not relevant but in practice a minimum depth is required to ensure laminar flow and to allow temporary storage of settled silt. The modular settlement pond has been designed conservatively with a surface area of 24m^2 (12m x 2m) and a depth of 1m. This is divided into three chambers of equal length and in practice it has been found that most of the settlement occurs in the first chamber with very low turbidity levels being achieved in the final effluent. The design is

conservative and therefore has sufficient redundancy to cater for occasional higher runoff rates or sediment loads.

For practical reasons it may be necessary to increase the area directed to a settlement pond in which case the pond surface area will be increased pro rata.

4.5.3 Extreme flow rates

For rainfall intensities above the design value of 20mm/hour the excess runoff needs to be temporarily stored. The storage can be provided in the drainage channels by installing check dams at intervals along the channel as described below.

The storage volumes required for 10-year storm events of various durations are shown in the Table 1 below. The volumes are based on a catchment area of 1,000m^2 and a runoff coefficient of 0.70. The maximum storage volume required is 6.98m^3 for 20 minutes storm duration. This is equivalent to 30 minutes of flow through the settlement pond at the design through flow rate of 3.90 litres/second. The stored water will drain off gradually as runoff from the works area subsides. The storage volume represents an average depth of 0.06m in a 200m long, 0.60m wide open drain and can therefore be easily accommodated in the drainage system.

Storm Event	Duration (minutes)	Rainfall rate (mm/hour)	Excess (mm/hour)	Runoff Coefficient	Storage Volume (m^3)
M10-60min	60	24.50	4.50	0.70	3.15
M10-40min	40	32.40	12.40	0.70	5.79
M10-30min	30	39.10	19.10	0.70	6.69
M10-20min	20	49.90	29.90	0.70	**6.98**
M10-10min	10	71.40	51.40	0.70	6.00
M10-5min	5	94.90	74.90	0.70	4.37

TABLE 1 - CALCULATED STORAGE VOLUMES

The ability to limit flow rates is fundamental to the control of sediment during extreme storm events. It is not proposed to use any proprietary mechanical devices for this purpose but instead to rely on the check dams to effectively limit flow rates to the required levels. The check dams are constructed with gravel or other suitable material and will be of sufficient length and height to provide the required attenuation rates. This will vary depending on the gradient of the drainage channel with higher gradients requiring a greater number of dams with larger dimensions. Their ability to retain water and release it slowly can be confirmed visually.

4.5.4 Outflow Weirs

The effluent from each settlement pond will discharge to an open channel, 8 to 10 metres in length, running parallel to the ground contours. This will form a weir that will overflow on its downhill side and

disperse the flow across the existing vegetation. A minimum buffer width of 20m is specified between the overflow weir and downstream watercourses. Buffer widths are designed in line with Scottish Forestry Commission Guidelines (2004) on protection of water courses during forestry operations and management. This method buffers the larger volumes of run-off discharging from the drainage system during periods of high precipitation, reducing the hydraulic loading and further reducing suspended sediment load to surface watercourses. The closest overflow weir is 44m from the watercourse, which represents twice the specified buffer and is closer to the 50m buffer applied during the wind farm design. In general, the outflow weirs should not be located on slopes steeper than 3:1 or in areas of high peat stability risk. However, since there are no areas of deep peat in the Upperchurch site, peat stability is not a particular risk in this case.

4.5.5 Check dams

Check dams will be placed at regular intervals based on bed gradient along all drains to slow down runoff, facilitate settlement and reduce scour and ditch erosion. Check dams are relatively small and composed of gravels or other suitable material. Depending on the longitudinal gradient they will be placed at distances and heights that allow small pools to develop behind them. This is required in order to attenuate flow to the settlement ponds during storm events where the runoff rate would otherwise exceed the settlement pond capacity.

4.6 SEDIMENT CONTROL MANAGEMENT

The settlement ponds and check dams described in the previous section provide the essential mechanism for the removal of silt from construction related runoff and the controlled return of the treated runoff to the downstream watercourses. Additional infrastructure and control methodologies are also required in order to minimise the sediment load from the runoff and to prevent contamination by other potential pollutants.

4.6.1 Working near watercourses

No work will take place within 50m buffer zones of watercourses except for clear span bridges or culverts and associated road construction. Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk that pollution could occur. All construction method statements will be developed in consultation with Inland Fisheries Ireland – Shannon and South Western River Basin Districts.

4.6.2 Minimise exposed area

The area of exposed ground will be kept to a minimum by maintaining where possible existing vegetation that would otherwise be subject to erosion in the vicinity of the wind farm infrastructure and

keeping excavated areas to a minimum. The clearing of peat, where it occurs, will be delayed until before construction begins rather than stripping the entire site months in advance particularly during road construction.

4.6.3 Silt fences

Silt fences or other appropriate silt retention measures will be installed where there is a risk of erosion runoff to watercourses from construction related activity particularly if working during prolonged wet weather periods or if working during intense rainfall events. Silt fences can be used in conjunction with check dams in drains. Preliminary site works, and particularly the construction of the drainage system, will require the use of silt fences to prevent siltation due to ground disturbance caused by excavation works.

4.6.4 Engineered deposition areas

Temporary engineered deposition areas will be designated and designed to hold temporary stockpiles and located away from drains and watercourses. Stockpiles that are at risk of erosion will be protected by silt trapping apparatus such as a geo-textile silt fences to prevent contamination of runoff.

4.6.5 Felling

Permanent tree felling will take place to facilitate access to the wind farm infrastructure. All associated tree felling will be undertaken using good working practices as outlined in *Forestry Harvesting and the Environment Guidelines* and *Forestry and Water Quality Guidelines*, both published by the Forest Service, Department of Marine and Natural Resources, July 2000. The latter guidelines deal with sensitive areas, erosion, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel and machine oils.

4.6.6 Establish vegetation

As part of the works, some areas of organic soil and peat will be permanently removed. These areas include the locations of new roads, upgraded existing roads, turbine bases, hard standings and electrical sub-station compound. The soil can be re-used to remediate exposed areas and prevent erosion in the future when the civil works have been completed.

In addition, some exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation. This can be by natural regeneration or by reseeding. Natural regeneration relies on colonisation of bare ground by native species from adjacent habitats. A roughened surface will be provided, which can trap seeds and soil to provide initial regeneration areas. The need for replanting or reseeding will be decided by the developer in consultation with the project ecologist near the end of the

construction phase and during the beginning of the operational phase (See both the Construction Environmental Management Plan and Operational Environmental Management Plan).

4.6.7 Road runoff

All access roads are to be stabilised and maintained after grading followed by a final capping with crushed limestone or similar quality stone. Limestone or similar quality stone can significantly reduce road related runoff resulting from construction traffic and the road stone. The road surface can become contaminated with clay or other silty material during construction. Road cleaning will, therefore, need to be undertaken regularly during wet weather to reduce the risk of sediment runoff to watercourses. This is normally achieved by scraping the road surface with the front bucket of an excavator and disposing of the material at designated locations within the site.

4.6.8 Wheel washes

Wheel washes will be provided for exiting heavy vehicles to ensure roads outside of the site boundary are clean. It is recommended that a designated bunded and impermeable wheel wash area is provided and resultant waste water is diverted to a settlement pond for settling out of solids. If a pumped dewatering system is required it will be well planned and pumped water will be adequately treated in the settlement pond.

4.7 OPERATIONAL PHASE

The measures for control of runoff and sediment relate to the construction phase of the project when there is continuous movement of site vehicles and delivery vehicles. Following construction the amount of on-site traffic will be negligible and there will be no particular risk of sediment runoff. It is therefore proposed to partly fill the sediment ponds with stone so that they will not present a long-term safety risk. Runoff from the roads, hard-standings, and other works areas will continue to be directed to these ponds and from there to the outfall weirs. Check dams within the drainage channels will also remain in place. The drainage infrastructure will be monitored post-construction during the first six months of the operational phase. The retention of this drainage infrastructure will ensure that runoff continues to be attenuated and dispersed across existing vegetation before reaching the downstream receiving waters.

4.8 FLOOD ATTENUATION

The creation of impermeable areas within a development site has the effect of increasing rates of runoff into the downstream drainage system and this may increase flood risk and flood severity downstream. This applies particularly to urban areas that drain to closed pipe systems which do not have the capacity to cater for increased hydraulic loads. The Upperchurch wind farm development is located within a large rural catchment with an open drainage system. The footprint of the impermeable areas and the associated increase in runoff rate is very small in the context of the catchment size and therefore

presents a negligible increase in downstream flood risk. Notwithstanding the low increase in flood risk due to the development, the drainage system has been designed to prevent any increase in discharge rates above that which already exist in the undeveloped site.

The following flood attenuation measures have been incorporated into the design:

- Existing drains will bypass the works and no additional runoff will be routed directly into them;
- Overland flow of clean water that is intercepted by the works will be collected in open drains, piped to the downhill side of the works, and dispersed over existing vegetation by means of overflow weirs as described elsewhere in this document. These will be provided at intervals of approximately 200m, the exact locations being determined on site at construction stage.
- Runoff from roads, hard-standings and other new surfaces will be also be dispersed across existing vegetation downstream of the works following removal of sediment in the settlement ponds. This flow regime will remain in place permanently after completion of the works.
- Some attenuation will be provided by the use of a series of gravel dams placed at intervals within the open drains carrying silt contaminated runoff. These are intended to limit the flow rate to the settlement ponds during construction but they will also provide attenuation of flow to the downstream receiving waters in the longer term during the operational phase of the wind farm. The overflow weirs downstream of the settlement ponds will remain in place permanently so that the flow continues to be dispersed across existing vegetation and not directly to open drains or streams.

4.9 INSPECTION AND MAINTENANCE

Controls need to be regularly inspected and maintained to ensure that any failures, such as a build up of silt or a tear in a silt fence, are quickly identified and repaired so as to prevent to water pollution. Inspection and maintenance is critical after prolonged or intense rainfall while maintenance will ensure continued effectiveness of the sediment and erosion plan. A programme of inspection and maintenance will be designed and dedicated construction personnel assigned to manage this programme. A checklist of the inspection and maintenance control measures will be developed and records kept of inspections and maintenance works. Controls must work well during the operational phase of the wind farm until the vegetation has re-established. As aforementioned, the drainage infrastructure will also be monitored post-construction during the early operational phase.

4.10 WATER QUALITY MONITORING

Baseline water quality of all of the streams leaving the development site will be undertaken prior to construction. This baseline data will include the main components of a full hydrograph for the streams including both high spate flow and base flow where possible.

A weir or flume water level auto-logger and infra-red suspended solids sonde will be installed at select locations. This equipment will allow for continuous monitoring of water flow and associated suspended solids load during storm events. This equipment will be installed in time to monitor baseline conditions

for at least 6 months prior to construction, and will be maintained during construction and post construction for at least 12 months.

During the construction phase of the project, water quality in the streams and outflow from the drainage and attenuation system will be monitored, field-tested and laboratory tested on a regular basis during different weather conditions. This monitoring along with the visual monitoring will help to ensure that the mitigation measures that are in place to protect water quality are working.

During the construction phase of the project, the development areas will be monitored regularly for evidence of groundwater seepage, water ponding and wetting of previously dry spots, and visual monitoring of the effectiveness of the constructed drainage and attenuation system to ensure it does not become blocked, eroded or damaged during the construction process.

4.11 CONCLUSION

Construction practices impact on the natural drainage patterns in a landscape. The intent is to keep clean water clean and to manage construction related runoff through a designed, managed and maintained sediment and erosion plan. Attenuation measures are incorporated into the design of the drainage and sediment control system.

The measures outlined above, in conjunction with the site drainage layout and details, will prevent sediment and erosion problems and will ensure that the development of the Upperchurch wind farm will not have a significant impact on the River Suir and River Shannon or their tributaries.

4.12 REFERENCES

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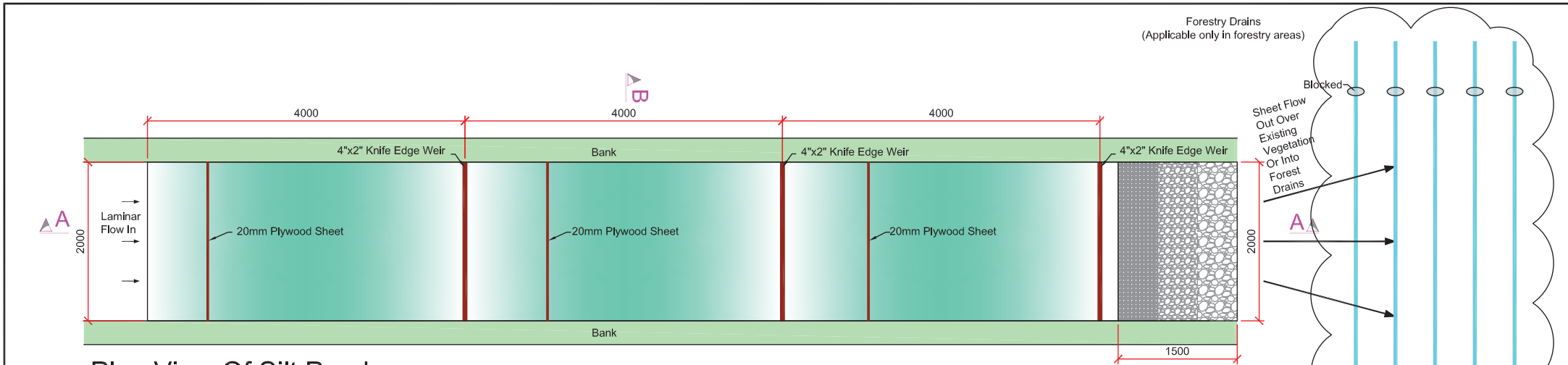
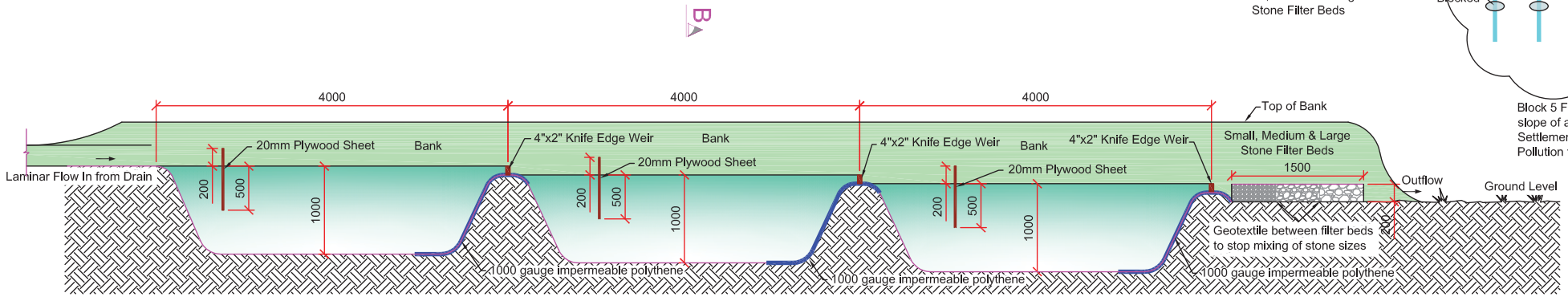
Appendix 1

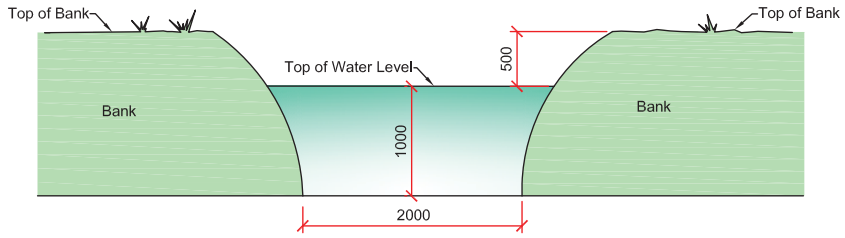
15388-5005 Proposed Clear Span Bridge Detail



Plan View Of Silt Ponds (with discharge to forestry drains where applicable) Scale 1:50



Section A-A Scale 1:50



Section B-B Scale 1:50

Rev.	Date	Description	by	ch'd	app
A	26.11.13	Issued For RFI	JK	TB	JoL

Client: Ecopower Developments Ltd

Project: Upperchurch Wind Farm

Title: Proposed Site Drainage Details

Malachy Walsh and Partners
Consulting Engineers
Cork | Tralee | London | Limerick

Scales (A3)	1:50	
Drawn	JK	26.11.2013
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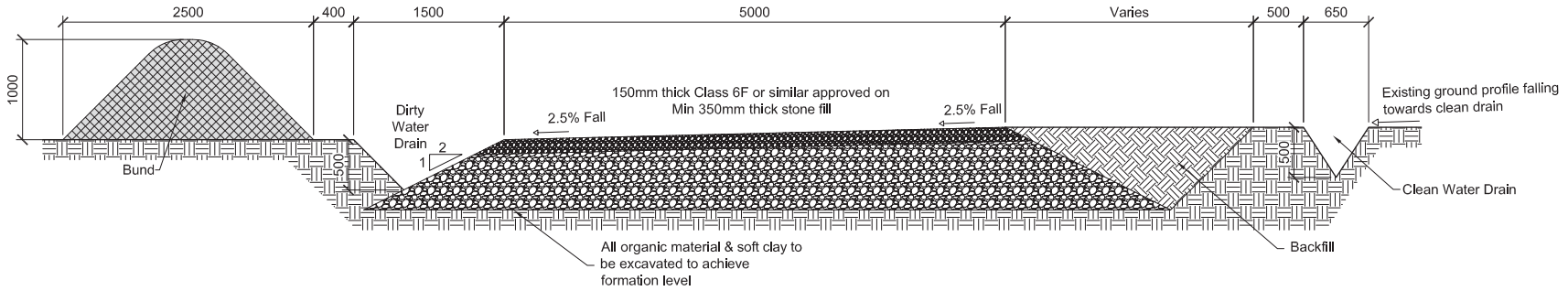
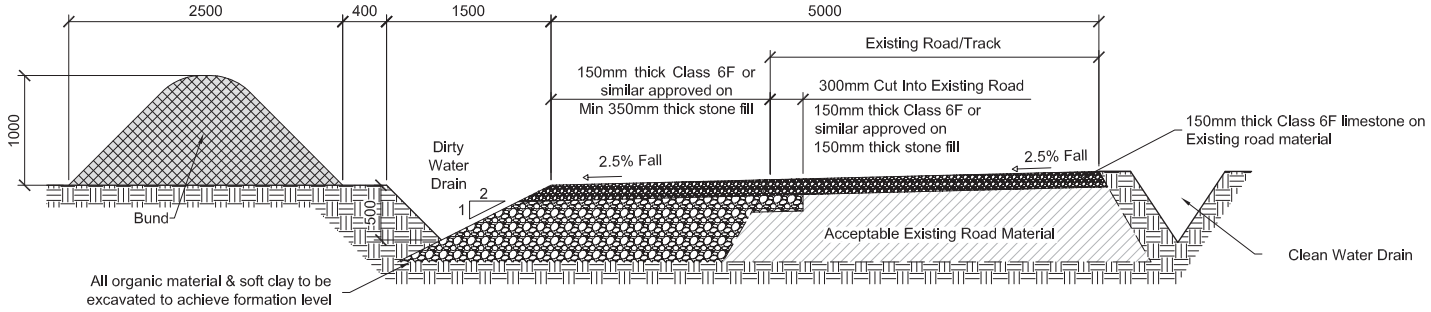
Rev. A



Typical Excavated Access Track Detail Scale 1:50



Typical Widening To Existing Access Track Detail Scale 1:50

Rev.	Date	Description	by	ch'd	app
A	26.11.13	Issued For RFI	JK	TB	JoL

Client: Ecopower Developments Ltd

Project: Upperchurch Wind Farm

Title: Proposed Internal Road Details

Malachy Walsh and Partners
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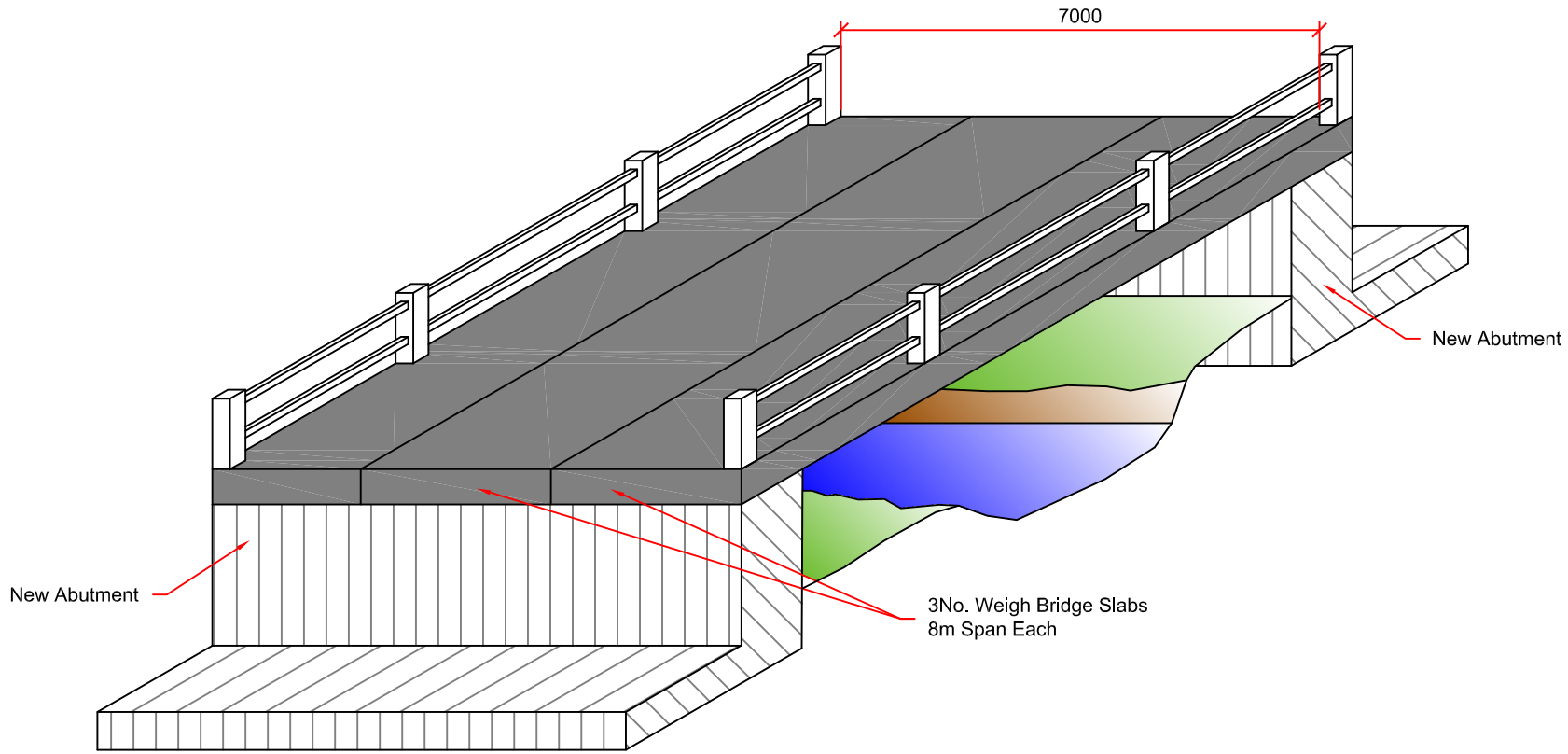
Cork | Tralee | London | Limerick

Scales (A3)	1:50	
Drawn	JK	26.11.2013
Checked	TB	26.11.2013

Drg. No. 15388-5006

Rev. A



Proposed Clear Span Bridge Detail Scale 1:100

Rev.	Date	Description	by	ch'd	app
A	26.11.13	Issued For RFI	JK	TB	TB

Client

Ecopower Developments Ltd

Project

Upperchurch Wind Farm

Title

Proposed Clear Span Bridge Detail

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Consulting Engineers
Cork | Tralee | London | Limerick

Scales (A4)	1:100	
Drawn	JK	26.11.2013
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Rev. A

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 6
Sediment & Erosion Control Plan

ECOPOWER

April 2021

Malachy Walsh and Partners

Consulting Engineers

Cork | Tralee | Limerick | London

WINDFARM DEVELOPMENT

UPPERCHURCH, THURLES, COUNTY TIPPERARY

SEDIMENT AND EROSION CONTROL PLAN

ECOPOWER DEVELOPMENTS LIMITED

Project	Document	Revision	Prepared	Checked	Status	Date
14708	6002	B	Sean Doyle	Jack O'Leary	Final	24 September 2012

1 Introduction

Sediment such as peat, clay and silt can cause significant pollution during the construction phase of civil engineering projects due to erosion of exposed soil by surface water runoff. This plan has been prepared to control runoff and prevent erosion during the construction phase of the Upperchurch Wind Farm. The implementation of sediment and erosion control measures is essential in preventing sediment pollution. Erosion control is intended to prevent runoff flowing across exposed ground and becoming polluted with sediments while sediment control is designed to slow runoff (Murnane et al., 2006).

The sediment and erosion plan is compiled with regard to:

- Knowledge of the site's environmental conditions;
- Previous construction experience with wind farm developments in similar upland environments;
- Previous experience of environmental constraints and issues from construction in other wind farms in similar environmental conditions;
- Mitigation measures outlined in other EIS Chapters most notably **Chapter 9, Hydrology and Hydrogeology**; and
- A number of technical guidance and best management practice manuals.

The following site specific information was used to compile the sediment and erosion plan:

- High resolution aerial photography;
- OSi 10m Contour data;
- Wind farm infrastructure layout (turbines, sub-station, roads and ancillary development);
- Hydrology maps (watercourses and buffer zones);
- Soil and land use maps; and
- Modified Bilham Tables of rainfall intensity, duration and frequency.

2 Site description

The site is located with in a se ries of small hills or drum lins to the west of Upperchurch village and 18 kilometres to the west of Thurles. The hil ls are at elevations of bet ween 363mOD and 411mOD and the peaks are generally at heights of 100m above the intervening lower terrain.

The Slievefelim to Silvermines Mountains SPA lies to the west of the site. Most of the site is within the South Eastern River Basin Distri ct and drains to the Owenbeg, Turraheen and Clodiagh Rivers and ultimately to the River Suir. The remaining part of the site at the south western extremity is within the Shannon River Basin District and drains to the Aughvana River and ultimately to the Mulkear River.

The area is underlain by Silurian Metasedim ents and Volcanics with subsoils consisting of Devonian / Carboniferous sandsto ne and shale till. Som e rock outcropping occurs, m ost notably at the northeast part of the site. The area originally had shallow peat land cover but most of it has been reclaim ed by de ep ploughing and converted to pasture. The rem aining peat areas are used for commercial forestry.

Overall it is a landscape much altered by human activity.

3 Control of Sediment and Erosion

This plan has been designed to cause m inimal disturbance to the current hydrological regime and minimise suspended sediment loading. Reduction of sediment loading is important as the site drains to a num ber of streams and rivers immediately to the north, east and south that ultimately drain to the River Suir and to the Mulkear River (a tr ibutary of the River Shannon). Therefore, m itigation measures are required to protect ag ainst suspended solid loading of headwater drainage during the construction stage of the project.

The plan will be implemented early in the construction phase, prior to the main site clearance works and preferably during dry weather c onditions to control increased runoff and associated suspended solids loads in discharging waters from the developm ent areas. The plan can be i mplemented in phases as work progresses through the site. The events and locations with the highest potential for sediment runoff include:

- During and after heavy rainfall events or prolonged rainfall;
- Areas where construction activities (earthworks) are taking place;
- Steep slopes;
- Temporary stockpiles;
- Borrow pits;
- Areas of exposed ground;
- During bridge or drain work s (e.g. during im plementation of the drainage network) and
- Clear felling.

The proposed drainage layout and sedim ent control details are show n on the following figures which are at the end of this report:

- **FIGURE 15-I-1 to 15-I-4** – Proposed Drainage Layout;
- **FIGURE 15-I-5** – Internal Road Details;
- **FIGURE 15-I-6** – Site Drainage Details.

And are sh own on the following drawings which accom pany this E nvironmental Impact Statement:

- **Drawings 14708-5001 to 14708-5004** – Proposed Drainage Layout;
- **Drawing 14708-5005** – Internal Road Details;
- **Drawing 14708-5006** – Site Drainage Details.

It is proposed to com bine sediment and erosion control measures to reduce the pollution runoff from the site during the construction phase of Upperchurch wind farm. It is important to reduce erosion of soil and peat where possible to prevent sediment suspension in runoff.

No work will tak e place within 50m buffer zones of watercourses except for clear span bridges or culverts and associated road construction. All construction method statements will be developed in consultation with Inland Fish eries Ireland – Shannon River Basin District and South Eastern River Basin District.

Generally, the footprint of the works area of a wind farm development represents only a small proportion of the overall catchment area intercepted by the site. Unless appropriate measures are put in place the works area can potentially contaminate all the runoff from the upstream catchment, creating an excessive volume of contaminated water which is then difficult to manage. The aim of this sediment and erosion plan is to **intercept the clean water runoff from the upstream catchment and to isolate it from the contaminated water flowing from the works areas**. This minimises the volume of contaminated water that has to be cleaned before it is released to the downstream receiving waters.

3.1 PROTECTION OF CLEAN WATER FROM THE UPSTREAM CATCHMENT

A fundamental principle of the design of the sediment and erosion plan is that clean water flowing in the upstream catchment, including overland flow and flow in existing streams, is not contaminated by silt from the works area. Existing stream crossings, the works area will be piped. New drains will be constructed to collect overland flow that is intercepted by the works areas or by new access roads. These will be constructed on the uphill side of the works and piped to the downhill side, bypassing the works areas, thereby preventing contamination with construction related runoff water. However, this will cause the normally dispersed flow to be concentrated at specific discharge points downstream of the works. In order to disperse the flow each clean water drain will be terminated in a discharge channel running parallel to the ground contours that will function as a weir to disperse the flow over a wider area of vegetation. This will prevent erosion of the ground surface and will attenuate the flow rate to the downstream receiving waters. The resultant diversion of clean water runoff will ensure that the sediment and erosion control measures will only need to deal with construction related runoff.

3.2 TREATMENT OF WATER FROM THE WORKS AREAS

Runoff from the works areas will be isolated from the clean catchment runoff by means of a series of open drains that will be constructed on the down-hill side of the works. These drains will be directed to settlement ponds that will be constructed throughout the site, downhill from the works areas. The ponds have been designed to a modular size to cater for a single turbine hard standing area or a 1,000m^2 area of internal access road. Each drain will incorporate a series of check dams that will attenuate the flow and provide storage for the increased runoff from exceptional rainfall events. Where larger areas of runoff have to be catered for at a single discharge point the size of the settlement lagoon will be increased pro rata. At locations where fine silt particles, less than 20 microns in size, are present in the runoff, larger settlement ponds will be required. Proprietary clarifiers may be used as an alternative, with the addition of flocculants where necessary.

Excavation of drains will cause an initial drawdown of the water table in the immediate vicinity at locations where it is above the drain invert. The clay layers will have low permeability and the underlying till will have moderate permeability. Some seepage can

occur from these layers but, based on site investigation information, is expected to be minimal. The volume and rate of flow from this source are unlikely to be significant or to exceed the capacity of the settlement ponds which are designed for extreme storm events.

Dewatering of turbine base excavations can result in significant flow rates to the drainage and settlement system if high capacity pumps are used. In order to avoid the need for pumping it is proposed to provide drainage channels from the excavations so as to prevent a build up of water. Where this is not feasible, dewatering should only be carried out at a flow rate that is within the capacity of the sediment ponds

The design of the settlement ponds in outlined below.

3.3 SETTLEMENT PONDS

Drains carrying construction site runoff will be diverted into settlement ponds that reduce flow velocities, allowing silt to settle and reducing the sediment loading. Settlement ponds have been designed as a three-stage tiered system and this has been proven to work effectively on wind farm construction sites. The three-stage system also facilitates effective cleaning with minimal contamination of water exiting the pond. The settlement ponds have been designed with regard to the following:

- Size of construction area and associated runoff flow rate (clean water from the surrounding catchment will be diverted away from construction area);
- Modified Bilham Tables for rainfall intensity and duration;
- Expected sedimentation rates; and
- Character of the impermeable areas (runoff coefficients).

Settlement ponds will require inspection and cleaning when necessary. This will be carried out under low or zero flow conditions so as not to contaminate the clean effluent from the pond. The water level would first be lowered to a minimum level by pumping without disturbing the settled sediment. The sediment would then be removed by mechanical excavator and disposed of in areas designated for deposition of spoil. Ponds will also require perimeter fencing and signage to ensure that there are no health and safety risks.

Contaminated runoff can be generated on the site access roads, construction compounds, sub-station sites and turbine hard standing areas and is mainly due to excavation for the infrastructure or movement of delivery vehicles and on-site traffic. A modular approach has been adopted for the design of the settlement ponds which have been sized to cater for a catchment area of 1,000m^2 works area. This is equivalent to a road length of 200m or the area of a typical turbine hard standing.

Generally, high intensity rainfall events have a short duration and lower intensity rainfall events tend to have a longer duration. The Bilham Table for statistical rainfall events demonstrates that exceedance probability decreases as intensity or duration increases. The runoff control measures for the wind farm site have been designed in the context of storm events of varying duration and intensity. The settlement ponds have been designed to cater for a maximum continuous flow rate associated with a medium-intensity rainfall event.

Higher intensity runoff will be attenuated by the open drain collection system which provides temporary storage and limits the rate at which it enters the settlement ponds. This is achieved by the use of check dams within the open drains as described elsewhere in this document. Longer duration storms of 24 hours or more generally have very low intensity and are not critical in terms of the runoff rates that they generate. Since the design is for the construction phase only, no additional allowance has been made for possible increase in rainfall intensity due to climate change in the future.

3.3.1 Design flow rate

The modular settlement ponds are designed to operate effectively for the runoff rate associated with a continuous high rainfall event of 20mm/hour. This is equivalent to a 60 minute duration storm event with a 5-year return period (M5-60) or a 25 minute duration storm event with a 1-year return (M1-25).

The design runoff rate is calculated using the formula:

$Q = c\,i\,A$

where c is the runoff coefficient

i is the rainfall intensity in m/sec and

A is the catchment surface area in m^2

A runoff coefficient of 0.70 is assumed for the hardcore surface. For a rainfall intensity of 20mm/hour and an area of 1,000m^2 the runoff rate is:

$Q = 0.70 \times (0.02/3600) \times 1{,}000\ m^3/sec$

$= 0.0039\ m^3/sec$ (3.90 litres/sec)

3.3.2 Pond surface area

The main design parameter for the settlement pond is the water surface area. The required surface area is the design flow rate in m^3/sec divided by the particle settlement velocity (V_s) in m/sec (Area = $Q/V_s\ m^2$). The particle settlement velocity is determined using the formula derived by Stokes in 1851 as follows:

$V_s = 2\,r^2\,(D_p - D_f) / (9\,n)$

where V_s is the particle settling velocity (m/sec)

r is the radius of the particle (metres),

D_p is the density of the particles (kg/m^3);

D_f is the density of the fluid (kg/m^3),

n is the viscosity of the fluid (0.000133 kg sec/m^2 @ 10°C).

For a particle density of 2,700kg/m^3 and diameter of 20 microns the settlement velocity V_s is 0.000284m/sec.

The required settlement pond surface area is

$A = Q/V_s$

= 0.0039/0.000284

= 13.70m^2

Theoretically the pond depth is not relevant but in practice a minimum depth is required to ensure laminar flow and to allow temporary storage of settled silt. The modular settlement pond has been designed conservatively with a surface area of 24m^2 (12m x 2m) and a depth of 1m. This is divided into three chambers of equal length and in practice it has been found that most of the settlement occurs in the first chamber with very low turbidity levels being achieved in the final effluent. The design is conservative and therefore has sufficient redundancy to cater for occasional higher runoff rates or sediment loads.

For practical reasons it may be necessary to increase the area directed to a settlement pond in which case the pond surface area will be increased pro rata.

3.3.3 Extreme flow rates

For rainfall intensities above the design value of 20mm/hour the excess runoff needs to be temporarily stored. The storage can be provided in the drainage channels by installing check dams at intervals along the channel as described below.

The storage volumes required for 10-year storm events of various durations are shown in the Table 1 below. The volumes are based on a catchment area of 1,000m^2 and a runoff coefficient of 0.70. The maximum storage volume required is 6.98m^3 for 20 minutes storm duration. This is equivalent to 30 minutes of flow through the settlement pond at the design through flow rate of 3.90 litres/second. The stored water will drain off gradually as runoff from the works area subsides. The storage volume represents an average depth of 0.06m in a 200m long, 0.60m wide open drain and can therefore be easily accommodated in the drainage system.

Storm Event	Duration (minutes)	Rainfall rate (mm/hour)	Excess (mm/hour)	Runoff Coefficient	Storage Volume (m^3)
M10-60min	60	24.50	4.50	0.70	3.15
M10-40min	40	32.40	12.40	0.70	5.79
M10-30min	30	39.10	19.10	0.70	6.69
M10-20min	20	49.90	29.90	0.70	**6.98**
M10-10min	10	71.40	51.40	0.70	6.00
M10-5min	5	94.90	74.90	0.70	4.37

TABLE 1 - CALCULATED STORAGE VOLUMES

The ability to limit flow rates is fundamental to the control of sediment during extreme storm events. It is not proposed to use any proprietary mechanical devices for this purpose but instead to rely on the check dams to effectively limit flow rates to the required levels. The check dams are constructed with gravel or other suitable material and will be of sufficient length and height to provide the required attenuation rates. This will vary depending on the gradient of the drainage channel with higher gradients requiring a greater number of dams

with larger dimensions. Their ability to reta in water and re lease it slowly can be co nfirmed visually.

3.3.4 Outflow Weirs

The effluent from each settlement pond will discharge to an open channel, 8 to 10 metres in length, running parallel to the ground contours. This will form a weir that will overflow on its downhill side and disperse the flow across the existing vegetation. A minimum buffer width of 20m is specified between the overflow weir and downstream watercourses. Buffer widths are designed in line with Scottish Forestry Commission Guidelines (2004) on protection of water courses during forestry operations and management. This method buffers the larger volumes of run-off discharging from the drainage system during periods of high precipitation, reducing the hydraulic loading and further reducing suspended sediment load to surface watercourses. In general, the outflow weirs should not be located on slopes steeper than 3:1 or in areas of high peat stability risk. However, since there are no areas of deep peat in the Upperchurch site, peat stability is not a particular risk in this case.

3.3.5 Check dams

Check dams will be placed at regular intervals based on bed gradient along all drains to slow down runoff, facilitate settlement and reduce scour and ditch erosion. Check dams are relatively small and composed of gravels or other suitable material. Depending on the longitudinal gradient they will be placed at distances and heights that allow small pools to develop behind them. This is required in order to attenuate flow to the settlement ponds during storm events where the runoff rate would otherwise exceed the settlement pond capacity.

FIGURE 1 EXAMPLES OF CHECK DAMS AND EXAMPLE OF SILT FENCE USED IN CONJUNCTION WITH CHECK DAMS ALONG ROADSIDE DRAINAGE CHANNELS

3.4 SEDIMENT CONTROL MANAGEMENT

The settlement ponds and check dams described in the previous section provide the essential mechanism for the removal of silt from construction related runoff and the controlled return of the treated runoff to the downstream watercourses. Additional infrastructure and control methodologies are also required in order to minimise the sediment load from the runoff and to prevent contamination by other potential pollutants.

3.4.1 Working near watercourses

No work will take place within 50m buffer zones of watercourses except for clear span bridges or culverts and associated road construction. Working near watercourses during or after intense or prolonged rainfall events will be avoided and work will cease entirely near watercourses when it is evident that there is a risk that pollution could occur. All construction method statements will be developed in consultation with Inland Fisheries Ireland – Shannon and South Western River Basin Districts.

3.4.2 Minimise exposed area

The area of exposed ground will be kept to a minimum by maintaining where possible existing vegetation that would otherwise be subject to erosion in the vicinity of the wind farm infrastructure and keeping excavated areas to a minimum. The clearing of peat, where it occurs, will be delayed until before construction begins rather than stripping the entire site months in advance particularly during road construction.

3.4.3 Silt fences

Silt fences or other appropriate silt retention measures will be installed where there is a risk of erosion runoff to watercourses from construction related activity particularly if working during prolonged wet weather periods or if working during intense rainfall events. Silt fences can be used in conjunction with check dams in drains. Preliminary site works, and particularly the construction of the drainage system, will require the use of silt fences to prevent siltation due to ground disturbance caused by excavation works.

3.4.4 Engineered deposition areas

Temporary engineered deposition areas will be designated and designed to hold temporary stockpiles and located away from drains and watercourses. Stockpiles that are at risk of erosion will be protected by silt trapping apparatus such as a geo-textile silt fences to prevent contamination of runoff.

3.4.5 Felling

Permanent tree felling will take place to facilitate access to the wind farm infrastructure. All associated tree felling will be undertaken using good working practices as outlined in *Forestry Harvesting and the Environment Guidelines* and *Forestry and Water Quality Guidelines*, both published by the Forest Service, Department of Marine and Natural Resources, July 2000. The latter guidelines deal with sensitive areas, erosion, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel and machine oils.

3.4.6 Establish vegetation

As part of the works, some areas of organic soil and peat will be permanently removed. These areas include the locations of new roads, turbine bases, hard standings and electrical sub-station compound. The soil can be re-used to remediate exposed areas and prevent erosion in the future when the civil works have been completed.

In addition, some exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation. This can be by natural regeneration or by reseeding. Natural regeneration relies on colonisation of bare ground by native species from adjacent habitats. A roughened surface will be provided, which can trap seeds and soil to provide initial regeneration areas. The need for replanting or reseeding will be decided by the developer in consultation with the project ecologist near the end of the construction phase.

3.4.7 Road runoff

All access roads are to be stabilised and maintained after grading followed by a final capping with crushed limestone or similar quality stone. Limestone or similar quality stone can significantly reduce road related runoff resulting from construction traffic and the road stone. The road surface can become contaminated with clay or other silty material during construction. Road cleaning will, therefore, need to be undertaken regularly during wet weather to reduce the risk of sediment runoff to watercourses. This is normally achieved by scraping the road surface with the front bucket of an excavator and disposing of the material at designated locations within the site.

3.4.8 Wheel washes

Wheel washes will be provided for exiting heavy vehicles to ensure roads outside of the site boundary are clean. It is recommended that a designated bunded and impermeable wheel wash area is provided and resultant waste water is diverted to a settlement pond for settling out of solids. If a pumped dewatering system is required it will be well planned and pumped water will be adequately treated in the settlement pond.

3.5 OPERATIONAL PHASE

The measures for control of runoff and sedime nt relate to the construction phase of the project when there is continuous movement of site vehicles and delivery vehicles. Following construction the amount of on-site traffic will b e negligible and there will be no p articular risk of sediment runoff. It is therefore propos ed to partly fill the sedim ent ponds with ston e so that they will not present a long-term safety risk. Runoff from the roads, hard-standings, and other works areas will continue to be directed to these ponds and from there to the outfall weirs. Check dams within the drainage channels will also remain in place. The retention of this drainage infrastructure will ens ure that runoff continues to be atte nuated and dispers ed across existing vegetation before reaching the downstream receiving waters.

3.6 FLOOD ATTENUATION

The creation of impermeable areas within a development site has the effect of increasing rates of runoff into the downstream drainage syst em and this m ay increase flood risk and flood severity downstream. This applies particularly to urban areas that drain to closed pipe systems which do not have the capacity to cater for increased hydraulic loads. The Upperchurch wind farm development is located within a large rural catchment with an open drainage system. The footprint of the im permeable areas and the associated in crease in runoff rate is very sm all in the co ntext of the catchment size and therefore presents a negligible increase in downstream flood risk. Notwithstandi ng the low increase in flood risk due to the developm ent, the drainage system has been designed to prevent any increase in discharge rates above that which already exist in the undeveloped site.

The following flood attenuation measures have been incorporated into the design:

- Existing drains will bypass the works and no additional runoff will be routed directly into them;
- Overland flow of clean water tha t is intercep ted by the works will be collected in open drains, piped to the downhill side of the works, and dispers ed over existing vegetation by m eans of overflo w weirs as described elsewhere in this docum ent. These will be provided at intervals of a pproximately 200m, the exact locations being determined on site at construction stage.
- Runoff from roads, hard-standings and other n ew surfaces will be als o be dispers ed across existing vegetation downstream of the works following removal of sediment in the settlement ponds. This flow r egime will rem ain in place perm anently after completion of the works.
- Some attenuation will be provid ed by the us e of a series of gravel d ams placed at intervals within the open drains carrying silt contaminated runoff. These are intended to limit the flow rate to the settlem ent ponds during construction but they will also provide attenuation of flow to the downstream receiv ing waters in th e longer term during the operational phase of the wind farm. The overflow weirs downstream of the

settlement ponds will rem ain in place perm anently so that the flow continues to be dispersed across existing vegetation and not directly to open drains or streams.

3.7 INSPECTION AND MAINTENANCE

Controls need to be regularly inspected and maintained to ensure that any failures, such as a build up of silt or a tear in a silt fence, are quickly identified and repaired so as to prevent to water pollution. Inspection and m aintenance is critical after prolonge d or intense rainfall while maintenance will ensure continued effect iveness of the sediment and erosion plan. A programme of inspection and m aintenance will be designed and dedicated construction personnel assigned to m anage this progra mme. A checklist of the inspection and maintenance control measures will be deve loped and records kept of inspections and maintenance works. Controls must work well during the operational phase of the wind farm until the vegetation has re-established.

3.8 WATER QUALITY MONITORING

Baseline water quality of all of the stream s leaving the development site will be undertaken prior to construction. This baseline data will include th e main components of a full hydrograph for the streams including both high spate flow and base flow where possible.

A weir or flume water level auto-logger and infra-red suspended solids sonde will be installed at select locations. This equipment will allow for continuous monitoring of water flow and associated suspended solids load during storm events. This equipment will be installed in time to monitor baseline conditions for at leas t 6 months prior to cons truction, and will be maintained during construction and post construction for at least 12 months.

During the construction phase of the project, wa ter quality in the stre ams and outflow from the drainage and attenuation system will be monitored, field-tested and laboratory tested on a regular basis during dif ferent weather conditions. This m onitoring along with the visual monitoring will help to ensure that the mitigation measures that are in place to protect water quality are working.

During the construc tion phase of the projec t, the develop ment areas will be m onitored regularly for evidence of groundwater seepage, water ponding and wetting of previously dry spots, and visual m onitoring of the effectiven ess of the constructed drainage and attenuation system to ensure it does not becom e blocked, eroded or dam aged during the con struction process.

3.9 CONCLUSION

Construction practices impact on the natural drainage patterns in a landscape. The intent is to keep clean water clean and to m anage construction related runoff through a designed, managed and maintained sediment and erosion plan. Attenuati on measures are incorporated into the design of the drainage and sediment control system.

The measures outlined above, in conjunction with the site drainage layout and details, will prevent sediment and erosion problems and will ensure that the development of the

Upperchurch wind farm will not have a significant impact on the River Suir and River Shannon or their tributaries.

3.10 REFERENCES

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Forest Service, Department of Marine and Na tural Resources, July 2000. Forest Harvesting and the Environment Guidelines.

Forest Service, Department of Marine and Na tural Resources, July 2000. Forestry and W ater Quality Guidelines.

Murnane, E., Heap, A. and A. Swain, 2006. Control of water pollution from linear construction projects. A Technical Guidance. A CIRIA publication, UK.

FIGURE 15-I-1: PROPOSED DRAINAGE LAYOUT MASTER SHEET

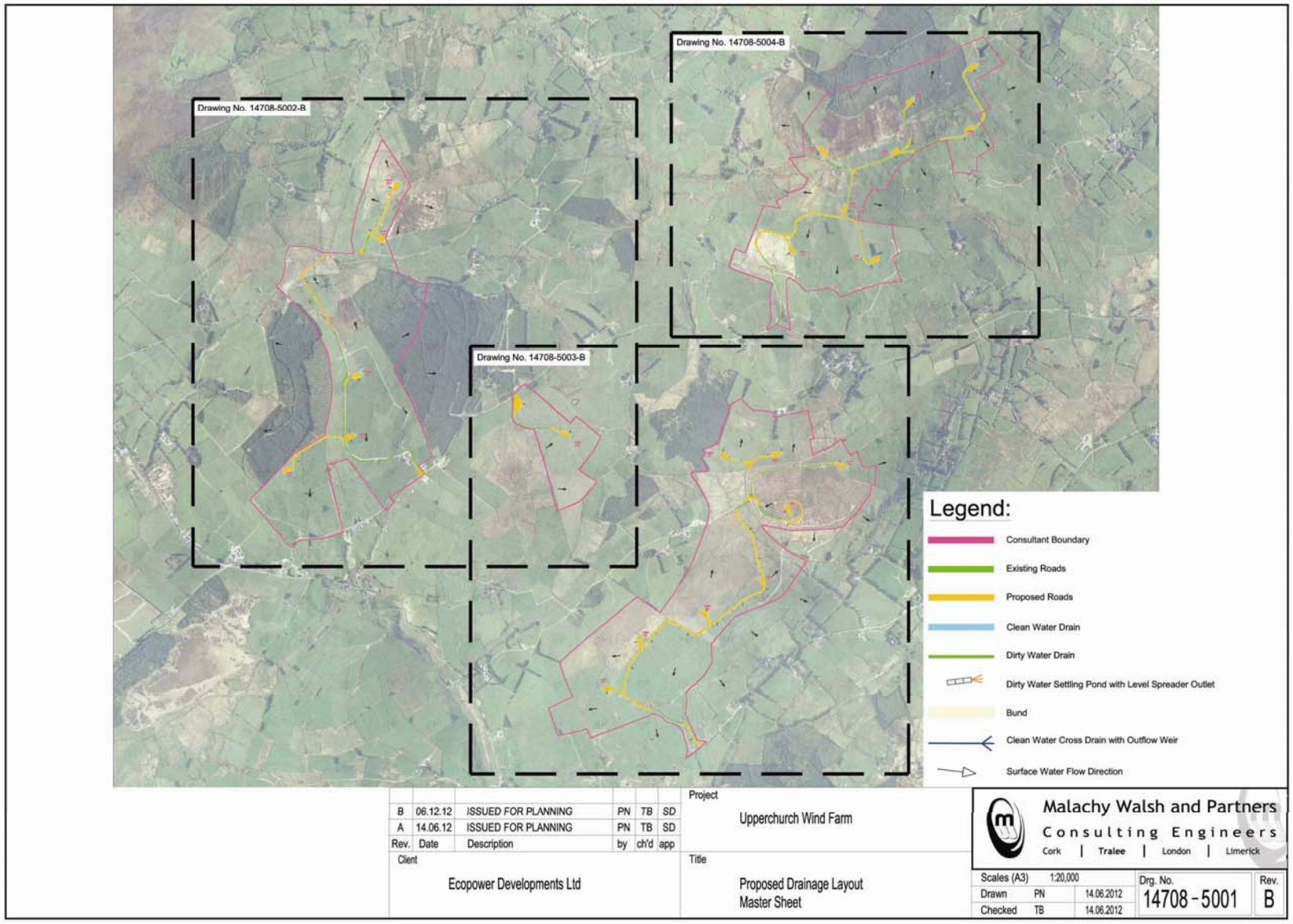


FIGURE 15-I-2: PROPOSED DRAINAGE LAYOUT SHEET 1 OF 3

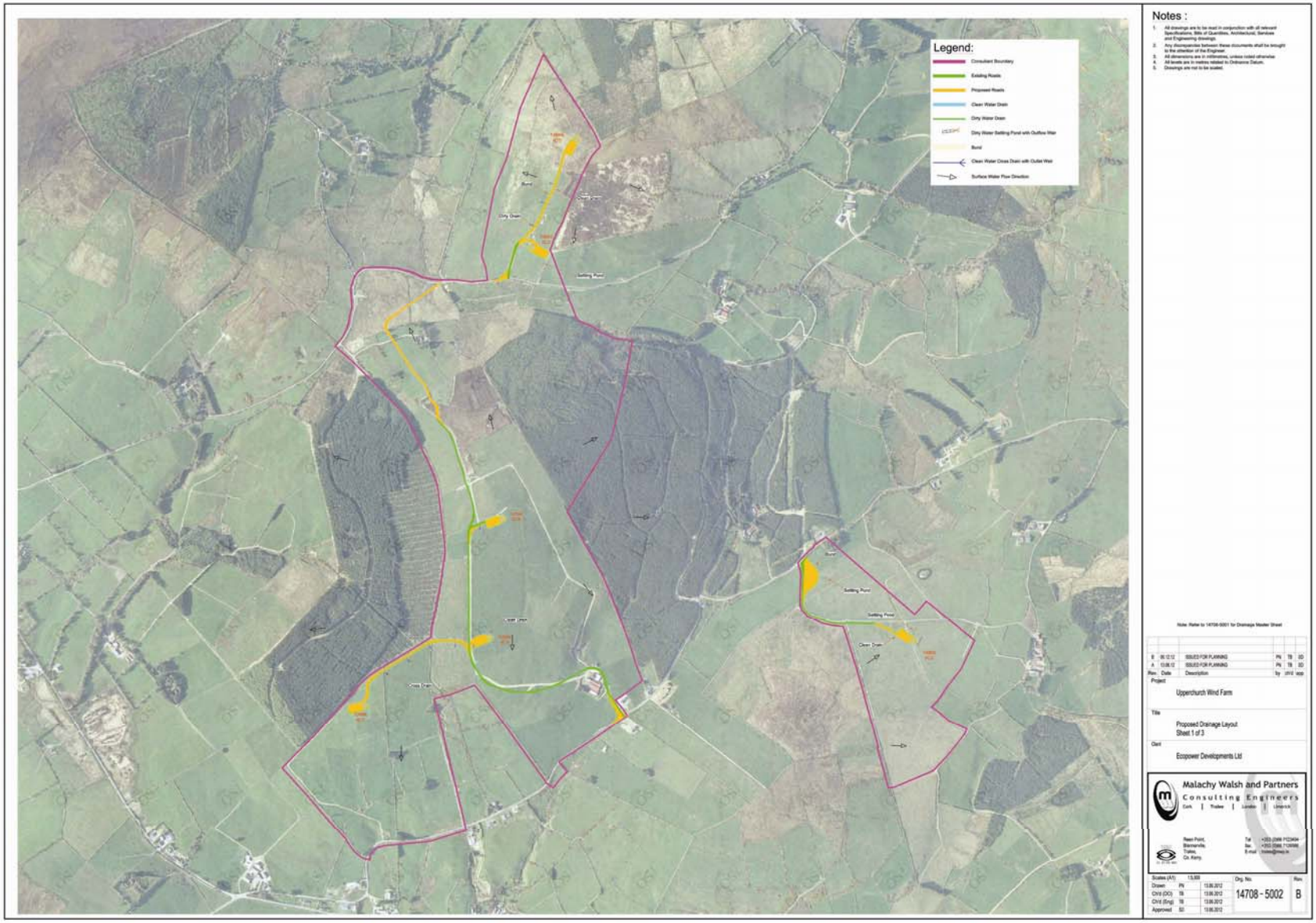


FIGURE 15-I-3: PROPOSED DRAINAGE LAYOUT SHEET 2 OF 3

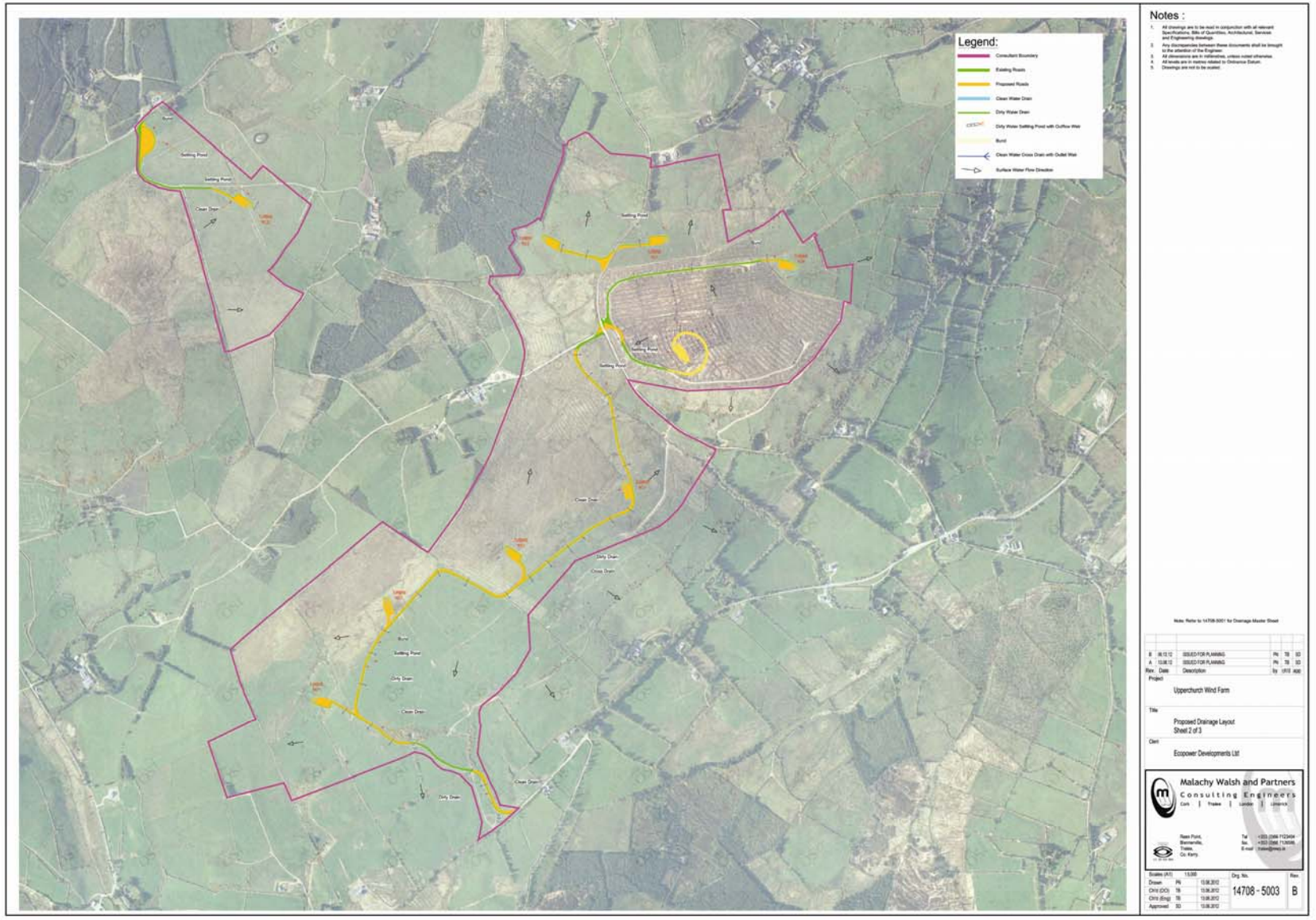


FIGURE 15-I-4: PROPOSED DRAINAGE LAYOUT SHEET 3 OF 3

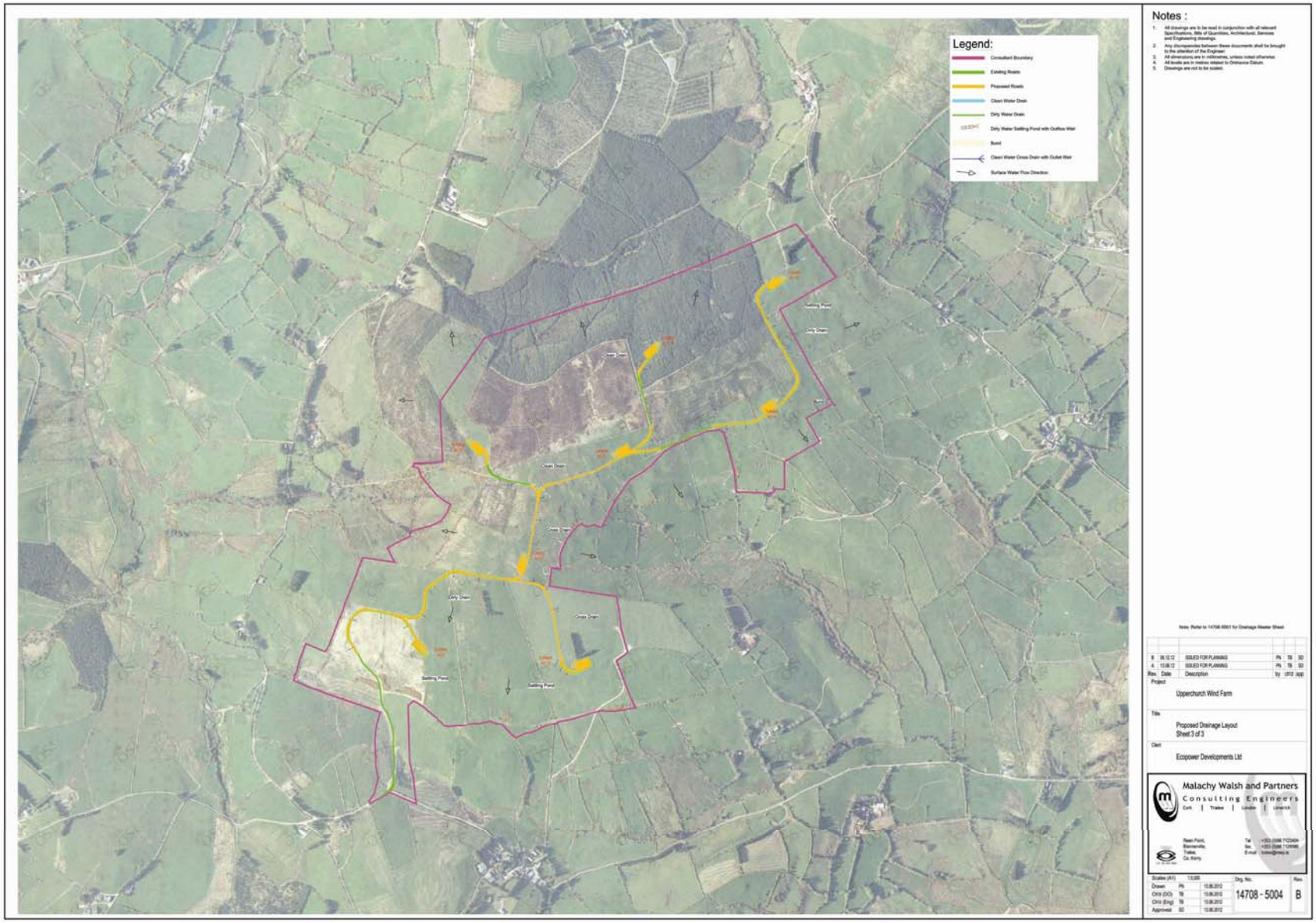
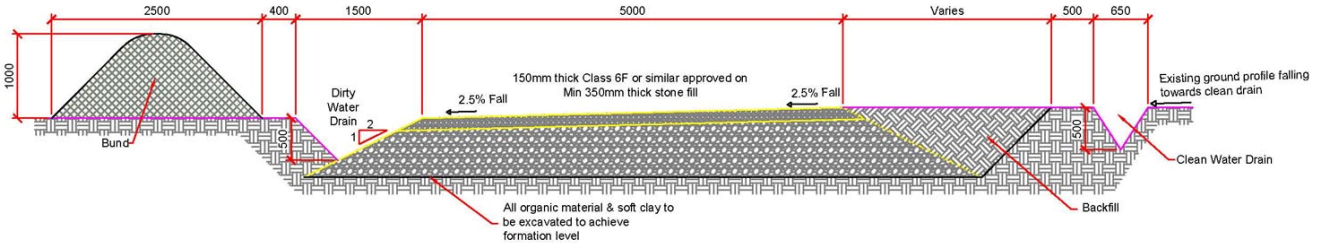
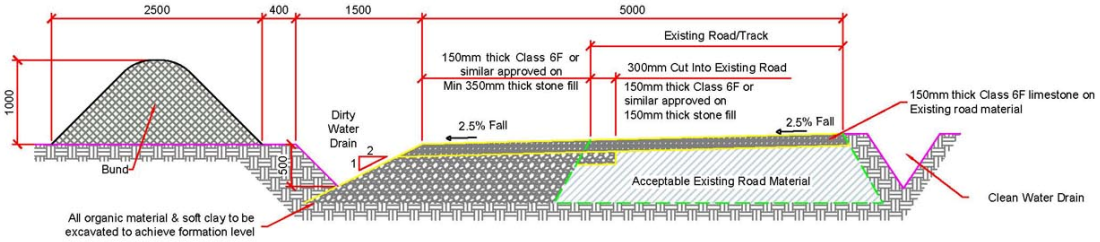


FIGURE 15-I-5: PROPOSED INTERNAL ROAD DETAILS



Typical Excavated Access Track Detail Scale 1:50



Typical Widening To Existing Access Track Detail Scale 1:50

Rev.	Date	Description	by	ch'd	app
A	13.06.12	Issued For Planning	PN	TB	JoL

Client: Ecopower Developments Ltd

Project: Upperchurch Wind Farm

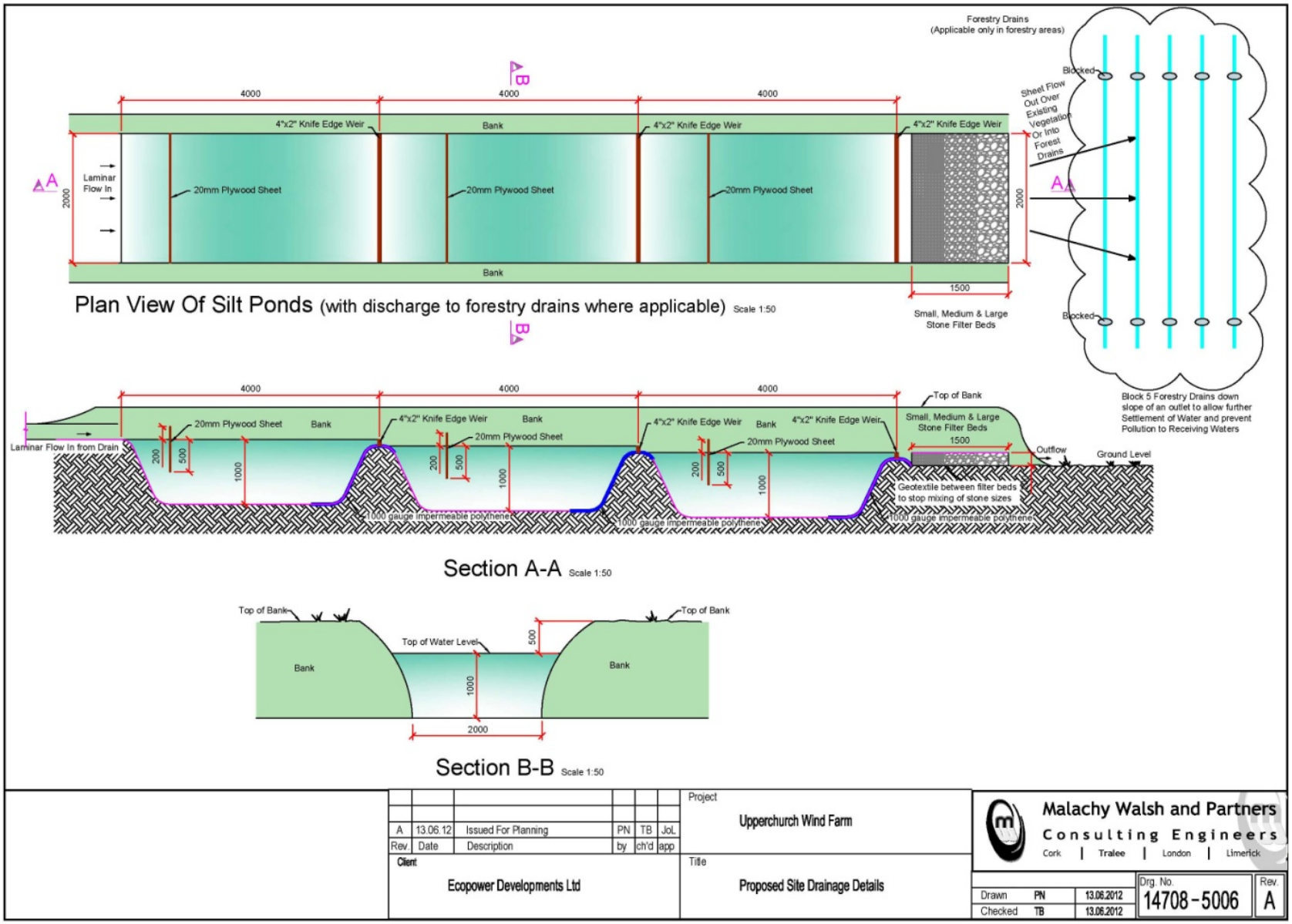
Title: Proposed Internal Road Details

Malachy Walsh and Partners
Consulting Engineers
Cork | Tralee | London | Limerick

Drawn	PN	13.06.2012
Checked	TB	13.06.2012

Drg. No. 14708-5005 Rev. A

FIGURE 15-I-6: PROPOSED SITE DRAINAGE DETAILS



UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 7

Waste Management Plan

ECOPOWER

April 2021

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 Southern Region Waste Management Plan.

1.1.2 Scope of WMP

This WMP **concentrates on the construction stage** of Upperchurch Windfarm 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 Upperchurch Windfarm.

All site personnel will have a responsibility to keep the construction works areas tidy, not to litter and to bring wastes back to the Upperchurch Windfarm Site Compound No. 1 on a daily basis for storage.

1.2 Construction Waste & Material Arising

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

In the course of the construction of Upperchurch Windfarm, the following construction wastes/ excavated materials will arise:

Table 1: Construction Wastes/Excavated Materials

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

1.3 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. Arlo 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 No. 1. 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 No. 1 will also accommodate the temporary site offices and WC facilities and this area will be secured by fencing and manned security 24/7 to prevent unauthorised access.

1.3.1 Waste Collection – Arlo

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

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

All chemical wastes will be removed from site by Arlo 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.

1.3.2 Excavated materials arising

All soil and stone excavated from the development footprint area will be reused on-site to reinstate works areas and to form drainage bunds or permenant storage berms, 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 berms. The reinstated areas and new berms will be reseeded with grass species to encourage reinstatement of the existing vegetation

1.3.3 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 No. 1. When full, the skips will be collected by authorised waste contractor, Arlo.

1.3.4 Canteen Wastes/WC facilities

Self-contained toilets and washing facilities, with integrated waste water storage tanks, will be provided for construction workers at the Upperchurch Windfarm Site Compound No. 1. The waste water storage tanks will be emptied as needed, by the approved licensed operator, Arlo, 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. 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 No. 1, and collected regularly by the approved operator, Arlo

1.3.1 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 No. 1 for any waste oil, oily rags and contaminated materials. Storage of any hazardous wastes produced will be kept separate from other waste materials, in order to avoid further contamination.

1.3.2 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.

1.4 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	Upperchurch Windfarm - Site Compound No.1
Material being Transported	e.g Canteen Waste
Quantity of Material	tonnes
Date of Material Movement	dd/mm/yyyy
Name of Carrier	e.g. Arlo
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.

1.4.1 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	Estimated Quantities & 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.

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 8

Invasive Species Management Plan

ECOPOWER

April 2021

1. Invasive Species Management Plan – Upperchurch Windfarm

In this Plan, Invasive Species relates to any animal or plant introduced (deliberately or accidently) by human activity to an area in which they do not naturally occur. Invasive Species, which are also referred to as 'invasive non-native species', or '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.

Invasive Species, such as Japanese knotweed, Himalayan knotweed, Rhododendron, and Giant Hogweed are regulated for control under legislation including under the requirements of the *European Communities (Birds and Natural Habitats) Regulations, 2011, S.I. No. 477*, which makes it an offence to *knowingly disperse or allow to escape* plant species listed in the Regulations.

A description of the biosecurity measures for Invasive Species which will be implemented during construction works are presented in **Section 4: Biosecurity Measures for the Containment and Management of Invasive Species** of this Plan. These measures are taken from the most relevant and current guidance in relation to the containment and management of non-native invasive plant species in construction projects. In addition to the above a list of general measures to be applied in respect of the prevention of spread of invasive species in the aquatic environment and the spread of invasive animal species in the terrestrial environment is provided.

2. Results of Invasive Species Surveys at Upperchurch Windfarm

During fieldwork for the Upperchurch Windfarm project, conducted between 2012 and 2020, **no invasive plant infestations were recorded within the Upperchurch Windfarm site boundary** and as such risks from Invasive plant infestations are not present. However, to avoid creating new infestations all movements of vehicles and machinery will follow the Biosecurity Measures listed in Section 4.

2.2 Invasive Species Infestations at Other Elements of the Whole UWF Project

Upperchurch Windfarm is part of a whole project – the Whole Upperchurch Windfarm (UWF) Project, which also includes UWF Related Works, UWF Grid Connection, UWF Replacement Forestry and UWF Other Activities.

Invasive species infestations in proximity to Other Elements of the Whole UWF Project were assessed in the Invasive Species Surveys. In summary, there is one infestation proximal to UWF Related Works, one infestation proximal to a Haul Route Activity location (part of UWF Other Activities), and 24 in close proximity to UWF Grid Connection works (there are also an additional 19 infestations close to UWF Grid Connection works, but at a sufficient distance from works areas not to pose a risk).

The promoter of the Upperchurch Windfarm, Ecopower Developments Ltd, is also the promoter of the Whole UWF Project, and as such will have full control over all construction practices for the works as the Promoter. Ecopower Development is committed to implementing the Biosecurity Measures, which are described in Section 4 of this Plan, for all works and activities relating to the Whole UWF Project.

3. Relevant Project Life-Cycle Stages

The focus of this Invasive Species Management Plan is the construction stage of the Upperchurch Windfarm, as this stage is associated with the largest volume of traffic moving on and off the site, and with the movement of machinery and excavation and movement of soils on-site.

It is important to note that there are currently no invasive plant infestations within the Upperchurch Windfarm boundary and as such construction or operational risks from Invasive plant infestations are not present. However, the Biosecurity Measures outlined in Section 4 will be implemented at the Upperchurch Windfarm site.

Regarding the decommissioning stage of the wind farm, it is impossible to predict what infestations will be present in 25 years' time. The windfarm Promoter will apply Best Practice Biosecurity Measures to assessing and dealing with any/all infestations wherever they occur within their wind farm. A new updated Invasive Species Management Plan will be produced for the decommissioning stage.

4. Biosecurity Measures

All works or activities in close proximity to Invasive Plant Infestations will be carried out under the supervision of an invasive species specialist.

The prescriptions for the treatment of invasive species were derived with reference to the following literature:

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

4.1 Biosecurity Measures for works proximate to Invasive Plant Species Infestations

4.1.1 Pre-Construction Processes

- Pre-Construction confirmatory surveys will be completed by an invasive species specialist, 3 – 4 weeks before construction begins. Mapping, showing the most up to date distribution and extent of each infestation, will be distributed to the Promoter, Owners Engineer and the Contractor;
- A toolbox talk will be provided by the invasive species specialist with the Contractors construction site engineers and general operatives to explain about all invasive species identified at, or in close proximity to, works areas and the restrictions that will apply for the full construction period. The toolbox talk will cover all pertinent topics including all relevant invasive species close to construction works and the biosecurity measures to be implemented while working. The invasive species toolbox talk will cover the full lifecycle of every construction activity including, but not limited to, all onsite construction activities, mechanical excavation, transportation and disposal of all material from

excavations, through to the backfilling of excavations, and reinstatement of the construction works area;

- Covering of knotweed infestations (adjacent the works) will be carried out 7 days ahead of works in close proximity to an infestation. The infestations will be covered so that their full extent plus 1 metre is covered entirely and no vegetation is visible;
- The covering of vegetative knotweed infestations with high density polyethylene grass carpet terram at all identified locations prior to any works commencing on that section and the monitoring of construction works at that section when it happens. The polyethylene grass carpet terram covering will only be placed on and removed from the infestation under direct supervision from an invasive species specialist. When taking the terram off an infestation and moving to the next section the construction team will need to ensure that all adherent material has been removed and placed within the adjacent infestation i.e. it will be important not to spread the infestation;
- No posts will be used to secure the coverings i.e. there will be no uncontrolled ground interference within 7 meters of any infestation during any of these operations;
- Once each knotweed infestation has been covered, works can begin at that location, an invasive species specialist will be present to provide supervision of all works adjacent to infestations;
- Rhododendron infestations and the giant hogweed infestation will not be covered with high density polyethylene grass carpet terram, instead where works occur within 5m of Rhododendron infestations or within 5m of the giant hogweed infestation, an invasive species specialist will be present to ensure that construction machinery and operatives do not come into contact with these infestations;
- The site Environmental Clerk of Works will ensure that the Contractor engages a suitable waste disposal company with the requisite license for handling any hazardous waste (i.e. invasive species material). The Contractor will maintain records of all wastes arising, and the documentation will include the waste contractor's local authority license and proof of appropriate haulage license per individual haulage vehicle.
- Excavated material from works areas within 15m of an infestation, will be disposed as potentially contaminated material, by a licensed contractor to a suitably licensed waste facility.
- Construction works adjacent to the infestation will be carried out under supervision of the invasive species specialist.

4.1.2 Construction Phase Processes for works locations proximate to Infestations

- Before construction begins at any location in close proximity to an infestation, all General Operatives will attend a toolbox talk on invasive species. No General Operative will be allowed to work on the project without completing the toolbox talk;
- Once this is completed construction can begin with onsite supervision of works in close proximity to locations where invasive species occur;
- The Environmental Clerk of Works will ensure that only licensed hauliers are collecting and disposing of material from any open excavation.

4.2 Biosecurity Measures to Prevent the Spread/Introduction of Aquatic Invasive Species

4.2.1 Inspection and Cleaning of Delivery Vehicles

- Prior to arrival on site, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water hotter than 65 degrees Celsius, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. Virkon Aquatic);
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. Given that Crayfish Plague has affected rivers in the area recently (2017) the level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site;
- A dedicated member of the construction crew will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the Upperchurch Windfarm site. These persons will receive training in the correct techniques; Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually. A bin will be provided at each work locations/site entrance for adherent material to be placed in. This will be emptied on a daily basis into the hazardous waste container at the Site Compound No.1 for removal offsite by a licensed operator; Spot checks on the efficacy of cleaning strategies will be carried out by the Project Ecologist. Records of supplies and cleaning of delivery vehicles will be kept by the dedicated member of the construction crew, and will be regularly inspected by the Environmental Clerk of Works;
- Before works take place onsite the Contractor will have 150kg (15No. x 10kg buckets) of Virkon Aquatic available for the construction team – this will be stored in the COSSH store at Site Compound No.1.
- A Virkon footbath will be available at the site compounds, construction areas and at the site entrances;
- Each construction crew will be equipped with a 'disinfection box'. This will contain Virkon Aquatic, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution;
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site of operation, securely stored away from traffic for removal to the waste storage area in Site Compound No.1 at the end of the work day;
- No removed material or run-off will be allowed to enter a water body of any sort. If watercourses are present near construction works areas a small 1-foot bund will be built using sand bags on either side of the works to ensure no water can enter the watercourse – any dirty water will be directed back into the construction site/excavated trench to be treated;

4.2.2 Measures for Works at/in/near 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 watercourses will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards. This also applies to footwear use on lands and roads at the Upperchurch Windfarm site.
- Any observations of mass mortality of Crayfish will be reported to the relevant authorities immediately upon evidence being found;

4.3 Biosecurity Measures to Prevent the Spread/Introduction of Invasive Animal Species

New hedgerows, trees and shrubs will be planted as part of the Upperchurch Windfarm project. These trees/shrubs (the root balls, leaves and soil) can contain invasive animal species. 'Hitch-hiking' is a term used to describe when a species is spread by the movement of other material. This can be, for example, on plants, soil, clothing or equipment.

Good practice Biosecurity Measures will be followed on the Upperchurch Windfarm site in order to avoid the unintentional introduction and spread of invasive animal species through newly imported plants or growing media.

Measures to be applied throughout the construction period will be as follows:

- Care will be taken in the use of trailers and the movement of plants onsite – inspections of all plants and shrub root balls will take place before they leave the nursery but also when they arrive onsite;
- All trailers will be checked before they leave the nursery but also when they arrive onsite;
- Staff will be appropriately trained in preventing the spread of invasive species (including training in relevant regulations).
- A toolbox talk will be provided by the invasive species specialist with the Contractors construction site engineers and general operatives to explain about all potential animal invasive species and the controls expected and that will apply for the full construction period. The toolbox talk will cover all pertinent topics including all relevant invasive species close to construction works and the biosecurity measures to be implemented.
- The invasive species toolbox talk will cover the full lifecycle of every plant delivery onsite including how to inspect deliveries and how to deal with any 'hitchhikers' if found;
- In all cases of an invasive species being found the relevant statutory authorities will be contacted immediately.

Example of 'hitchhiker'

Small mammals (e.g. White Toothed Shrew)

Hitchhike on: Trailers, larger root balls, and movement of large plants.

How to prevent it: Check plant consignments for signs of mammals. Signs would include droppings, chewed packaging materials and also seeing the animals. Avoid allowing any animals transported to your site to escape into the wild.

Insects (e.g. Red lily beetle, Harlequin ladybird)

Hitchhike on: Plants brought onto the site.

How to prevent it: Check consignments of the plants. Will require hand picking or in some cases use of pesticides. Do not release any handpicked animals into the wild.

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 9
Ecological Management Plan

ECOPOWER

April 2021

Malachy Walsh and Partners
Engineering and Environmental Consultants

Upperchurch Wind Farm Ecological Management Plan

15388

November 2013

Job number	Revision	Prepared by	Checked by	Status	Date
15388-6004	A	JK	JA	Final	26th November 2013

MWP ENVIRONMENT AND PLANNING

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1 Introduction

The Ecological Management Plan for the Upperchurch Wind Farm site provides a framework for the enhancement of ecological features within the site. The plan outlines management to be carried out over a five year period, in addition to long-term management of the site.

Ecological Management Plans for wind farm sites are becoming more common place in Ireland, in recognition of the management objectives of such sites to include, not only wind energy production, but also nature conservation. By their very nature, wind farms in Ireland are often located in remote upland areas.

2 Site Description

The proposed Upperchurch Wind Farm site is located in north Co. Tipperary, approximately 1.9 km west of the village of Upperchurch and a further 18 km west of Thurles town. The study area is made up of four sections with an overall area of 12 km².

The surrounding local landscape is dominated by 'Pasture' with 'Forestry, 'Bog', 'Other Agricultural Land' and 'Other' land located to the south of the proposed wind farm site (NPWS, online mapping 2012). The area is underlain by Silurian Metasediments and Volcanics, with subsoils consisting of "Devonian/Carboniferous sandstone and shale till".

The four sections of the site are located on a series of small hills or drumlins that reach elevations of between 363mOD and 411mOD, where the peaks are generally at heights of 100m above the intervening lower terrain. The highest peak is that of Knockmaroe, at an elevation of 411mOD.

The area originally would have had a shallow peat land cover but most of it has been reclaimed by deep ploughing and converted to pasture. The remaining peat areas are used mainly for commercial forestry. Some rock outcropping occurs, most notably at the northeast part of the site.

3 Environmental Management Plan

An Environmental Management Plan (EMP) has been prepared as part of this further information request to collate and manage the proposed and agreed mitigation measures, monitoring and follow-up arrangements and management of impacts. The EMP is a preliminary plan which has to be finalised by the appointed contractor. An EMP provides a commitment to mitigation and follow-up monitoring and reduces the risk of pollution and improves the sustainable management of resources. The environmental commitments of the proposed development will be managed through the EMP and will need to be secured in contract documentation and arrangements for construction, and later development stages, so that it can be ensured they are implemented. While the EMP will mainly address the construction phase, a separate early operation EMP has also been drafted which addresses many of the monitoring requirements of the Ecological management plan.

The Ecological Management Plan for the Upperchurch Wind Farm has been developed to enhance ecologically valuable features within the site.

4 Hen harrier displacement and /or disturbance

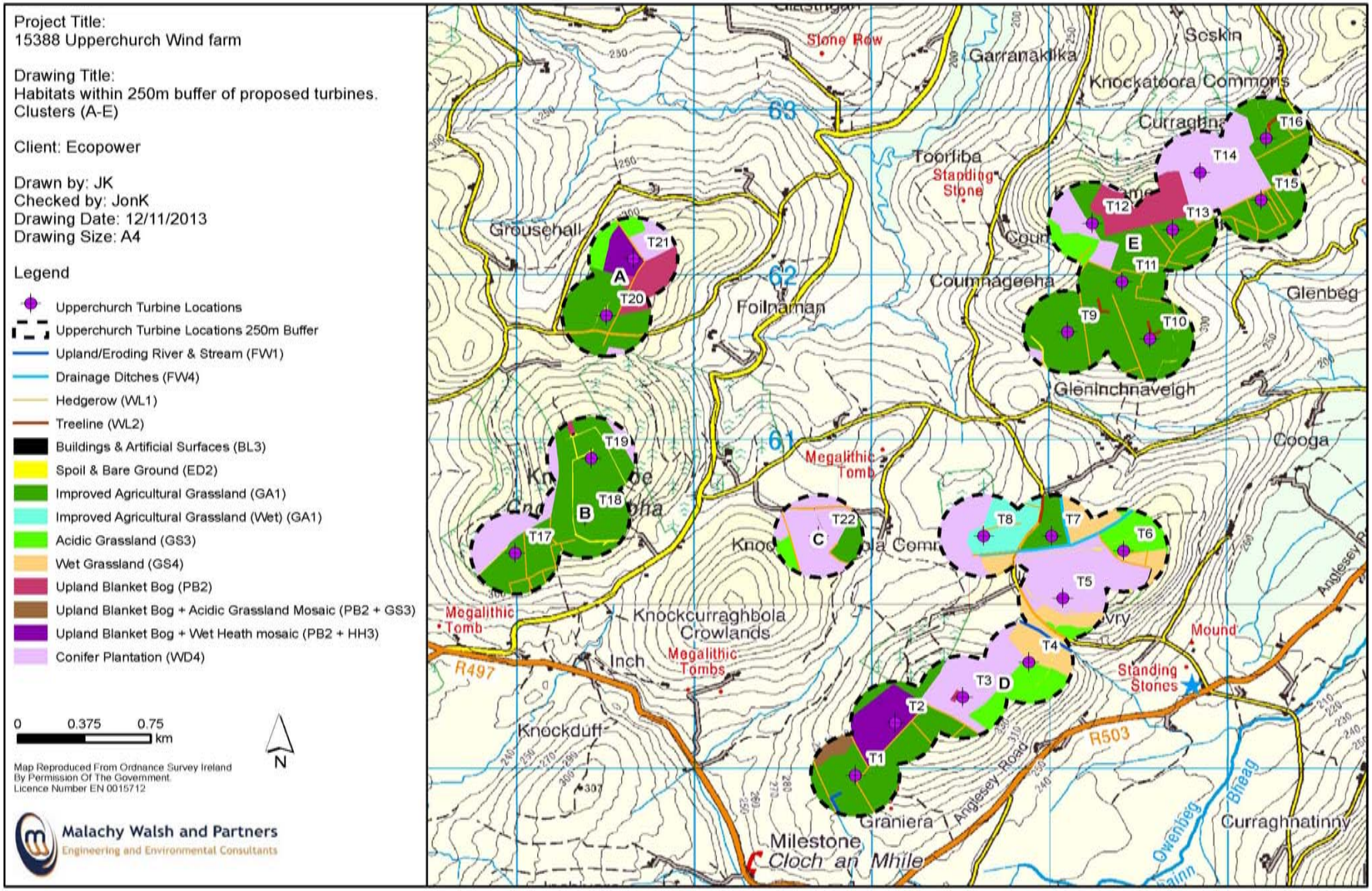
There is the potential that the hen harriers recorded utilising habitats within the site (upland blanket bog, heath, wet grassland and pre-ticket conifer plantation) during ornithological surveys may be displaced and/or disturbed due to the increased noise and human activity during the construction phase of the development. It is considered likely that the species shall return to the site following the construction of the proposed development. Table 1 below illustrated the operational period of the proposed wind farm based on the year of construction. The earliest estimated construction date for the proposed wind farm is 2017.

Table 1: Operational timeframe for the proposed wind farm based on the year of construction

Year of construction	Life of the wind farm
2017	2017 - 2042
2018	2018 - 2043
2019	2019 - 2044
2020	2020 - 2045
2021	2021 - 2046
2022	2022 - 2047
2023	2023 - 2048
2024	2024 - 2049

When estimating the potential area of displacement during the operational phase of the wind farm the findings of Pearce-Higgins *et al*. (2009) (*The distribution of breeding birds around upland wind farms* published in the Journal of Applied Ecology) was consulted. The paper outlines the findings of a study conducted in the UK which measured the potential impact of displacement to bird species as a result of wind farms. Following the erection of the turbines hen harrier previously utilising habitats avoided suitable habitat by a distance of between 250 – 500 m from each turbine. A buffer of 250 m around each turbine was used to calculate the total amount of potential foraging habitat loss due to displacement.

For the purpose of calculating this potential displacement area the proposed wind farm was grouped in five different zones labelled A to E. The turbine numbers within each cluster are presented in Table 2. .The table below details the areas of suitable habitat around all 5 zones i.e. wet grassland, heath / bog and conifer plantation potentially utilised by hen harrier within the 250 m buffer. Direct habitat loss outside of the 250m buffer within the footprint of the development was also considered.


Project Title:
15388 Upperchurch Wind farm
Drawing Title:
Habitats within 250m buffer of proposed turbines.
Clusters (A-E)
Client: Ecopower
Drawn by: JK
Checked by: JonK
Drawing Date: 12/11/2013
Drawing Size: A4
Legend
Upperchurch Turbine Locations
Upperchurch Turbine Locations 250m Buffer
Upland/Eroding River & Stream (FW1)
Drainage Ditches (FW4)
Hedgerow (WL1)
Treeline (WL2)
Buildings & Artificial Surfaces (BL3)
Spoil & Bare Ground (ED2)
Improved Agricultural Grassland (GA1)
Improved Agricultural Grassland (Wet) (GA1)
Acidic Grassland (GS3)
Wet Grassland (GS4)
Upland Blanket Bog (PB2)
Upland Blanket Bog + Acidic Grassland Mosaic (PB2 + GS3)
Upland Blanket Bog + Wet Heath mosaic (PB2 + HH3)
Conifer Plantation (WD4)
0 0.375 0.75 km
N
Map Reproduced From Ordnance Survey Ireland
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Malachy Walsh and Partners
Engineering and Environmental Consultants
Stone Row
Garranakilka
Scskin
Knockatoora Commons
Curraglina
Toorliba
Standing Stone
Grousehall
Foilnaman
Coumnageeha
Glenbeg
Glenlnchnaveigh
Cooga
Megalithic Tomb
Knockcurraghbola Crowlands
Megalithic Tombs
Inch
Knockduff
Mound
Standing Stones
R497
R503
Anglesey Road
Graniera
Milestone
Cloch an Mhile
Curraghnatinny
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16
T17
T18
T19
T20
T21
T22
A
B
C
D
E
61
62
63

Table 2: Turbines groupings within the each zone

Zone name	Turbine numbers
Zone A	T20 and T21
Zone B	T17, T18 and T19
Zone C	T22
Zone D	T1, T2, T3, T4, T5, T6, T7 and T8
Zone E	T9, T10, T11, T12, T13, T14, T15 and T16

The relative difference is down to the temporary nature of suitable hen harrier habitat in conifer plantations within the displacement buffer and the footprint of the development. It is accepted the conifer plantations are only utilised by hen harrier between years 2 and 10 of each rotation. Once the canopy becomes enclosed the habitat is not suitable for hen harrier. There are a total of 8 different landowners with conifer plantation within the displacement area. Planting years for stands of conifer plantation ranged from 1973 up to more recent plantations planted in 2007. The average life of conifer plantation is approximately 45 years before harvesting with the second rotation planted 2-5 years after. If particular stands of conifer plantation are older than 10 years with enclosed canopy (unsuitable habitat) during the construction of the proposed wind farm and remain closed for the lifetime of the wind farm, than no mitigatory habitat is required. Table 3 below outlines the summary of conifer plantation within the study area.

The area of compensatory habitat required for conifer plantation was calculated, within the displacement buffer and directly within the footprint of the proposed wind farm, based on the number of years it offers potential habitat for hen harrier. The total number of years each section of conifer plantation is within the favourable stage for hen harrier (years 2 to 10 after planting) was calculated over the lifetime of the wind farm based on a range of construction years. The ratio or percentage of this timeframe was calculated by dividing this figure by 25 years the total period the wind farm would be operational. The area of compensatory habitat required for conifer plantation was calculated by multiplying this ratio by the total area of each section of conifer habitat. Table 4 below outlines the total areas of mitigatory habitat required for the loss of conifer plantation based on the first years of operation.

Ratio of each section of conifer plantation over the life of the wind farm

Total years between (years 2 to 10) for each section of conifer plantation / 25 years (the life of wind farm)

Area of compensatory habitat required for each section

Individual ratio x area of each section of conifer plantation

Table 3: Summary of conifer plantation within the both the 250m buffer zone from each wind turbine and infrastructure outside the buffer zone.

Zone	Turbine No.	Total area of conifer plantation (Hectares)	Year planted	Timeframe within the 2 to 10 year window (1st rotation)	Year of planting 2nd rotation (45 yrs)	Within the 2 to 10 year window (2nd rotation)
Area of conifer plantation within 250m buffer from turbines						
Zone A	**20 to 21**	0.5100	1984	1986 to 1994	2034	2036 to 2044
		3.7600	Between 1995 and 2000	Estimate 1998 to 2006	2037	2042 to 2050
Zone B	**17 to 19**	9.2700	1973	1975 to 1983	2018	2023 to 2031
		0.5000	1984	1986 to 1994	2034	2036 to 2044
Zone C	**22**	14.2600	2004	2006 to 2014	2049	2054 to 2062
		0.8700	2006-2007	2008 to 2016	2051	2053 to 2061
Zone D	**1 to 8**	17.7000	2005-2006	2007 to 2015	2050	2055 to 2063
		22.6200	Pre 1995	Estimate 1993-1994 to 2002	2037	2042 to 2050
		6.5000	Pre 1995	Estimate 1995 to 2003	2030	2035 to 2043
Zone E	**9 to 16**	6.2400	1999/2000	2002 to 2010	2044 to 2045	2049 to 2057
		0.5000	2003-2004	2006 to 2014	2049	2054 to 2062
		9.0300	1999	2002 to 2010	2044	2049 to 2057
		15.1271	Pre 1995	Estimate 1995 to 2003	2030	2035 to 2043
Areas of conifer plantation outside the 250m buffer but within the footprint of the wind farm						
Zone C	-	0.04	2006-2007	2008 to 2016	2051	2053 to 2061
Zone C	-	0.018	2004	2006 to 2014	2049	2054 to 2062
Zone D	-	0.256	2005-2006	2007 to 2015	2050	2055 to 2063
Zone E	-	0.157	2003-2004	2006 to 2014	2049	2054 to 2062

Table 4: Calculated area of componsatory habitat required for the loss of conifer plantation for each year of construction.

Construction year	Total Area of displacement habitat required (Hectares)
2017	10.32
2018	12.28
2019	13.38
2020	14.43
2021	15.49
2022	16.54
2023	17.60
2024	19.26

The table below details the areas of other habitat types of value for hen harrier around all turbines i.e. wet grassland, heath / bog and acid grassland, potentially utilised by hen harrier within the 250 m buffer. A calculation of the potential loss of other habitat types of value for hen harrier across all twenty two turbines for the 25 year life of the wind farm has indicated that the total extent of displaced hen harrier foraging habitat within the site is 84.27 Hectares.

Table 5: Area (Hectares) of potential hen harrier habitat within each 250m buffer zone

Habitat Type (Fossitt Code)	Zone A	Zone B	Zone C	Zone D	Zone E	Total
Acid Grassland (GS3)	3.72	-	1.67	17.64	3.85	26.88
Wet Grassland (GS4)	-	-	-	20.75	12.10	32.85
Upland Blanket Bog (PB2)	6.80	0.21	-	0.28	-	7.29
Upland Blanket Bog + Acidic Grassland (PB2 + GS3)	-	-	-	2.03	-	2.03
Upland Blanket Bog + Wet Heath mosaic (PB2 + HH3)	4.31	-	-	10.92	-	15.23
Total Area (Hectares)	**14.83**	**0.21**	**1.67**	**51.62**	**15.95**	**84.27**

The total area of potentially valuable hen harrier habitat to be lost and / or altered due to its proximity directly within the footprint of the proposed development but outside the 250m buffer zone for individual turbine was also considered. Table 6 below summarises the total areas of each habitat type.

Table 6: Potential hen harrier habitat outside the 250m buffer zone within the footprint of the development

Habitat Type (Fossitt Code)	Area (ha)
Dry calcareous and neutral grassland (GS1)	0.03
Wet Grassland (GS4)	0.32
Upland Blanket Bog (PB2)	0.10
Total Area (Hectares)	**0.46**

The table below details all habitat types, potentially utilised by hen harrier within the 250 m buffer and the footprint of the proposed development. A calculation of the potential loss of other habitat types of value for hen harrier across all twenty two turbines for the 25 year life of the wind farm has indicated that the total extent of displaced hen harrier foraging habitat within the site is 95.05 Hectares.

This is based on a scenario that the wind farm is constructed in 2017. The total area of mitigatory habitat required increases each year after 2017 due to the proposed life time of the wind farm extending into the favourable window for individual sections of conifer plantation within the displacement area. Table 7 below gives the estimated total displacement area (in Hectares) from 2017 to 2024.

Table 7: The estimated displacement area (in Hectares) from 2017 to 2024

Year of construction	2017	2018	2019	2020	2021	2022	2023	2024
Good habitat within 250m buffer around turbines	84.27	84.27	84.27	84.27	84.27	84.27	84.27	84.27
Footprint of development outside buffer	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Conifer Plantation - 2nd and 10th year after planting	10.32	12.28	13.38	14.43	15.49	16.54	17.60	19.26
Total Area (Hectares)	**95.05**	**97.01**	**98.11**	**99.16**	**100.22**	**101.27**	**102.33**	**103.99**

The habitats within the proposed site are, however considered to be of low value for breeding hen harrier and there are no records of the species breeding within the site. The foraging habitats within the 250m buffer lie outside the boundary of the SPA, and are relatively common throughout the greater area, and there are other suitable habitats nearby, which could be used by the species. The closest turbine to the SPA boundary is located 490m from the boundary of the *Slievefelim to Silvermines SPA* (Site Code 4165).

5 Management plan objectives

5.1 Requirement for a suitably qualified ecologist

A suitably qualified ecologist will be required to oversee this Ecological Management Plan over the life time of the wind farm. All site actions and monitoring measures will be required to be undertaken by the developer and under the supervision of the ecologist to achieve the objectives of the plan.

5.2 Upperchurch hen harrier scheme

5.2.1 Alternative hen harrier habitat

In order to mitigate the loss of potential foraging habitat for hen harrier, due to the construction of the wind farm at Upperchurch, it is proposed to provide alternative habitat, adjacent to the area of development. When deciding upon suitable mitigatory habitat, two factors have been considered;

- The alternative (mitigatory) habitat must benefit from management to improve its value as suitable foraging habitat for hen harrier;
- The land must not be within the 250m buffer from turbines or within the footprint of the development;
- The proximity of the SPA to the mitigatory habitat must be considered, so that the mitigatory habitat chosen, acts as a continuation of the SPA

Bearing in mind these factors, at total of 128 Hectares of land has been put forward as alternative habitat. The habitat types are a mixture of wet grassland and improved grassland. (See Figure 1 and Figure 2 included in Appendix 1 Hen Harrier Habitat Area – Individual Field photographs, management measures and restrictions) The management plan for alternative hen harrier habitat was prepared with reference to relevant best practice management guidelines, especially the National Parks and Wildlife Service Farm Plan Scheme (Department of Environment, Heritage and Local Government, 2010) attached in Appendix 2. The list of signatures of landowners signed up for the scheme is presented in Appendix 3. A list of the proposed alternative habitat areas are presented in Table 8 below.

Table 8: Habitat type and area (hectares) of each field within the proposed alternative habitat area

Field code	Habitat type	Area (Hectares)
GK1	Wet grassland	1.6
GK2	Agricultural grassland with riparian corridor	3.3
GK3	Wet agricultural grassland with riparian corridor	2.3
GK4	Wet agricultural grassland	1.7
GK5	Agricultural grassland	2.4
GK6	Wet grassland with riparian corridor	2.2
GK7	Wet agricultural grassland with riparian corridor	1.6
GK8	Wet agricultural grassland	0.8
JQ1	Wet agricultural grassland	3.5
JQ2	Wet agricultural grassland with riparian corridor	2.4
JQ3	Wet agricultural grassland with riparian corridor	2.9
JQ4	Wet agricultural grassland with riparian corridor	4.6
JQ5	Wet agricultural grassland with riparian corridor	1.6
JQ6	Wet agricultural grassland	1.3
JQ7	Wet agricultural grassland	1
JQ8	Wet agricultural grassland with riparian corridor	1.8
JQ9	Wet agricultural grassland with riparian corridor	1.2
JQ10	Wet agricultural grassland with riparian corridor	1.7
JQ11	Wet agricultural grassland	1.7
JQ12	Wet agricultural grassland	2.6
SR1	Wet grassland	2.8
MC1	Wet agricultural grassland	3.5
MC2	Wet agricultural grassland	3.5
MC3	Wet agricultural grassland	5.4
GR1	Improved agricultural grassland	2.4
GR2	Willow scrub and wet grassland	0.4
GR3	Wet agricultural grassland with riparian corridor	3.0
GR4	Wet agricultural grassland with riparian corridor	9.1
GR5	Wet agricultural grassland	9.4
PQ1	Wet agricultural grassland	2.1
PQ2	Wet agricultural grassland	4.5
PQ3	Wet agricultural grassland	4.7
PQ4	Wet agricultural grassland	5.9
PQ5	Wet agricultural grassland	9.8
VD1	Wet agricultural grassland	3.3
VD2	Wet agricultural grassland	2.4
VD3	Wet agricultural grassland	1.1
AR1	Wet agricultural grassland with enclosure and riparian corridor	5.0
MR1	Wet agricultural grassland	2.2

5.2.2 Protocol for site management

The objectives of the proposed management plan are as follows:

- To allow improved grassland swards to revert back to wet grassland and more semi natural grassland habitats;
- To improve cover for hen harrier within large open fields by the creation of hedgerows and woodland enclosures;
- To improve riparian corridors by the planting of willow, alder and other suitable native broadleaved species. These corridors shall be fenced off to limit potential ingress by livestock; and
- To manage rush coverage, scrub and improve coverage (hedgerows and enclosures) within wetter habitats to optimise their value to hen harrier.

The following general measures and restrictions will be put in place to ensure the proposed alternative habitat meets the criteria of the Upperchurch hen harrier scheme. The specific list of proposed measures and restrictions for each field is outlined in more detail in Appendix 1 of this report.

Measures:

- Land will be allowed to revert back to wet grassland;
- Achieve 30 - 70% rush coverage optimum;
- Rush coverage is controlled with grazing;
- Rush coverage is controlled with cutting, usually every second year;
- Target stocking level: minimum of 0.6 LU/Ha, maximum of 1.6 LU/Ha;
- Grassland field over 2ha: Plant 25m of hedge per hectare;
- Grassland field over 4ha: Plant 100m of hedge per hectare for each hectare over 4haor fence off an enclosure between 0.1 to 0.3ha for each hectare over 4ha.Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier;
- Enhance riparian corridor: Plant willows, alder and other suitable native broadleaved species; and
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by animals.

5.2.3 Grazing levels

Continued grazing of the land is essential to maintain the appropriate sward within fields and not allow excessive stands of scrub or rush to dominate the habitat. Guidance target stocking rate on wet grassland/rough pasture is a minimum of 0.6 LU/hectare (NPWS Farm plan scheme, Appendix 2). There is no specific figure given for the upper limit of planned stocking density but it is recommended that it must not be at a level that would constitute management as improved agricultural grassland (on average between 2-3.5 LU/ha).

It is suggested that a proposed upper stocking limit for grazing be reduced to 1.6 LU/ha within improved agricultural grassland, rank (wet) improved agricultural grassland and wet grassland for the first two years of the plan. The quality of the habitat available after the implementation of these measures will be assessed by the project ecologist.

5.2.4 Rush management

The recommended optimal range for rush cover within hen harrier habitat is within the range of 30–70%. Dense covering of rushes is allowable but not to the point where rushes are falling over or matting the ground. Appropriate grazing levels will go much of the way in maintaining the rush cover within the optimal range. However, active management may be required to further ensure the quality of habitat. Rushes shall be cut on a two year cycle. Annual surveys by the project ecologist during the first five years in particular will assess the need for cutting within each section of habitat. In fields where wet grassland and rushes will need time to establish, the first cut will not be carried out until the Year 2 or 3 of the scheme. If the establishment of rush is slow in particular areas, cutting will not take place to allow further time for the habitat to become established.

5.2.5 Nutrient management

The use of chemical and/or organic fertilisers within a grassland site may be permitted at certain locations but not if it is counterintuitive to the objective of the management of the area for hen harrier. This will be assessed by the project ecologist.

5.2.6 Weed control

The control of noxious weeds required a part of land management for grazing (e.g. ragwort, etc) currently exists and may need some degree of continuation. The spraying and broadcast application of herbicide will not be permitted. Herbicides will be applied via spot or wipe on treatments.

5.2.7 Restrictions

Supplementary to the active management measures certain restrictions shall also apply. The following restrictions will apply to farmers within the Upperchurch hen harrier scheme:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of drains or reclaiming heath or bog.
- No removal of hedgerows.

- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits
- No new forestry plantation.

With the spread of fertiliser grass species outcompete herb species so it is important to restrict the use of fertiliser to allow plant species, particularly those of wet grassland, to flower and seed.

Lime spreading is undertaken in upland areas to reduce the acidity of the soil, however, in the context of biodiversity improvements it is important to limit its application to allow plants to flower and seed.

Upland burning is undertaken to control scrub and enrich the soil, however, it can have a significant impact on wildlife. Therefore, burning will not be permitted.

Drains facilitate the drying of the land and reduce the water table. A relatively high water table is required to encourage the development of wet grassland therefore this practice will be prohitited.

The reclamation of bog, which is habitat loss, will not be permitted.

It will not be permitted to remove hedgerow which is an important ecological corridor and food for small birds, which are food source for hen harrier. 2.8km of new hedgerow will be developed with this scheme.

Recreation of off-road vehicles can cause damage through rutting and damage valuable habitat. It will not be permitted.

The use of poisons or bait will not be permitted.

While forestry is of value to the hen harrier, it is only of value during the early years, 2-10, when the canopy is open to hunting hen harrier. Once the canopy closes at the end of the pre-thicket stage it is no longer of use until its next rotation, which could be 30 years away.

5.2.8 Monitoring of the plan

The continually 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 shall be carried out for the first five years of the scheme by the project ecologist. The project ecologist shall assess the proposed 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. After five years, inspections shall be carried out every three years of the scheme by the project ecologist with a report prepared outlining the progress of the scheme and any further recommendation required as well as details of future monitoring required. This report will then be submitted to National Parks and Wildlife Services for comment.

In addition to this hen harrier workshops will be delivered by the project ecologist at the initiation of the scheme. It is proposed that all landowners participating in the plan as well as those involved in the wind farm development will attend a series of hen harrier workshops which will be developed and delivered by the project ecologist. A suitably qualified representative from NPWS will be invited to deliver part of the information day/course. The aim of the workshop will be to advise landowners on the importance of the conservation of the hen harrier, the proper and full implementation of the plan and fully explain the measures and the restrictions set down in the plan.

*5.3 **Mitigation measures for all bird species***

5.3.1 Construction phase

The proposed locations of the wind turbines have been carefully planned to avoid important wildlife habitats. The following measures are designed to reduce the predicted impacts on bird populations:

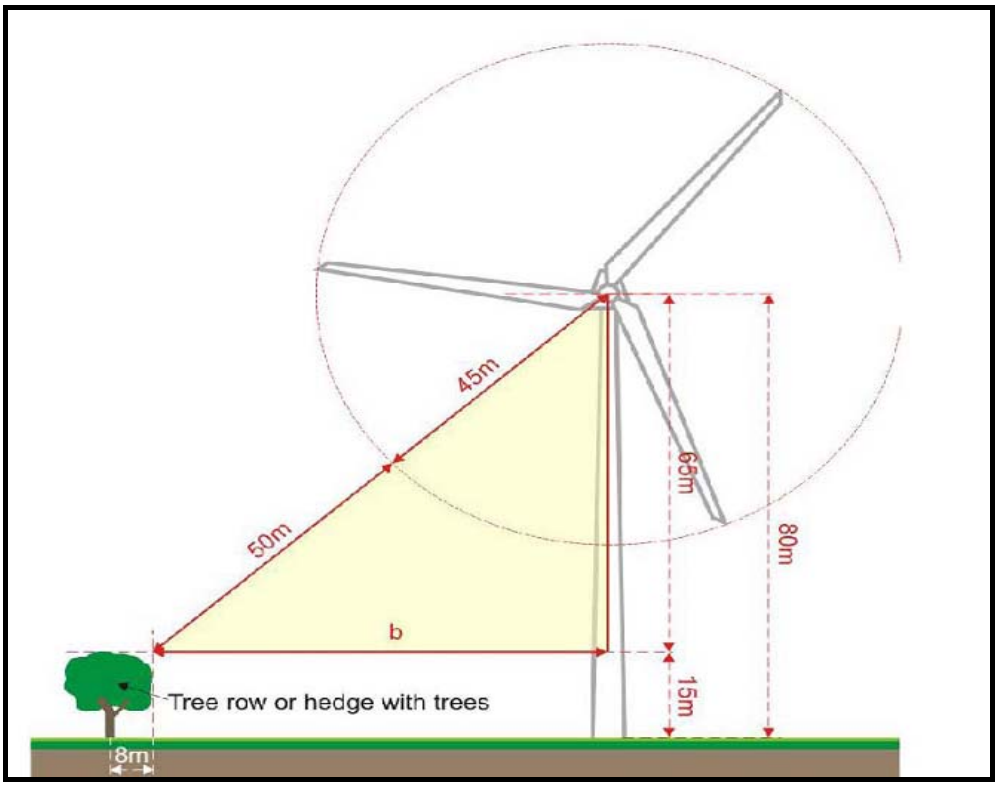
- Pre-construction monitoring will be undertaken within the site, and will continue during the construction phase.
- Vegetation clearance, including the felling of trees, scrub and hedgerow, will be undertaken outside the breeding bird period (1st April to the 31st of August).
- Work should begin before the breeding season begins to ensure that incubating birds or birds with young are not displaced by work commencing during the breeding season.
- Damage to or loss of trees will be kept to a minimum, during the construction phase.
- Machinery must be kept on roads and hardstanding areas, and aside from advancing roads, should not move onto habitats beyond the proposed development footprint, in order to prevent unnecessary damage or disturbance.

5.3.2 Operational Phase

The use of "white lights" on the turbines will be avoided, as these can attract night flying birds such as migrants, and insects, which in turn, can attract bats.

*5.4 **Mitigation measures for bats***

Natural England (2012) has advised that predicted harm to bats can be minimised by altering locations of turbines within a site. According to Natural England (2012) "*To minimise the risk to bat populations, our advice is to maintain a 50 m buffer around any feature (trees, hedges) into which no part of the turbine intrudes. This means that the edge of the rotor-swept area needs to be at least 50 m from the nearest part of the habitat feature. Therefore, 50 m should be the minimum stand-off distance from blade tip to the nearest feature. It is incorrect to measure 50 m from the turbine base to habitat feature at ground level as this would bring the blade tips very close to the canopy of a tall hedgerow tree and potentially put bat populations at risk. Instead, it is necessary to calculate the distance between the edge of the feature and the centre of the tower*." These distances were taken into account during the design phase of the wind farm.



$b = \sqrt{\{(50 + bl)^2 - (hh - fh)^2\}}$

where:

b = the distance on the ground between the edge of the canopy and the turbine (m)

bl = blade length (m)

hh = hub height (m)

fh = feature height (m)

Five of the twenty two turbines (T3, T9, T12, T14, and T22) will require the felling of some conifer plantation for the installation of turbine and or hardstanding areas. While enclosed conifer plantations are of low value to bat species, the area of clear-felling required was calculated using the recommended formula. It is recommended that this distance be taken into account when applying for the felling licence, should the proposed wind farm receive planning. The calculations shown below give an example of the recommended distance for felling of trees within a plantation, with an average tree height of 5m:

$b = \sqrt{\{(50 + 45)^2 - (85 - 5)^2\}}$

$b = \sqrt{2625}$

$b = 51.2m$

Foraging activity was recorded along hedgerows and treelines within the study area, and at the site of a cluster of farm buildings, east of the turbine T22. The two small streams within

the site also offer potential habitat for bats. The following mitigation measures will be carried out to increase the value of the study area for bats:

- Bat boxes shall be erected within the study area, at suitable locations deemed favourable, as a result of the pre- and post-construction bat surveys.
- Native species (including hawthorn, blackthorn, hazel and oak) will be planted along new hedgerows within the site, to increase their value as foraging habitat to bats. Native species offer higher quality habitat for invertebrates, the main prey item for bat species. All planting and hedgerow reinstatement will be carried out following the guidelines and recommended methodology referenced in Knowles, (1995) and JNCC, (2001).
- Gaps within existing hedgerows shall be planted with native species, to encourage the use of hedgerows as flight paths.

5.4.1 Haulage routes

If any local bridge is to be strengthened, prior to use for haulage of construction materials for this development, it shall first be surveyed for bat presence, prior to any upgrading or maintenance works. Bats, especially Daubenton's, regularly use bridges for roosting and are vulnerable within such structures, due to infilling of crevices, during which they may be entombed. If bats are found, subject to safety considerations, some crevices beneath the bridge shall be retained for their continued use, according to best practice bat mitigation measures for bridge works (see National Roads Authority 2006a/2006b). Any maintenance or upgrading works, including pressure grouting or re-pointing of bridges, shall only proceed after an inspection of the structure for potential bat roosts, and will be in accordance with best practice guidelines and statutory procedures. Mature trees that require felling should along haulage routes should also be surveyed for potential bat roosts bats. Any mitigation measures carried out to mitigate the potential impact to bats along haulage routes will be conducted under the terms of an appropriate NPWS wildlife derogation licence.

*5.5 **Habitats and Stream Crossings***

There will be one new stream crossing required for the proposed development, and a stream crossing method statement will be developed, in consultation with the Inland Fisheries Ireland.

*5.6 **Enhancement of site suitability for dragonflies/damselflies and amphibians***

5.6.1 Rationale and objective

A Surface Water Management Plan has been developed to manage sediment runoff from exposed soil/peat and drainage during the construction and early operational phases of the proposed wind farm, this plan is appended to the Construction Environmental Management Plan submitted with this further information reply. Sediment ponds are an element of this plan and will be constructed at regular intervals to attenuate sediment. It is proposed that a number of suitable sediment ponds are kept *in situ* once construction has been completed, as these ponds could provide optimum habitat for dragonfly and damselfly species and other

insects, birds and amphibians. Health and safety issues will have to be taken into consideration with fencing and signs recommended to alert people to potential dangers.

Some modification may be required to make selected ponds suitable. Most animals (insects, birds and amphibians) prefer the shelter provided by the vegetation which grows in very shallow water around the margins of ponds. Therefore, the best wildlife ponds will have very gently sloping sides, providing extensive areas of very shallow water (just a few centimetres in depth). This enables a wide band of emergent vegetation to become established around the margins of the pond (See Figure 1). If the pond is large enough, it will have a deep central area at least 1-1.5 m deep (see Figure 2). This deep area will help prevent emergent vegetation from taking over the pond completely.

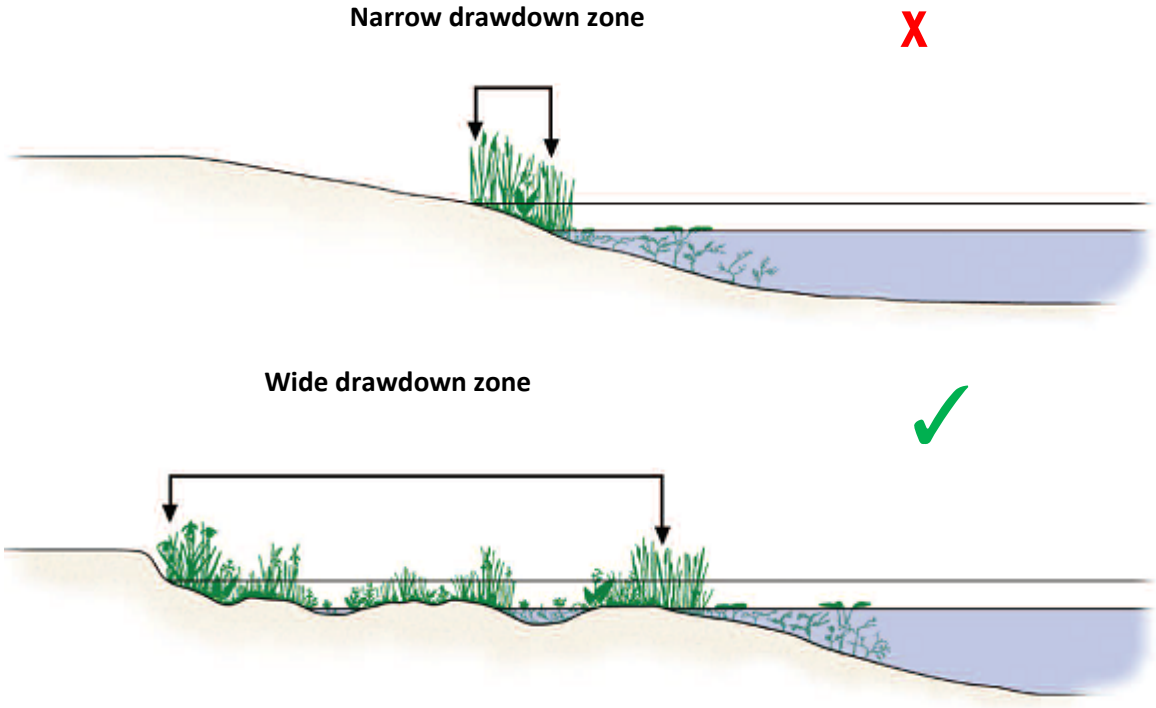


Figure 1: Create broad undulating drawdown zones – they are one of the most valuable areas for wildlife (Pond Conservation, 2013).

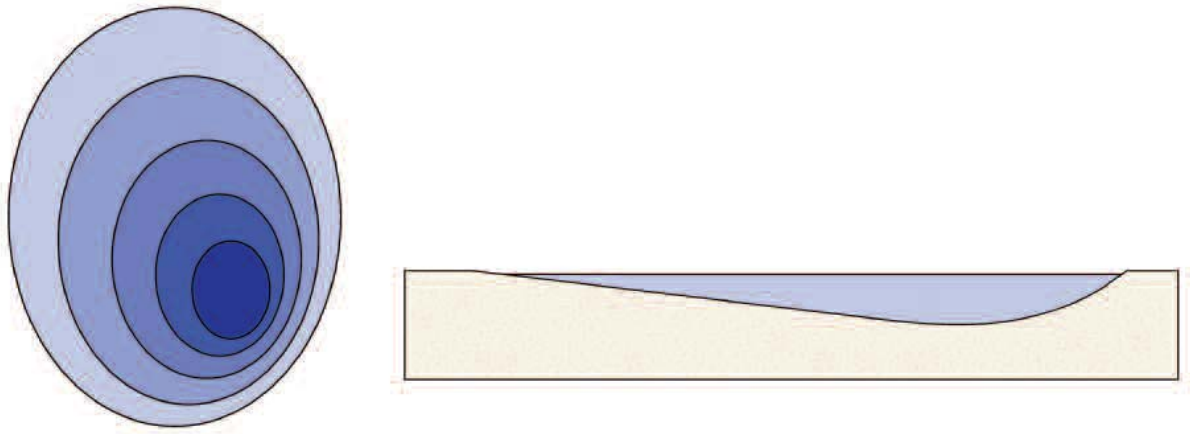


Figure 2: Asymmetric profile – useful to combine shallow water areas with greater depth (Pond Conservation, 2013).

5.6.2 Management action

1. A number of suitable sediment ponds will be retained *in situ* and may require modification as specified, in order to enhance the suitability of the site for insects, birds and amphibians.

*5.7 **Hedgerow Removal***

Approximately 360m of good quality hedgerows will be removed as part of the construction of infrastructure. As part of the proposed development, approximately 360m of new hedgerow will be planted to mitigate this loss of habitat. Approximately 2.8km of new hedgerows shall also be created as part of the hen harrier management scheme. Existing hedgerows in poor condition will be planted with native species, to increase there ecological value. This measure shall improve existing corridors within the site. The location of these hedgerows will be sited to ensure the connectivity of existing corridors will be maintained and will be designed by the project ecologist during the construction phase of the wind farm. Native species will be replanted within the proposed new hedgerows. A list of potential species is presented in Table 8 below.

Table 9: List of species to be used for new hedgerows.

Common name	Latin name
Ash	*Fraxinus excelsior*
Bay Willow	*Salix pentandra*
Black Alder	*Alnus glutinosa*
Blackthorn/Sloe	*Prunus spinosa*
Crab apple	*Malus sylvestris*
Common/Wild Cherry	*Prunus avium*
Downey Birch	*Betula pubescens*

Common name	Latin name
Goat Willow	*Salix caprea*
Grey Willow	*Salix atrocinerea*
Hawthorn	*Crataegus monogyna*
Mountain Ash/Rowan	*Sorbus aucuparia*
Pedunculate Oak	*Quercus robur*
Sessile Oak	*Quercus petraea*
Wych Elm	*Ulmus glabra*
Yew	*Taxus baccata*

5.8 ***Enhancement of keyhole felled areas***

5.8.1 *Rationale and objective*

Areas of existing conifer plantation will require permanent felling, in order to accommodate wind farm infrastructure and the erection of turbines. A large part of the felled area will not be required to accommodate the elements of wind farm infrastructure. This area will be allowed to naturally regenerate and be managed for nature conservation purposes. The main aim is to restore the conditions that allow wet heath, upland blanket bog, wet grassland and scrub vegetation to recover on these felled areas, within the site.

The different tree felling methods will have an influence on the success of the restoration, and it is proposed that this be undertaken, with prior consultation with the project ecologist. Restoration will be achieved by the felling of conifer trees and blocking selected drains, to locally increase the water table.

In the event that the natural establishment of vegetation is slow, it is proposed to harvest seeds from purple-moor grass (*Molinia caerulea*) and other suitable species from a suitable location outside the site, and plant them within the bare felled areas.

5.8.2 *Management actions*

1. Selected drains will be blocked.
2. Natural establishment of wet grassland, scrub and possible wet heath vegetation will be allowed.
3. Where natural establishment of vegetation is slow, purple-moor grass (*Molinia caerulea*) and other suitable species will be planted within the bare felled areas.
4. The removal of excess brash and trees off site, and disposal at an appropriate location, to minimise nutrient leaching to the soil and watercourses.

6 Monitoring

6.1 Rationale

It is recognised that the success of any management plan depends to a large extent on an effective monitoring strategy. In addition, recording and monitoring can significantly contribute to the furthering of technical knowledge, which can then be applied to future similar projects.

In the case of Upperchurch Wind Farm, monitoring over an initial 5-year period will be very important; in order to determine the extent of establishment of desired habitats.

The full scope and timing of these surveys will be drawn up in consultation with NPWS, prior to the completion of the construction phase.

6.2 Vegetation monitoring

The process of blanket bog and wet heath establishment, as well as the establishment of wet grassland, scrub and wet heath areas within the felled areas, will be monitored by setting up a number of permanent vegetation monitoring quadrats. These will be surveyed during years 1, 2, 3 and 5. At the end of the 5-year vegetation monitoring, the data will be analysed and long-term monitoring or management will be proposed, if necessary.

6.3 Habitat Monitoring

Site visits by an appointed ecologist will be made to Upperchurch Wind Farm during the same years as the vegetation monitoring, in order to assess the status of the habitats at the site and whether any adjustment of the management plan is necessary.

6.4 Water Quality monitoring

Water quality monitoring will take place during the construction phase of the Upperchurch Wind Farm and for years 1, and 2 of operation. Monitoring of water quality parameters will be conducted monthly in Year 1. If thresholds are not exceeded in Year 1, then the effort may be reduced in Year 2. The scope of this monitoring will be developed in consultation with Inland Fisheries Ireland. Water sampling will include the following tests:

- Biological water quality analysis - Q sampling; and
- Physio-chemical water quality analysis.

6.5 Ornithological surveys

It is recommended that pre-construction surveys are undertaken, particularly during the breeding season. Post-construction surveys are also recommended, in order to assess the proposed mitigation measures and the potential impact of the proposed development to ecology. Three years of post construction survey shall include the following elements:

- Vantage point surveys

- Use of the hen harrier mitigatory habitat area
- Transect surveys
- Fatality searches

6.6 Monitoring of mammals

Pre-construction mammal surveys are recommended, including:

- Terrestrial mammal surveys, particularly, for badger, to determine whether the sett layout that was encountered, has altered.
- Pre-construction monitoring of the bat activity within the proposed site.

It is recommended that three years of post-construction surveys are carried out for the following elements:

- Post-construction monitoring of the badger sett identified and badger activity within the proposed site.
- Post-construction monitoring of the bat activity within the proposed site.
- Fatality searches, to incorporate any potential bat mortalities recorded.

7 Environmental auditing and maintenance

Routine inspections and maintenance of sediment and erosion control measures, fuel management measures and other mitigation measures (see the Construction Environmental Management Plan, Appendix I), incorporated into the design of the proposed wind farm, to be carried out. These inspections will take place regularly during the construction phase and during the operational life of the project.

8 Conclusions

An Ecological Management Plan was developed in order to enhance the existing value of habitats within the proposed site boundary. The overall management plan is summarised here in a tabulated format, for clarity.

Table 10: Summary of management actions

No.	Management Action	When	Main Target Habitat/Species
1	Timing of construction outside of the breeding season, near sensitive bird areas.	During construction	Hen harrier birds
2	Construction to begin before the breeding season, where possible.	During construction	Breeding birds
3	Damage or loss of trees will be kept to a minimum during the construction phase.	During construction	Birds/fauna
4	Surveys for bat roosts under bridges which require upgrading works along the turbine delivery route. Mature trees that require felling along haulage routes should also be surveyed for bats.	Pre-construction	Bats
5	Pre-construction bat surveys of any mature trees felling and structures demolished.	Pre-construction	Bats
6	Ensure during the felling works that the calculated buffer distance for bats between turbines and the edge of conifer plantations and hedgerows is installed.	During construction	Bats
7	Environmental auditing and maintenance, to ensure mitigation measures remain effective.	Pre, during and post-construction	-
8	Enhancement measures for hen harrier – alternative habitat	Pre, during and post-construction	Habitats / hen harrier
9	A number of suitable sediment ponds will be retained in situ and may require modification, in order to enhance the suitability of the site for invertebrates and amphibians.	Post-construction	Dragonflies, damselflies and amphibians
10	Creation and upgrading of 360m of hedgerows	Post-construction	Habitats and fauna including bats, hen harrier, and other bird species

No.	Management Action	When	Main Target Habitat/Species
11	Installation of bat boxes	Post-construction	Bats
12	Establishment of permanent quadrats in the felled areas and habitats altered during the construction phase.	Post-construction	Habitats
13	Selected drains to be blocked in felling areas to promote wet grassland, heath and bog.	Post-construction	Wet grassland, scrub and wet heath
14	Natural establishment of wet grassland, scrub and possibly wet heath and bog vegetation, will be allowed.	Post-construction	Wet grassland, scrub and wet heath
15	Where natural establishment of vegetation is slow, purple-moor grass (*Molinia caerulea*) and other suitable species will be planted within the bare felled areas.	Year 1	Purple-moor grass (*Molinia caerulea*) and other suitable species

Monitoring requirements include the establishment of permanent quadrats in the deposition and felled areas, in order to monitor the process of vegetation establishment and to take action where failure or poor progress is evident. Monitoring surveys will also be carried out for hen harrier, bats, badgers and water quality.

9 References

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Appendix 1

Hen Harrier Habitat Area

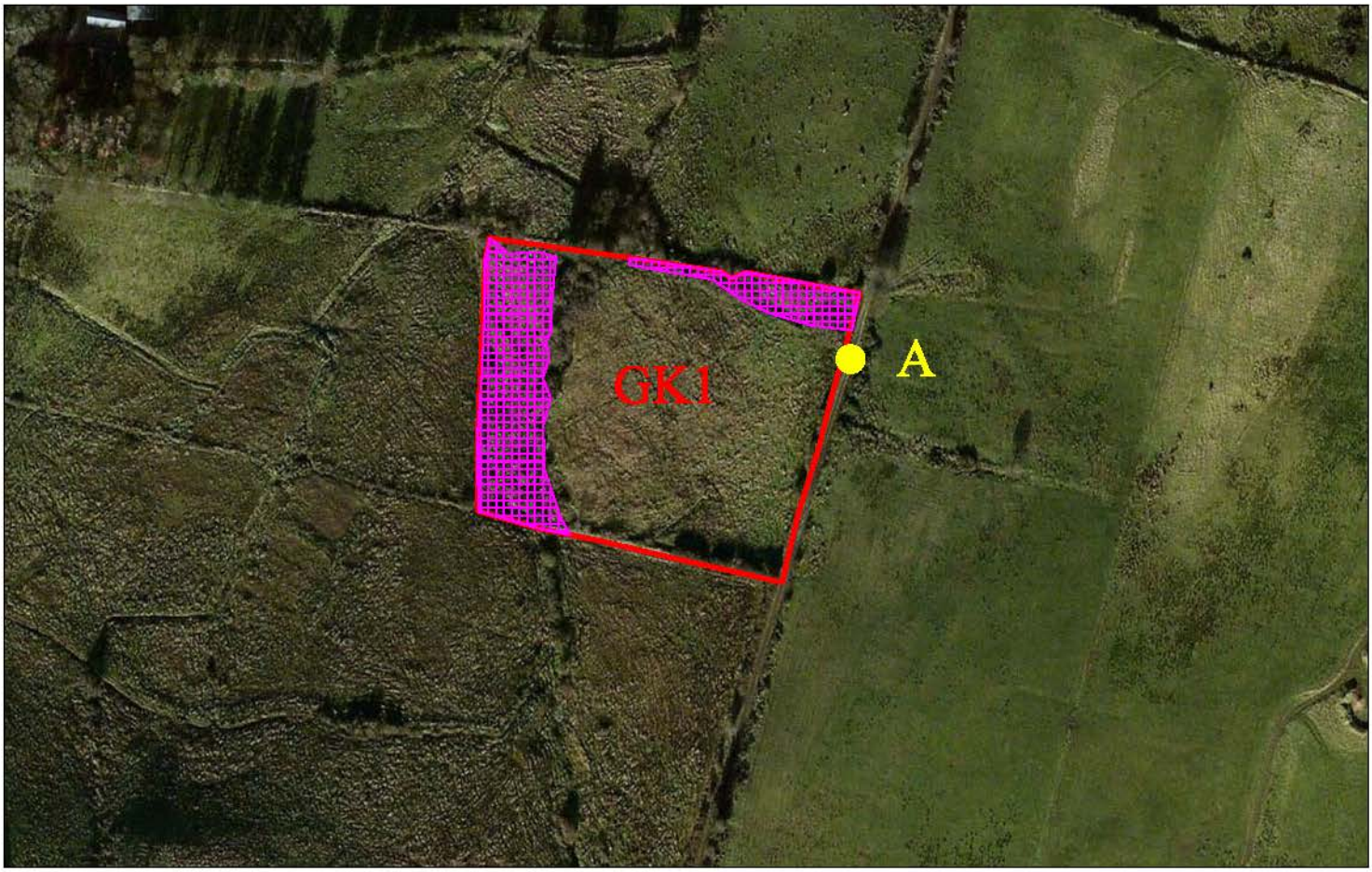
– Individual Field photographs,

Management measures and restrictions

Photographs of Field GK1

Photograph A looking west

Field ID: GK1



Field Description: Wet grassland

Field Size: 1.6Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Fence off two enclosures (Total 0.4Ha) and plant with native broadleaved species.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

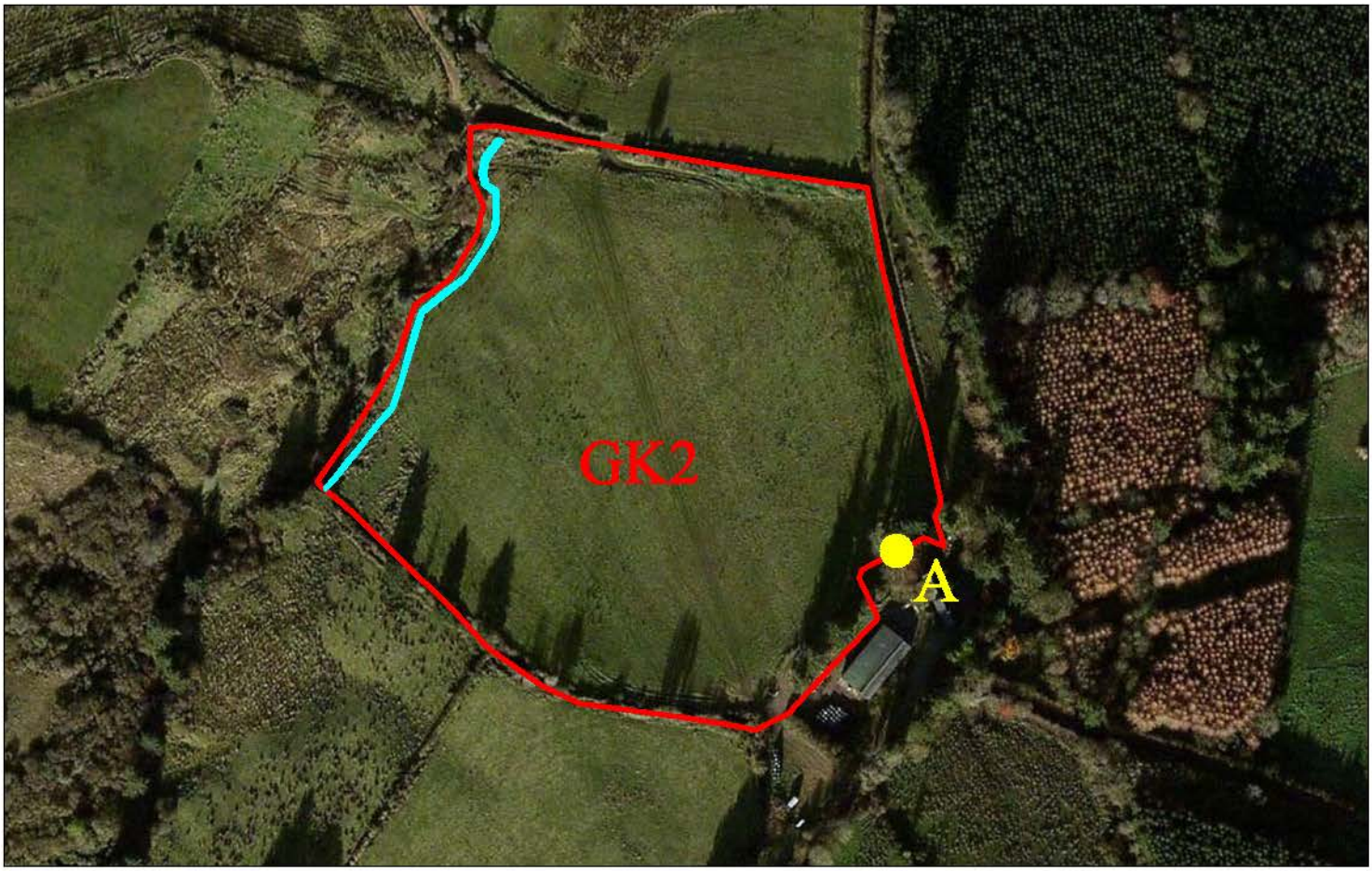
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK2

Photograph A looking west-northwest

Field ID: GK2



Field Description: Agricultural grassland with a riparian corridor

Field Size: 3.3Ha

Measures:

- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

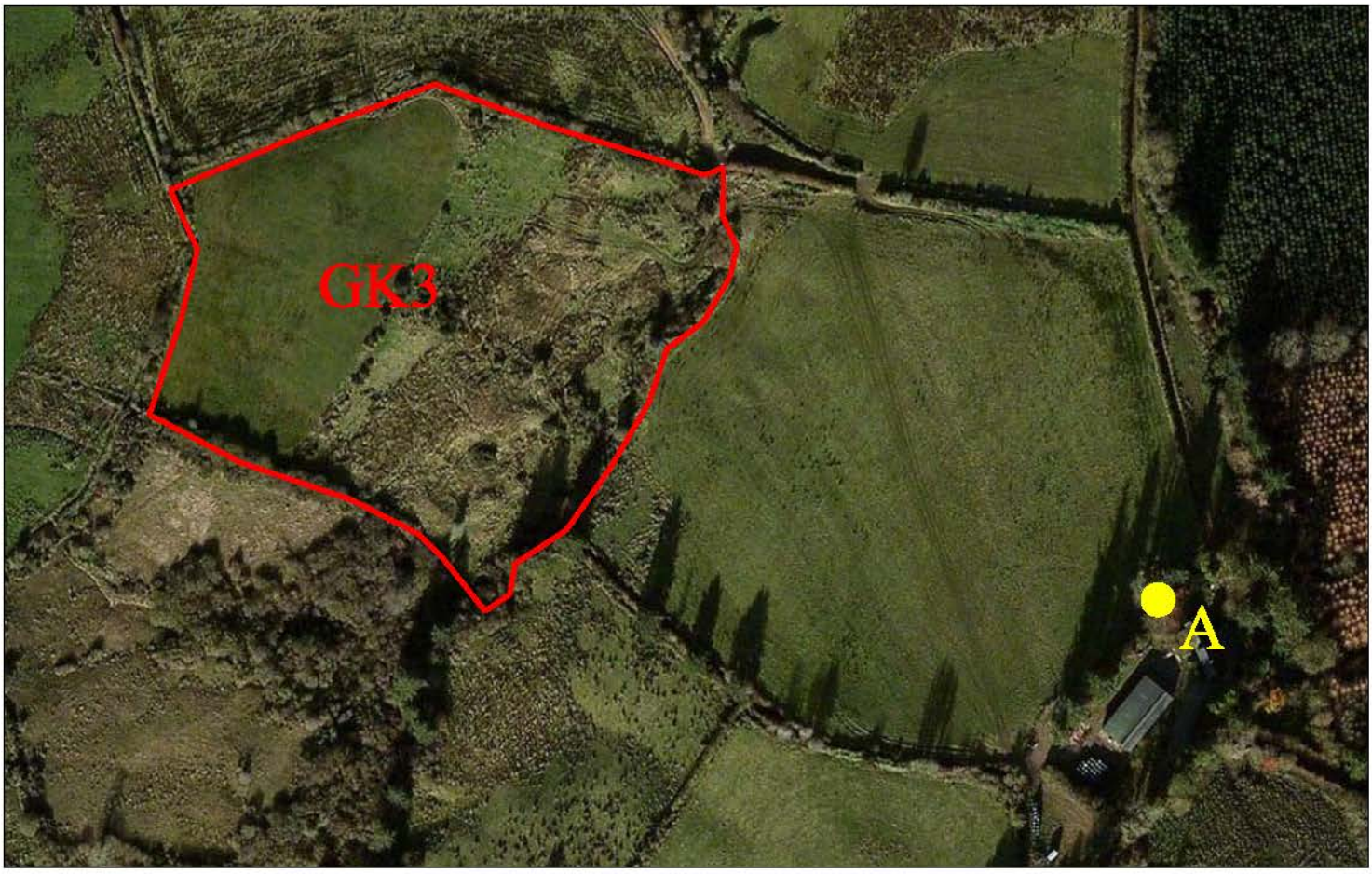
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK3

Photograph A looking west-northwest

Field ID: GK3



Field Description: Mix of agricultural grassland and wet grassland with a riparian corridor

Field Size: 2.3Ha

Measures:

- Eastern half of the field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage on eastern section.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

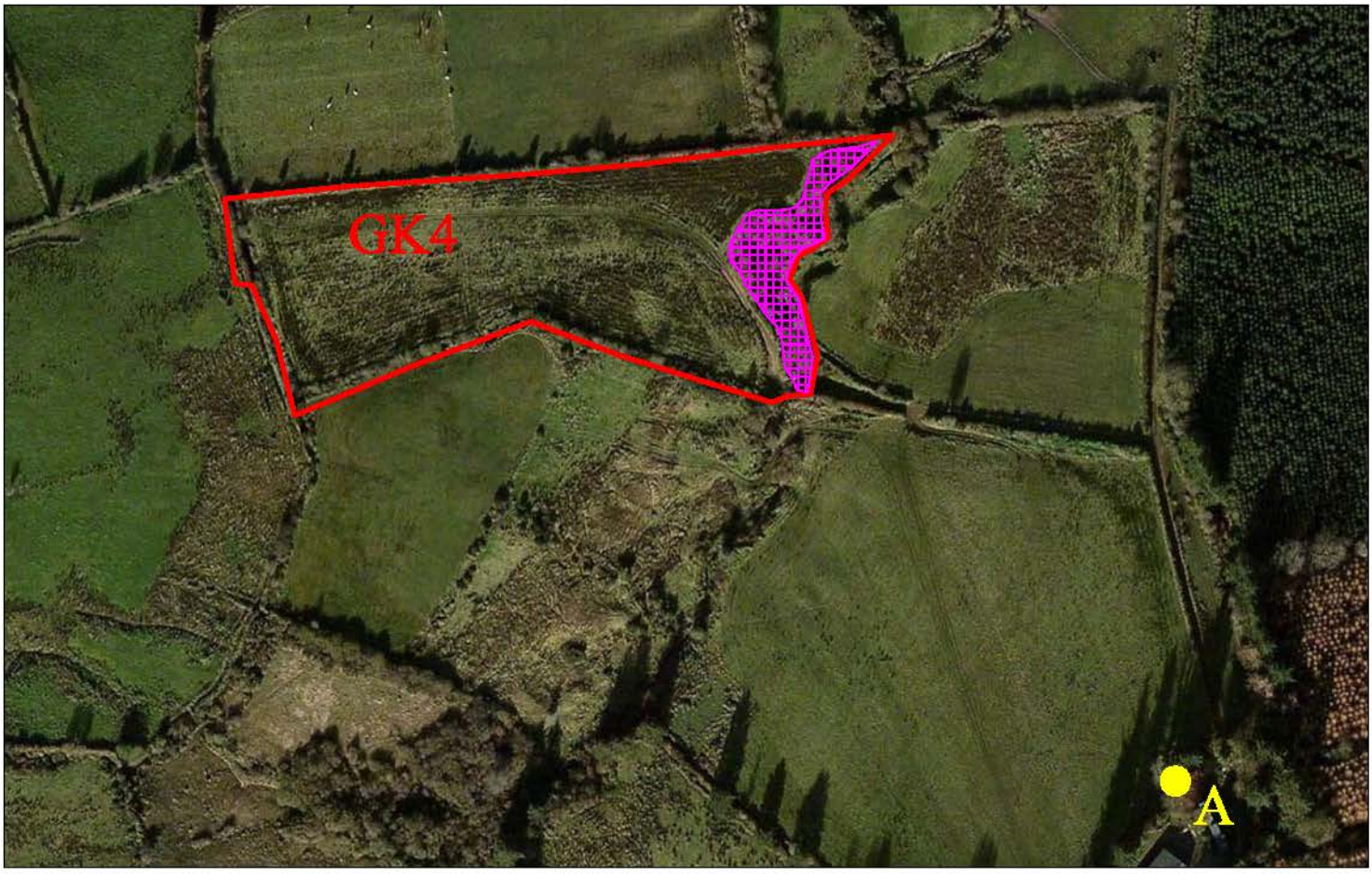
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK4

Photograph A looking northwest

Field ID: GK4



Field Description: Wet grassland
Field Size: 1.7Ha

Measures:

- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved enclosure (0.15Ha)
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

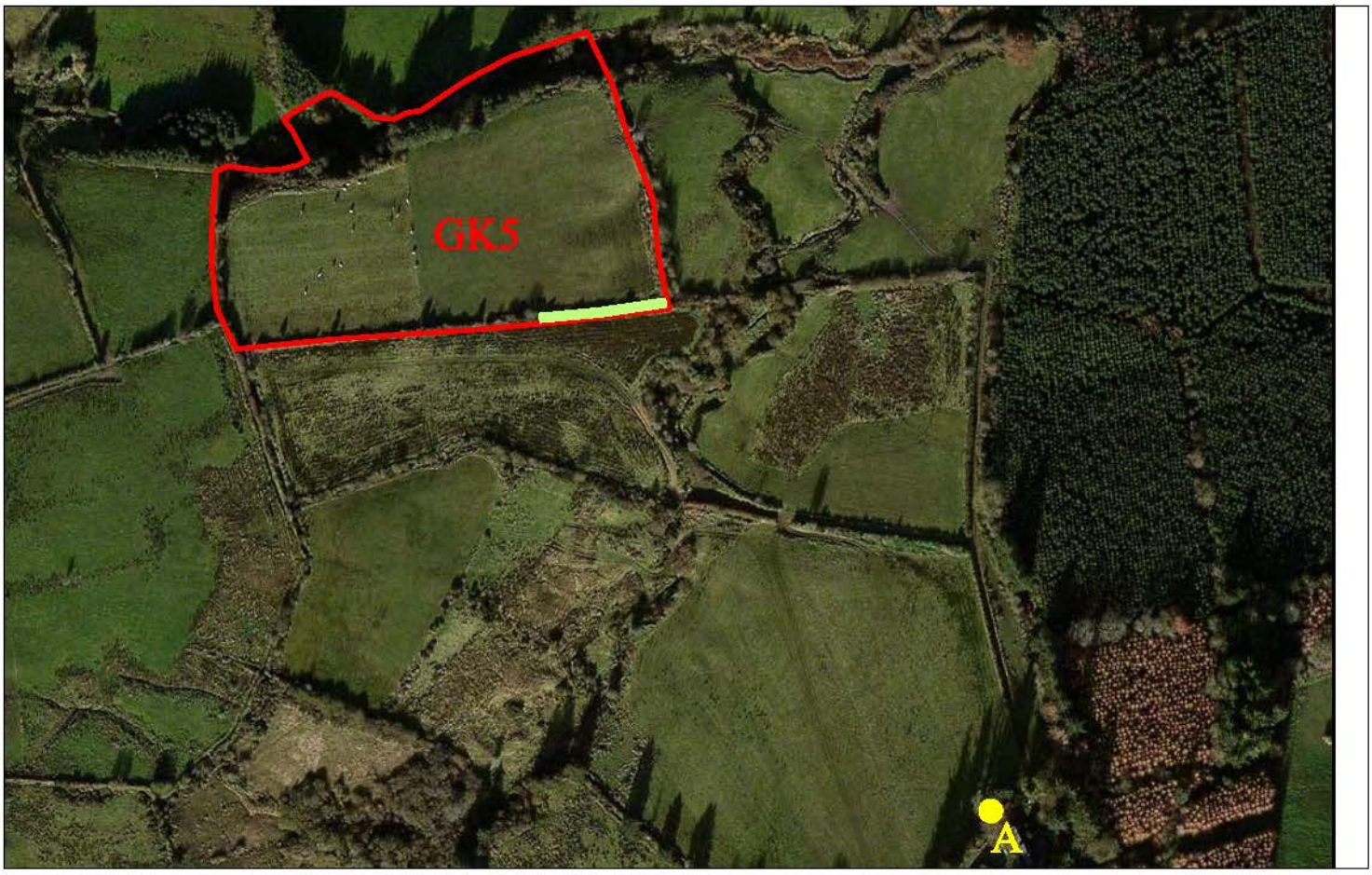
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK5

Photograph A looking north-northwest

Field ID: GK5



Field Description: Agricultural grassland.

Field Size: 2.4Ha

Measures:

- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 60m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

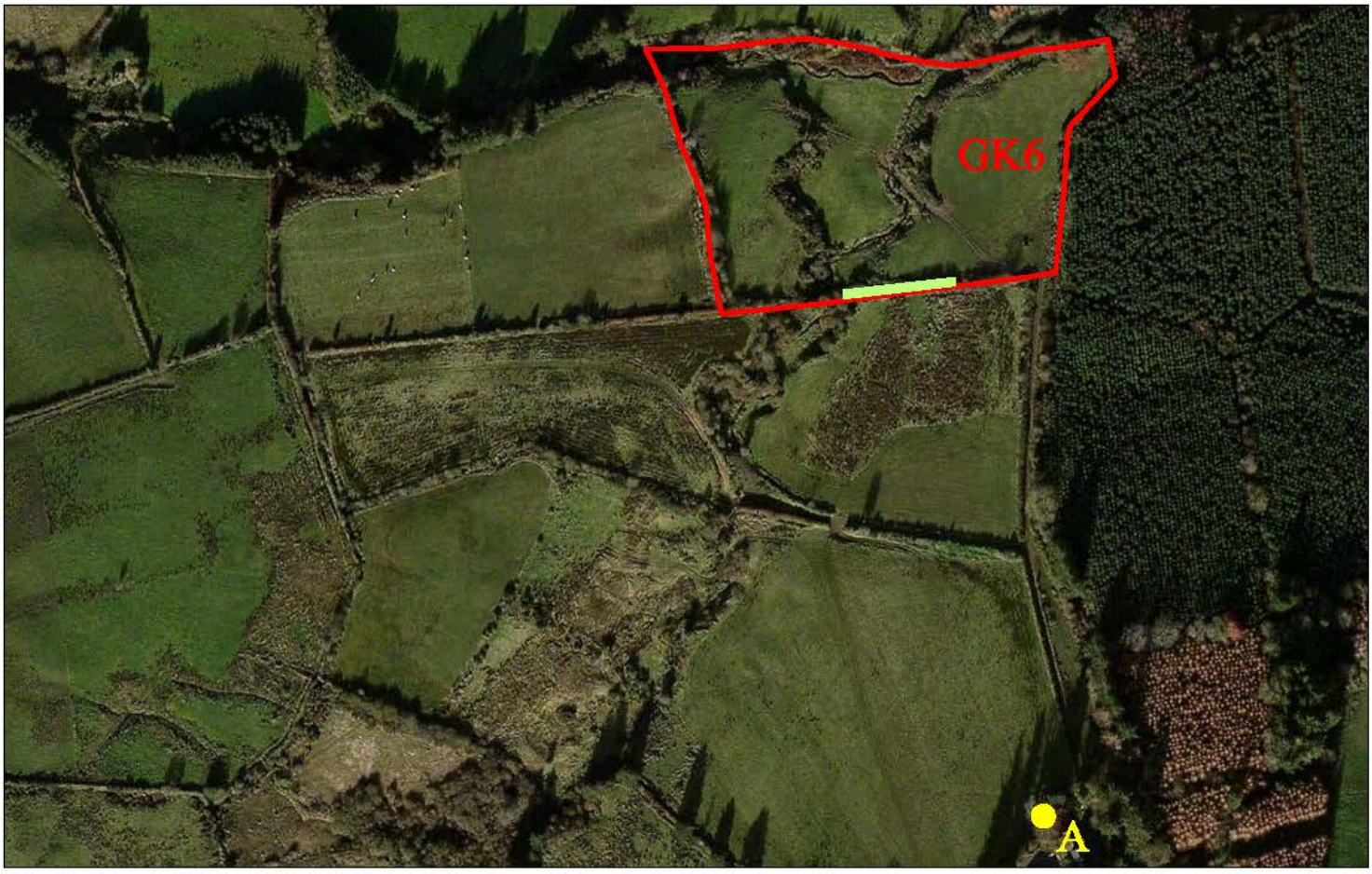
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK6

Photograph A looking north-northwest

Field ID: GK6



Field Description: Wet grassland with a riparian corridor

Field Size: 2.2Ha

Measures:

- Field will be maintained as wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 55m of hedgerow
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

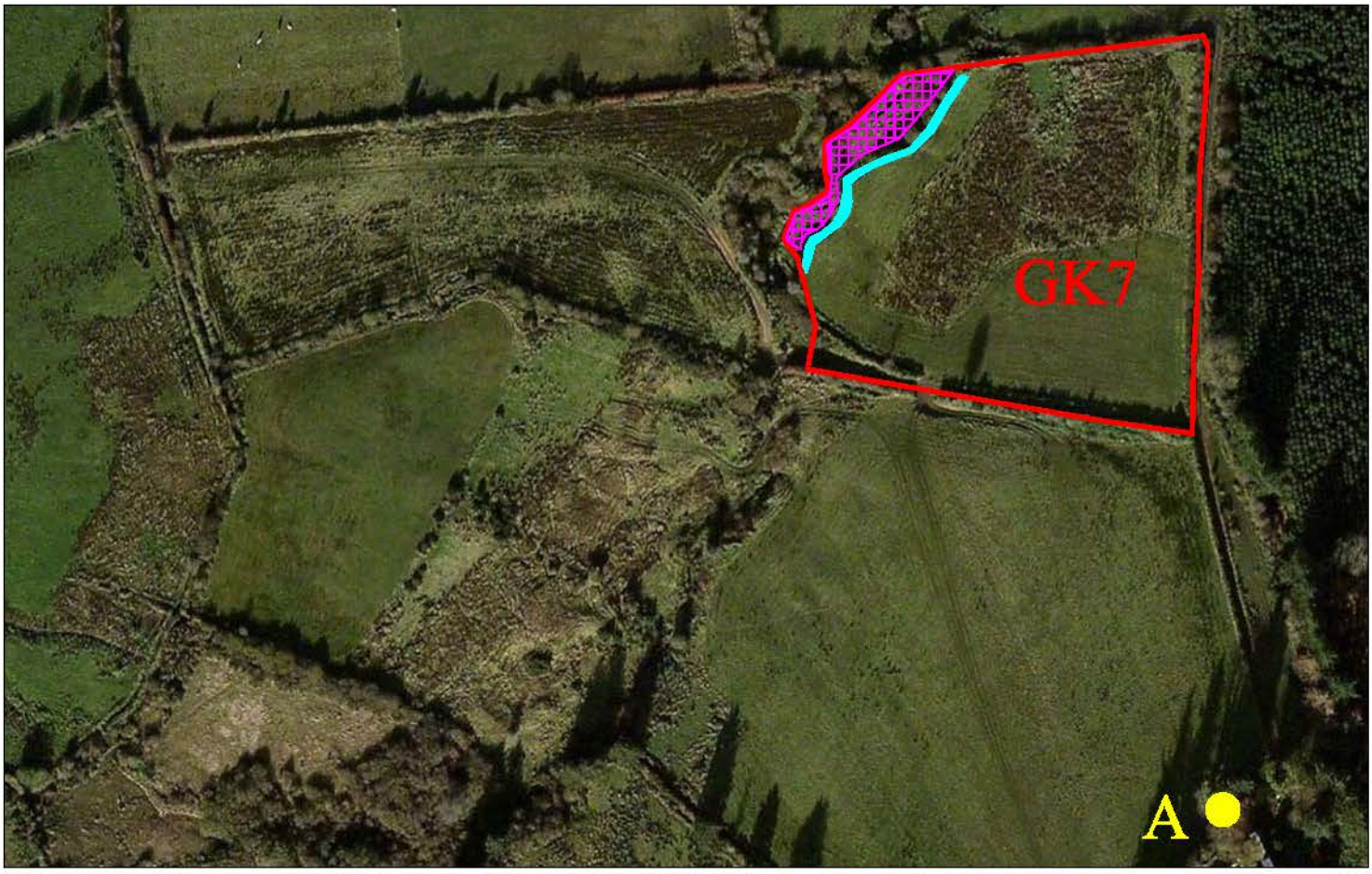
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field GK7

Photograph A looking north-northwest

Field ID: GK7



Field Description: Mix of agricultural grassland and wet grassland with a riparian corridor

Field Size: 1.6 Ha

Measures:

- Centre and northeast of the field will be maintained as wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Fence off enclosure (0.07Ha) and improve with native broadleaved species.
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

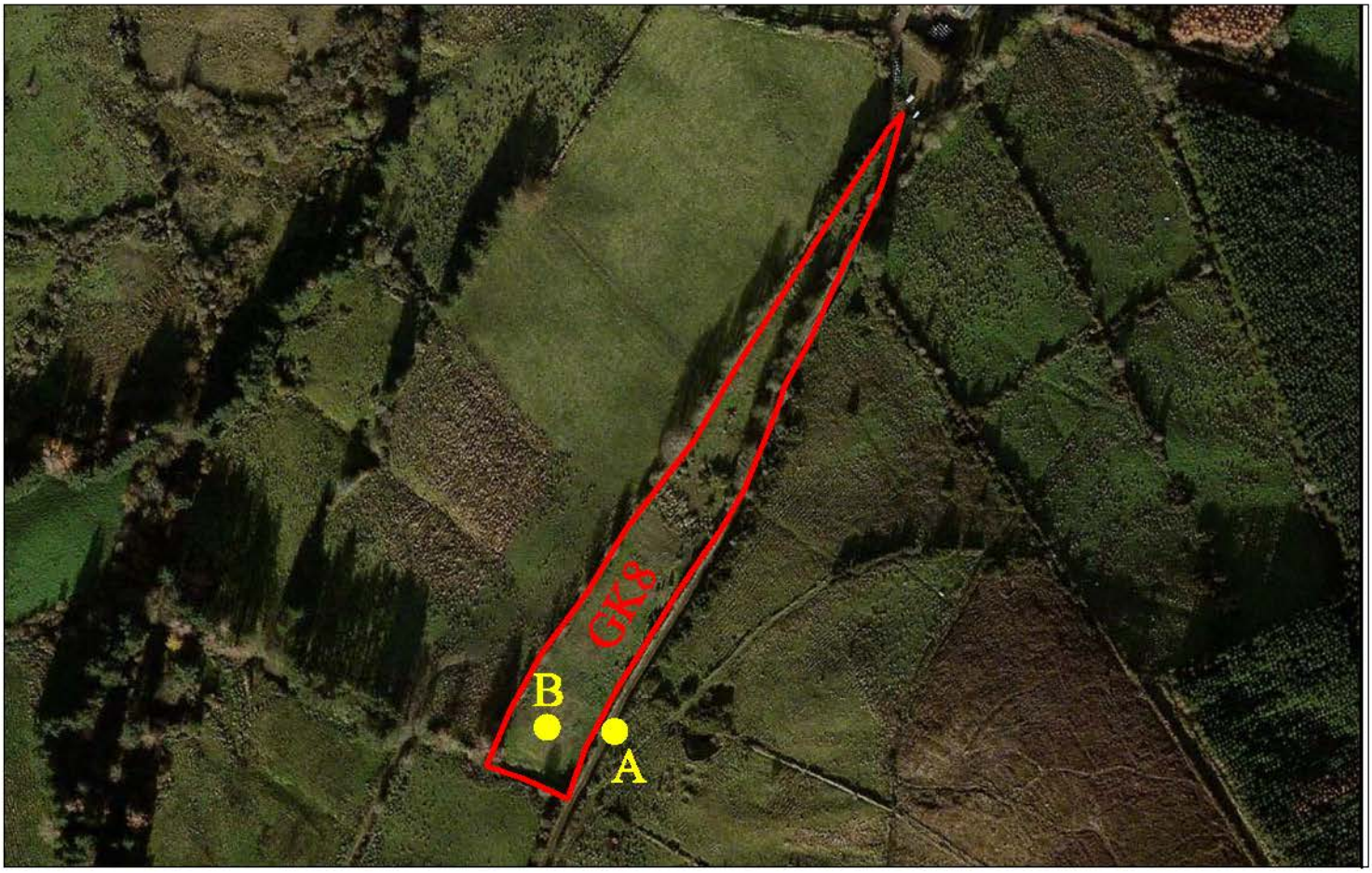
A Photograph Locations

Photographs of Field GK8

Photograph A looking west

Photograph B looking northeast

Field ID: GK8



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 0.8Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

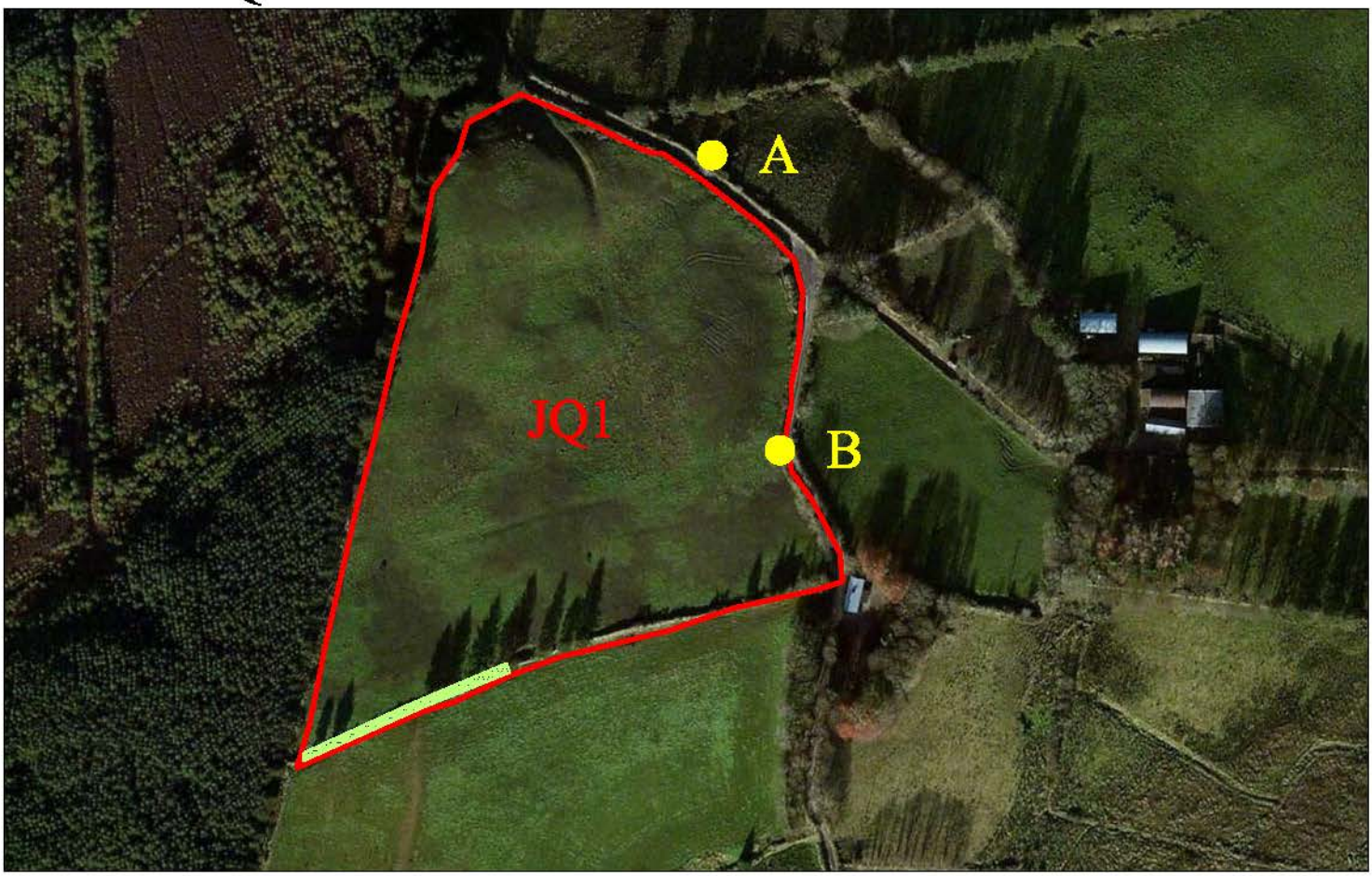
A Photograph Locations

Photographs of Field JQ1

Photograph A looking southwest

Photograph B looking west

Field ID: JQ1



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 3.5Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 88m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

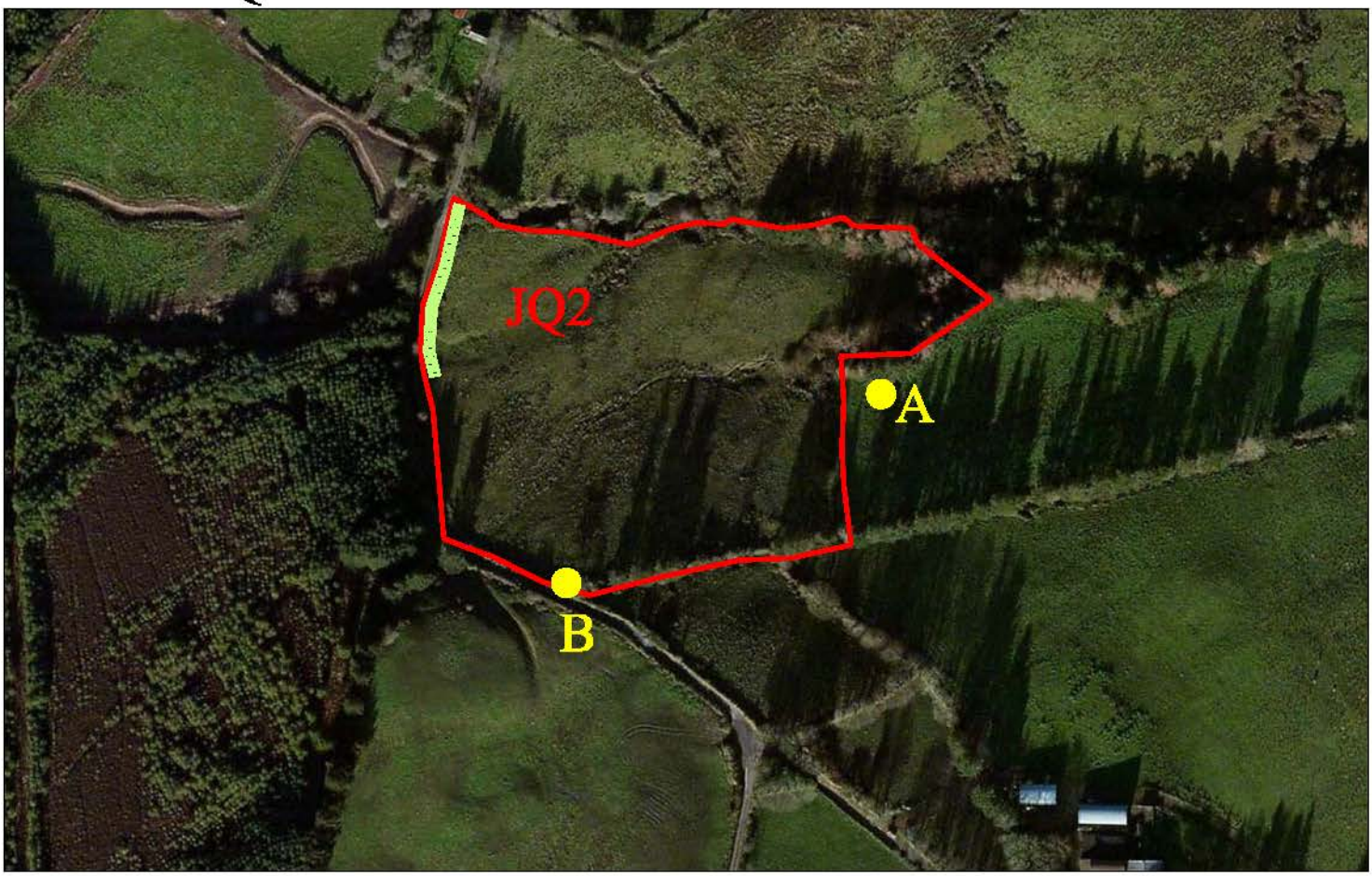
A Photograph Locations

Photographs of Field JQ2

Photograph A looking west

Photograph B looking north

Field ID: JQ2



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 2.4Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 60m of hedgerow
- Enhance riparian corridor:Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

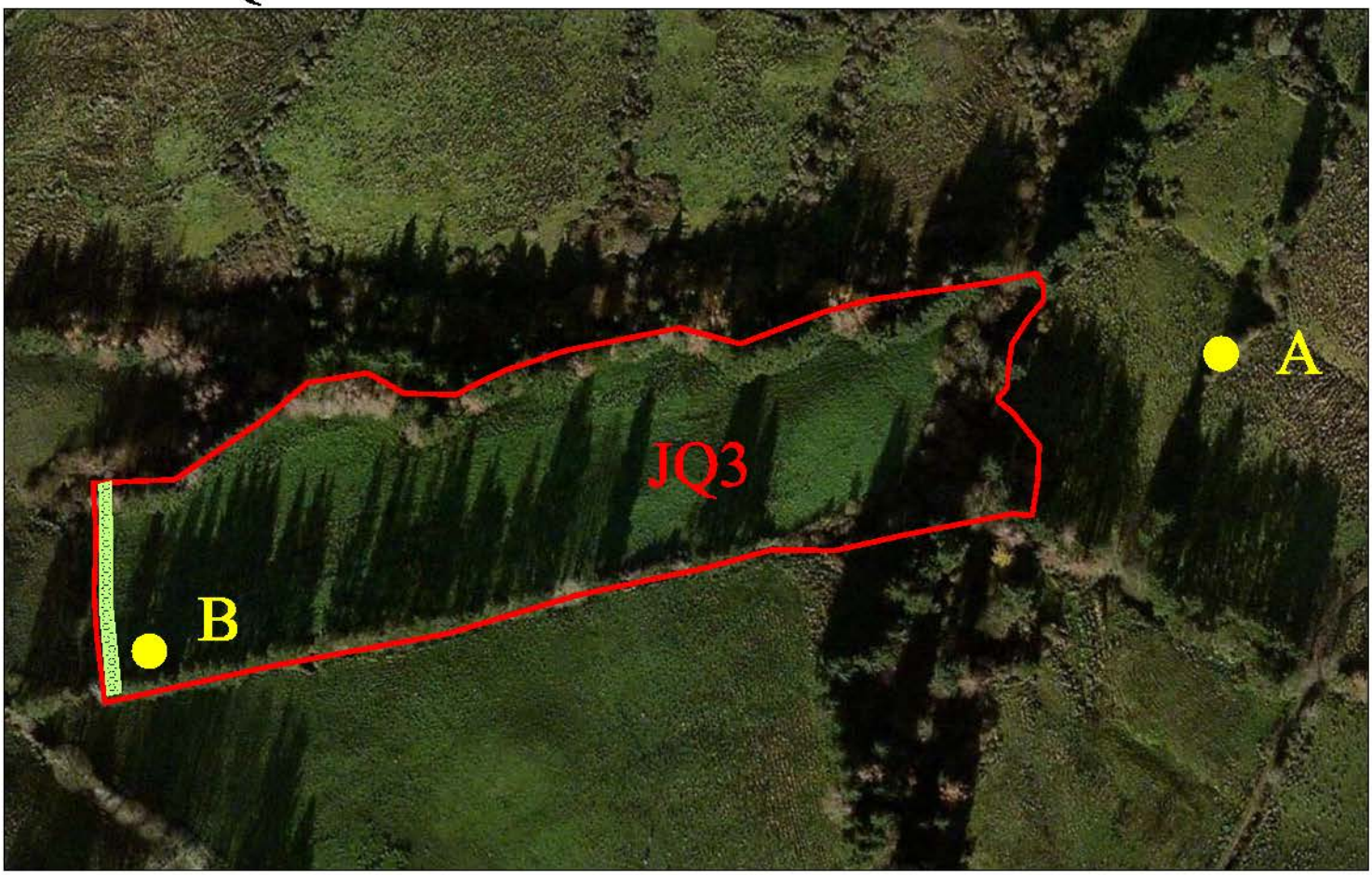
A Photograph Locations

Photographs of Field JQ3

Photograph A looking west

Photograph B looking east

Field ID: JQ3



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 2.9Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 73m of hedgerow
- Enhance riparian corridor:Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

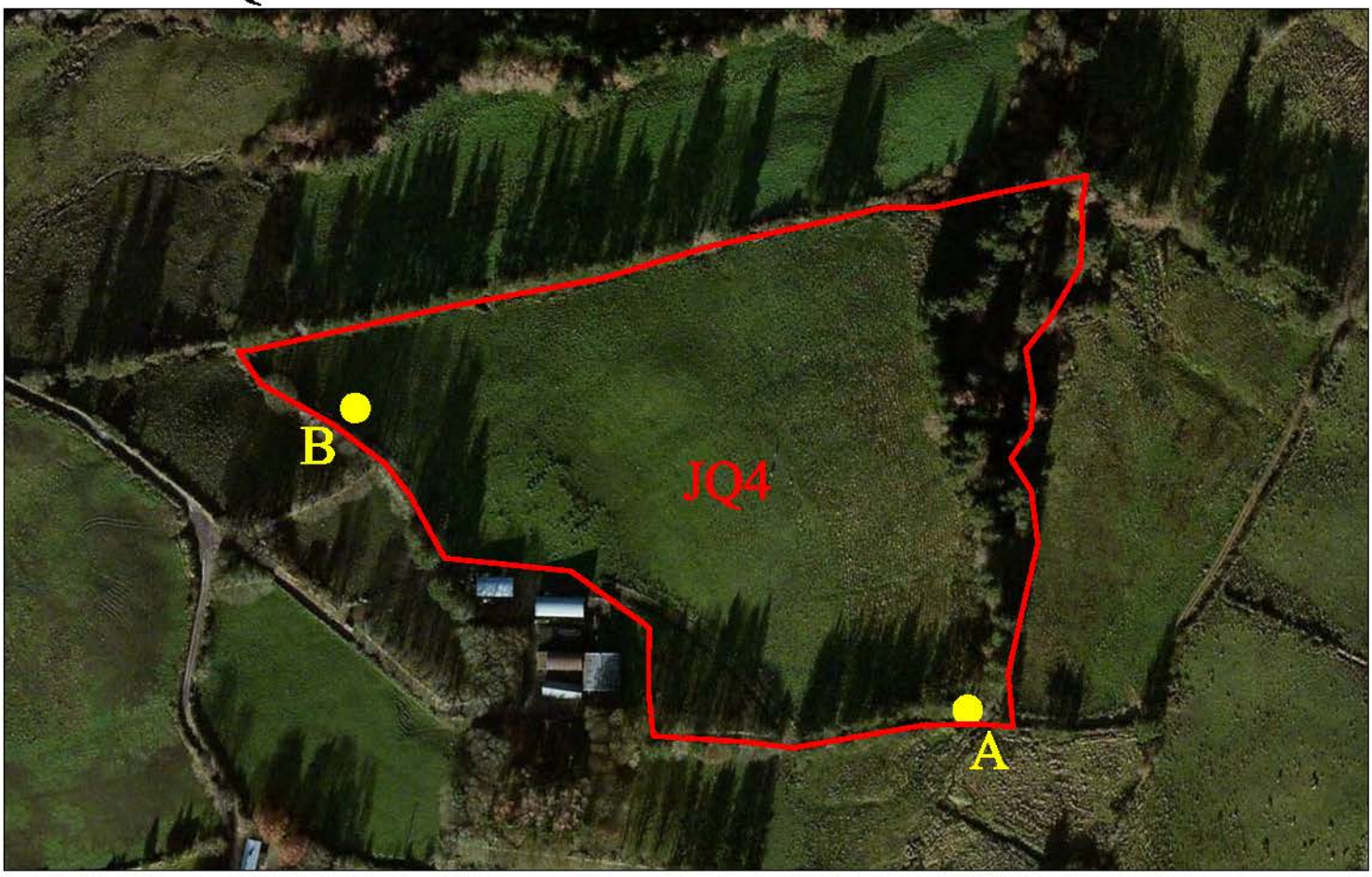
A Photograph Locations

Photographs of Field JQ4

Photograph A looking northwest

Photograph B looking east

Field ID: JQ4



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 4.6Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor:Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

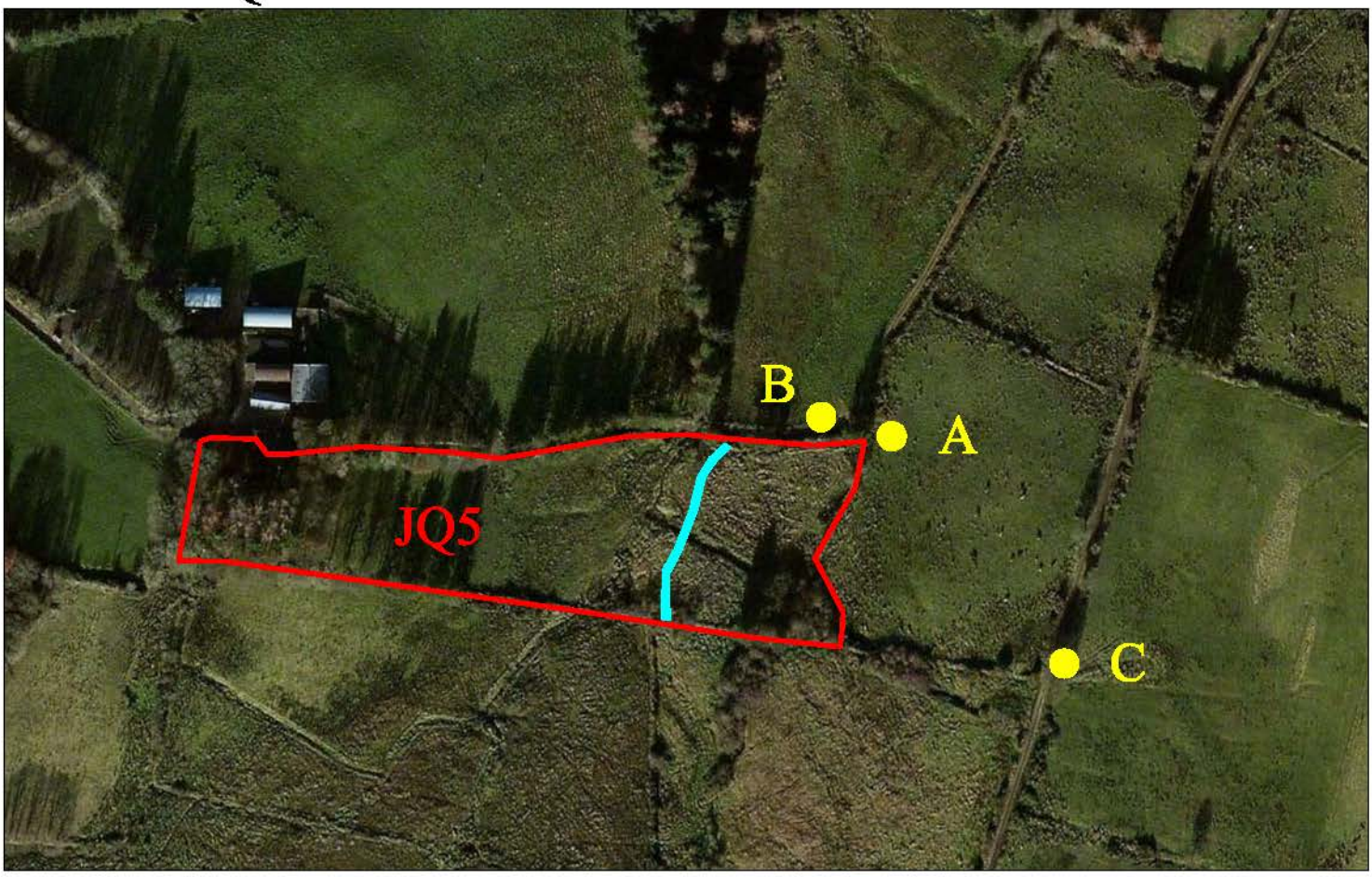
Photographs of Field JQ5

Photograph A looking west-southwest

Photograph B looking south-southwest

Photograph C looking west-northwest

Field ID: JQ5



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 1.6Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3)
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

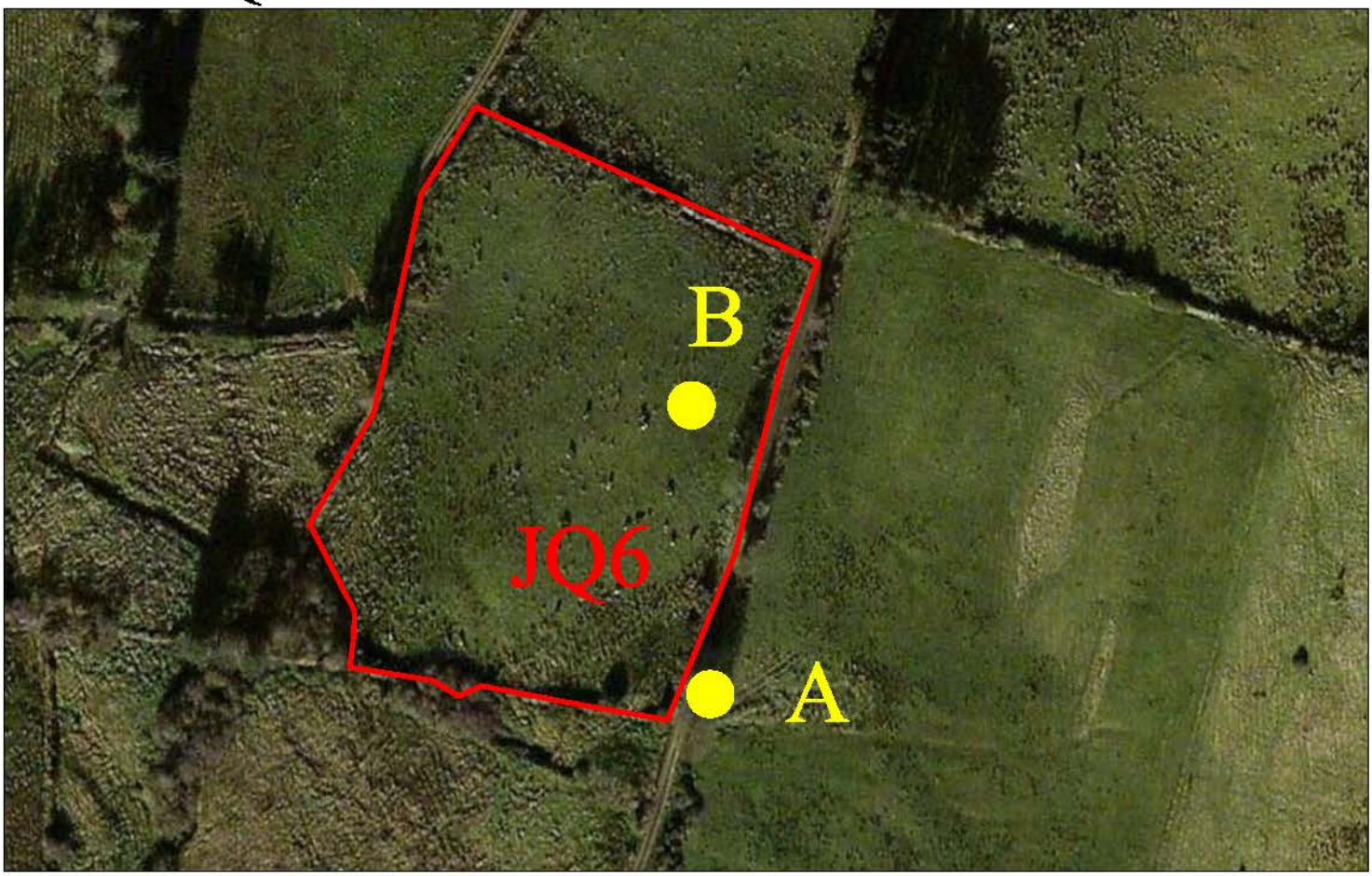
A Photograph Locations

Photographs of Field JQ6

Photograph A looking west

Photograph B looking southwest

Field ID: JQ6



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 1.3Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

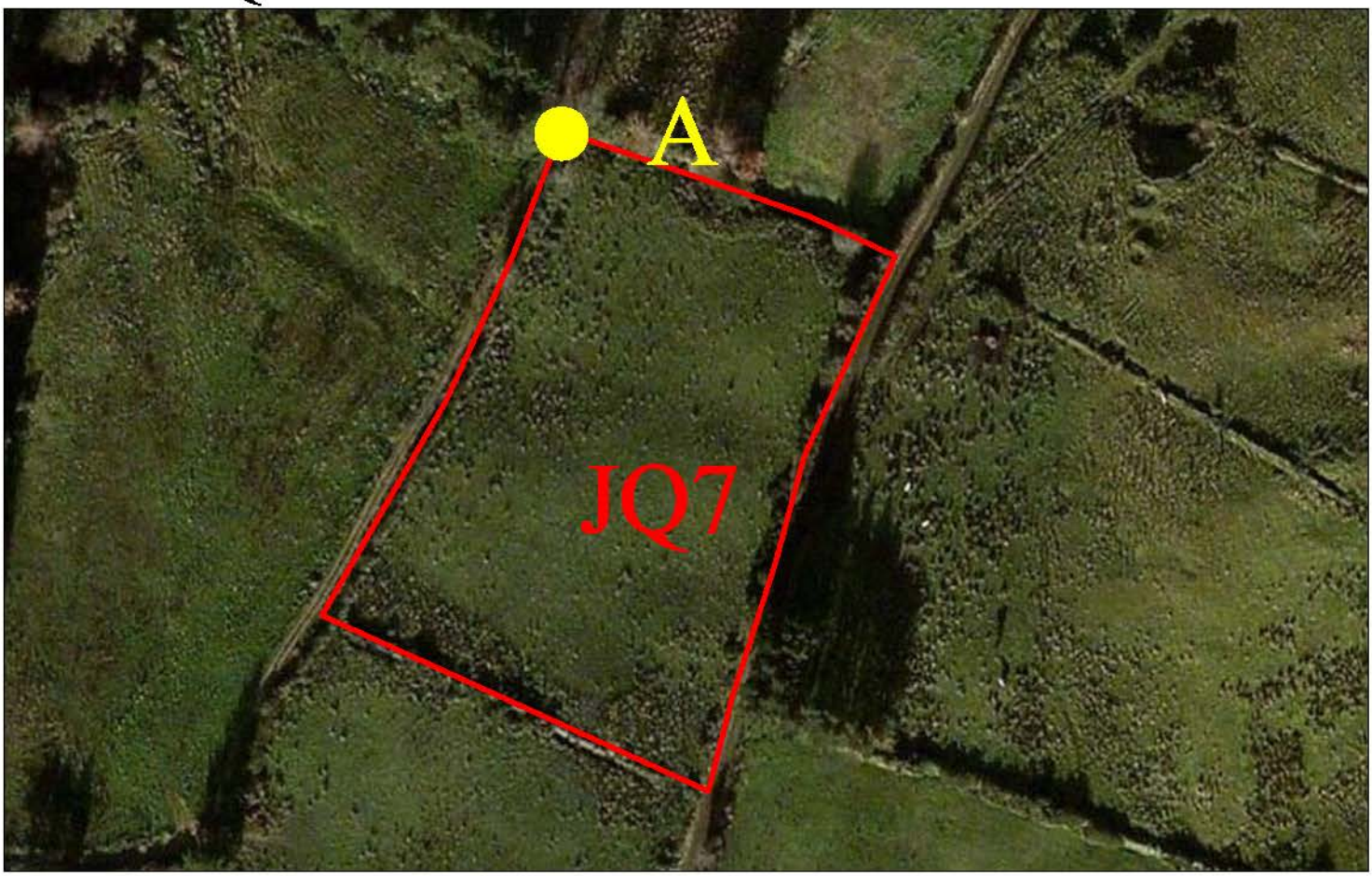
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field JQ7

Photograph A looking southeast

Field ID: JQ7



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 1.0Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

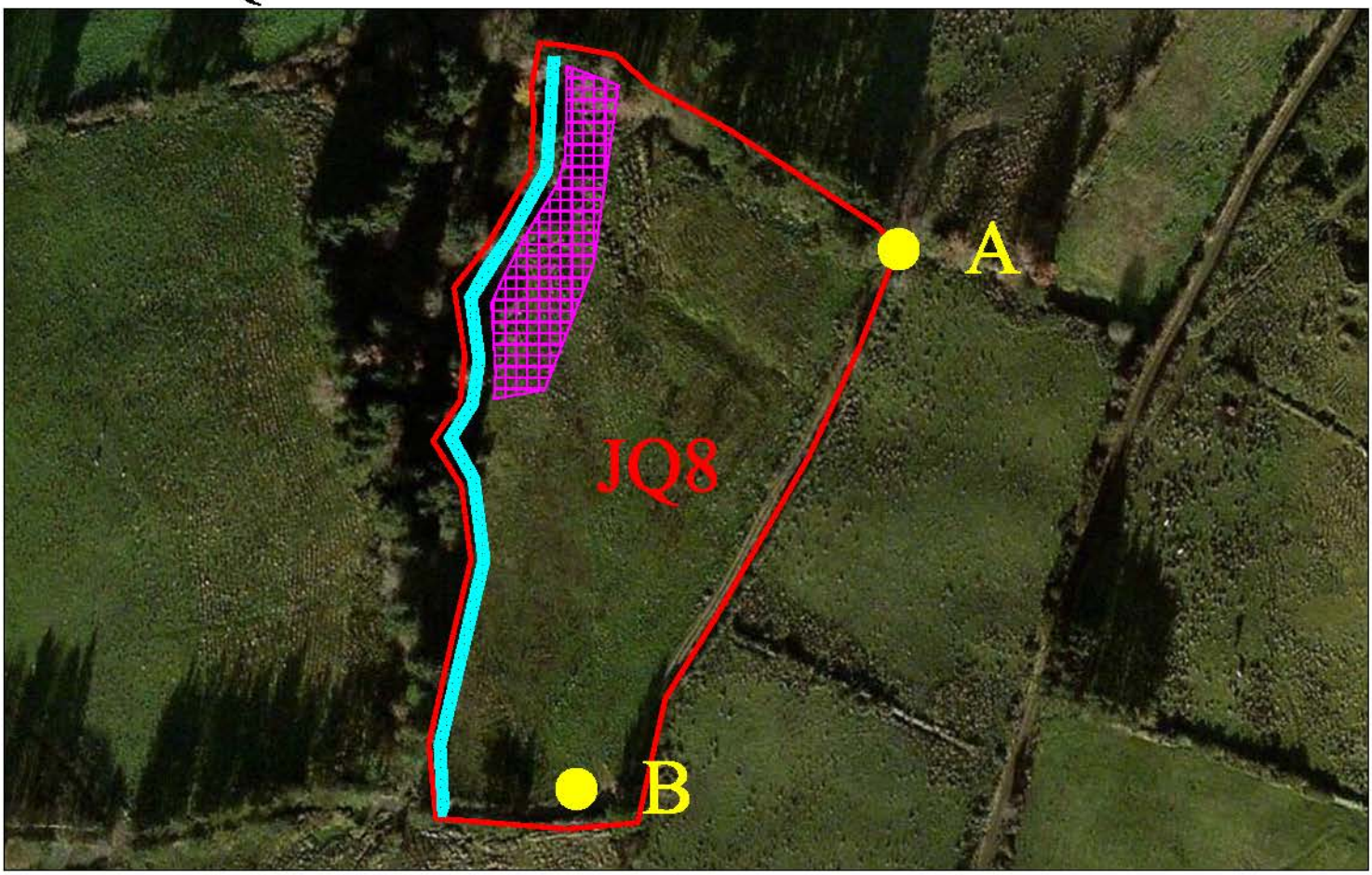
A Photograph Locations

Photographs of Field JQ8

Photograph A looking southwest

Photograph B looking north

Field ID: JQ8



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 1.8Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Fence off and maintain 0.15Ha enclosure along the riparian corridor.
- Enhance riparian corridor: Plant native broadleaved species.
- Enhance riparian corridor: Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

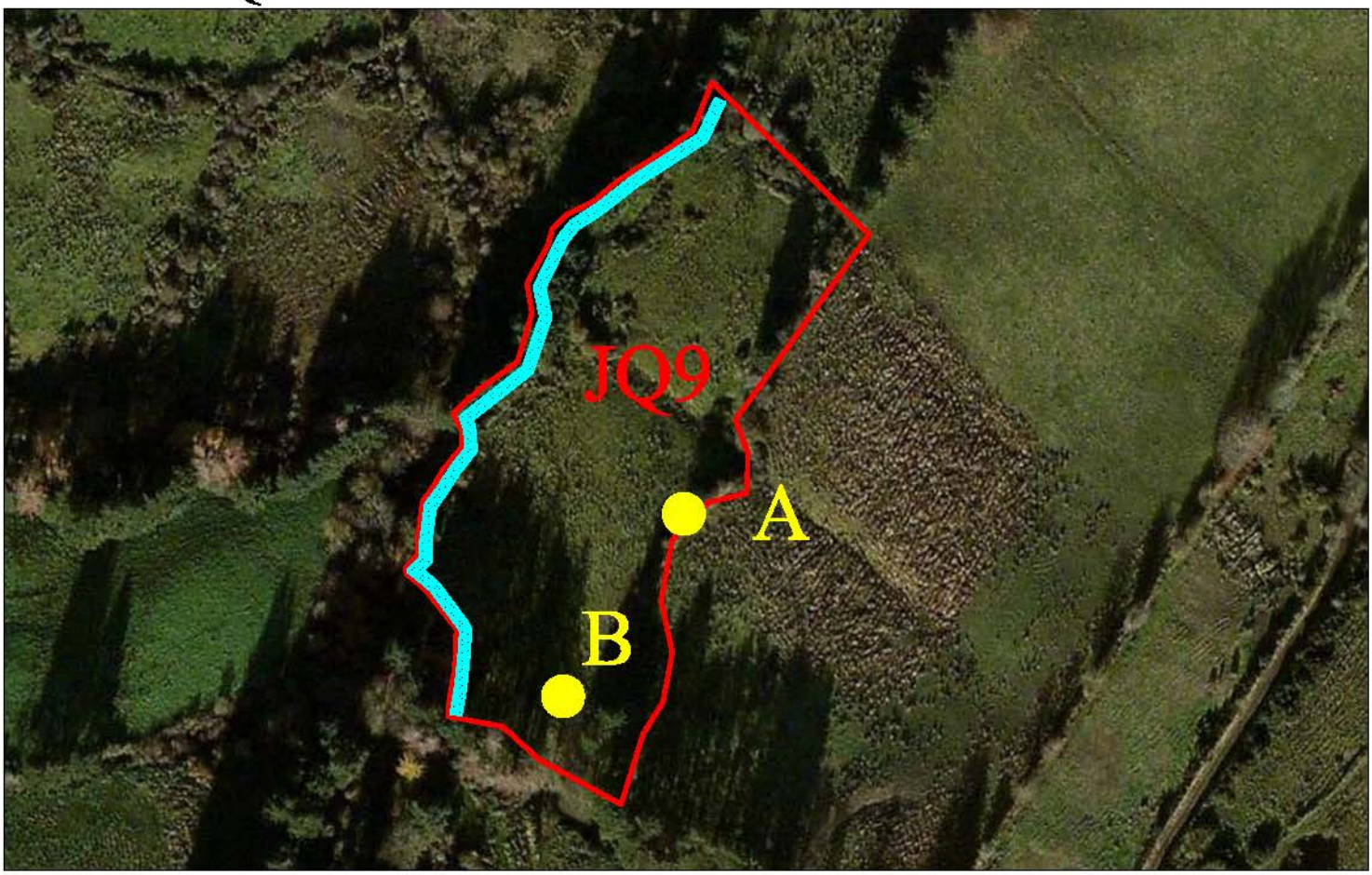
- Field Boundary
- New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
- Areas to be planted with woody scrub such as Willow, Alder, Birch
- Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.
- A — Photograph Locations

Photographs of Field JQ9

Photograph A looking north

Photograph B looking northwest

Field ID: JQ9



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 1.2Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Enhance riparian corridor:Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

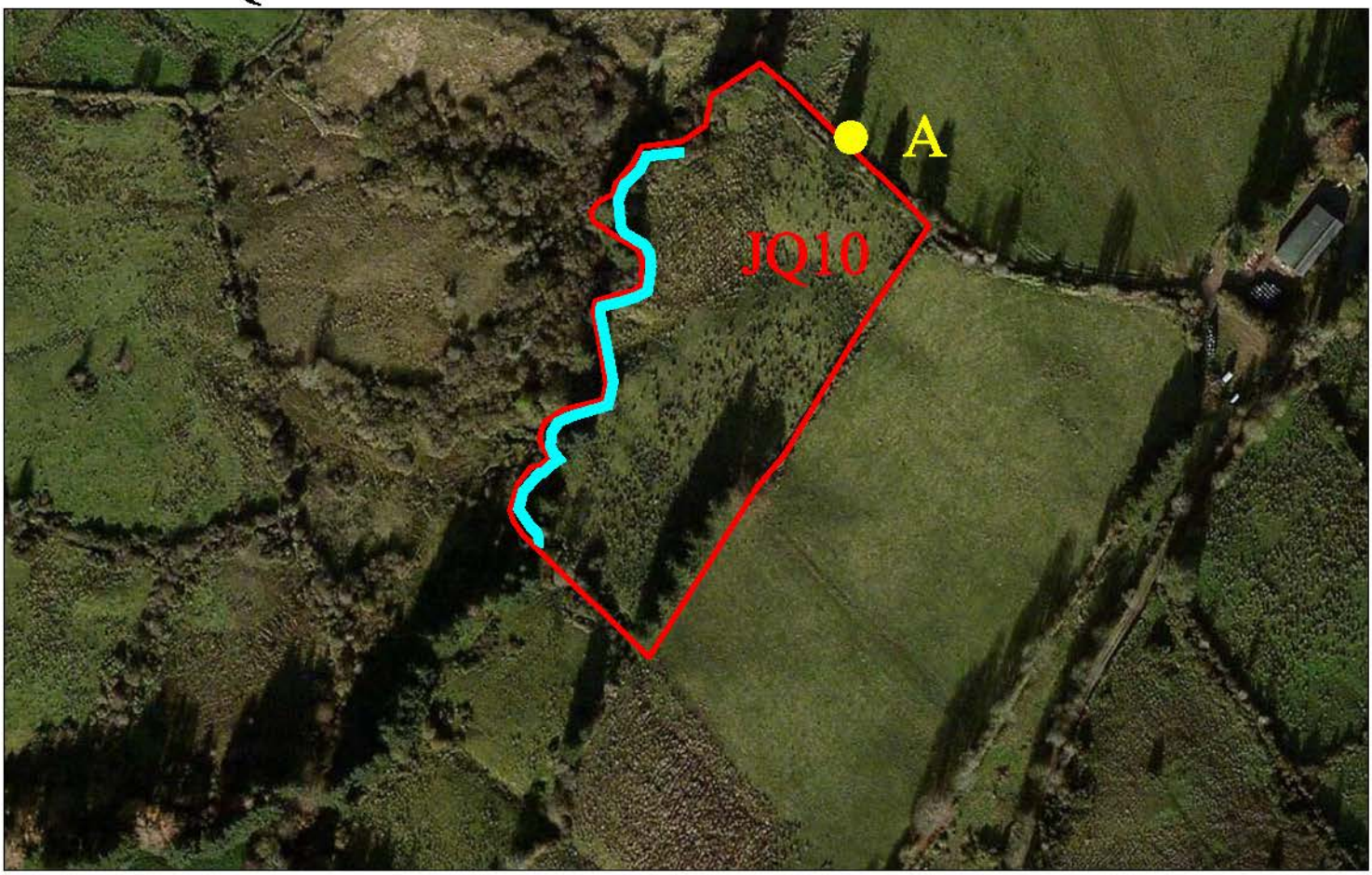
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field JQ10

Photograph A looking southwest

Field ID: JQ10



Field Description: Mix of agricultural grassland and wet grassland with riparian corridor.

Field Size: 1.7Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Enhance riparian corridor:Erect fencing to make stockproof and exclude access to river by livestock.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

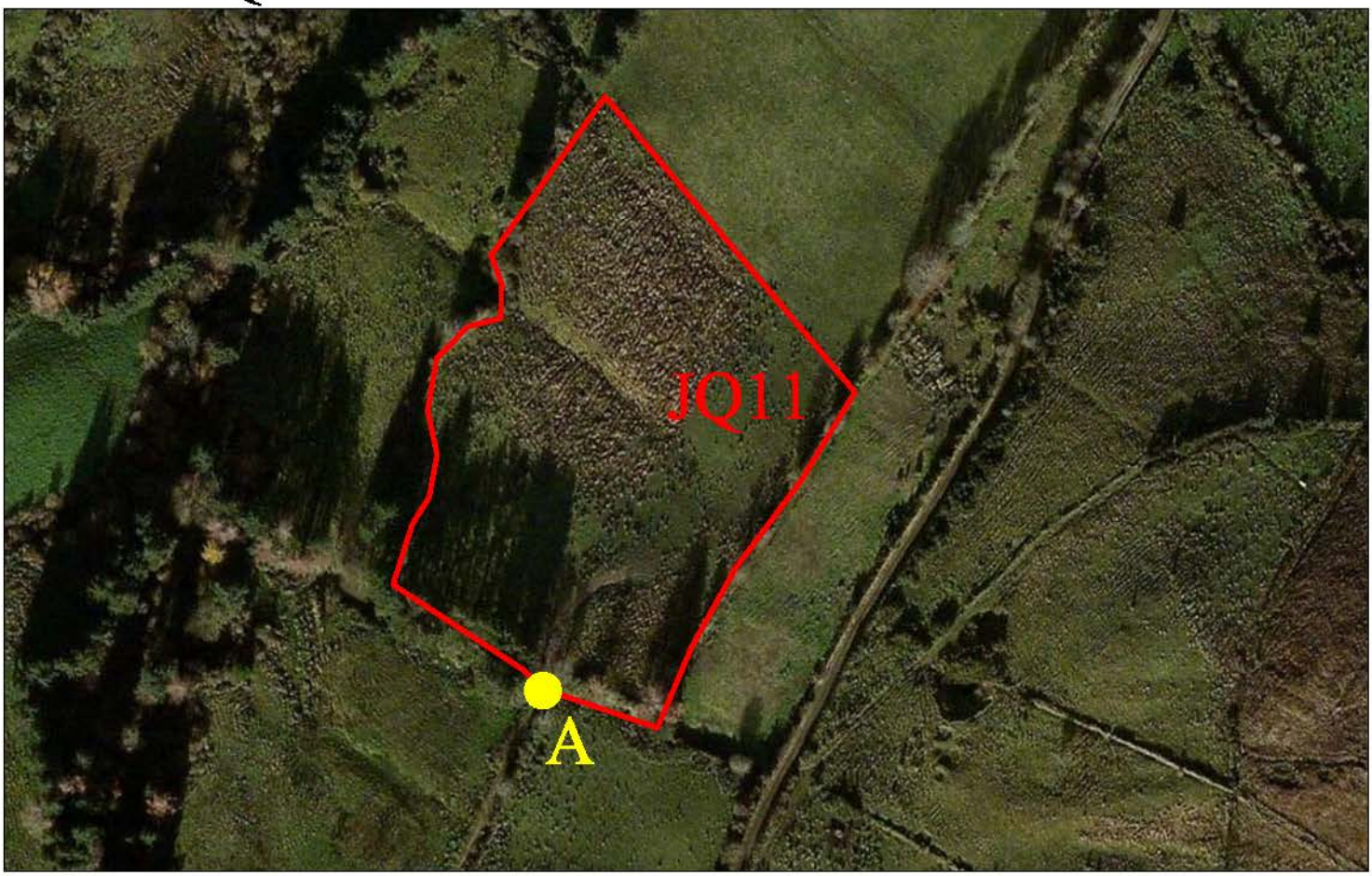
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field JQ11

Photograph A looking north

Field ID: JQ11



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 1.7Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

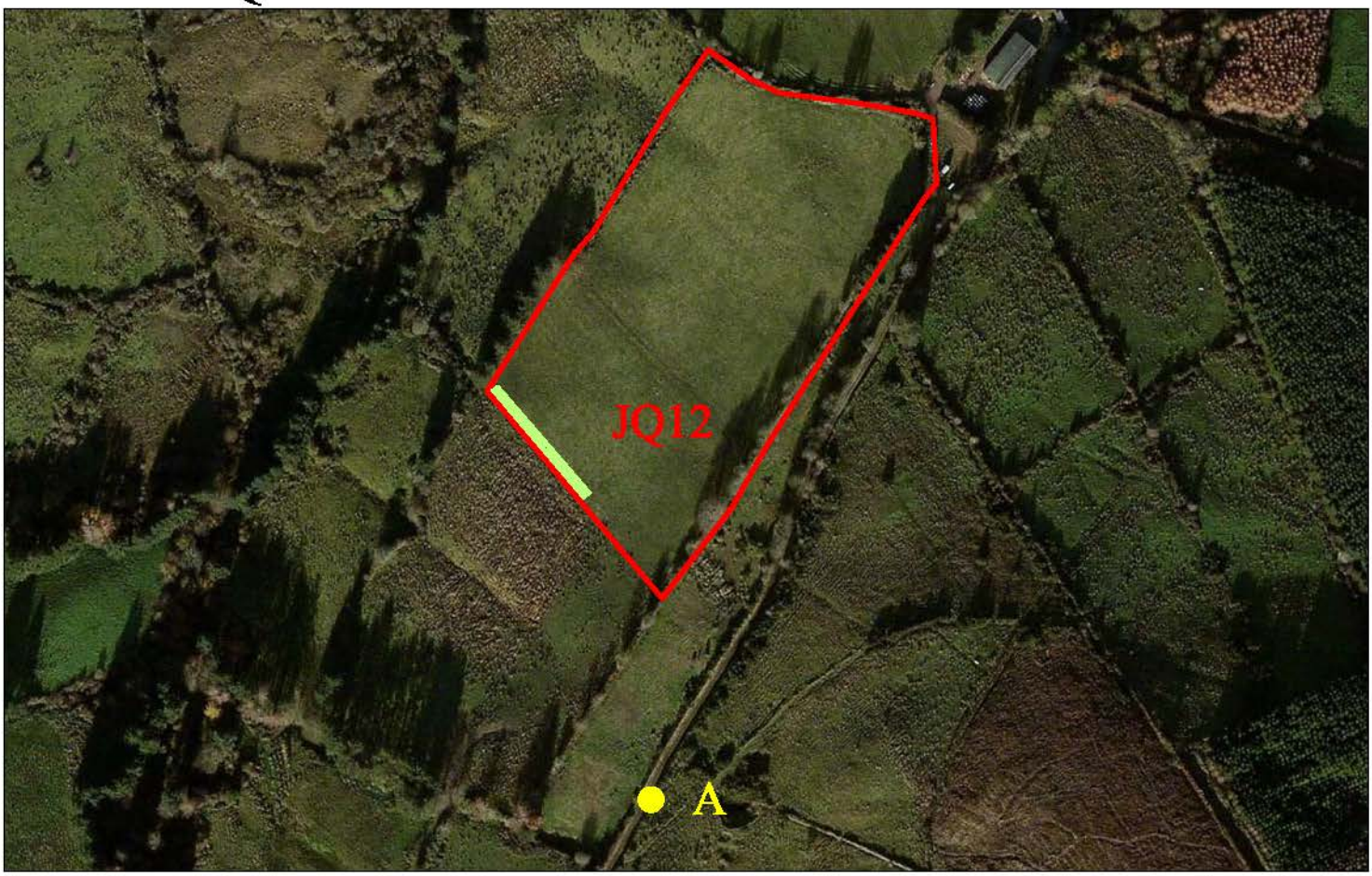
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field JQ12

Photograph A looking west

Field ID: JQ12



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 2.6Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 65m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

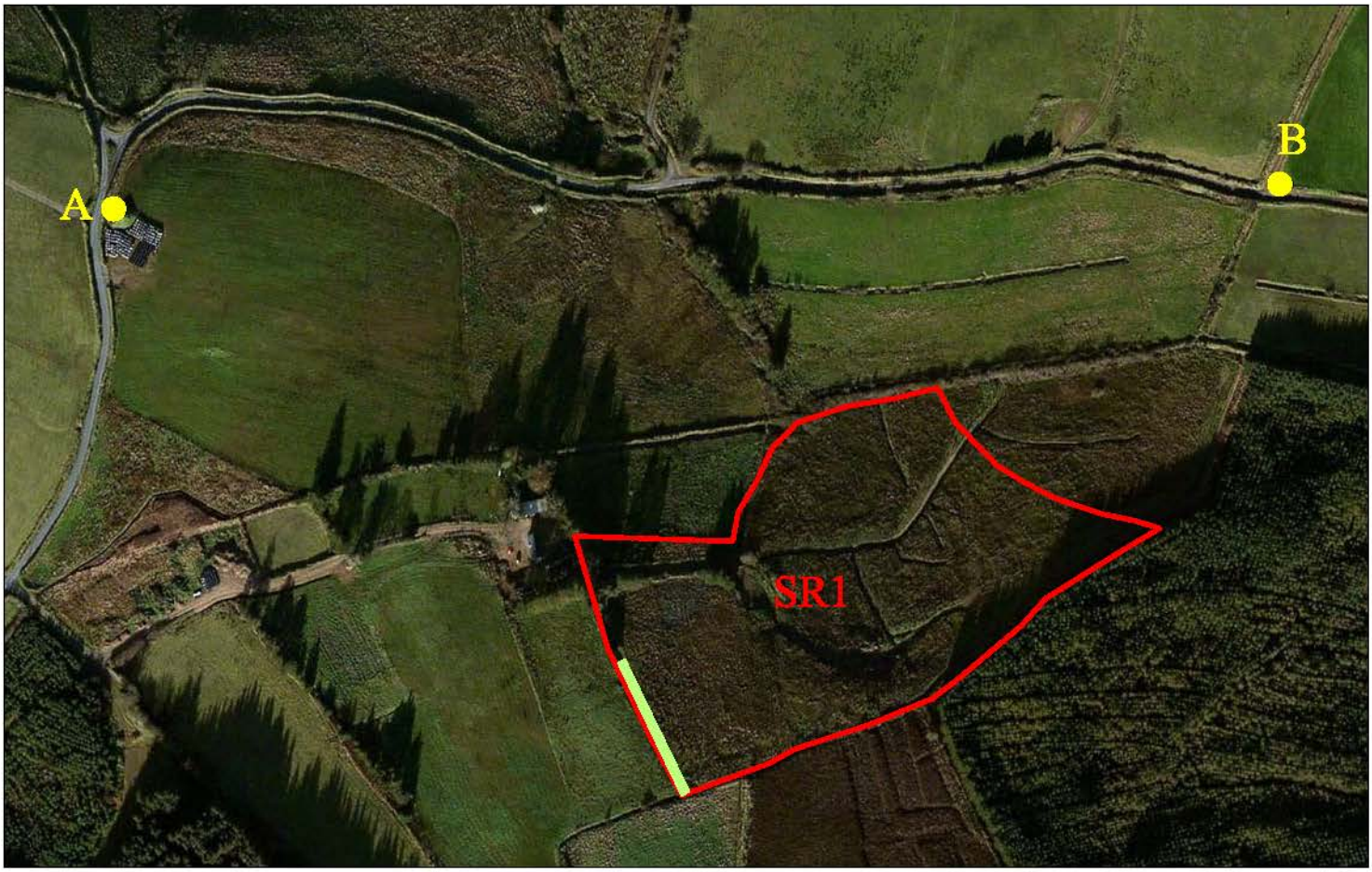
A Photograph Locations

Photographs of Field SR1

Photograph A looking southeast

Photograph B looking southwest

Field ID: SR1



Field Description: Wet grassland

Field Size: 2.8Ha

Measures:

- Field will be maintained as wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 70m of hedgerow

Restrictions:

- No speading of fertilizer
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

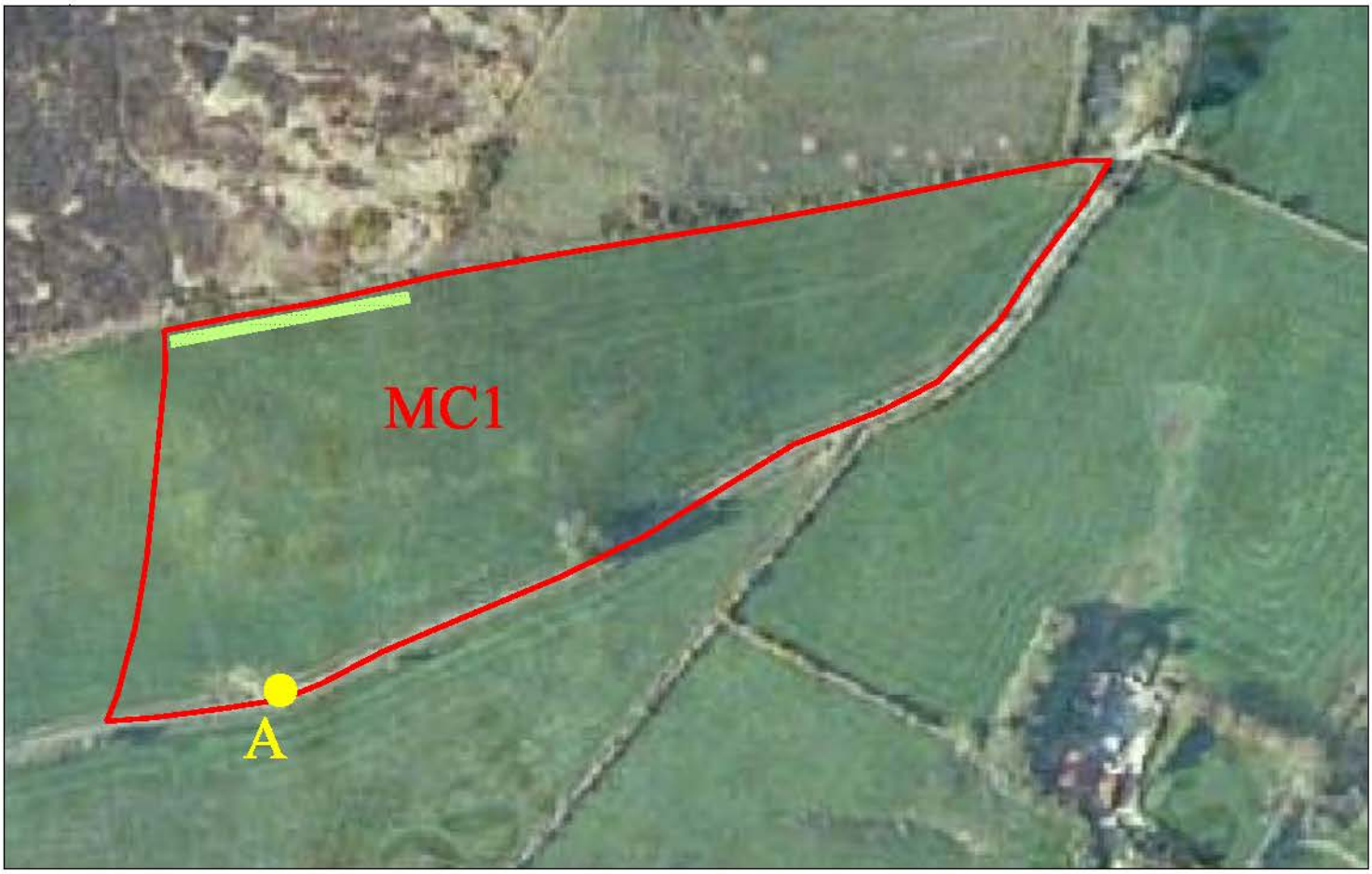
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field MC1

Photograph A looking north

Field ID: MC1



Field Description: Mix of agricultural grassland and wet grassland

Field Size: 3.5Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 88m of hedgerow

Restrictions:

- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

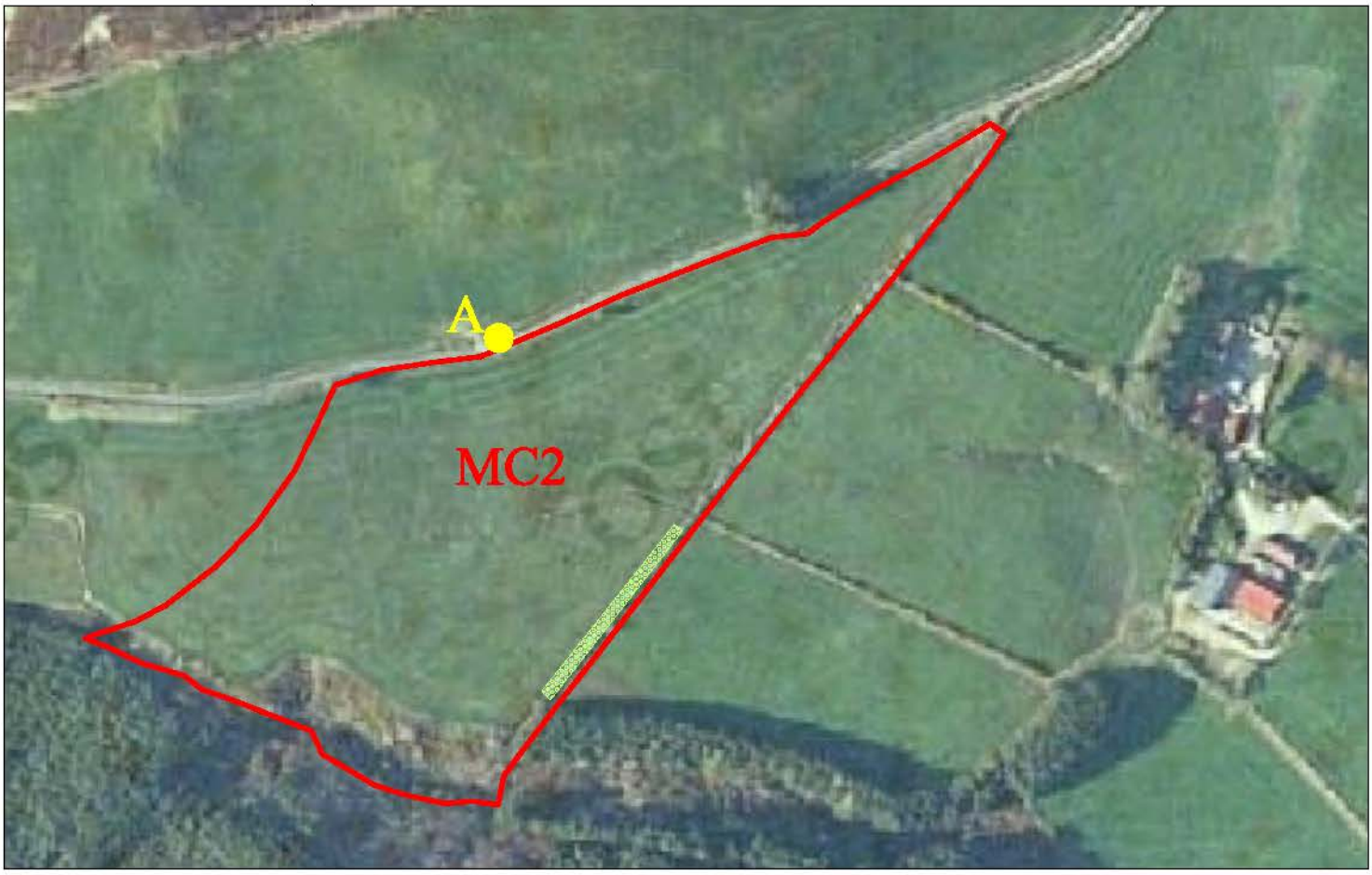
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field MC2

Photograph A looking southwest

Field ID: MC2



Field Description: Mix of agricultural grassland and wet grassland

Field Size: 3.5Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 88m of hedgerow

Restrictions:

- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

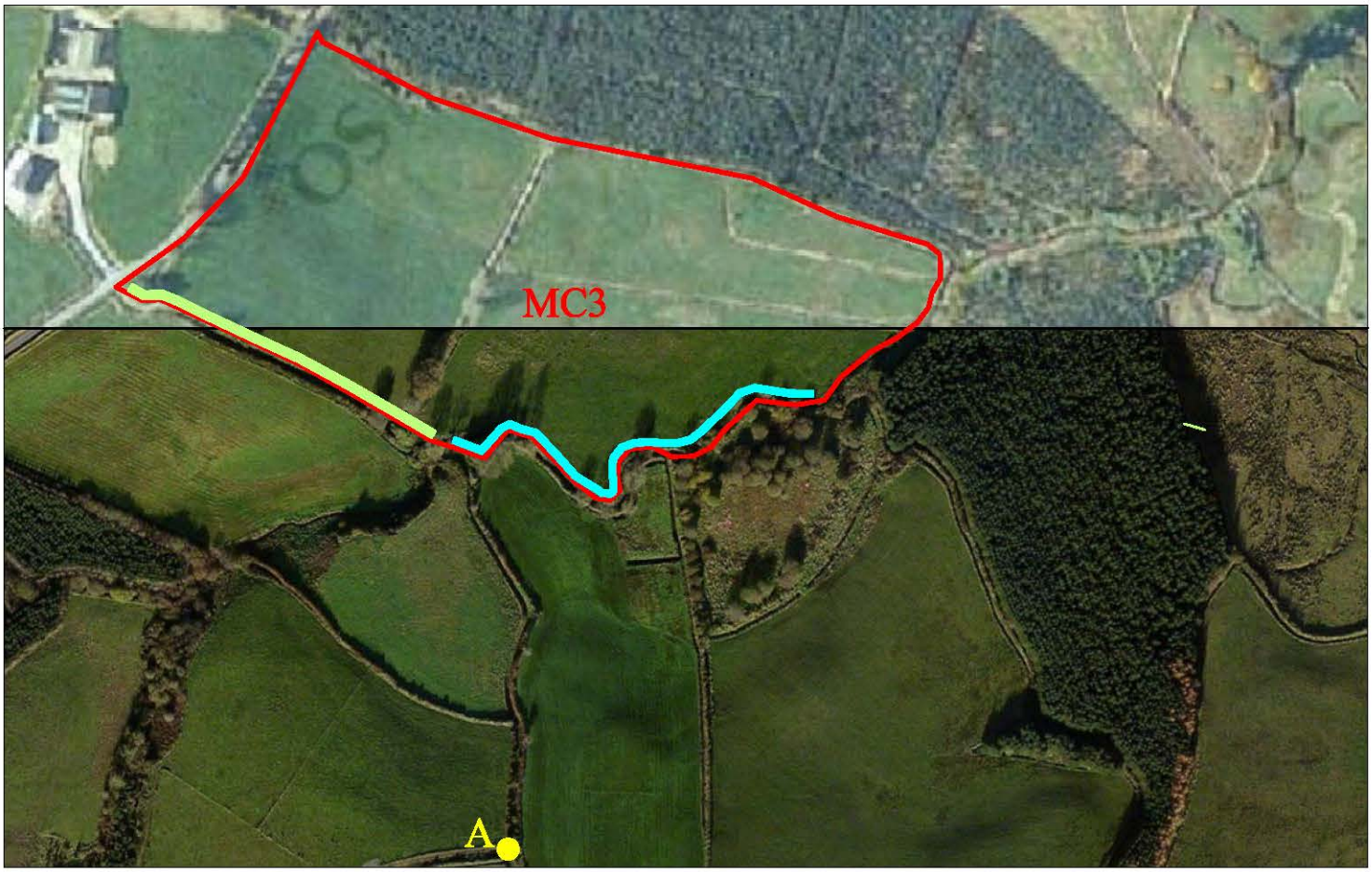
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field MC3

Photograph A looking northt

Field ID: MC3



Field Description: Mix of agricultural grassland and wet grassland

Field Size: 5.4Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Enhance riparian corridor: Plant native broadleaved species.
- Plant 180m of hedgerow

Restrictions:

- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

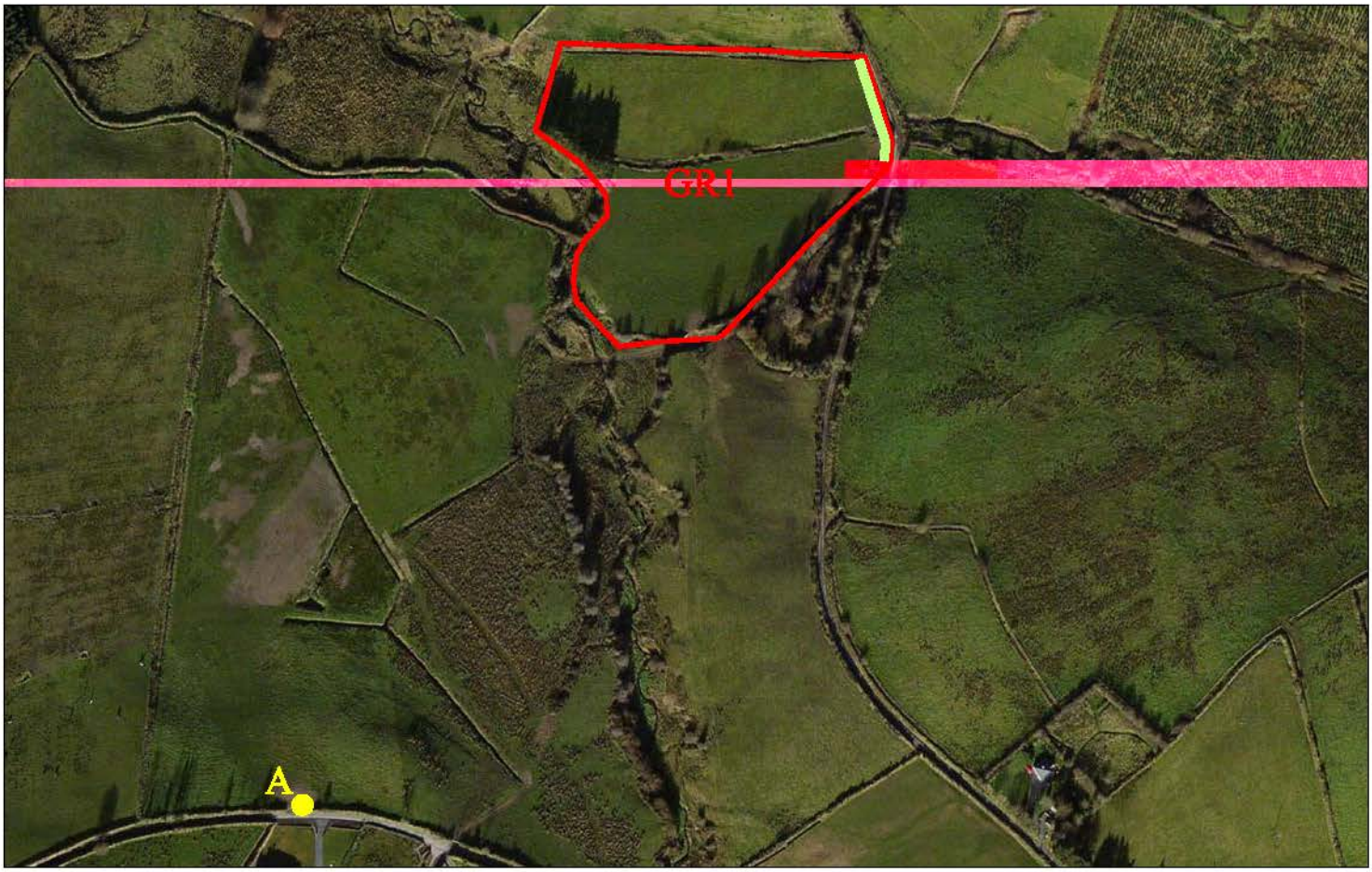
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photograph of Field GR1

Photograph A looking northeast

Field ID: GR1



Field Description: Agricultural grassland

Field Size: 2.4Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 60m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photograph of Field GR2

Photograph A looking northeast

Field ID: GR2

Field Description: Willow scrub and wet grassland

Field Size: 0.4Ha

Measures:
- Enhance with tree planting.

Restrictions:
- No spreading of fertiliser.
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows or trees.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

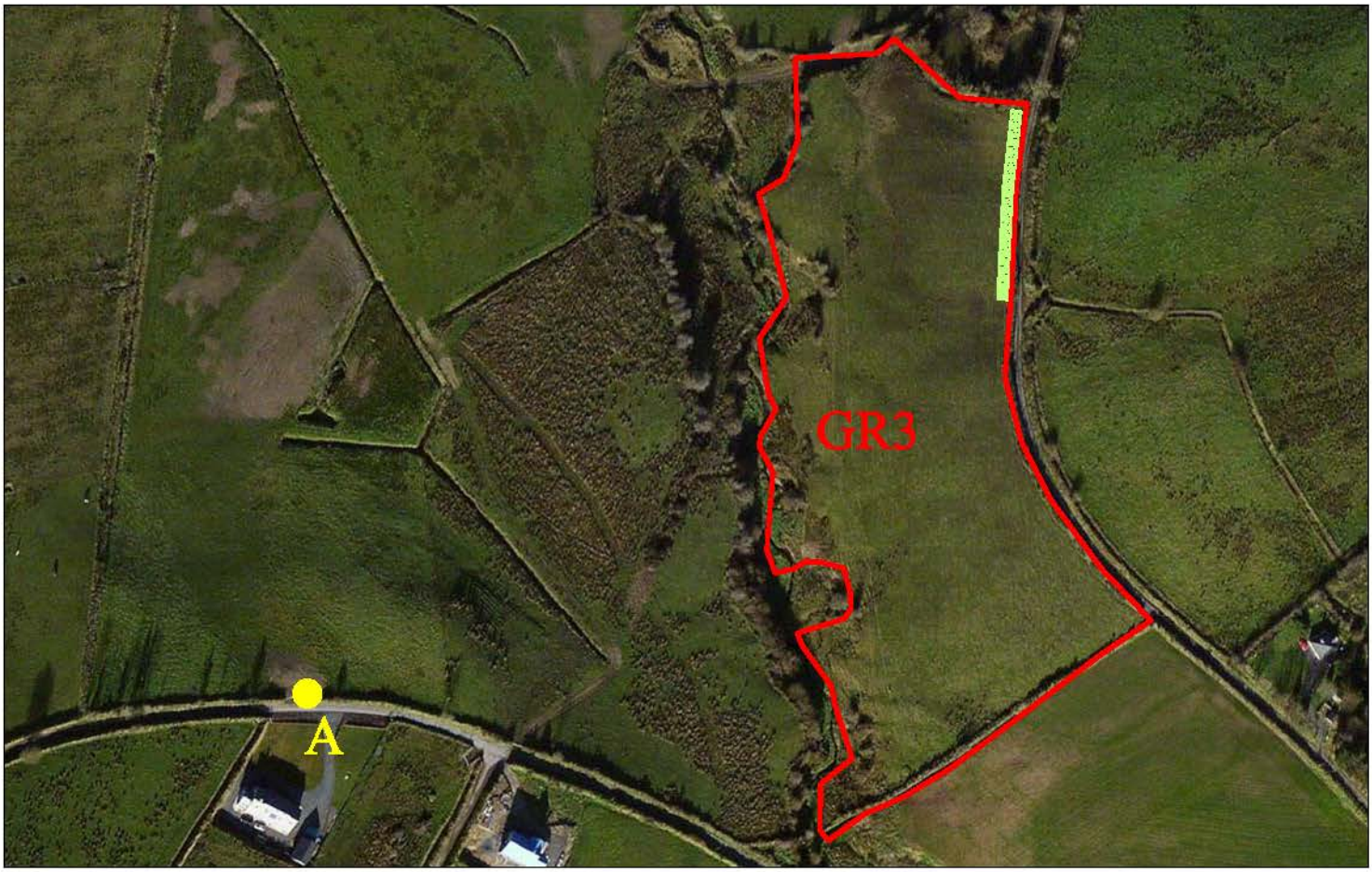
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photograph of Field GR3

Photograph A looking east-northeast

Field ID: GR3



Field Description: Mix of agricultural grassland and wet grassland with a riparian corridor

Field Size: 3.0 Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 75m of hedgerow.
- Enhance riparian corridor: Improve with woody scrub.

Restrictions:

- Limited spreading of fertiliser.
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

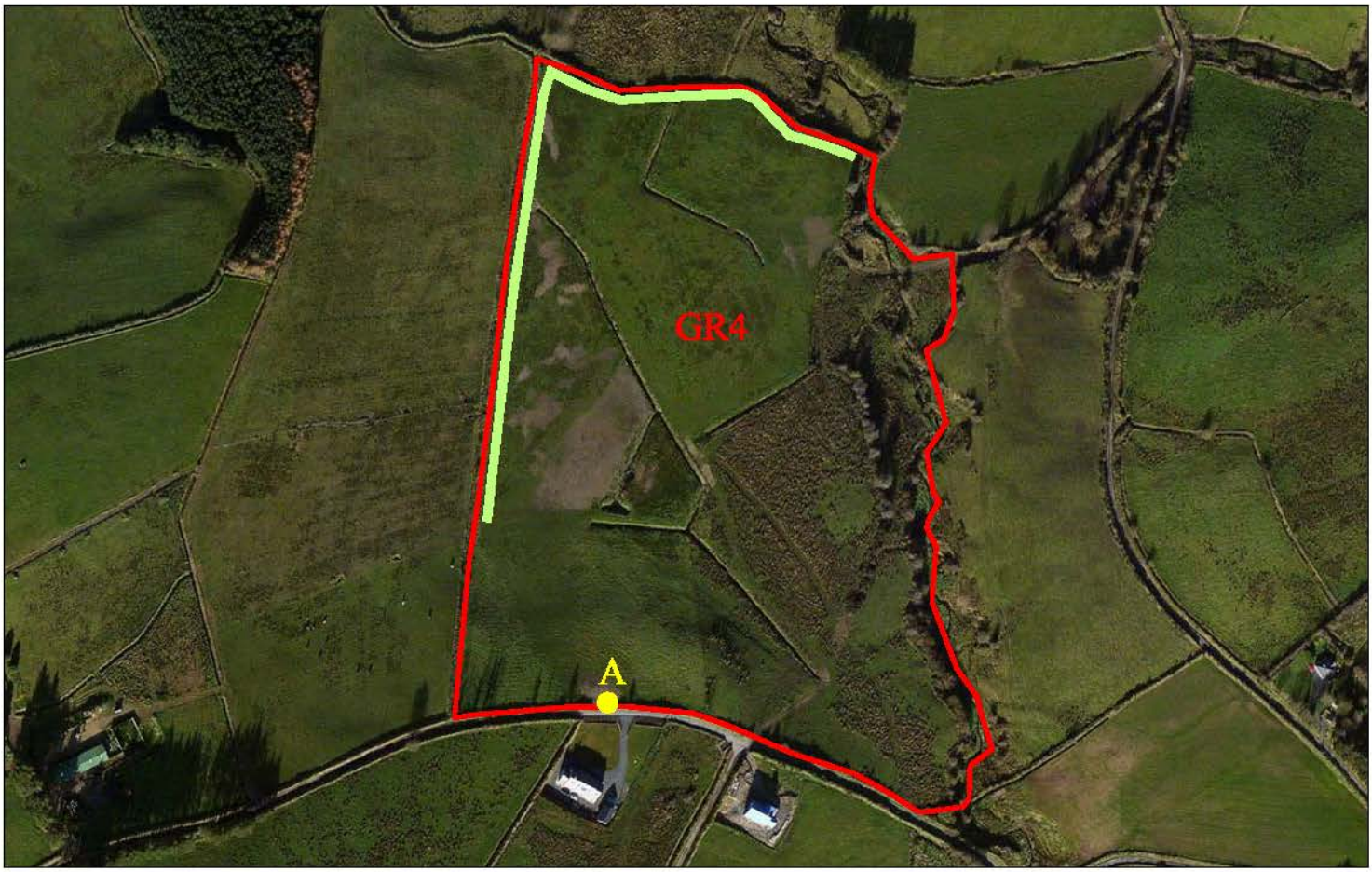
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photograph of Field GR4

Photograph A looking north

Field ID: GR4



Field Description: Mix of agricultural grassland and wet grassland with a riparian corridor

Field Size: 9.1Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 410m of hedgerow.
- Enhance riparian corridor: Improve with woody scrub.

Restrictions:

- Limited spreading of fertiliser.
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

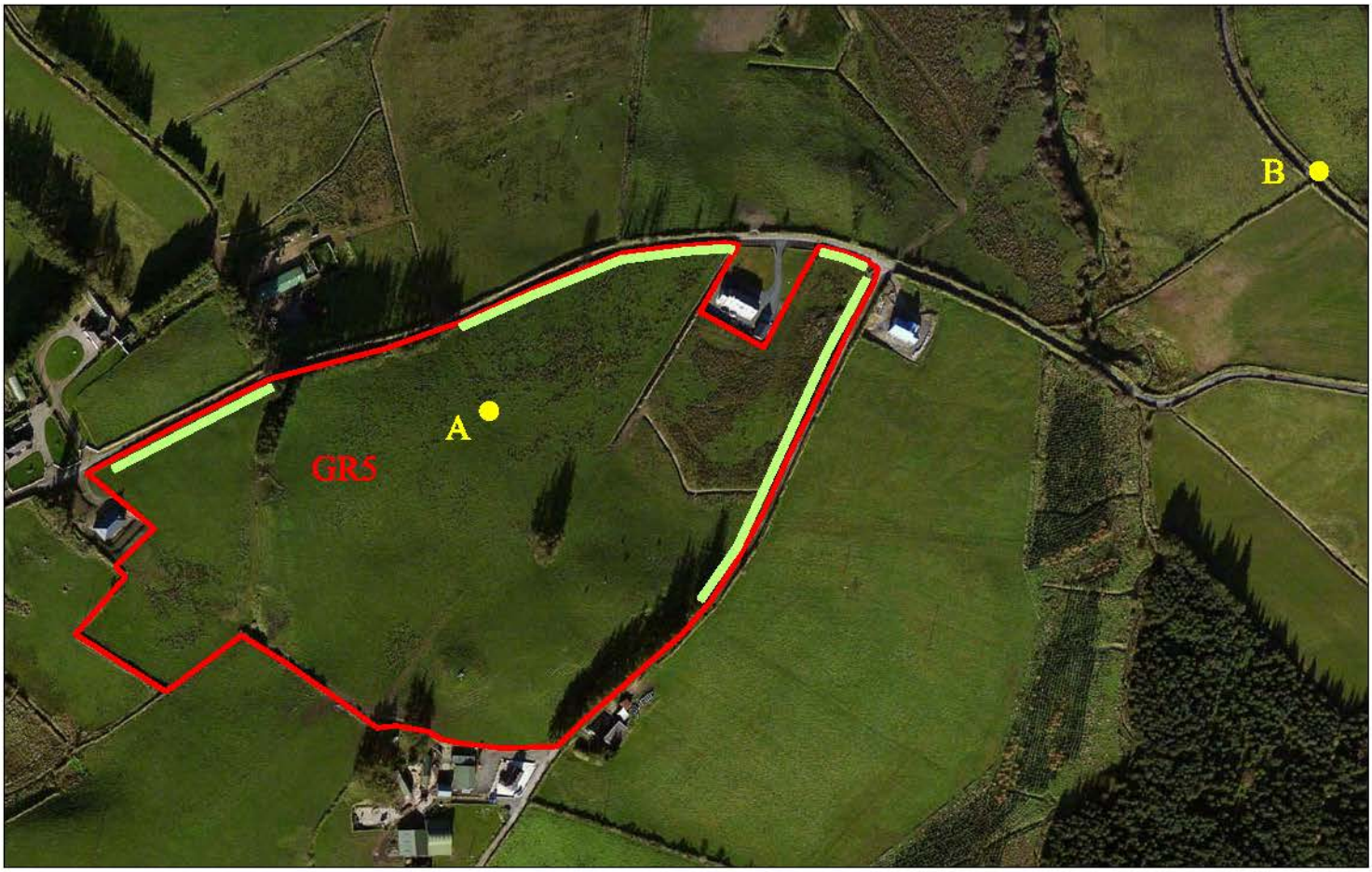
A Photograph Locations

Photographs of Field GR5

Photograph A looking southeast

Photograph B looking southwest

Field ID: GR5



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 9.4Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 540m of hedgerow.

Restrictions:

- Limited spreading of fertiliser.
- No spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field PQ1

Photograph A looking southeast

Field ID: PQ1

Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 2.1Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 53m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

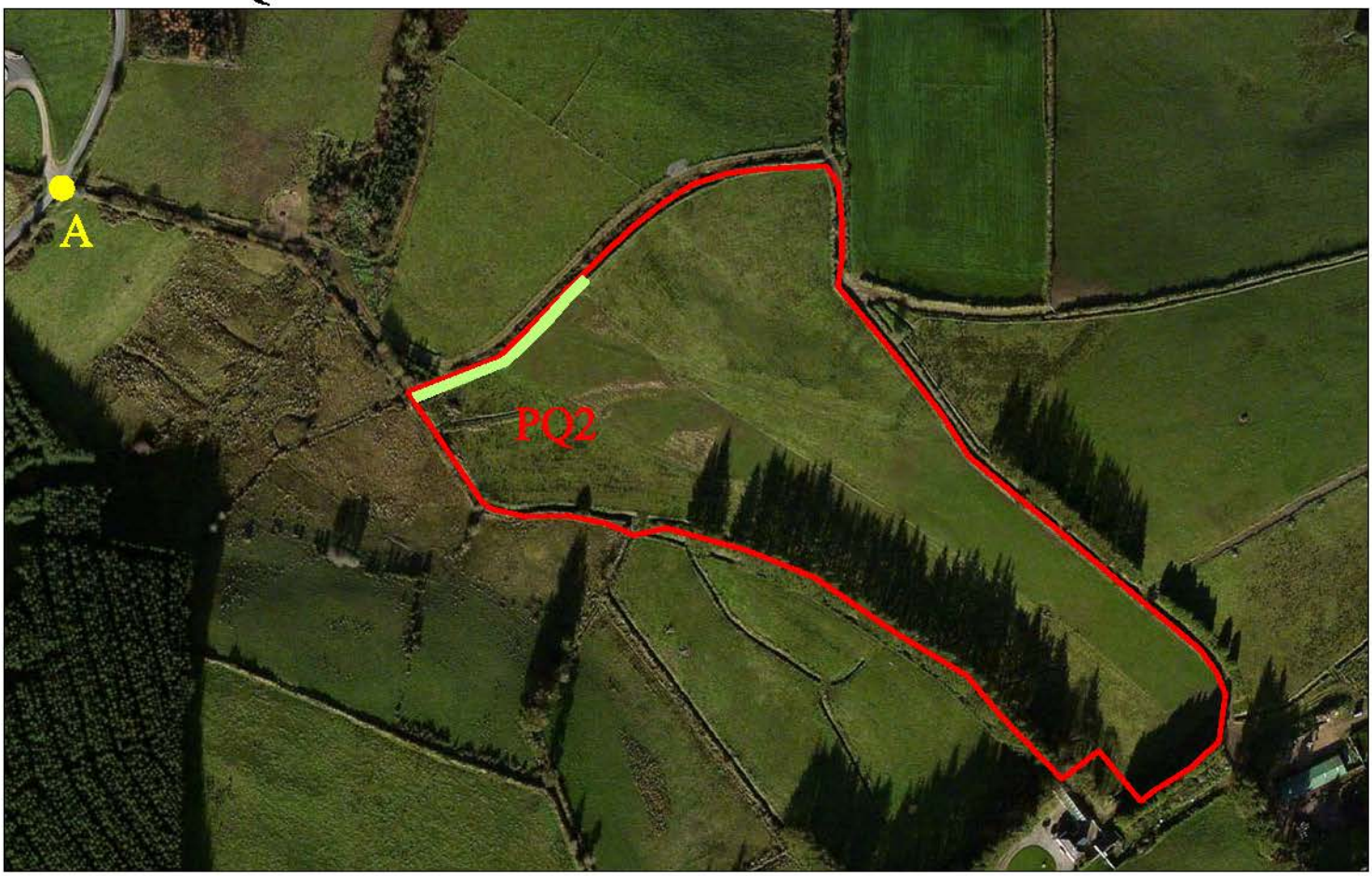
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field PQ2

Photograph A looking southeast

Field ID: PQ2



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 4.5Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3). Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 100m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

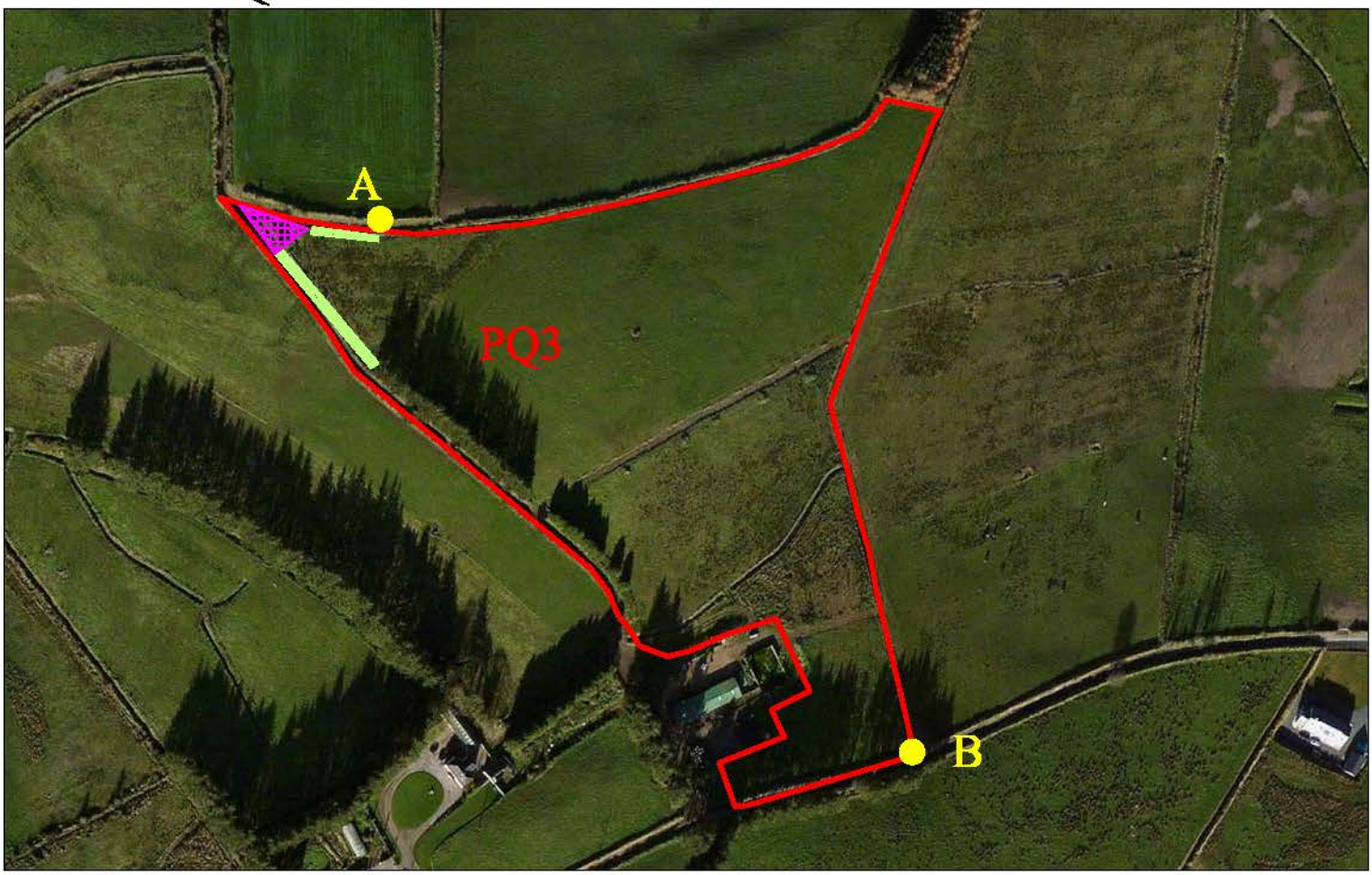
A Photograph Locations

Photographs of Field PQ3

Photograph A looking south-southeast

Photograph B looking northwest

Field ID: PQ3



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 4.7Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 100m of hedgerow
- Fence off enclosure (0.03Ha) improve with native broadleaved species.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

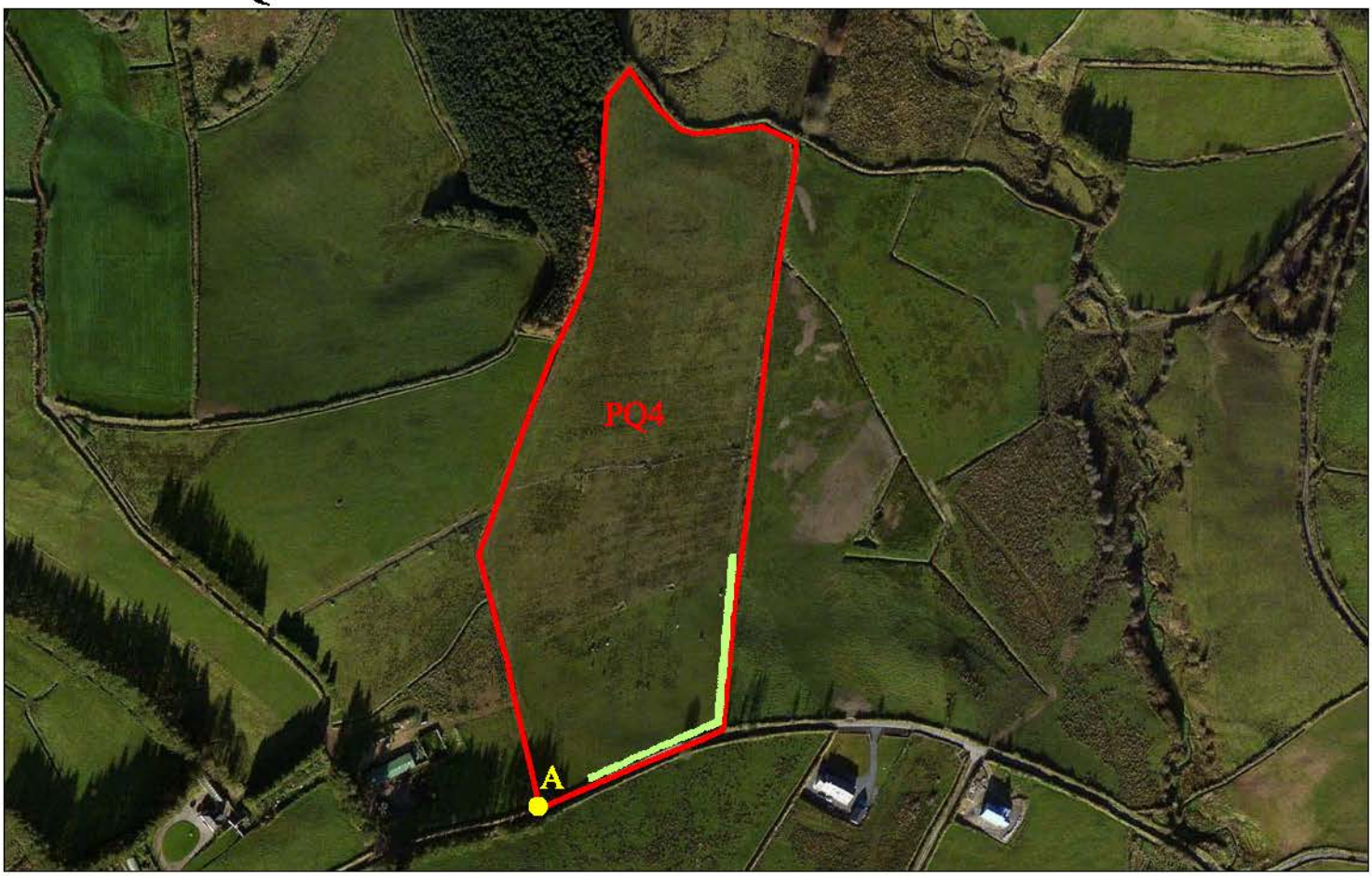
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field PQ4

Photograph A looking northeast

Field ID: PQ4



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 5.9Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 200m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

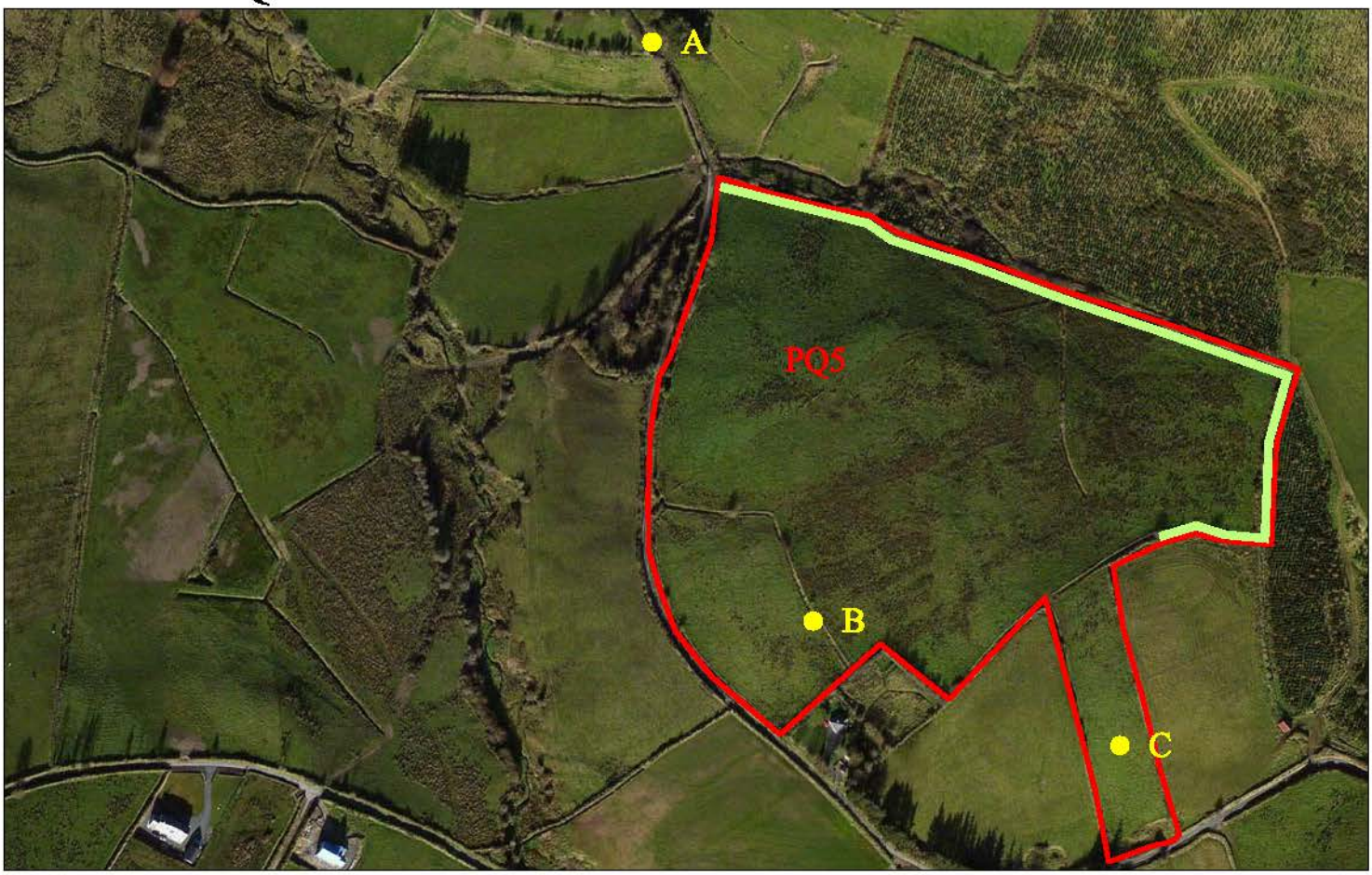
Photographs of Field PQ5

Photograph A looking southeast

Photograph B looking west

Photograph C looking north

Field ID: PQ5



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 9.8Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 560m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

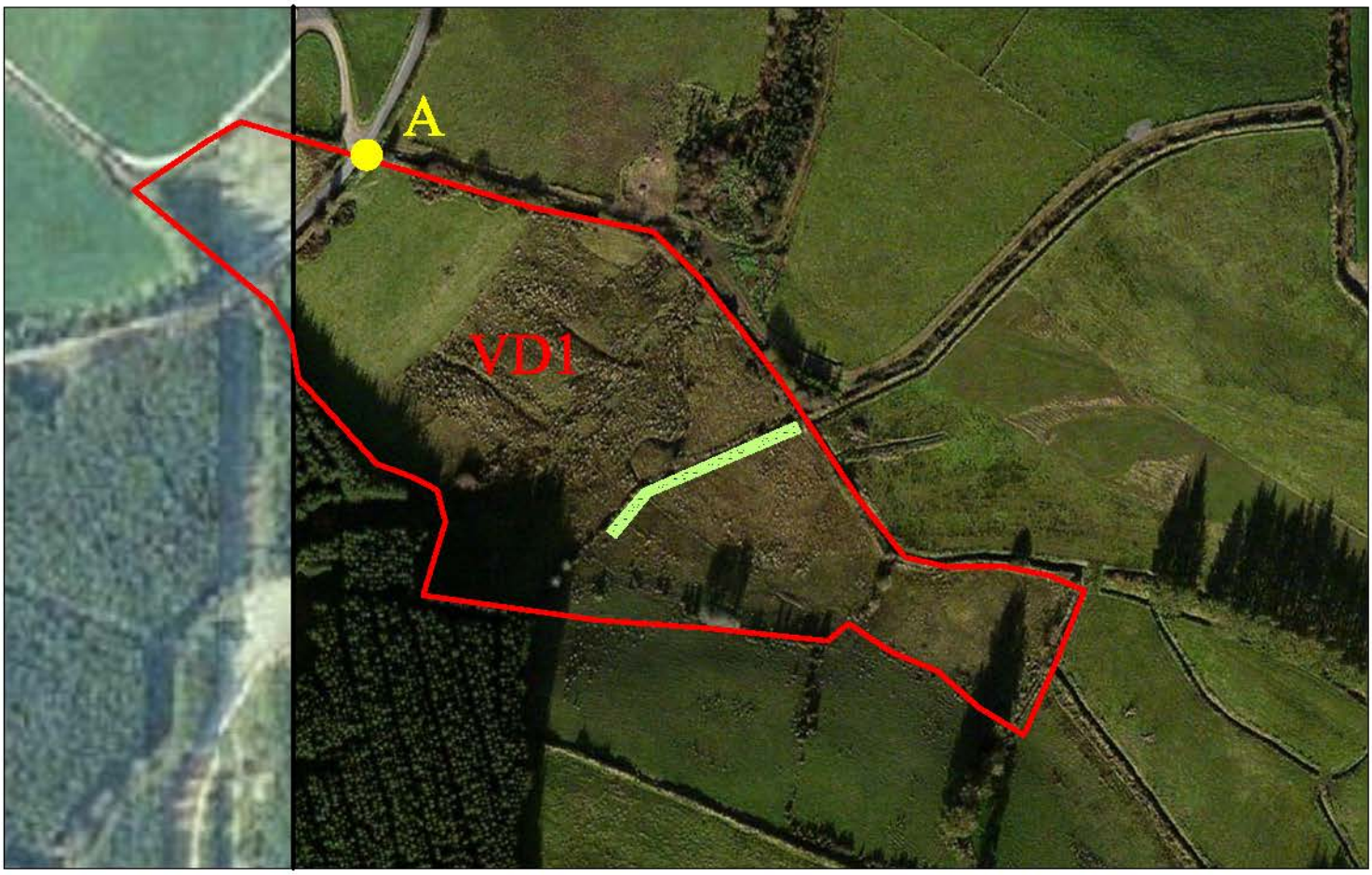
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field VD1

Photograph A looking southeast

Field ID: VD1



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 3.3Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 82m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

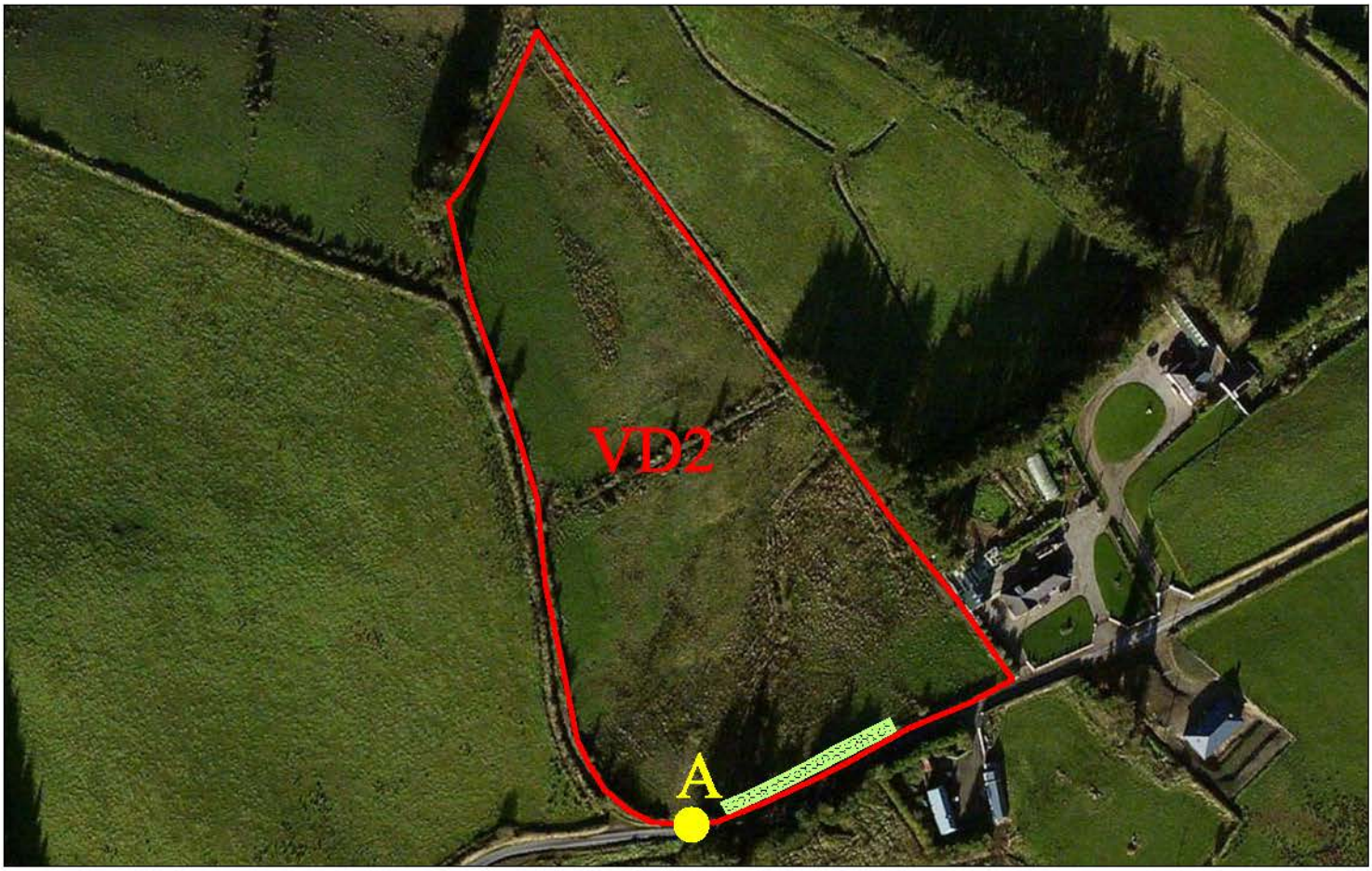
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field VD2

Photograph A looking north

Field ID: VD2



Field Description: Mix of agricultural grassland and wet grassland

Field Size: 2.4Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 63m of hedgerow

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

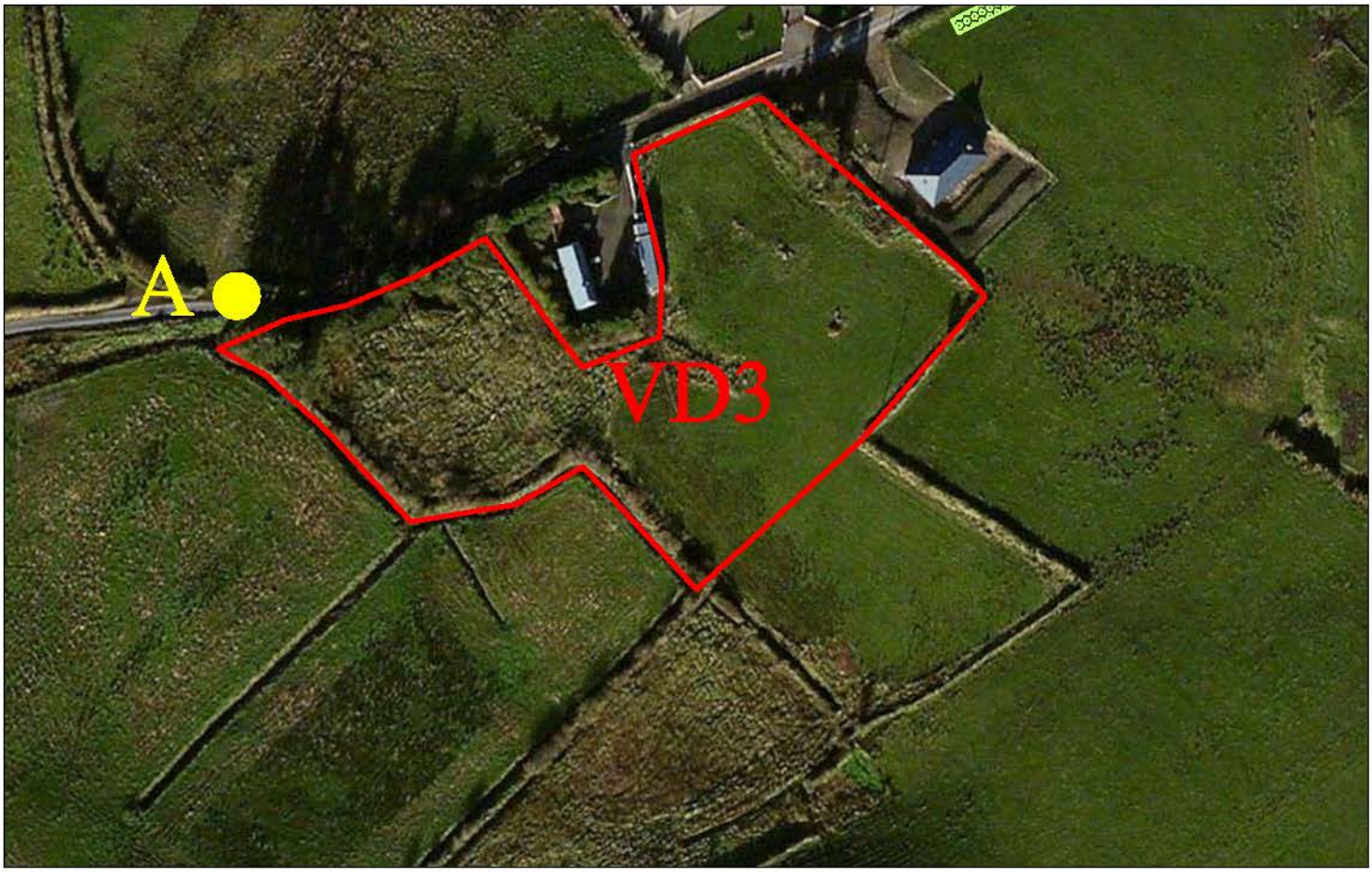
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field VD3

Photograph A looking southeast

Field ID: VD3



Field Description: Mix of agricultural grassland and wet grassland.

Field Size: 1.1Ha

Measures:

- Western half of the field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.

Restrictions:

- Limited spreading of fertiliser.
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

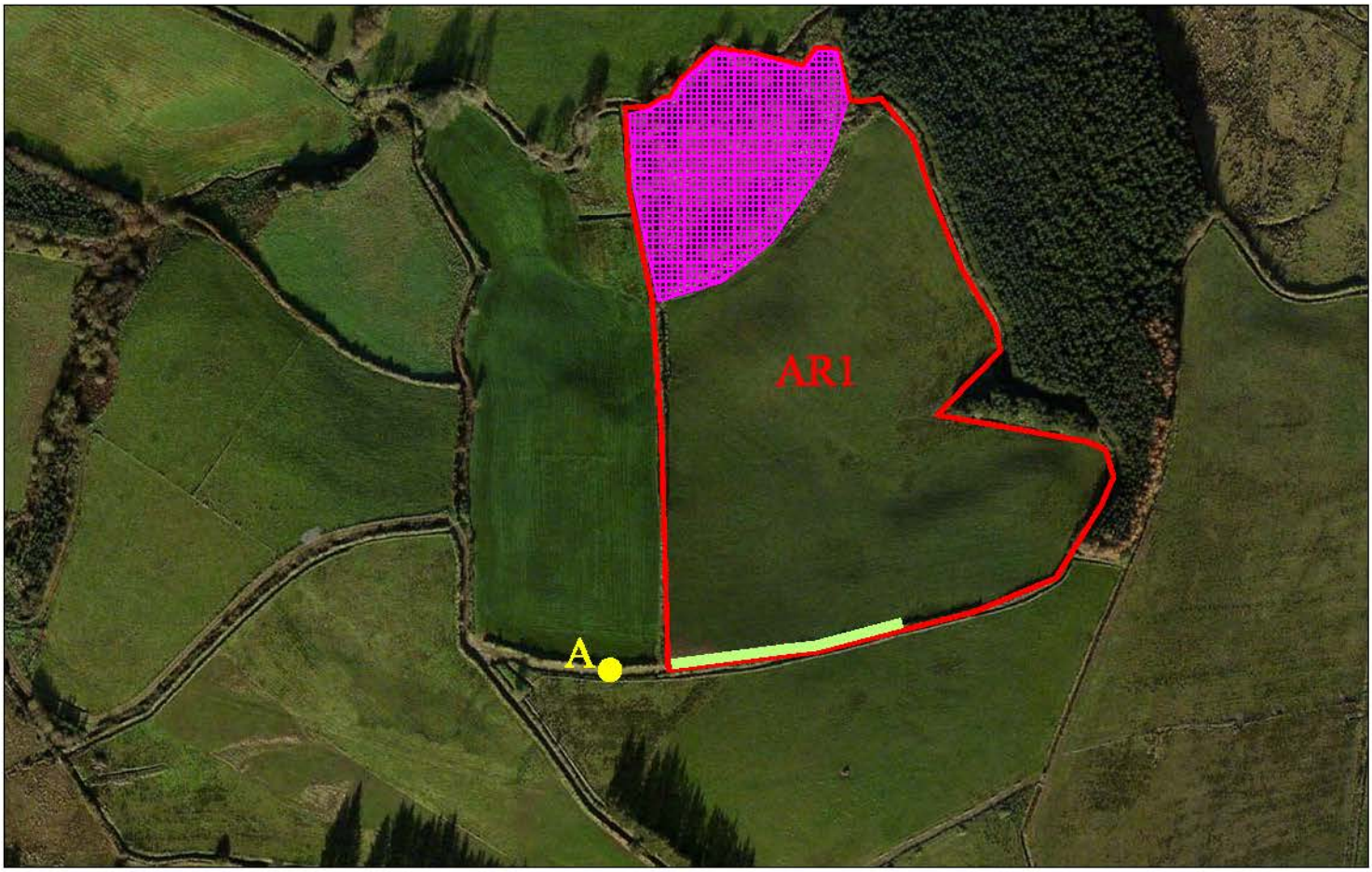
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field AR1

Photograph A looking northeast

Field ID: AR1



Field Description: Mix of agricultural grassland, wet grassland and enclosure with riparian corridor

Field Size: 5.0Ha

Measures:

- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 120m of hedgerow
- Fence off and maintain enclosure (0.93) and improve with native broadleaved species.

Restrictions:

- Limited speading of fertilizer
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

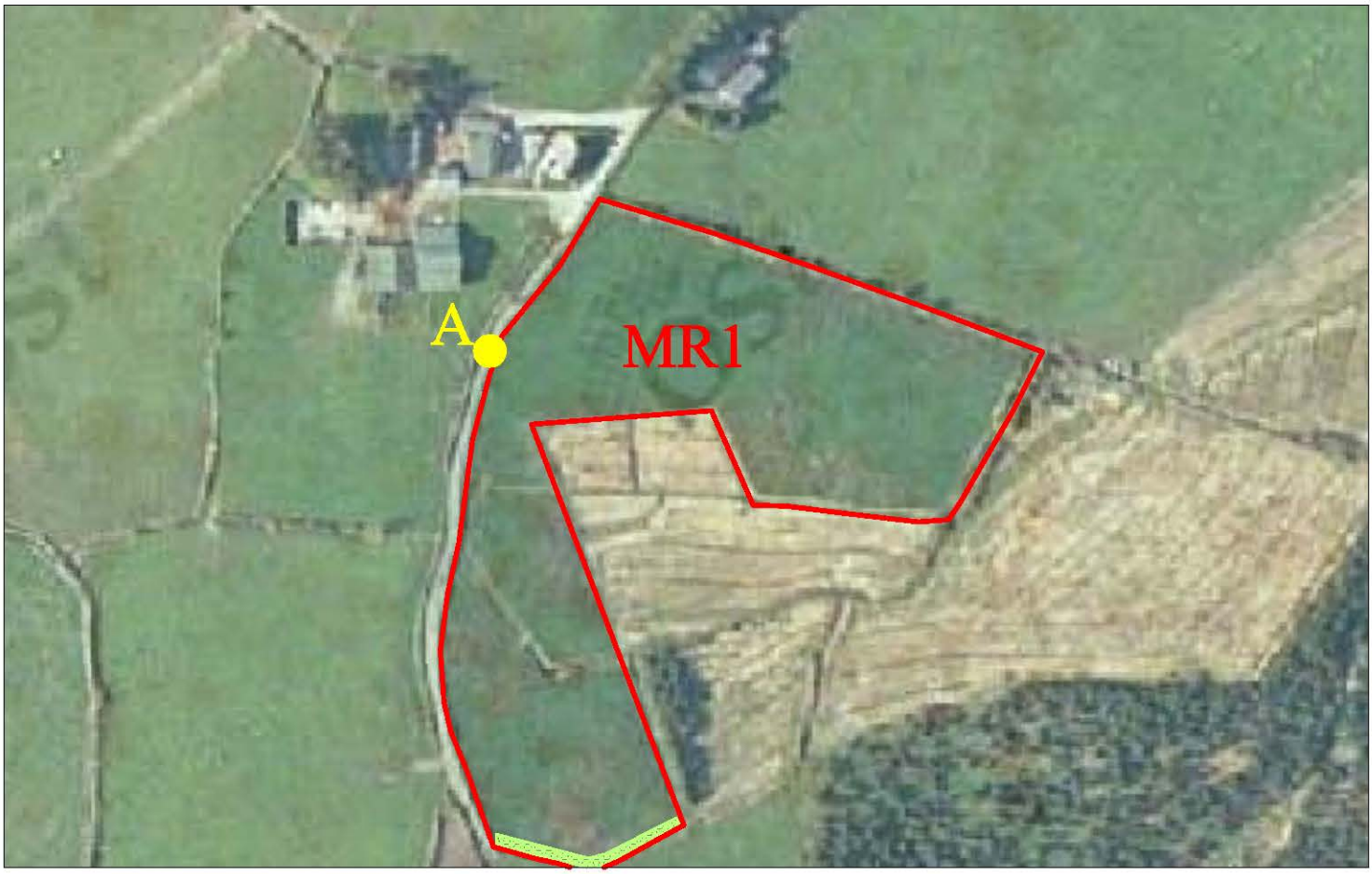
Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations

Photographs of Field MR1

Photograph A looking east

Field ID: MR1



Field Description: Mix of agricultural grassland and wet grassland

Field Size: 2.2Ha

Measures:

- Field will be allowed to revert back to wet grassland.
- Achieve 30 - 70% rush coverage.
- Rush coverage is controlled with cutting every second year.
- Rush coverage is controlled with grazing.
- Minimum stocking level of 0.6 LU/Ha and maximum stocking level of 1.6 LU/Ha (to be reviewed by project ecologist in year 3).
- Mark some lines of electric fence with plastic fliers so that they are more visible to the hen harrier.
- Plant 70m of hedgerow.

Restrictions:

- Limited speading of fertilizer
- Limited spreading of lime.
- No burning.
- No excavation of new drains or reclaiming heath or bog.
- No removal of hedgerows.
- No recreational off-roading with vehicles.
- No use of poisons or stupefying baits.
- No new forestry plantation.

Field Map Index:

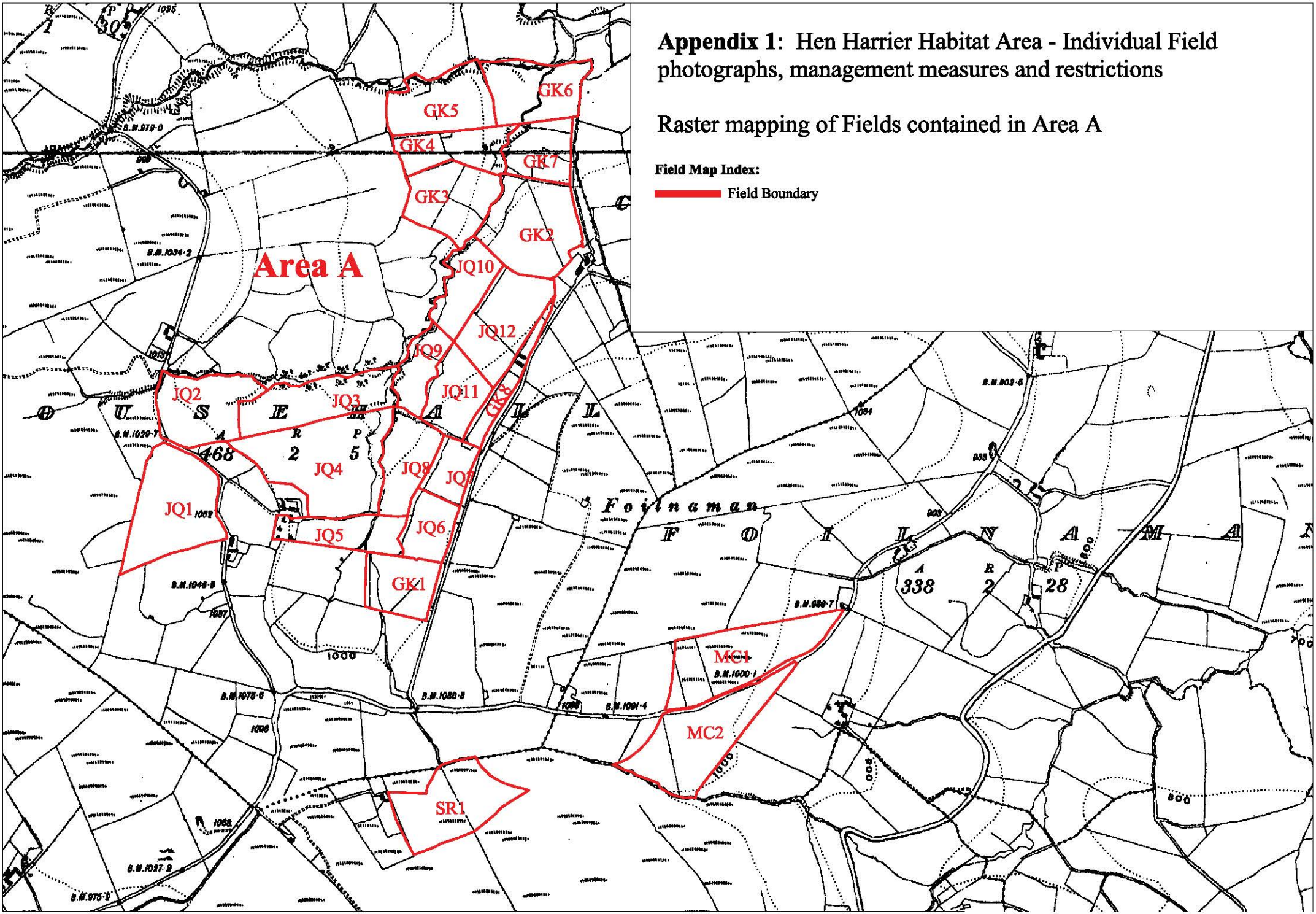
Field Boundary

New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

Areas to be planted with woody scrub such as Willow, Alder, Birch

Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

A Photograph Locations



Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

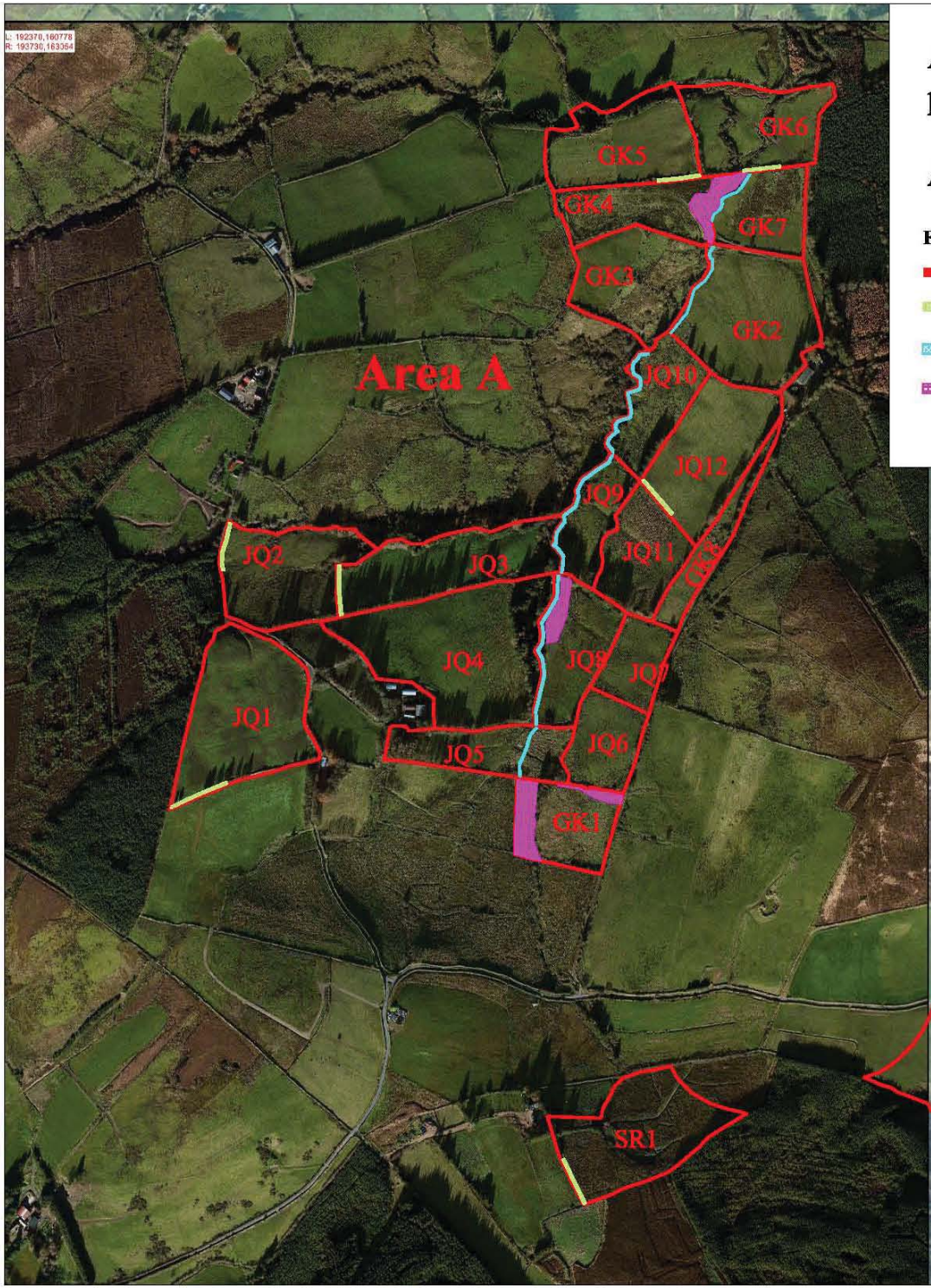
Raster mapping of Fields contained in Area A

Field Map Index:

Field Boundary

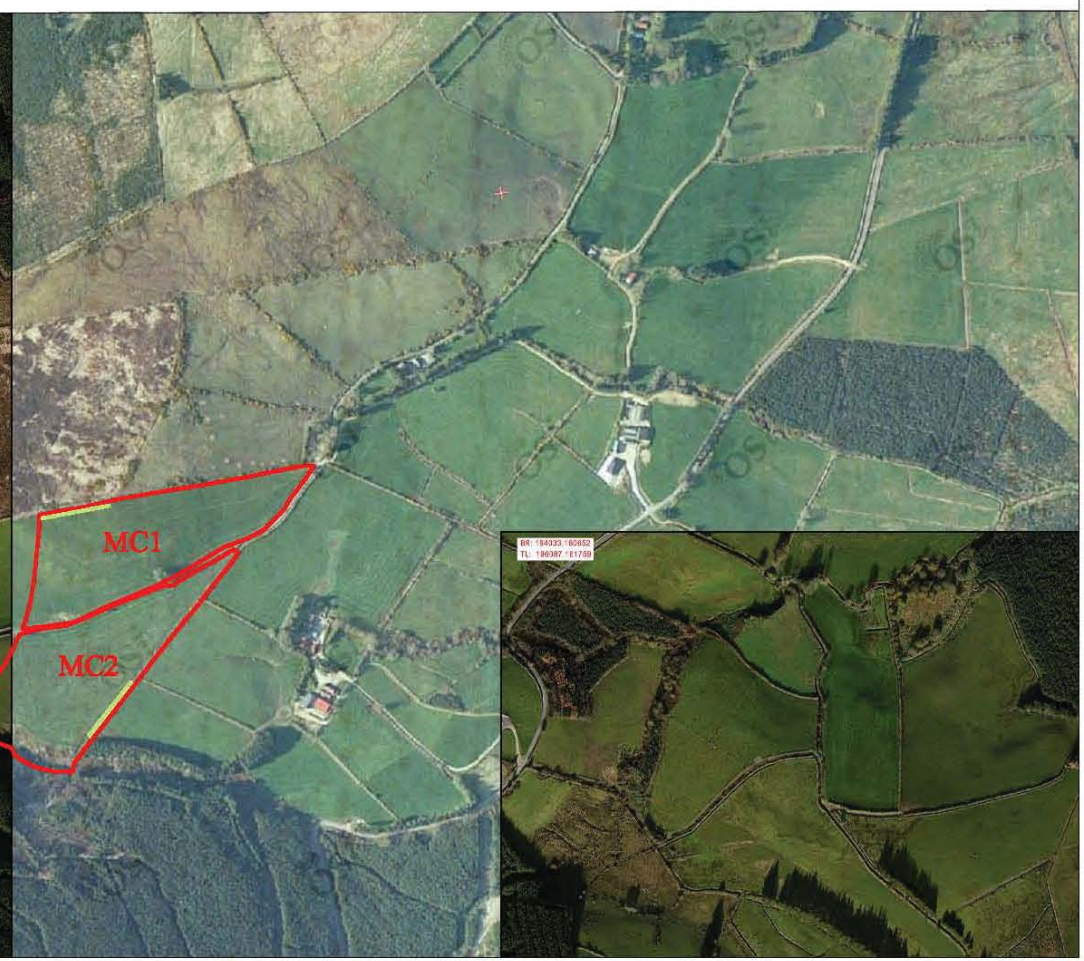
Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

Aerial View of Fields contained in Area A



Field Map Index:

- Field Boundary
- New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
- Areas to be planted with woody scrub such as Willow, Alder, Birch
- Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

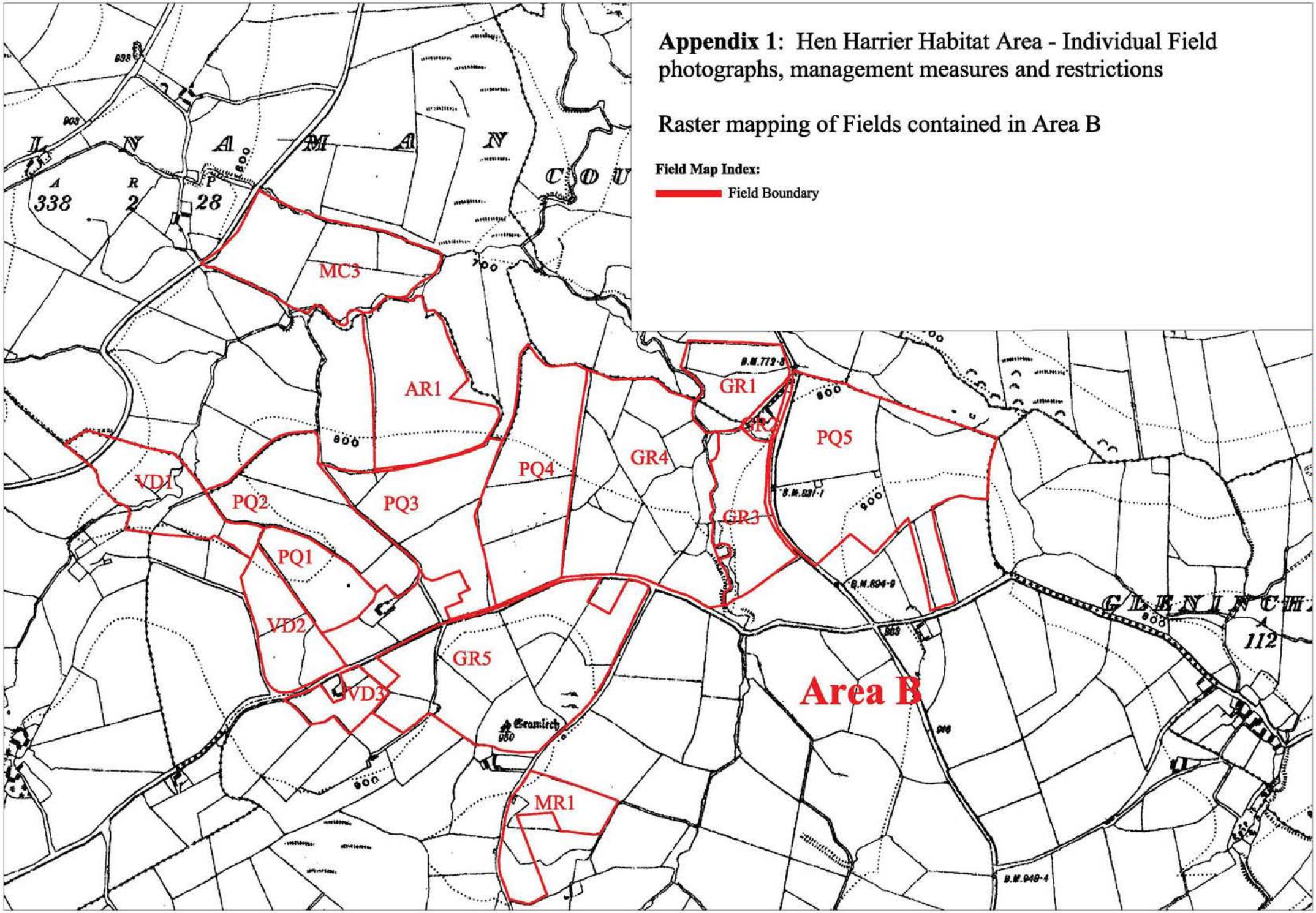


Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

Raster mapping of Fields contained in Area B

Field Map Index:

Field Boundary

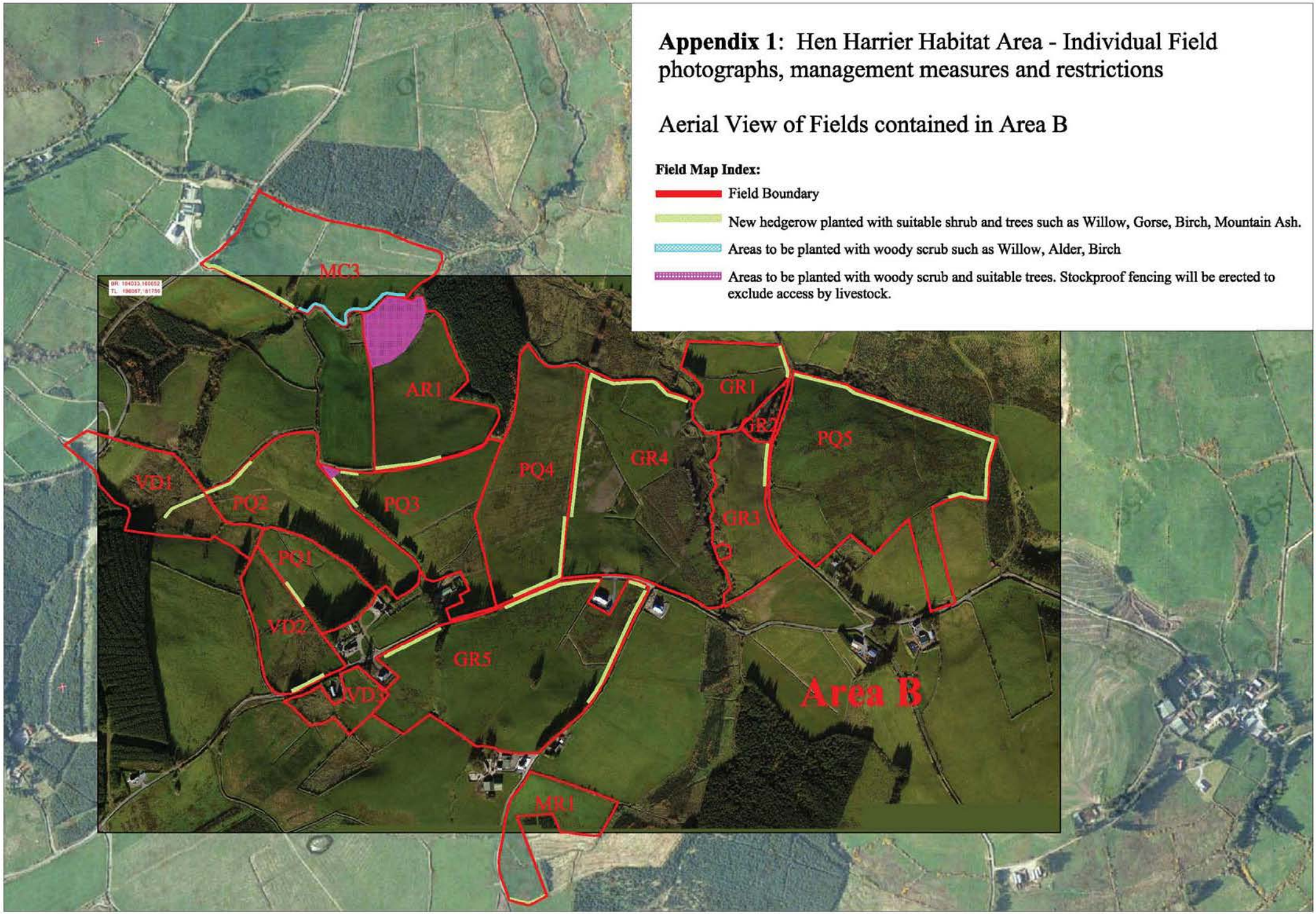


Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

Aerial View of Fields contained in Area B

Field Map Index:

- Field Boundary
- New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
- Areas to be planted with woody scrub such as Willow, Alder, Birch
- Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.



Appendix 2

National Parks and Wildlife Service Farm Plan Scheme

Part 1

NPWS FARM PLAN SCHEME FOR PRO-ACTIVE HEN HARRIER HABITAT MANAGEMENT

1. Biology and Ecology.

The Hen Harrier is a rare and threatened bird of prey, with a small breeding population (130-150 pairs). In Ireland, breeding habitat is found on low hills, particularly in the south and mid-west.

Hen Harriers nest on the ground in deep cover. Heather, scrub and early stages of new and replanted (second-rotation) conifer plantations are important nesting habitats. The breeding season is from mid-March to mid-August. The females lay a single clutch of 4-6 eggs and the number of young reared depends on habitat quality and availability of suitable prey. Birds generally move off the hills to lowland areas in winter, but many remain and occupy the same grounds they use for breeding, right throughout the year.

One of the major issues facing the Hen Harrier's future is habitat loss, and this is the reason why Hen Harriers are so rare in Ireland today. Hen Harriers require extensive areas of quality habitat to forage over, namely moorland, rough grassland, hill farmland, hedgerows, scrub and young conifer plantations. Forest plantations are useful while there is still open ground between the trees, but are of no use after canopy closure, and thus represent a loss of habitat from age 10-15 years onwards. Harriers depend on open areas, particularly farmed hill pastures. Without suitable grazing, vegetation becomes too rank for Hen Harriers to hunt over effectively.

2. Designation.

Since the Hen Harrier is listed on Annex 1 of the Birds Directive, Ireland is required to designate a suite of SPAs for its protection. In total six sites have been designated;

- Slieve Bloom Mountains SPA, Co's Laois & Offaly.
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Co's Cork, Kerry & Limerick.
- Mullaghanish to Musheramore Mountains SPA, Co. Cork.
- Slievefelim to Silvermines Mountains SPA, Co's Limerick & Tipperary.
- Slieve Beagh SPA, Co. Monaghan.
- Slieve Aughty Mountains SPA, Co's Clare & Galway.

The SPAs include conifer plantations, heath/ bog, scrub and rough grassland. Intensively managed agricultural land, houses and farm buildings have generally been excluded. Together the six sites total 169,000 hectares of land. Conifer plantation makes up 80,950 hectares (48%), rough grassland 39,630 hectares (23%) and heath/ bogs 47,760 hectares (28%). Certain SAC sites are included within the Hen Harrier SPA areas. In these cases the planner must refer to the conservation management plan and conservation objectives for the SAC and consult with the local Conservation Ranger.

2.1 Hen Harrier ARCS

NOTIFIABLE ACTIONS – ACTIVITIES REQUIRING CONSENT (OPERATIONS LIKELY TO ALTER, DAMAGE, DESTROY OR INTERFERE WITH THE INTEGRITY OF THE SITE).

- Burning areas of vegetation.
- Improving or reclaiming heath or bog.
- Removal of hedgerows.
- Organising, allowing or engaging in recreational activities involving off-road or racing vehicles, other than on a public road or by a landowner.
- Any other activity of which notice may be given by the Minister from time to time.

2.2 Hen Harrier conservation objectives.

- **Proposed Special Conservation Interest for Slieve Bloom Mountains SPA (4160)**
  Site is selected for: Hen Harrier
  Main conservation objective:
  To maintain the special conservation interest for this SPA at favourable conservation status: Hen Harrier.
- **Proposed Special Conservation Interest for Stacks to Mullaghereirk Mountains, West Limerick Hills and Mount Eagle SPA (4161)**
  Site is selected for: Hen Harrier
  Main conservation objective:
  To maintain the special conservation interest for this SPA at favourable conservation status: Hen Harrier.
- **Proposed Special Conservation Interest for Mullaghanish to Musheramore Mountains SPA (4162)**
  Site is selected for: Hen Harrier
  Main conservation objective:
  To maintain the special conservation interest for this SPA at favourable conservation status: Hen Harrier.
- **Proposed Special Conservation Interest for Slievefelim to Silvermines Mountains SPA (4165)**
  Site is selected for: Hen Harrier
  Main conservation objective:
  To maintain the special conservation interest for this SPA at favourable conservation status: Hen Harrier.
- **Proposed Special Conservation Interest for Slieve Beagh SPA (4167)**
  Site is selected for: Hen Harrier
  Main conservation objective**:**
  To maintain the special conservation interest for this SPA at favourable conservation status: Hen Harrier.
- **Proposed Special Conservation Interests for Slieve Aughty Mountains SPA (4168)**
  Site is selected for: Hen Harrier, Merlin
  Main conservation objective:
  To maintain the special conservation interests for this SPA at favourable conservation status: Hen Harrier; Merlin.

3. Management Prescriptions for Hen Harrier.

Hen Harrier SPAs include heath/ bog, rough grassland and conifer plantations and generally exclude areas of intensive farmland. The prescription involves maintaining or improving habitats to suit the Hen Harrier, delivering a required level of grazing, introduction or improvement of hedgerows, conifer, bracken and briar control, as well as ensuring rush or scrub do not grow to levels which are excessive or impenetrable for foraging harriers. It is important to understand beneficial and acceptable thresholds of scrub and rush. At either end of the spectrum, abandonment or intensification will reduce favourable hunting habitat for the Hen Harrier. It is also important to realise which ground is suitable for nesting and which is suitable for foraging.

The following prescription is a guidance document, which will be interpreted at farm level by NPWS approved farm planners and NPWS staff and will apply only to SPA lands that are currently suitable habitat (or will be maintained in a suitable condition) for Hen Harrier over the period of the plan. The intention is to ensure that extensive grazing continues and that appropriate management of grassland, scrub and bog creates a favourable habitat mosaic for Hen Harrier. It is important to appreciate that effective habitat management for Hen Harriers will benefit a wide range of other species. It is only by creating and maintaining habitat for prey species that populations of predatory species like the Hen Harriers can be protected.

The management prescription for the Hen Harrier has two objectives;

- **The provision of suitable nest sites.** Where known or suspected Hen Harrier nest sites occur on the farm the preservation of these sites takes precedence over other parts of the prescription. If there are no suitable nesting areas on the farm or within 1km of the farm then the provision of suitable nesting habitat is a priority for that farm.
- **Improving the value of the farm as a foraging area for Hen Harriers.** In general terms, anything that benefits potential prey species is of benefit to the Hen Harrier. Every plan must make provision for habitat enhancement. A key objective of the plan is to diversify the range and extent of habitats on the farm with a particular focus on habitats that support prey species e.g. scrub and habitats that facilitate foraging Hen Harriers, e.g. Rushy grassland.

It is imperative that important habitats present on entry into the scheme are retained over the period of the plan.

All a landowner's designated land must be entered into the scheme, with the option of up to 20% being managed as permanently improved grassland. Such permanently improved grasslands will not be eligible for payment in the scheme, as they are of limited use to Hen Harriers.

The small scale reseeding of fields of rough grassland (unless there are overriding conservation concerns by NPWS), is permitted where reseeding and reversion to rush pasture is a necessary part of the management dynamic in these areas. Any area to be reseeded can only be reseeded once over the five years of the plan.

The prescription (and payment) does not apply to;

- Commercial forestry.
- Commonages.
- Water bodies & Lakes.
- Areas of active turf cutting (within the last 5 years) or spread lands.
- Active quarries etc. A buffer ring around the foot of a wind turbine (250 metres radius). The increase in the buffer zone around wind turbines in respect of eligibility for payment shall apply to new plans approved after the approval of the terms and conditions document.
- Public roads and tarmac or concrete farm roads.
- Farmyards or dwelling houses.
- Recreational areas (e.g. clay-pigeon shooting, regular or intensive game shooting, car or ATV racing etc.)
- Intensively managed improved grassland. This includes wet grassland where silage is cut. Species rich Hay Meadows may be eligible for payment if no fertiliser is applied and cutting is delayed until July 15th.
- Payment on Bog/ Heath will be capped at 10 hectares. The requirement to manage bog or heath plots in an appropriate manner will however apply to all of the bog or heath on target area plots on the farm.
- Any other ground not deemed suitable by habitat or existing activities.

4. Required Management in different Habitat Types.

4.1 Grassland.

- **Improved grassland** is not eligible for payment under the scheme. Likewise wet grassland which is cut annually for silage is ineligible for payment. In general existing practices can continue on improved grassland. The plan must incorporate a planned stocking rate and a nutrient management plan for improved grassland plots. Any areas of existing improved grassland within the SPA can be retained on the farm. In addition the farmer is permitted to improve wet grassland plots to bring the area of improved grassland up to 20% of the designated area on the farm. If the farmer takes up this option it must be included in the plan. No payment will be made on plots planned for improvement.

  Where it is proposed to allow improved grassland to revert to a more natural state, a reversion program is required. This will involve;

  - Analysis of soil samples so that a baseline record of soil P & K exists.
  - Cease applying chemical and organic fertilisers.
  - No application of lime.
  - Habitat enhancement works. In most cases this will be satisfied by extra hedgerow planting. If there is already 400 metres of hedgerow per hectare on or adjoining the land planned for reversion then no further planting is required. If the amount of Hedgerow is less than 400 metres per hectare, the applicant will be required to plant sufficient hedgerow to bring the length of hedgerow up to 400 metres per hectare, subject to a maximum planting requirement of 50 metres per hectare. All hedgerow planting must be completed in year 1 of the plan – *see specifications for New Hedgerow Planting and Establishment* in

Part 3 of this Appendix. In most cases the new hedgerow should be located on or adjacent to the plots planned for reversion. If this is not possible they can be planted on other designated plots. A full explanation for this course of action must be given in the plan.

— If planting of new hedgerows is not feasible, alternative habitat enhancement works may be considered. Any such proposals must be agreed with NPWS before an application is submitted.

- **Wet grassland** is eligible for payment**. The objective is** to have rough grassland as rank as possible while not overgrown with dead grasses/ rushes. To achieve this, management must focus on three principal points;

— **Appropriate grazing pressure.** Grazing of areas of wet/ rough grassland by cattle or horses/ ponies or by mixed grazing is essential. Grazing by sheep can continue where this has been the traditional practice. Introduce light grazing, rather than cutting or topping, to areas with no stock. Guideline target stocking level on rough grazing is a minimum of 0.6 LU/ hectare. There is no formal upper limit to planned stocking density but it must not be at a level that would constitute management as improved grassland. Any deviation below the 0.6 LU/ hectare planned stocking rate for grasslands must be fully explained in the plan. In cases where the land is wet, consideration should be given to concentrating grazing pressure in the summer months.

The planners will decide the appropriate stocking for each farm, relating the stocking level requirement to the condition of the site. The planners will also consider the effects on the value of the farm for Hen Harriers by the current stocking density/ grazing regime and to maintain, decrease or increase this rate as is deemed necessary. Where the current stocking density is too high, stock may have to be sold or extra non-designated lands leased. Where stocking density is too low, new stock may have to be bought in for all or part of the year. How changes in stocking densities are to be achieved should be clearly described in paragraph 4.1 of the plan. A date must be given by which time such changes will have been achieved.

— **Rush management.** The objective is to maintain rough grassland in the optimal condition for Hen Harrier. Optimal condition constitutes as dense a covering of rushes as feasible, but not to the point where rushes are falling over, or matting the ground. Rush cover in the 30 – 70% range is ideal. While appropriate grazing pressure is essential, in most cases managing rush cover will require some degree of active management. In the majority of cases rush management will be achieved by cutting every second year. However there will be considerable variation from site to site and alternative cutting regimes may be more appropriate in certain cases. Table A below defines the most common situations encountered and the most appropriate management rush management regimes.
At the outset of the plan, the planner should specify what management regime is to be applied to achieve and maintain optimal rush cover.

The plan should also explain why the proposed course of action has been selected.

Advice on appropriate rush management is given in the *Rush* Management Table below. In general, rushes should be cut on a 2 year cycle unless there are specific reasons for a longer cycle, e.g. weak rush growth. In most cases, active rush management should commence in year 1 of the plan and should only be delayed until year 2 or 3 where improved grassland is in reversion, where rush growth is very weak or where the rushes were cut or treated with herbicide in the year prior to joining the scheme. On farms with a large area of rushy grassland (> 10 hectares) it is permitted to delay active rush management on a portion of the area until year 2. The area where active rush management is to be delayed for this reason should not normally exceed 50% of the wet grassland component of the farm. The plots selected for a delayed commencement of active rush management should if possible be in classes II or III as described below.

The use of a herbicide applied using a weed lick is permitted but not encouraged. This should only be considered in cases where rush growth is very dense and cutting is impractical. In certain situation where difficulty of access prevents the use of mowing equipment the use of a weed lick mounted on a quad bike may be considered. The application of herbicides for the management of rushes should normally be restricted to years 1 or 2 of the plan. In no circumstances should a weed lick be used more than once on the same plot over the course of the plan.

If a planner feels that the most appropriate management regime differs from that given in these guidelines they should give a full explanation for their planned course of action. The location of a station in the area involved may be beneficial. The planned rush management should be reviewed on an annual basis to determine if it is having the desired effect. If difficulty of access prevents the active management of rushes this should be fully explained in the farm plan and any possible alternatives described.

Planners are reminded that if during an annual inspection they assess that rush recovery has been stronger or weaker than had been originally anticipated then they should update the plan to change the cutting sequence for future years.

Table A

Code	**Rush Management Table**
I	Habitats where rush cover of 30-70% is considered unlikely to be achievable, irrespective of management and perhaps in some cases undesirable, e.g. Shallow Limestone soils. No cutting required.
II	Swards where reversion of Improved Grassland is planned or where Rush cover is less than 10%. One or two cycles of cutting commencing in year 3 may be appropriate may be appropriate to allow further rush development in the early years of the plan.
III	Swards where rush cover is 10-30 % or where rushes have been topped in the past year. One or two cycles of cutting commencing in year 3 may be appropriate.
IV	Swards where the rush cover is already in the 30-70% range. In these cases cutting / topping in years 1, 3 & 5 could maintain the sward in the desired state.
V	Swards where rush cover is dominant (>70%) and where weed-licking with a suitable herbicide in year 1 followed by cutting/ topping in years 3 & 5 could be considered. In most of these cases there would be no recent history of rush control management. Weed licking with a suitable herbicide may give the applicant the chance to create a suitable sward within 2 or 3 years. The use of herbicides must always be subject to consideration of the possible effects on Watercourses. No herbicide use is permitted within 5 metres of a watercourse or existing hedgerow without the consent of the NPWS. A greater distance may be required in sites which are also designated as an SAC.

The actions suggested above are for example only, and do not constitute set prescriptions. The planners will have to use their own judgement in drawing up a rush management plan. However if the planners intend to deviate from the guidelines given above a full explanation for their chosen course of action is required. This should be given on the relevant Implementation Page of the plan. The ultimate goal is to achieve a covering of 30-70% rushes.

- **Nutrient management.** In most cases the application of chemical or organic fertiliser should be avoided. Where this has been traditionally carried out it may continue – *see Appendix 5 Soil Analysis, Lime and Plant Nutrient Applications.*

- **Other grasslands.** The management of other grassland types, e.g. long established hay meadows or upland grassland should be based on the following;
  - Maintain traditional grazing patterns.
  - Control Bracken if necessary (by weed licking, spot spraying, cutting, rolling or controlled trampling with stock. Mechanical control or trampling is most effective in May/ early June. Mechanical control will need to be repeated several times during this period to have a beneficial impact.
  - Cut species rich meadows after July 15th, preferably later.
  - Do not plough, cultivate, drain or otherwise reclaim.
  - Do not plant conifers.
  - Do not plant trees unless such action is provided for in the plan.

— Do not apply lime.
— Do not fertilise above the stipulated levels.
— Do not fertilise on slopes greater than 25°.
— Do not exceed the recommended stocking limits.
— Do not provide supplementary feed stock on the grassland except where this has been traditionally practised.
— Do not dump waste material.

- **Mosaic of wet grassland and heath.**

  There are many cases where the vegetation in a plot is best described as a mosaic of wet grassland and heath. Such plots may have a high cover of rushes along with heather species, Purple Moor Grass (*Molinia caerula*) and occasionally Bog Myrtle (*Myrica gale*). These are amongst the most important hunting habitats, as they are home to the Meadow Pipit (*Anthus pratensis*), the main prey item of Hen Harriers. Where cover is deep enough, e.g. ≥40 cm, they can also make attractive nesting or roosting sites. In many cases these plots will be very wet and difficult to access with machinery. Management should focus primarily on maintaining grazing at a sustainable level and the establishment of small patches of scrub. Appropriate grazing levels will vary from site to site but should be between 0.25 LU/ hectare and 0.6 LU/ hectare. Cutting of Rushes should be considered where it is feasible but the use of herbicides other than as a spot treatment for difficult weeds should not be carried out.

- **Requirement for habitat enhancement in certain large grassland plots.**

  In large grassland plots there is a risk that lack of cover may be a limiting factor on the value of the site for potential prey species. The same issue applies in plots with little or no hedgerows. To address this, additional measures to diversify the habitat are required. These apply in all designated SPA grassland plots where payment is being claimed. They are not required in areas designated as part of an SAC.

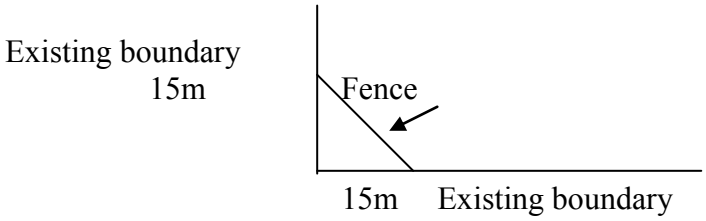
  Grassland fields over 2 hectares in size or with less than 100 metres of hedgerow per hectare.

  In fields of this type the plan must incorporate the establishment of scrub in field corners or the planting of 25 metres of hedgerow per hectare. The planting of Hedgerows must be in accordance with the Specifications for Hedgerow Planting and Establishment *(See- Appendix 6*). Planting must be completed in year 1 and established by the end of year 4. If the field corners option is chosen then stock must be excluded from at least 2 field corners. A permanent fence is required for this purpose. The fence is to be set back at least 15 metres from the corners - *see Figure 1* below. At least 10 native trees must be planted in the field corner; the trees must be staked and protected with a tree guard. The choice of species is to be based on those native species known to do well on similar sites in the area. Willows are very useful for supporting Hen Harrier prey and increasing hunting potential, and grow well in most cases. Native tree species such as Oak (*Quercus robur & Q petraea*), Mountain Ash (*Sorbus aucuparia*) and Hawthorn (*Crataegus monogyna*) are also preferred. Achieving a diverse blend of species is encouraged. The field corner must be left ungrazed for the duration of the farm plan contract. Fencing and tree planting must be completed before the end of year 1. Briars and Blackthorn are to be controlled on an an-

nual basis through the contract period. Spot treatments with a suitable herbicide or mechanical control, e.g. using a strimmer are acceptable control methods. If using a strimmer care should be taken to avoid damaging the young trees. The tree guards referred to above will be of some value in this regard. In situations where soil types permit and where adequate shelter exists an acceptable alternative is to plant a cover crop e.g. Kale in the field corner. If this option is chosen, Kale must be planted in the first spring in the scheme and left undisturbed for 2 years. The Kale should be removed in the second autumn after planting and the site left fallow in year 3. The Kale must be replanted in the spring of year 4 and left undisturbed for the rest of the contract period. Club root resistant varieties like Caledonian should be used. The use of small quantities of fertiliser is permitted but not required. A margin of 2 metres is to be left undisturbed along the existing field boundaries. The use of herbicides in site preparation is permitted provided;

- The plot is not also designated as an SAC.
- They are not used within 3 metres of the existing field boundaries (5m in the case of watercourses and existing hedgerows).
- That care is taken to ensure that no drift occurs.

Figure 1.



Grassland fields over 4 hectares in size.

In grassland fields over 4 hectares in size the establishment of new hedges and/ or exclosures is required. In grassland fields over 4 hectares in size, at least one exclosure or 100 metres of new hedgerow are required for each hectare or part thereof over 4 hectares. For example in a 6 hectare grassland plot, 2 exclosures or 200 metres of new Hedgerow are required. If the plot in question is improved grassland in reversion, then these requirements are in addition to any additional hedgerow planting required as part of the reversion process.

Exclosures should be 0.1-0.3 hectares in size, stock are to be excluded from these exclosures by means of a permanent fence before the end of year 1. The fence must be maintained in a stockproof condition for the duration of the scheme. Where possible, exclosures should incorporate any existing patches of scrub. Exclosures are to be planted with native tree/ shrub species at a density of 1000 plants per hectare (Whips 40-80 cm in size are the preferred planting material. Planting must be completed before the end of year 1 in the scheme. The choice of species should be based on those known to do well on similar sites on the farm. The planting density may be reduced if some scrub already exists on the site.

Hedgerow planting and establishment must be in accordance with the Hedgerow planting specifications in the Terms and Conditions document.

General issues relating to grassland management.

- Reseeding of rough grassland fields will be allowed, or may be required, where this is shown to be necessary and part of an existing management regime. (There will be very few instances where this is necessary, but there are always caveats and every farm has its own intricacies).
- Broadcast spraying of rushes is not permitted but spot treatments or wipe-on treatments are allowed. Herbicides applied using a weed lick can be applied where necessary, particularly in situations where rush growth is very dense or where cutting is impractical due to steep slopes. Applications should not be at a rate which will denude fields completely of rushes. Under normal circumstances chemical treatment of rushes will only be permitted once in a 5 year plan. Wipe on treatments can only be applied in either year 1 or year 2 of the plan.

4.2 Scrub/ hedgerows.

Woody Scrub (e.g. Gorse, Willow, Alder, Birch etc.) is one of the most beneficial habitats on the landscape for Hen Harriers, as it provides prey (e.g. passerines, small mammals) and an ideal hunting scenario for the harrier (i.e. irregular/ thick/ 'bushy'). Scrub and hedgerow clearance has been held accountable for the loss of much Hen Harrier habitat in Ireland, and subsequent decline in population. Where there is evidence of scrub or hedgerow removal (since 2007) these habitats must be re-instated before application to the scheme.

In general existing areas of scrub and hedgerow should be retained. In open areas or areas where the extent of scrub/ hedgerow is limited, there will be a need to either create habitat or to facilitate some expansion of gorse and native hardwood scrub. Small areas of established gorse or willow scrub, or gorse, willow can be trimmed to prevent further encroachment onto grassland or access paths, but they must not be removed, burnt or killed.

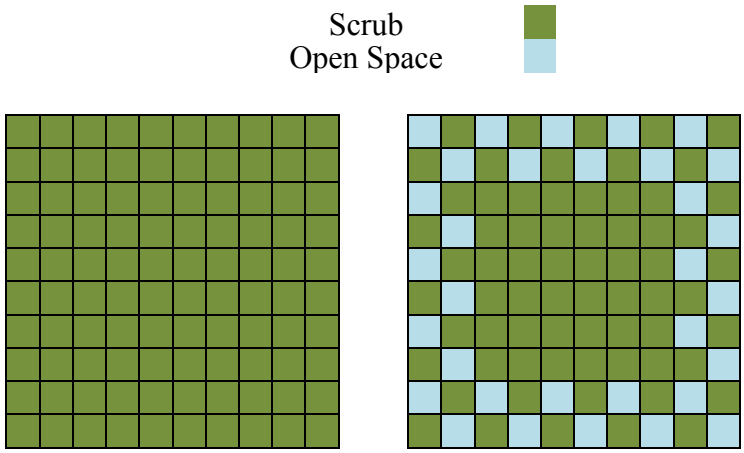
The cutting of roadside hedgerows for safety reasons and cutting necessary for the protection of overhead lines is permitted on an annual basis. In the case of other hedgerows, cutting is not normally required. It is permitted to cut a hedge, once over the period of the plan to prevent the hedge "escaping". Hedgerow trees, e.g. Ash and Oak should be left uncut in such cases. If a hedgerow requires cutting it should be cut to an "A" shape, i.e. wider at the base then at the top. The further encroachment of scrub onto grassland can be controlled by cutting on annual basis if required. Cutting in this case should not come closer than 1m from the base of the hedge. However a buffer zone of 1.5m on each side of the hedge must be left uncut. Fertilisers should not be applied within this buffer zone. In addition herbicides and pesticides should not be used within 5m of an existing hedgerow. The only exception to this is the spot treatment of difficult invasive weeds such as Japanese Knotweed (*Fallopia japonica*). Hedge cuttings should be piled into heaps and left to decay naturally. In all cases, the cutting of hedgerows must not be carried out between March 1st and August 31st.

Large continuous blocks (>1 hectare) of established briar, scrub or gorse must be opened up (outside the bird breeding season, March 1st –August 31st) unless the area is known, or deemed suitable as nesting habitat. Contact the local Conservation Ranger if clarification is sought on this matter. Often, areas of bramble, dwarf gorse, and willow will be

used for nesting. As a general rule, the planner should assess the ground flora in this respect. If the area of scrub has patches of grasses, sedges, bramble or heather etc, there is a chance of Hen Harriers (or other birds such as Merlin) nesting there. If the area of scrub has little or no ground vegetation under the scrub canopy, then the scrub will be of limited nesting value, and thus management should focus on increasing its foraging value by increasing surface area. The Hen Harriers world is one of surface area and habitat structure as much as habitat/ species composition. Increased surface area equals increased foraging ability. A 1 hectare area of scrub, which is completely closed in, resembles the surface area of a cube. A 1 hectare area of scrub, which has open patches, particularly linear open patches („rides'), has a much higher surface area. Proposed rides or paths must be marked on the farm plan map. Rides should be c 10 metres in width; the preferred method to cut out rides is cutting with hand tools (including chainsaws). Any proposal for mechanical control must be agreed with NPWS prior to plan submission. The brash should be stacked in heaps along the length of the ride and allowed to decay naturally. The ride can be grazed by stock after clearance works are completed. Sufficient rides to ensure that the remaining blocks of scrub do not exceed 1 hectare in size are required. Work on cutting out rides must commence in year 1, At least 80% of the required works must be completed before the end of year 3 and 100% before the end of year 4.

Retain at least 50% of the area covered by scrub and hedges in scattered lines or patches rather than in a single block. A suggested clearance of scrub (*where necessary*) is given in Figure 2. In situations where the terrain makes access difficult and cutting out rides or paths impossible an alternative strategy is to cut out 10 x 10 m blocks. One block must be cut out per hectare per year in blocks of scrub exceeding 1 hectare in size. The brash is to be piled within the clearing and left to decay naturally. Control of scrub regeneration is not required (except in the case of Rhododendron). Dates for the completion of planned scrub control must be given in the plan. In all cases the cutting off scrub is not permitted between March 1st and August 31st each year.

FIGURE 2. SUGGESTED SCRUB MANAGEMENT FOR NON-NESTING AREAS CLOSED IN BY UNSUITABLE SCRUB



(a) 1 hectare of closed-in, Non-nesting scrub (0% O.S.)

(b) Staggered Edge (40% O.S.)

(c) Linear Rides (50% O.S.)

(d) Diagonal Rides (34% O.S.)

Each diagram = 1hectare. Each cell = $100m^2$
Plots of >1hectare to be designed hectare by hectare
Optimum ride width = 10 metres
Design Open Space (O.S.) lengthwise (i.e. 5 rides of 100 metres long rather than 100 rides of 5 metres long)
Creation of designs by cutting/ removal, not burning
Diagrams for illustrative purposes only.

4.3 **Woodland.**

No active management of woodlands is normally required. Supplementary feeding should not be carried out in deciduous woodlands.

4.4 **Forestry.**

Commercial forestry plantations are not eligible for payment. However thinning, fertilising, disease control and clear felling should be in accordance with current Forest Service guidelines. The planting of areas on which payment has been claimed without the approval of the NPWS is a serious matter which will result in penalties up to and including termination of farm plan contracts.

4.5 **Heath and blanket bog.**

Maintain a low stocking intensity on heath/ bog. Guideline stocking levels are a maximum 0.25 LU/ hectare on heath and a maximum of 0.10 LU/ hectare on blanket bog. All self-seeded conifers outside of forestry plantations and Rhododendron or other invasive species must be removed in year 1 of the plan. Ongoing control will be required in each subsequent year of the contract period. Acceptable control methods are cutting/ pulling or spot treatment with a suitable herbicide. This is of particular importance in Blanket Bog/ Heath Habitats.

Consideration should be given to the creation of shallow pools 30- 50 cm deep to provide spawning sites for amphibians.

4.6 **Other habitats.**

The planner should refer to the NPWS publication *"Nature on the Farm"* for guidelines on the appropriate management of habitats other than those described above.

5. **Management Issues Common to all Habitat Types.**

5.1 **Protection of known nest sites**.

If a nest is present, grazing should be excluded from an area within 50 metres of the nest site between March 1st and July 31st. A temporary electric fence is adequate for this purpose. If there is an existing stockproof boundary closer than 50 metres from the nest site it can be utilised as part of the boundary.

If nesting is suspected the participant should notify the NPWS or their planner at the earliest possible opportunity

5.2 **Supplementary feeding.**

Supplementary feeding can continue provided excessive poaching is avoided. Sacrificial paddocks are not permitted at any time. Supplementary feeding of round bales or from fixed feeding points is not permitted within 30 metres of a watercourse. On land sloping towards a watercourse a greater distance may be required.

5.3 **Burning.**

The burning of vegetation or other materials on SPA designated lands is not permitted at any time during the contract period.

5.4 **Use of herbicides.**

Spraying or broadcast application of herbicide is not permitted. Use spot application and wipe-on treatments to eradicate docks, thistles, ragwort and similar noxious weeds. Rhododendron and conifers may be removed by cutting and herbicide treatment (round-up applied to incision made into the cambium (just inside bark) works best. Bracken control may be by rolling, cutting and/ or by controlled cattle/ equine trampling in early summer. In exceptional circumstances, control of bracken by herbicides may be permitted. The use of herbicides is not permitted within 5 metres of a watercourse or existing hedgerows; the only exception is spot treatment for the control of difficult invasive species such as Japanese Knotweed (*F japonica*). If watercourses are located in an SAC and a conservation management plan or ARCs specify a greater distance then this greater distance shall apply. Any exceptions to the above must be agreed with NPWS before the plan is approved.

5.5 **Use of poisons or stupefying baits**

The use of poisons or stupefying baits is not permitted. Hen Harriers and other birds of prey can fall victim to secondary and direct poisoning.

5.6 **Fence marking.**

Hen Harriers can fly into electric and barbed wire. Light coloured plastic fliers on wire are an effective counter measure.

5.7 **Drainage maintenance**.

The maintenance of existing drains is permitted but new drains should not be opened. In blanket bog or heath drain maintenance should cease unless there is evidence that to do so would adversely affect neighbouring properties. Maintenance of drains is only permitted in the month of September unless derogation has been granted by the relevant Fisheries Board for the period October –April.

Creation of ponds which will benefit biodiversity (e.g. amphibians, other wildlife) are to be encouraged, where no annexed habitat (e.g. heather/ bog) is being sacrificed and the land is not also an SAC.

6 Supplementary Notes, Hen Harrier

6.1 The area of blanket bog and heath payable to individual applicants shall be capped at an area of 10 hectares.

6.2 The improved grassland existing at the time of SPA designation can remain in the farm. However it is not permitted to increase this area beyond 20% of the SPA area on the farm.

If the area of improved grassland already exceeds 20% of the SPA area on the farm then no further increase is permitted.

6.3 If it is known that Hen Harriers are nesting or winter roosting on the farm, the farm plan must provide protection for the nest site. Where it is discovered that Hen Harriers are nesting or winter roosting on the farm after a plan has been approved an amendment to the farm plan will be required. Participants must report any suspected nest sites to their planner or to the NPWS.

6.4 Landowners should be requested to report any Hen Harrier sightings to their planner and/ or NPWS (via harriers@environ.ie).

6.5 Participants should refrain from publicising the exact location of nest sites. They should in so far as is practical avoid approaching the nest during the period March 1st – July 31st.

6.6 Managing the farm for Hen Harriers fits the concept of focal species modelling. In managing habitats to benefit Hen Harriers, a range of other beneficial outcomes will be achieved. Successful management for Hen Harriers will be of benefit for other species most notably Merlin, Kestrels, Sparrowhawks, Owls, Red Grouse, Irish Hare, Curlew, Golden Plover and a range of small mammal and bird species. Habitats such as blanket bog, upland heath, rivers and streams, hedgerows and trees will also benefit. Hen Harriers can be seen as indicator species, indicating the health of the overall ecosystem and landscape.

Appendix 3

Landowner consent letters

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Gerard Ryan, Knockeravoola, Upperchurch, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 24.6Ha in area.

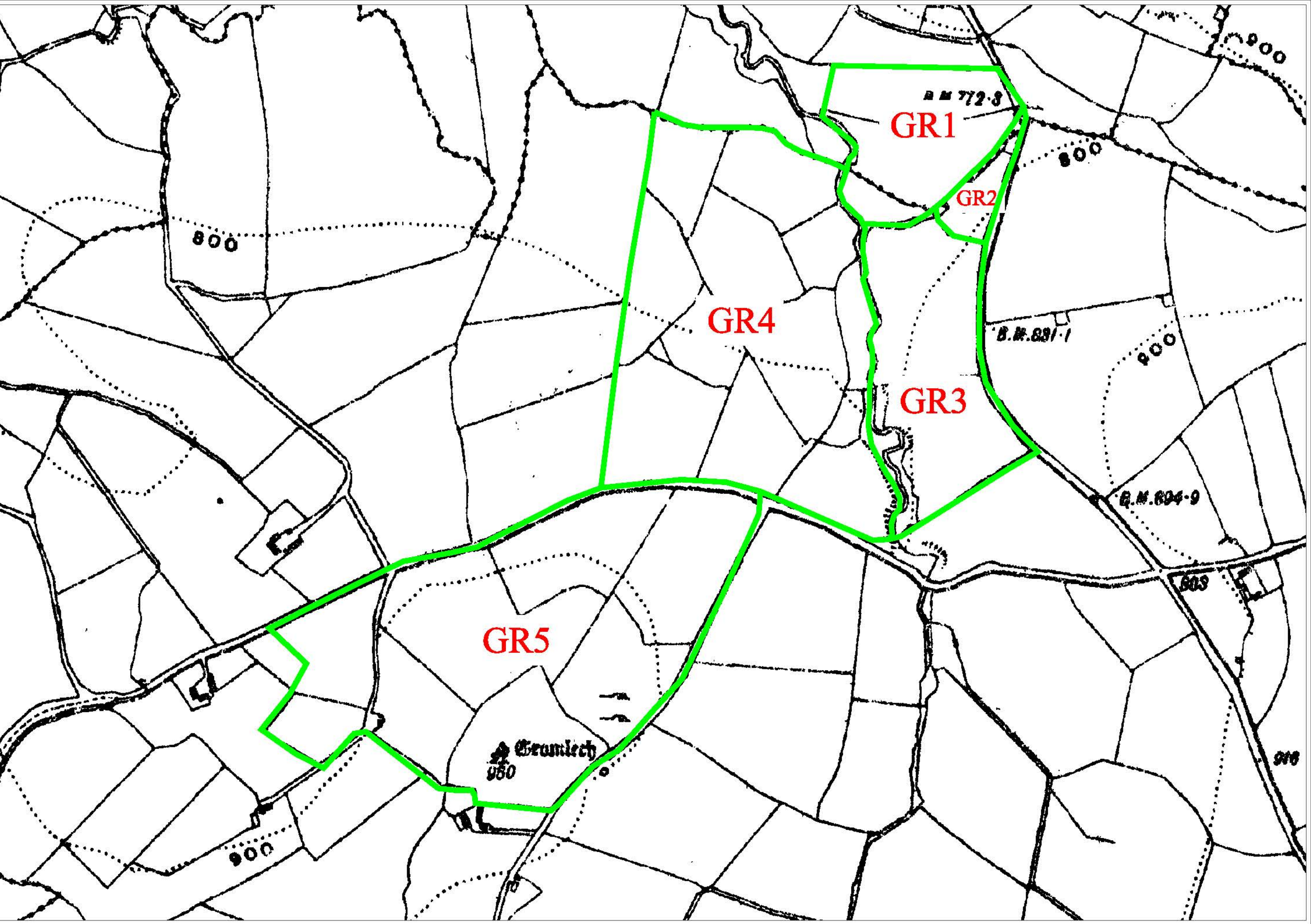
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Gerard Ryan C.

Date: 23/11/2013


GR1
GR2
GR3
GR4
GR5
B.M. 772·3
B.M. 831·1
B.M. 804·9
Cromlech
950
800
900
803
916

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Patrick Quinlan of Knockcurraghbola, Upperchurch, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 27 hectares in area.

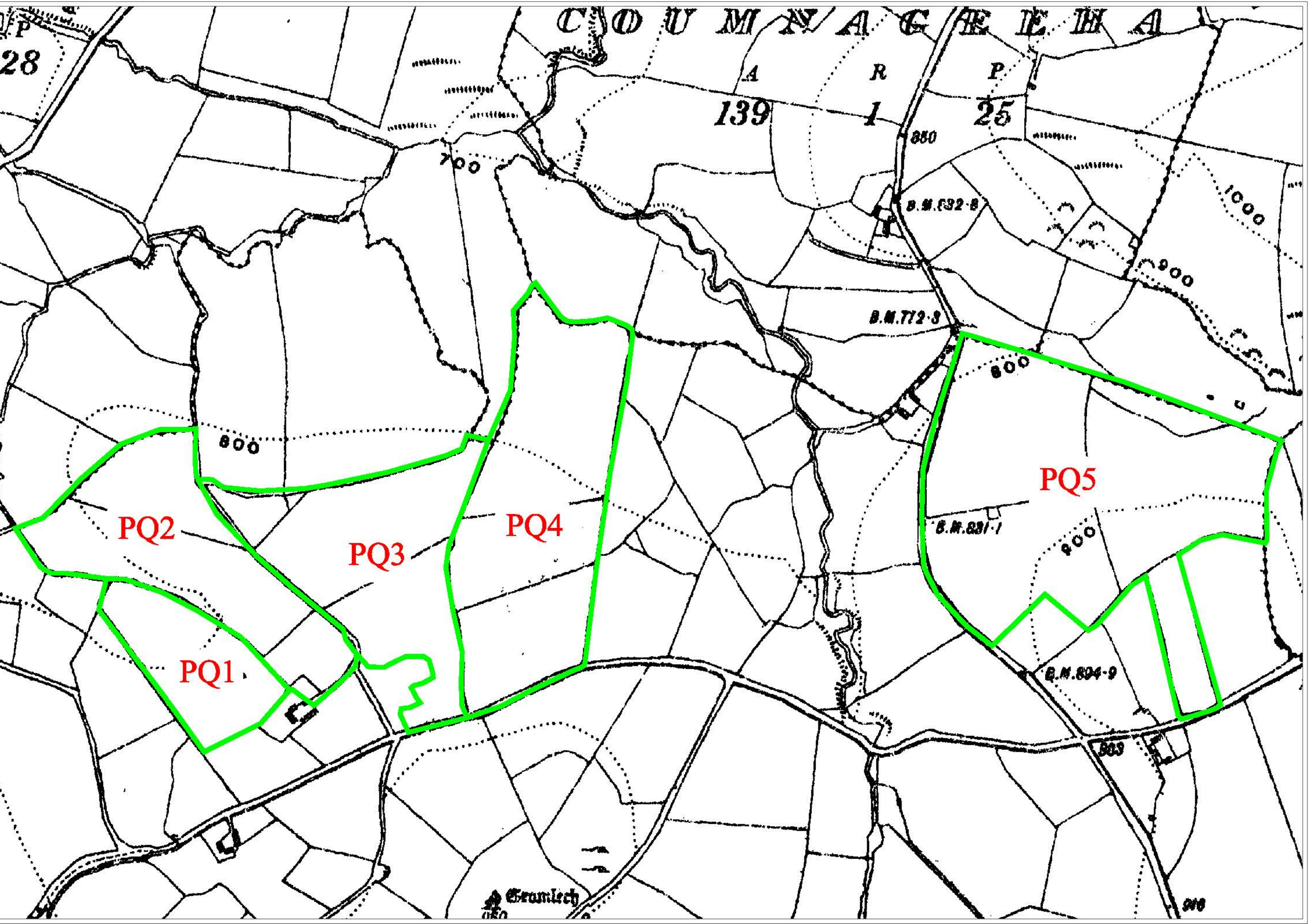
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Patrick Quinlan

Date: 25/11/2013



COUMNAGEEHA
A R P
139 1 25
P
28
850
B.M.832·8
1000
900
B.M.772·3
700
800
800
PQ1
PQ2
PQ3
PQ4
PQ5
B.M.881·1
900
B.M.894·9
Cromlech

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Vincent O Dwyer of 14, Cluain Dara, Monadreen, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 8 hectares in area.

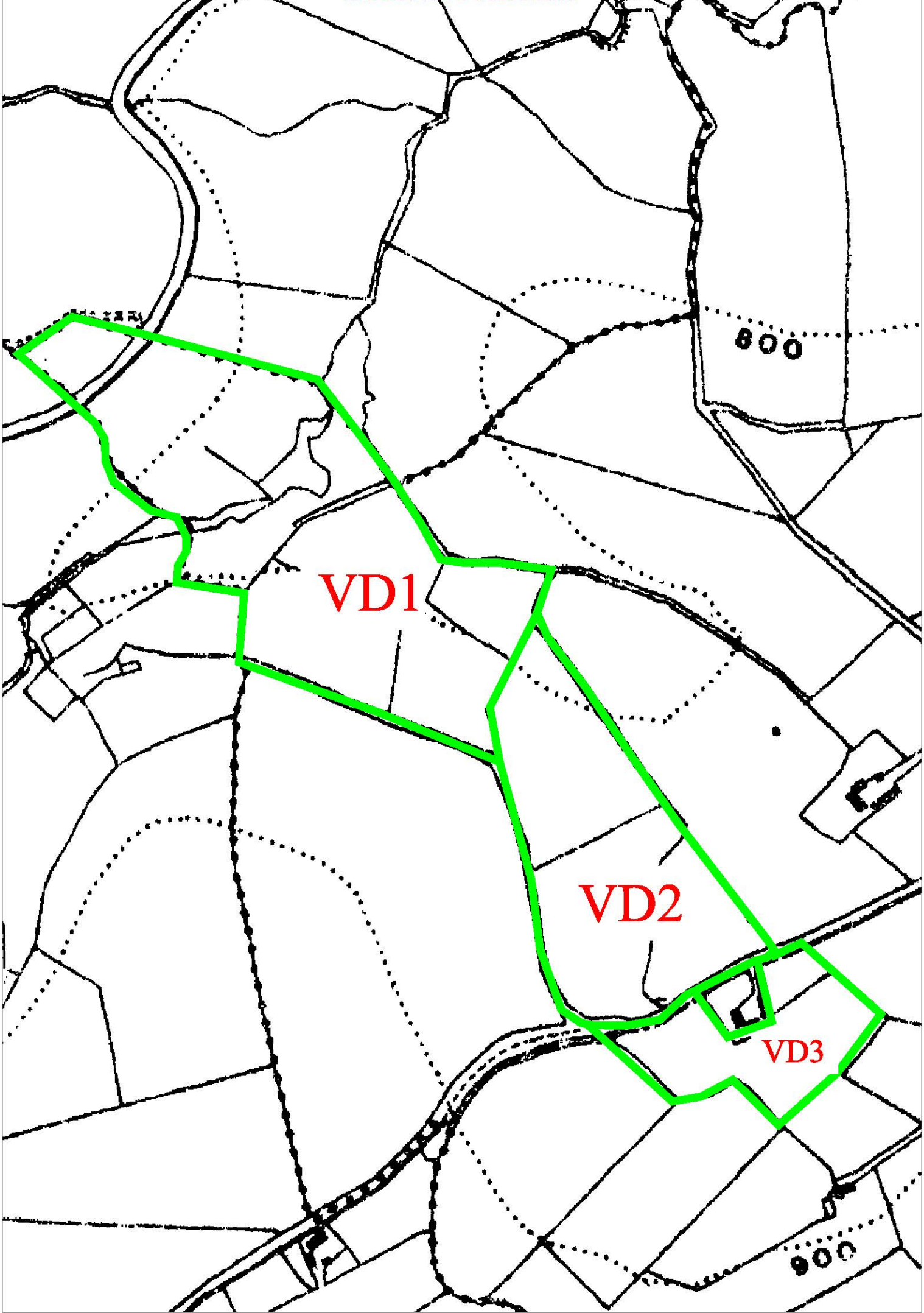
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Vincent O'Dwyer.
.....

Date: 25/11/13


VD1
VD2
VD3

To:
Ecopower Development s Limited
Sion Road
Kilkenny

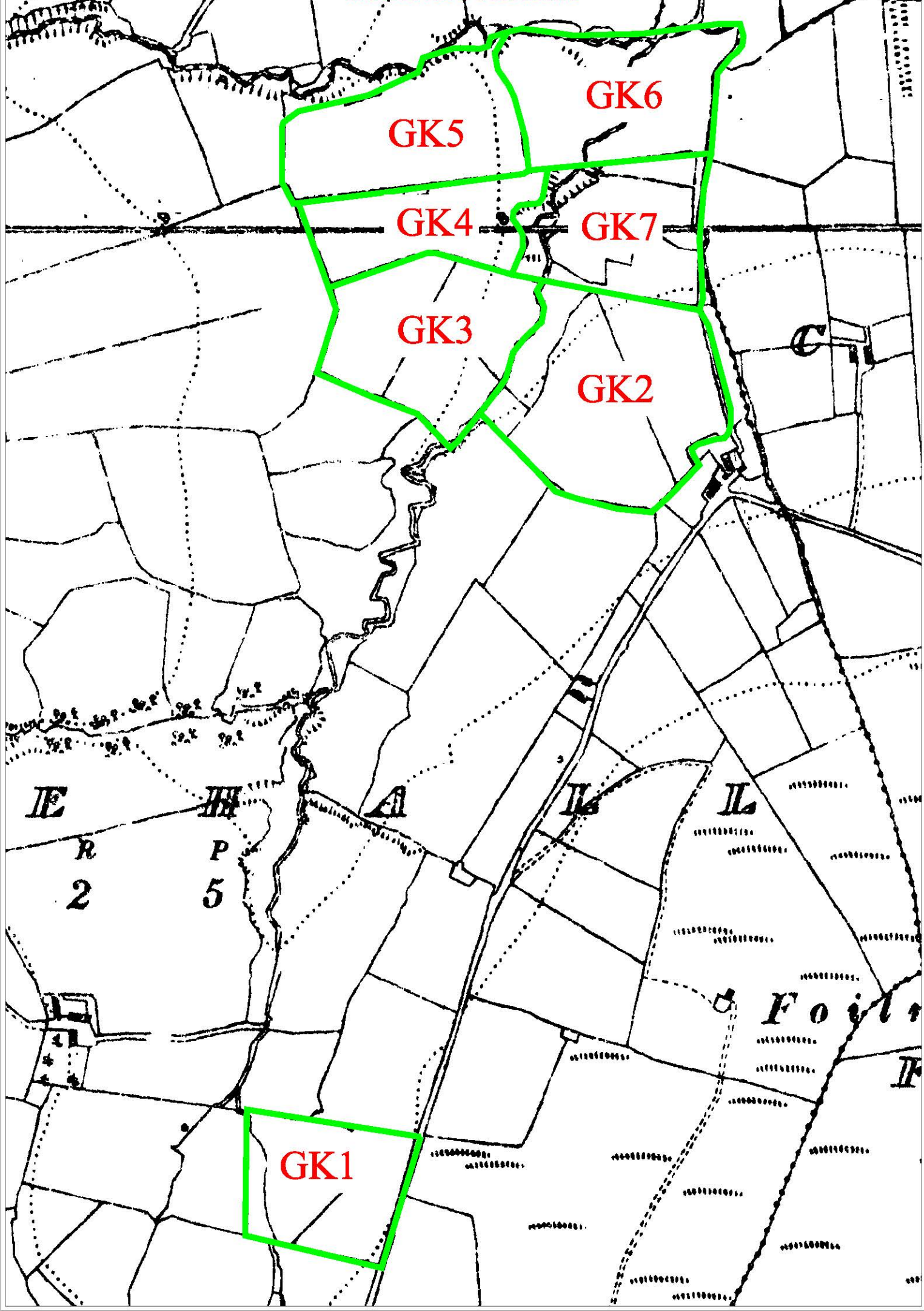
I, Gerard Kennedy, Foilnamon, Milestone, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 15.7 hectares in area.

I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003. I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Gerard Kennedy

Date: 26/11/2013


GK6
GK5
GK4
GK7
GK3
GK2
GK1

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, John Quinlan, Grousehall, Milestone, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 26.5 hectares in area.

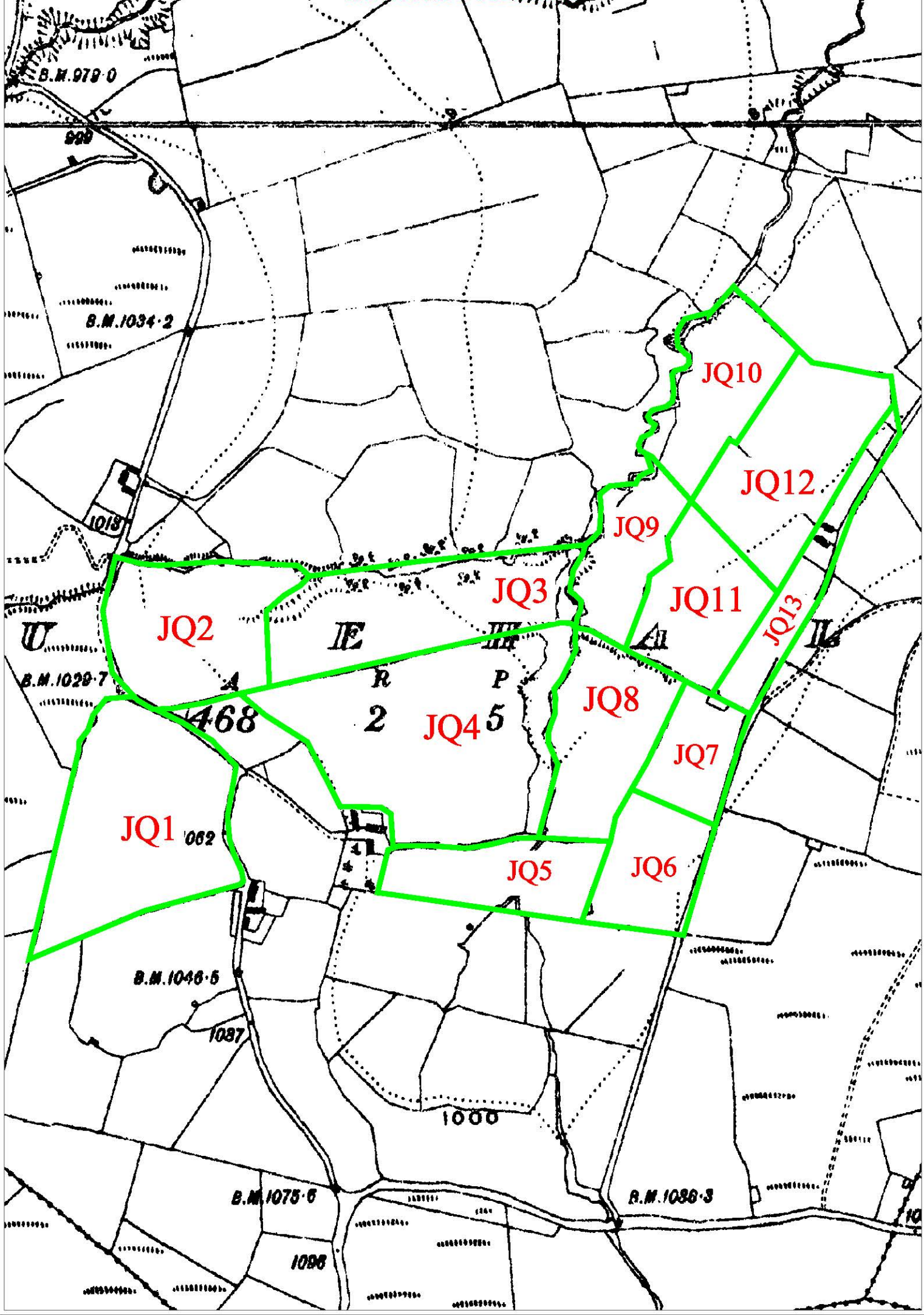
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

.....

Date: 26/11/13


JQ1
JQ2
JQ3
JQ4
JQ5
JQ6
JQ7
JQ8
JQ9
JQ10
JQ11
JQ12
JQ13
B.M.979·0
B.M.1034·2
B.M.1029·7
B.M.1046·5
B.M.1075·6
B.M.1036·3
1018
1062
1087
1000
1096
468

To:
Ecopower Development s Limited
Sion Road
Kilkenny

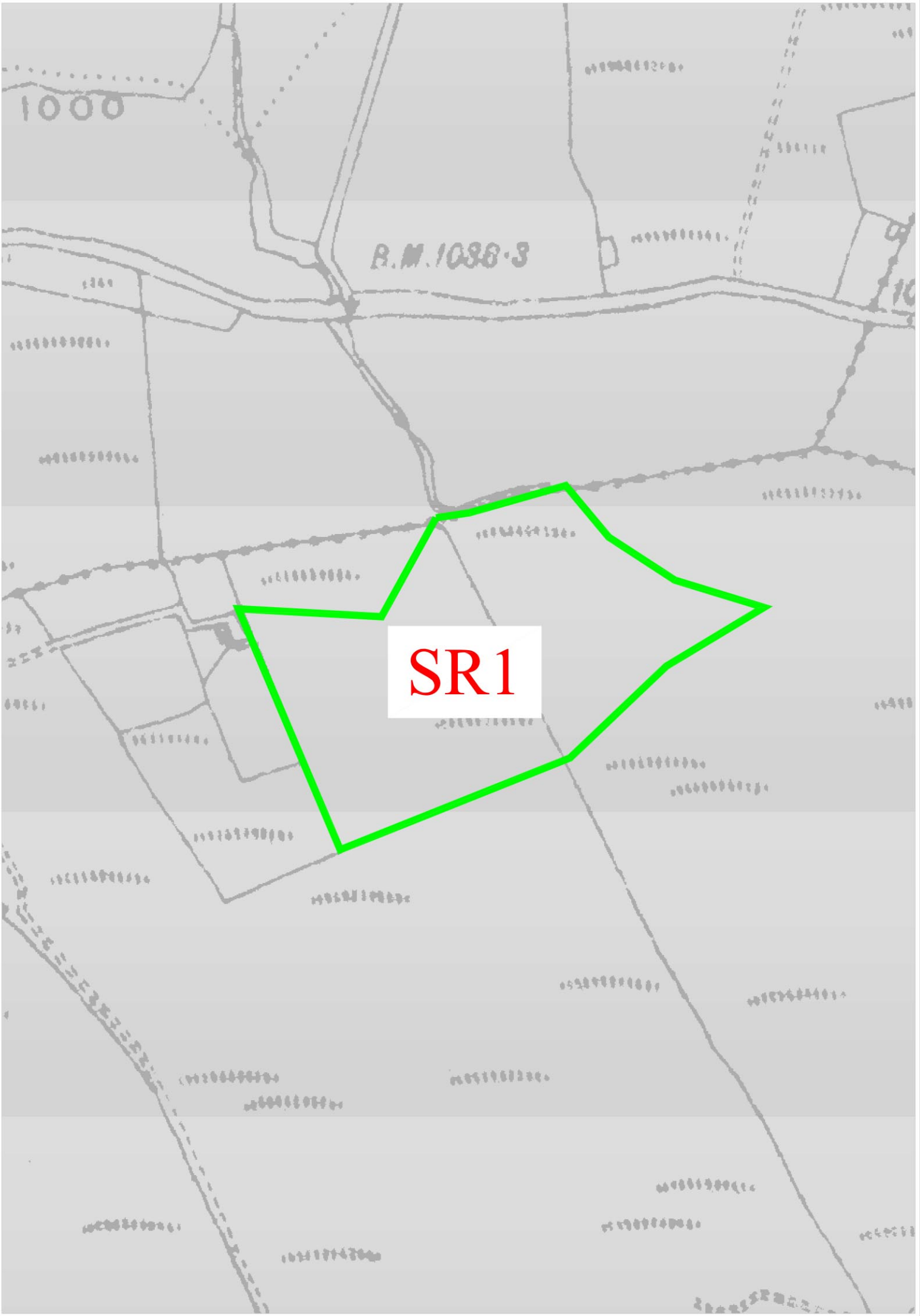
I, John (SEAN) Ryan of Knockmaroe Kilcommon

Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 2.8 hectares in area.

I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003. I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Date: 26/11/13


1000
B.M.1038·3
SR1

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Andrew Ryan, of Fethamore

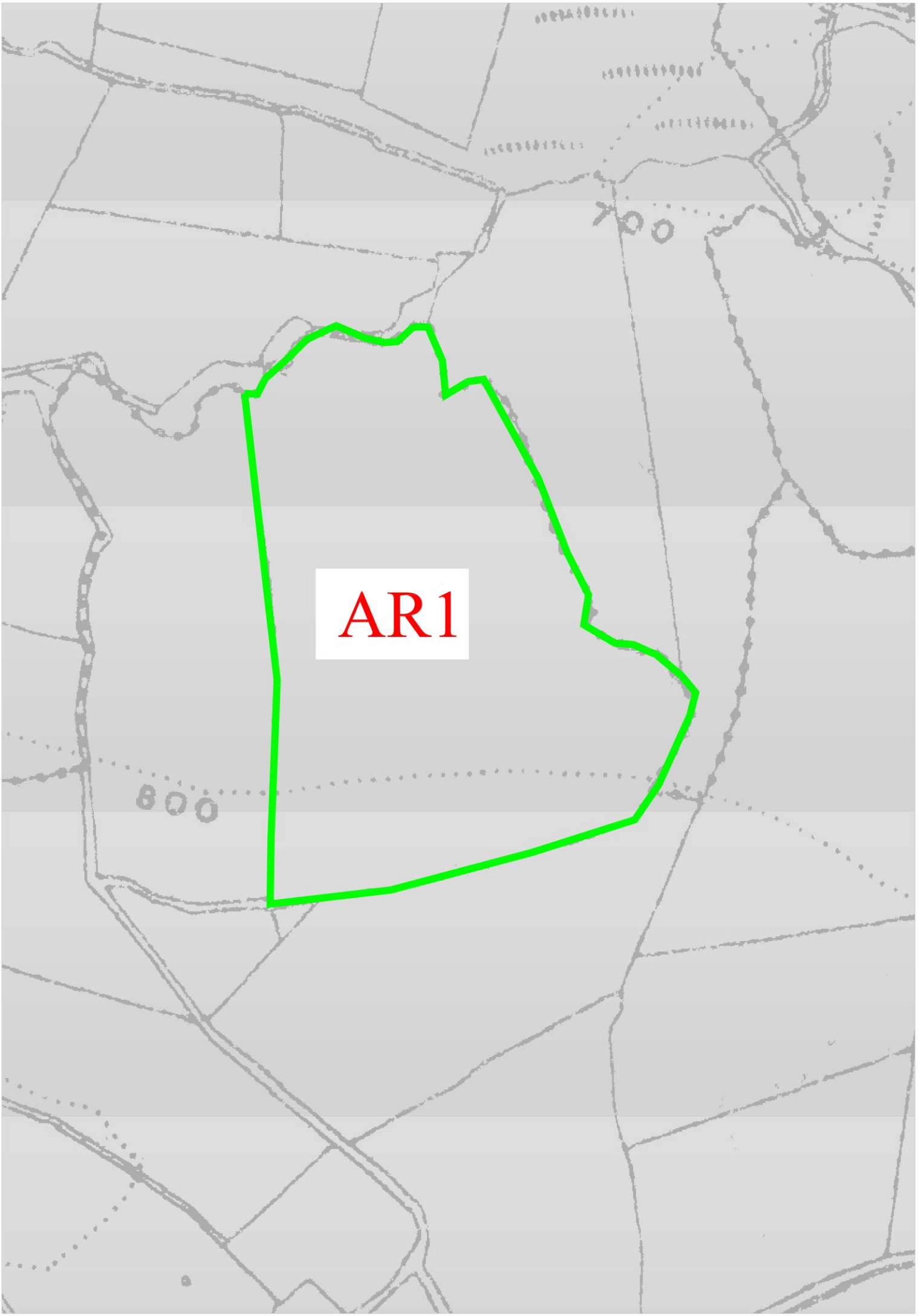
Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 5 hectares in area.

I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003. I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Andy Ryan

Date: 26/11/2013


AR1
700
800

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Michael Carey, of Toulnamon

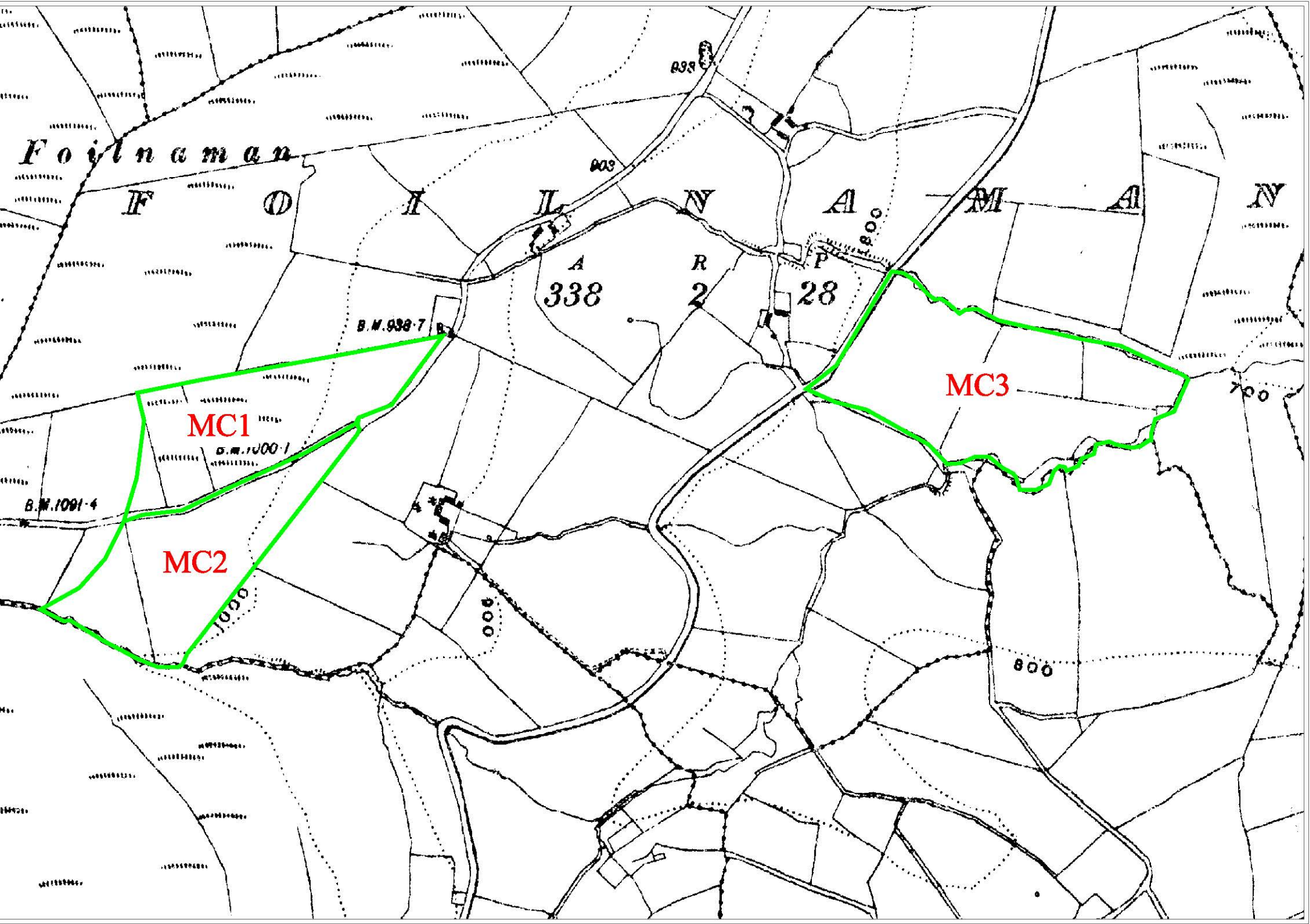
Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing ..12.... hectares in area.

I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003. I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Michael Carey

Date: 26/11/2013


Foilnaman
FOILNAMAN
A 338
R 2
P 28
MC1
MC2
MC3
B.M.938·7
B.M.1091·4
B.M.1000·1
1000
900
800
700

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Michael Ryan, of Glown, Upperchurch

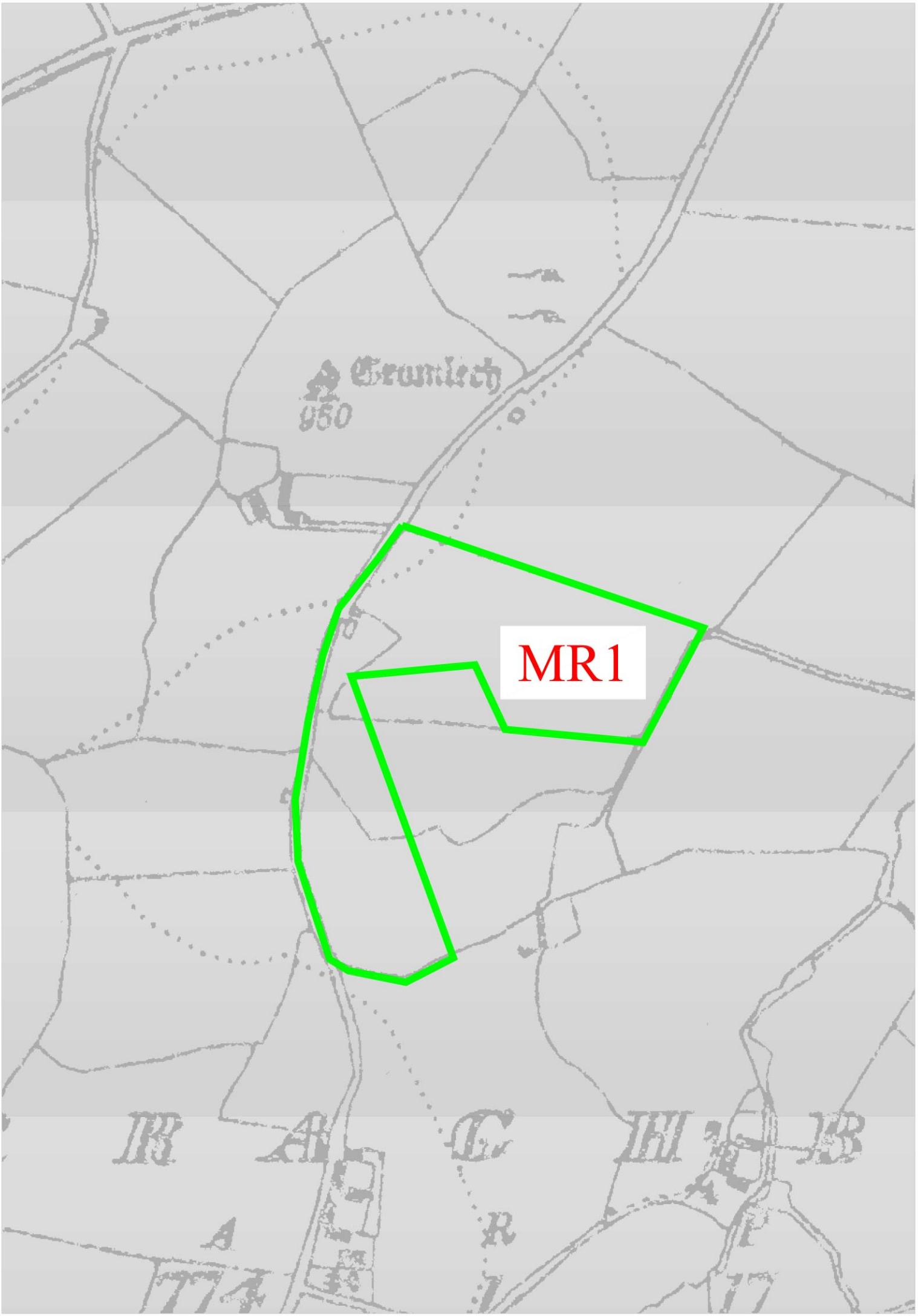
Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 2 hectares in area.

I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003. I understand that this management plan will continue for the operational lifetime of the Upperchurch Windfarm.

I confirm that I have read and understand the HHHMP.

Michael Ryan.

Date: 26/11/2013


Grunlich
950
MR1

Appendix 4

Hen Harrier Habitat Area Matrix

Area A

Measures/Field ID:	GK1	GK2	GK3	GK4	GK5	GK6	GK7	GK8	JQ1	JQ2	JQ3	JQ4	JQ5	JQ6	JQ7	JQ8	JQ9	JQ10	JQ11	JQ12	SR1	MC1	MC2	MC3
A: Wet Grassland, B Agri/Wet, C: Agri. R: riparian W: Willow Scrub	B	CR	BR	A	C	AR	BR	B	B	BR	BR	BR	BR	B	B	BR	BR	BR	B	B	A	B	B	B
Size in Hectares	1.6	3.3	2.3	1.7	2.4	2.2	1.6	0.8	3.5	2.4	2.9	4.6	1.6	1.3	1	1.8	1.2	1.7	1.7	2.6	2.8	3.5	3.5	5.4
Plant hedgerow with broadleaved native species					60	55			88	60	73									65	70	88	88	180
Fence off and plant/maintain enclosure with broadleaved native species	0.4			0.2			0.1									0.2								
Enhance riparian corridor: Plant woody scrub		√					√						√			√	√	√						√
Enhance riparian corridor: stockproof fencing		√	√	√		√	√			√	√	√	√			√	√	√						
Land will be allowed to revert back to wet grassland			√			√	√		√	√							√	√			√	√	√	√
Achieve 30 - 70% rush coverage optimum	√		√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Rush coverage is controlled with grazing	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Rush coverage is controlled with cutting, usually every second year	√		√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Target stocking level: Min 0.6 LU/Ha, Max 1.6 LU/Ha	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Mark electric fence lines with plastic fliers	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Restrictions:																									
Limited spreading of fertiliser	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√				
Limited spreading of lime	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No burning	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No excavation of new drains or reclaiming heath or bog	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No removal of hedgerows	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No recreational off-roading with vehicles	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No use of poisons or stupefying baits	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No new forestry plantation	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Area B

Measures/Field ID:	GR1	GR2	GR3	GR4	GR5	PQ1	PQ2	PQ3	PQ4	PQ5	VD1	VD2	VD3	AR1	MR1
A: Wet Grassland, B Agri/Wet, C: Agri. R: riparian W: Willow Scrub	C	W	BR	BR	B	B	B	B	B	B	B	B	B	BR	B
Size in Hectares	2.4	0.4	3	9.1	9.4	2.1	4.5	4.7	5.9	9.8	3.3	2.4	1.1	5	2.2
Plant hedgerow with broadleaved native species	60		75	410	540	53	100	100	200	560	83	63		120	70
Fence off and plant/maintain enclosure with broadleaved native species								0.3						0.9	
Enhance riparian corridor: Plant woody scrub			√	√											
Enhance riparian corridor: stockproof fencing															
Land will be allowed to revert back to wet grassland			√	√	√						√	√	√		√
Achieve 30 - 70% rush coverage optimum	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Rush coverage is controlled with grazing	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Rush coverage is controlled with cutting, usually every second year	√		√	√		√	√	√	√	√	√	√	√	√	√
Target stocking level: Min 0.6 LU/Ha, Max 1.6 LU/Ha	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Mark electric fence lines with plastic fliers	√		√	√	√	√	√	√	√	√	√	√	√	√	√
Restrictions:															
Limited spreading of fertiliser	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Limited spreading of lime	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No burning	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No excavation of new drains or reclaiming heath or bog	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No removal of hedgerows	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No recreational off-roading with vehicles	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No use of poisons or stupefying baits	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
No new forestry plantation	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 10

Construction Contract Documents

(following appointment of construction contractor)

ECOPOWER

April 2021

UPPERCHURCH WINDFARM ENVIRONMENTAL MANAGEMENT PLAN 2021

Tab 11
Method Statements

(following appointment of construction contractor)

ECOPOWER

April 2021