

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

REFERENCE DOCUMENT 36 of 36

This document contains the following:

UWF Replacement Forestry

- **2018 Natura Impact Statement for Whole UWF Project Elements 1 to 5 – Volume D6 (Volume 6 of 6)**
 - Appendix A16: Supporting 2013/2014 Planning Documentation for Upperchurch Windfarm (*2013 Revised NIS, 2013 Ecological Management Plan for Hen Harrier, 2013 Surface Water Management Plan, 2013 preliminary Environmental Management Plan, 2014 ABP Inspectors Report*)

VOLUME D: APPROPRIATE ASSESSMENT REPORTING

Whole Upperchurch Windfarm Project

Natura Impact Statement for Whole UWF Project Elements 1 to 5

May 2018

Volume D6 (Volume 6 of 6)

Appendix A16: Supporting 2013/2014 Planning Documentation for Upperchurch Windfarm

(2013 Revised NIS, 2013 Ecological Management Plan for Hen Harrier, 2013 Surface Water Management Plan, 2013 preliminary Environmental Management Plan, 2014 ABP Inspectors Report)



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Whole Upperchurch Windfarm Project

Natura Impact Statement for Whole UWF Project Elements 1 to 5

March 2018

Appendix A16: Supporting 2013/2014 Planning Documentation for Upperchurch Windfarm



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Revised Natura Impact Statement

Upperchurch Windfarm

14708

December 2012

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MWP ENVIRONMENT AND PLANNING

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1 Introduction

1.1 Background

Member States are required to designate Special Areas of Conservation (SACs) and Special Protected Areas (SPAs) under the EU Habitats and Birds Directives, respectively. SACs and SPAs are collectively known as Natura 2000 sites. An ‘Appropriate Assessment’ (AA) is a required assessment to determine the likelihood of significant impacts, based on best scientific knowledge, of any plans or projects on Natura 2000 sites. A screening for AA determines whether a plan or project, either alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

This AA screening has been undertaken to determine the potential for significant impacts of a proposal to construct a 22 turbine windfarm, 1.9 km west of Upperchurch and a further 18 km west of Thurles in county Tipperary, on nearby Sites with European conservation designations (i.e. Natura 2000 Sites). The purpose of this assessment is to determine, the appropriateness, or otherwise, of the proposed project in the context of the conservation objectives of such sites. For clarity of nomenclature this proposal will be described, hereinafter, as the Upperchurch Windfarm.

This Screening for Appropriate Assessment has been undertaken by Malachy Walsh and Partners ecologists.

Assessment of potential impacts on other species of national and community interest does not fall within the scope of this report.

An Environmental Impact Statement has also been carried out in association with the proposed windfarm.

1.2 Legislative Context

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and of wild fauna and flora by the designation of SACs and the Birds Directive (79/409/EEC) seeks to protect birds of special importance by the designation of SPAs. It is the responsibility of each member state to designate SPAs and cSACs, both of which will form part of Natura 2000, a network of protected sites throughout the European Community.

An Appropriate Assessment is required under Article 6 of the Habitats Directive where a project or plan may give rise to significant effects upon a Natura 2000 Site, and paragraphs 3 and 4 state that:

6(3) Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the

site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

The current assessment was conducted within this legislative framework and also the recent DoEHLG (2009) guidelines. As outlined in these, it is the responsibility of the proponent of the project developer to provide a comprehensive and objective Screening for Appropriate Assessment, which can then be used by the competent authority in order to conduct the Appropriate Assessment (DoEHLG, 2009).

1.3 Stages of AA

A Screening for Appropriate Assessment (AA) has been prepared by Malachy Walsh and Partners, to determine the likelihood of significant impacts, if any, of the proposal to construct a 22 turbine windfarm and all associated works located 1.9km west of Upperchurch village and a further 18km west of Thurles in County Tipperary, on nearby sites with European conservation designations (i.e. Natura 2000 sites). A Natura Impact Statement (NIS) has also been undertaken and is presented in this report after the screening stage.

The AA process is a four-stage process to complete the AA, with issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. This proposal has proceeded as far as Stage 2 only.

The first stage of the AA process and that undertaken to determine the likelihood of significant impacts of this proposal is:

Stage 1: Screening.

The second stage of the AA process assesses the impact of the proposal (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and its ecological structure and function. A Natura Impact Statement was prepared for this proposed development. A Natura Impact Statement

containing a professional scientific examination of the proposal is required and includes any mitigation measure to avoid, reduce or offset negative impacts:

Stage 2: Natura Impact Statement (NIS).

If the outcome of Stage 2 is negative i.e. adverse impacts to the sites cannot be scientifically ruled out, despite mitigation, the plan or project should proceed to Stage 3 or be abandoned.

This stage examines alternative solutions to the proposal:

Stage 3: Assessment of alternative solutions.

The final stage is the main derogation process examining whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project to adversely affect a Natura 2000 site where no less damaging solution exists:

Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain.

In summary, the purpose of the Screening stage is to determine the necessity or otherwise for a NIS. Screening for AA examines the likely effects of a project or plan, alone and in combination with other projects or plans, upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant. If it is determined during screening that the proposal may have a significant effect on a Natura 2000 site then a NIS will need to be prepared. A Screening exercise has been undertaken and concluded that a NIS was required. The Screening is outlined in section 2 below as it now forms part of the overall NIS. The NIS is presented in Section 3 below.

1.4 Screening Steps

This Screening for AA, or Stage 1 of AA, has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the ‘Habitats’ Directive 92/43/EEC (EC, 2001) and the European Commission Guidance ‘Managing Natura 2000 sites’ (EC, 2000).

Screening for AA involves the following:

Establish whether the plan is necessary for the management of a Natura 2000 site;

Description of the Plan;

Identification of Natura 2000 sites potentially affected;

Identification and description of individual and cumulative impacts likely to result from the plan;

Assessment of the significance of the impacts identified above on site integrity; and

Exclusion of sites where it can be objectively concluded that there will be no significant effects.

Stage 1, Screening, examines whether or not likely effects upon a Natura 2000 site will be significant and determines whether the AA process for the proposed windfarm needs to proceed to Stage 2.

1.5 Assessment Methodologies

1.5.1 In house Consultation with Design Engineers

Consultation with the client, Ecopower Developments, and with Malachy Walsh and Partners' in-house engineering team was conducted on an ongoing basis in order to formulate a project design which would avoid, by design and at source, any construction activities that could initiate potential water quality impacts. As a consequence, all aspects of the construction of the proposed windfarm and its layout adopted an avoidance by design approach. An example of this aspect of the avoidance by design approach is the fact that the windfarm roads and the turbine sites for the most part were located on the least ecologically sensitive areas found during the site investigation in order to minimise potential impacts. In addition, it was decided to remove if possible, from the projects design, all elements that could impinge on the conservation interests of the nearby Lower River Suir cSAC and the Lower River Shannon cSAC located downstream thereby avoiding impacts at source.

1.5.2 Desk Study

A desk study was carried out to collate available information on the proposal site's natural environment. This comprised a review of the following publications and datasets:

OSI Aerial photography and 1:50000 mapping;
National Parks and Wildlife Service (NPWS);
BirdWatch Ireland;
Teagasc soil area maps (NBDC website);
Geological Survey Ireland (GSI) area maps;
Environmental Protection Agency (EPA) water quality data;
Shannon River Basin District (ShRBD) datasets (Water Framework Directive);
South Eastern River Basin District (SERBD) datasets (Water Framework Directive); and
National Biodiversity Centre (NBDC) (on-line map-viewer).

1.5.3 Ecological Site Surveys

1.5.3.1 *Habitat surveying, mapping and evaluation*

Field surveys were conducted by ecologists during the month of June 2012. Habitats were categorised according to the Heritage Council's '*A Guide to Habitats in Ireland*' (Fossitt, 2000) to level 3.

The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.* 2011) published by the Heritage Council. Laminated A3 aerial

photography was used together with a GPS to accurately enable field navigation. Habitat categories, characteristic plant species and other ecological features and resources were recorded on waterproof field sheets.

Scientific and common names for plants follow Parnell *et al.* (2012) and Blamey *et al.* (1996), respectively. Habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcView 9.2.

1.5.3.2 *Water quality and aquatic habitat assessment*

In order to collect baseline water quality data and in order to conduct fisheries and riparian habitat evaluations, a programme of biological and physico-chemical water quality assessments were undertaken in the waterways draining the area of the proposed windfarm. Streams in the vicinity of the proposed development were surveyed by an ecologist on the 11th of June and 22nd of August, 2012. A total of six sampling points were strategically identified at locations within the catchment areas of the proposed Upperchurch Windfarm site in order to assess and give an indication on the water quality in the immediate area surrounding the proposed windfarm site.

Biological water quality monitoring refers to Q Value system of ranges where the relationship between water quality and the in-stream macroinvertebrate community is described in numerical terms. A Q value of 5 indicates very high water quality while a Q value of 1 indicates poor water quality. Kick sampling, where the river bed is disturbed using the foot immediately upstream of a kick net, which collects the sample, was conducted at five sampling stations just downstream of the study area. Macroinvertebrate samples were returned to the laboratory where species within each kick sample were identified to genus level. Differing macroinvertebrate species are assigned to a group according to its tolerance of or sensitivity to water pollution. A river is then assigned a Q value based on these groupings. Table 1, below indicates the relationship between Q values and water quality.

Table 1: Relationship between biotic index (Q-value) and water quality.

| Biotic Index | EPA Water Quality | Water Framework Directive Ecological Status | Quality Status |
|--------------|-------------------|---|----------------------------|
| Q5 | Good | High | Unpolluted Waters |
| Q4-5 | Fair - Good | High | |
| Q4 | Fair | Good | |
| Q3-4 | Doubtful - Fair | Moderate | Slightly Polluted Waters |
| Q3 | Doubtful | Poor | Moderately Polluted Waters |
| Q2-3 | Poor - Doubtful | Poor | |
| Q2 | Poor | Bad | Seriously Polluted Waters |
| Q1-2 | Bad - Poor | Bad | |
| Q1 | Bad | Bad | |

1.5.3.3 *Ornithological surveys*

Winter Hen Harrier Survey 2010/2011

Field surveys were undertaken at the proposed site in order to examine the usage and activity of hen harriers at the site during the winter of 2010/2011.

Vantage Point Observations

Vantage point observations were carried out in order to assess the level of raptor activity and purpose at the development site. These observations were carried out in accordance with NPWS hen harrier survey guidelines. Three (3) vantage point locations were selected in order to obtain maximum visibility of the site and habitats outside the site boundary.

Vantage point watches were of six (6) hours duration and the three vantage points were watched for a total of eighteen (18) hours per site visit. During the course of the survey from November 2010 to March 2011 the site was watched for a total of ninety (90) hours. The locations of the vantage points are illustrated in Figure 6-7 at the end of this report.

Summer Hen Harrier Survey 2011

Vantage Point Observations

Vantage point observations were carried out in order to assess the level of raptor activity and purpose at the development site during the summer of 2011. These observations were carried out in accordance with NPWS hen harrier survey guidelines. The vantage point locations chosen for the summer hen harrier survey remained the same as those chosen for the winter hen harrier survey.

Vantage point watches were of six (6) hours duration and the three vantage points were watched for a total of eighteen (18) hours per site visit. During the course of the summer survey from April to July 2011 the site was watched for a total of seventy two (72) hours. The locations of the vantage points are illustrated in Figure 6-7 at the end of this report.

Transect surveys

Winter Transect counts were undertaken on 19th January and 16th March 2011 at five locations across the site and their locations are illustrated in Figure 6-8 at the end of this report. Transect counts were undertaken on 19th May and 12th July 2011 at the same five locations as the winter bird survey.

1.5.3.4 *Otter survey*

A survey for signs of otters, including scat and evidence of otter holts, was carried out in conjunction with the programme of water quality assessments described above and during the ecological site visits.

1.5.4 Assessment of Potential Impact Significance

Once the potential impacts that may arise from the proposal are identified the significance of these is assessed through the use of key indicators:

Habitat loss;

Habitat alteration;
 Habitat or species fragmentation;
 Disturbance and/or displacement of species; and
 Water quality and resource.

In line with the EPA Guidelines (EPA, 2002), the following terms are defined when quantifying duration:

- Temporary: up to 1 year;
- Short-term: from 1-7 years;
- Medium-term: 7-15 years;
- Long-term: 15-60 years; and
- Permanent: over 60 years.

The criterion for confidence levels of the predicted likely impacts are given here in Table 1 as recommended by IEEM, (2006) and NRA, (2009).

Table 2: Confidence levels of predictions of likely impacts as outlined in NRA (2009) and IEEM (2006).

| Confidence level category | |
|---------------------------|---|
| Near certain | >95% chance of occurring as predicted |
| Probably | 50-95% chance of occurring as predicted |
| Unlikely | 5-50% chance of occurring as predicted |
| Extremely unlikely | <5% chance of occurring as predicted |

The impact significance criteria follow EPA guidance (EPA, 2002).

Table 3: Significance of impact (EPA, 2002).

| Significance of Impacts | Definition |
|--------------------------------|--|
| <i>Imperceptible Impact</i> | An impact capable of measurement but without noticeable consequences. |
| <i>Slight Impact</i> | An impact which causes noticeable changes in the character of the environment without affecting its sensitivities. |
| <i>Moderate Impact</i> | An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends. |
| <i>Significant Impact</i> | An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. |
| <i>Profound Impact</i> | An impact which obliterates sensitive characteristics. |

2 Stage 1 Screening

2.1 Management of Natura 2000 Site

The proposal is not connected with or necessary to the conservation management of a Natura 2000 site.

2.2 Description of Project

2.2.1 Brief Project Description

In this revision of the NIS for the RFI it is important to note that T22 has been moved 110m to the south. It is in the same habitat type, however, and it is now a distance of 419m (previously 458m) from the nearest watercourse and 2.1km (previously 2.0km) to the Slievefelim to Silvermines SPA.

It is proposed to construct the 22 turbine windfarm at a location situated approximately 1.9 km west of the village of Upperchurch and a further 18 km west of Thurles in County Tipperary. The turbines are numbered T01 to T22 and are arranged in four clusters as follows:

T01 to T08 are arranged around two hills at Shevry;

T09 to T16 are arranged around the hill at Knocknamena;

T17 to T21 are arranged around two hills at Knockmaroe and Foilnaman; and

T22 is a single turbine on the northeast side of the hill at Knockcurraghbola.

The individual clusters occur within a series of small hills or drumlins and are distributed over an area of 12km². 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 highest peak is that of Knockmaroe at an elevation of 411mOD (Grid Ref: R193372 160945). All of the proposed wind turbine locations are on elevated sloping ground with good natural drainage to the streams in the surrounding valley.

2.2.2 Purpose of the Project Proposal

The purpose of the project is to generate electricity from wind energy and to export to the national grid. It will produce pollution free electricity with the capacity to provide power, generating 150 million kWh, for up to 23,070 homes.

2.2.3 Description of the Site

The principal land uses within the greater area are pasture (dairy farming and dry cattle) and some blocks of conifer plantation occur within the site. The surrounding local landscape is a mixture of predominantly improved agricultural grassland, acidic grassland, upland blanket bog with some of this habitat forming mosaics with wet heath.

An ecological survey, conducted as part of the EIS associated with the proposed windfarm, determined that the habitats listed at Table 4, below, comprise the habitats in the area of the proposed windfarm.

It was clear from the ecological survey that the extent of upland blanket bog habitat within the site boundary and the greater geographical area was larger historically. Both the quality and extent of this habitat has been significantly reduced by peat-cutting and agricultural land management practises including drainage, grazing, fertilisation and reseeded. There is evidence of peat harvesting in the past with small areas of this habitat occurring within limited sections of the site where peat banks of up to 1.3 m can be seen.

The soil composition within the turbine cluster areas is, variously comprised of mosaics of ‘Surface water Gleys / Ground water Gleys acidic’, ‘Lithosols / Regosols’, ‘Podzols Peaty’, ‘Shallow Peaty Gleys’ and ‘Acid Brown Earths/ Brown Podzolics’. Bedrock at the location is ‘Silurian Metasediments and Volcanics’ with some rock outcropping, most notably at the northeast part of the site.. The Corine Landcover classes ‘Pasture’, ‘Bog’, ‘Other’ and ‘Forestry’ are the dominant types in the area around the windfarm and in the greater geographical area extending away from the proposal site¹.

Three first order streams situated adjacent to the proposed windfarm site drain 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.

The site drains to the different rivers as follows:

Suir Catchment

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 areas around turbines T19, T20, T21 and T22 drain in different directions to unnamed tributaries of the Clodiagh River to the north.

¹ Data in this paragraph from <http://maps.biodiversityireland.ie/#/Map> [accessed 06/09/2012]

Shannon Catchment

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.

2.2.4 Ecological description of the proposed Upperchurch Windfarm Site

2.2.4.1 Terrestrial Ecology

Habitat surveys were conducted by ecologists during the month of June 2012. Habitats were categorised according to the Heritage Council’s ‘A Guide to Habitats in Ireland’ (Fossitt, 2000) to level 3. A total of 13 habitats types were identified within the proposed Upperchurch Windfarm EIS study area. The predominant habitats within the site are improved agricultural grassland and conifer plantation.

See Volume 2 Chapter 6 Figure 6-4 A, B and C for a habitat map of the proposed Upperchurch Windfarm site. Site photographs of habitats are presented in Appendix 6-1, Volume 3. Table 4, below, lists the habitats recorded during the habitat survey with a qualitative description.

Table 4 Summary list of habitats recorded with spatial description

| Habitat (code) | Evaluation |
|---------------------------------------|---|
| Improved Agricultural Grassland (GA1) | There is an extensive cover of Improved Agricultural Grassland throughout the site. The habitat is not species rich (as per agricultural grassland) but is of value to species which forage within it. |
| Coniferous Plantation (WD4) | There are 5 stands of conifer plantation within the study area planted on heath/upland blanket bog habitat. The dense growth within this habitat means there is very little light penetration reducing the diversity of plant species at ground level. Some areas have been felled and replanted. The younger stands have much more diverse vegetation undergrowth. |
| Wet Grassland (GS4) | This habitat is common in the lower lying areas and along margins of streams of the site. The wet grassland habitat has been modified by the building of drains around the field boundaries, reseeding and the application of fertiliser. While generally species poor the habitat is considered to be of some ecological value. |
| Wet Heath (HH3) | An area to the west of T2 in the south eastern section is classified as wet heath. This area was dominated by bell heather and purple moor-grass. This area would be subject to cattle grazing. Peat depth is low, approximately 0.3m. Formed due to peat extraction. |
| Acid Grassland (GS3) | This habitat occurs mainly outside of the enclosed grassland farm areas in areas where no reclamation has taken place but is extensively grazed by cattle. This habitat occurs to the south east of turbines T3 and T4 and on steep slopes to the northwest of turbine T21. |
| Upland Blanket Bog (PB2) | Upland blanket bog is one of the least dominant habitats within the study area. The habitat has been degraded by previous peat extraction, land reclamation, conifer plantation, grazing and drainage. |
| Eroding/Upland River (FW1) | There are 3 small, first order streams within the study area. These streams are quite small. Extensive man made drainage features drain into these habitats to dry out the surrounding low lying landscape. |
| Hedgerow (WL1) | There is a network of hedgerows along the improved grassland field boundary throughout the site. |
| Drainage Ditches | Man-made features extending around the boundaries of lower lying |

| Habitat (code) | Evaluation |
|---|--|
| (FW4) | agricultural fields and conifer plantation within the study area. Many are large with some vegetation. |
| Spoil and Bare Ground (ED2) | The forestry and farm roads within the site fall into this habitat category and are dominated by compact gravel which is naturally occurring to the area |
| Buildings and Artificial Surfaces (BL3) | Habitat of very low ecological value. |
| Treelines (WL2) | There are some small sections of treelines within the study area which mostly occur along tree-lined roads. |
| Neutral Grassland (GS1) | One section of this habitat near turbine T22. |

2.2.4.2 Aquatic Ecology

A water quality assessment was undertaken of the waterways draining the proposed windfarm site to provide baseline water quality, fisheries and riparian habitat data. Watercourses in the vicinity were surveyed by an ecologist on the 11th of June and the 22nd August 2012. The survey results will provide a baseline for future monitoring to ensure that the existing water and habitat quality of watercourses within and adjacent to the site are maintained during the construction and operational phase of the proposed windfarm development.

The study area is situated on hills or drumlins with a number of streams that support the upper reaches of the Owenbeg, Clodiagh and Turraheen River catchments which drain to the Suir. Tributaries of the Clodiagh River drain the northern and central locations of the site while the southern and eastern portion of the site are drained by tributaries of the Owenbeg and Turraheen Rivers. The westerly cluster comprised of turbines T17 and T18 is drained by an unnamed tributary of the Aughvana River and is the only part of the overall site that forms part of the Shannon River Basin District.

A total of six sampling points were strategically identified at locations within the catchment area of the proposed Upperchurch Windfarm site in order to assess and give an indication on the water quality in the immediate area surrounding the proposed site. Table 5 below details the Grid References and Q value of each sampling station on which the survey was undertaken.

Table 5 List of Sampling Stations with Q values

| Sampling Station | Grid Reference | Location | Q Value |
|------------------|----------------|--|---------|
| 1 | 97973 61082 | Unnamed stream (east of site) which flows to the Owenbeg River | Q3 |
| 2 | 97336 59293 | Owenbeg river (east of site) | Q4 |
| 3 | 94363 59329 | Unnamed stream (southern section of the site) which flows to the Turraheen River | Q4 |
| 4 | 95056 62330 | Unnamed stream (central area of site) which flows to the Clodiagh River | Q4 |
| 5 | 94623 63001 | Unnamed stream (northern section of the site) which flows to the Clodiagh River | Q4-5 |
| 6 | 93464 59759 | Unnamed stream (southern section of the site) which flows to the Aughvana River | Q3 |

2.2.4.3 Physiochemical water quality

Table 2-6: Physiochemical water quality recorded at the Upperchurch site, Co. Tipperary.

| Parameter | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Salmonid Regulations S.I. No. 293 of 1988 | Surface Water Regulations S.I. No. 272 of 2009 |
|---------------------------------------|--------|--------|--------|--------|--------|--------|---|--|
| pH | 7.5 | 7.6 | 7.2 | 7.7 | 7.6 | 7.7 | >6 & <9 | |
| Alkalinity, mg/L as CaCO ₃ | 72.5 | 62.9 | 91.1 | 81.0 | 56.6 | 119 | | |
| Temperature | 11.28 | 11.98 | 10.03 | 12.29 | 12.46 | 12.10 | | |

| Parameter | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Salmonid Regulations S.I. No. 293 of 1988 | Surface Water Regulations S.I. No. 272 of 2009 |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--|---|
| Suspended solids mg/L | 3 | 2 | 6 | <2 | <2 | 18 | <25 | |
| BOD (mg/L) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | 1.4 | <5 | <2.2 |
| Nitrate(mg/L) NO ₃ -N | 1.08 | 0.73 | 2.07 | 1.23 | 0.65 | 1.95 | | |
| Nitrite (mg/L) NO ₂ -N | <0.005 | <0.005 | <.005 | <.005 | <.005 | 0.01 | <0.05 | |
| Sulphate (mg/L) | 5.14 | 4.85 | 5.70 | 4.78 | 4.56 | 4.36 | | |
| MRP, mg/L P | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.06 | | ≤0.035 |
| Total phosphorous P (mg/L) | 0.09 | <0.04 | 0.16 | 0.06 | 0.04 | <0.04 | | |
| Total dissolved phosphorous P (mg/L) | 0.09 | <0.04 | 0.12 | 0.06 | 0.04 | <0.04 | | |
| Particulate phosphorous (mg/L) | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | | |
| Ammonia | 0.03 | 0.02 | <0.02 | 0.03 | 0.02 | <0.02 | ≤ 1 | |
| Ammonia (unionised) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | ≤ 0.02 | |
| Metals | | | | | | | | |
| Iron (mg/L) | 0.251 | 0.146 | 0.025 | 0.089 | 0.110 | 0.16 | | |
| Aluminium (mg/L) | 0.019 | 0.042 | 0.023 | 0.037 | 0.024 | 0.05 | | |

Physiochemical water quality testing was undertaken on the 11th of June and 22nd of August 2012 at the same location as the Q value sampling to establish the baseline water quality of watercourses immediately downstream of the proposed windfarm.

Dissolved oxygen levels were >11mg/L in all the watercourses that were surveyed, indicating that all of the surface waters in the catchment areas had levels of oxygen capable of

supporting healthy salmonid populations as per the Salmonid Water Regulations (SI No. 293 of 1988). The pH levels at all sampling stations ranged between 7.5 and 7.7. These fall within the range >6 and <9 required under the Salmonid Water Regulations (S.I. No. 293 of 1988), required for balanced and healthy fish populations in the Salmonid Regulations.

Levels of unionised ammonia and nitrite recorded were within the thresholds specified in the Salmonid Regulations (S.I. No. 293 of 1988). Similarly the BOD levels were low with sites 1 through 5 inclusive, recording $<1.0\text{mg/L}$ BOD and site 6 recording the highest levels; 1.4mg/L BOD. All sites were in compliance with the Salmonid Water Regulations.

Ortho-phosphate (MRP) levels were similar across sampling sites with 0.01mg/L levels recorded at sites 1, 2, 3 and 5 with site 4 recording 0.2mg/L and site 6 recording the highest levels of 0.06mg/L . Sites 1 through 5 levels are below the levels recommended in the Surface Water Regulations (S.I. No. 272 of 2009) meeting the requirements of the regulation, however site 6 exceeds the ≤ 0.035 recommended levels.

The suspended solid levels were low for streams 1 through 5, with levels recorded ranging from 2mg/L to 6mg/L . The value at sampling station 6 was the highest at 18mg/L . All streams were in compliance with the threshold of $<25\text{mg/l}$ required under the Salmonid Water Regulations (S.I. No. 293 of 1988).

2.2.5 Characteristics of the Project (Construction Phase)

2.2.5.1 Size, scale, area, land-take

The proposed windfarm site does not require land take from a Natura 2000 or Ramsar site. The proposed windfarm site is made up of four sections distributed in separate clusters over an overall area of approximately 12km². The total proposed site footprint is 110,210 m²

2.2.5.2 Resource requirement

It is estimated that a total of 17,020m³ of material will be required for the widening of existing tracks and the construction of new access tracks for the proposed development. It is estimated that construction of the hardstand areas will involve a total volume of 31,100m³ of imported stone material. It is proposed to source the materials from at local registered quarries.

An average of 345m³ of imported concrete will be required for each base.

2.2.5.3 Transportation requirements

New and upgrading of existing access tracks will be required to facilitate construction and turbine traffic during the construction, operational and decommissioning phases.

It is proposed that the turbine components will be delivered either from Dublin port or Foynes port. If the components are delivered from Dublin Port they will be transported west along the M7 to the Nenagh by-pass and turn onto the R498 at Knockalton Upper. If the turbine components are delivered from Foynes Port they will be transported east on the M7 to the Nenagh by-pass and turn right on the R498 at Knockalton Upper. The traffic will then travel the R498 into Thurles and turnaround at the Tipperary Institute roundabout and travel back up the R498 for 2.5km in order to effect the turn left onto the R503 after the Racecourse. The vehicles will travel west along the R503 for 17.1km and turn left onto the proposed Upperchurch Windfarm site entrance at an existing field gate at Graniera. The turbine deliveries and construction traffic will also use entrances from the local roads at Knockmaroe, Knockcurraghbola Commons, Shevry, Grousehall and Knocknamena Commons. It is expected that construction materials will be transported along a similar route.

2.2.5.4 Equipment requirement

In association with the above materials the following is a non-exhaustive typical list of plant and equipment that may be required for construction:

30-50T Excavators;

Low ground pressure excavators (Bogmaster);

Mobile cranes for construction;

Rebar/shuttering/precast units/conc pipes/box culverts;

Cranes (1 main, 1 assist) Erection 120t to 800t;
 Dump trucks;
 Tractors and trailers;
 Double contained fuel bowsers;
 12t Rollers;
 Crushers;
 Screener;
 Diesel powered generators; and
 Water bowsers.

2.2.5.5 Excavation requirements

Implementation of the development will result in the removal of soil, subsoil and rock in parts of the site in order to facilitate the construction of access roads, the upgrade of existing farm roads, the substation compound, crane hard standings and turbine bases. This soil will be reused within the construction site for backfilling around turbine bases and for landscaping post construction.

The volumes of material to be excavated are summarised in Table 7 **Error! Reference source not found.**

Table 7 Volumes of material to be excavated

| Element | Topsoil (m ³) | Peat (m ³) | Subsoil (m ³) |
|------------------------------|---------------------------|------------------------|---------------------------|
| Turbine T01 | 540 | - | 4,281 |
| Turbine T02 | 527 | - | 3,832 |
| Turbine T03 | 481 | - | 2,160 |
| Turbine T04 | 540 | - | 4,281 |
| Turbine T05 | - | 570 | 5,318 |
| Turbine T06 | 540 | - | 4,281 |
| Turbine T07 | 545 | - | 4,433 |
| Turbine T08 | 518 | - | 3,255 |
| Turbine T09 | 545 | - | 4,433 |
| Turbine T10 | 507 | - | 3,160 |
| Turbine T11 | 498 | - | 2,725 |
| Turbine T12 | 550 | - | 4,798 |
| Turbine T13 | 540 | - | 4,281 |
| Turbine T14 | - | 520 | 3,603 |
| Turbine T15 | 520 | - | 3,603 |
| Turbine T16 | 518 | - | 3,255 |
| Turbine T17 | 505 | - | 2,928 |
| Turbine T18 | 505 | - | 2,928 |
| Turbine T19 | 498 | - | 2,725 |
| Turbine T20 | 518 | - | 3,255 |
| Turbine T21 | 505 | - | 2,928 |
| Turbine T22 | 507 | - | 3,160 |
| New roads | 13,050 | 900 | 0 |
| Widened roads | 2,070 | 360 | 0 |
| Sub-totals (m ³) | 25,527 | 2,855 | 79,623 |
| Total (m ³) | 107,500 | | |

2.2.5.6 Emissions during the lifetime of the project

Air pollutants from construction vehicles, plant, machinery or generators may include emissions of SO₂, NO_x, CO₂, and PM₁₀ (particulates). Any traffic generated by the construction phase will be temporary and of short duration and may cause a temporary, slight, negative impact within the site.

There are no air pollutants or emissions associated with the operational phase of the windfarm. As a result there will be a neutral impact on the local area during the operational phase. The operation of the windfarm will have a positive impact on the national air and climate environment however, through the provision of pollution-free electricity.

2.2.5.7 Waste Management

From a waste management perspective the project can be divided into three phases

Construction;

Operation/Maintenance; and

Decommissioning.

Construction phase waste may consist of hardcore, stone, concrete, steel reinforcement, shuttering timber and unused oil and diesel. This waste will be collected at the end of the construction phase and taken off site to be reused, recycled and disposed of in accordance with best practice procedures at an approved facility. Waste from toilets will be taken from site on a regular basis by approved contractors and disposed of in an authorised facility in accordance with best practice. Plastic waste will be taken for recycling by approved contractor and disposed or recycled at an approved facility.

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

Wastes generated during the decommissioning phase will be taken off site and disposed of appropriately.

2.2.5.8 Timescales

Once construction commences, it is estimated that the windfarm could be constructed within 8 months.

2.2.6 Description of construction

The first priority of the construction phase will be to construct the access road network, and associated drainage network, and upgrade the existing roads and the spine roads in particular

so that they are capped with limestone or similar quality stone to reduce the potential for road degradation. Vehicular movements will be restricted to the footprint of the proposed development, particularly with respect to the newly constructed access roads.

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

Construction of a temporary site compound;

Construction of the access tracks and associated drainage;

Construction of stream crossing;

Construction of the turbine foundations;

Construction of the hard stand areas for the turbine assembly and erection;

Turbine and ancillary equipment transport to the site;

Turbine erection;

Construction of the electrical control building; and

Laying of electrical cables.

2.2.6.1 Temporary site compound

A temporary site compound will be used at the site during the construction period for the safe storage of supplies and equipment, and the provision of toilet facilities (with temporary holding tank) and canteen facilities for construction staff. The holding tank will be emptied on a regular basis and taken to a wastewater treatment facility by a contractor with the appropriate waste collection permit. The compound and associated facilities will be removed on completion of construction and the area will be appropriately reinstated.

2.2.6.2 Access Roads

The construction phase of this project will require deliveries of material and turbines to the site. The access roads to the turbines and the site substation will consist of both existing tracks and newly constructed roads.

Importation of stone from local quarries for the construction of access roads and hard standings.

Construction of 8.0 km of 5.00m wide new roads; and

Widening and upgrading of 3.9 km of existing farm roads (average 2m widening).

All new roads will be excavated, built up with suitable material and capped with suitable material.

2.2.6.3 Drainage

Site drainage has been considered in the Sediment and Erosion Plan detailed in Appendix 15.2 Volume 3. of the EIS. This plan has been prepared to prevent sediment runoff and control erosion during the construction phase of the project. The plan has also been designed

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

2.2.6.4 *Clearfelling*

Prior to construction, clear-felling of approximately 4.35 ha area of conifer plantation will be required to facilitate the construction the proposed windfarm and associated infrastructure.

2.2.6.5 *Wind Turbine foundations and hardstands*

Excavation for the construction of 22 turbine bases with a minimum depth of 2.00m and 225m² plan area and hardstands with an excavation depth of 0.60m and 1,040m² plan area;

Each wind turbine will have a reinforced concrete base pad foundation with a central upstand above the base, which will support the tower. The foundation pad will bear onto rock or other such suitable bearing stratum.

The turbine foundations be backfilled with the materials removed during excavation. The surface vegetation and topsoil layer will be removed and stored adjacent to the foundation site, whilst excavation of the foundation progresses. This stored material will be used during reinstatement of the foundation area following the construction of each wind turbine foundation.

Erection of 23 turbines with hub heights of up to 85m and maximum tip height of up to 126.60m. Once erected the wind turbines will operate automatically, requiring visits on a periodic basis only. These visits, primarily for turbine servicing, will typically be made using four-wheel drive vehicles which will keep to access roads.

2.2.6.6 *Sub-station and grid connection*

Construction of an electrical substation compound and installation of associated equipment and laying of electrical cable between turbines and the substation compound will be required. The substation compound will measure 64m x 41m. The cabling from the proposed turbines of the Upperchurch Windfarm will link to the proposed sub-station on site. The cables linking the turbine transformers will be located underground to reduce visual impact. A trench of at least 1m deep and 0.5m wide will accommodate these cables.

2.2.7 Operation, decommissioning and restoration

The windfarm will have a projected commercial lifespan of 20-25 years during which time it will produce pollution free electricity with the capacity to provide power, generating 150 million kWh, for up to 23,070 homes. There will be maintenance during the operating period with operating and maintenance personnel typically using four-wheel drive vehicles to visit the site. The system may be readily upgraded at the end of its commercial life, or alternatively decommissioned.

If it is decided to decommission the windfarm at the end of its lifespan, the turbines, transformers, meteorological monitoring mast and substation will be dismantled and removed from the site following consultation with North Tipperary County Council. All associated hardstand areas will be remediated to match the surrounding landcover at the time. An environmental assessment will be undertaken at that time to ascertain whether or not it would be more or less environmentally damaging to remove or keep in place the underground cables and access tracks. All materials removed from the site will be treated in accordance with best practice waste management procedures and will be in consultation with North Tipperary County Council.

2.2.8 Identification of other projects or plans

There are a number of existing windfarms to the west and south of the site. These are listed at Table 8, below.

Table 8: Neighbouring Windfarms in the vicinity existing and permitted.

| Wind farm | Number of Turbines | Distance and direction from proposed site | Status |
|---------------------------|--------------------|---|-----------------|
| Knockastanna, Co Limerick | 4 | 8.1km S | Operating |
| Mienvee | 1 | 9km SW | Operating |
| Garracummer | 15 | 3.5km SW | In Construction |
| Falleennafinoga | 2 | 5.5km S | In Construction |
| Hollyford | 3 | 5.5km S | Permitted |
| Glencarbry | 9 | 6.3kn S | Permitted |
| Glenough | 14 | 3.2kn S | Operating |
| Cappagh White | 18 | 8.5km S | Permitted |
| Curraghraigue | 6 | 9.5km N | Operating |
| Knockmeale | 2 | 8.2km NW | Permitted |
| Knockastanna, Co Limerick | 4 | 8.1km S | Operating |

Other relevant projects and plans include:

Agriculture is one of the main land uses within the area. Land reclamation, drainage, reseeded, fertilisation, and intensive grazing has transformed the landscape of this area.

Forestry occurs within sections of the site, consisting of either mature or young conifer plantations. Felling has been carried out in sections and has been replanted with the youngest observed at the location of Turbine 22 standing at 1.5 meters high.

2.3 Identification of Natura 2000 sites

2.3.1 Zone of impact influence

The screening stage of AA involves compiling a ‘long list’ of European sites within a zone of potential impact influence for later analysis which may or may ultimately not be impacted upon by the proposal. All Natura 2000 sites within 15km of the proposal location will be characterised in the context of the rationale for designation and qualifying features, in accordance with NPWS guidance. Following this, the potential impacts associated with the proposal will be identified before an assessment is made of the likely significance of these impacts. Finally, in the conclusion of the screening stage, the Natura 2000 sites within 15km whose integrity will not be adversely impacted will be ruled out. If screening indicates sites will be affected it will be necessary to proceed to Stage 2, Appropriate Assessment for a more detailed assessment.

2.3.2 Identification of Natura 2000 and Ramsar sites

Adopting the precautionary principle in identifying potentially affected European sites, it has been decided to include all cSACs and SPAs/Ramsar sites, within a 15km radius of the proposed windfarm site. The Convention on Wetlands of International Importance especially as Waterfowl Habitat, more commonly known as the Ramsar Convention, was ratified by Ireland in 1984. Ramsar sites are also subject to AA screening. Although not specifically required, it would be considered best practice to include Ramsar sites (classified under the Ramsar Convention 1971) in the appropriate assessment process².

Table 9 below lists all designated cSACs and classified SPA sites (referred to as designated sites from hereon in) within 15km of the proposal site including their proximity.

Table 9: Designated conservation sites within a 15km radius of proposal site

| No. | Designated Site | Site Code | Proximity of site to nearest point of designated site |
|-----|--|-----------|--|
| 1 | Slievefelim to Silvermines Mountains SPA | 004165 | Adjacent to the western boundary of turbines T17 to T21. |
| 2 | Anglesey Road cSAC | 002125 | 2.55km south west of the proposed windfarm site. |
| 3 | Lower River Shannon cSAC | 002165 | 2.7km west of the site boundary (T17 to T21). |
| 4 | Lower River Suir cSAC | 002137 | 2.8km east of the proposed windfarm site and approximately 4.1km downstream. |
| 5 | Bolingbrook hill SAC | 002124 | 6.9km north west of the site |

² EPA, A Note on Waste Water Discharging Licence Appropriate Assessments

| No. | Designated Site | Site Code | Proximity of site to nearest point of designated site |
|-----|---------------------------------|-----------|---|
| | | | boundary (T17 to T21). |
| 6 | Keeper Hill SAC | 001197 | 10.7km north west of the site boundary (T17 to T21). |
| 7 | Silvermines mountains West SAC | 002258 | 11.25km north west of the site boundary (T17 to T21). |
| 8 | Kilduff, Devilsbit Mountain SAC | 000934 | 13.35km north east of the site boundary (T9 to T16) |
| 9 | Philipston Marsh SAC | 001847 | 13.6km south west of the site boundary (T1 to T8). |

2.3.3 Characteristics of Natura 2000 and Ramsar sites

Table 10, below, characterises the cSACs, SPA and Ramsar sites that lie within 15km of the proposal site by listing the qualifying features and other conservation interests (information pertaining to designated sites is from site synopses, conservation objectives and other information available on www.npws.ie and on the Ramsar website). The qualifying Features of Interest are the primary reasons for the European sites designation, for instance the endangered species that occupy the SAC; rare habitats that occur there; or threatened birds that breed or over-winter in the SPA.

Table 10: Designated conservation sites with qualifying Features of conservation Interest

| Designated Site | Site Code | Features of Interest |
|--|-----------|--|
| Slievefelim to Silvermines Mountains SPA | 004165 | Hen Harrier (<i>Circus cyaneus</i>) [A082] |
| Anglesey Road cSAC | 002125 | Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] |

| | | |
|---------------------------------|---------------|--|
| <p>Lower River Shannon cSAC</p> | <p>002165</p> | <p>Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] Sea lamprey (<i>Petromyzon marinus</i>) [1095] Brook lamprey (<i>Lampetra planeri</i>) [1096] River lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonizing mud and sand [1310] Spartina swards (<i>Spartinion maritimae</i>) [1320] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349] Otter (<i>Lutra lutra</i>) [1355] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> |
| <p>Lower River Suir cSAC</p> | <p>002137</p> | <p>Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] Sea lamprey (<i>Petromyzon marinus</i>) [1095] Brook lamprey (<i>Lampetra planeri</i>) [1096] River lamprey (<i>Lampetra fluviatilis</i>) [1099] Allis shad (<i>Alosa alosa</i>) [1102] Twaité shad (<i>Alosa fallax fallax</i>) [1103] Salmon (<i>Salmo salar</i>) [1106] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] Otter (<i>Lutra lutra</i>) [1355]</p> |

| Designated Site | Site Code | Features of Interest |
|---------------------------------|-----------|--|
| | | <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]</p> <p>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]</p> <p>Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0]</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p><i>Taxus baccata</i> woods of the British Isles [91J0]</p> |
| Bolingbrook hill SAC | 002124 | <p>Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]</p> <p>European dry heaths [4030]</p> <p>Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]</p> |
| Keeper Hill SAC | 001197 | <p>Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]</p> <p>Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]</p> <p>Blanket bog (*active only) [7130]</p> |
| Silvermines Mountains West SAC | 002258 | <p>Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010]</p> <p>European dry heaths [4030]</p> <p>Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]</p> <p>Blanket bog (*active only) [7130]</p> |
| Kilduff, Devilsbit Mountain SAC | 000934 | <p>European dry heaths [4030]</p> <p>Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]</p> |
| Philipston Marsh SAC | 001847 | <p>Transition mires and quaking bogs [7140]</p> <p>Alkaline fens [7230]</p> |

Conservation Objectives of the sites outlined in Table 10 above are included in Appendix 1.

2.3.4 Conservation Objectives

According to the Habitat's Directive, the *conservation status of a natural habitat* will be taken as 'favourable' when:

its natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable as defined below.

According to the Habitat's Directive, the *conservation status of a species* means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The *conservation status* will be taken as 'favourable' when:

population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, *and* the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, *and* there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

These conservation objectives are of a wide-ranging nature and most of the conservation objectives developed by NPWS for Natura 2000 sites area are adapted from these and are published on line by the NWPS as 'Generic Conservation Objectives' documents. The available documents are included in Appendix 2. Site specific Conservation Management Plans have been developed for some sites listed at Table 10, above, namely Bolingbrook Hill, Keeper Hill and Kilduff, Devilsbit Mountain SACs and these documents are published on line at www.npws.ie.

Figures 2 and 3 at the end of this chapter show the Natura 2000 Sites located within 15 km of the proposed development site. No Ramsar Sites were recorded within 15 km of the proposed development. Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) have been omitted from the list as they outside the scope of the Appropriate Assessment. The potential impact to these sites is discussed in Ecology chapter of the main EIS document Chapter 6, Volume 2.

2.3.5 Identification of Potential Impacts

Potential impacts are identified in this section. Only those features of the development that have the potential to impact on qualifying features, conservation interests and conservation objectives of the identified Natura 2000 sites are considered.

| | |
|--|--|
| <p><i>Description of elements of the project likely to give rise to impacts on Natura 2000 sites.</i></p> | <ul style="list-style-type: none"> • Use of plant machinery and associated fuels and oils. • Increased levels of disturbance due to human activities during the construction phase. • Waste generation during construction phase. • Excavations for turbine bases, roads etc. • Extension of the existing road network footprint and associated drainage. • Near and in stream works required for road network stream crossings. • Felling of 4.35 ha. of pre-thicket and post thicket conifer plantation |
| <p><i>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on Natura 2000 sites by virtue of:</i></p> <ul style="list-style-type: none"> • <i>Size and scale;</i> • <i>Land-take;</i> • <i>Distance from Natura 2000 Site or key features of the Site;</i> • <i>Resource requirements;</i> • <i>Emissions;</i> • <i>Excavation requirements;</i> • <i>Transportation requirements;</i> • <i>Duration of construction, operation etc.; and</i> • <i>Other.</i> | <ul style="list-style-type: none"> • Construction phase excavations to be conducted within the catchment of a headwater of an SAC designated for the protection of riparian habitats and species have the potential to initiate point source pollution events. • Soil exposed during construction phase could potentially be transferred via surface water runoff to water courses. • Construction of road network, and its associated drainage network, introduces a potential pollution pathway enabling the transfer of pollutants to ground and surface water during construction and operational phases. • Fugitive noise from construction phase activity and human presence could create disturbance impacts on animal species present within the zone of impact influence. • Movement of plant and machinery: Most of the traffic movement within the site will be over existing excavated tracks. • Ground stability: The approach to and method of excavation of rock and earth materials is very important for ground stability. Interference with the existing ground stability conditions by inappropriate excavation methods such as continuous vehicular movement over excavated soil must be mitigated by appropriate construction methods. • Storage, Stockpiles and Waste Generation: Of significance during the construction phase of the |

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| | <p>project is the handling of excavated materials, their storage and re-use. There is potential for negative direct and indirect short-term minor impact on ground stability and negative direct and indirect short-term moderate to significant impact on water quality, for example slope failure due to excessive loading (surcharge) > 1m in height and the resultant release of peat washings and suspended solids to the surface water system.</p> <ul style="list-style-type: none"> • Use of Fuels and Oils: The plant equipment that will be used during the construction stage is run on hydrocarbons. This implies that mobile equipment will require regular refuelling from a fuelling station, which is likely to be stored on site or will be supplied by a truck / tanker that will be scheduled to re-fuel the plant directly. This poses the potential for spillage and leakage of hydrocarbons from plant equipment and associated transfer stations during the construction phase of this project. |
| <p><i>Describe any likely changes to the site arising as a result of:</i></p> <ul style="list-style-type: none"> • <i>Reduction of habitat area;</i> • <i>Disturbance of key species;</i> • <i>Habitat or species fragmentation;</i> • <i>Reduction in species density;</i> • <i>Changes in key indicators of conservation value; and</i> • <i>Climate change.</i> | <ul style="list-style-type: none"> • Due to the alteration of the environment rainwater falling on the development footprint will follow a new drainage regime. • Detrimental water quality impacts could cause significant changes in the water quality influencing the conservation status of the aquatic habitats and designated species creating disturbance or displacement impacts. |
| <p><i>Describe any likely impacts on the Natura 2000 site as a whole in terms of:</i></p> <ul style="list-style-type: none"> • <i>Interference with the Key relationships that define the structure of the site; and</i> • <i>Interference with key relationships that define the function of the site.</i> | <p>Detrimental water quality impacts could cause significant interference with the key relationships that define the structure and function of the site.</p> |
| <p><i>Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be</i></p> | <p>The combined elements of the construction phase could potentially create significant impacts in aquatic habitats in streams adjacent to the site and in the Natura 2000 site to which they drain.</p> |

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| <i>significant or where the scale of magnitude of impacts is not known.</i> | |
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2.4 Assessment of Significance of Potential Impacts

This section considers the list of sites identified in section 2.3 above. The magnitude/extent, probability and duration of significant impacts affecting these sites are examined in the following sections.

It is considered that the proposed windfarm development does not include any element that has the potential to significantly alter the favourable conservation status of species and habitats for which certain Natura 2000 sites, and considered in this document, are designated. It is considered that these sites are outside the zone of impact influence of the proposed windfarm and that the conditions required to initiate a potential ‘source-pathway-target’ vector connecting the proposed windfarm to these designated sites will not be created. It is further considered that no potential impact pathway connects these designated sites to the location of the proposed works and, therefore, it is objectively concluded that no impact on these sites is reasonably foreseeable as a result of the proposed windfarm. These sites are listed below and will not be considered further in this document.

Anglesey Road cSAC (002125)

Bolingbrook hill SAC (002124)

Kilduff, Devilsbit Mountain SAC (000934)

Silvermines mountains West SAC (002258)

Keeper Hill SAC (001197)

Philipston Marsh SAC (001847)

Therefore, the assessment of significance of potential impacts that follows focuses on the remaining designated sites. These sites are:

Lower River Shannon cSAC (002165)

Lower River Suir cSAC (002137)

Slievefelim to Silvermines Mountains SPA (004165)

The potential for significant impacts on the remaining three Natura 2000 Sites arising from the proposal was determined based on a number of indicators including:

Habitat loss;

Habitat alteration;

Habitat or species fragmentation;

Disturbance and/or displacement of species;

Water quality and resource.

2.4.1 Habitat Loss and Alteration

The proposal considered in this document does not require any land take from any Natura 2000 or Ramsar site. It is considered that no significant habitat loss or alteration impacts, within any of the designated sites considered in this document, are reasonably foreseeable as a result of the proposal considered in this document. Indirect impacts on aquatic habitats are assessed in section 2.4.3 below.

2.4.2 Habitat or Species Fragmentation

Bearing in mind the size, scale and duration of the proposed windfarm and its location relative to the relevant designated sites, it is considered that no significant habitat or species fragmentation impacts are reasonably foreseeable within any of the designated sites considered in this document, as a result of the proposal considered in this document.

2.4.3 Disturbance and/or displacement of species

The species, for which the Natura 2000 sites are designated, can be separated into Aquatic, Terrestrial/Riparian and Avian categories as follows:

2.4.3.1 Aquatic

Sea lamprey (*P. marinus*) [Lower River Suir cSAC and Lower River Shannon cSAC]
 Brook lamprey (*L. planeri*) [Lower River Suir cSAC and Lower River Shannon cSAC]
 River lamprey (*L. fluviatilis*) [Lower River Suir cSAC and Lower River Shannon cSAC]
 Salmon (*S. salar*) [Lower River Suir cSAC and Lower River Shannon cSAC]
 Freshwater pearl mussel (*M. margaritifera*) [Lower River Suir cSAC and Lower River Shannon cSAC]
 White-clawed crayfish (*A. pallipes*) [**Lower River Suir cSAC**]
 Allis shad (*Alosa alosa*) [**Lower River Suir cSAC**]
 Twait shad (*A. fallax fallax*) [**Lower River Suir cSAC**]
 White-clawed crayfish (*A. pallipes*) [**Lower River Suir cSAC**]
 Bottle-nosed dolphin (*T. truncatus*) [1349] [**Lower River Shannon cSAC**]
 Aquatic species are considered further in section 2.5.4 Water Quality.

2.4.3.2 Terrestrial/Riparian

Otter (*L. lutra*) [Lower River Suir cSAC and Lower River Shannon cSAC]

2.4.3.3 Avian

Hen harrier (*Circus cyaneus*) [Slievefelim to Silvermines Mountains SPA]

There is the potential that some of the species maybe impacted by the proposed development and this will be considered further in the Natura Impact Statement.

2.4.4 Water Quality

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 [The Lower River Suir cSAC (Site Code:002137)] 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 [Lower River Shannon cSAC (Site Code:002165)]. The watercourses both within and adjacent to the site boundary are tributaries of both the Lower River Suir and the Lower River Shannon cSAC.

No work will take place within 50m buffer zones of watercourses, except at clear span bridges or culverts and associated road construction. A total of three first order streams occur within the site boundary. One stream/river crossing will be required approximately 254 m to the north of Turbine 4. All construction method statements will be prepared in consultation with Inland Fisheries Ireland.

Roadside drainage will be an integral part of the proposed Upperchurch Windfarm considered in this document. The construction of new roads and the upgrading and widening of existing farm roads will comprise of an integrated set of drainage and sediment control measures which will allow pollution control attenuation prior to discharge across ground rather than to surface water, thereby preventing water runoff from entering watercourses directly.

While the water quality in the Lower River Suir cSAC and the Lower River Shannon cSAC is not in itself a feature of qualifying interest of the SACs it is the case that adverse impacts to their water chemistry could have indirect impacts on the conservation interests of the site; for example by affecting the distribution and density of white-clawed crayfish and the Fresh water pearl mussel or the distribution and density of salmonids which in turn could, potentially, affect the availability of prey for otter.

2.4.4.1 Lower River Suir cSAC (Site Code: 002137)

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.

A number of fish species listed under Annex II of the EU Habitats Directive occur within the Suir catchment. These include Atlantic salmon (*S.salar*). All three lamprey species: sea lamprey (*Petromyzon marinus*), river lamprey (*Lamprera fluviatilis*) and brook lamprey (*Lampetra planeri*), which are likely to occur throughout much of the catchment. Allis shad

(*Aloso aloso*) and twaite shad (*Alosa fallax fallax*) which occur in Waterford Harbour and tidal sections of the lower River Suir at least as far upstream as Carrick-on-Suir.

A number of protected invertebrates also occur within the Suir catchment which include the freshwater pearl mussel (*Margaritifera margaritifera*) and the White clawed crayfish (*A. pallipes*).

A fishery survey of the River Suir Catchment and Management Recommendations was prepared by the Regional Fisheries Board on behalf of the SE Region Fisheries Board in 2006. The major objective of the assessment was to establish the status of fish stocks in relation to the ecology of the Suir and its tributaries, and to use this data to generate focused management programmes. The Suir is recognised as a premier brown trout angling fishery and also a major salmon fishery. In 2005 the Suir was ranked as the 4th best salmonid river in Ireland, based on angling returns (CFB, 2006).

2.4.4.2 Lower River Shannon cSAC (Site Code: 002165)

The south western boundary of the proposed Upperchurch is within the Shannon River Basin District and drains to the Aughvane River and ultimately to the Mulkear River which is part of the Lower River Shannon cSAC.

The Lower River Shannon cSAC is a very large site stretching along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. 4 species of fish listed on Annex II of the EU Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), and Salmon (*Salmo salar*). The three lampreys and Atlantic salmon have all been observed spawning in the lower Shannon or its tributaries. Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the EU Habitats Directive, occurs abundantly in parts of the Cloon River.

2.4.4.3 Conclusion

With regard to the conservation interests of the Lower River Shannon cSAC and the Lower River Suir cSAC it is noted that there is the potential for an unmitigated impact as a result of the proposed development. This impact and proposed mitigations are discussed further in the Natura Impact Statement.

2.5 Conclusion of screening stage

In conclusion, to determine the potential impacts, if any, of the proposed windfarm on nearby Natura 2000/Ramsar sites, a screening process for AA was undertaken. The proposed development is within 15km of 9 Natura 2000 Sites. There are no Ramsar sites within 15km of the proposed development.

In concluding the above assessments of significance, it has been shown that there will be no potential impact to the following sites as a result of the proposed development:

Anglesey Road cSAC (002125)
Bolingbrook hill SAC (002124)
Kilduff, Devilsbit Mountain SAC (000934)
Silvermines mountains West SAC (002258)
Keeper Hill SAC (001197)
Philipston Marsh SAC (001847)

However, the proposed project could have potential negative ecological affects on three Natura Sites namely the *Lower River Shannon cSAC*, *Lower River Suir cSAC* and *Slievefelim to Silvermines Mountains SPA*.

Hence, the recommendation of the screening process is to proceed to Stage 2; Statement for Appropriate Assessment for three Natura 2000 Sites:

Lower River Shannon cSAC (Site code: 002165);
Lower River Suir cSAC (002137); and
Slievefelim to Silvermines Mountains SPA (004165)

3 Natura Impact Statement

3.1 Introduction

The main objective of Stage 2 of the Appropriate Assessment process is to consider the impact of the project or plan on the integrity of the Natura 2000 and Ramsar Sites, either alone or in combination with other projects, with respect to the conservation objectives of the sites and to identify and assess mitigation measures against any adverse effects the plan or project is likely to cause. Following the screening stage of the Appropriate Assessment, three Natura 2000 Sites were identified that may potentially be impacted by the proposed development are described below followed by further descriptions and details of the characteristics of the proposal. The potential impacts resulting from the unmitigated construction phase of the proposal, and from its operational phase, are then discussed in relation to the conservation objectives of the sites. Mitigation measures where appropriate are presented in below in Section 3.7.

3.1.1 Information sources

Information from the following sources was used to compile the Natura Impact Assessment:

- Winter Bird Survey – November 2010 to March 2011 (Volume 2, Chapter 6);
- Summer Bird Survey – April 2011 to August 2011 (Volume 2, Chapter 6);
- Habitat survey of the site – conducted by ecologists during the month of June 2012 (Volume 2, Chapter 6);
- Mammal survey conducted in conjunction with the habitat survey (Volume 2, Chapter 6);
- The geotechnical stability assessment (Volume 3, Appendix 3-A);
- National Biodiversity Centre Mapping System³
- National Parks and Wildlife Services (NPWS); and
- BirdWatch Ireland;

Publications that are used here and not referenced specifically include:

- Lynas, P., Newton, S.F., and Robinson, J.A. (2007). The status of birds in Ireland: an analysis of conservation concern 2008-2013. *Irish Birds*, 8: 149-167.
- Crowe, O., 2005. Ireland's Wetlands and their Waterbirds: status and distribution. BirdWatch Ireland.
- Gibbons, D.W., Reid, J.B. and R.A. Chapman, 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991*. British Trust for Ornithology, 1993.
- Dempsey, E and O' Clery, M. (2010). *The Complete Field Guide to Ireland's Birds*.
- Commission of the European Communities (2003). *Interpretation manual of European Union Habitats-EUR 25*. DG Environment-Nature and Biodiversity. Brussels.

³ Available at : <http://maps.biodiversityireland.ie/#/Home> [accessed on various dates July, August 2012]

3.2 Description of the Project

A detailed description of the characteristics is outlined at section 2.2.5 above and further detail is presented in Chapter 2 of the EIS.

3.3 Characteristics of Natura 2000 Sites

The NPWS site synopses of the Natura 2000 Sites are provided below to describe the site in more detail. The dates on which the site synopses were written are included at the end of each synopsis.

3.3.1 The Lower River Shannon candidate Special Area of Conservation (cSAC) (Site code: 002165) site synopsis (NPWS)

This very large cSAC stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The Shannon and Fergus flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian Rocks and the western stretches through Carboniferous Limestone. The Mulkear flows through Lower Palaeozoic Rocks in the upper reaches before passing through Namurian Rocks, followed by Lower Carboniferous Shales and Carboniferous Limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates. Rivers within the subcatchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarraiff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigne River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulmasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River Estuary. Both the Fergus and inner Shannon estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulmasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some Eel-grass beds (*Zostera* spp.) and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community, which has been noted from the

inner Shannon and Fergus estuaries, is a Macoma- Scrobicularia-Nereis community. In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate: swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and Club-rushes (*Scirpus maritimus*, *S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triquetrus*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).

Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus Estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh Grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Seaspurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus Estuary: a type of robust Saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the compass of Common Saltmarsh-grass (*Puccinellia maritima*) and Hard-grass (*Parapholis strigosa*). Saltmarsh vegetation also occurs around a number of lagoons within the site. The two which have been surveyed as part of a National Inventory of Lagoons are Shannon Airport Lagoon and Cloonconeen Pool. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland.

Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa*, *Cerastoderma glaucum*, *Lekanesphaera hookeri*, *Palaemonetes varians*, *Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of Stonewort (*Chara canescens* and *Chara* cf. *connivens*).

Most of the site west of Kilredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris*), Sea Champion (*Silene maritima*), Thrift and Plantains (*Plantago* spp.). A

rare endemic Sea Lavender (*Limonium recurvum* subsp. *pseudotranswallinum*) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the cSAC. The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include the following:

Stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).

Shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).

Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.

Sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Flowing into the estuaries are a number of tidal rivers. Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Seminatural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, however, improved grassland is most common. One grassland type of particular conservation

significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*). Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis*. The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*), Elm (*Ulmus glabra*, *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich. Woodland is infrequent within the site, however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmateia*) and Pendulous Sedge (*Carex pendula*). In the low hills to the south of the Slievefelim mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2 km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula* spp.), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features. The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places.

There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5 km north west of Cappamore Co. Limerick. The bog contains some wet areas with good moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site. A number of plant species that are Irish Red Data Book species occur within the site - several are protected under the Flora (Protection) Order, 1999: Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary.

Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City.

Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill.

Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynes area.

Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary.

Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon.

Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to be confirmed.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94. Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank. A number of species listed on Annex I of the E.U. Birds Directive breed within the cSAC site. These include Peregrine Falcon (2-3 pairs),

Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site. Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey. Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon. Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River. There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through overgrazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale. In the past, Cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds

and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

17.05.2005

3.3.2 Lower River Suir SAC (Site Code: 002137) site synopsis (NPWS)

This site consists of the freshwater stretches of the River Suir immediately south of Thurles, the tidal stretches as far as the confluence with the Barrow/Nore immediately east of Cheekpoint in Co. Waterford and many tributaries including the Clodiagh in Co. Waterford, the Lingaun, Anner, Nier, Tar, Aherlow, Multeen and Clodiagh in Co. Tipperary. The Suir and its tributaries flows through the counties of Tipperary, Kilkenny and Waterford. Upstream of Waterford city, the swinging meanders of the Suir crisscross the Devonian sandstone rim of hard rocks no less than three times as they leave the limestone-floored downfold below Carrick In the vicinity of Carrick-on-Suir the river follows the limestone floor of the Carrick Syncline. Upstream of Clonmel the river and its tributaries traverse Upper Palaeozoic Rocks, mainly the Lower Carboniferous Visean and Tournaisian. The freshwater stretches of the Clodiagh River in Co. Waterford traverse Silurian rocks, through narrow bands of Old Red Sandstone and Lower Avonian Shales before reaching the carboniferous limestone close to its confluence with the Suir. The Aherlow River flows through a Carboniferous limestone valley, with outcrops of Old Red Sandstone forming the Galtee Mountains to the south and the Slievenamuck range to the north. Glacial deposits of sands and gravels are common along the valley bottom, flanking the present-day river course. The site is a candidate SAC selected for the presence of the priority habitats on Annex I of the E.U. Habitats Directive - alluvial wet woodlands and Yew Wood. The site is also selected as a candidate SAC for floating river vegetation, Atlantic salt meadows, Mediterranean salt meadows, old oak woodlands and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon and Otter.

Alluvial wet woodland is declining habitat in Europe as a result of drainage and reclamation. The best examples of this type of woodland in the site are found on the islands just below

Carrick-on-Suir and at Fiddown Island. Species occurring here include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Grey Willow (*S. cinerea*), Osier (*S. viminalis*), with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Angelica (*Angelica sylvestris*), Pendulus Sedge (*Carex pendula*), Meadowsweet (*Filipendula ulmaria*) and Valerian (*Valeriana officinalis*). The terrain is littered with dead trunks and branches and intersected with small channels which carry small streams to the river. The bryophyte and lichen floras appear to be rich and require further investigation. A small plot is currently being coppiced and managed by National Parks and Wildlife. In the drier areas the wet woodland species merge with other tree and shrub species including Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*). This adds further to the ecological interest of this site.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the flood-plain of the river is intact. Characteristic species of the habitat include Meadowsweet (*Filipendula ulmaria*), Purple Loosestrife (*Lythrum salicaria*), Marsh Ragwort (*Senecio aquaticus*), Ground Ivy (*Glechoma hederacea*) and Hedge Bindweed (*Calystegia sepium*).

Old oak woodlands are also of importance at the site. The best examples are seen in Portlaw Wood which lies on both sides of the Clodiagh River. On the south-facing side the stand is more open and the Oaks (mainly *Quercus robur*) are well grown and spreading. Ivy (*Hedera helix*) and Bramble (*Rubus fruticosus*) are common on the ground, indicating relatively high light conditions. Oak regeneration is dense, varying in age from 0-40 years and Holly (*Ilex aquifolium*) is fairly common but mostly quite young. Across the valley, by contrast, the trees are much more closely spaced and though taller are poorly grown on average. There are no clearings; large Oaks extend to the boundary wall. In the darker conditions, Ivy is much rarer and Holly much more frequent, forming a closed canopy in places. Oak regeneration is uncommon since there are as yet few natural clearings. The shallowness of the soil on the northfacing slope probably contributes to the poor tree growth there. The acid nature of the substrate has induced a “mountain” type Oakwood community to develop. There is an extensive species list present throughout including an abundance of mosses, liverworts and lichens. The rare lichen *Lobaria pulmonaria*, an indicator of ancient woodlands, is found.

Inchinsquillib Wood consists of three small separate sloping blocks of woodland in a valley cut by the young Multeen River and its tributaries through acidic Old Red Sandstone, and Silurian rocks. Two blocks, both with an eastern aspect, located to the north of the road, are predominantly of Sessile oak (*Quercus petraea*) and Hazel, with Downy Birch (*Betula pubescens*), Ash and Holly. The ground flora is quite mixed with for example Wood sedge (*Carex sylvatica*), Bluebell (*Hyacinthoides non-scriptus*), Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Pignut (*Conopodium majus*) and Hard fern (*Blechnum spicant*). The base poor nature of the underlying rock is, to some extent masked by the overlying drift. The third block, to the south of the road, and with a northern aspect, is a similar although less

mature mixture of Sessile Oak, Birch and Holly, the influence of the drift is more marked, with the occurrence of Wood anemone (*Anemone nemorosa*) amongst the ground flora.

Floating river vegetation is evident in the freshwater stretches of the River Suir and along many of its tributaries. Typical species found include Canadian Pondweed (*Elodea canadensis*), Milfoil (*Myriophyllum* spp.), Fennel Pondweed (*Potamogeton pectinatus*), Curled Pondweed (*P. crispus*), Perfoliate Pondweed (*P. perfoliatus*), Pond Water-crowfoot (*Ranunculus peltatus*), other Crowfoots (*Ranunculus* spp.) and the moss *Fontinalis antipyretica*. At a couple of locations along the river, Oppositeleaved Pondweed (*Groenlandia densa*) occurs. This species is protected under the Flora (Protection) Order, 1999.

The Aherlow River is fast-flowing and mostly follows a natural unmodified river channel. Submerged vegetation includes the aquatic moss *Fontinalis antipyretica* and Stream Water-crowfoot (*Ranunculus pencillatus*), while shallow areas support species such as Reed Canary-grass (*Phalaris arundinacea*), Brooklime (*Veronica beccabunga*) and Water Mint (*Mentha aquatica*). The river bank is fringed in places with Alder (*Alnus glutinosa*) and Willows (*Salix* spp.).

The Multeen River is fast flowing, mostly gravel-bottomed and appears to follow a natural unmodified river channel. Water Crowfoots occur in abundance and the aquatic moss *Fontinalis antipyretica* is also common. In sheltered shallows, species such as Water-cress (*Rorippa nasturtium-aquaticum*) and Water-starworts (*Callitriche* spp.) occur. The river channel is fringed for most of its length with Alder, Willow and a narrow strip of marshy vegetation.

Salt meadows occur below Waterford City in old meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing rivers below Little Island. There are very narrow, non-continuous bands of this habitat along both banks. More extensive areas are also seen along the south bank at Ballynakill, the east side of Little Island, and in three large salt meadows between Ballynakill and Cheekpoint. The Atlantic and Mediterranean sub types are generally intermixed. The species list is extensive and includes Red Fescue (*Festuca rubra*), Oraches (*Atriplex* spp.), Sea Aster (*Aster tripolium*), Sea Couch Grass (*Elymus pycnanthus*), frequent Sea Milkwort (*Glaux maritima*), occasional Wild Celery (*Apium graveolens*), Parsley Water-dropwort (*Oenanthe lachenalii*), English Scurvygrass (*Cochlearia anglica*) and Sea Arrowgrass (*Triglochin maritima*). These species are more representative of the Atlantic sub-type of the habitat. Common Cord-grass (*Spartina anglica*), is rather frequent along the main channel edge and up the internal channels. The legally protected (Flora (Protection) Order, 1999) Meadow Barley (*Hordeum secalinum*) grows at the landward transition of the saltmarsh. Sea Rush (*Juncus maritimus*), an indicator of the Mediterranean salt meadows, also occurs.

Other habitats at the site include wet and dry grassland, marsh, reed swamp, improved grassland, coniferous plantations, deciduous woodland, scrub, tidal river, stony shore and mudflats. The most dominant habitat adjoining the river is improved grassland, although

there are wet fields with species such as Yellow Flag (*Iris pseudacorus*), Meadow Sweet (*Filipendula ulmaria*), Rushes (*Juncus* spp.), Meadow Buttercup (*Ranunculus acris*) and Cuckoo Flower (*Cardamine pratensis*).

Cabragh marshes, just below Thurles, lie in a low-lying tributary valley into which the main river floods in winter. Here there is an extensive area of Common Reed (*Phragmites australis*) with associated marshland and peaty fen. The transition between vegetation types is often well displayed. A number of wetland plants of interest occur, in particular the Narrow-leaved Bulrush (*Typha angustifolia*), Bottle Sedge (*Carex rostrata*) and Blunt-flowered Rush (*Juncus subnodulosus*). The marsh is naturally eutrophic but it has also the nutritional legacy of the former sugar factory which discharged into it through a number of holding lagoons, now removed. Production is high which is seen in the size of such species as Celery-leaved Buttercup (*Ranunculus sceleratus*) as well as in the reeds themselves.

Throughout the Lower River Suir site are small areas of woodland other than those described above. These tend to be a mixture of native and non-native species, although there are some areas of semi-natural wet woodland with species such as Ash and Willow. Cahir Park Woodlands is a narrow tract of mixed deciduous woodland lying on the flatlying floodplain of the River Suir. This estate woodland was planted over one hundred years ago and it contains a large component of exotic tree species. However, due to original planting and natural regeneration there is now a good mix of native and exotic species. About 5km north west of Cashel, Ardmayle pond is a long, possibly artificial water body running parallel to the River Suir. It is partly shaded by planted Lime (*Tilia* hybrids), Sycamore (*Acer pseudoplatanus*) and the native Alder. Growing beneath the trees are shade tolerant species such as Remote sedge (*Carex remota*).

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (*Margaritifera margaritifera* and *M. m. durrovensis*), Freshwater Crayfish (*Austroptamobius pallipes*), Salmon (*Salmo salar*), Twaite Shad (*Alosa fallax fallax*), three species of Lampreys - Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*) and River Lamprey (*Lampetra fluviatilis*) and Otter (*Lutra lutra*). This is one of only three known spawning grounds in the country for Twaite Shad.

The site also supports populations of several other animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat (*Myotis daubentoni*), Natterer's Bat (*M. nattereri*), Pipistrelle (*Pipistrellus pipistrellus*), Pine Marten (*Martes martes*), Badger (*Meles meles*), the Irish Hare (*Lepus timidus hibernicus*), Smelt (*Osmerus eperlanus*) and the Frog (*Rana temporaria*). Breeding stocks of Carp are found in Kilsheelan Lake. This is one of only two lakes in the country which is known to have supported breeding Carp. Carp require unusually high summer water temperatures to breed in Ireland and the site may therefore support interesting invertebrate populations.

Parts of the cSAC site have also been identified as of ornithological importance for a number of Annex I (EU Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from 4 count areas within the site for the three winters between 1994 and 1997. Wintering populations of migratory birds use the site. Flocks are seen in Coolfinn Marsh and also along the reedbeds and saltmarsh areas of the Suir. Coolfinn supports nationally important numbers of Greylag Geese on a regular basis. Numbers between 600 and 700 are recorded. Other species occurring include Mallard (21), Teal (159), Widgeon (26), Tufted Duck (60), Pintail (4), Pochard (2), Little Grebe (2), Black-tailed Godwit (20), Oystercatcher (16), Lapwing (993), Dunlin (101), Curlew (195), Redshank (28), Greenshank (4) and Green Sandpiper (1). Nationally important numbers of Lapwing (2750) were recorded at Faithlegg in the winter of 1996/97. In Cabragh marshes there is abundant food for surface feeding wildfowl which total at 1,000 or so in winter. Widgeon, Teal and Mallard are numerous and the latter has a large breeding population - with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the EU Birds Directive, occurs along some of the many tributaries throughout the site.

Landuse at the site consists mainly of agricultural activities including grazing, silage production, fertilising and land reclamation. The grassland is intensively managed and the rivers are therefore vulnerable to pollution from run-off of fertilisers and slurry. Arable crops are also grown. Fishing is a main tourist attraction on stretches of the Suir and some of its tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. The Aherlow River is a designated Salmonid Water under the EU Freshwater Fish Directive. Other recreational activities such as boating, golfing and walking are also popular. Several industrial developments, which discharge into the river, border the site including three dairy related operations and a tannery.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitat Alluvial Forest. The site also supports populations of several Annex II animal species and a number of Red Data Book animal species. The presence of two legally protected plants (Flora (Protection) Order, 1999) and the ornithological importance of the river adds further to the ecological interest of this site.

6.10.2006

3.3.3 Slievefelim to Silvermines Mountains SPA (004165)

The Slievefelim to Silvermines Mountains SPA is an extensive upland site located in Counties Tipperary and Limerick. Much of the site is over 200 m in altitude and rises to 694 m at Keeper Hill. Other peaks included in the site are Slieve Felim, Knockstanna, Knockappul, Mother Mountain, Knockteige, Cooneen Hill and Silvermine Mountain. The site is underlain mainly by sandstones of Silurian age. Several important rivers rise within the

site, including the Mulkear, Bilboa and Clare. The site consists of a variety of upland habitats, though approximately half is afforested. The coniferous forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). Roughly one-quarter of the site is unplanted blanket bog and heath, with both wet and dry heath present. The bog and heath vegetation includes such typical species as Ling Heather (*Calluna vulgaris*), Bilberry (*Vaccinium myrtillus*), Bell Heather (*Erica cinerea*), Common Cottongrass (*Eriophorum angustifolium*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Scirpus cespitosus*) and Purple Moorgrass (*Molinia caerulea*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment. Some stands of deciduous woodland also occur, especially within the river valleys.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier. This SPA is one of the strongholds for Hen Harrier in the country. A survey in 2005 resulted in four confirmed and one possible breeding pairs, whereas nine pairs had been recorded in the 1998-2000 period. These numbers represent 3% of the national total. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to c. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey. The site is also a traditional breeding site for a pair of Peregrine. Merlin has been recorded within the site but further survey is required to determine its status. Both of these species are also listed on Annex I of the E.U. Birds Directive. Red Grouse is found on some of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

The main threat to the long-term survival of Hen Harriers within the site is further afforestation, which would reduce and fragment the area of foraging habitat, resulting in possible reductions in breeding density and productivity. Overall, the site provides excellent nesting and foraging habitat for breeding Hen Harrier and is among the top five sites in the country for the species

16.7.2007

3.3.4 Features of Interest of the Lower River Shannon cSAC

Table 11 below lists the Annex I habitats and Annex II species for which the Lower River Shannon cSAC has been selected.

Table 11: List of qualifying Features of Interest of the Lower River Shannon cSAC.

| Qualifying Interests of the Lower River Shannon cSAC (Site Code: 002165) |
|--|
| Habitats |
| Sandbanks which are slightly covered by sea water all the time [1110] |
| Estuaries [1130] |
| Mudflats and sandflats not covered by seawater at low tide [1140] |
| Coastal lagoons [1150] |
| Large shallow inlets and bays [1160] |
| Reefs [1170] |
| Perennial vegetation of stony banks [1220] |
| Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] |
| <i>Salicornia</i> and other annuals colonizing mud and sand [1310] |
| Spartina swards (<i>Spartinion maritimae</i>) [1320] |
| Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] |
| Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] |
| Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] |
| Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] |
| Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] |
| Species |
| Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] |
| Sea lamprey (<i>Petromyzon marinus</i>) [1095] |
| Brook lamprey (<i>Lampetra planeri</i>) [1096] |
| River lamprey (<i>Lampetra fluviatilis</i>) [1099] |
| Salmon (<i>Salmo salar</i>) [1106] |
| Bottle-nosed dolphin (<i>Tursiops truncatus</i>) [1349] |
| Otter (<i>Lutra lutra</i>) [1355] |

3.3.5 Features of Interest of the Lower River Suir SAC.

Table 12, below, lists the Annex I habitats and Annex II species for which the Lower River Suir cSAC has been selected.

Table 12: List of qualifying Features of Interest for the Lower River Suir cSAC.

| Qualifying Interests of the Lower River Suir cSAC (Site Code: 002165) |
|--|
| Habitats |
| Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] |
| Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] |
| Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] |
| Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] |
| Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] |
| Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] |
| <i>Taxus baccata</i> woods of the British Isles [91J0] |
| Species |
| Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] |
| White-clawed crayfish (<i>Austropotamobius pallipes</i>) [1092] |
| Sea lamprey (<i>Petromyzon marinus</i>) [1095] |
| Brook lamprey (<i>Lampetra planeri</i>) [1096] |
| River lamprey (<i>Lampetra fluviatilis</i>) [1099] |
| Allis shad (<i>Alosa alosa</i>) [1102] |
| Twaite shad (<i>Alosa fallax fallax</i>) [1103] |
| Salmon (<i>Salmo salar</i>) [1106] |
| Otter (<i>Lutra lutra</i>) [1355] |

3.3.6 Feature of Interest of the Slievefelim to Silvermines Mountains SPA (004165).

Table 13, below, lists the bird species for which the Slievefelim to Silvermines Mountains SPA (004165) has been selected.

Table 13: List of qualifying Features of Interest of the Slievefelim to Silvermines Mountains SPA.

| Qualifying Interests of the Slievefelim to Silvermines Mountains SPA |
|---|
| Site Code:(004165) |
| Hen Harrier (<i>C. cyaneus</i>) [A082] |

3.4 Conservation Status

According to the Habitat's Directive, the conservation status of a natural habitat will be taken as 'favourable' when:

- its natural range and the area it covers within that range are stable or increasing,
- the specific structure and functions which are necessary for its long-term maintenance exist are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined below.

According to the Habitat's Directive, the conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats,
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

3.4.1 Conservation Objectives and Management Plans

There are no management plans completed to date for the Lower River Shannon cSAC, Lower River Suir cSAC or the Silvermines Mountains SPA. The conservation objectives for the Natura 2000 Sites are as follows:

3.4.1.1 Lower River Shannon cSAC (site code: 002165):

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1029] *Margaritifera margaritifera*
- [1095] *Petromyzon marinus*
- [1096] *Lampetra planeri*
- [1099] *Lampetra fluviatilis*
- [1106] *Salmo salar* (only in fresh water)
- [1110] Sandbanks which are slightly covered by sea water all the time
- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [1150] Coastal lagoons
- [1160] Large shallow inlets and bays
- [1170] Reefs
- [1220] Perennial vegetation of stony banks
- [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts
- [1310] *Salicornia* and other annuals colonizing mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1349] *Tursiops truncatus*
- [1355] *Lutra lutra*
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260]
- [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

3.4.1.2 Lower River Suir cSAC (site code: 002137)

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- [1029] *Margaritifera margaritifera*
- [1092] *Austropotamobius pallipes*
- [1095] *Petromyzon marinus*
- [1096] *Lampetra planeri*
- [1099] *Lampetra fluviatilis*
- [1103] *Alosa fallax*
- [1106] *Salmo salar* (only in fresh water)
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- [1355] *Lutra lutra*
- [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
- [91J0] *Taxus baccata* woods of the British Isles

3.4.1.3 Slievefelim to Silvermines Mountains SPA (site code: 004165):

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Circus cyaneus [breeding]

3.4.2 Conclusion

Any impact which is likely to cause or contribute to any of the qualifying species and habitats not reaching or maintaining favourable conservation status within these Natura 2000 Sites would be regarded as being in conflict with the management of the sites. In addition, any impact which would hinder the maintenance of the extent, species richness and biodiversity of the sites would also be in conflict with the conservation objectives.

3.5 Ecological Features Selected for Natura Impact Assessment

Tables 11, 12 and 13 above, list the habitats and species for which the Natura 2000 sites, considered in this section of the document, have been designated. It is considered that some of these features will not be impacted by the proposed development and these are listed below in Table 14 with the Natura 2000 sites designated for their protection, in section 3.5.1 below. The significance of the impacts affecting the remaining habitats and species, listed in section 3.5.2, below, will then be assessed in terms of magnitude/extent, probability and duration in sections following.

3.5.1 Ecological features not selected for Natura Impact Assessment

The species and habitats of qualifying interest that will not be impacted by the proposed development are listed in Table 14. These habitats, which are either coastal in their distribution or are grassland and forest habitats not connected to the proposal site either directly within the footprint of the development or via waterways draining the site. Dolphin is a marine species and therefore not present within the zone of impact influence of the proposed windfarm site.

Table 14: List of Ecological features not selected for Natura Impact Assessment with Natura 2000 site designated for their protection

| Feature | Designated Site |
|--|---|
| Coastal and Halophytic Habitats | |
| Sandbanks which are slightly covered by sea water all the time [1110] | Lower River Shannon cSAC |
| Estuaries [1130] | Lower River Shannon cSAC |
| Mudflats and sandflats not covered by seawater at low tide [1140] | Lower River Shannon cSAC |
| Coastal lagoons [1150] | Lower River Shannon cSAC |
| Large shallow inlets and bays [1160] | Lower River Shannon cSAC |
| Reefs [1170] | Lower River Shannon cSAC |
| Perennial vegetation of stony banks [1220] | Lower River Shannon cSAC |
| Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] | Lower River Shannon cSAC |
| <i>Salicornia</i> and other annuals colonizing mud and sand [1310] | Lower River Shannon cSAC |
| <i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320] | Lower River Shannon cSAC |
| Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Natural and Semi-natural grassland Habitats | |

| | |
|---|---|
| <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] | Lower River Shannon cSAC |
| Forest Habitats | |
| Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] | Lower River Suir cSAC |
| Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0] | Lower River Suir cSAC |
| <i>Taxus baccata</i> woods of the British Isles [91J0] | Lower River Suir cSAC |
| Species (Marine) | |
| Bottlenose dolphin (<i>T. truncatus</i>) [1349] | Lower River Shannon cSAC |

3.5.2 Ecological features selected for Appropriate Assessment

All of the features of qualifying interest that were deemed relevant to the proposed development were selected for further analysis in respect to likely impacts. These features are listed in Table 15, below. Characteristics of the ecological features selected for Appropriate Assessment are then discussed in the sections following.

Table 15: Ecological features selected for Natura Impact Assessment within Natura 2000 Sites designated for their protection

| Feature | Designated Site |
|---|---|
| Freshwater Habitats (Aquatic) | |
| Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Birds | |
| Hen Harrier (<i>C. cyaneus</i>) [A082] | Slievefelim to Silvermines Mountains SPA |
| Invertebrates | |
| Freshwater pearl mussel (<i>M. margaritifera</i>) [1029] | Lower River Shannon cSAC, Lower River Suir cSAC |
| White-clawed crayfish (<i>A. pallipes</i>) [1092] | Lower River Suir cSAC |
| Fishes | |
| Salmon (<i>S. salar</i>) [1106] | Lower River Shannon cSAC, Lower River Suir cSAC |

| | |
|--|---|
| Sea lamprey (<i>P. marinus</i>) [1095] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Brook lamprey (<i>L. planeri</i>) [1096] | Lower River Shannon cSAC, Lower River Suir cSAC |
| River lamprey (<i>L. fluviatilis</i>) [1099] | Lower River Shannon cSAC, Lower River Suir cSAC |
| Allis shad (<i>A. alosa</i>) [1102] | Lower River Suir cSAC |
| Twaite shad (<i>A. fallax fallax</i>) [1103] | Lower River Suir cSAC |
| Mammals | |
| Otter (<i>L. lutra</i>) [1355] | Lower River Shannon cSAC, Lower River Suir cSAC |

3.5.2.1 Habitat

Both the Lower River Shannon cSAC and the Lower River Suir cSAC are designated for the protection of the habitat type ‘Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]’. This is a freshwater habitat found in sections of water courses with natural or semi-natural dynamics (minor, average and major beds) where the water quality shows no significant deterioration (EDG, 2007). This habitat is described as being present ‘in the major river systems within’ the Lower River Shannon cSAC (see Section 3.3.1, Site synopsis 002165), and is ‘present in the freshwater stretches of the River Suir and along many of its tributaries’ (See Section 3.3.2, site synopsis 002137) Because floating river vegetation communities are found along some the freshwater stretches within both Natura 2000 sites there is the potential that this habitat is within the zone of impact influence of the proposal. The primary pressures on this habitat are considered to be eutrophication, overgrazing, excessive fertilisation, afforestation and the introduction of invasive alien species; the current conservation status of this habitat type is bad (NPWS, 2008). Any impact on this habitat would occur as a result of unmitigated adverse water quality impacts caused by the proposal described in this report. These impacts are discussed in section 3.6.3 below.

3.5.2.2 Birds

Hen Harrier (*C. cyaneus*) [A082]

The hen harrier is listed as an Annex I species under the Birds Directive and classified as an ‘Amber Listed’ species of medium conservation concern (see Lynas *et al.* 2007). Breeding birds are confined to moorland and young forestry plantations, where they nest on the ground. Hen harriers are found mainly in Counties Laois, Tipperary, Cork, Clare, Limerick and Kerry. In summer hen harrier are found on mountains and moorlands, nesting on the ground.

It also nests in young conifer plantations. In winter birds can roost communally and are found in most parts of Ireland including coastal areas.

There is a clear association between habitat composition and hen harrier activity (Wilson *et al.* 2006) and both the quality and quantity of foraging habitats are known to influence hen harrier distribution (Watson, 1977, Pain *et al.*, 1997, Redpath & Thirgood, 1999, Redpath *et al.*, 2002, Madders 2003 cited in Ruddock *et al.* 2012). In their analysis of the distribution of hen harriers in Ireland Wilson *et al.* (2006) determined that areas with less than 30% cover of bog, rough pasture or young forest were avoided by hen harriers. Therefore, the habitat composition of the area is a determining factor influencing the potential level of hen harrier activity. An additional, and primary, governing factor is the proximity of hen harrier nests, as this has a major influence on habitat use (Madders, 2000), both by breeding birds and fledging juveniles, within the areas adjacent to any location.

Therefore, an extensive area of habitats, which are of high ecological value to hen harrier, is available in the extended geographical area surrounding the proposed Upperchurch Windfarm site. It is considered that hen harriers species will preferentially select these areas of high ecological value above the, lower value, post thicket canopy conifer and agricultural grassland habitats or the remnant upland blanket bog/wet heath mosaic areas that are available within the windfarm site.

Post thicket conifer plantation is of only limited value to hen harrier (O'Flynn 1983, Sim *et al.* 2001 cited in Wilson *et al.*, 2009) and is not strongly associated with either foraging or breeding (Madders 2003, Barton *et al.* 2006 cited in Wilson *et al.* 2009) possibly because of the lack of structural diversity within the uniform conifer blocks (O'Donoghue *et al.* 2011).

It is noted that hen harriers in Ireland strongly avoid this habitat type for nesting due to the lack of cover and the levels of human activity (Wilson *et al.*, 2009).

There is a strong association in Ireland between, pre thicket, second rotation conifer plantation and hen harrier nest site selection (Norriss *et al.* 2002, O'Donoghue 2004 cited in Wilson *et al.* 2009; Irwin *et al.* 2012) albeit that other factors, such as the remaining area of heath/bog and rough grassland that is available for foraging (Norris *et al.* 2007, cited in Lewis *et al.* 2009) also influence site selection.. Young second rotation conifer are of value to nesting and foraging hen harrier after 4 years and were replanting to take place in 2035 then the habitat could be conceivable of value for 1-6 years during the later years of windfarm operation.

3.5.2.3 Aquatic species

Freshwater pearl mussel (*M. margaritifera*) [1029]

The freshwater pearl mussel is listed under Annex II of the EU Habitats Directive and is one of the species for which the Lower River Shannon cSAC and the Lower River Suir cSAC have been designated. Ireland is said to support up to 46% of the known populations of the freshwater pearl mussel (*M. margaritifera*) within the European Union (Anon, 2010). The

freshwater pearl mussel is listed under Annex II of the EU Habitats Directive and is one of the species for which both the Lower River Shannon cSAC, Lower River Suir cSAC have been designated. Freshwater pearl mussels have a complex life cycle. They mature between seven and 15 years of age and can have a prolonged fertile period lasting into old age. The larvae (glochidia) initially attach to the gills of salmonid fish hosts which provide nourishment, before they become large enough for independent development in the river bed. After excysting from host fish juvenile mussels survive in the interstices of the substrate, comprised of a stable combination of sand, gravels and cobbles, where good oxygen exchange occurs. A covering of fine silt may prevent this and cause heavy mortalities. In summary, the freshwater pearl mussel requires very high quality rivers with clean river beds and waters with very low levels of nutrients without artificially elevated levels of siltation. The survival of the freshwater pearl mussel is under threat and many of the populations are not reproducing and will ultimately disappear if rehabilitative action is not taken.

Of the remaining populations in Ireland it is estimated that at least 90% will “probably never breed successfully again” (Moorkens, 2006, cited in Byrne et al., 2009).

The principal threat to this species is poor substrate quality due to increased growth of algal and macrophyte vegetation as a result of severe nutrient enrichment, as well as physical siltation. Freshwater pearl mussel is listed as critically endangered in the Republic of Ireland in the most recent review of local IUCN threat status of Irish molluscs. Its overall conservation status in Ireland is ‘Unfavourable’ (NPWS, 2008)

The published current distribution for this species⁴ does not include either of the 10km squares which incorporate the location of the proposal considered in this document namely R95 and R96.

White-clawed crayfish (*A. pallipes*) [1092]

The Lower River Suir cSAC is designated for the protection of this species. In Ireland, the white-clawed crayfish most commonly occurs in small and medium-sized lakes, large rivers, streams and drains, wherever there is sufficient lime (Reynolds, 2007). The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although it is capable of tolerating significant fluctuations. Juveniles live among submerged tree-roots, gravel or aquatic plants, while larger crayfish need stones to hide under, or earthen banks in which to burrow. Crayfish show little activity during the winter period (December to March), spending most of their time torpid in refuges. They become more active when the water temperature increases. Females carry their eggs over winter attached in a dense cluster under their tails (Peay, 2003) and they require undisturbed shelter over a prolonged winter-spring period.

White-clawed crayfish eat a wide range of food including fallen leaves, aquatic vegetation, dead fish, aquatic invertebrates such as snails and caddis-fly larvae, and other dead or live crayfish. They have a wide range of predators; juveniles are eaten by fish, birds and

⁴ Species distribution mapping referred to in this section of the document is published in NPWS, 2008

invertebrate predators, adults are taken by large predators; heron, otter and mink. The crayfish try to avoid predation by hiding in refuges by day and coming out at night, when most birds and fish are resting.

The overall conservation status of the white-clawed crayfish in Ireland is poor, due to the reduction in its range and the continuing pressures that it faces (NPWS, 2008). The most recently published Current Range and Current Distribution mapping for this species includes both 10km grid squares which incorporate the proposal considered in this document.

Salmon (*S. salar*) [1106]

Atlantic salmon is a species of qualifying interest for both the Lower River Shannon cSAC, Lower River Suir cSAC. It is an anadromous species, living in freshwater for at least the first 2 or 3 years of life before migrating to sea. Relatively large cool rivers with extensive gravelly bottom headwaters are essential during their early life. Smolts migrate to sea where they may live for 1 or 2 years before returning to freshwater. A decline in Salmon stocks is well recognised in Ireland and throughout the range of the North Atlantic Salmon and is attributed to several factors including the salmon disease Ulcerative Dermal Necrosis (UDN), poor marine survival and some overfishing. The NPWS suggest that agricultural enrichment, forestry related pressures and poor water quality resulting from inadequate sewage treatment are the major pressures affecting Irish salmon rivers (NPWS 2007).

The most recently published Current Range and Current Distribution mapping for this species includes the 10km grid squares that encompass the location of the proposal considered in this document, and indicates that the species has a wide distribution within the River Suir system ranging from the headwaters to the lower reaches of the system and also within the extended Mulkear River system, which is a tributary of the Shannon, to which first order streams adjacent to the site drain.

Sea lamprey (*P. marinus*) [1095]

Both the Lower River Shannon cSAC and the Lower River Suir cSAC are designated for the protection of this species. Sea lampreys spend their adult life in marine and estuarine waters, living as external parasites on other fish species. They migrate up rivers to spawn in areas of clean gravels and after they have spawned, they die. After hatching, the young larvae settle in areas of fine sediment in still water, where they burrow. They live as filter feeders and may remain in fine sediments for several years before transforming into adult fish. Sea lampreys, which can grow up to 1m in length, are widely distributed around the coast. However they tend to occur in low densities. Overall, the conservation status of the sea lamprey in Ireland is considered to be poor (NPWS, 2008). The Current Range and Current Distribution mapping does not include the 10km squares which encompass the proposal considered in this document

Brook lamprey (*L. planeri*) [1096] River lamprey (*L. fluviatilis*) [1099]

The river lamprey grows to 30cm and has a similar life history to the sea lamprey. The brook lamprey is the smallest of the three lampreys native to Ireland at 15 to 20cm. It is also the

only one of the three which is non-parasitic and spends all its life in freshwater. Despite the difference in ecology, brook and river lamprey are very similar genetically and extremely difficult to distinguish from each other. Juvenile river and brook lampreys cannot be discriminated and metamorphosed individuals can only be distinguished on the basis of dentition (King *et al.*, 2004). As a result, for the purposes of this assessment, the brook and river lampreys have been treated together. Both are species of qualifying interest for both the Lower River Shannon cSAC and the Lower River Suir cSAC. The current conservation status of these species in Ireland is considered to be good (NPWS, 2008).

Allis shad (*A. alosa*) [1102]

Allis shad spend their adult life at sea or in the lower reaches of estuaries, ascending to freshwater to spawn in early summer. The spawning females shed their eggs into the water where they either drop into the gravel bed or begin to drift downstream. Those eggs that fall into gravels hatch after several days and then drift downstream. The young fish may remain in estuarine waters during their second year before finally going to sea where they mature. While European populations have a recorded capacity for significant migration upstream, this capacity seems more constrained in Irish populations (King *et al.*, 2004). Weirs and dams are known to be obstacles to the migration of Allis shad upstream. The current conservation status of the species is 'Unknown' (NPWS, 2008).

Twaite shad (*A. fallax fallax*) [1103]

The twaite shad is a member of the herring family and is found in coastal areas from Norway and Iceland to the north-eastern Mediterranean. Shad normally live in estuarine and coastal waters but come into the lower reaches of rivers to spawn. Very little is known about the distribution, abundance and biology of the twaite shad although it has been studied in the River Barrow in County Waterford, and in the Solway rivers (Scotland)⁵. Twaite shad normally spawn, in May and June, near the tidal limits (NPWS, 2008). Weirs and dams are known to be obstacles to the migration of Twaite shad upstream. The current conservation status of the species is bad (NPWS, 2008).). Irish Red Data Book classified as vulnerable.

3.5.2.4 Mammals

Otter (*L. lutra*) [1355]

The otter is a species of qualifying interest for both the Lower River Shannon cSAC and Lower River Suir cSAC. The otter is widespread throughout the country, in freshwater and coastal habitats, and Ireland has long been considered to hold one of the most important otter populations in Western Europe (Whilde, 1993). Due to a decline in the population in Europe, including Ireland, the otter has been listed in Annex II of the EU Habitats Directive and Appendix II of the Berne Convention. It is also protected under the Wildlife Acts 1976 and 2000. It is listed in the Red Data Book (Whilde, 1993) as vulnerable.

⁵ <http://www.habitas.org.uk/priority/species.asp?item=42767>

Otters can, potentially, exploit all stretches of a river system where they are present. The two major threats facing otters in Europe are habitat destruction and water pollution (from NPWS, 2008) and the current conservation status for the species is considered ‘Unfavourable-Inadequate’ (NPWS, 2008). In an Irish context the main four threats have been assessed to be direct and indirect habitat destruction, pollution (particularly organic pollution resulting in fish kills), disturbance from increasing recreational activities and accidental death and persecution (Foster-Turley, *et al.*, 1990).

3.6 Assessment of Potential Impacts

3.6.1 Habitat loss or alteration

3.6.1.1 Habitats

The proposal considered in this document does not require any land take from any Natura 2000 or Ramsar site. It is considered that no significant habitat loss or alteration impacts, within any of the designated sites considered in this section of the document, are reasonably foreseeable as a result of the proposal considered in this document.

3.6.1.2 Aquatic habitats

The potential for the alteration of aquatic habitats due to an impairment of water quality is assessed section 3.6.3 below.

3.6.2 Disturbance and/or displacement of species

3.6.2.1 Birds

In relation to the Natura 2000 sites and their conservation objectives, the main bird species of concern is the hen harrier as this is the species for which the Slievefelim to Silvermines Mountains SPA is designated. The bird surveys of the Upperchurch area show that the proposed development site is not greatly or regularly utilised by hen harriers. Hen harriers which use the wider district for foraging could be affected by:

construction activities;

disturbance/displacement by the actual presence of the turbines; and

risk of collision.

It is possible that the construction activities (construction vehicles, erection of turbines, construction of access roads, turbine foundations and hardstandings *etc.*) could cause disturbance to foraging and/or potential nesting hen harriers in the area. However, the bird surveys show that no breeding took place within the study area in 2011. Hence, the construction activities at the proposed development site are unlikely to impact breeding hen harriers.

Disturbance/displacement by the presence of the turbines

Recent research shows that operational turbines cause low levels of displacement of foraging hen harriers. A monitoring study on hen harriers at an existing windfarm in Derrybrien, Co. Galway indicates that the displacement of hen harriers due to wind turbines is also relatively low, with foraging hen harriers regularly observed within 50m of turbines (Madden and Porter, 2007).

Displacement in terms of nesting/breeding appears to be greater. Whitfield and Madders (2006) refer to Natural Research unpublished data from Argyll in Scotland and Northern

Ireland, which indicate that nesting attempts may occur in the order of 200-300m around turbines. More recent research indicates that there is a lower density of breeding hen harriers within 500m of turbines (Pearce-Higgins *et al.*, 2009).

Hen harrier was observed on two occasions at Upperchurch during the course of the winter and summer raptor vantage point surveys. The randomness and low number of hen harrier observations during the vantage point surveys in 2010 and 2011 suggests that the proposed windfarm site 2km west of Upperchurch is used infrequently by hen harriers. The very low number of observations would suggest that the significance of the risk of Disturbance/displacement as a result of the construction of the wind farm is considered *very low*.

Collision risk

Collision risk for hen harriers is considered to be low (see Madden and Porter, 2007; Whitfield and Madders, 2006). They are known to be manoeuvrable in flight and have been observed to fly to within 10m of turbine bases (Madden and Porter, 2007) and to fly through the gaps in an electricity pylon. The minimum distance between the proposed turbine hubs within the proposed development site is 280m. The randomness and low number of hen harrier observations during the vantage point surveys in 2010 and 2011 suggests that the proposed windfarm site 2km west of Upperchurch is used infrequently by hen harriers and the resultant risk of collision is *very low*.

3.6.2.2 Aquatic species

Freshwater pearl mussel (*Margaritifera margaritifera*)

Distribution in the Lower River Shannon cSAC

As was noted previously the current published distribution for this species within the Shannon river system does not include any 10km square which incorporates any stretch of river downstream of the location of the proposal considered in this document. Mapping of the distribution in this cSAC indicates that the species is restricted to the Feale system a separate tributary which drains to the Shannon Estuary via the Cashen River in North County Kerry. No records for the river system downstream of the proposal site are retained at the NBDC on line data resource. On the basis of the evidence outlined in this paragraph it is concluded that no impacts on this species, within the Lower River Shannon cSAC downstream of the proposal site, are reasonably foreseeable as a result of the proposal considered in this document.

Distribution in the Lower River Suir cSAC

The published current distribution for this species includes 10km grid squares R94 and S05 which incorporate the Clodiagh River into which first order stream adjacent to the proposal site drain. The distribution mapping also includes 10km grid squares S04, S02 and S01 which contain a significant stretch of the main channel of the Suir further downstream of the proposal site. In addition records from 2006, retained at the National Biodiversity Data

Centre on line data resource, indicate that the species was then recorded in several locations on the Multeen River. An unnamed stream adjacent to the proposal site drains to the Turaheen River which in turn drains to the Multeen. The nearest record retained is for 1km grid square R9844 situated approximately 21km downstream⁶ of the proposal site. It is presumed in light of the aforementioned direct evidence and on the basis of the precautionary principle, that this species is potentially present within the zone of impact influence of the proposal.

There is a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the Freshwater pearl mussel within the Lower River Suir cSAC downstream of the proposal site.

There is also a risk of negative impact to this species because of its complex life cycle which includes a larval stage when they are dependent on salmonid fish hosts. It is possible that these salmonids could be in the impact zone of the development when they migrate further upstream. The main potential risk to the mussel posed by the proposed development is the threat of sedimentation and pollution of waterways during the construction phase of the proposal. Therefore, it cannot be objectively concluded that significant indirect impacts on the freshwater pearl mussel will not ensue from an unmitigated construction phase.

White-clawed crayfish (*Austropotamobius pallipes*)

As was noted previously the most recently published Current Range and Current Distribution mapping for this species includes both 10km grid squares which incorporate the proposal considered in this document. In addition, records retained at the NBDC include one location within the Turraheen system and several locations on the Owenbeg system all of which are downstream of the proposal site considered in this document. The record on the Turraheen is located approximately 8km⁷ downstream of the site. The nearest location on the Owenbeg is approximately 4km downstream of the site. O Connor (2007) noted that crayfish were abundant at Munroe Bridge which is situated on the Cromoge River which drains to Clodiagh at a point upstream of the point of confluence of the Clodiagh and Owenbeg. Taken together these various records indicate the strong likelihood of the presence of a significant population(s) within the upper Clodiagh/Owenbeg system. It is presumed in light of the aforementioned direct evidence and on the basis of the precautionary principle, that this species is potentially present within the zone of impact influence of the proposal.

There is a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the white-clawed crayfish.

⁶ Distance measured on 'Draw and Measure' tool on the IFI Water Framework Directive Fish Survey Map Viewer (Available at <http://www.ifigis.ie/WFDFishMap/> [accessed 14/08/2012])

⁷ Distances measured on 'Analysis' tool on the NBDC Biodiversity Maps Map Viewer. (Available at <http://maps.biodiversityireland.ie/#/Map> [accessed 15/08/2012])

Therefore, it cannot be objectively concluded that significant indirect impacts on the white-clawed crayfish will not ensue from an unmitigated construction phase.

Salmon (*S. salar*) [1106]

As was mentioned previously, current available evidence indicates that this species has a wide distribution within both cSAC river systems. It is presumed in light of the aforementioned evidence and on the basis of the precautionary principle, that this species is potentially present within the zone of impact influence of the proposal.

There is a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the Atlantic salmon. The main potential risk posed by the proposed development is the threat of sedimentation and pollution of waterways and consequent potential loss of spawning habitat during the construction phase. Therefore, it cannot be objectively concluded that significant indirect impacts on the salmon will not ensue from an unmitigated construction phase.

Potential nursery habitat was recorded along the stream to the south of turbines T9 and T10. No suitable salmon nursery habitat was recorded within the other streams within the site boundary.

Sea lamprey (*Petromyzon marinus*)

Distribution in the Lower River Shannon cSAC

The Current Range and Current Distribution mapping indicates that this species is not present within the tributary system which connects the proposal considered in this document, via the Mulkear River, to the main channel of the River Shannon. The mapping indicates that the nearest record is for 10km Grid square R55 at a location downstream of the point of confluence of the Mulkear and Shannon rivers, near Castletroy in Limerick city. This location is a linear distance in excess of 29km west of the proposal site and separated from it by a watercourse of significantly greater length. It is noted that the weir at Annacotty is a migration barrier that prevents lamprey from accessing the Mulkear of the river⁸. On the basis of the evidence outlined in this paragraph it is concluded that within the Lower River Shannon cSAC downstream of the proposal site, no significant impacts on this species are reasonably foreseeable as a result of the proposal considered in this document.

Distribution in the Lower River Suir cSAC

The Current Range and Current Distribution mapping indicates that that the distribution of the species extends to a location which is in excess of 12km downstream of the point of confluence of the Turaheen/ Multeen system and the Owenbeg/ Suir system (near Golden, County Tipperary). This location, which is in excess of a linear distance of 34km south east of the proposal, is adjacent to Cahir in County Tipperary. O Connor, (2007 p.4) states that sea lamprey were recorded downstream of Cahir, County Tipperary a finding confirmed by the

⁸ <http://www.mulkearlife.com/sea-lamprey.php>

Current range and Distribution mapping which indicates that the species has a wide distribution within the River Suir system spanning the Suir from downstream of Cahir to the lower reaches of the system (NPWS, 2008). It is presumed in light of the aforementioned direct evidence and on the basis of the precautionary principle, that this species is potentially present within the zone of impact influence of the proposal.

There is a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the sea lamprey within the Lower River Suir cSAC downstream of the proposal site.

The main potential risk posed by the proposed development is the threat of sedimentation and pollution of waterways during the construction phase of the proposal. Therefore, it cannot be objectively concluded that significant indirect impacts on the sea lamprey will not ensue from an unmitigated construction phase.

Brook lamprey (*Lampetra planeri*) [1096] and River lamprey (*Lampetra fluviatilis*)

Currently no records are retained online at the National Biodiversity Data Centre for these species within the extended river systems of either cSAC. The current known distribution for these species includes the 10km squares within which the proposal considered in this document occurs and the grid squares which incorporate the extended river systems which drain to both cSACs. O Connor (2007) confirmed the presence of these species within the Multeen, upstream of its point of confluence with the Aughnaglanny River, at a site approximately 18km downstream of the proposal site. The same survey recorded these species on the Owenbeg and Clodiagh rivers at sites located up stream of their point of confluence which is situated approximately 9km downstream on the Owenbeg and 19km downstream on the Clodiagh.

It is presumed in light of the aforementioned evidence and on the basis of the precautionary principle, that these species are potentially present within the zone of impact influence of the proposal. within both cSACs.

There is a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the lamprey within the Lower River Suir cSAC downstream of the proposal site.

There is a potential risk of a negative impact on these species from the construction. The main potential risk posed by the proposed development is the threat of sedimentation and pollution of waterways during the construction phase of the proposal. Therefore, it cannot be objectively concluded that significant indirect impacts on lamprey will not ensue from an unmitigated construction phase.

Allis shad (*A. alosa*) [1102]

The Lower River Suir cSAC is designated for the protection of this species because Current Range mapping for this species is only available in 50km grid cells the resolution is less fine

than that which is available for other species. However, mapping of the Current Distribution of this species, which is available at 10km grid resolution, indicates that the species is confined to the lower reaches of the Suir system (NPWS, 2008) which is a linear distance of in excess of 60km south east of the proposal site and separated from it by a watercourse of considerably greater length⁹. Therefore, on the basis of the distribution mapping, and bearing in mind the constrained capacity for upstream migration referred to previously, it is considered unlikely that this species occurs within 15km of the proposed development. On the basis of the evidence outlined in this paragraph it is concluded that on this species, within the cSAC, no significant impacts are reasonably foreseeable as a result of the proposal considered in this document.

Twaite shad (*A. fallax fallax*) [1103]

The Lower River Suir cSAC is designated for the protection of this species Because Favourable Reference Range Mapping for this species is only available in 50km grid cells the resolution is less fine than that which is available for other species. However, mapping of the Current Distribution of this species, which is available at 10km grid resolution, indicates that the species s is confined to the lower reaches of the Suir system at a linear distance of in excess of 60km¹⁰ south east of the proposal site and separated from it by a watercourse of considerably greater length. Therefore on the basis of the distribution mapping, and the evidence sited in the site synopsis, it is considered unlikely that this species occurs within 15km of the proposed development. On the basis of the evidence outlined in this paragraph it is concluded that on this species, within either cSAC, no significant impacts are reasonably foreseeable as a result of the proposal considered in this document.

⁹ Distance measured using ‘Measure Distance’ Analysis Tool available at <http://maps.biodiversityireland.ie/#/Map> [accessed 14/08/2012]

¹⁰ Distance measured using ‘Measure Distance’ Analysis Tool available at <http://maps.biodiversityireland.ie/#/Map> [accessed 14/08/2012]

3.6.2.3 *Mammals*

Otter (*L. lutra*)

A search of the NBDC online resource indicates that the most recent, adjacent, records retained for this species are 1980 records included in the 1982 Otter Survey of Ireland¹¹. At that time otter were recorded in 100m grid square R947628 approximately 1.3km north east of T21 on the Clodiagh river and in 100m grid square R974594 on the Owenbeg, approximately 1.2km south east of T2. These records, albeit historic, indicate that otters are potentially present within the vicinity of the proposal.

It is presumed in light of the aforementioned evidence and on the basis of the precautionary principle, that these species are potentially present within the zone of impact influence of the proposal.

There is a risk that disturbance due to noise and human presence could cause disturbance or displacement impacts on this species during the construction phase of the proposed windfarm. There is also a risk that the water quality of the local watercourses, that drain the site, could be impaired during the construction stage of the proposed windfarm. It is possible that this could impact negatively on the otter within both the Lower River Shannon cSAC and the Lower River Suir cSAC downstream of the proposal site.

It is considered that the proposal considered in this document could potentially pose a risk of habitat degradation through sedimentation and/or pollution. This could impact the otter directly or indirectly through the reduced availability of prey. Therefore, it cannot be objectively concluded that significant indirect impacts on the otter will not ensue from an unmitigated construction phase.

3.6.3 Water Quality

The potential significant impacts of the proposed development on aquatic ecology (without mitigation) are summarised as follows:

Pollution of watercourses with suspended solids due to runoff of soil from construction areas. In the absence of adequate mitigation measures, contamination of water courses with suspended solids may have the potential to impact on potential salmonid spawning and nursery areas and this is one of the most significant potential impacts of the proposed development. The impact would be classified as a significant negative impact on all affected streams (namely the Clydagh and Breanagh Rivers and their tributaries). Pollution of the local watercourses would result in a direct impact on the SPA and particularly the cSAC.

Pollution of watercourses with nutrients due to ground disturbance during construction and during clear felling of forestry.

The main potential sources of nutrient inputs to freshwater due to ground disturbance are:
Nutrients adsorbed or chemically bound to eroded suspended solids

¹¹ Available at: <http://maps.biodiversityireland.ie/#/Map> [accessed 7/06/2012]

Leaching of fertilisers used during the forestry operation

Pollution of watercourses with nutrients due to decomposition of brash after forestry clear felling.

Pollution of watercourses, during construction phase, with other substances such as fuels, lubricants, waste concrete, waste water from wash facilities, etc.

Pollution of watercourses with surface drainage water from paved areas and road surfaces.

There is a risk of pollution of surface waters with hydrocarbons from paved areas after the construction is complete.

Permanent loss of habitat due to stream crossings.

Construction of stream crossings at site entrance and installation of box culvert at may result in potential for in-stream deterioration of water quality.

In the absence of adequate mitigation measures, pollution of water courses from any of the above possible sources has the potential to impact on qualifying interests, aquatic species, otter and freshwater habitat within the *Lower River Shannon and Lower River Suir c SACs*. This is the most significant potential impact of the proposed development. The impact, if it resulted in a severe pollution event, would be classified as a significant negative impact on the adjacent stream and on both cSACs. A number of species of qualifying interest could be affected, particularly if spawning success of these species was negatively impacted. Additional impacts would occur, particularly to otter, should availability of prey be reduced.

Table 16 Summary of unmitigated impacts

| Ecological Feature | Potential impacts | Potential significance of the unmitigated impact Lower River Shannon cSAC | Potential significance of the unmitigated impact Lower River Suir cSAC |
|---|--|---|--|
| Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] | Possible decrease in water quality as a result of run-off of pollution. | Significant | Significant |
| Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029] | Possible decrease in habitat quality from sedimentation or pollution. Possible death of glochidia larvae. Possible decrease in abundance of parasitic salmonid hosts due to sedimentation or pollution of habitat. | <i>None expected</i> | Significant |
| White-clawed crayfish (<i>Austropotamobius pallipes</i>)[1092] | Possible decrease in habitat quality from sedimentation or pollution. | <u>Species not a Qualifying Feature of Interest</u> | Significant |
| Atlantic salmon (<i>Salmo salar</i>) [1106] | Possible decrease in habitat quality from sedimentation or pollution and reduction in spawning area. | Significant | Significant |
| Sea lamprey (<i>Petromyzon marinus</i>)[1095] | Possible decrease in habitat quality from sedimentation or pollution. | <i>None expected</i> | Significant |

| Ecological Feature | Potential impacts | Potential significance of the unmitigated impact Lower River Shannon cSAC | Potential significance of the unmitigated impact Lower River Suir cSAC |
|---|---|--|--|
| Brook lamprey (<i>L. Planeri</i>) [1096] and River lamprey (<i>Lampetra fluviatilis</i>) [1099] | Possible decrease in habitat quality from sedimentation or pollution and reduction in spawning area. | Significant | Significant |
| Allis shad (<i>A. alosa</i>) [1102] | | <u>Species not a Qualifying Feature of Interest</u> | <i>None expected</i> |
| Twaite shad (<i>A. fallax fallax</i>) [1103] | | <u>Species not a Qualifying Feature of Interest</u> | <i>None expected</i> |
| Otter (<i>L. lutra</i>) [1355] | Possible disturbance or displacement impacts from noise and human presence during construction phase. Possible decrease in habitat quality and/or prey availability from sedimentation or pollution. | Significant | Significant |
| Ecological Feature | Potential impacts | Potential significance of the unmitigated impact Slieve Felim to Silvermines SPA | |
| Hen harrier (<i>C. cyaneus</i>) [A082] | Disturbance/displacement from habitat Potential risk of collision | Not Significant | |



3.7 Mitigation

Construction of the windfarm has the potential to cause negative short-term and/or permanent impacts to terrestrial habitats within the proposed windfarm site and to aquatic habitats and species in the rivers and streams associated with the site. A number of planned mitigation measures detailed below will reduce these impacts significantly. Many of the mitigation measures below have been based on CIRIA (Construction Industry Research and Information Association, UK) technical guidance on water pollution control and on current accepted best practice.

3.7.1.1 *Storage, Stockpiling and Waste Generation Management*

All excavated earth materials must 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.

In addition, a construction phase Environmental Management Plan will be incorporated to include regular checking of equipment, materials storage and transfer areas, drainage structures and their attenuation ability during the construction phase of the project. The purpose of this management control is to ensure that the measures that are put in place continue to operate effectively, to prevent accidental leakages, and to identify potential breaches in the protective retention and attenuation network during earthworks operations

3.7.1.2 *Soil, Subsoil and Bedrock Removal*

The removal of topsoil, mineral subsoil and bedrock is an unavoidable impact of the development but every effort will be made to ensure that the amount of earth materials excavated is kept to a minimum in order to limit the impact on the geological and hydrological aspects of the site.

A number of mitigation measures have been incorporated into the project design in order to reduce the likely significance of the impacts on the Natura 2000 sites as outlined above. The main concern is the potential impacts on the water quality of watercourses within the Lower River Suir and the Lower River Shannon cSACs during the construction phase, and the subsequent impacts on the aquatic species of qualifying The main risk to the water quality of the streams draining the site, which drain into the nearby Lower River Suir cSAC and the Lower River Shannon cSAC, results from the potential sedimentation of streams, run-off of pollutants from construction discharging into watercourses and accidental fuel spillages. These risks arise from both felling and construction activities. Management measures will be put in place to avoid any pollution risks to the Lower River Suir cSAC and the Lower River Shannon cSAC.

3.7.2 Water Quality Measures during the Construction Phase

It is noted that no in-stream works are proposed. A number of mitigation measures will be implemented in order to reduce the significance of the potential adverse impacts associated with the construction phase.

3.7.2.1 *Runoff and sediment control*

Erosion control where runoff is prevented from flowing across exposed ground and sediment control where runoff is slowed to allow suspended sediment to settle are important elements in runoff and sediment control. An erosion and sediment control management plan has been designed to prevent sediment and pollutant runoff into the river during the construction phase and is included as Appendix 15-2 Volume 3. This plan will be implemented during construction to control increased runoff and associated suspended solid loads in discharging waters from the development areas. The main elements of this plan include:

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, substation compound, turbine bases, etc) of the development the associated erosion and sediment controls at each section will be put in place prior to construction of each section. Access roads will need to be constructed to access the proposed site for turbine locations. The associated erosion and sediment controls, drains, sediment traps and settling ponds, will be constructed along side these roads and in a conscious manner to ensure that the potential risk to water quality is minimised;

Minimise area of exposed ground by maintaining existing vegetation that would otherwise be subject to erosion in the vicinity of the windfarm infrastructure and keeping excavated areas to a minimum;

The clearing of soil and peat associated with the proposed development will take place immediately before construction begins;

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;

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 will 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.

Run-off from wind turbine foundation concrete pours shall not be permitted to enter the drainage system and shall be contained within the foundation excavations and designated areas that are suitably sited and designed;

No work will take place within 50m buffer zones of live watercourses except for the stream crossings.

All construction method statements will be prepared in consultation with Inland Fisheries Ireland;

All associated tree felling will be undertaken using good working practices as outlined by the Forest Service in their 'Forestry Harvesting and Environment Guidelines' (Forest Service, 2000a) and the 'Forestry and Water Quality Guidelines' (Forest Service, 2000b). The latter guidelines deal with sensitive areas, erosion, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel and machine oils;

Drainage ditches or other suitable measures will be adopted alongside access roads, turbines and other disturbed areas to prevent silt or contamination from construction water runoff entering watercourses;

Check dams will be placed at regular intervals based on slope gradient along all drains to slow down runoff to encourage settlement and to reduce scour and ditch erosion;

Drains, carrying construction site runoff, will be diverted into silt traps;

Wheel washes will be provided for exiting heavy vehicles to ensure roads outside of the site boundary are clean;

Pumped or tremied concrete will be monitored carefully to ensure no accidental discharge into the watercourse;

A programme of inspection and maintenance of drainage and sediment control measures during construction will be designed and dedicated construction personnel assigned to manage this programme;

Water quality monitoring will be carried out for two years post-construction to determine whether water quality is impacted.

3.7.2.2 *Protection of Watercourses (General Measures)*

It is recommended that the following measures should be incorporated into the development so as to ensure no significant negative impact on water course and the features of conservation interest:

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.

Fuelling and lubrication of equipment will be carried out in bunded areas.

Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of.

Oil booms and oil soakage pads will be kept on site to deal with any accidental spillage.

Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.

Prior to any work it will be ensured that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

Overnight parking of vehicles away from watercourses

3.7.2.3 *Run-off and Sediment Control Plan and Measures*

A Sediment and Erosion Control Plan will be designed to safeguard the water environment and incorporated into the Construction Environmental Management Plan (CEMP) and other surface water management measures employed during the construction phase of the proposed windfarm (see Chapter 6 Volume 2). 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

Erosion control where run-off is prevented from flowing across exposed ground and sediment control where run-off is slowed to allow suspended sediment to settle are important elements in run-off and sediment control. This plan will be implemented during construction to control increased run-off and associated suspended solid loads in discharging waters from the construction area. All site compound drainage will be passed through a settlement facility with the capacity to retain any accidental spillage or leakage of polluting substances. The main elements of this plan include:

Prior to excavation, drains will be established to effectively drain grounds prior to earthworks. Such drains will be positioned at an oblique angle to slope contours to ensure ground stability.

All site excavations and construction will be supervised by a suitably qualified engineer. The contractor's methodology statement will be reviewed and approved by a suitably qualified engineer prior to site operations.

Run-off from foundation concrete / cementitious material pours shall not be permitted to enter the watercourse and shall be contained within the foundation excavations and designated areas that are suitably sited and designed.

The area of exposed ground will be kept to a minimum by maintaining, where possible, existing vegetation.

Temporary deposition areas will be designated and designed to hold temporary stockpiles of spoil. These will be located away from the stream and stockpiles that are at risk of erosion will be protected by silt trapping apparatus such as a geotextile silt fence to prevent contaminated run-off.

Silt fences or other appropriate silt retention measure will be installed where there is a risk of erosion run-off to the stream from construction related activity, particularly during prolonged wet weather periods or an intense rainfall event.

Check dams will be placed at regular intervals based on slope gradient along all drains to slow down run-off to encourage settlement and to reduce scour and ditch erosion.

Drains carrying construction site run-off will be diverted into silt traps.

It is recommended that wheel washes will be provided in a bunded area at a remove from the stream.

Pumped or tremied concrete / cementitious material will be monitored carefully to ensure no accidental discharge into the stream.

A programme of inspection and maintenance of drainage and sediment control measures during construction will be designed and dedicated construction personnel assigned to manage this programme.

Silt traps will be regularly inspected, any blockages cleared and they will be maintained and cleaned during dry weather.

A continuous silt fence will be installed down slope from the works area where construction shall take place within 100m of a stream. 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 river 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.

3.7.2.4 Fuel and Oil Management Plan

Fuel management measures will be implemented which will incorporate the following elements:

Machinery will be confirmed as being mechanically sound and without fuel or oil leaks and fit for purpose prior to project start;

Use of biodegradable products where possible, e.g. hydraulic fluid;

Mobile bowsers, tanks and drums will be stored in secure, impermeable storage area, a minimum of 50m 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 will be regularly inspected for leaks and signs of damage;

Only designated trained operators will be 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. will be kept on site in the event of an accidental spill.

3.7.2.5 Replanting and Reinstatement of Site

Exposed areas of the site that are slow to re-vegetate may need to 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.

As a result of permanent felling, works areas surrounding T3, T9, T12, T14 and T22 will be bare and it is proposed to incorporate these areas into an Ecological Management Plan for the site.

3.7.2.6 Truck Wash and Concrete / Cementitious Material Residue

It is important to prevent concrete and other cementitious material from entering the streams situated in close proximity to the site.

It is recommended that a designated bunded and impermeable truck wash area be provided. Resultant waste water is to be diverted to siltation pond for settling out of solids, prior to release. It is important that a pumping / dewatering system is well planned. Pumped water will need to be treated in the adequate settlement pond and silt trap before it can enter the stream. Among other things, concrete and other cementitious material will be used for the construction and the following measures will be implemented:

Designate a concrete / cementitious material washout area away from drains and watercourses at a designated, contained impermeable area or washout trucks off-site.

A designated trained operator experienced in working with concrete and other cementitious material will be employed during the pouring phase.

Large volumes of concrete and other cementitious material water to be pumped into a skip to settle out.

3.7.2.7 Waste Control

The main contractor should engage a waste company to deal with all its wastes during construction, so all waste streams should be identified at the outset and a selection of skips and bins are delivered to the contractor's compound at the outset and the waste is then managed throughout the construction phase. The contractor should prepare a Waste Management Plan.

Any introduced semi-natural (road building materials) or artificial (PVC piping, cement materials, electrical wiring etc.) must be taken off site at the end of the construction phase. Any accidental spillage of solid state introduced materials must be removed from the site.

3.7.2.8 Storage

The storage of materials, containers, stockpiles and waste, however temporary, should follow best practice at all times and be stored at designated areas. Storage will be located 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.

3.7.3 Summary of Residual Mitigated Impacts

Table 16 below includes an assessment of the likely residual impacts of the proposed Upperchurch Windfarm provided that all management mitigation measures outlined above are adequately implemented.

Table 17: Potential Significance of the mitigated impact

| Ecological Feature(s) / Impact | Potential significance of the unmitigated impact | Summary of Mitigation Measures | Potential significance of the mitigated |
|--|--|--|---|
| Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) / Impairment of water quality | Significant | <ul style="list-style-type: none"> • Protection of water quality (general) • Run-off and Sediment Control Plan and Measures • Fuel and Oil Management Plan • Truck Wash and Concrete / Cementitious Material Residue • Waste Control • Storage | Not significant |
| White-clawed crayfish (<i>Austropotamobius pallipes</i>) / Impairment of water quality | Significant | | Not significant |
| Sea lamprey (<i>Petromyzon marinus</i>) / Impairment of water quality | Significant | | Not significant |
| River lamprey (<i>Lampetra fluviatilis</i>) and brook lamprey (<i>L. Planeri</i>) / Impairment of water quality | Significant | | Not significant |
| Atlantic salmon (<i>Salmo salar</i>) / Impairment of water quality | Significant | | Not significant |
| Otter (<i>Lutra lutra</i>) / Impairment of water quality | Significant | | Not significant |
| Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation / Impairment of water quality | Significant | | Not significant |

4 Cumulative Impact Assessment

The Natura Impact Assessment has been revised and updated following the a request by NTCC as part of a RFI (13/51/0003) for a cumulative impact assessment and ecological management plan.

4.1 Cumulative Impact upon SPA

The Upperchurch Wind Farm including a buffer zone of 250m radius around the turbines does not overlap with the SPA; the nearest turbine is 490m to the boundary of the *Slieve Felim to Silvermines Mountains SPA* (see Map 3, Appendix 1). Four of the turbines are located within 1km of the SPA, three turbines lies between 1km and 2km while the remaining turbines are located a distance of over 2km from the SPA.

The study area for the assessment includes the *Slieve Felim to Silvermines Mountains SPA* as well as a distance of 250m outside of the SPA.

Again, it is important to emphasise that the proposed Upperchurch Wind Farm will not affect the number of turbines within the SPA or within the 250m buffer zone surrounding the SPA boundary.

Table 18 below details the wind farm projects within the *Slievefelim to Silvermines Mountains SPA* and within the 250m buffer zone from its boundary. Of the 45 turbines within the SPA, 16 are proposed, 16 are permitted and 13 are operational. The Upperchurch Wind Farm is outside the SPA with the nearest turbine being 490m and the majority of turbines are located between 1-2km from the edge of the SPA (see Map 3, Appendix 1).

Table 18. Details of the wind farm projects within the SPA

| Wind Farm | Owner | Status | No. turbines | No. turbines within SPA & 250m buffer zone | No. turbines outside SPA |
|--------------|-----------------------------------|-----------|--------------|--|--------------------------|
| Garracummer | Bord Gais | Operating | 17 | 7* | 10 |
| Knockstanna | Airtricity | Operating | 5 | 5 | 0 |
| Bunkimalta | ESB/Coillte | Proposed | 16 | 16 | 0 |
| Knockmeale | Templederry Windfarm Ltd | Operating | 2 | 1 | 1 |
| Castlewaller | Castlewaller Woodland Partnership | Permitted | 16 | 16 | 0 |
| | | | 56 | 45 | 11 |

* Two of the seven turbines lie outside the SPA but within the 250m buffer zone

Conifer plantation is considered to provide suitable foraging habitat during the open canopy stage, between years 2-10 of planting. Therefore, conifer plantation is only suitable for 20% or 8 years of its estimated 40 year rotational cycle and is thus considered to provide suitable habitat on a short-term basis. The provision of suitable conifer plantation habitat thus only coincides with a portion, and not all, of the lifetime of a windfarm. Marginal or semi-natural habitats, which are permanently open (i.e. not subject to the rotational cycles of conifer plantations), are considered suitable hen harrier foraging habitats over the lifetime of the windfarm.

Table 19. Details of the Upperchurch Wind Farm

| Wind Farm | No. turbines within SPA & 250m buffer zone | Habitat types within 250m displacement zones of use to hen harrier | Short-term suitable foraging areas, conifer plantation (ha) | Area of suitable conifer plantation over project lifetime (ha) | Permanently suitable foraging areas, semi-open & marginal habitats (ha) |
|-------------|--|--|---|--|---|
| Upperchurch | 0 | Conifer plantation, acid grassland, wet grassland, upland blanket bog, wet heath | 108ha | 11ha | 84ha |

Table 2 above details the habitat types and areas within Upperchurch Wind Farm that are suitable on a short-term and permanent basis. At Upperchurch there is a mix of permanently open habitats (acid grassland, wet grassland, bog, heath) and conifer plantation (suitable on a short-term basis). Table 20 below details the habitat types and areas of the wind farms within the *Slievefelim to Silvermines Mountains* SPA and the 250m buffer zone that are suitable on short-term and permanent basis (see Map 1, Appendix 1). At Garracummer, Bunkimalta and Castlewaller the displacement zones are dominated by conifer plantation. The 5 turbines at Knockastanna support bog and wet grassland that can be considered as suitable foraging habitat through the lifetime of the wind farm (i.e. permanently suitable). Knockmeale supports less than 1ha of suitable foraging habitat.

Table 20. Details of the wind farm projects within the SPA and buffer zone (information sourced from relevant wind farm planning application documentation, note Planning Ref. (PR) quoted)

| Wind Farm | No. turbines within SPA & 250m buffer zone | Habitat types within 250m displacement zones of use to hen harrier | Conifer plantation (ha) | Area of suitable conifer plantation available over project lifetime (ha) | Permanently suitable foraging areas, semi-open & marginal habitats (ha) |
|------------------------------|--|--|-------------------------|--|---|
| Garracummer | 7 | Conifer plantation | 106 | 44 | 20 |
| Knockstanna | 5 | Upland blanket bog, wet grassland | 6 | | 46 |
| Bunkimalta (P.R. 13510035) | 16 | Conifer plantation, upland blanket bog, wet grassland | 274 | 163 | 27 |
| Knockmeale | 1 | Agricultural grassland, wet grassland | 0 | 0 | 1 |
| Castlewaller (P.R. 11510251) | 16 | Conifer plantation | 288 | 48 | 0 |
| | 45 | | 674 | 255 | 84 |

It is estimated that of the 674ha within the displacement zones of the turbines within the SPA and 250m SPA buffer zone, 255ha of this is likely to be suitable as hen harrier foraging habitat over the lifetime of the wind farms. When combined with the 84ha of permanently open habitat this increases to a total area of 339ha of suitable hen harrier foraging habitat within the displacement zones. Should hen harrier avoid the 250m displacement zones around turbines and foraging habitat is lost as a result, there is potential for cumulative impacts to arise within the SPA. Upperchurch Wind Farm will not contribute to any habitat loss within the SPA or associated 250m buffer zone, however, hen harrier are known to use the site though infrequently and the loss of approximately 95ha of potentially suitable hen harrier habitat may result in a cumulative effect. The potential losses of foraging habitat for the hen harrier associated with the Upperchurch Wind Farm will be fully mitigated by the creation of areas of suitable foraging habitat (see EcMP for further detail). Therefore, it is considered that impact of Upperchurch Wind Farm will be neutral and it will not contribute to a significant cumulative impact upon the *Slieve Felim to Silvermines Mountains SPA*.

The two largest wind farms within the SPA, the proposed Bunkimalta (Planning Ref. 13510035) and the permitted Castlewaller (Planning Ref. 11510251), which make up 74% of wind farms within the SPA, have acknowledged the potential for potential cumulative effects for foraging hen harrier. To remedy this, both have provided for the creation of equivalent areas of suitable foraging habitat. Mitigation habitat that is the creation of equivalent areas of suitable foraging habitat has been proposed by the applicants for the Bunkimalta and Castlewaller Wind Farm projects. The Bunkimalta project proposes to create an equivalent

area of open canopy forest over the lifetime of the wind farm. Bunkimalta and Castlewaller are the largest of the wind farm projects within the SPA and they have the greatest coverage of forestry. Therefore, as a full mitigation programme involving the provision of equivalent areas of suitable foraging habitat is proposed for the Bunkimalta and Castlewaller projects it can be concluded that the net impact of these projects on the SPA is neutral and therefore the SPA should not be adversely affected.

In summary, the provision of mitigatory habitat for most of the turbines within the SPA and at Upperchurch Wind Farm coupled with the fact that Upperchurch wind farm lies outside the SPA and the associated 250m buffer zone, a cumulative impact effect with the SPA is not expected to arise.

4.1.1 Cumulative Impact of Other Wind Farms

The cumulative impact assessment area for the assessment of in-combination effects with other wind farms is made up of an area of 15km from the outer turbines of the Upperchurch Windfarm as well as the *SlieveFelims to Silvermines Mountains SPA* in addition to a buffer of 3km on the western edge of the SPA. The total area of this assessment area is 106,915ha. This differs from the SPA assessment area which was confined to the SPA and the surrounding 250m buffer zone.

There are a number of permitted and existing wind farms in the assessment area, as detailed in Table 21 below and Map 2 (Appendix 1). Of the 45 turbines within the SPA, 16 are proposed, 16 are permitted and 13 are existing and operating. The Upperchurch Wind Farm is outside the SPA with the nearest turbine being a distance of 490mm; most turbines are located at distances greater than 1km and 2km from the edge of the SPA (see Map 3, Appendix 1). The remaining 101 turbines within the study area are outside the SPA and within 15km of the Upperchurch Wind Farm. Most of these are located to the southeast of Upperchurch Wind Farm.

Table 21. Wind Farms within 15km of the proposed wind farm (wind farms with turbines with the SPA have been bolded for clarity)

| Wind Farm | Owner | Status | No. turbines | Distance from nearest UWF turbine - KM | No. turbines within SPA | No. turbines outside SPA | Distance of nearest turbine from SPA - KM |
|-----------|---------------------|--------------------|--------------|--|-------------------------|--------------------------|---|
| 1 | Upperchurch | Proposed | 22 | 0 | 0 | 22 | 0.5 |
| 2 | Garracummer | Operating | 17 | 2.8 | 5 | 12 | 0 |
| 3 | Knockstanna | Operating | 5 | 8 | 5 | 0 | 0 |
| 4 | Cappawhite | Permitted | 18 | 8.5 | 0 | 18 | 3.7 |
| 5 | Glencarby | Permitted | 11 | 4.5 | 0 | 11 | 3.4 |
| 6 | Glenough | Operating | 14 | 3.2 | 0 | 14 | 2.7 |
| 7 | Hollyford | Under construction | 3 | 3.7 | 0 | 3 | 3.1 |
| 8 | Turraheen | Proposed | 3 | 5.6 | 0 | 3 | 5.5 |
| 9 | Milestone | Proposed | 5 | 0.4 | 0 | 5 | 1.3 |
| 10 | Bunkimalta | Proposed | 16 | 9.5 | 16 | 0 | 0 |
| 11 | Knockmeale | Operating | 2 | 7.8 | 1 | 1 | 0.03 |
| 12 | Castlewaller | Permitted | 16 | 14 | 16 | 0 | 0 |
| 13 | Ballinlough | Operating | 3 | 12.7 | 0 | 3 | 9.2 |
| 14 | Curraghraigue | Operating | 6 | 9.4 | 0 | 6 | 2.4 |
| 15 | Ballinveny | Operating | 3 | 12.8 | 0 | 3 | 11.9 |
| | | | 144 | | 43 | 101 | |

A GIS and autocad software have been used to map and estimate abundances for potentially useful hen harrier foraging habitat such as conifer plantation (suitable on a short-term basis during its open canopy stage) and marginal and semi-natural habitats, which are useful over the 25 year lifetime of the wind farm. The results of this analysis are presented in the following tables and have been used to undertake the assessment (see Map 2, Appendix 1).

Table 22. Temporarily and permanently suitable foraging habitat within the assessment area

| | Wind Farm | No. turbines within SPA & 250m buffer zone | Habitat types within 250m displacement zones of use to hen harrier | Area of conifer plantation within 250m displacement zones (ha) | Area available conifer plantation within 250m displacement zones (ha) over lifetime of windfarm | Permanently suitable foraging areas, semi-open & marginal habitats (ha) |
|---|-------------|--|--|--|---|---|
| 1 | Upperchurch | 0 | Conifer plantation, acid grassland, wet grassland, upland blanket bog, wet heath | 11 | 11 | 84 |
| 2 | Garracummer | 7 | Conifer plantation | 106 | 44 | 77 |
| 3 | Knockstanna | 5 | Upland blanket bog, wet grassland | 6 | 4 | 46 |
| 4 | Cappawhite | 0 | Conifer plantation, wet grassland, bog/heath | 234 | 92 | 93 |
| 5 | Glencarbry | 0 | Conifer plantation, wet grassland, acid grassland, wet heath mosaic | 135 | 44 | 17 |
| 6 | Glenough | 0 | Conifer plantation, wet grassland, wet heath, acid grassland | 90 | 18 | 29 |
| 7 | Hollyford | 0 | Conifer plantation, wet grassland, wet heath, acid grassland, heath/bog cutover | 5 | 0 | 19 |
| 8 | Turraheen | 0 | Conifer plantation, wet grassland, bog/grassland mosaic, bog, wet heath | 16 | 14 | 12 |
| 9 | Milestone | 0 | Conifer plantation, wet grassland, wet heath | 15 | 15 | 10 |

| | | | | | | |
|----|----------------|-----------|---|------------|------------|------------|
| 10 | Bunkimalta | 16 | Conifer plantation, upland blanket bog, wet grassland | 163 | 163 | 27 |
| 11 | Knockmeale | 1 | Agricultural grassland, wet grassland | 0 | - | 1 |
| 12 | Castlewaller | 16 | Conifer plantation | 48 | 48 | 0 |
| 13 | Ballinlough | 0 | - | - | - | - |
| 14 | Curraghgraique | 0 | Conifer plantation | 1 | 0 | 0 |
| 15 | Ballinveny | 0 | Conifer plantation | 7 | 7 | 0 |
| | | 45 | | 788 | 451 | 415 |

Table 5 above presents all of the wind farms within the assessment areas. The total area of conifer plantation within the 205m displacement zones is 788ha, however, this does not reflect the fact that the plantation canopy will be closed for 80% of 4/5 of its rotational cycle. Therefore, this figure is a considerable overestimation. Following an analysis of the amount of area of available conifer plantation for foraging hen harrier over the lifetime of the Upperchurch Wind Farm this has been reduced to 451ha within the 250m displacement zones.

Table 6 below presents the corine landcover analysis, which was used in the assessment. Based on an analysis of the definitions of the landcover classifications habitats that are considered to provide potentially suitable forging habitat include transitional woodland-scrub, coniferous forestry, peat bog, moor and heath and natural grassland. It has been estimated that a total of approximately 22,000ha of potentially suitable hen harrier habitat occurs within the assessment area.

Table 23. Corine landcover estimates within the assessment area

| Landcover type | Area (ha) | Potentially suitable hen harrier foraging area (ha) | Class as a % of the Zone |
|------------------------------------|--------------|---|--------------------------|
| Pasture | 73,169 | - | 68% |
| Transitional Woodland-Scrub | 9,092 | 9,092 | 9% |
| Coniferous Forestry | 7,536 | 7,536 | 7% |
| Agricultural | 7,271 | - | 7% |
| Peat Bog | 4,562 | 4,562 | 4% |
| Un-Irrigated Land | 2,427 | - | 2% |
| Complex Cultivation | 984 | - | 1% |
| Natural Grassland | 521 | 521 | 0% |
| Broadleaf Forestry | 409 | - | 0% |
| Discontinuous Urban | 398 | - | 0% |
| Moor and Heath | 304 | 304 | 0% |
| Inland Marsh | 240 | - | 0% |
| | | 22,015 | 100.0% |

When taken into context of the total area of potentially suitable available landcover of ~ 22,000ha for foraging hen harrier, the Upperchurch project will potentially affect 95ha (see Table 19), which is less than 0.5%. The other wind farm projects within the assessment area will potentially affect 451ha of useful conifer plantation and 415ha of open habitat giving a total of 866ha (see Table 22). When taken in context of the 22,015ha of available land this constitutes less than 4% of the total suitable landcover. The presence of the other windfarms may result in a cumulative effect; however, it is unlikely to be significant.

Mitigatory habitat has been proposed for Upperchurch Wind Farm through the provision of areas of suitable foraging habitat (nearest turbine is 490m from edge of SPA, therefore outside 250m buffer zone around SPA) the net impact is considered neutral. It is not anticipated that Upperchurch Wind Farm will contribute in a significant way to a cumulative effect.

Furthermore, mitigatory habitat has been proposed to offset loss of potential foraging habitat for the two largest wind farms, Bunkimalta and Castlewaller. Mitigatory habitat has also been proposed for Milestone Wind Farm (P.R. 12510385), which lies within the vicinity of Upperchurch Wind Farm but like Upperchurch is located outside of the SPA.

4.1.2 Cumulative Impact of Forestry

The *Slievefelim to Silvermines Mountains SPA* is an extensive upland site and approximately half of the site is afforested, including both first and second rotation plantations and clear fell areas. Roughly one-quarter of the site is unplanted blanket bog and heath, with both wet and dry heath present. The remainder of the site is largely rough grassland that is used for hill farming while some stands of deciduous woodland also occur, especially in the river valleys.

A considerable portion of the forestry within the SPA was planted pre-2000 and much of the current crop is in its second 40 year rotation. Of the total area of land within the assessment area (that is the 15km around the windfarm + SPA + 3km area surrounding SPA) 14,862ha or 13.9% of the forestry within the greater assessment area was planted prior to the year 2000. The significance of this is that that area may be of value to hen harrier for a portion of the lifetime of Upperchurch Wind Farm, which is planned for construction in 2017. It is only pre-thicket or open canopy conifer plantation during the years 2-10, or often years 3-9, that are considered to be of use to the hen harrier. Most of the forestry planted post-2000 will already be past the pre-thicket stage and the canopy will have closed.

From examination of a number of evidence sources in particular aerial photography and analysis presented in the planning documentation submitted in support of other wind farms in the region, it is expected that the area of available suitable forestry for hen harrier foraging will decrease over the lifetime of the Upperchurch Wind Farm. The expected reduction is mainly due to the impending closure of open canopy young second rotation forestry, which occurs 10 years after planting. This will likely result in a reduction in potential foraging habitat for the hen harrier within the SPA and influence future population trends.

According to the National Hen Harrier Survey (Ruddock, 2012) a significant decrease in population has been recorded since the previous national survey in 2005. It is considered that forest maturation is considered partly responsible for this due to a shift in the age structure to more mature closed canopy. It is worth noting that one of the principal threats to nesting hen harrier is predators such as crows and foxes (pers. comm. Barry O'Donoghue).

With the creation of an area of hen harrier foraging habitat as part of the Upperchurch project, it is expected that the hen harrier will use this area while forestry lands within the SPA come under pressure. With the EcMP in place the potential impact of the Upperchurch Wind Farm will be neutral, and may even be considered positive. It is not anticipated that the project when considered with forestry will result in a significant cumulative impact.

4.2 Other Cumulative Effects

4.2.1 Cumulative disturbance effects

Cumulative disturbance effects can occur during the construction phase in particular, due to noise, visual intrusion or disturbance effectively amounting to habitat loss arising from the effect of displacement from more than one wind farm development. Disturbance is short term and may occur during construction. Disturbance effects may be non-linear where birds may tolerate a certain level of disturbance up to a threshold (SNH, 2012).

Observations of a female hen harrier during a breeding season survey at Glencarbry Windfarm Extension in summer 2011, while the western-most turbine at Glenough wind farm was undergoing construction, indicated no disturbance effect. The bird was first observed over mature conifer plantation and circled north over improved agricultural grassland, to within 300m of the construction area (pers. obs.). Glencarbry wind farm and Glenough wind farm are 4.5km and 3.2 km to the south of the proposed Upperchurch wind farm, respectively (pers. obs. 2011).

It is not expected that cumulative disturbance effects, which are temporary in nature, will be significant.

4.2.2 Cumulative Collision Effects

Cumulative collision effects can arise as a result of a number of wind farm developments in an area as well as changes in behaviour of bird species in response, making them more / less likely to collide (King et al., 2009). In practice, most birds take avoidance action to avoid a wind farm or wind turbine structure and alter their flight lines (SNH, 2012). Information on collision is limited, because as mentioned it can rarely be assumed that all collisions are detected, due to scavenging, as well as surveyor bias.

The evidence to date indicates that the effects are extremely species and site specific. Not all species are equally sensitive to collision. Large birds such as raptors and wildfowl are considered to be at greater risk of collision due to their flight behaviour and mobility (Percival, 2003). Percival notes that in Ireland, wind farms are most likely to have a serious negative impact on birds in areas of high concentrations of seabirds, wintering wildfowl or breeding raptors. There is no evidence of breeding raptors at Upperchurch Wind Farm with the nearest known nest recorded roughly 4km to the southeast of the Upperchurch site bordering the Glenough windfarm to the southeast of the site.

There is no known hen harrier flight paths between foraging and roosting areas associated with the Upperchurch project.

Observations at the Glenough wind farm in 2012 and 2013 indicated that potential hen harriers collision was unlikely as the majority of flying adults and juveniles were recorded below 35m i.e. below turbine blade height (Cork Ecology 2012, 2013).

All observations of hen harrier during breeding and winter surveys at Upperchurch in 2011 and 2013 were recorded below 35m.

The main collision risk to hen harrier occurs where nests are located within 500m of a turbine. A risk to fledglings that are not as aerially skilled as adults may result in a collision risk.

At Glenough wind farm, there is an historic hen harrier nest site, c. 300m from the nearest turbine and another c. 2.5km from the nearest turbine. In 2012, during a post-construction survey, two fledged young were observed at the nest site, 2.4km from the nearest turbine. In 2013, two fledged young were observed at the nest site, 300m from the nearest turbine (Cork Ecology 2012, 2013). As already stated, Glenough wind farm is 3.2km from the nearest turbine at the proposed Upperchurch wind farm.

Post-construction monitoring at a wind farm site in Co. Galway indicated that most observations were of hen harrier foraging at less than 10m above ground, although birds were also recorded at rotor height. Between 10 and 11 pairs of hen harriers bred within 5km of the wind farm site boundary, during each year of monitoring (Madden and Porter 2007).

It is not expected that collision of hen harrier with turbines at Upperchurch will occur due to the low flying height of foraging hen harriers together with the absence of recorded nests within the vicinity of the project.

4.2.3 Cumulative Barrier Effects

Cumulative barrier effects occurs where birds alter their migration flyways or local flight paths, to avoid wind farm developments, resulting in increased energy expenditure as birds have to fly longer distances and could result in disruption. Barrier effects depend on species, type of bird movement, flight height, turbine layout, wind force and direction (King at al., 2009).

There is a strong relationship between cumulative barrier effects and cumulative displacement effects, particularly after construction has taken place. It will depend on the number of wind farms and the number of turbines in these wind farms, within the vicinity of the proposed wind farm at Upperchurch. It will also depend on the quality of hen harrier habitats available within these wind farms and in the surrounding area.

At a 71 turbine wind farm site in Co. Galway, within the Slieve Aughty SPA, there were numerous sightings of hen harrier. Monitoring commenced in 2004, prior to the erection of

turbines and continued in 2006 and 2007, when the wind farm was in full operation. Most observations were of hen harrier foraging at less than 10m over the bog. Birds regularly passed within 50m of turbines, with one bird foraging within 10m of a turbine base. The behavioural observations indicated that birds passed between turbines or along lines of turbines, and no sudden movements were seen that suggested alarm or hesitation (Madden and Porter 2007).

At the 14 turbine wind farm at Glenough, the levels of hunting recorded during the post-construction monitoring, indicated that there was suitable hunting habitat both within the wind farm and in the immediate surrounding area, and that the presence of turbines did not act as a barrier to foraging hen harrier (Cork Ecology 2013).

The turbines at Upperchurch are well spread and the site is not considered a bird migration route. Other wind farms in the region are well spread and spaced from one another and most turbines are at a minimum of 300-400m apart.

In summary it is not expected that the Upperchurch Wind Farm proposal will contribute a significant cumulative barrier effect with other windfarms.

4.2.4 Cumulative Impact of Agriculture

The area within and surrounding the proposed wind farm at Upperchurch is currently intensively farmed and is primarily improved agricultural grassland. This habitat is deemed unsuitable for foraging hen harrier. It is one of the main habitats associated with the 250m buffer displacement zone around the turbines. If the wind farm was granted permission, it is likely that farming would continue within these buffer zones.

It is expected that the quota for milk will be removed in 2015 and under Harvest 2020¹² milk production is expected to increase by 50% by 2020. Existing marginal land such as that surrounding the SPA and within 15km of the wind farm may be subject to improvement in an effort to increase the amount of available high quality agricultural grassland and meet the 2020 target for milk production. If this occurs on a significant level it is likely to result in the reduction of future hen harrier foraging habitat and may have a knock-on effect on future population trends.

The proposed Ecological Management Plan prepared as part of the RFI proposes the management of approximately 120ha of land outside the SPA. This will have the effect of securing this land for hen harrier foraging habitat over the lifetime of the wind farm whose construction is likely to coincide with the early years of the removal of the milk quota. With

¹² <http://www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/>

the Ecological Management Plan in place the potential impact of the Upperchurch Wind Farm will be neutral, and may even be considered positive. A significant cumulative effect with agriculture is not anticipated.

4.3 Hen Harrier Habituation to Wind Farm Development

Certain bird species are known to habituate to the presence of wind farms (Spaans et al., 1998 a & b). In Pierce-Higgins et al., (2012) following temporary disturbance during construction, upland bird populations became habituated to operational wind farms. This conclusion was based on a 3 year period of wind farm operation. The main finding of this study for breeding bird populations suggests that the main effects of wind farms may be through disturbance displacement during construction. The turbines at Upperchurch are carefully sited and well spread; it is likely that hen harriers will habituate to the wind farm to a degree over its lifetime.

At Garracummer wind farm, there were no observations of hen harrier nesting behaviour during the construction phase in 2011/2012, although there was hen harrier breeding activity observed in the 5km hinterland, during the construction phase. However, there was a significant increase in raptor activity during post-construction monitoring at the site in 2013 (pers. comm. BGE, 29/11/2013). Garracummer wind farm is 2.8km from the nearest turbine at Upperchurch wind farm and is within 5km of the wind farm at Glenough.

As already mentioned with regard to the 14 turbine wind farm at Glenough, the levels of hunting recorded during the post-construction monitoring, indicated that there was suitable hunting habitat both within the wind farm and in the immediate surrounding area, and that the presence of turbines did not act as a barrier to foraging hen harrier (Cork Ecology 2013).

5 Conclusion

The proposed windfarm lies within 15 km of Lower River Shannon cSAC (site code 002165), Bolingbrook Hill cSAC (site code 002124), Lower River Suir cSAC (site code 002137), Anglesey Road cSAC (site code 002125), Slievefelim to Silvermines Mountains SPA (site code 004165), Silvermines mountains West SAC (site code 002258), Keeper Hill SAC (site code 001197), Kilduff, Devilsbit Mountain SAC (site code 000934) and Philipston Marsh SAC (site code 001847). An Appropriate Assessment has been undertaken to determine the significance of the impact on Natura 2000 sites. No adverse impact is expected to arise to Natura 2000 Sites as a result of the proposed development.

The main potential negative impacts identified relate to habitat loss, disturbance to fauna during construction phase of the development, risk of collision for the hen harrier and the pollution of waterways downstream of the drains/streams within the proposed site.

A comprehensive erosion and sediment plan has been developed and this will reduce the likelihood of any potential pollution event occurring which could impact on protected sites downstream of the development. Other mitigation measures include the implementation of a fuel management plan, control of wheel wash, dewatering and concrete, and the recommendation for the composition of an ecological management plan prior to construction. Pre-construction monitoring will be undertaken for birds and post construction monitoring will be undertaken for the first two year of operation.

No significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed Upperchurch Windfarm.

Following the completion of a cumulative impact assessment it is anticipated that the project will not contribute to significant cumulative impacts.

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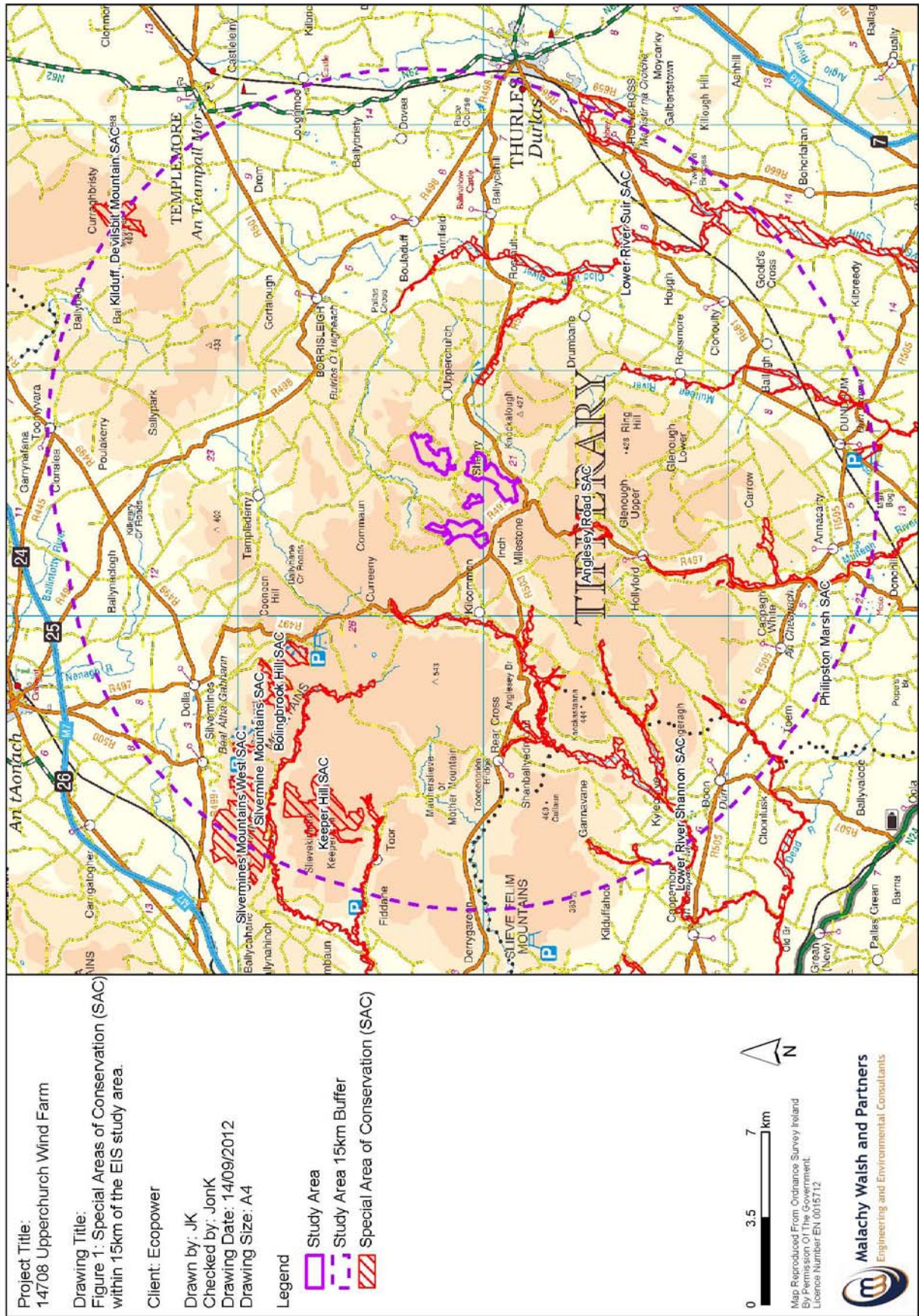
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6.1

Appendix 1
Figures

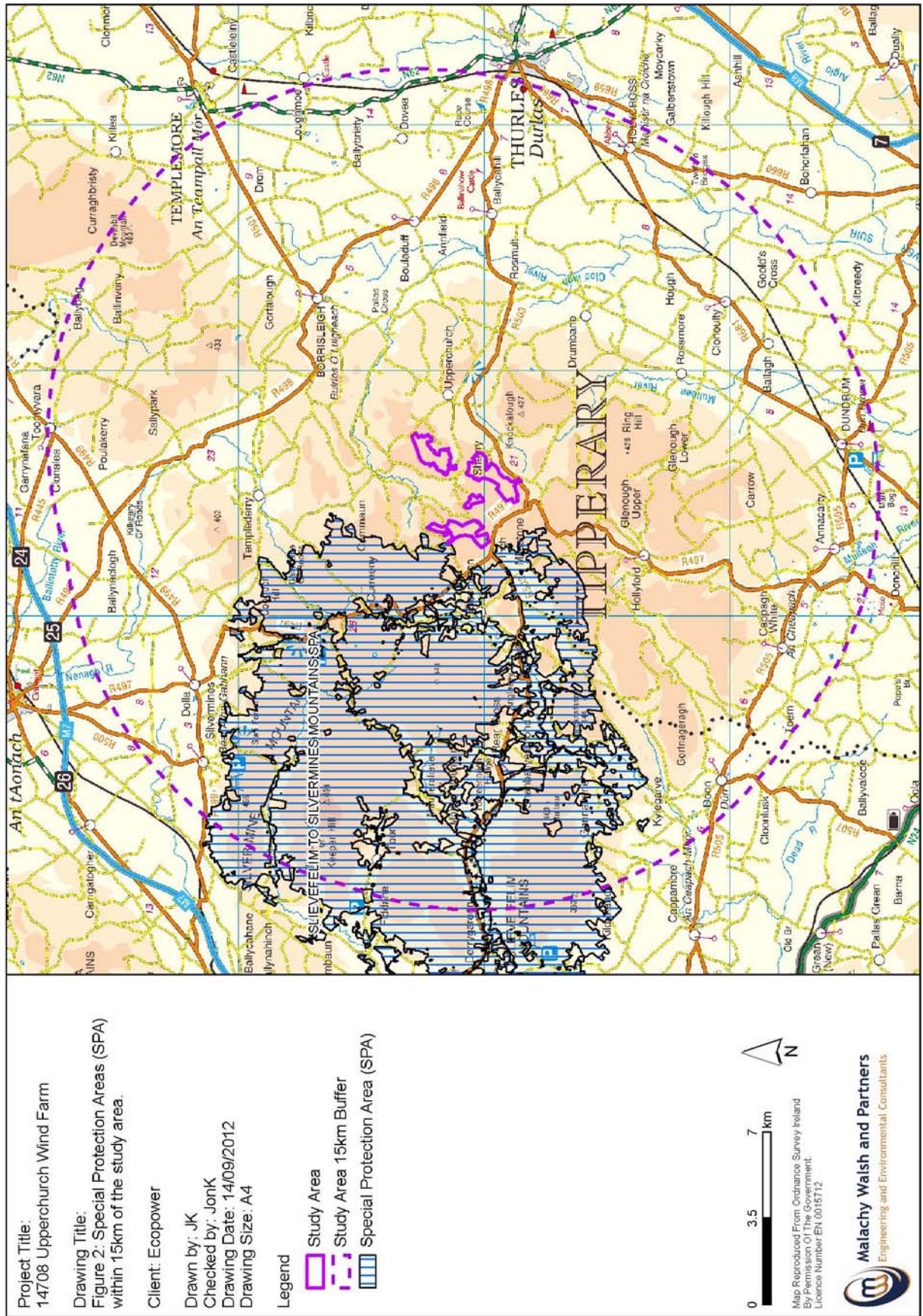
Upperchurch Windfarm Enviromental Impact Statement

FIGURE 13-II-1: SPECIAL AREAS OF CONSERVATION (SAC) WITHIN 15KM OF THE STUDY AREA



Upperchurch Windfarm Environmental Impact Statement

FIGURE 13-II-2: SPECIAL PROTECTION AREAS (SPA) WITHIN 15KM OF THE STUDY AREA



Appendix 2
Conservation Objectives

Conservation Objectives for Anglesey Road SAC [002125]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [6230] * Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)

Citation:

NPWS (2011) Conservation objectives for Anglesey Road SAC [002125]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Kilduff, Devilsbit Mountain SAC [000934]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [4030] European dry heaths
- ◆ [6230] * Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)

Citation:

NPWS (2011) Conservation objectives for Kilduff, Devilsbit Mountain SAC [000934]. Generic Version 3.0.
Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Keeper Hill SAC [001197]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [4010] Northern Atlantic wet heaths with *Erica tetralix*
- ◆ [6230] * Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)
- ◆ [7130] Blanket bogs (* if active only)

Citation:

NPWS (2011) Conservation objectives for Keeper Hill SAC [001197]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Philipston Marsh SAC [001847]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [7140] Transition mires and quaking bogs

Citation:

NPWS (2011) Conservation objectives for Philipston Marsh SAC [001847]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Bolingbrook Hill SAC [002124]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [4010] Northern Atlantic wet heaths with *Erica tetralix*
- ◆ [4030] European dry heaths
- ◆ [6230] * Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)

Citation:

NPWS (2011) Conservation objectives for Bolingbrook Hill SAC [002124]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Lower River Suir SAC [002137]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [1029] *Margaritifera margaritifera*
- ◆ [1092] *Austropotamobius pallipes*
- ◆ [1095] *Petromyzon marinus*
- ◆ [1096] *Lampetra planeri*
- ◆ [1099] *Lampetra fluviatilis*
- ◆ [1103] *Alosa fallax*
- ◆ [1106] *Salmo salar* (only in fresh water)
- ◆ [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- ◆ [1355] *Lutra lutra*
- ◆ [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
- ◆ [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- ◆ [6430] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
- ◆ [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Citation:

NPWS (2011) Conservation objectives for Lower River Suir SAC [002137]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

-
- ◆ [91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
 - ◆ [91J0] * *Taxus baccata* woods of the British Isles

Citation:

NPWS (2011) Conservation objectives for Lower River Suir SAC [002137]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Conservation Objectives for Lower River Shannon SAC [002165]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [1029] *Margaritifera margaritifera*
- ◆ [1095] *Petromyzon marinus*
- ◆ [1096] *Lampetra planeri*
- ◆ [1099] *Lampetra fluviatilis*
- ◆ [1106] *Salmo salar* (only in fresh water)
- ◆ [1110] Sandbanks which are slightly covered by sea water all the time
- ◆ [1130] Estuaries
- ◆ [1140] Mudflats and sandflats not covered by seawater at low tide
- ◆ [1150] * Coastal lagoons
- ◆ [1160] Large shallow inlets and bays
- ◆ [1170] Reefs
- ◆ [1220] Perennial vegetation of stony banks
- ◆ [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts
- ◆ [1310] *Salicornia* and other annuals colonizing mud and sand
- ◆ [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)

Citation:

NPWS (2011) Conservation objectives for Lower River Shannon SAC [002165]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

-
- ◆ [1349] *Tursiops truncatus*
 - ◆ [1355] *Lutra lutra*
 - ◆ [1410] Mediterranean salt meadows (*Juncetalia maritimi*)
 - ◆ [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
 - ◆ [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
 - ◆ [91E0] * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Citation:

NPWS (2011) Conservation objectives for Lower River Shannon SAC [002165]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning

Appendix 13-II: Natura Impact Statement

Conservation Objectives for Silvermines Mountains West SAC [002258]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- ◆ [4010] Northern Atlantic wet heaths with *Erica tetralix*
- ◆ [4030] European dry heaths

Citation:

NPWS (2011) Conservation objectives for Silvermines Mountains West SAC [002258]. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

For more information please go to: www.npws.ie/protectedsites/conservationmanagementplanning



Conservation Objectives for Slievefelim to Silvermines Mountains SPA [004165]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- ◆ *Circus cyaneus* [breeding]

Citation:

NPWS (2011) Conservation objectives for Slievefelim to Silvermines Mountains SPA [004165]. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht.



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 | 26 th 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.

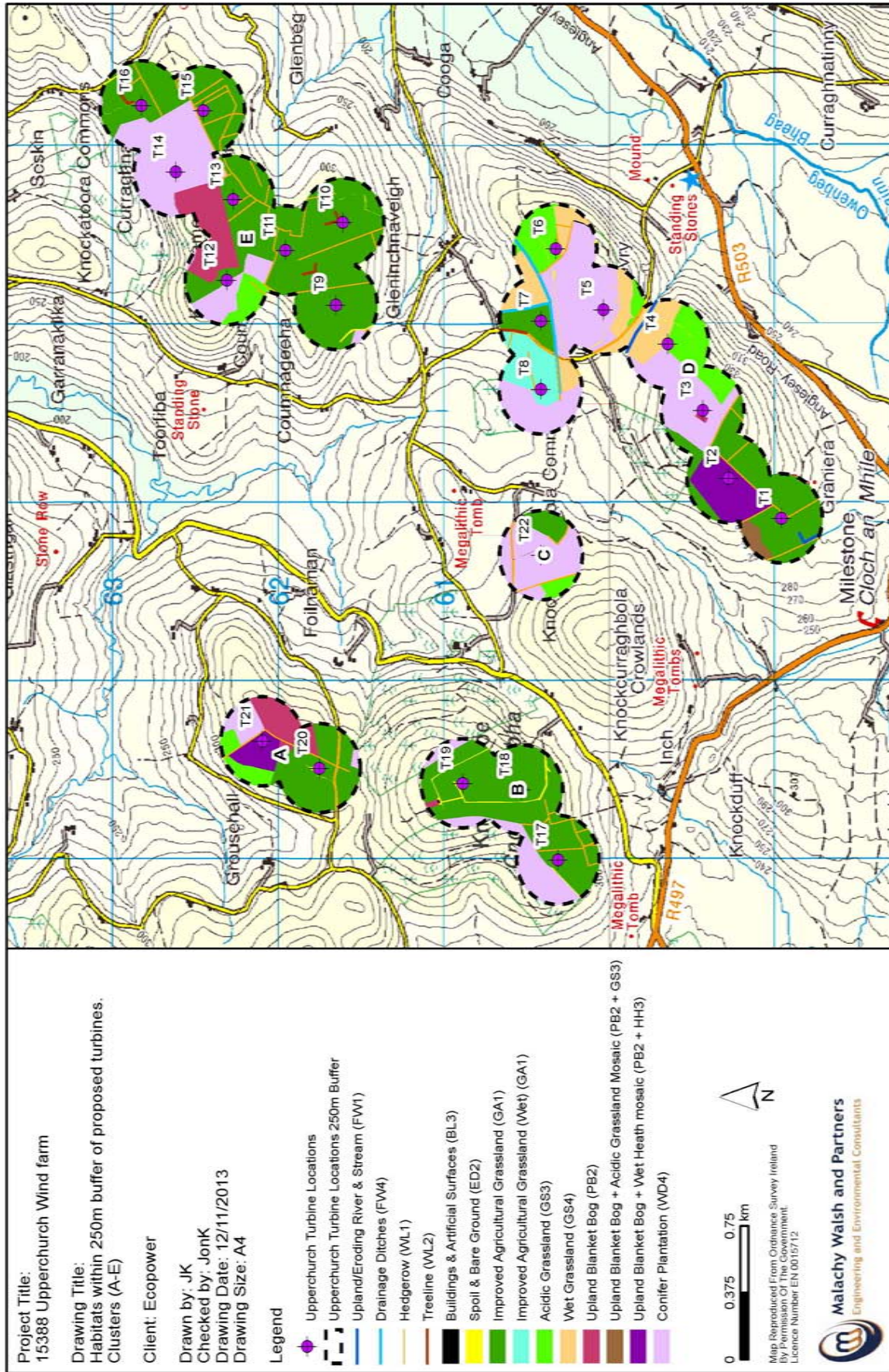


Table 2: Turbines groupings within the each zone

| 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, then 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 |
| Zone E | 9 to 16 | 6.5000 | Pre 1995 | Estimate 1995 to 2003 | 2030 | 2035 to 2043 |
| | | 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 compensatory 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, a 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 4ha or 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 prohibited.

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:

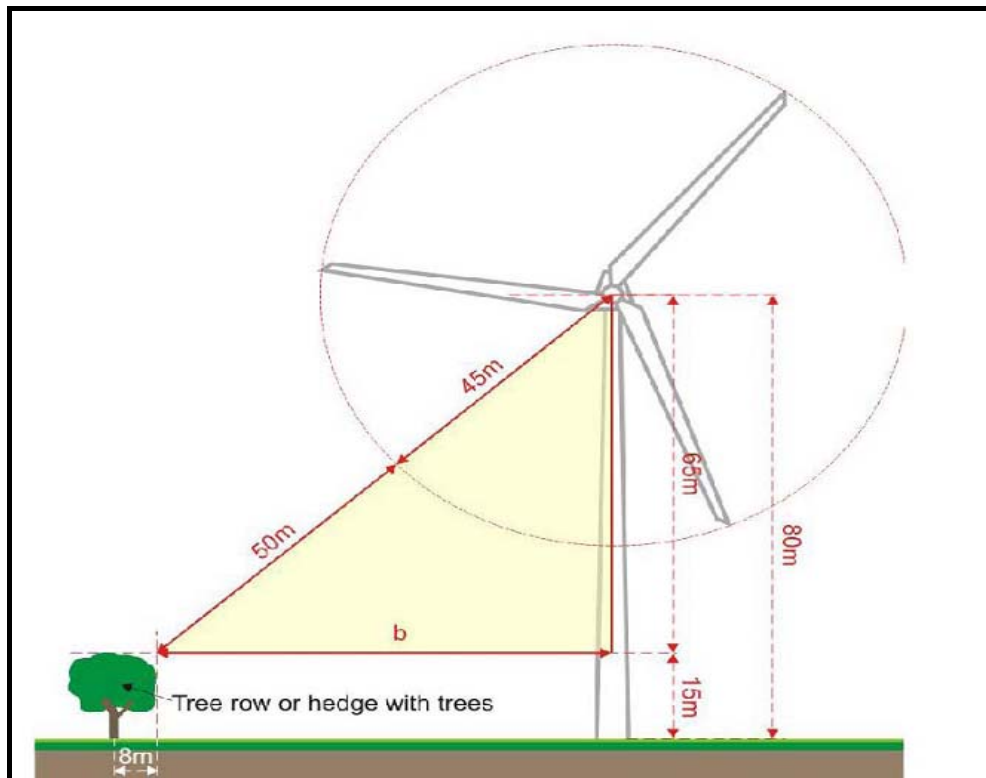
- Pre-construction monitoring will be undertaken within the site, and will continue during the construction phase.
- Vegetation clearance, including the felling of trees, scrub and hedgerow, will be undertaken outside the breeding bird period (1st April to the 31st of August).
- Work should begin before 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:

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

$$b = \sqrt{2625}$$

$$b = 51.2\text{m}$$

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.

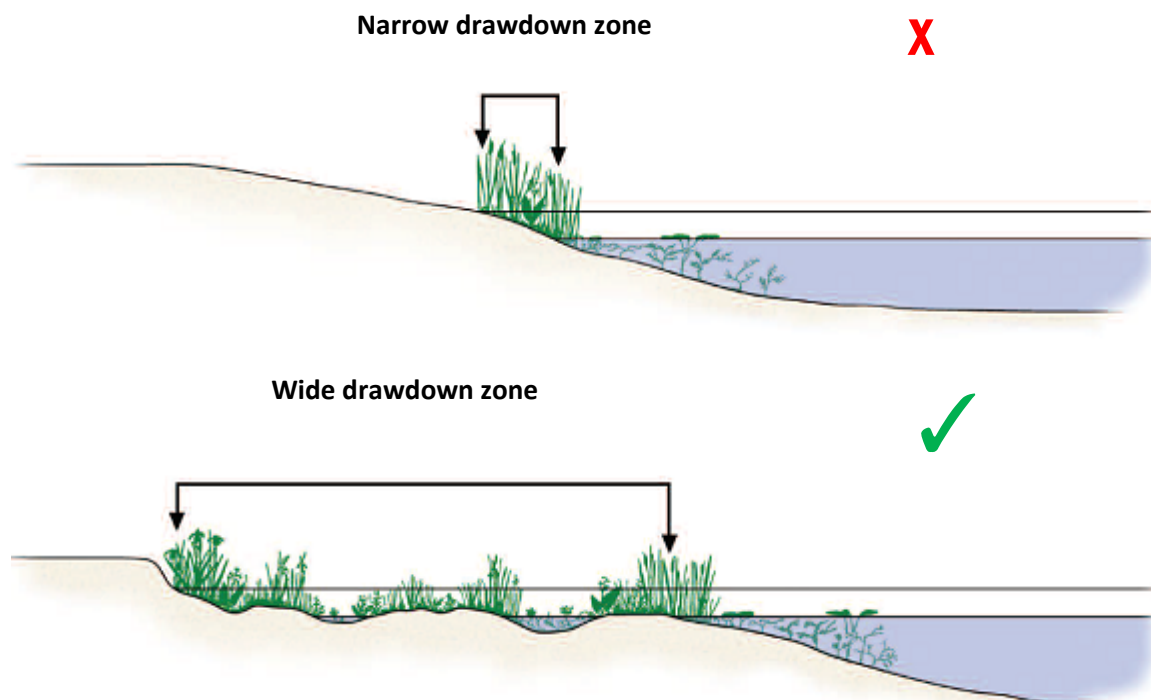


Figure 1: Create broad undulating drawdown zones – they are one of the most valuable areas for wildlife (Pond Conservation, 2013).

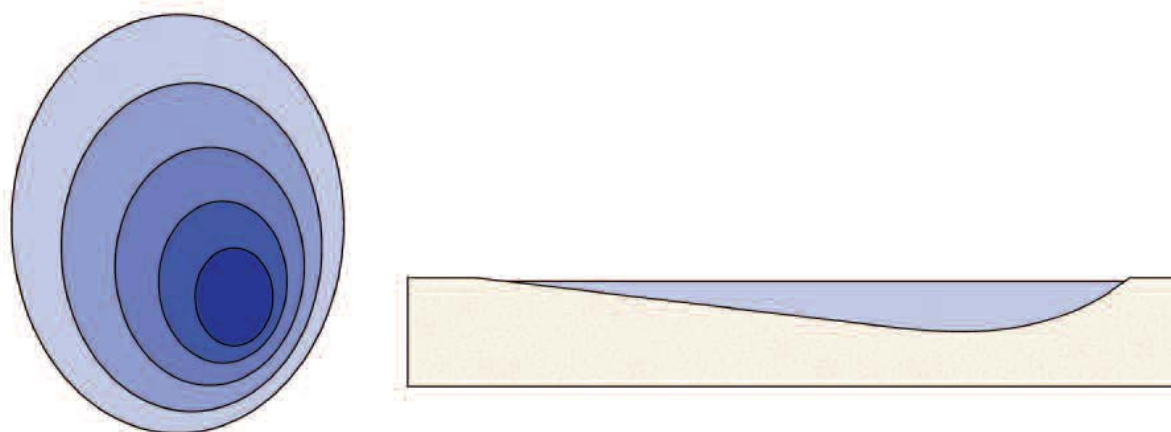


Figure 2: Asymmetric profile – useful to combine shallow water areas with greater depth (Pond Conservation, 2013).

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 their 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 | <i>Fraxinus excelsior</i> |
| Bay Willow | <i>Salix pentandra</i> |
| Black Alder | <i>Alnus glutinosa</i> |
| Blackthorn/Sloe | <i>Prunus spinosa</i> |
| Crab apple | <i>Malus sylvestris</i> |
| Common/Wild Cherry | <i>Prunus avium</i> |
| Downey Birch | <i>Betula pubescens</i> |

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

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 (<i>Molinia caerulea</i>) and other suitable species will be planted within the bare felled areas. | Year 1 | Purple-moor grass (<i>Molinia caerulea</i>) 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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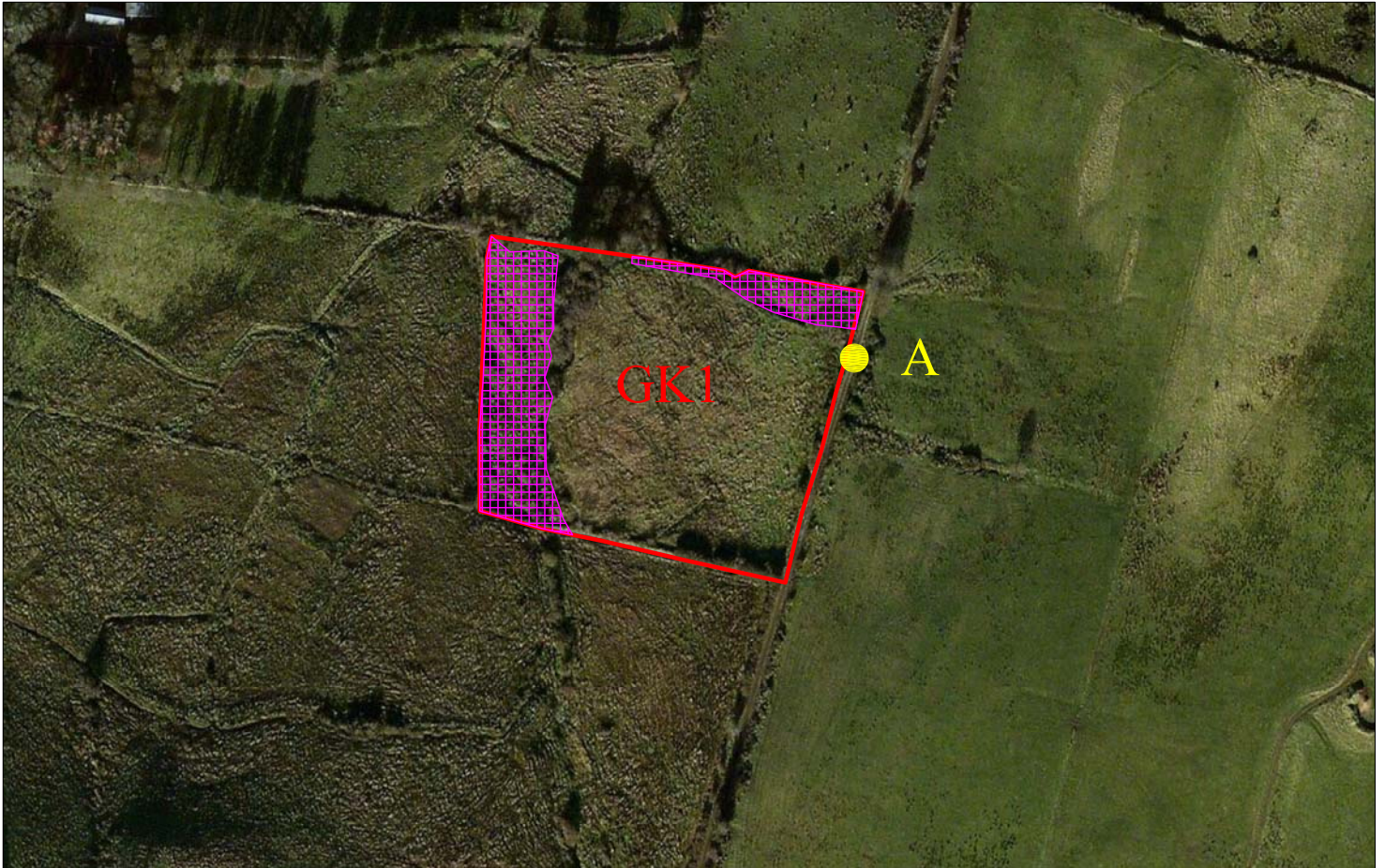
Appendix 1
Hen Harrier Habitat Area
– Individual Field photographs,
Management measures and restrictions

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.

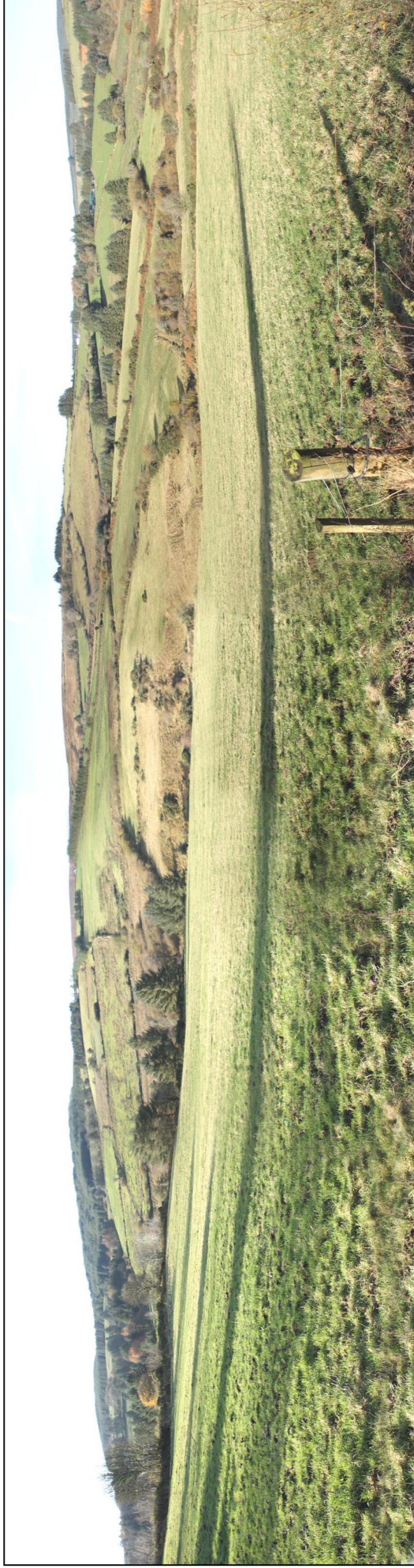
 Areas to be planted with woody scrub such as Willow, Alder, Birch

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

 Photograph Locations

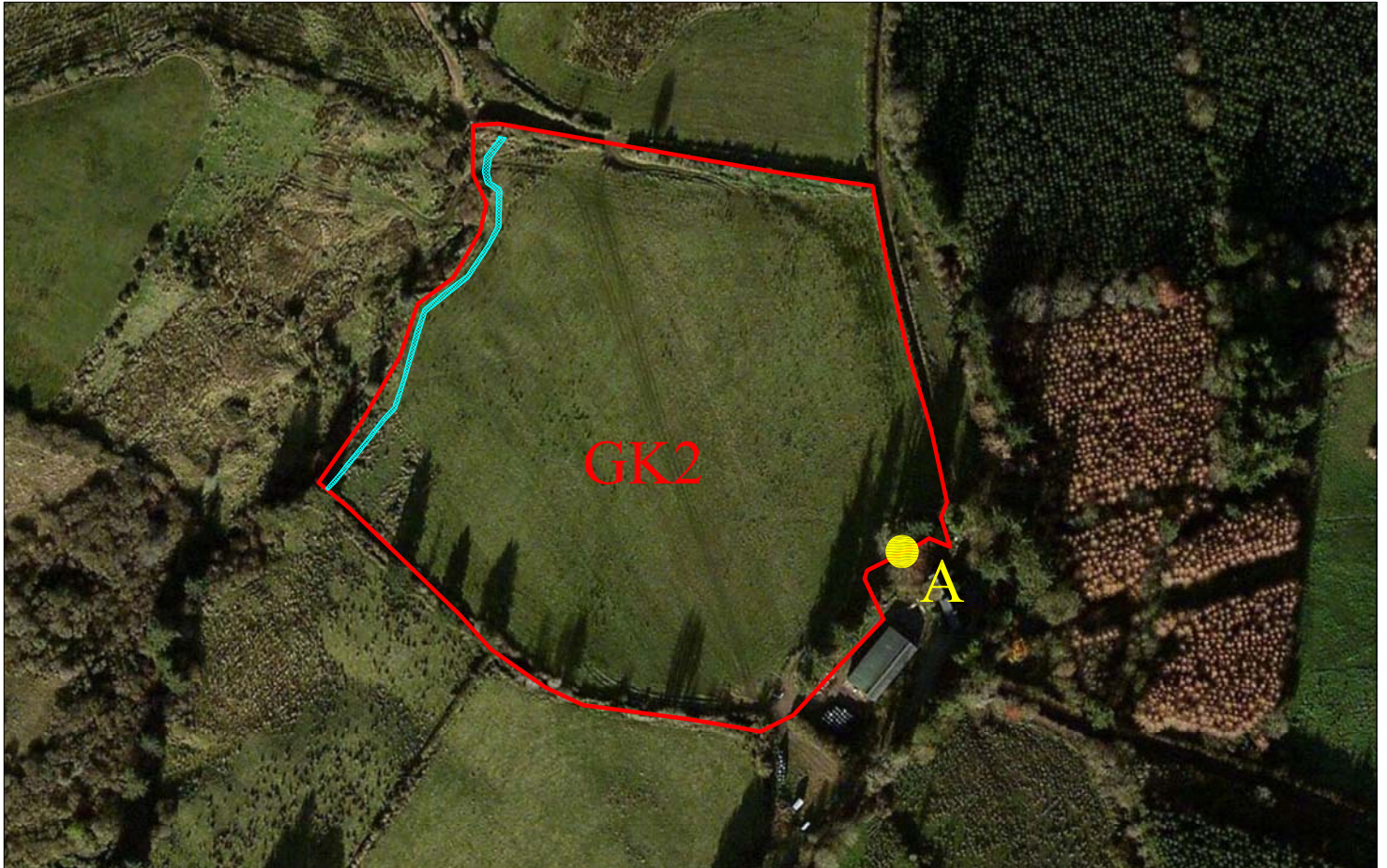
Photographs of Field GK2

REFERENCE DOCUMENT



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.
-  Photograph Locations

Photographs of Field GK3

REFERENCE DOCUMENT



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

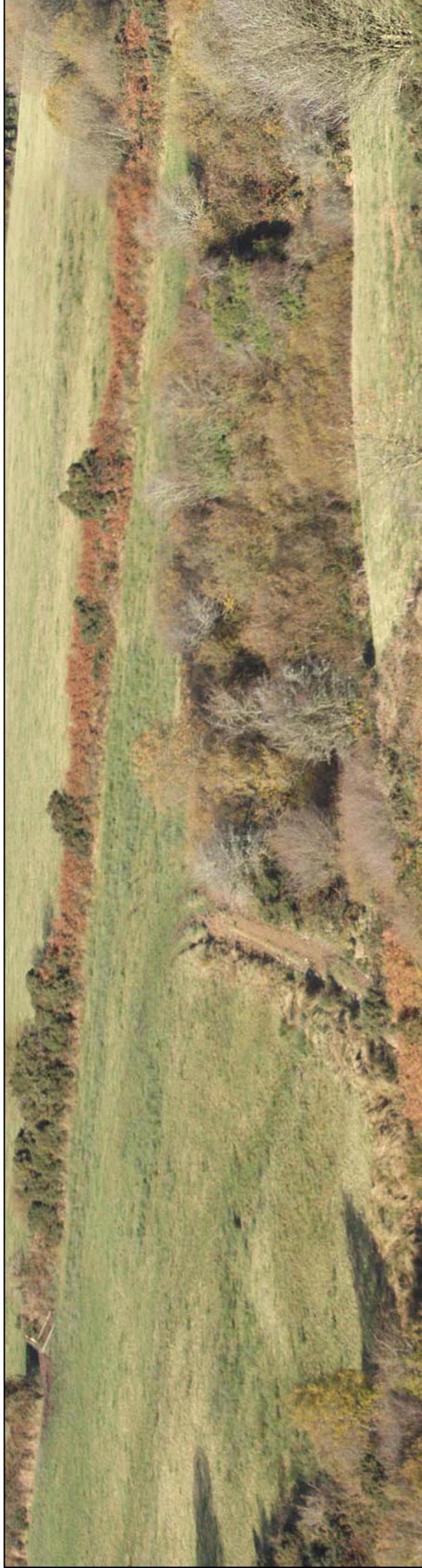
 New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

 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.

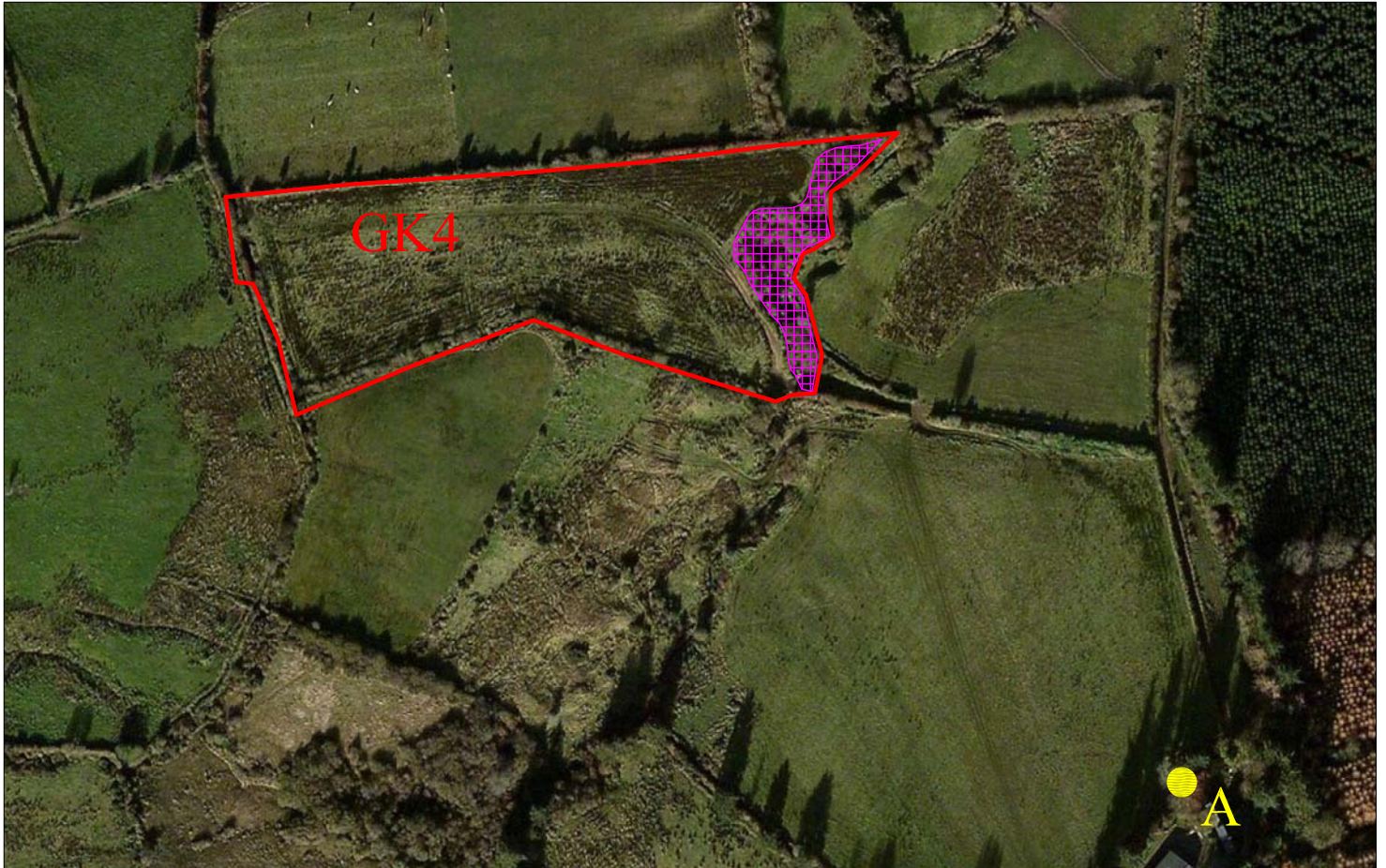
 Photograph Locations

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

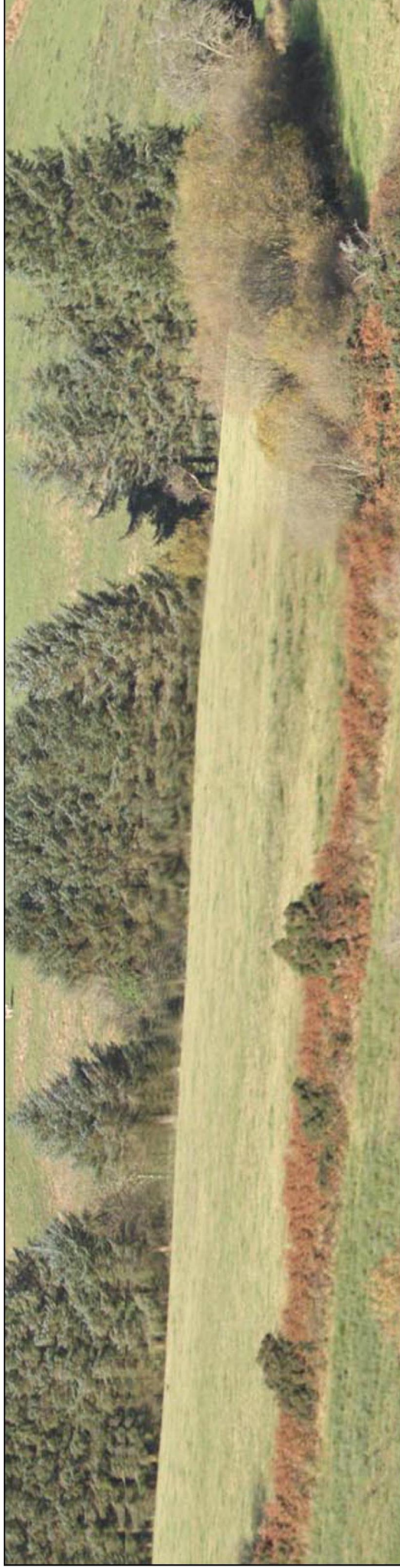
 New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

 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.

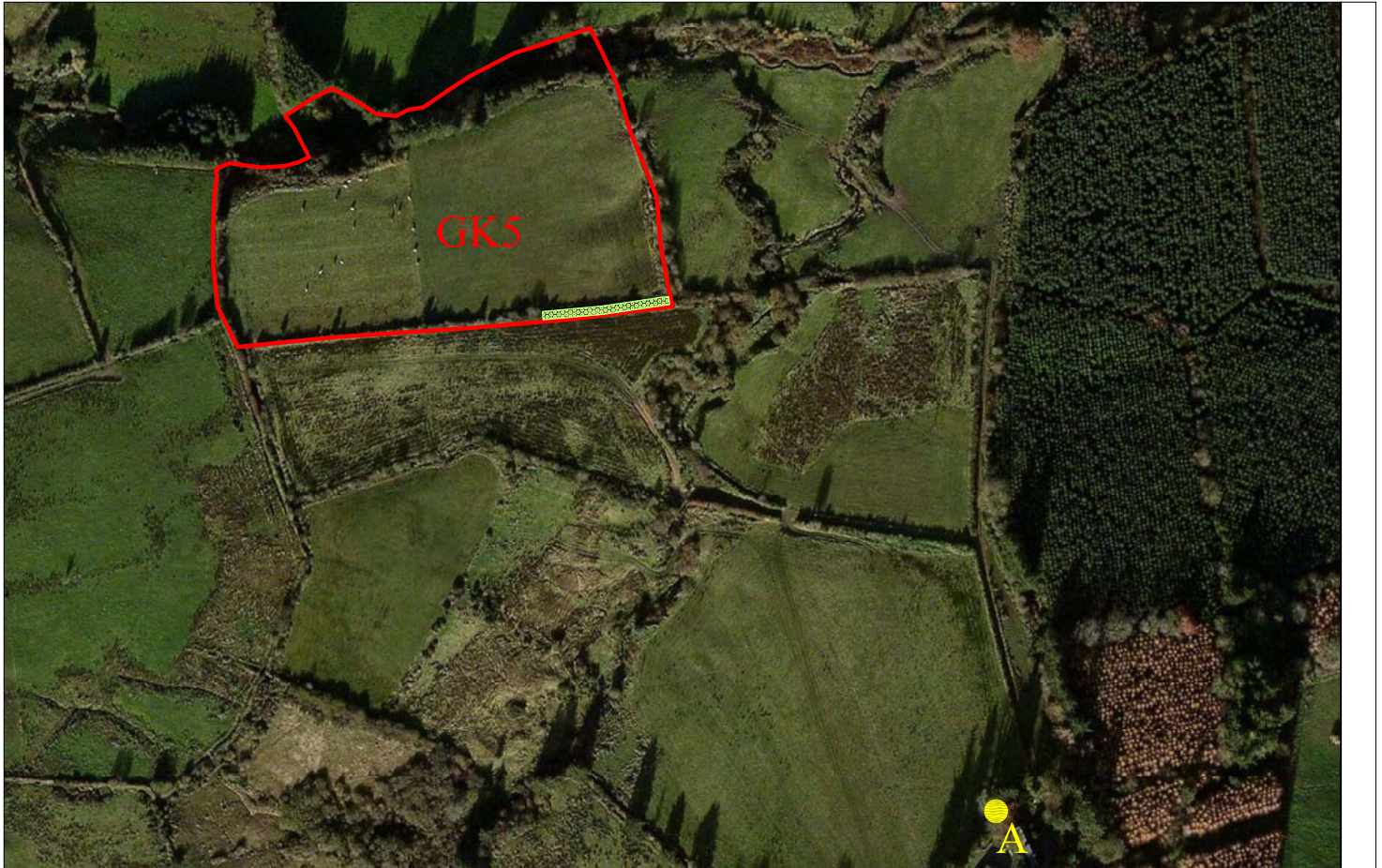
 Photograph Locations

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:

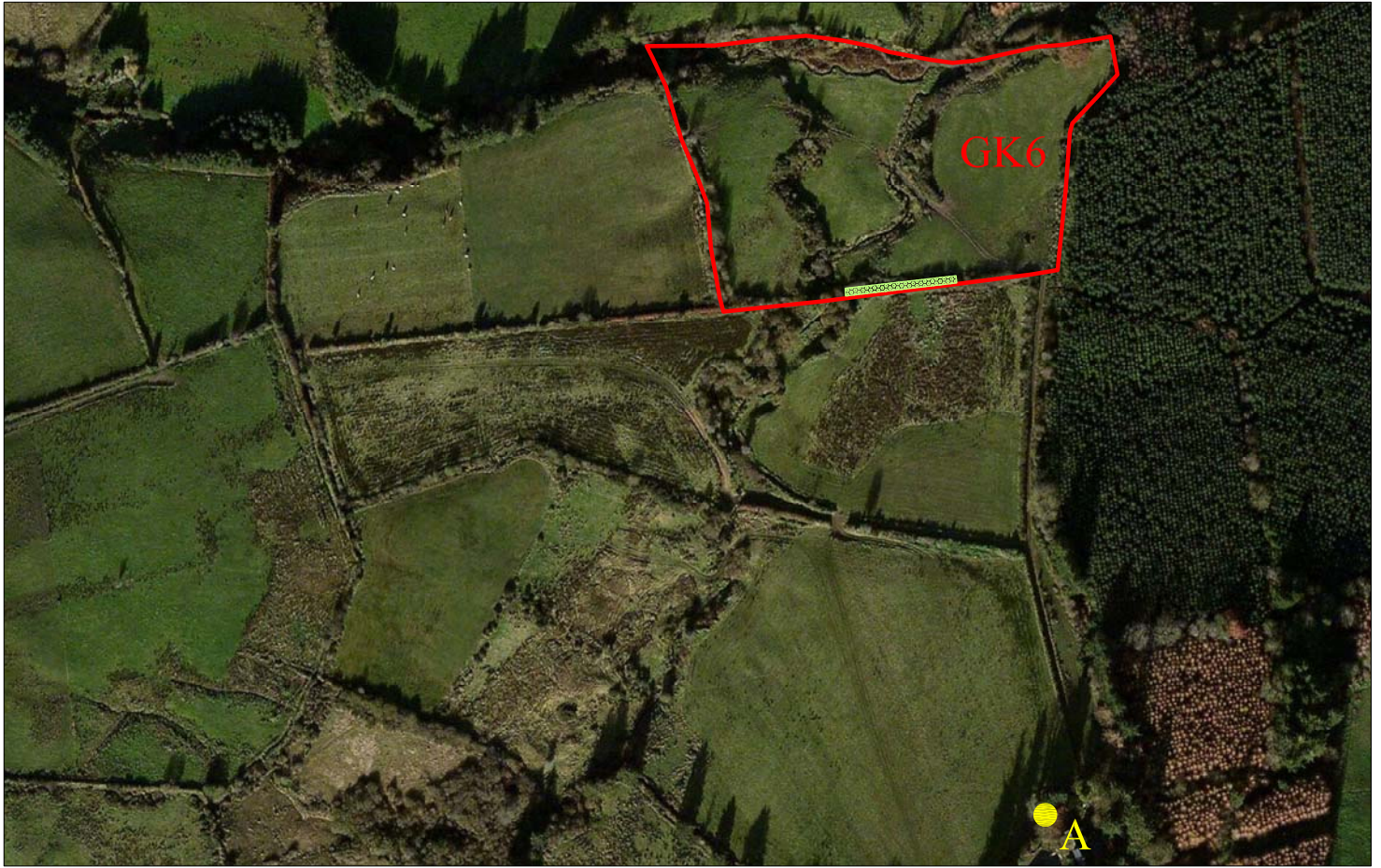
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

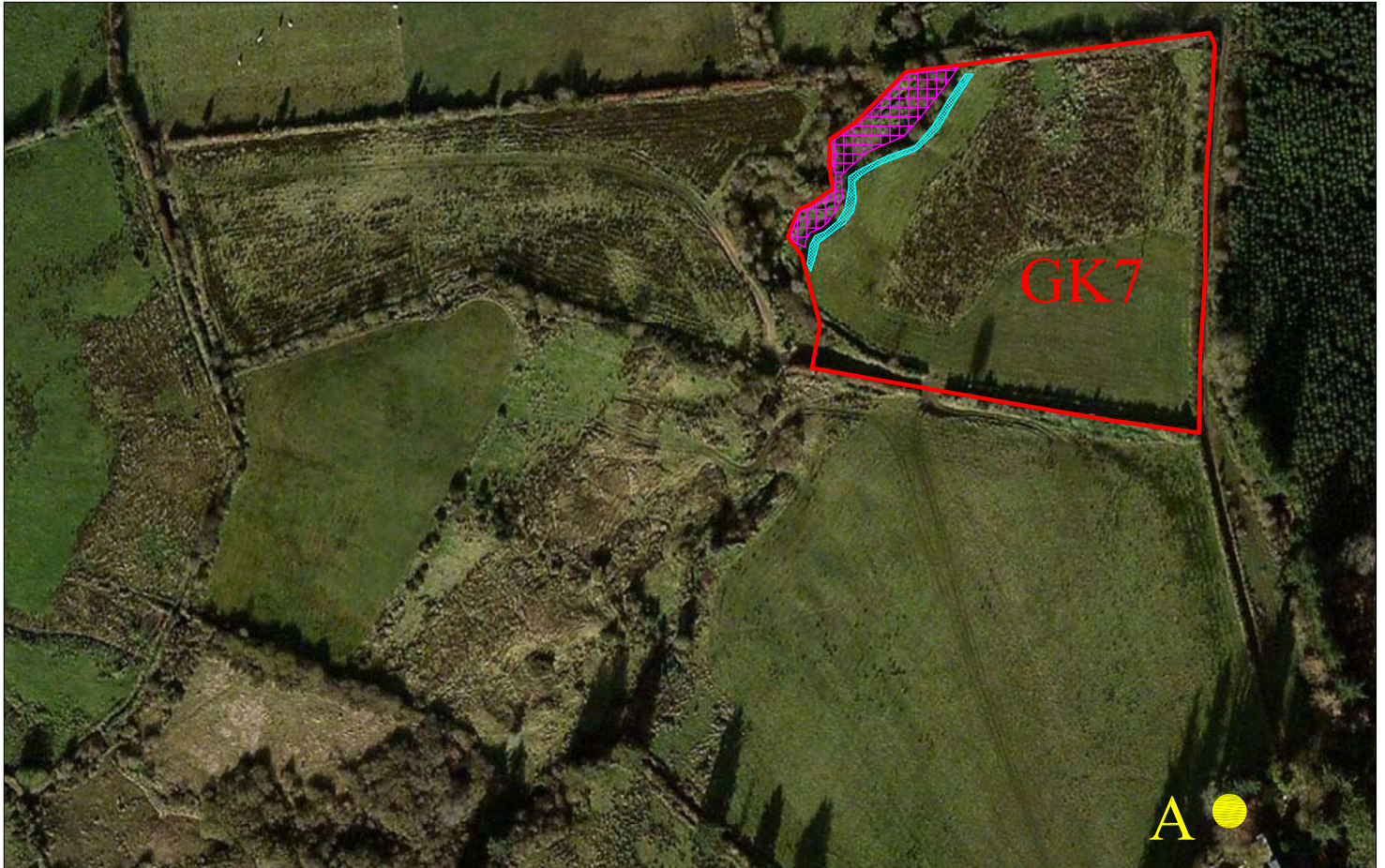
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

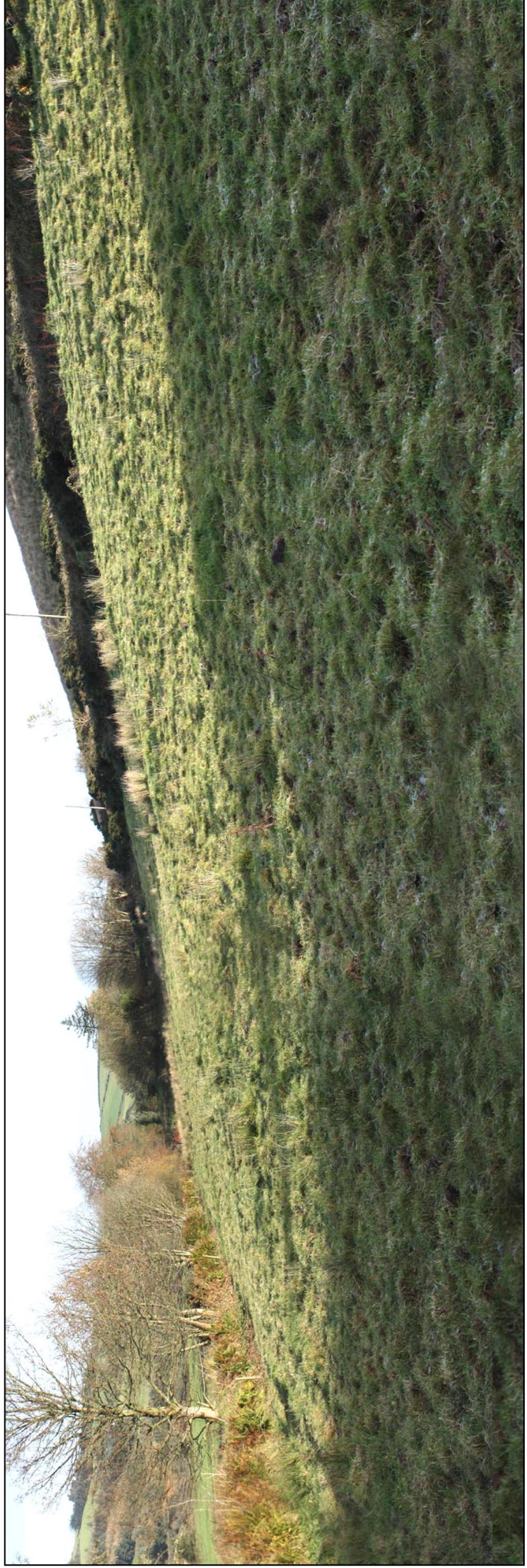
Field Map Index:

-  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.
-  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.

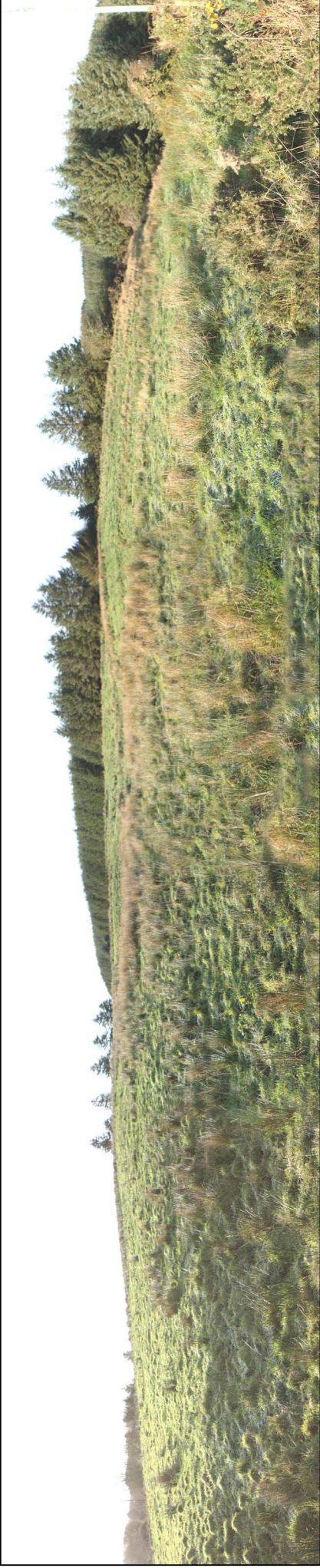
Restrictions:

- 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.
-  Photograph Locations

Photographs of Field JQ1

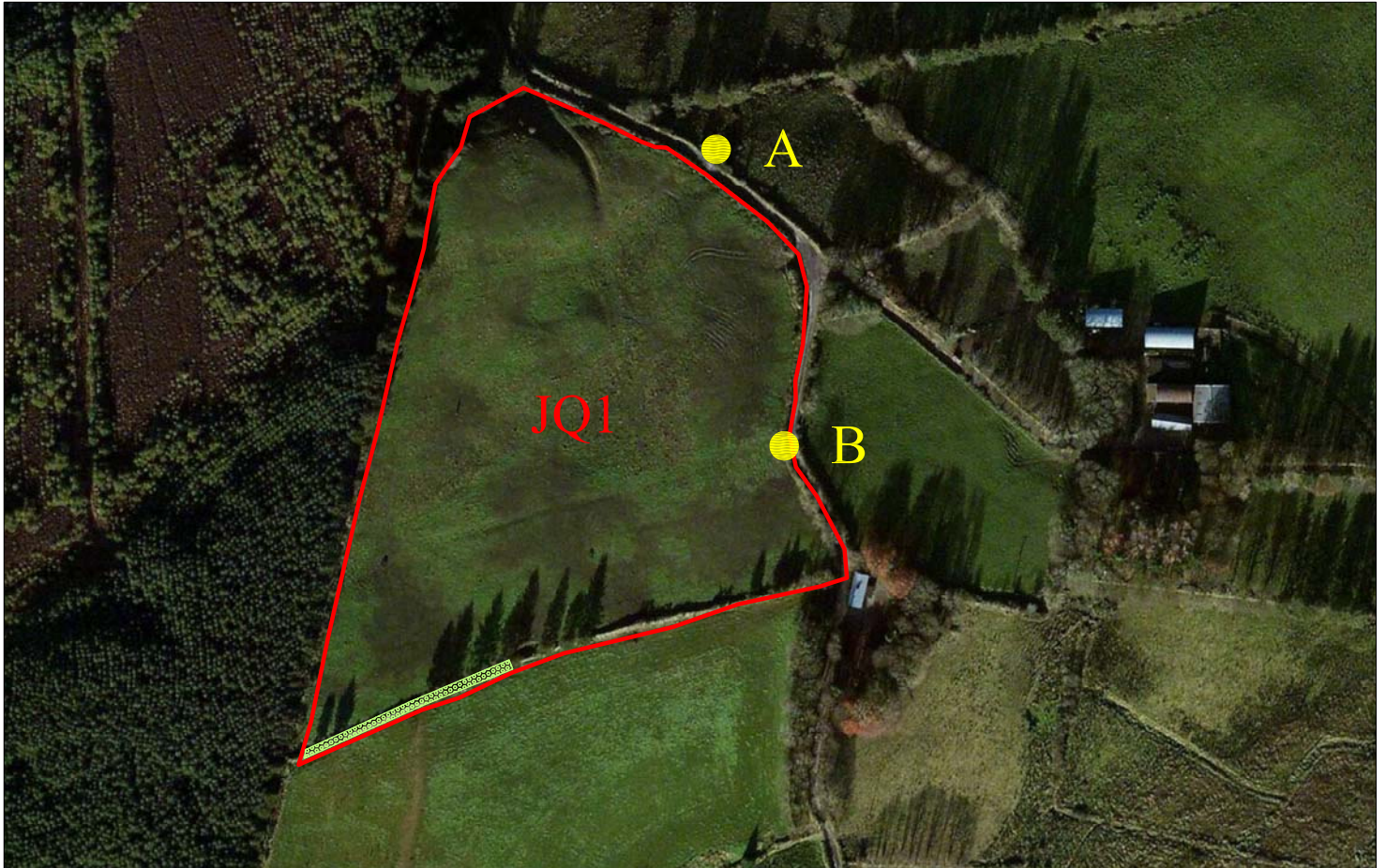


Photograph A looking southwest



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

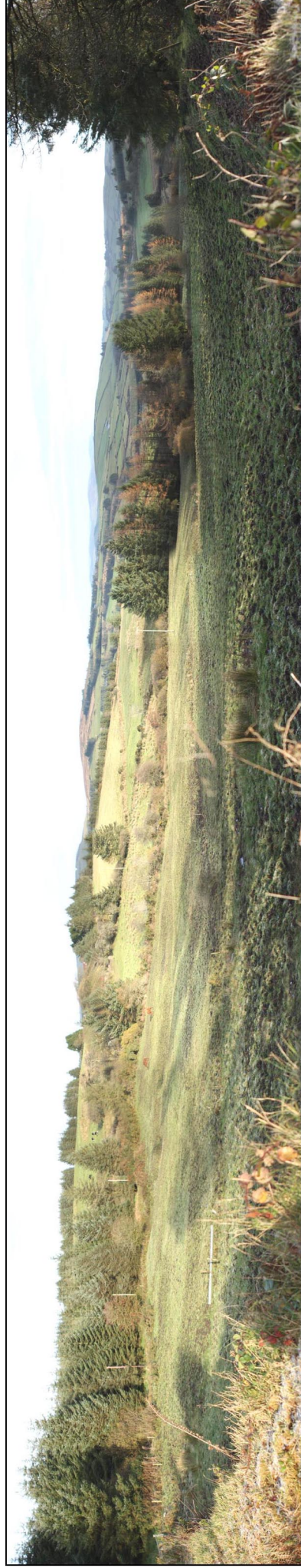
 Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

 Photograph Locations

Photographs of Field JQ2

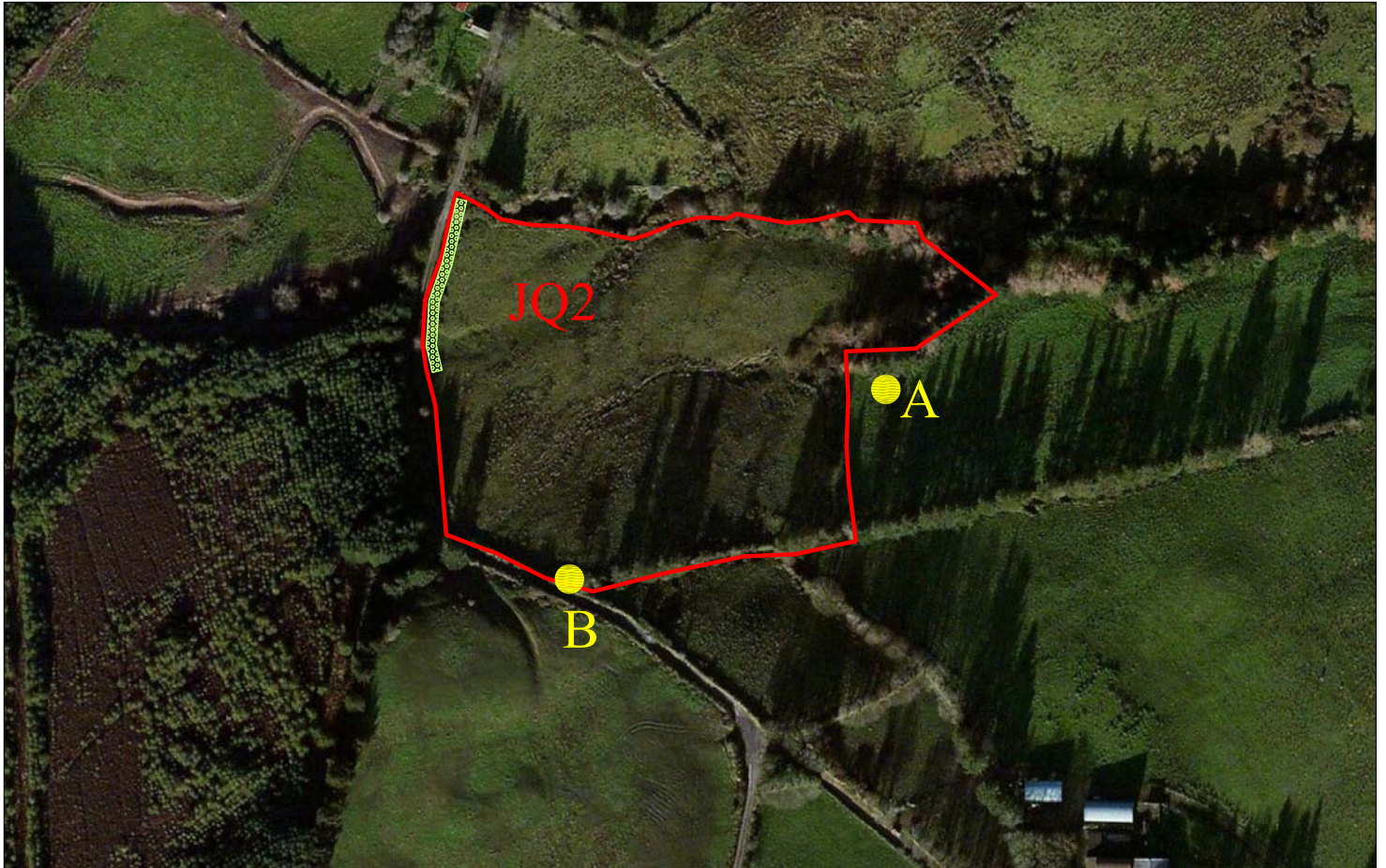


Photograph A looking west



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.

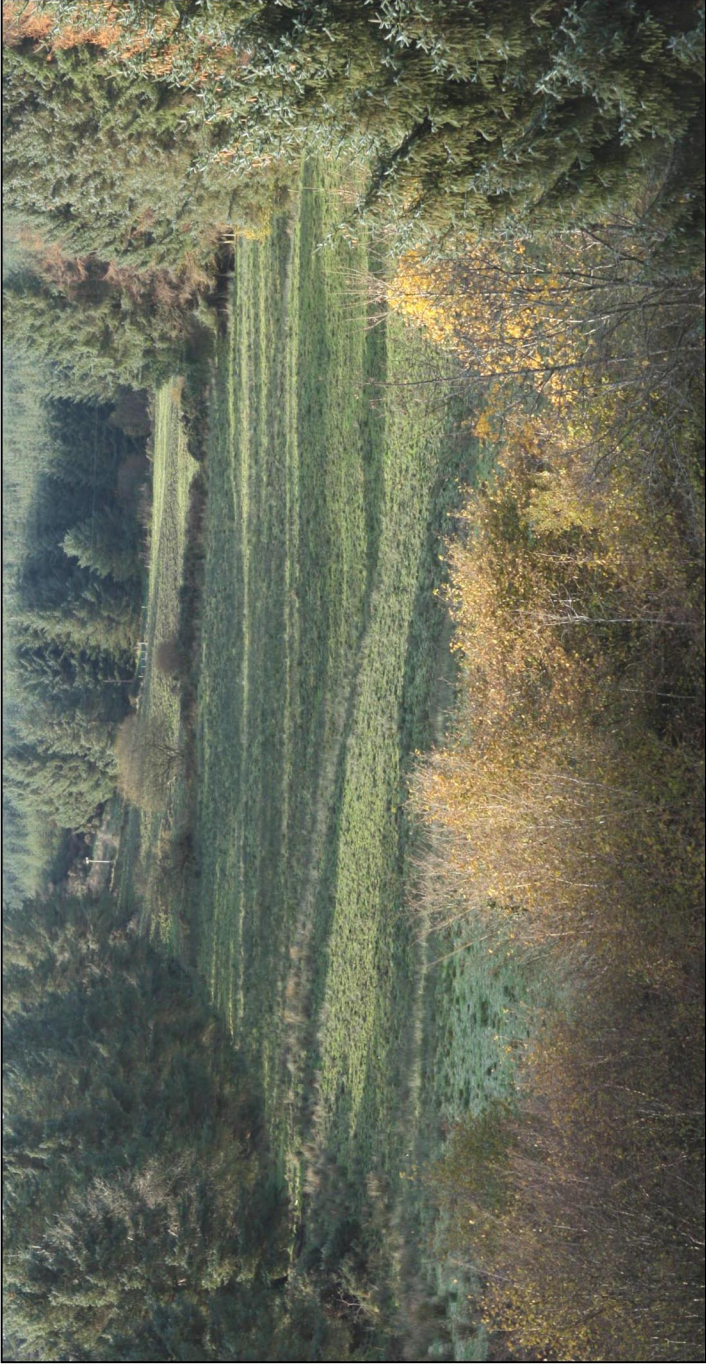
Restrictions:

- 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.
-  Photograph Locations

Photographs of Field JQ3

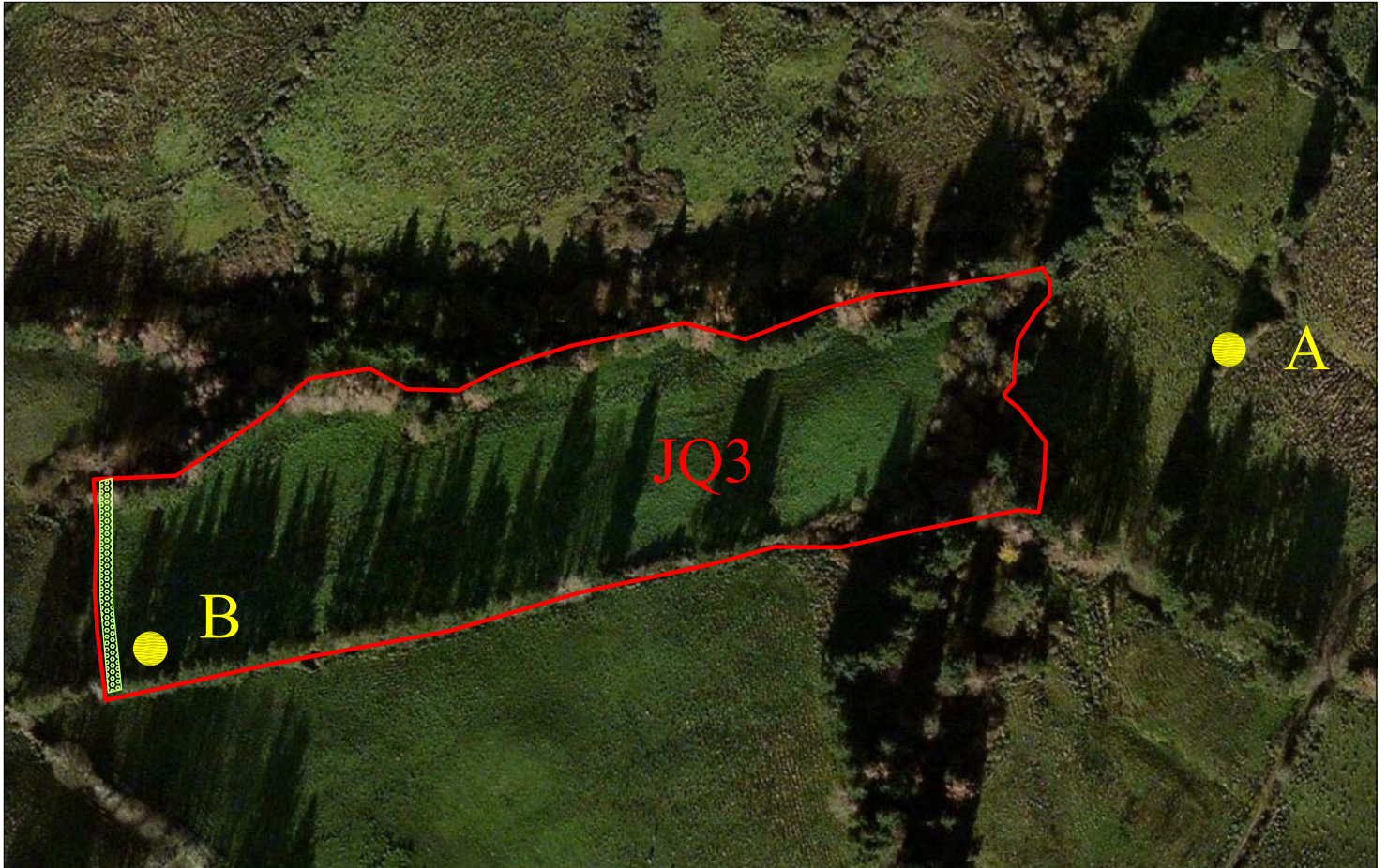


Photograph A looking west



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.
-  Photograph Locations

Photographs of Field JQ4

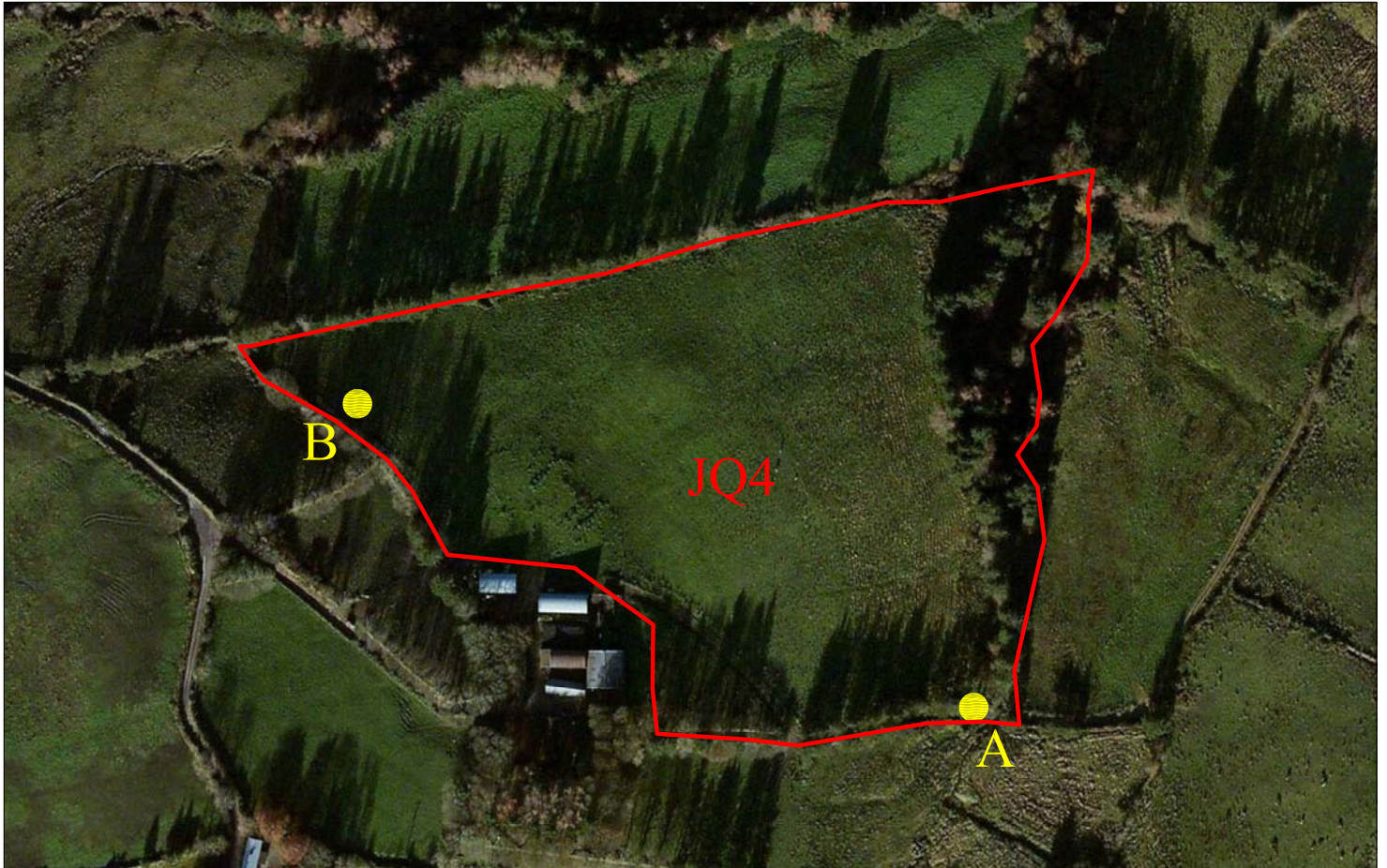


Photograph A looking northwest



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.
-  Photograph Locations

Photographs of Field JQ5



Photograph A looking west-southwest

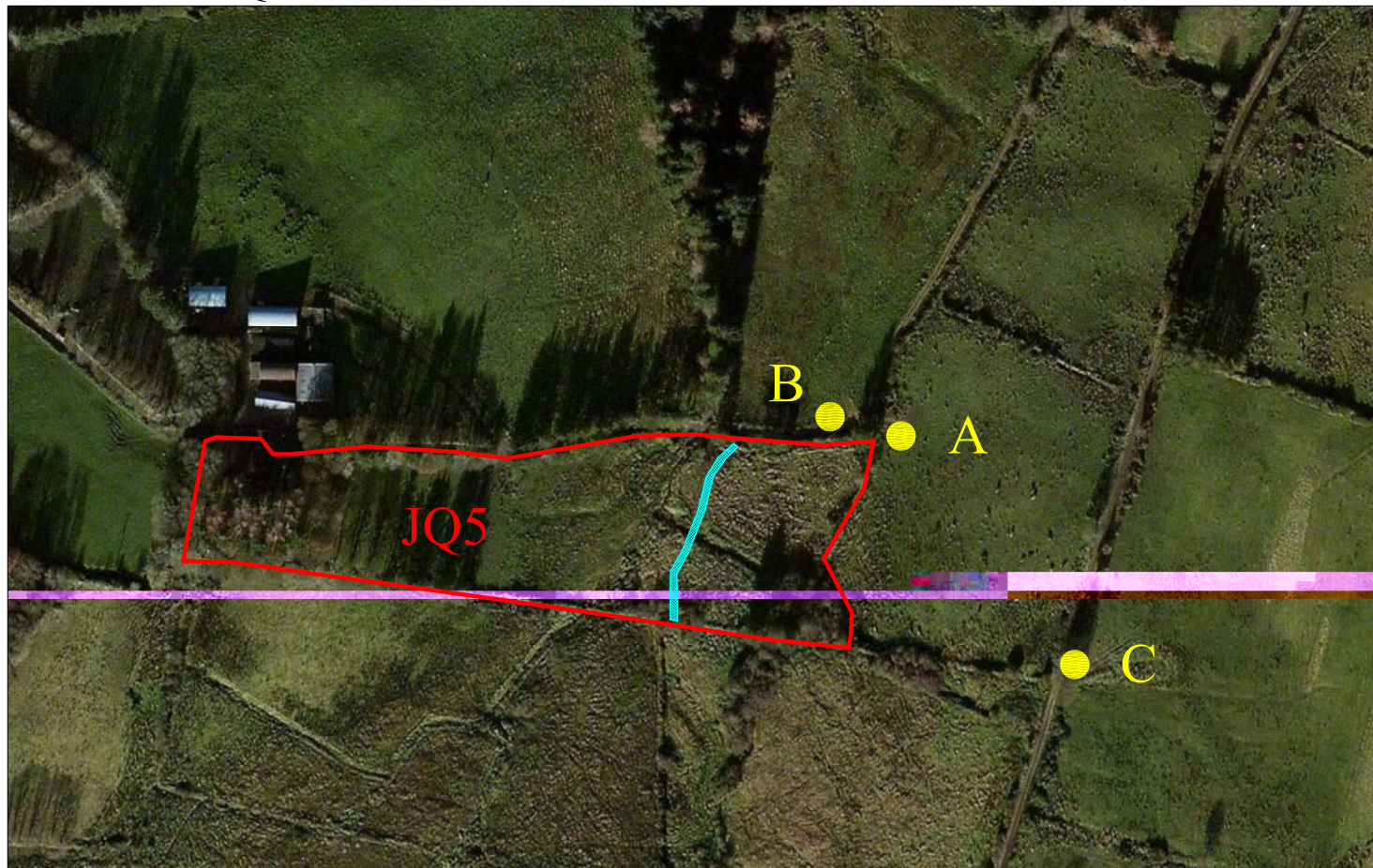


Photograph B looking south-southwest



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

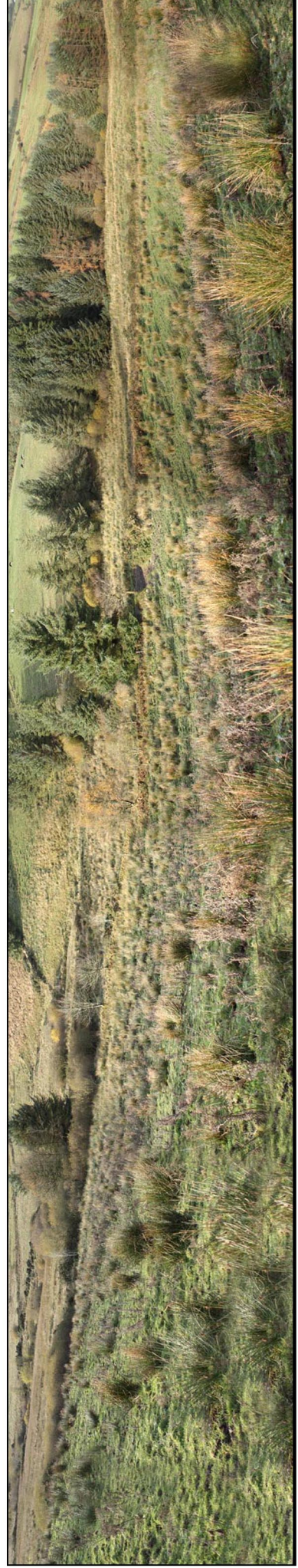
 Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

 Photograph Locations

Photographs of Field JQ6

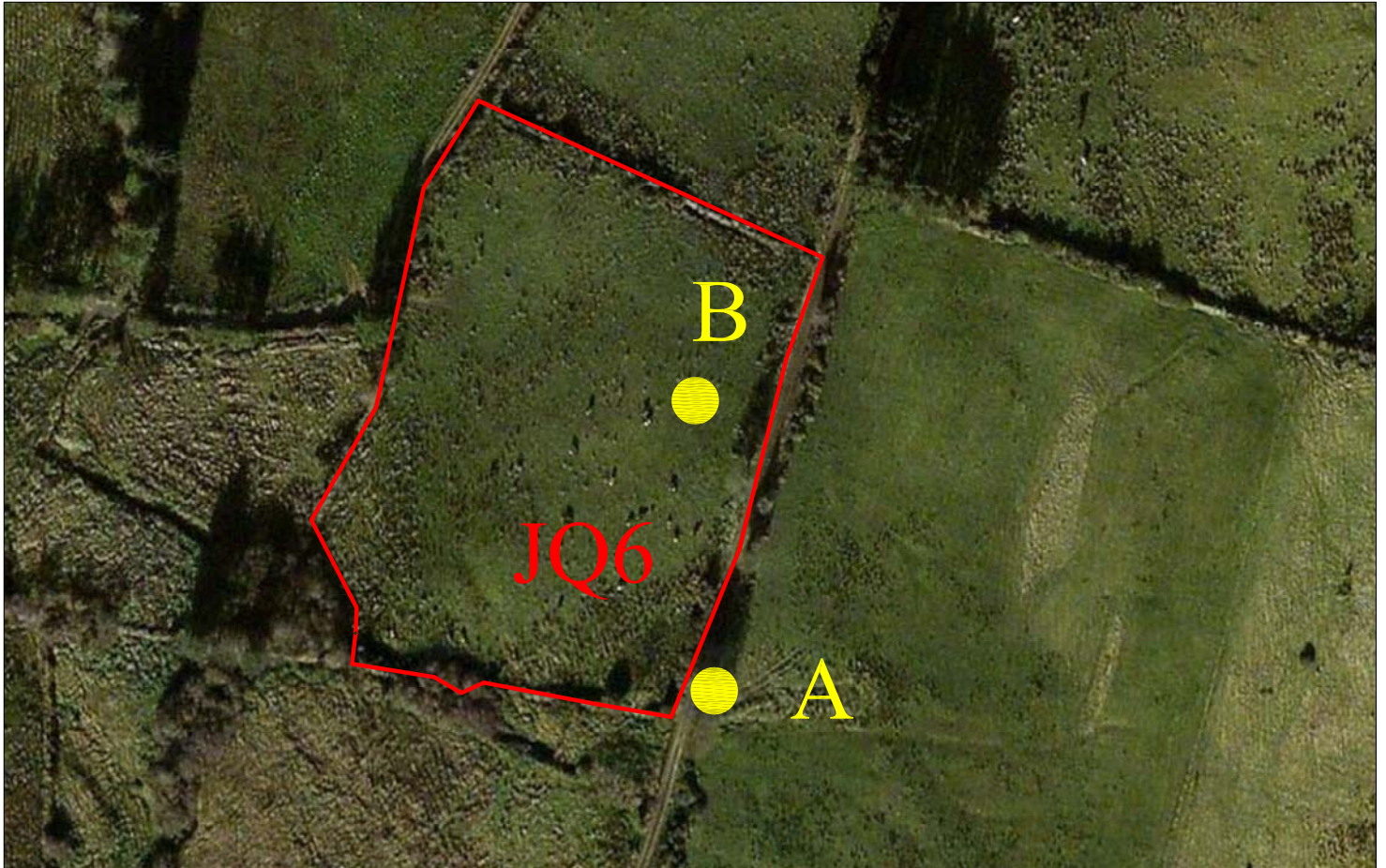


Photograph A looking west



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.

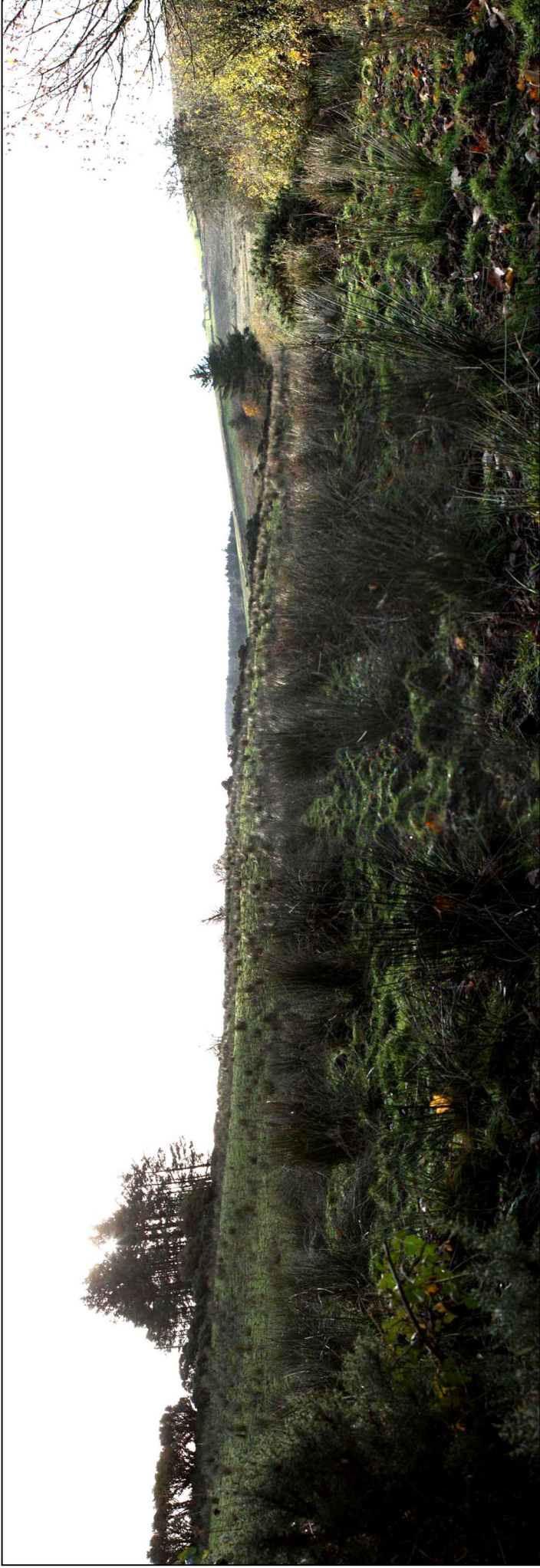
Restrictions:

- 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:

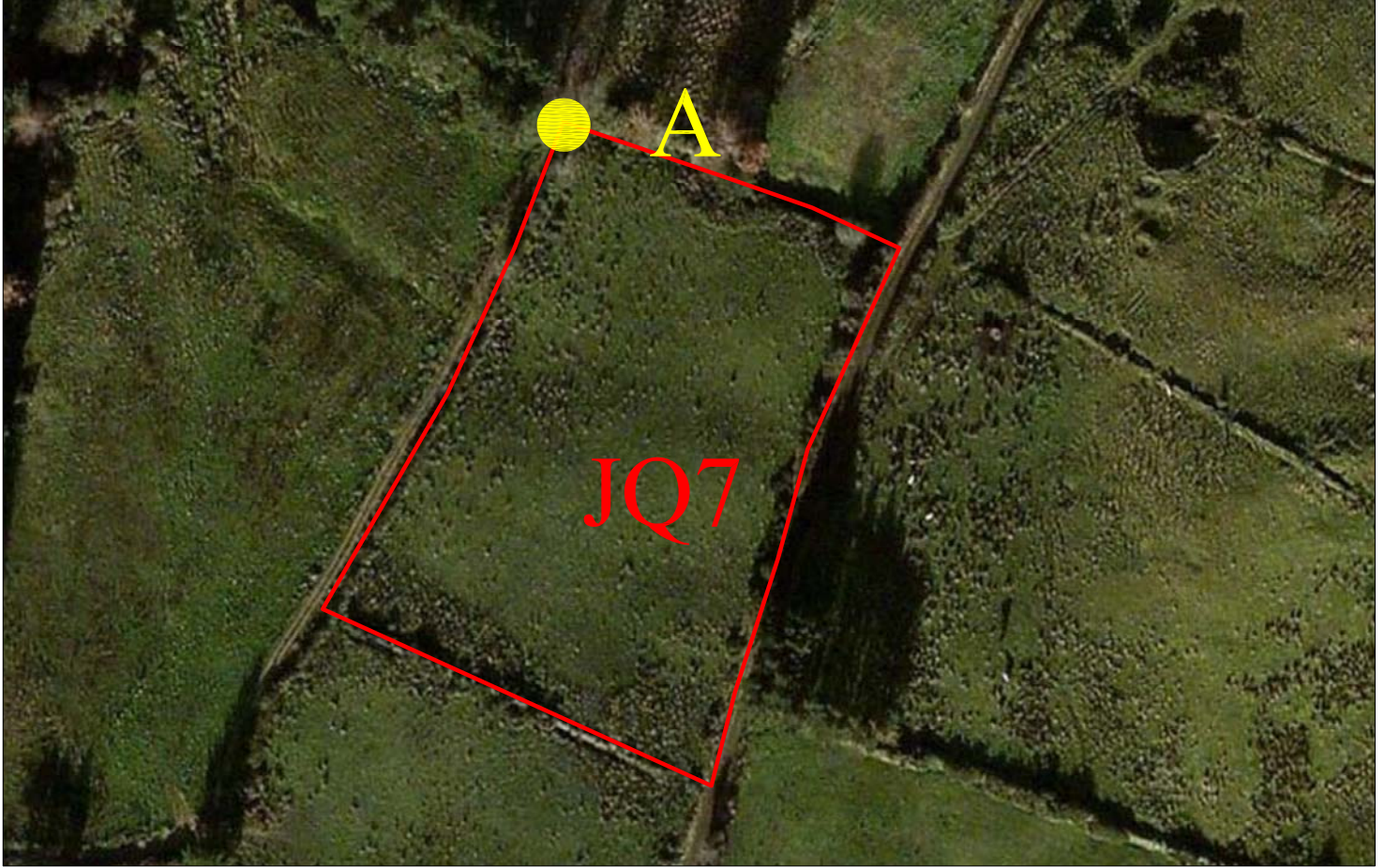
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

 Photograph Locations

Photographs of Field JQ8

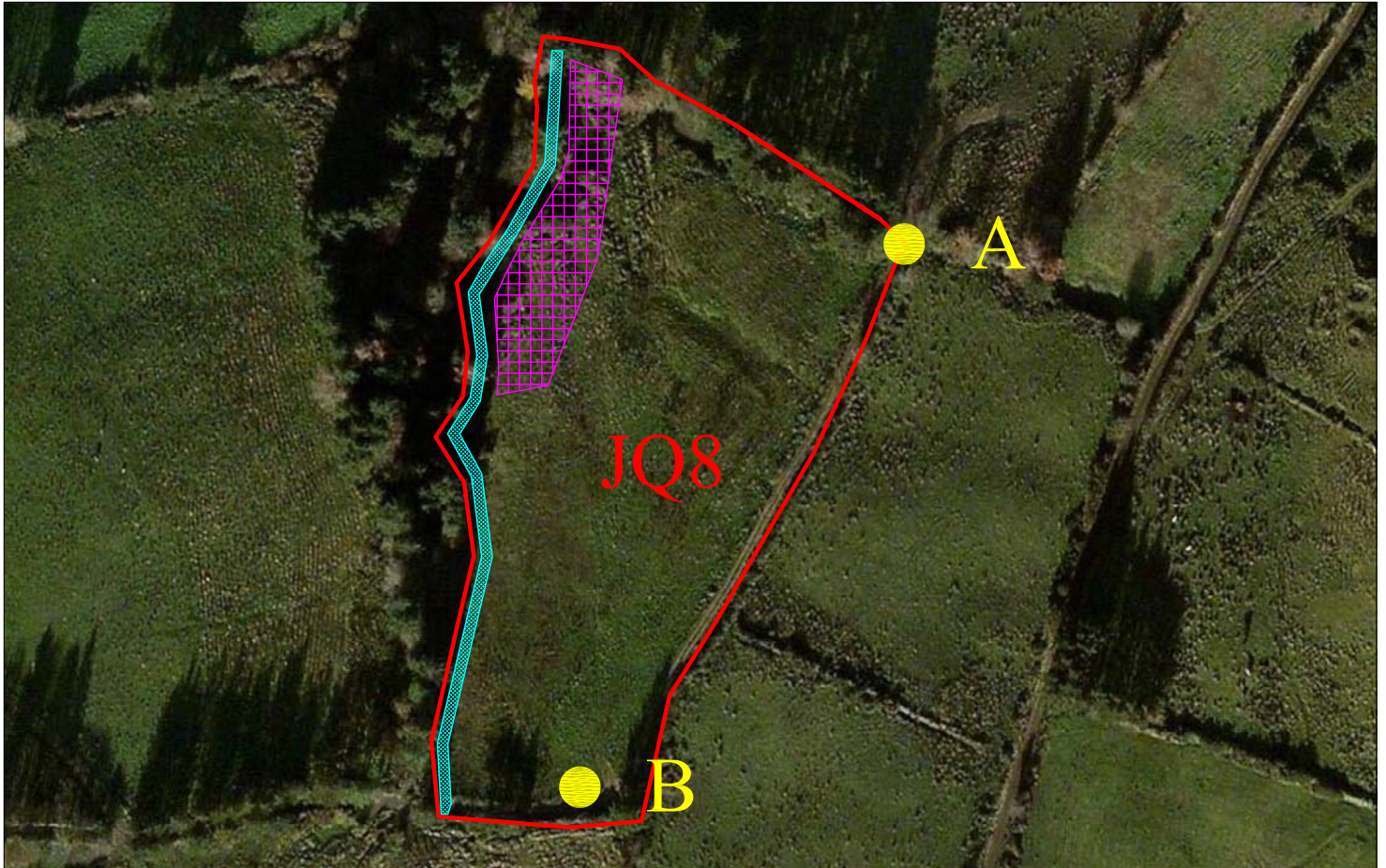


Photograph A looking southwest



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.

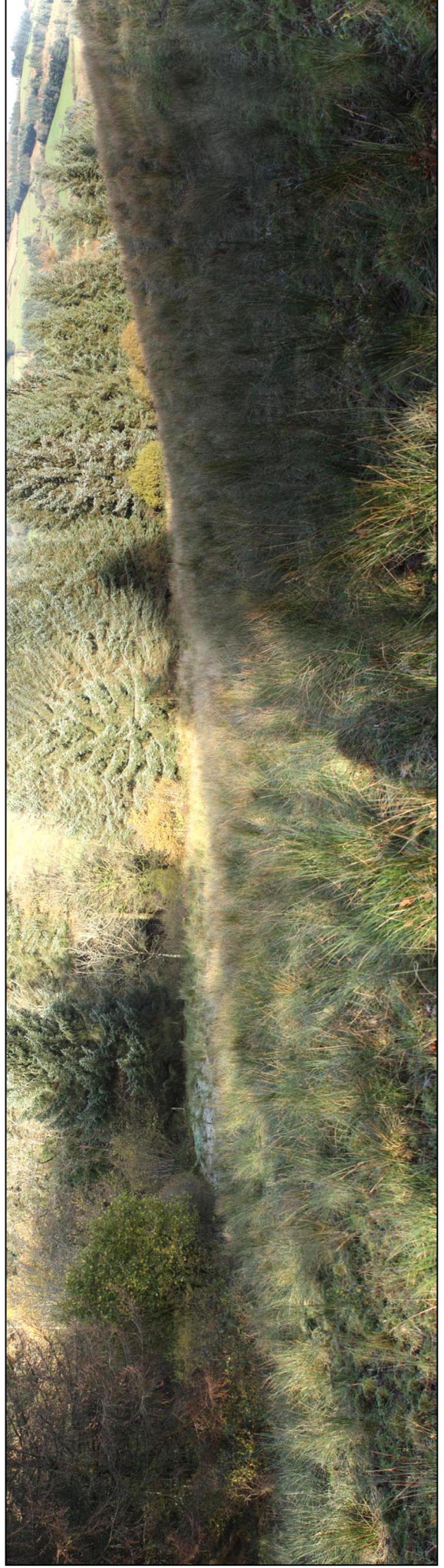
Field Map Index:

-  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.
-  Photograph Locations

Photographs of Field JQ9

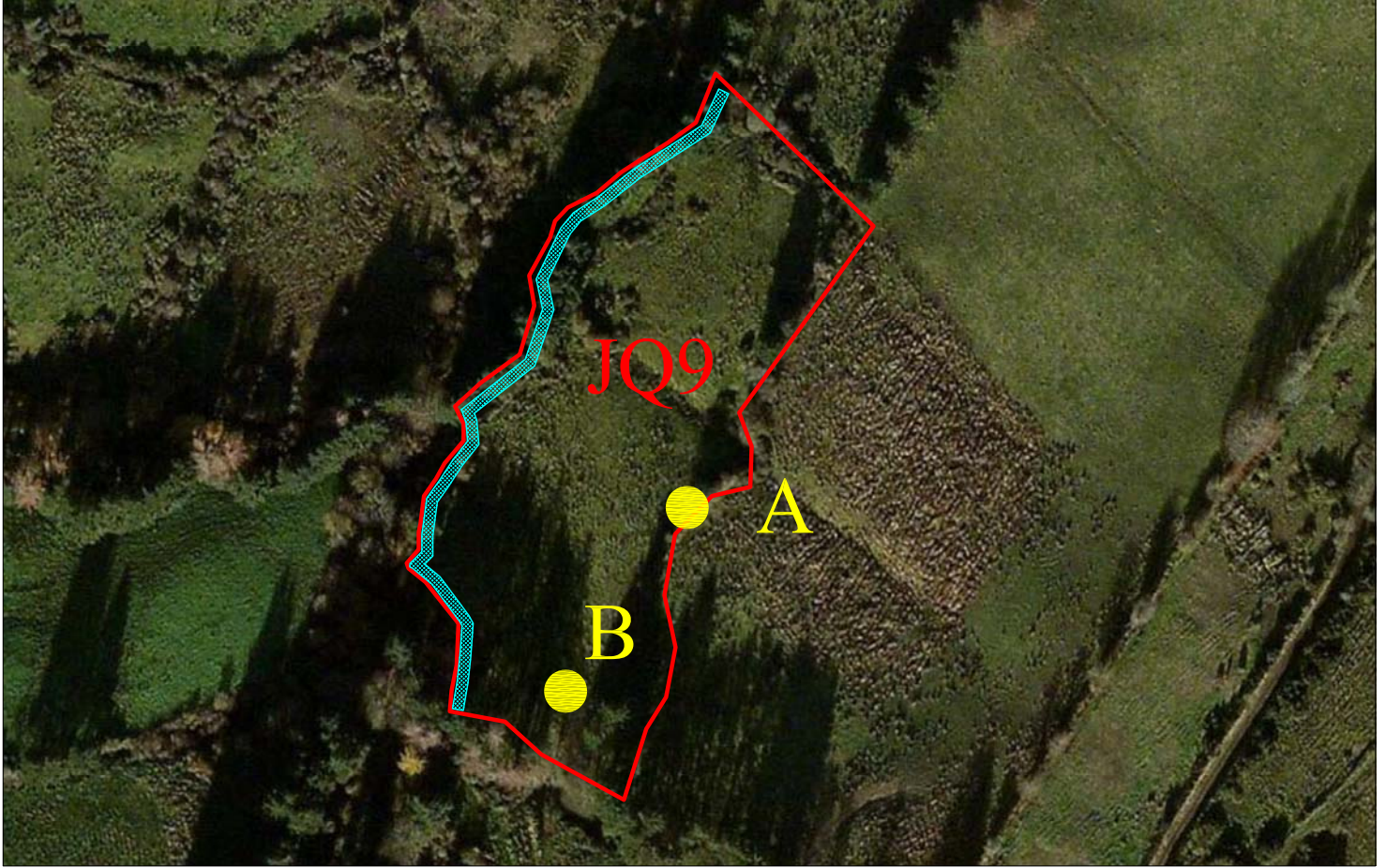


Photograph A looking north



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.

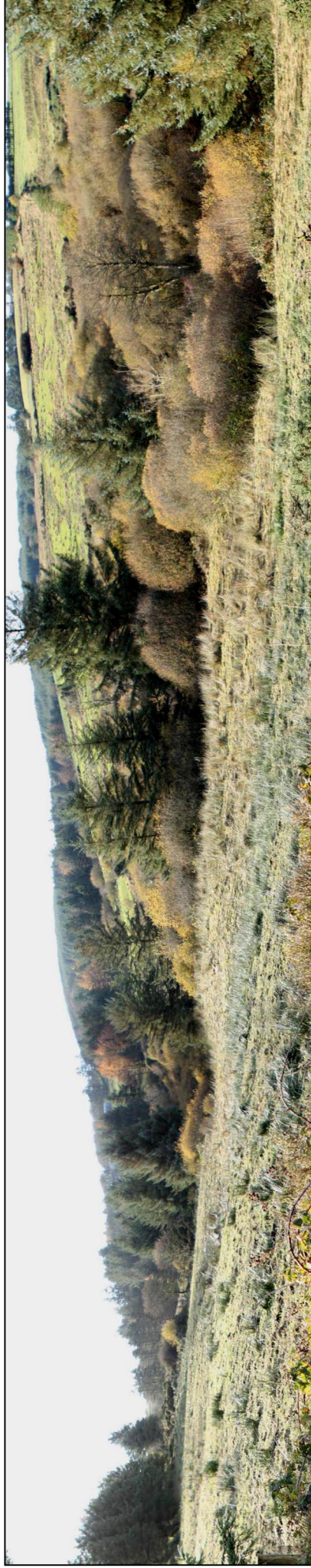
Restrictions:

- 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:

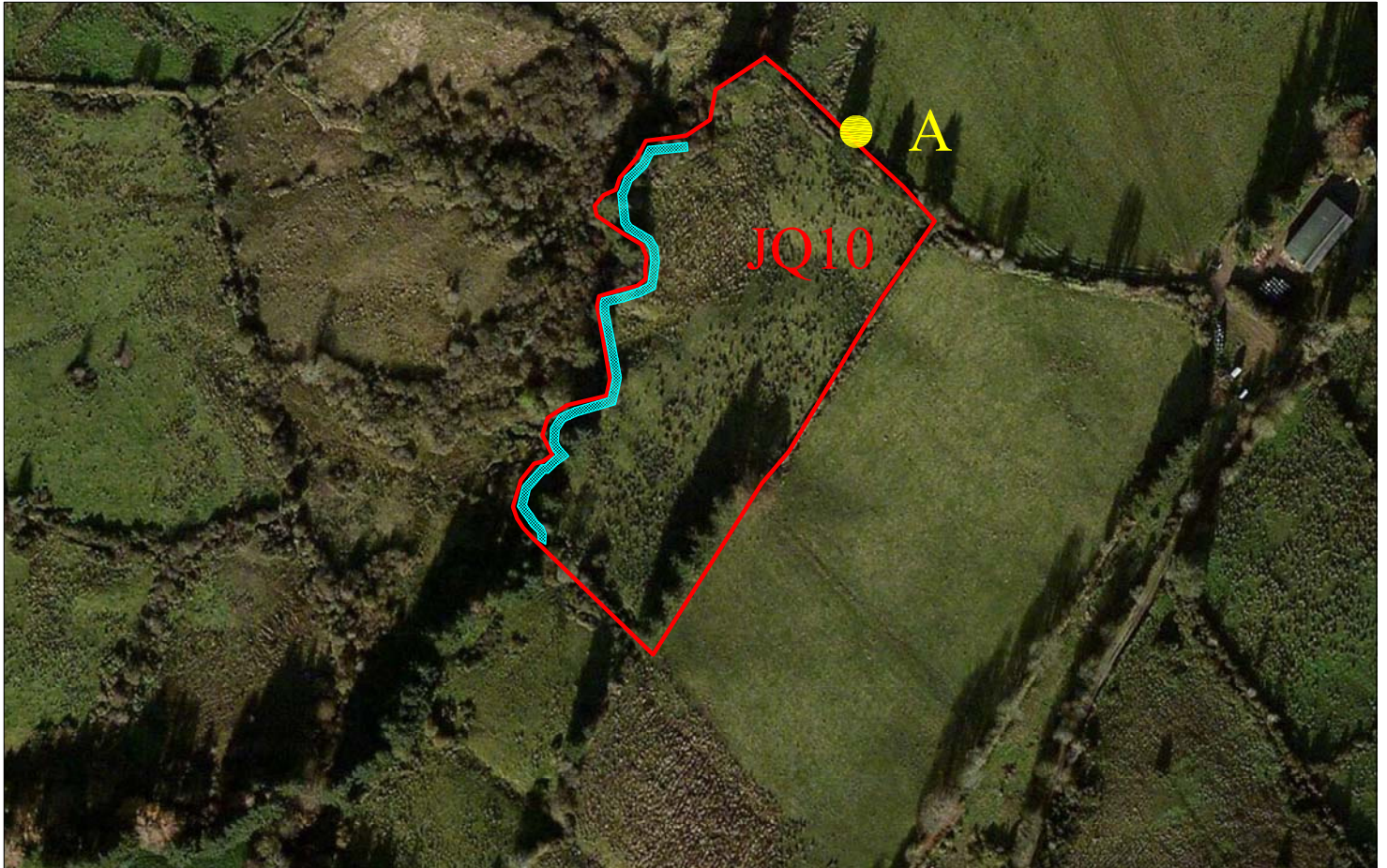
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

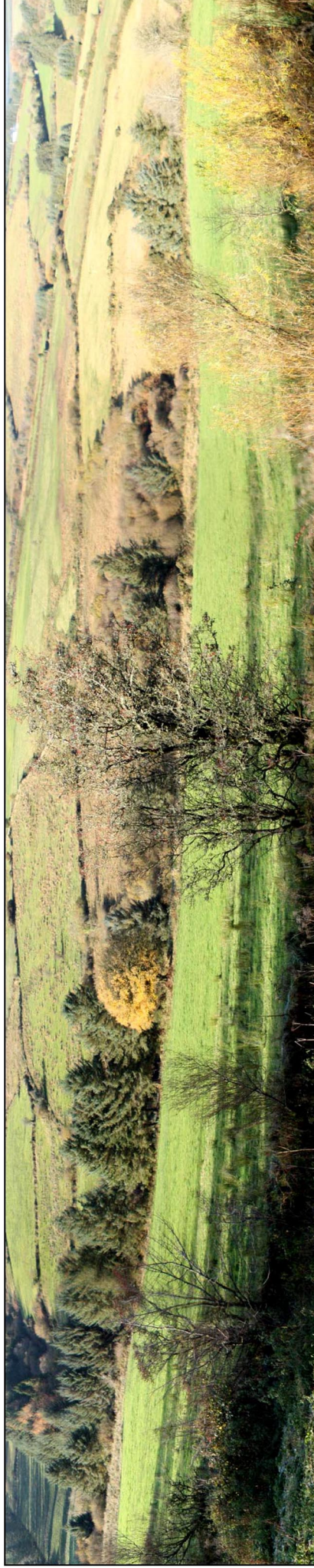
Restrictions:

- 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:

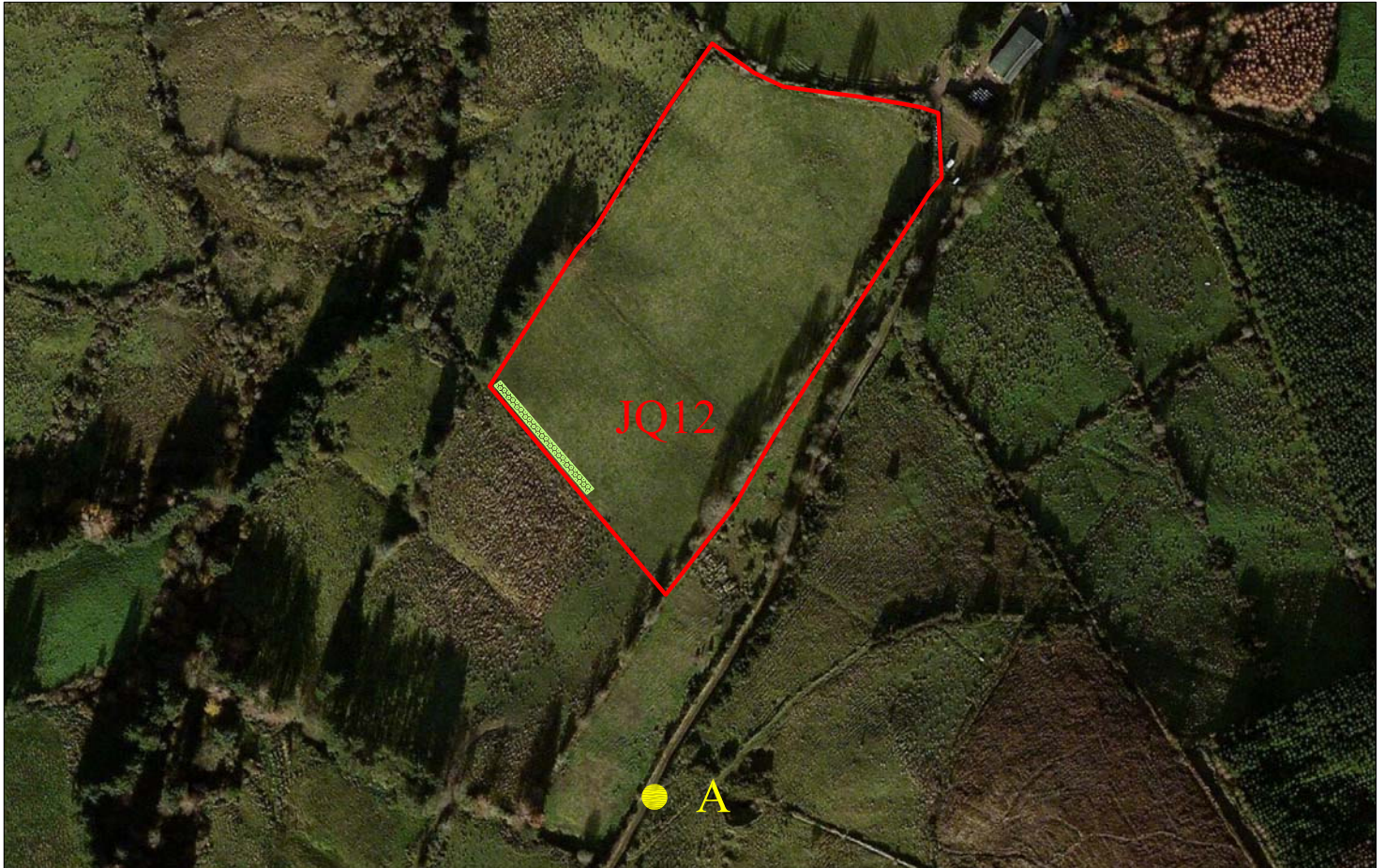
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

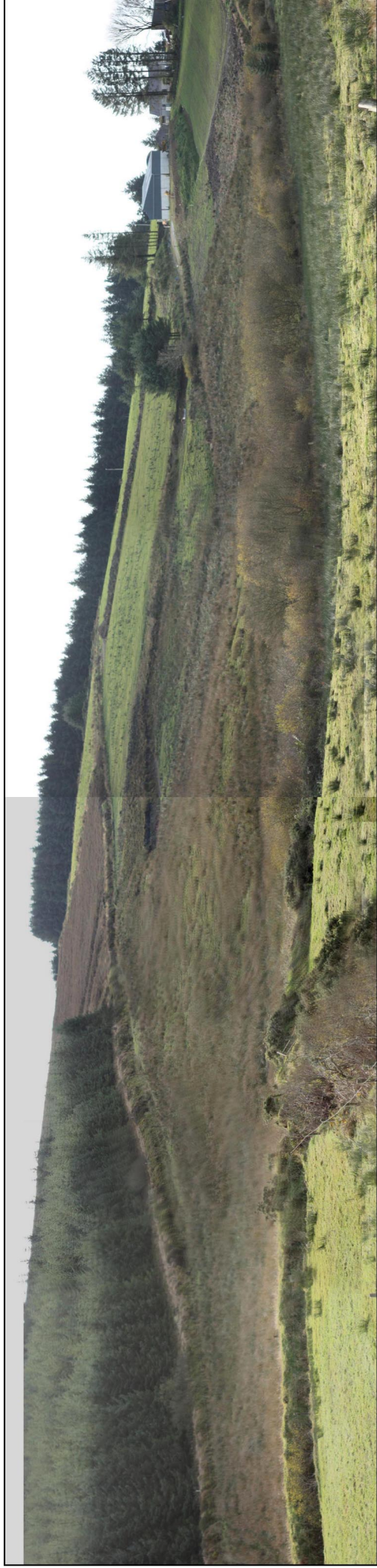
Field Map Index:

-  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.
-  Photograph Locations

Photographs of Field SR1

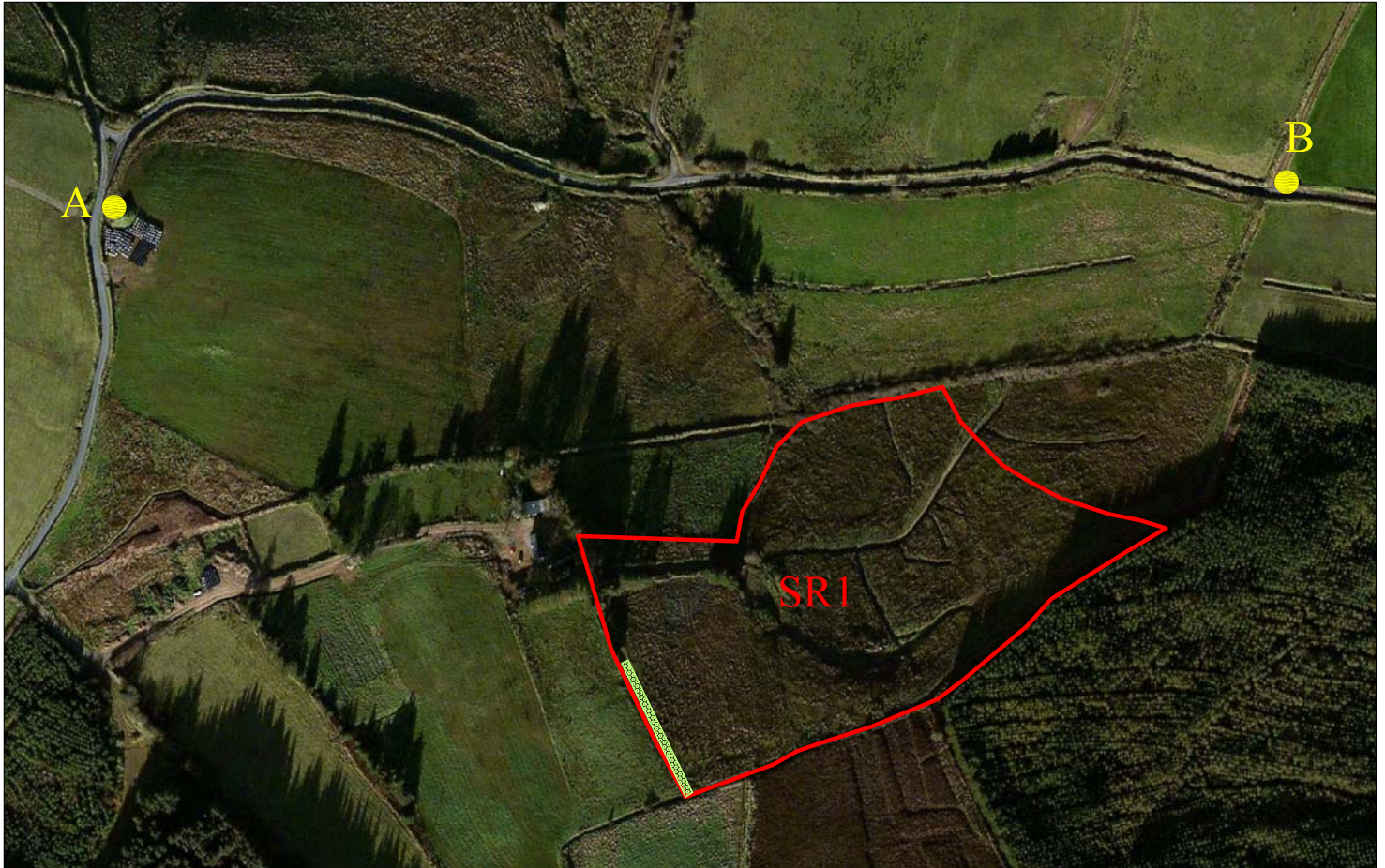


Photograph A looking southeast



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 spreading 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.

 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.

 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.

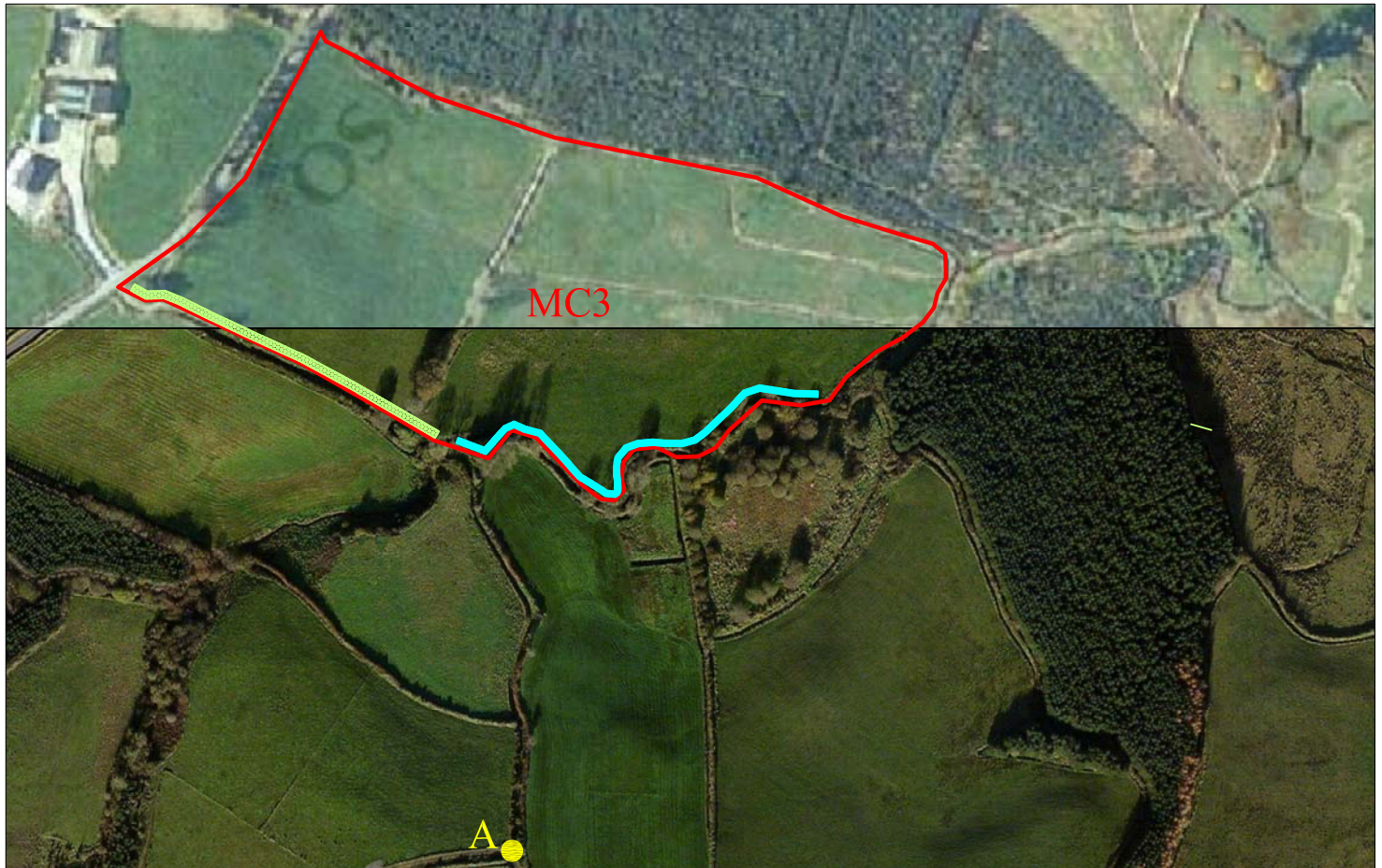
 Photograph Locations

Photographs of Field MC3



Photograph A looking north

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.

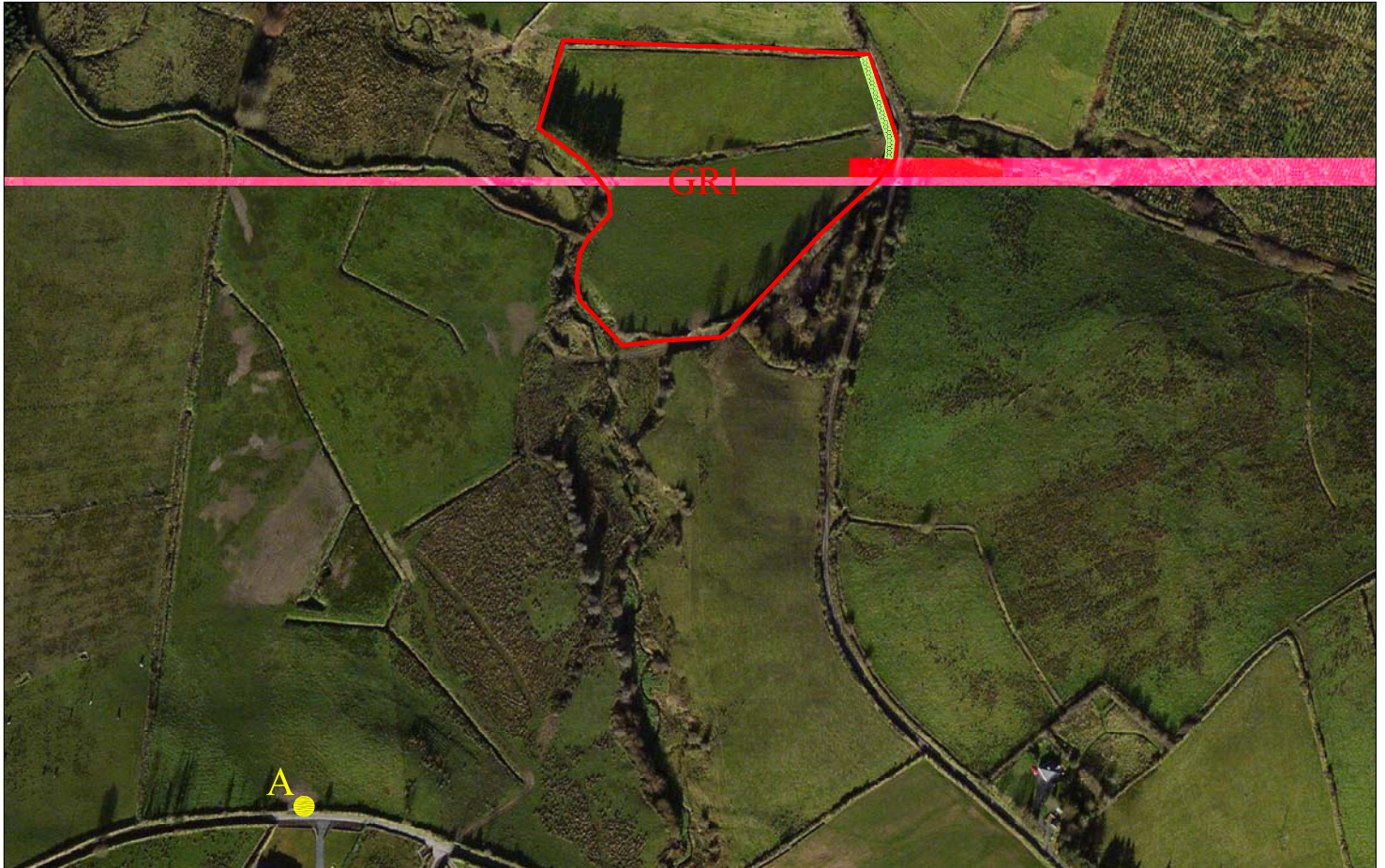
 Photograph Locations

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:

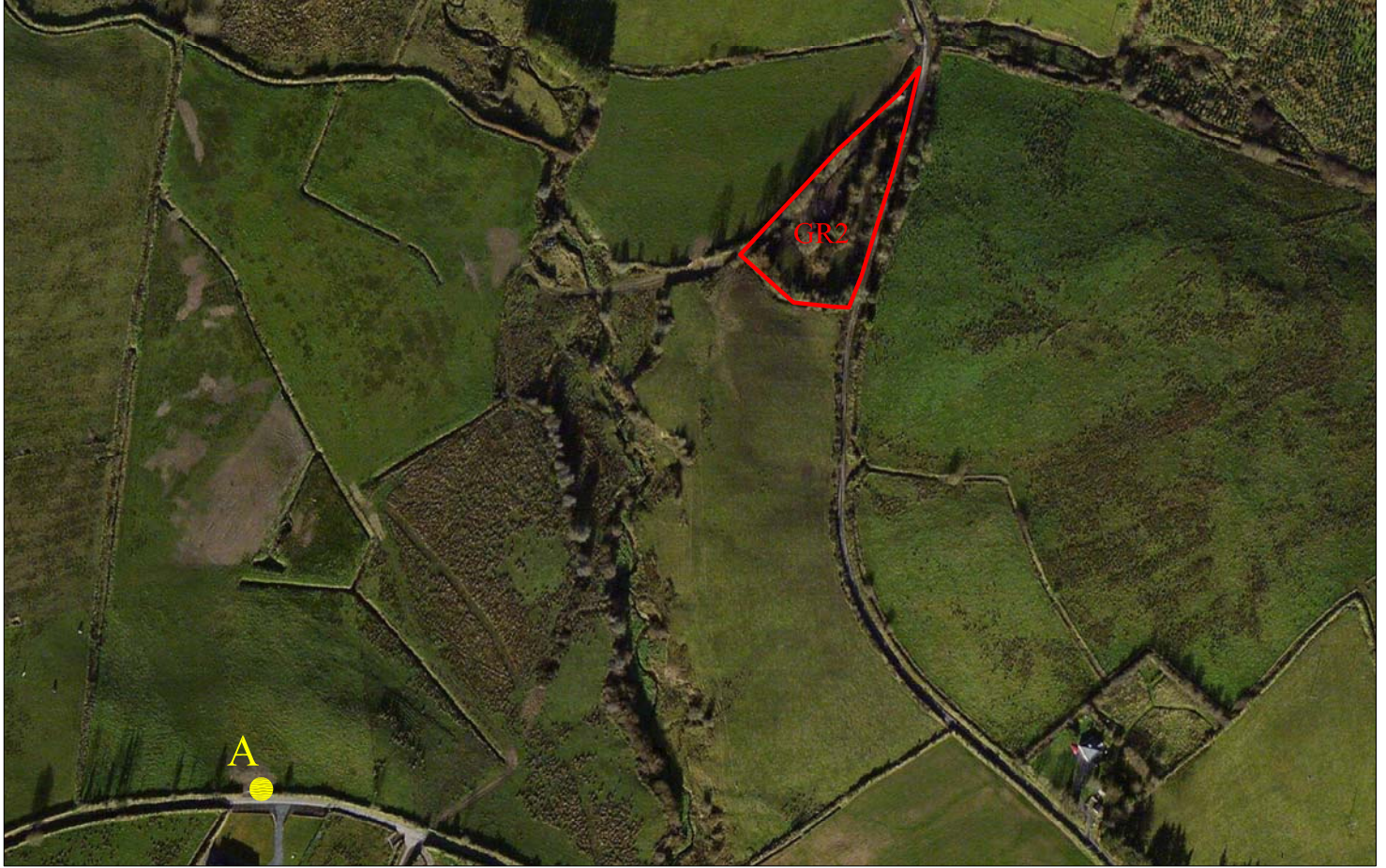
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

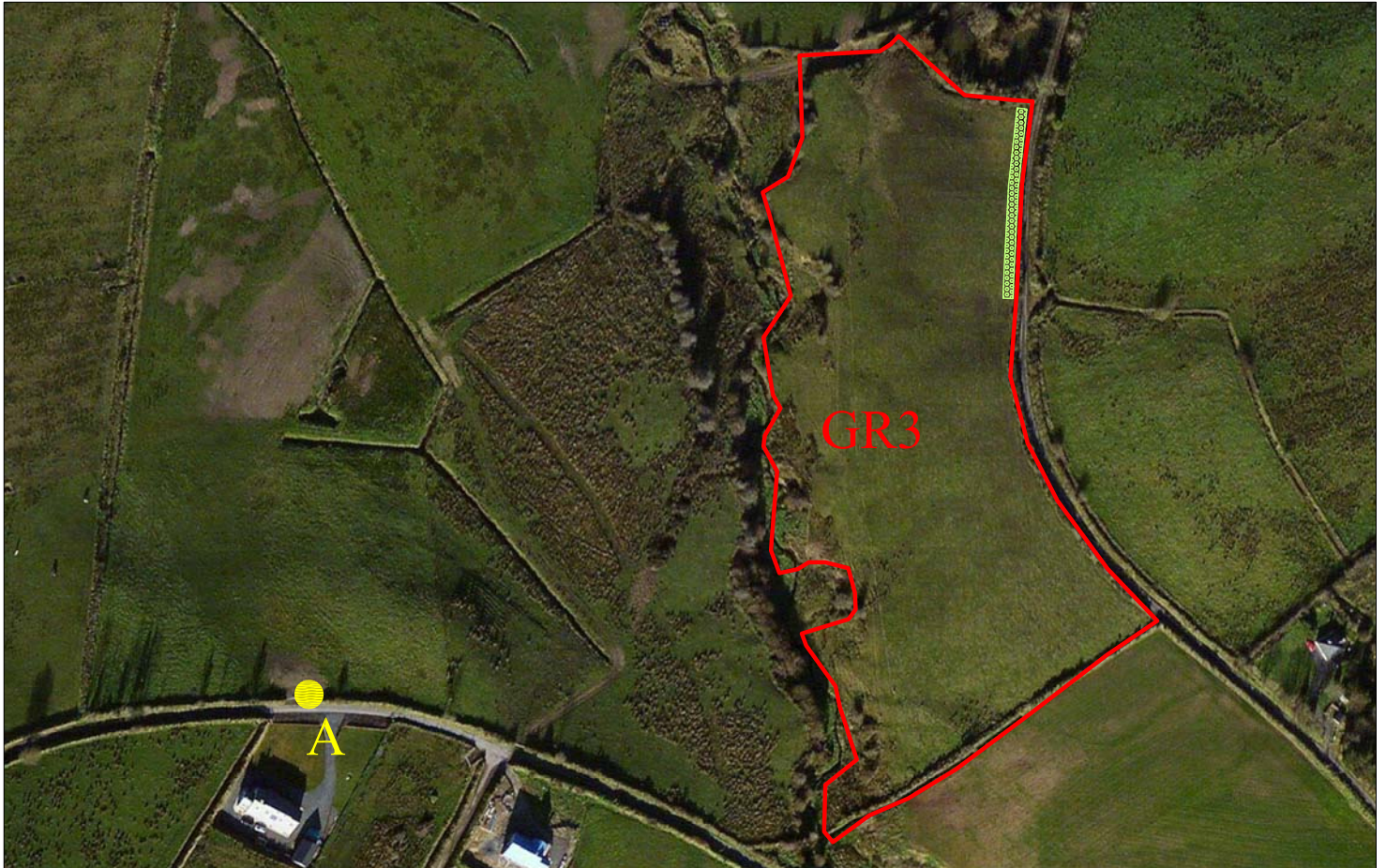
 Photograph Locations

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:

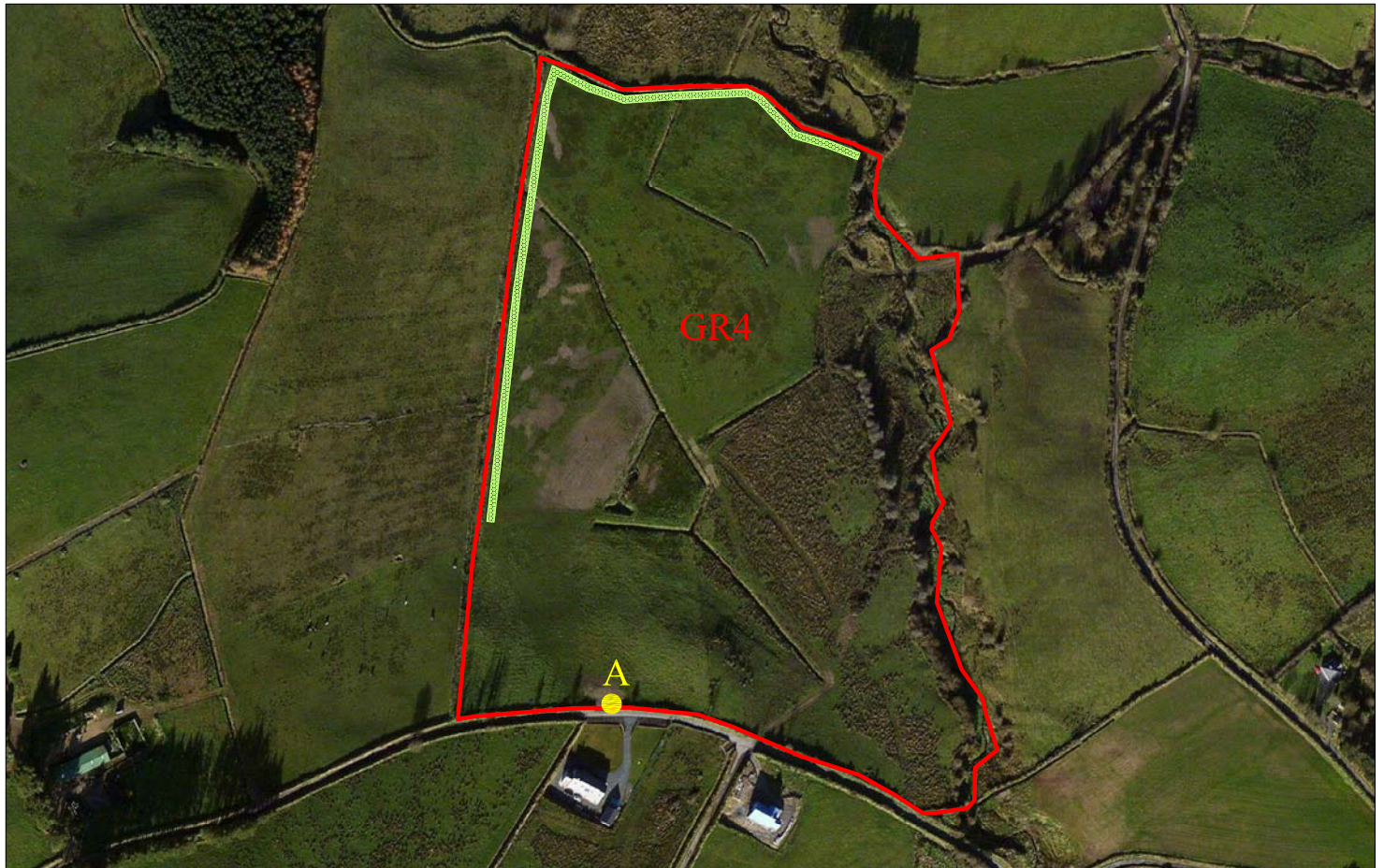
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

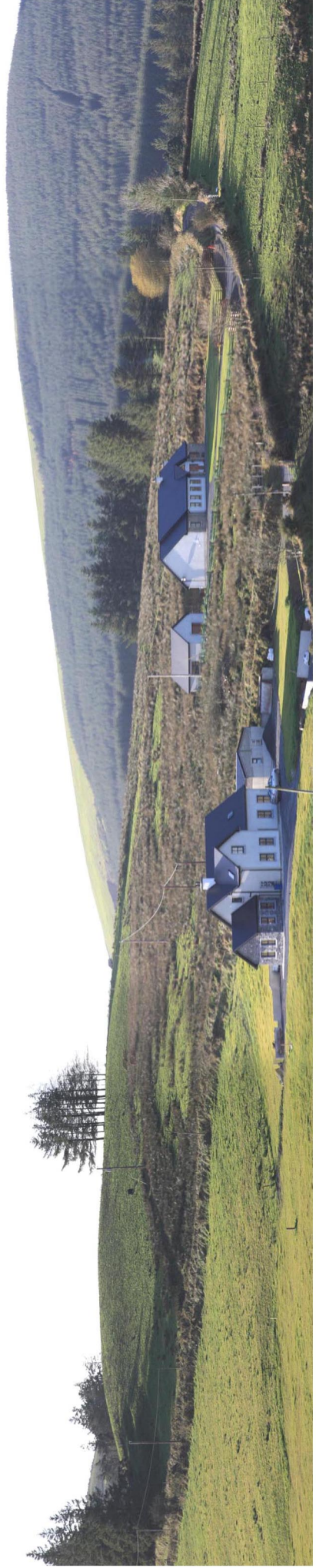
Field Map Index:

-  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.
-  Photograph Locations

Photographs of Field GR5

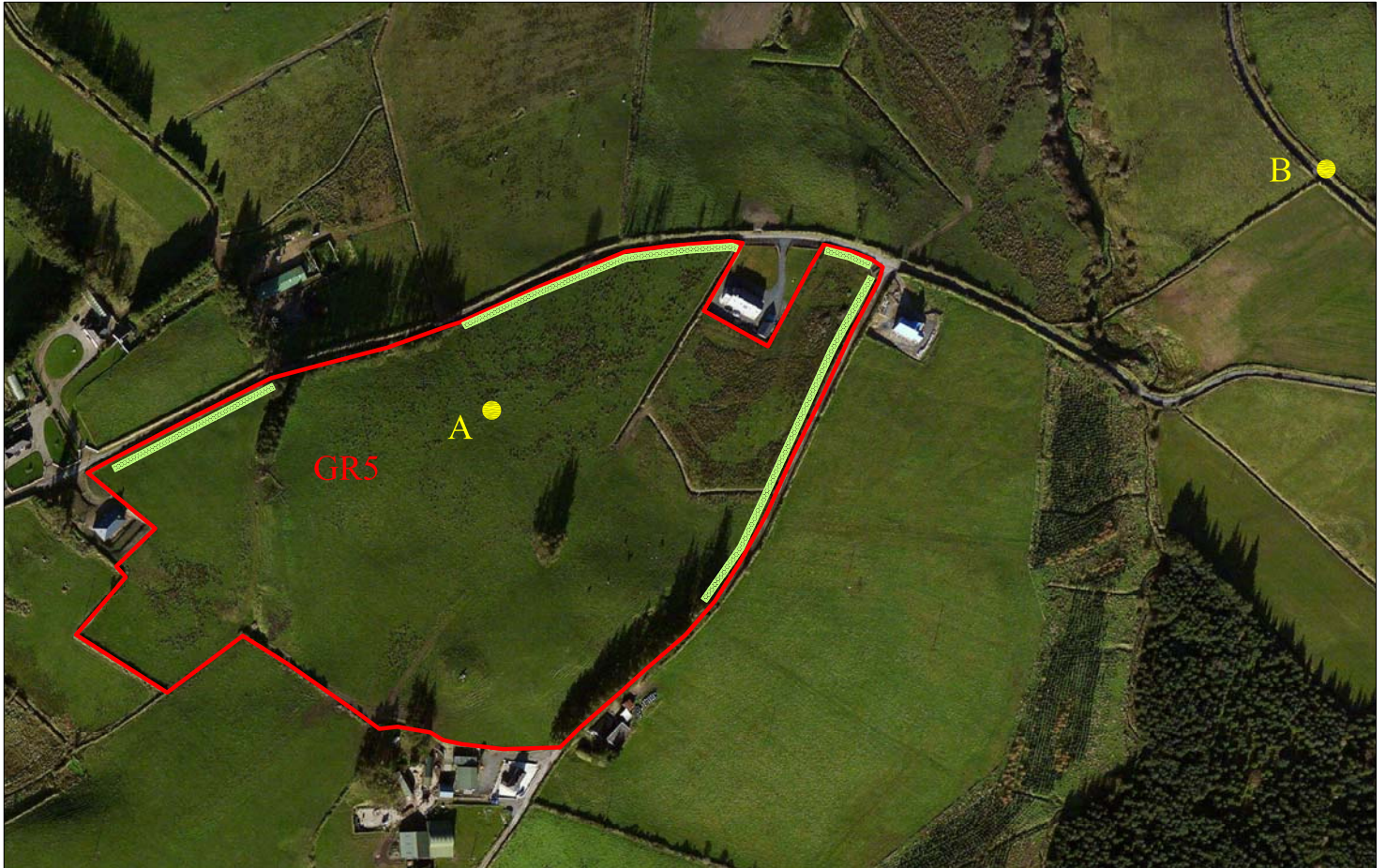


Photograph A looking southeast



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.

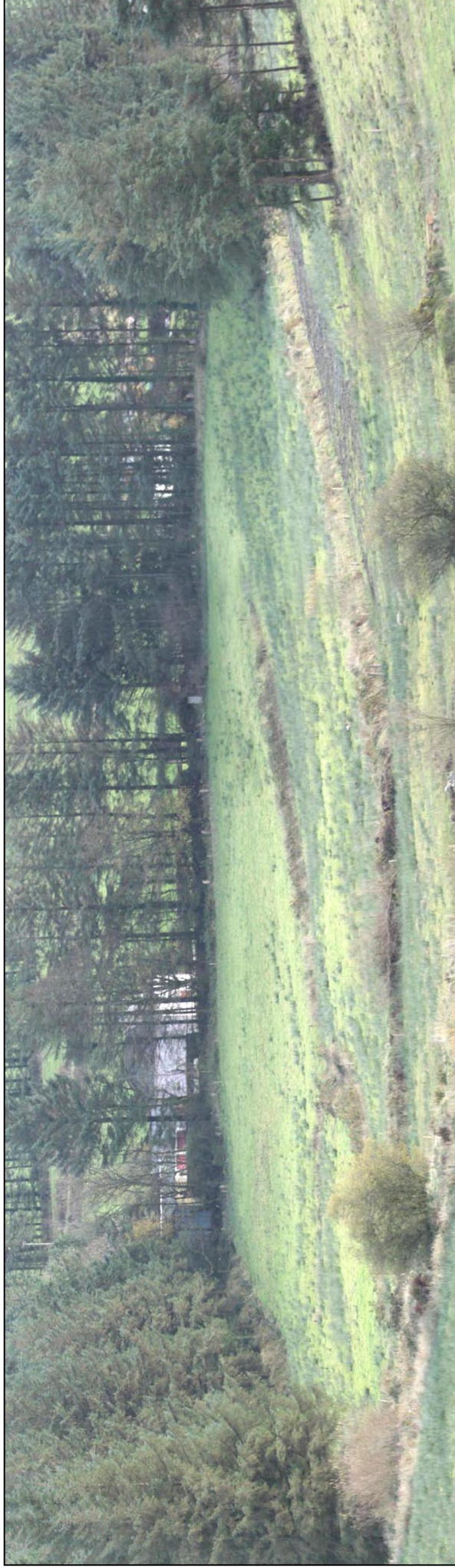
Restrictions:

- 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.
-  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:

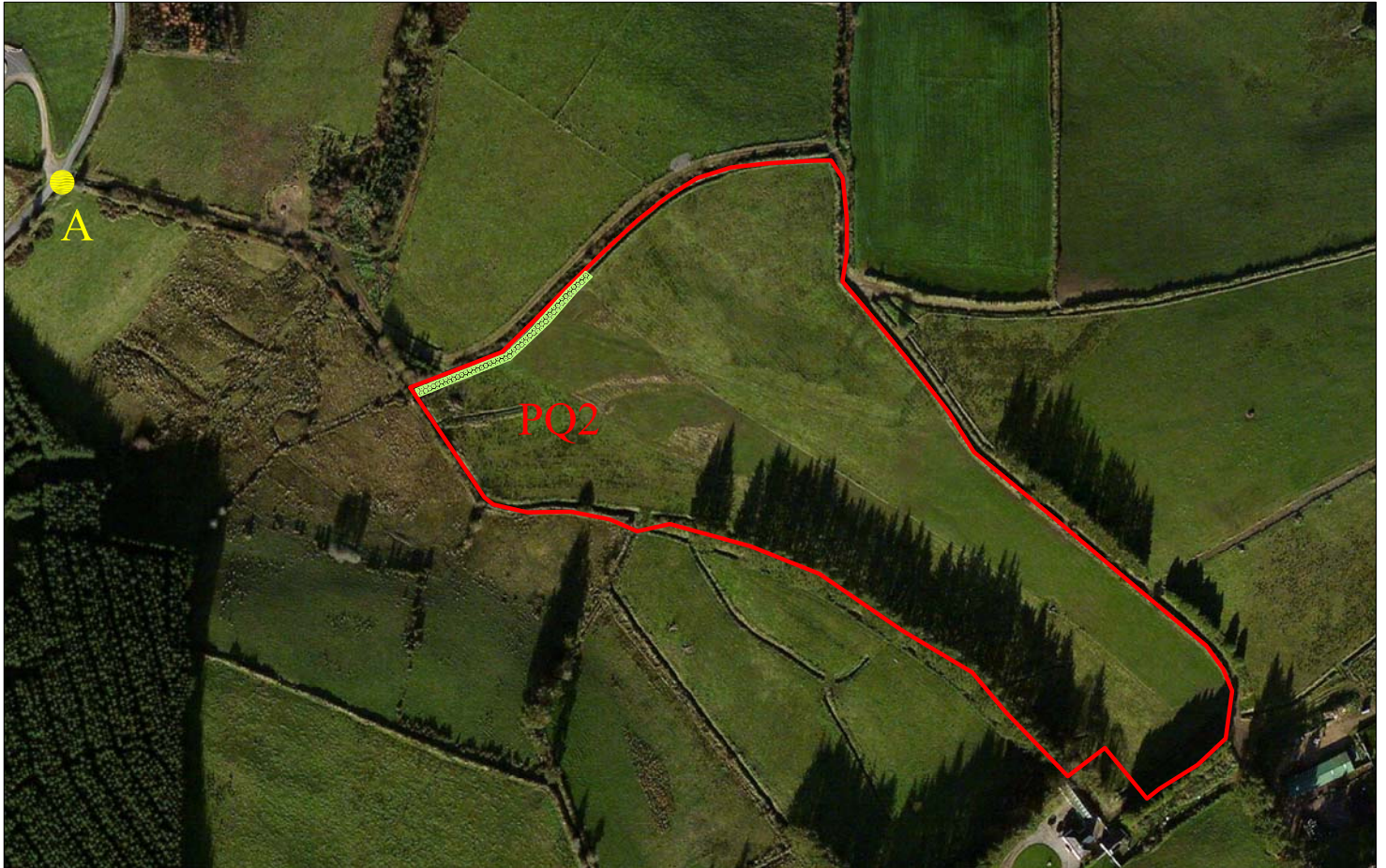
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

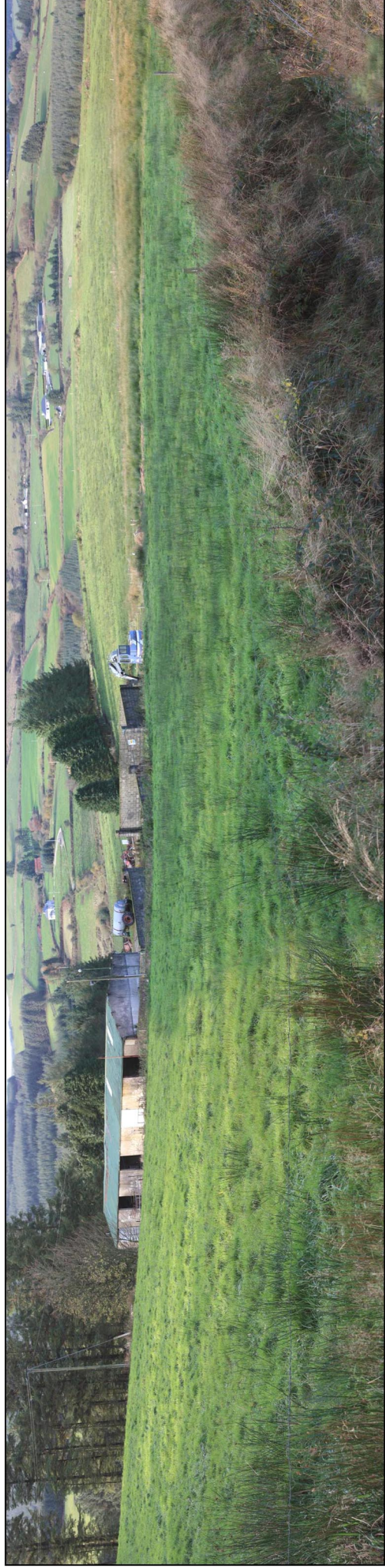
 Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

 Photograph Locations

Photographs of Field PQ3

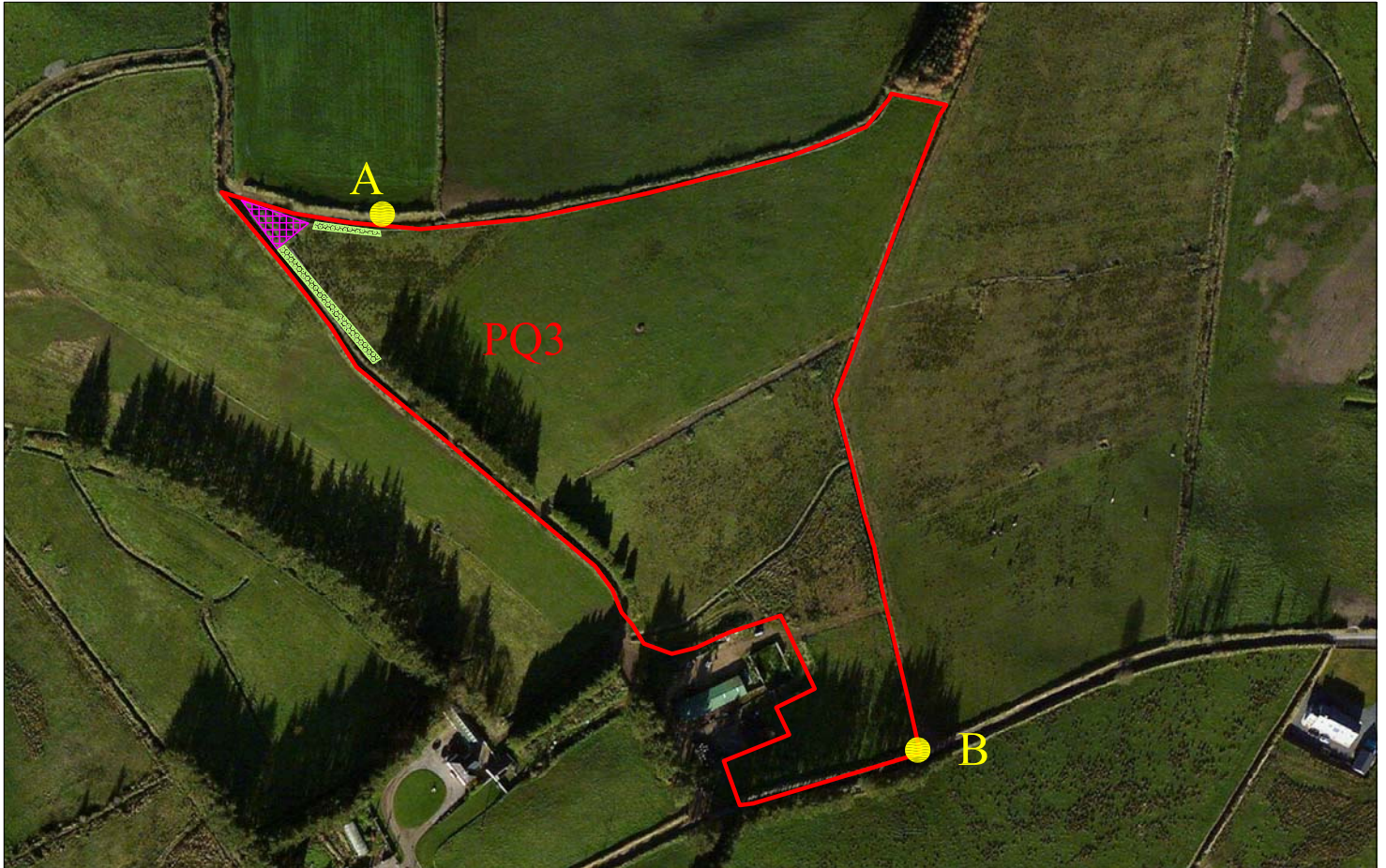


Photograph A looking south-southeast



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

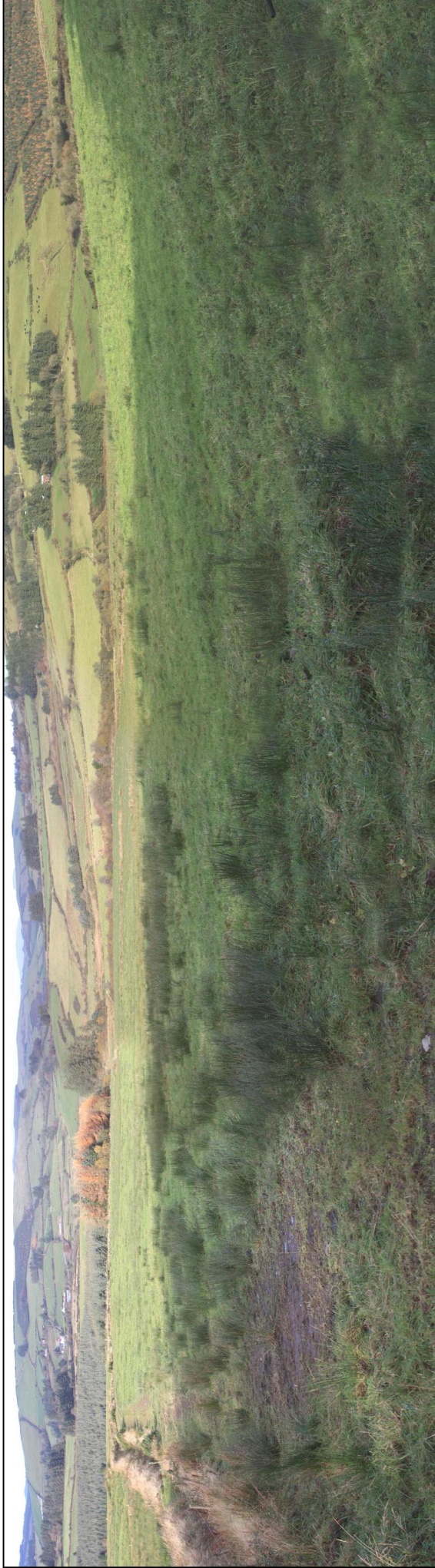
 New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.

 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.

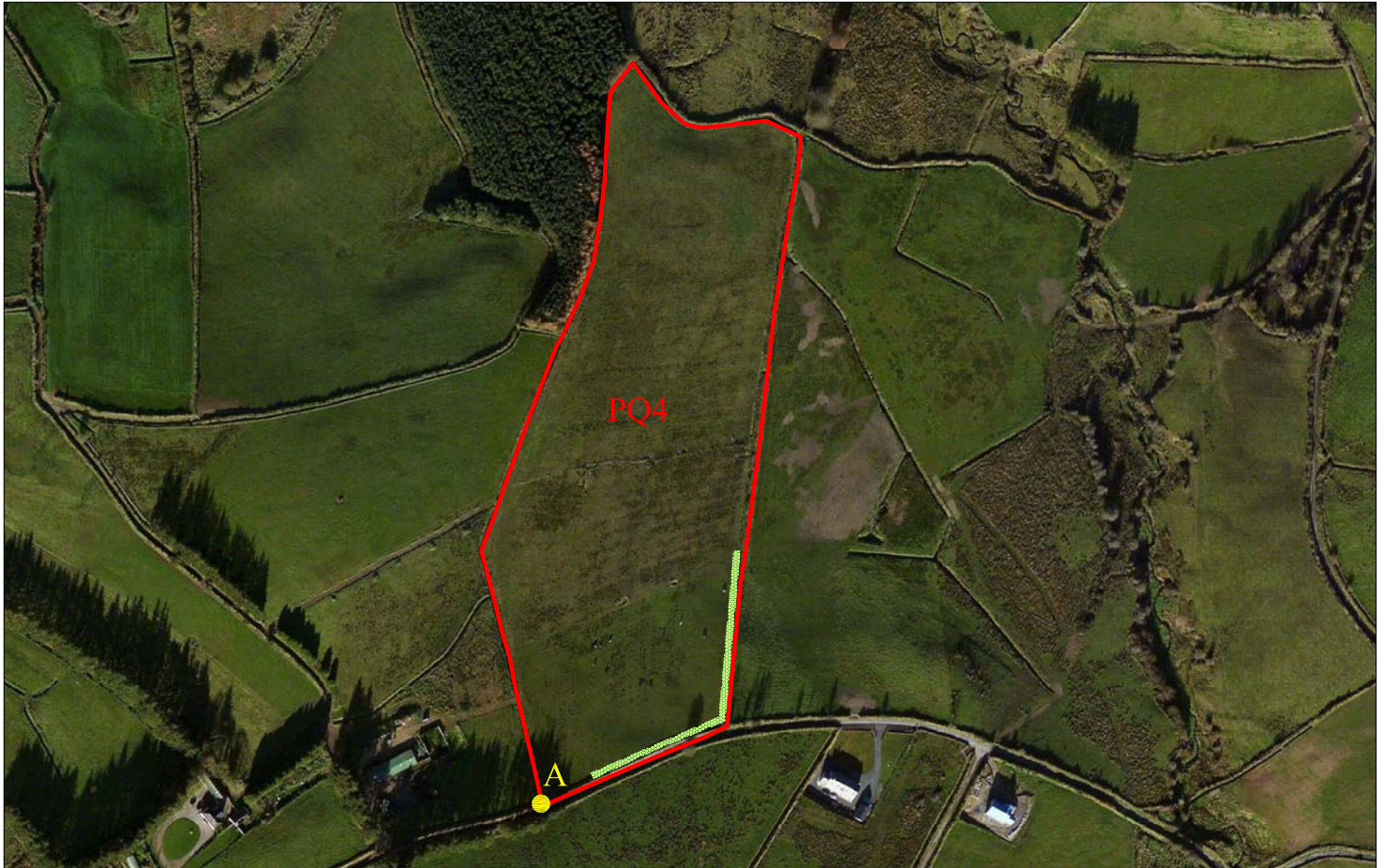
 Photograph Locations

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.

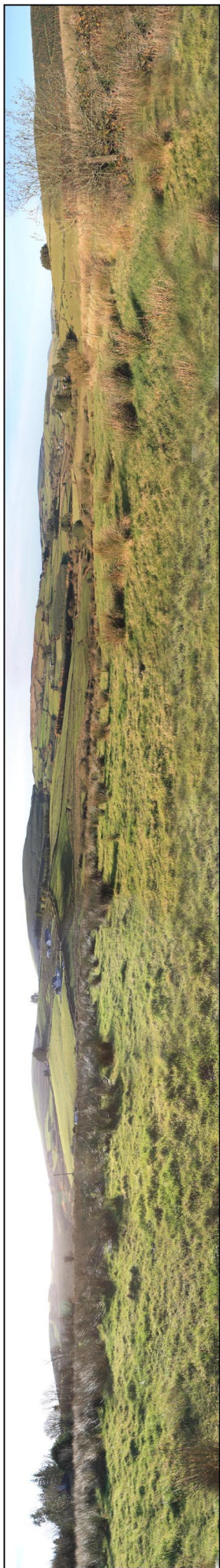
Field Map Index:

-  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.
-  Photograph Locations

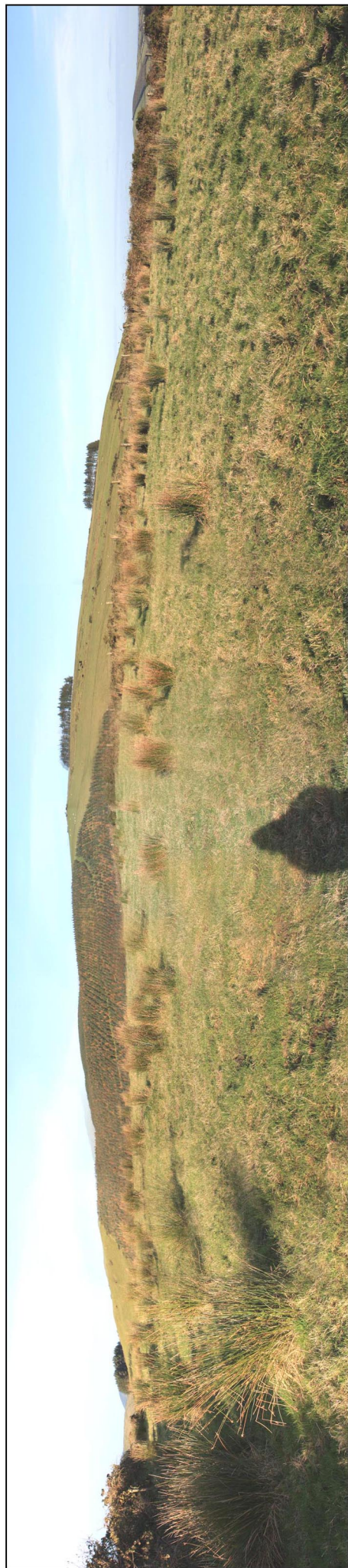
Photographs of Field PQ5



Photograph A looking southeast

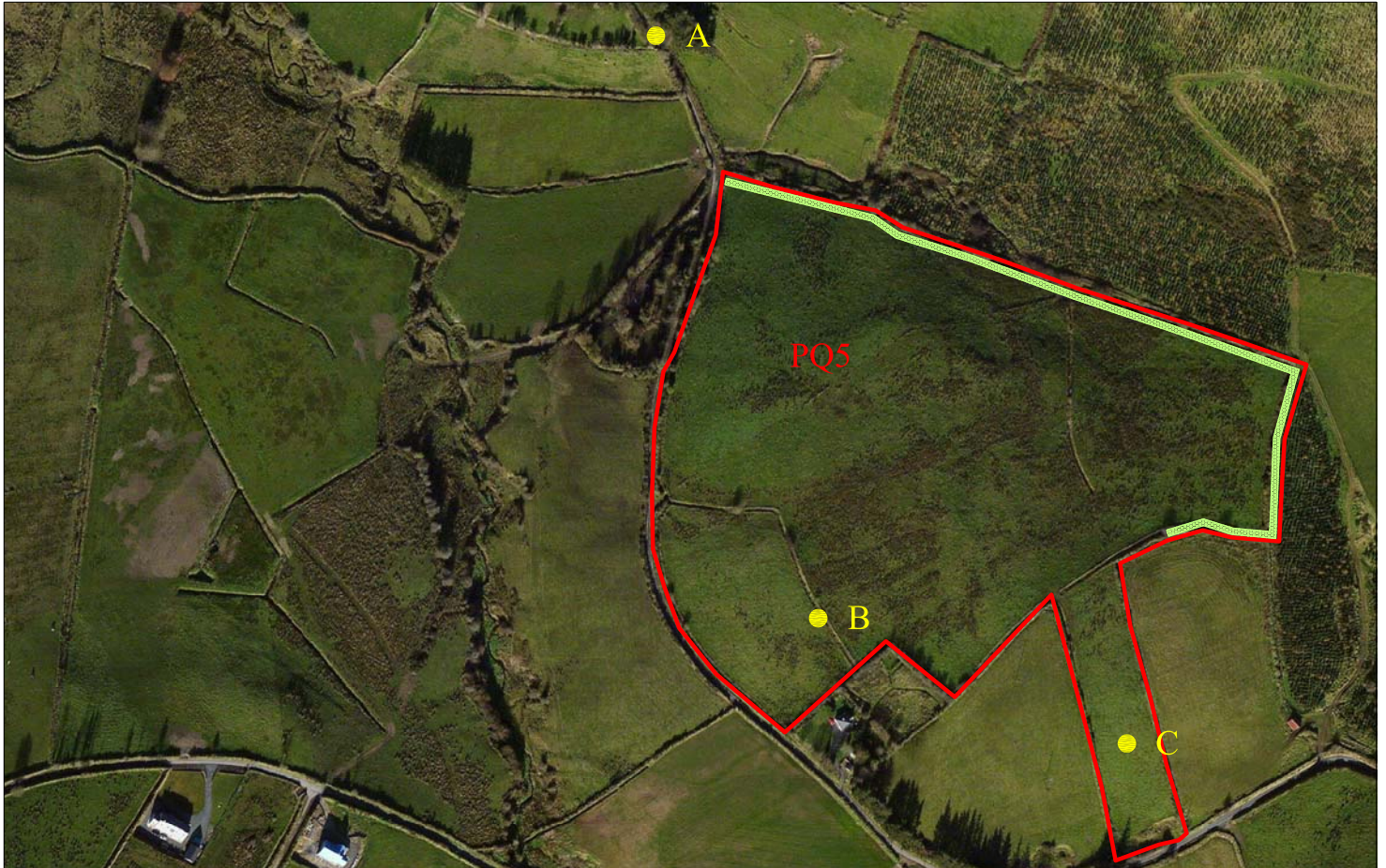


Photograph B looking west



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.

 Photograph Locations

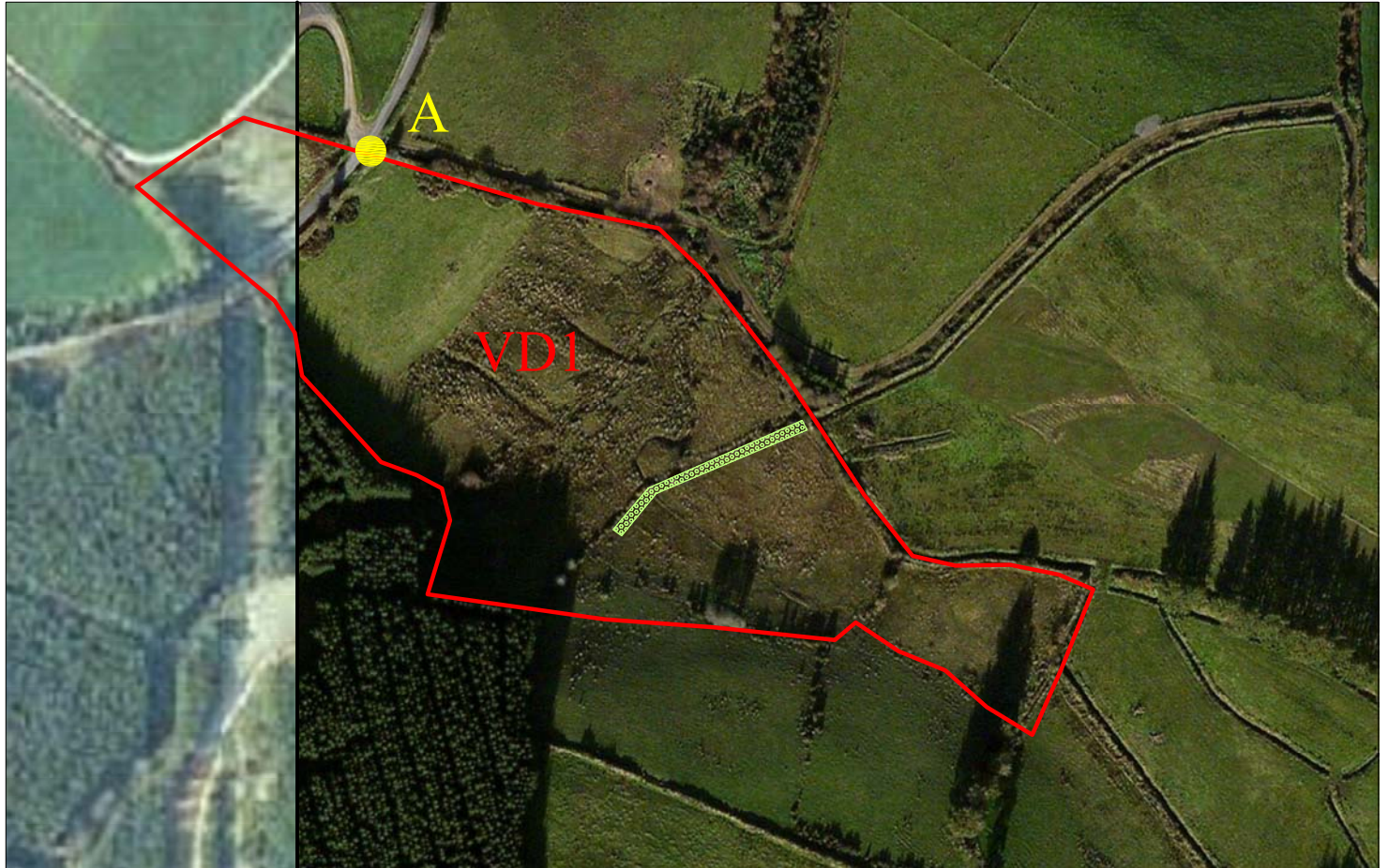
Photographs of Field VDI

REFERENCE DOCUMENT



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:

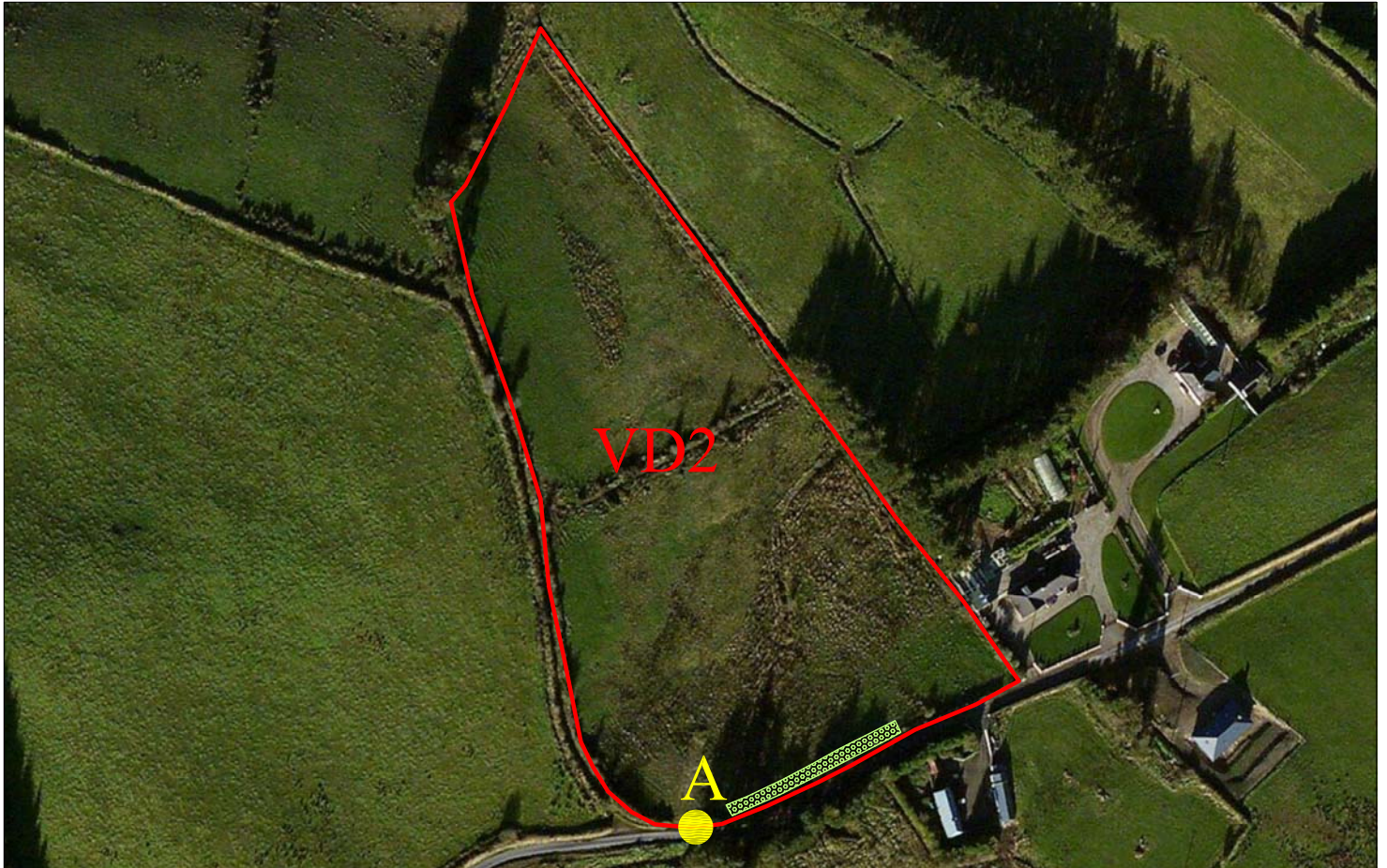
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by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

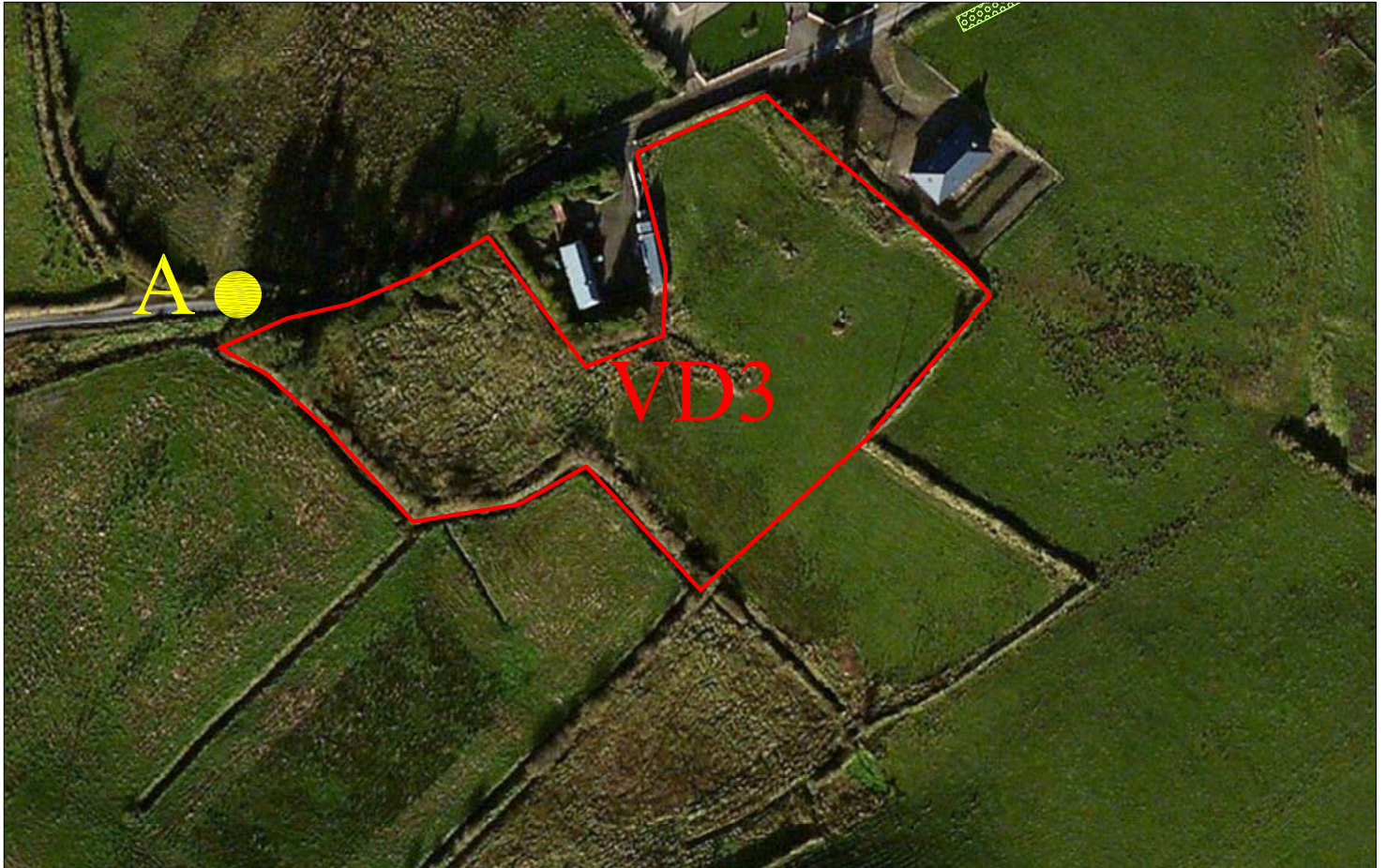
 Photograph Locations

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.

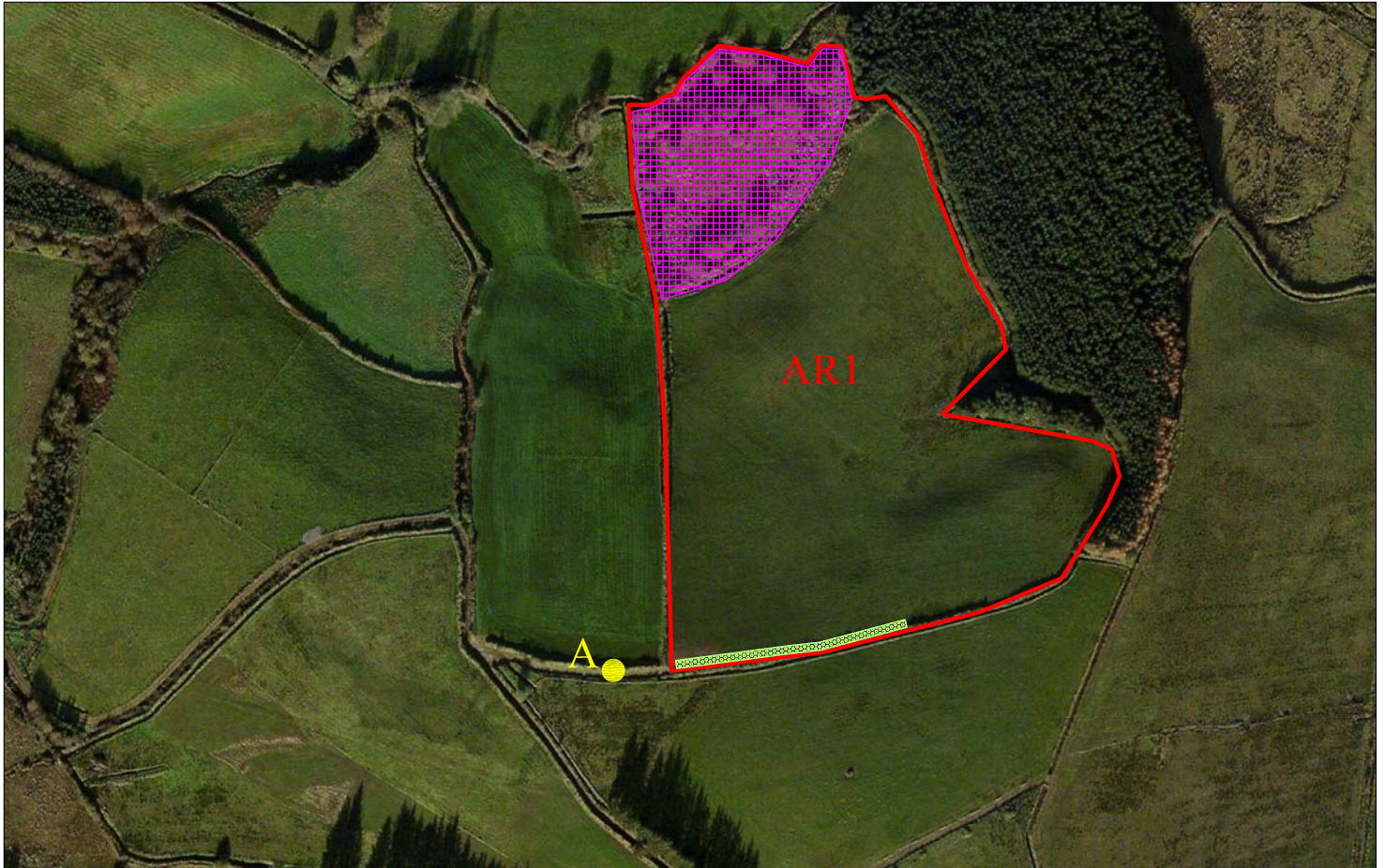
 Photograph Locations

Photographs of Field ARI



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 spreading 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.

 Photograph Locations

Photographs of Field MRI



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 spreading 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

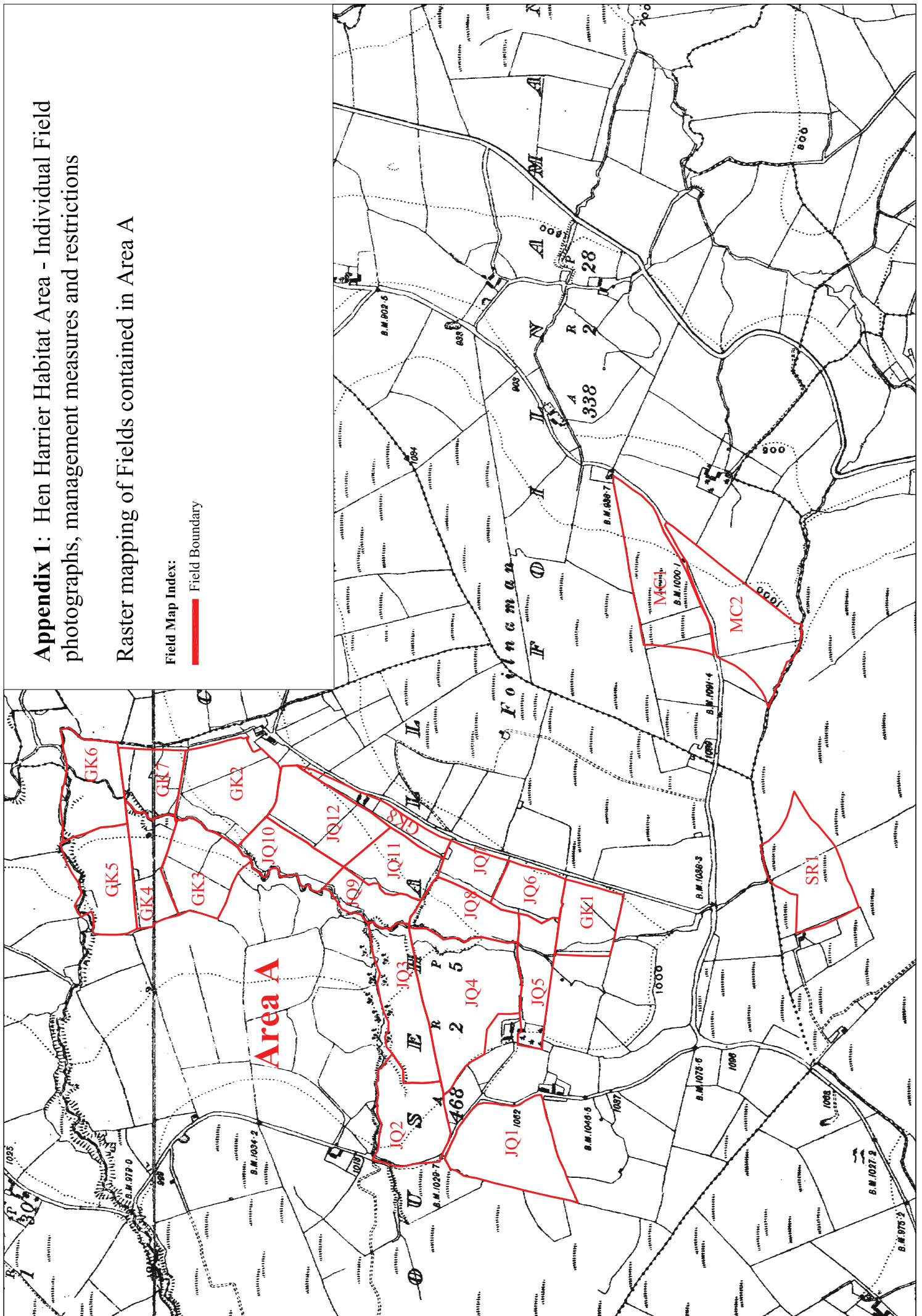
 Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by livestock.

 Photograph Locations

Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

Raster mapping of Fields contained in Area A


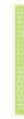


Field Map Index:
Field Boundary



Appendix 1: Hen Harrier Habitat Area - Individual Field photographs, management measures and restrictions

Aerial View of Fields contained in Area A

Field Map Index:

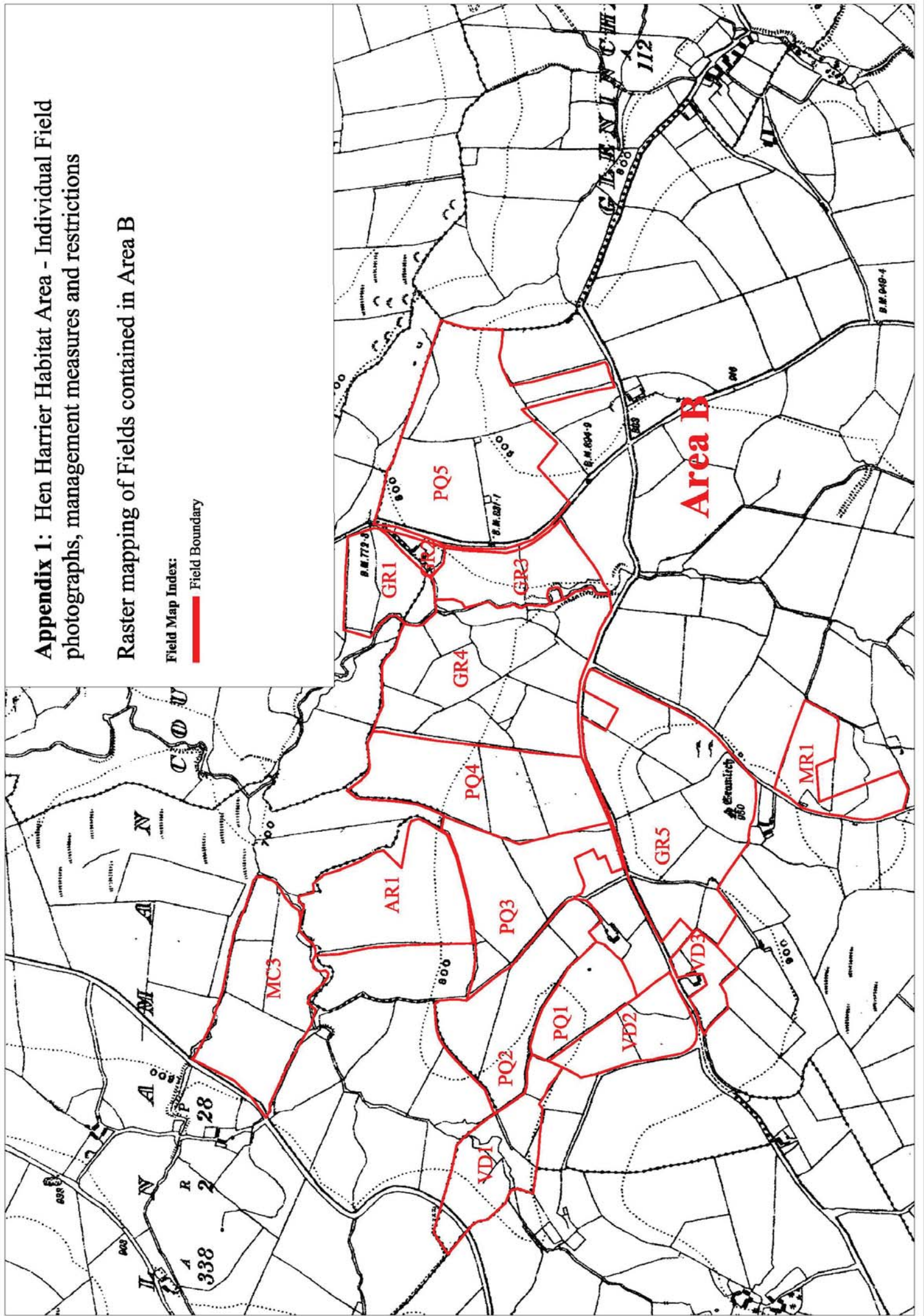
-  Field Boundary
-  New hedgerow planted with suitable shrub and trees such as Willow, Gorse, Birch, Mountain Ash.
-  Areas to be planted with woody scrub such as Willow, Alder, Birch
-  Areas to be planted with woody scrub and suitable trees. Stockproof fencing will be erected to exclude access by 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 reseeded of fields of rough grassland (unless there are overriding conservation concerns by NPWS), is permitted where reseeded 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

| <i>Code</i> | <u>Rush Management Table</u> |
|-------------|--|
| 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 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 caerulea*) 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.

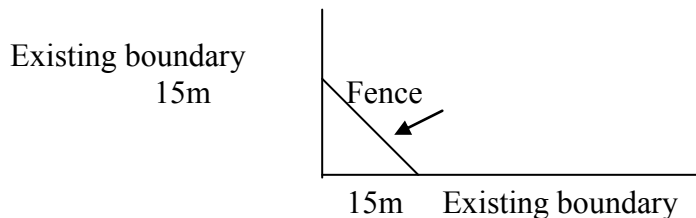
Grassland fields over 2 hectares in size or with less than 100 metres of hedgerow per hectare.

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.

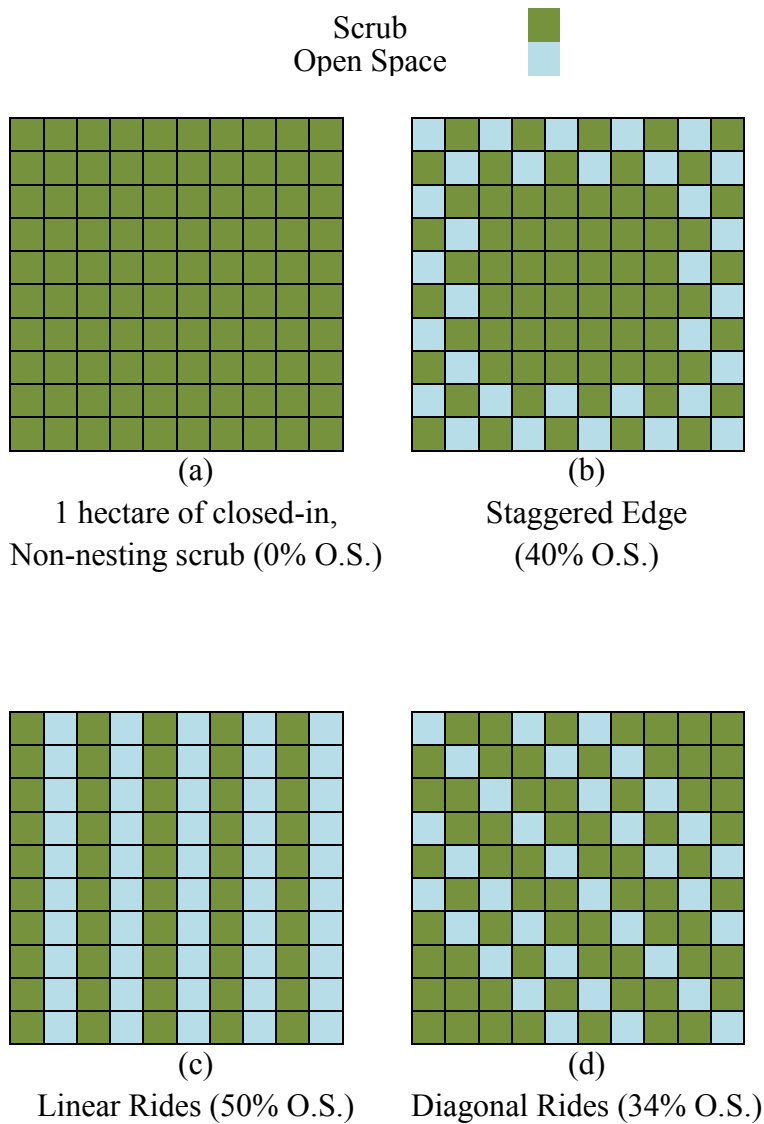
The cutting of roadside hedgerows for safety reasons and cutting necessary for the protection of overhead lines is permitted on an annual basis. In the case of other hedgerows, cutting is not normally required. It is permitted to cut a hedge, once over the period of the plan to prevent the hedge "escaping". 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 than 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**



Each diagram = 1hectare. Each cell = 100m²
 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

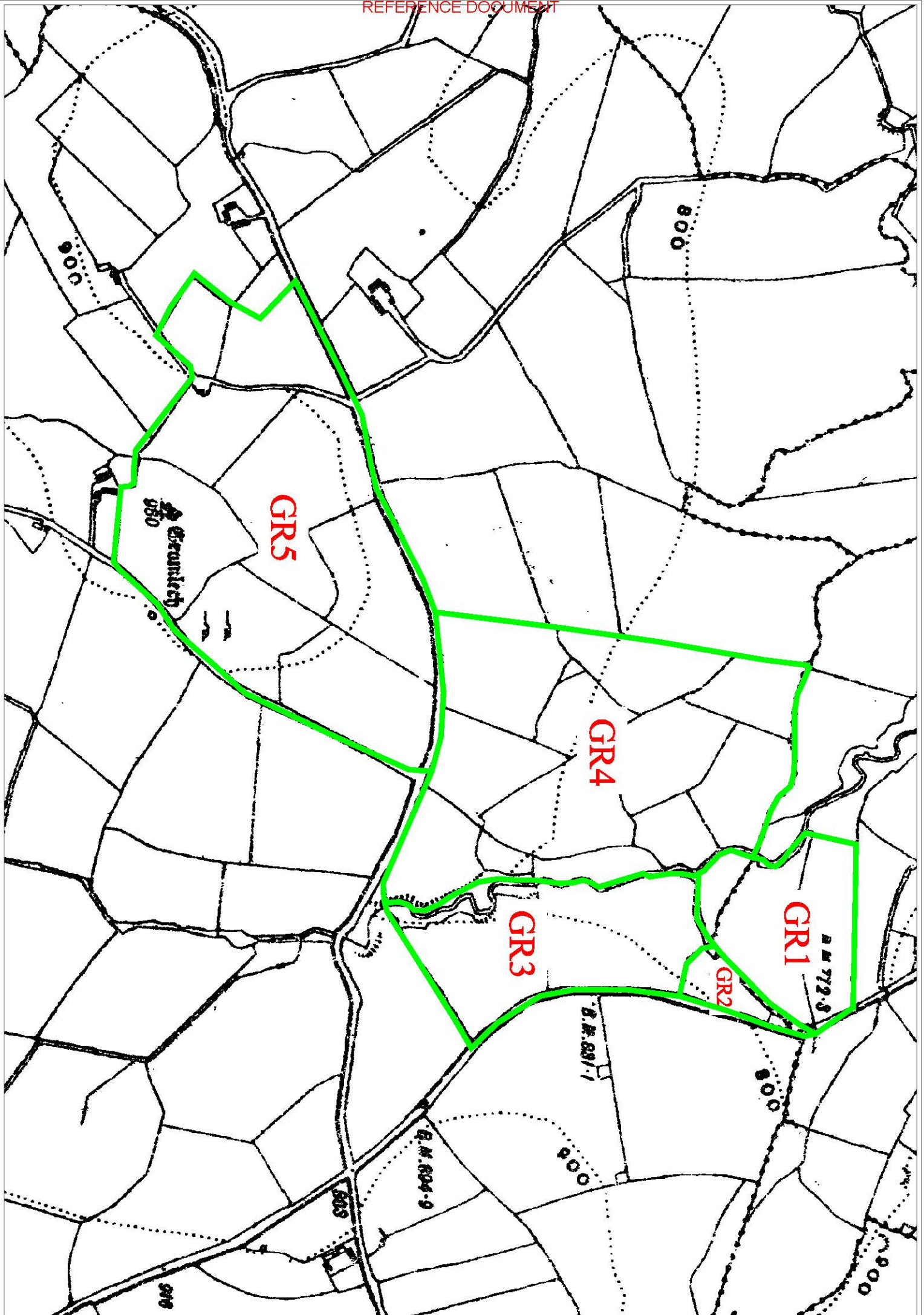
I, Gerard Ryan, Knockravoola, Upperchurch, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 24.6Ha in area.

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



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.

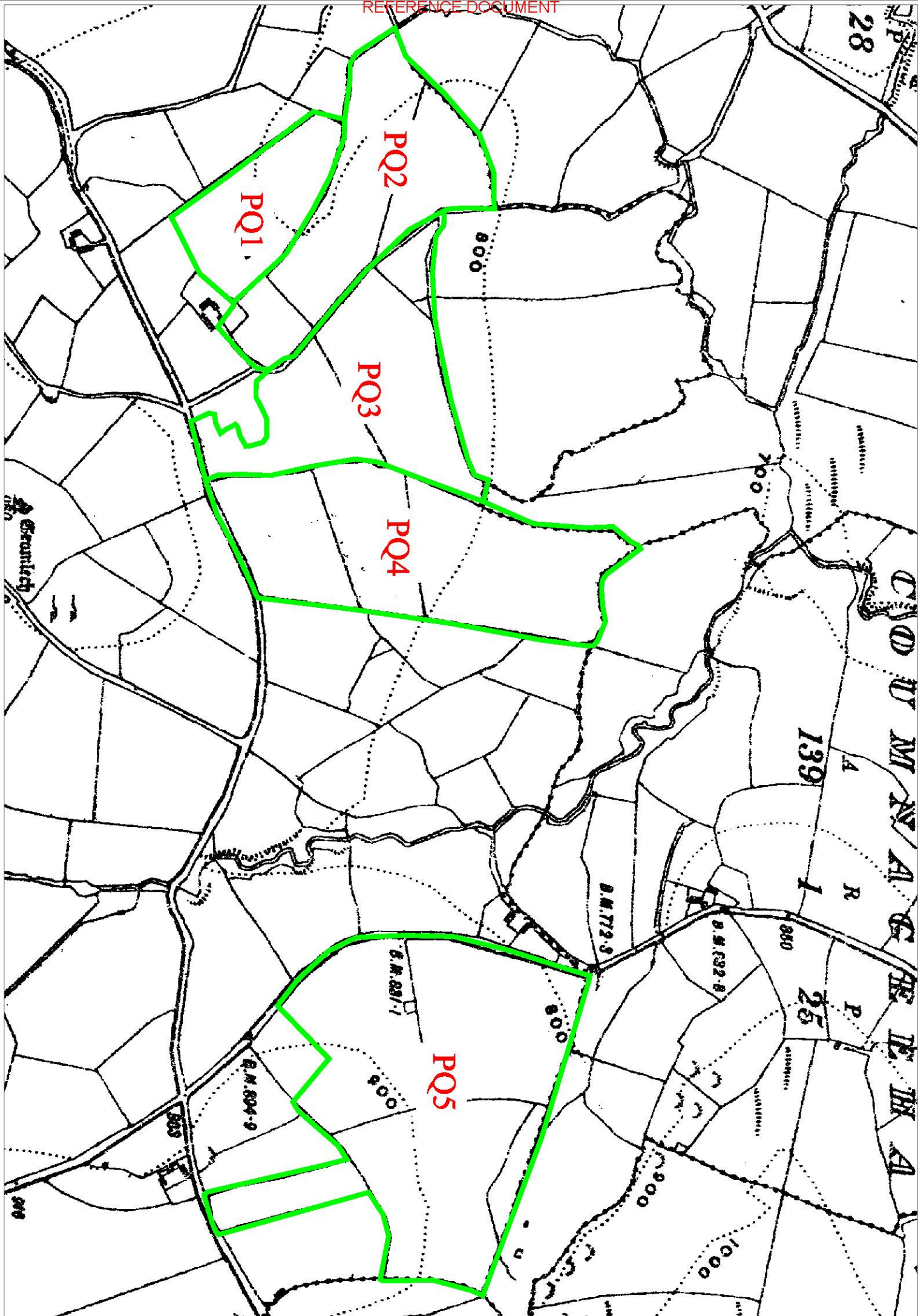
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

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.

A handwritten signature in black ink, appearing to read 'Patrick Quinlan', written over a dotted line.

Date: 25/11/2013



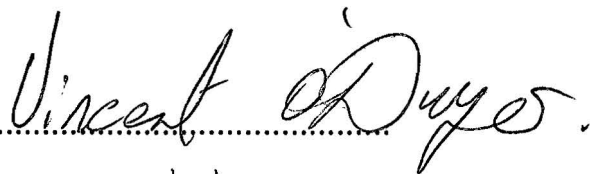
To:
Ecopower Development s Limited
Sion Road
Kilkenny

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.

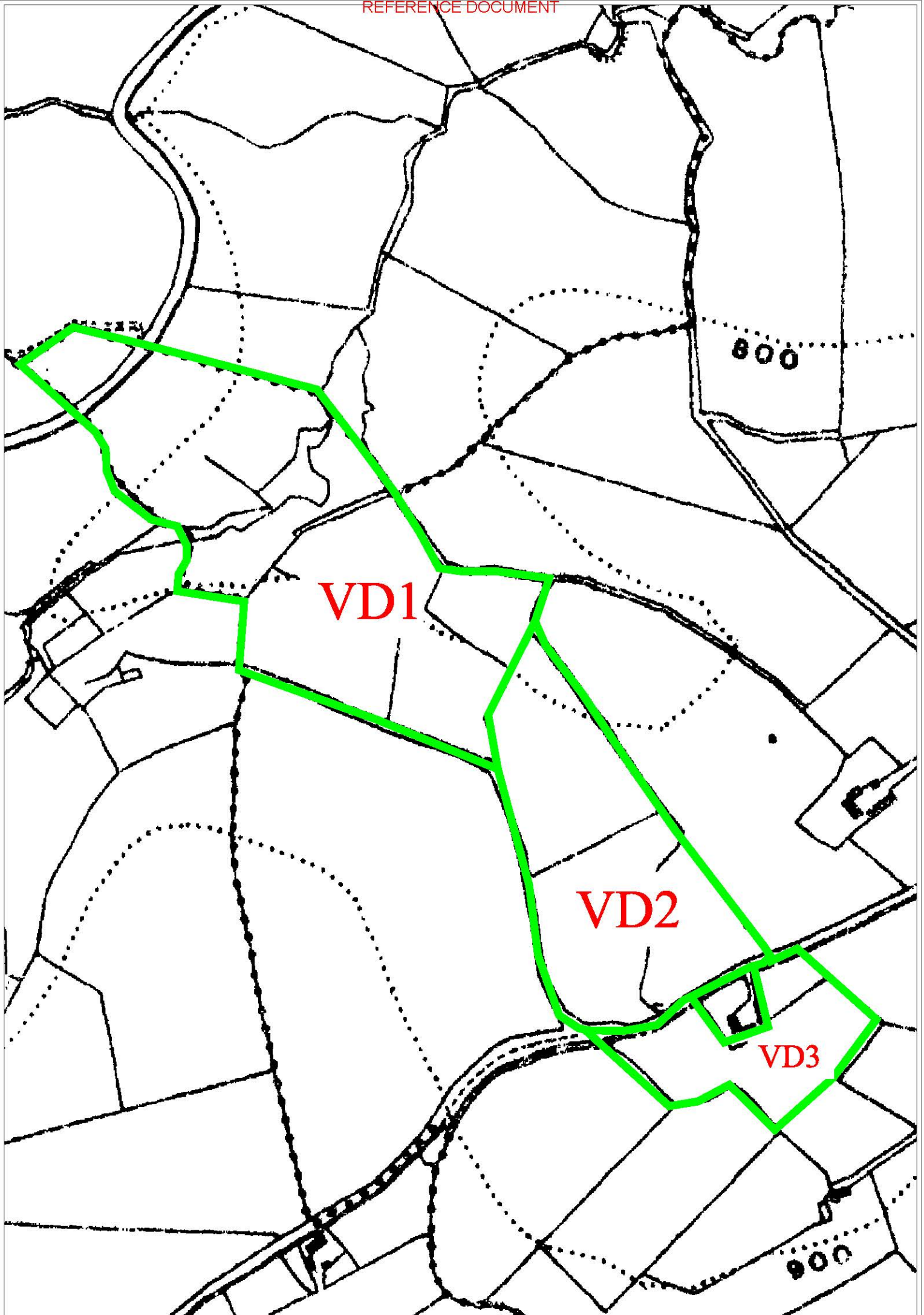
I undertake to manage these lands as described in the Hen Harrier Habitat Management Plan (HHHMP) as submitted in response to Further Information, Planning Ref. No. 13/51/0003.

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.


.....

Date: 25/11/13



VD1

VD2

VD3

800


800

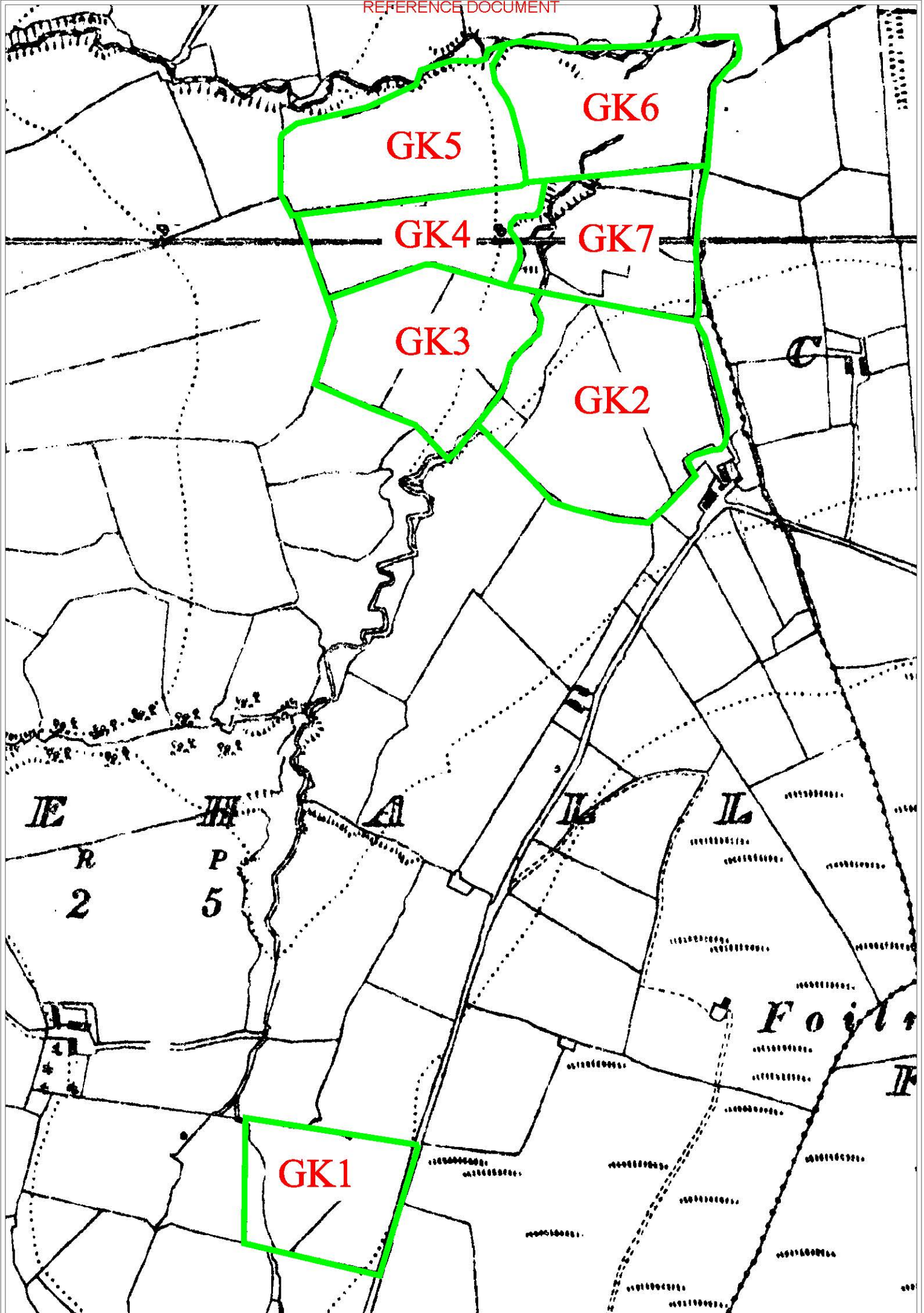
To:
Ecopower Development s Limited
Sion Road
Kilkenny

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~~ ^{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.


Date: 26/11/2013



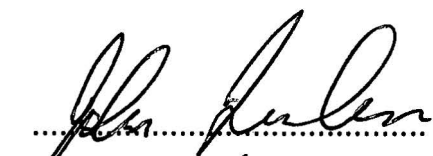
To:
Ecopower Development s Limited
Sion Road
Kilkenny

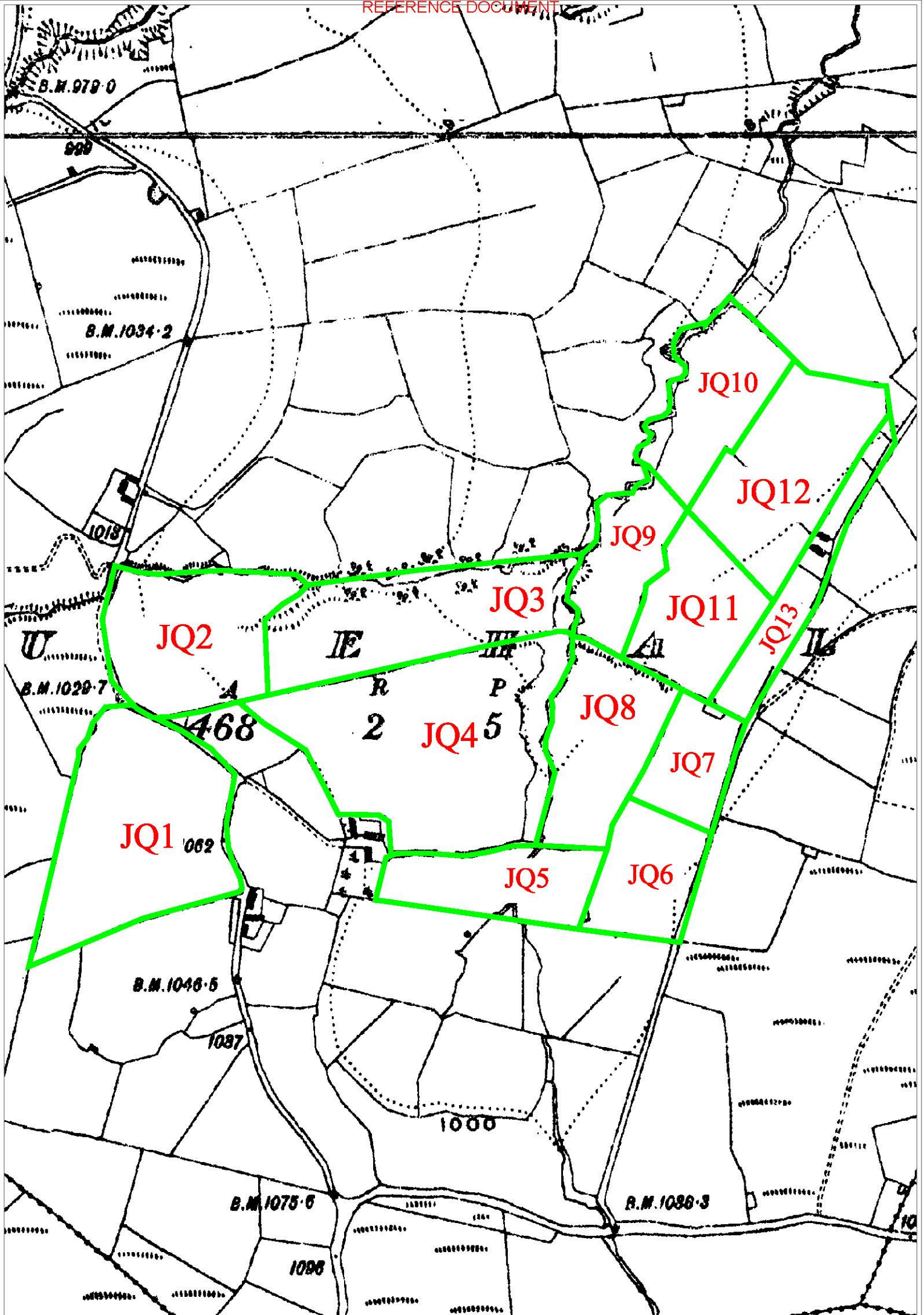
I, John Quinlan, Grousehall, Milestone, Thurles, Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing ^{26.5}~~2.5~~ hectares in area.

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



To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, John (SEAN) Ryan of Knockmole Kilkenny

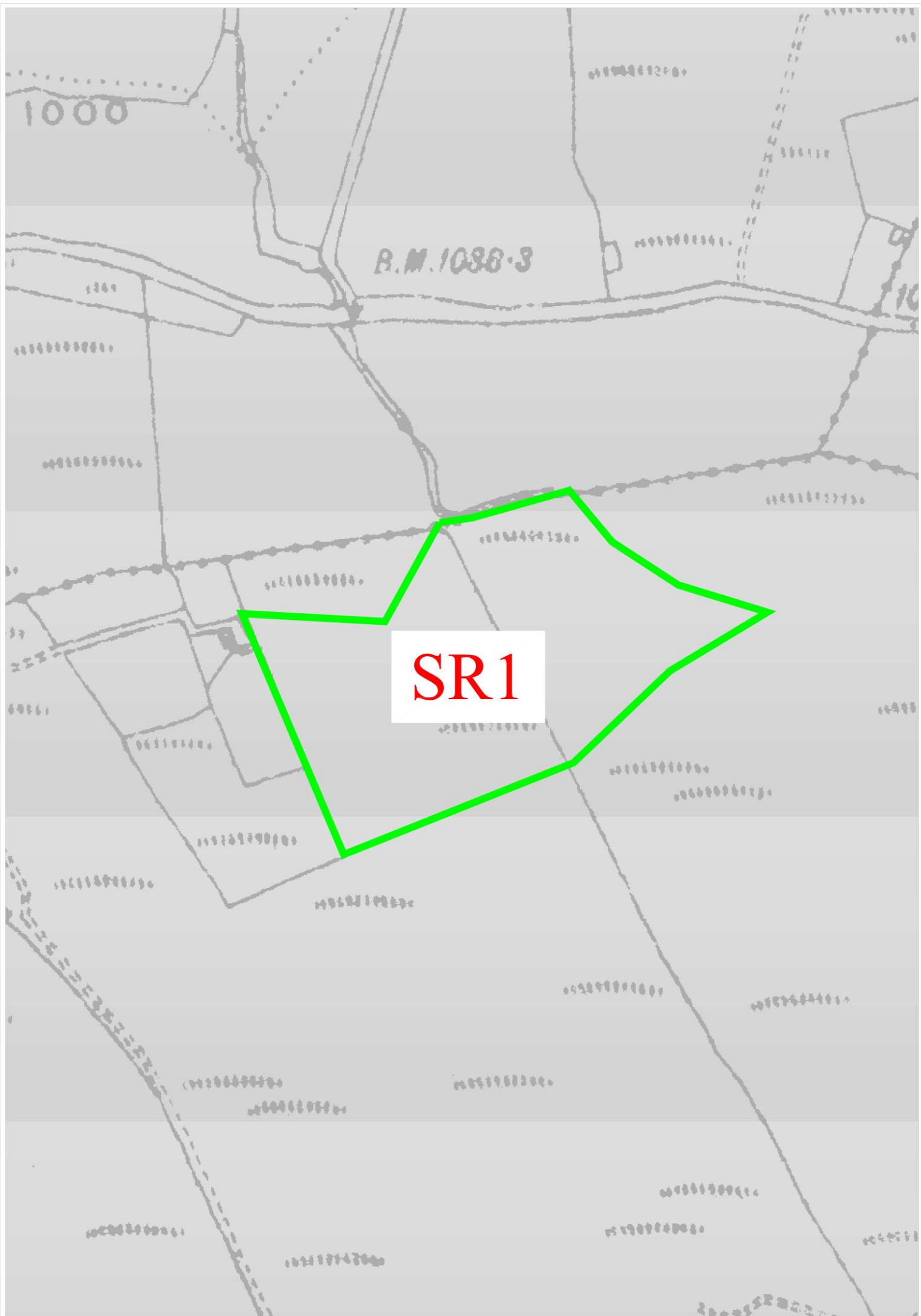
Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing2.8 hectares in area.

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.

Sean Ryan

Date: 26/11/13



To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Andrew Ryan....., of Fer Oramon.....

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 (HHMP) 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 HHMP.

Andy Ryan.....

Date: 26/11/2013



AR1

To:
Ecopower Development s Limited
Sion Road
Kilkenny

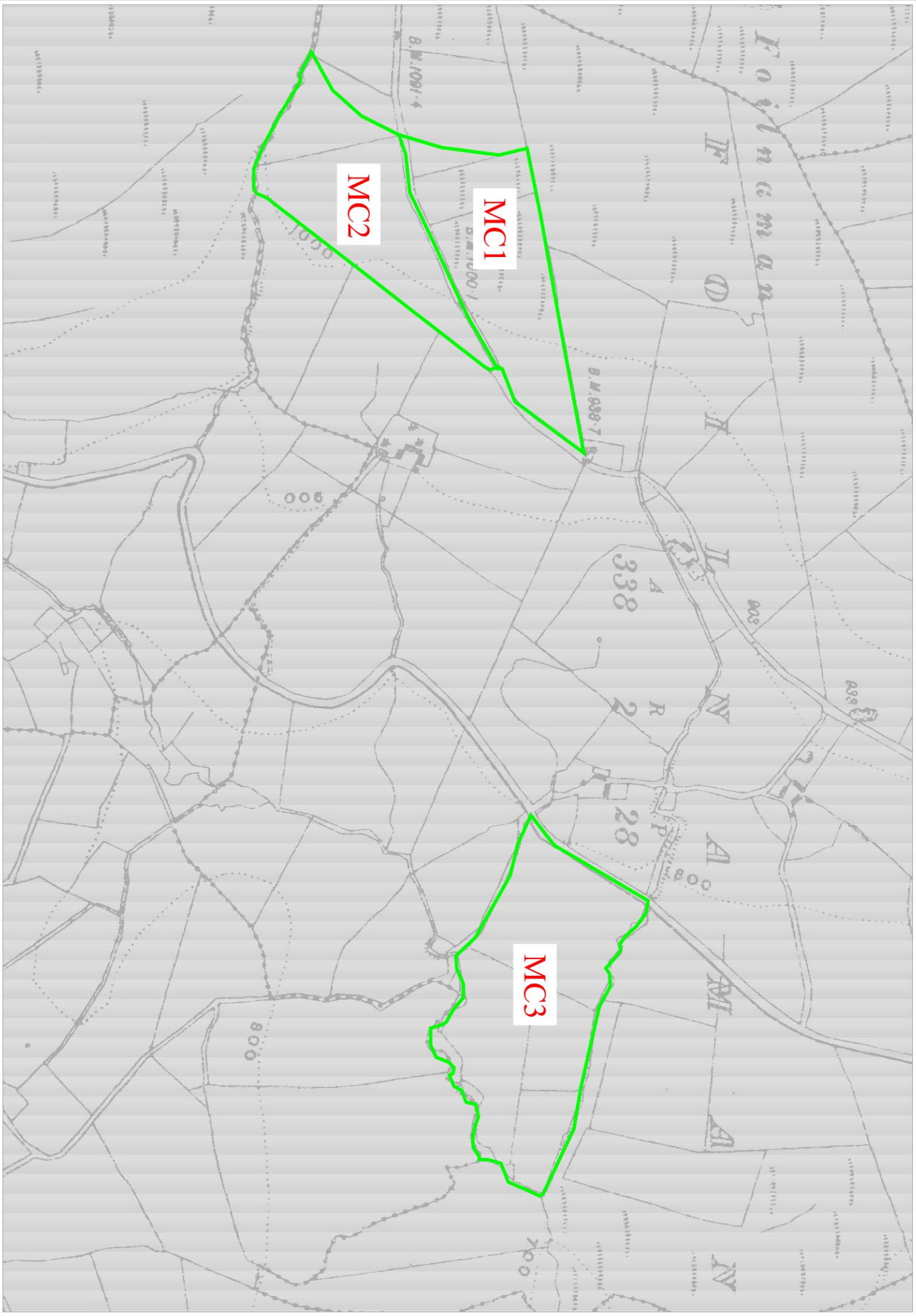
I, *Michael Carey*....., of *Foynamion*.....

Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing *..1.2..* 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 Carey.....
Date: *26/11/2013*



MC2

MC1

MC3

To:
Ecopower Development s Limited
Sion Road
Kilkenny

I, Michael Ryan, of Gloun Upperchurch

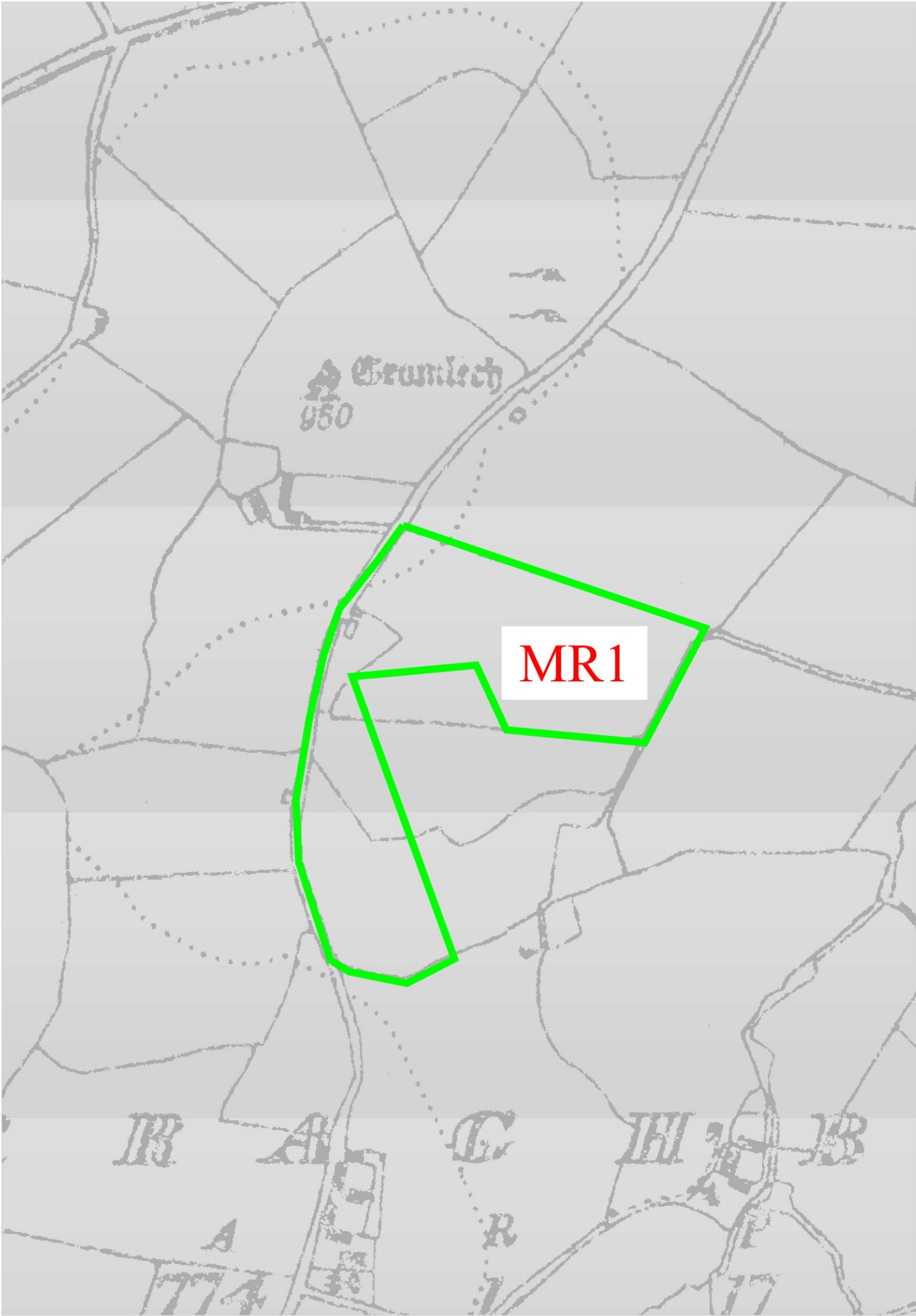
Co. Tipperary confirm that I am the owner of the lands outlined on the attached map containing 2 hectares in area.

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



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774

Appendix 4

Hen Harrier Habitat Area Matrix



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 |



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Appendices

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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 225m² plan area and hardstands with an excavation depth of 0.60m and 1,040m² 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 2,624m² 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 main 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 brush 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/ivers 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 cementitious 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 brush and needles that remain from the felling process. Brush, if left on site, will eventually lose its 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 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 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 1,000m² 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 is 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 1,000m² 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 1,000 m^2 the runoff rate is:

$$\begin{aligned} Q &= 0.70 \times (0.02/3600) \times 1,000 \text{ m}^3/\text{sec} \\ &= 0.0039 \text{ m}^3/\text{sec} \text{ (3.90 litres/sec)} \end{aligned}$$

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 = $Q/V_s \text{ m}^2$). The particle settlement velocity is determined using the formula derived by Stokes in 1851 as follows:

$$V_s = \frac{2 r^2 (D_p - D_f)}{9 \eta}$$

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),

η is the viscosity of the fluid ($0.000133 \text{ kg sec}/\text{m}^2 @ 10^\circ\text{C}$).

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

The required settlement pond surface area is

$$\begin{aligned} A &= Q/V_s \\ &= 0.0039/0.000284 \\ &= 13.70\text{m}^2 \end{aligned}$$

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 24 m^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 1,000m² and a runoff coefficient of 0.70. The maximum storage volume required is 6.98m³ 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 reseeded. 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 reseeded 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

Forestry Commission (2004). *"Forests and Water Guidelines"*. 4th Edition. Forestry Commission, Edinburgh, Scotland.

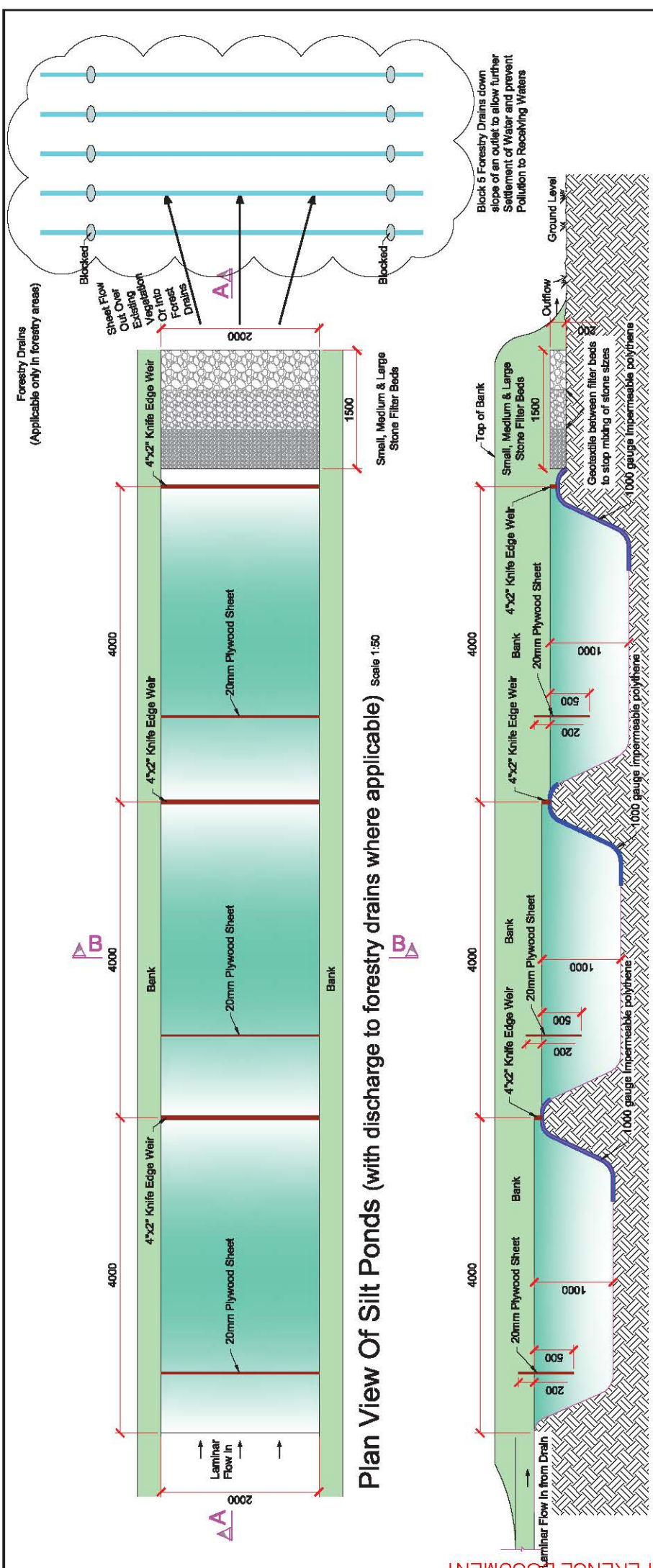
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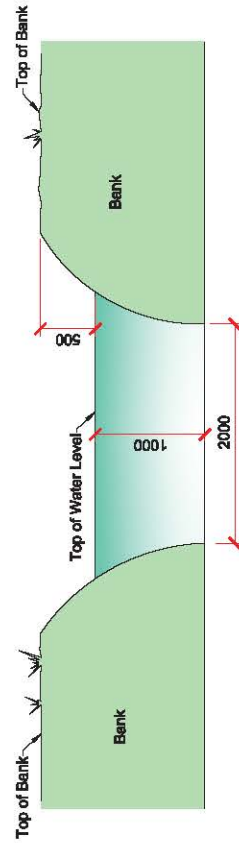
Appendix 1

15388-5005 Proposed Clear Span Bridge Detail

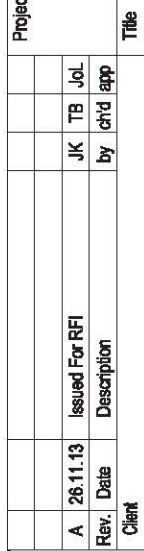


Plan View of Silt Ponds (with discharge to forestry drains where applicable) Scale 1:50

Section A-A Scale 1:50



Section B-B Scale 1:50



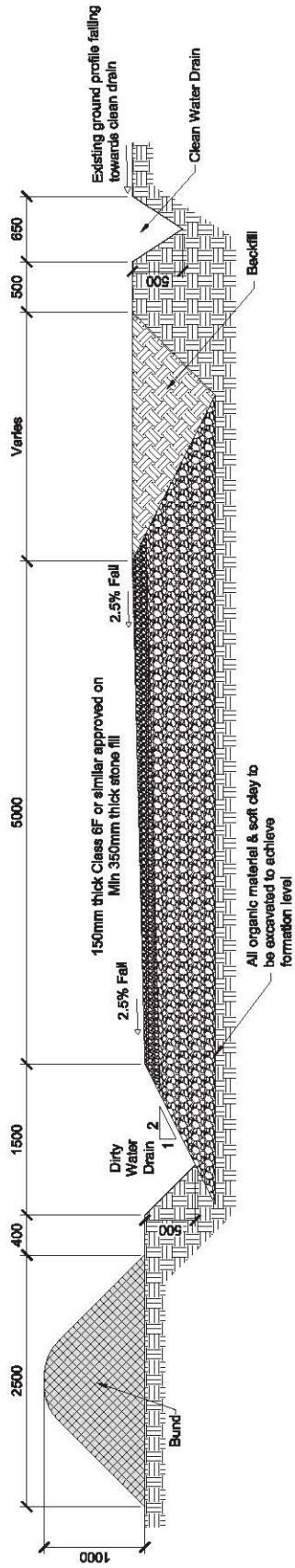
Malachy Walsh and Partners
Consulting Engineers
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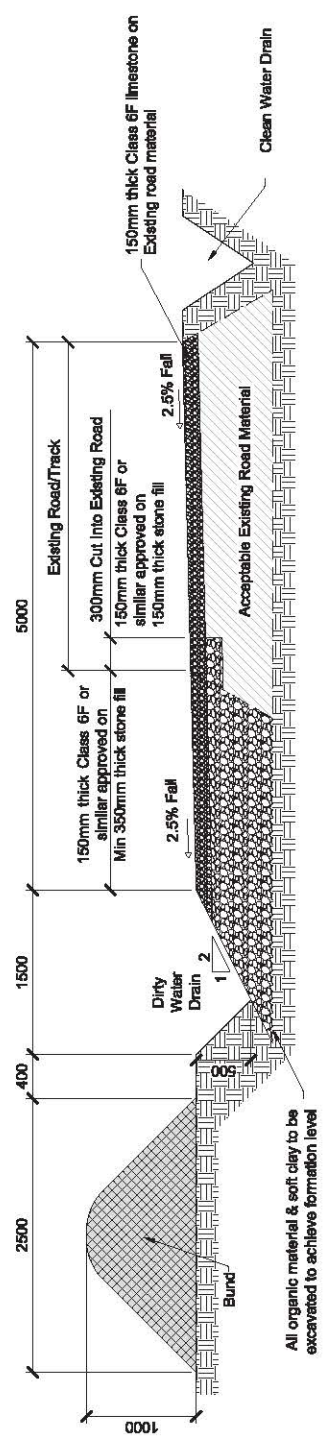
Project: **Upperchurch Wind Farm**

Title: **Proposed Site Drainage Details**

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| Rev. | A | Date | 26.11.13 | Issued For | RFI | JK | TB |
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Typical Excavated Access Track Detail Scale 1:50



Typical Widening To Existing Access Track Detail Scale 1:50

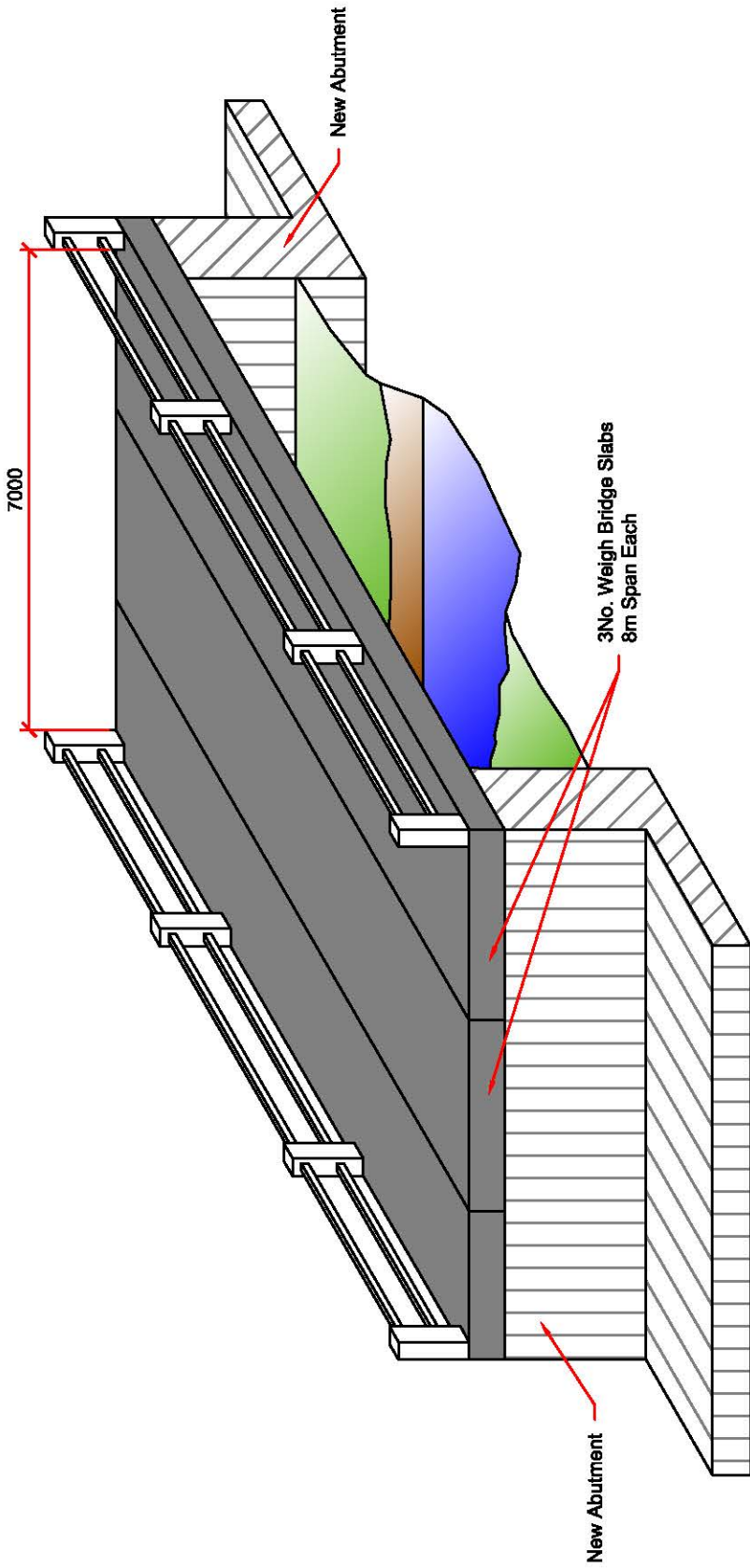
REFERENCE DOCUMENT

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| A | 26.11.13 | Issued For RFI | JK TB JcL |
| Rev. | Date | Description | by chd/jpp |
| Client | | Ecopower Developments Ltd | |
| Title | | Proposed Internal Road Details | |



Proposed Clear Span Bridge Detail Scale 1:100

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|  Malachy Walsh and Partners Consulting Engineers Cork Tralee London Limerick | | Drg. No. 15388-5005 | Rev. A |
| Scales (A4) | 1:100 | Drawn | Checked |
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| TB | TB | JK | TB |
| Project Upperchurch Wind Farm | | Title Proposed Clear Span Bridge Detail | |
| Client Ecopower Developments Ltd | Issued For RFI JK TB TB by ch'd app | | |
| Rev. Date A 26.11.13 | Description Issued For RFI | | |



Malachy Walsh and Partners
Engineering and Environmental Consultants

Preliminary Environmental Management Plan

For
Upperchurch Wind Farm

On behalf of

ECOPOWER DEVELOPMENTS LIMITED

15388
November 2013

| Job number | Revision | Prepared by | Checked by | Status | Date |
|------------|----------|------------------|-------------|--------|------------|
| 15388-6001 | B | Helen Burman-Roy | Monica Kane | Final | 21/11/2013 |



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- Appendix 2 Surface Water Management Plan
- Appendix 3 Ecological Management Plan
- Appendix 4 Waste Management Plan *(to be appended at a later date)*
- Appendix 5 Traffic Management Plan *(to be appended at a later date)*
- Appendix 6 Method Statements *(to be appended at a later date)*
- Appendix 7 Checklists *(to be appended at a later date)*
- Appendix 8 Organisational Structure *(to be appended at a later date)*

1 INTRODUCTION

1.1 BACKGROUND TO PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

All construction projects require the preparation of a site specific construction phase Environmental Management Plan in order to ensure that the project is constructed in accordance with best practice, with the minimum impact on the surrounding environment, in adherence with all environmental mitigation measures recommended in the Environmental Impact Statement and in compliance with any planning conditions which may be attached to a Grant of Permission by North Tipperary County Council.

This Environmental Management Plan (EMP) has been prepared by Malachy Walsh and Partners, on behalf of Ecopower Developments Limited, as a preliminary EMP at the planning stage of the project. The document aims to incorporate all mitigation measures recommended in the Environmental Impact Statement, and any additional mitigation measures recommended by specialist reports prepared as part of a response to a Request for Further Information (RFI) from North Tipperary County Council.

This EMP provides the information which will be contained in the final Contractor-developed Plan at the construction stage of the project. Furthermore, there will be a requirement on the Contractor to update these details, in particular to the roles and responsibilities of those appointed on the site for the construction of the project.

1.2 PLANNING CONTEXT

Ecopower Developments Limited applied to North Tipperary County Council (NTCC) for permission to construct a wind farm at Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg, Seskin, Co. Tipperary in January 2013. 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. The permission sought is for 10 years and the application was supported by an Environmental Impact Statement and Appropriate Assessment (Natura Impact Statement). The NTCC Planning Reference is 13/51/0003. On 28th February 2013, NTCC issued a Request for Further Information which included the provision of a preliminary Environmental Management Plan. The plan set out in this document will require revision and further input in the event of a grant of permission, to incorporate all details of the planning conditions and upon appointment of the Contractor, details of the personnel, roles, responsibilities and methods.

1.3 SCOPE AND PURPOSE OF ENVIRONMENTAL MANAGEMENT PLAN

1.3.1 Scope of the EMP

The Environmental Management Plan for the Upperchurch Wind Farm will detail all aspects of the construction stage of the project in compliance with the *planning conditions* of the grant of planning and relevant environmental mitigation measures. The EMP includes the following:

- Introduction
 - Background
 - Scope and Purpose
 - Roles and Responsibilities
- Existing Site
- Construction Works
 - Project Overview
 - Access
 - Engineering Works and Phases
 - Method Statements
 - Construction Schedule
- Environmental Requirements
 - Environmental Policy
 - Register of Mitigation Measures and Planning Requirements
 - Environmental Management Procedures
 - Environmental Monitoring Schedule

In as much as is possible at this stage of the project, the relevant information is included in the EMP.

1.3.2 Supporting Information in Appendices

Technical reports have been completed relating to the management of surface water run-off and the drainage details of the project, and the management of ecology. The following reports are included in the appendices and requirements of these assessments incorporated into the EMP;

- Ecological Management Plan
- Surface Water Management Plan

A table of Environmental Mitigation Measures is also included as an appendix.

The *revised EMP* will also include a Waste Management Plan, Traffic Management Plan, Method Statements, Checklists and an Organisational Structure in the Appendices.

1.3.3 Purpose of EMP

This EMP defines the management and implementation methodology of the relevant environmental issues of the proposed development. The work practices, construction management procedures and management responsibilities relating to the construction of the Upperchurch Wind Farm are outlined.

This EMP describes how the Contractor (when appointed) will implement a site construction management system on this project to meet the specified requirements which will include contractual, regulatory and statutory requirements, environmental mitigation measures and planning conditions. It is the contractor's responsibility to implement an effective management system to ensure that Ecopower Developments requirements for the construction of this wind farm are met.

All site personnel will be required to be familiar with the plan's requirements as related to their role on site. The plan describes the project organisation, sets out the procedures that will be adopted on site and outlines the key performance indicators for the site.

The EMP also defines the roles and responsibilities of the various parties to the construction contract, as set out below.

1.4 ROLES AND RESPONSIBILITIES/MANAGEMENT STRUCTURE

The roles and responsibilities outlined below are indicative at this stage in the project and will be updated upon appointment of the Contractor.

The appointed Contractor will be required to finalise the Organisational Structure for the project to oversee this EMP and to outline the specific responsibilities for the roles required (Organisational Structure to be appended). The roles may be outlined as follows;

- Contractor's Project Manager
- Site Agent
- Geotechnical Engineer
- Environmental Officer
- Health and Safety (PSDP& PSCS)
- Project Ecologist
- Project Archaeologist

Pending planning permission, conditions of planning and the appointment of a Contractor, details of the personnel and their responsibilities must be added to the EMP. An outline of potential roles is provided below but will require revision.

1.4.1 Project Manager – To be updated upon appointment of Contractor/finalisation of EMP

The Contractor's Project Manager is responsible for:

- the implementation of the Environmental Management Plan
- management of the construction project
- co-ordinating all construction teams
- implementing the Health and Safety Plan
- liaison with the client/developer
- production of construction schedule
- maintaining a site project diary

1.4.2 Site Agent – To be updated upon appointment of Contractor/finalisation of EMP

The Site Agent, reports to the Project Manager and is responsible for:

- implementing the Environmental Management Plan
- assigned project management duties
- implementing the Health and Safety Plan
- liaison with the client/developer
- production of construction schedule
- maintaining a site project diary

1.4.3 Geotechnical Engineer – To be updated upon appointment of Contractor/finalisation of EMP

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

- implementing the Environmental Management Plan
- materials procurement
- design of Temporary Works
- programming and planning of excavation works
- review and approval of method statements
- implementing the Health and Safety Plan
- maintaining a site project diary

1.4.4 Environmental Officer – To be updated upon appointment of Contractor/finalisation of EMP

The Environmental Officer is appointed by the Contractor and reports to the Project Manager. He is responsible for:

- implementing the environmental procedures of the EMP and updating it as necessary
- management of all environmental aspects of the construction works and audit of controls
- review and approval of method statements relating to environmental aspects
- ensuring implementation of mitigation measures
- training of staff in all environmental issues
- liaison with the client/developer
- auditing the construction works from an environmental viewpoint

1.4.5 Health and Safety Personnel – To be updated upon appointment of Contractor/finalisation of EMP

The Health and Safety personnel for the construction project is appointed by the Contractor in line with the Construction Regulations:

- carrying out duty of Project Supervisor Design Process
- 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 required legal duties with regard to health and safety

1.4.6 Project Ecologist– To be updated upon appointment of Contractor/finalisation of EMP

The Project Ecologist may be appointed by the Developer or the Contractor and is responsible for:

- review and approval of method statements relating to ecology, such as hedgerow removal
- ensuring implementation of ecological mitigation measures, such as recommended buffers
- implementation of the Ecological Management Plan
- management of ecology related site landscaping and re-vegetation activities
- liaison with the project manager/site agent
- liaison with the contractor/client/developer

1.4.7 Project Archaeologist – To be updated upon appointment of Contractor/finalisation of EMP

The Archaeologist may be appointed by the Developer or the Contractor and is responsible for:

- review and approval of method statements relating to archaeology
- ensuring implementation of archaeological mitigation measures, such as recommended buffers
- monitoring of groundworks associated with the development
- liaison with the project manager/site agent
- liaison with the contractor/client/developer

1.5 REFERENCE DOCUMENTS

The following reference documents apply to this EMP:

- Environmental Impact Statement for the Upperchurch Wind Farm (January 2013), prepared in respect of planning reference 13/51/0003.
- Response to the Request for Further Information and the technical reports prepared.
- Planning permission (and associated conditions) if granted by North Tipperary County Council.
- Tender documents for construction of Upperchurch Wind Farm, including any associated site investigation and geotechnical reports (if granted by North Tipperary County Council).

The following best practice guidelines may also be considered applicable to this EMP:

- National Roads Authority Construction Phase Noise Guidelines
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes (NRA)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA)
- Guidelines for the crossing of watercourses during the construction of National Road Schemes. Environmental Series on Construction Impacts. Dublin (NRA, 2006)
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (NRA)
- Consultation with Inland Fisheries Ireland and other relevant authorities, having regard to relevant pollution prevention guidelines. All works in or adjacent to watercourses will comply with the EPA/Inland Fisheries /NTCC/OPW requirements.
- Pollution Prevention Guidelines, Scottish Environmental Protection Agency
- The Planning System and Flood Risk Management Guidelines for Planning Authorities, Department of Environment, Heritage and Local Government (DoEHLG) 2009
- Advice and licensing regulations of the NPWS and under the guidelines of the National Roads Authority (NRA, 2004 & 2006)
- Windfarm Planning Guidelines 2006, Department of Environment, Heritage and Local Government
- Best Practice Guidelines for the Irish Wind Energy Industry, IWEA & SEAI

2 EXISTING SITE

2.1 SITE DESCRIPTION

The site of the Upperchurch Wind Farm is located within a series of small hills or drumlins 2km to the west of Upperchurch village and 18 kilometres to the west of Thurles. The proposal is to construct 22 turbines in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg, Seskin, west of Upperchurch village, Co. Tipperary. The turbines, which are numbered T01 to T22 are arranged in four clusters within an overall area of 12km².

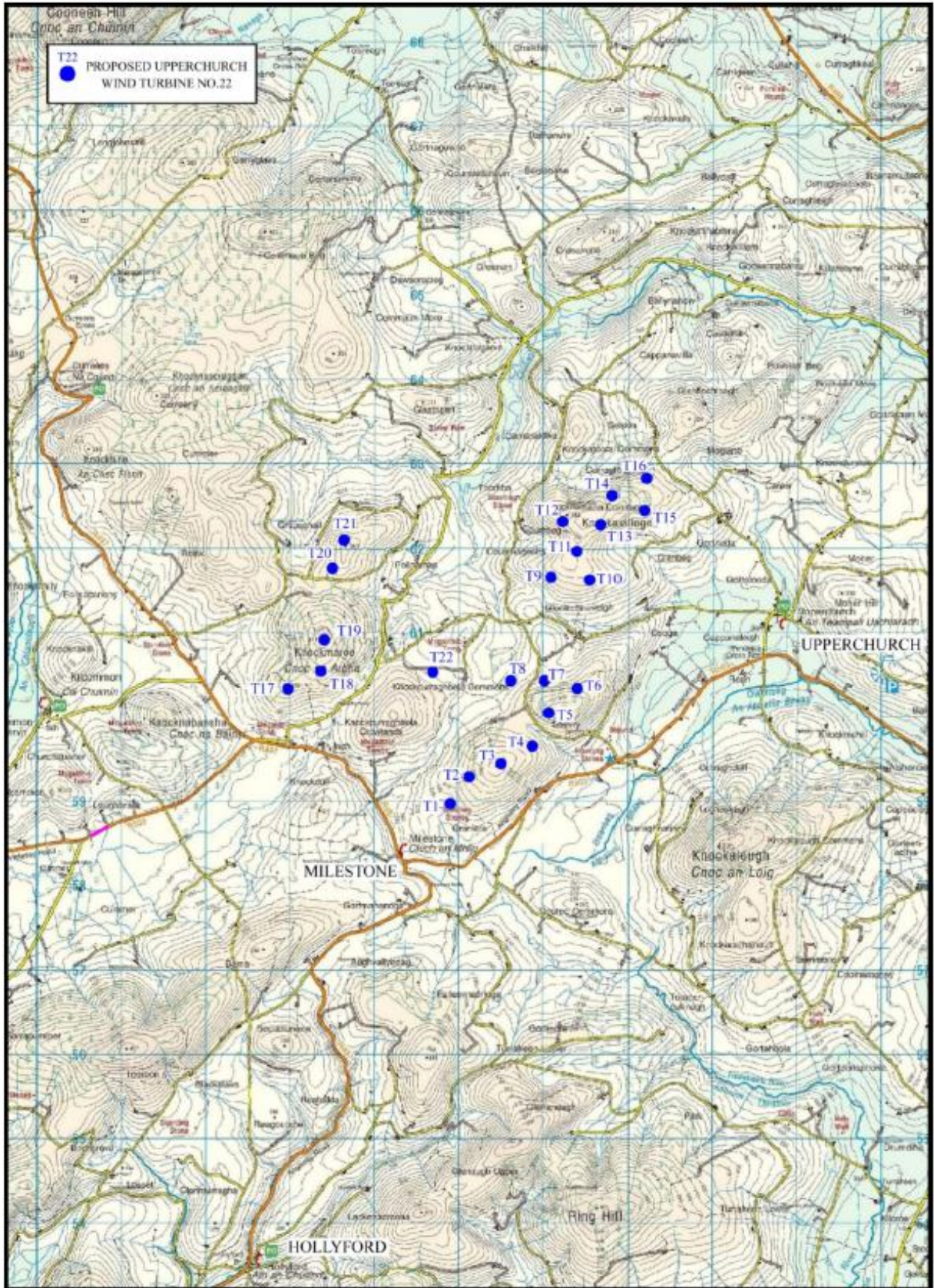
The four clusters are as follows

- T01 to T08 are arranged around two hills at Shevry;
- T09 to T16 are arranged around the hill at Knocknameana Commons;
- T17 to T21 are arranged around two hills at Knockmaroe and Foilnaman;
- T22 is a single turbine on the northeast side of the hill at Knockcurraghbola Crownlands.

The Upperchurch site lies just north and east of the junctions between the regional road from Limerick to Thurles (R503) and the regional road from Tipperary Town to Nenagh (R497). The regional road from Limerick to Thurles (R503) dissects the Silvermine Mountains from north to south. The regional road from Tipperary Town to Nenagh (R497) dissects the Silvermine Mountains from west to east

The Silvermine Mountains comprise many rounded peaks, with intervening valleys of sloping pasture and winding rivers and streams and extend over an area of c.330km². The proposed turbines are arranged in four clusters within an overall area of 12km² on the eastern margins of these mountains. The proposal is to construct 22 wind turbines together with ancillary service roadways and a 110kV substation compound. It is planned to access the site at Graniera, 1km before Milestone, at Site Entrance No. 1. From this point the construction vehicles will access the full site using newly built windfarm roadways, upgraded farm and forestry tracks and site entrances from the Third Class Road network within the site area. The electricity generated will be cabled underground to the windfarm substation compound in Knockcurraghbola Commons.

Figure 2-1. Proposed Layout of the Upperchurch Wind Farm



2.2 HABITATS AND SPECIES AT THE SITE

The habitats identified within the proposed 22-turbine windfarm study area are the improved agricultural grassland (GA1), wet grassland (GS4), coniferous plantation (WD4), wet heath (HH3), upland blanket bog (PB2), acid grassland (GS3), upland/eroding streams (FW1), spoil and bare ground (ED2), buildings and artificial surfaces (BL3), neutral grassland (GS1), hedgerows (WL1), drainage ditches (FW4) and treelines (WL2).

The proposed windfarm lies within 15 km of Lower River Shannon cSAC (site code 002165), Bolingbrook Hill cSAC (site code 002124), Lower River Suir cSAC (sitecode 002137), Anglesey Road cSAC (site code 002125), Slievefelim to Silvermines Mountains SPA (site code 004165), Silvermines mountains West SAC (site code 002258), Keeper Hill SAC (site code 001197), Kilduff, Devilsbit Mountain SAC (sitecode 000934) and Philipston Marsh SAC (site code 001847). An Appropriate Assessment has been undertaken to determine the significance of the impact on Natura 2000 sites. No adverse impact is expected to arise to Natura 2000 Sites as a result of the proposed development. No adverse impact is expected to arise to NHAs not covered by Natura 2000 sites.

The main potential negative impacts identified relate to habitat loss, disturbance to fauna during the construction phase of the development, risk of collision for the hen harrier and the pollution of waterways downstream of the drains/streams within the proposed site. Mitigation measures have been recommended throughout the Environmental Impact Statement and included in Appendix 1 of this EMP.

3 CONSTRUCTION WORKS

The following detail on the construction works is taken from the Environmental Impact Statement. The detail can be revised, *pending planning conditions and the appointment of a Contractor.*

3.1 PROJECT OVERVIEW

The first stage in the construction of a wind farm is building the on-site roads. This is followed by excavation of foundations, pouring of concrete, erection of the turbines and met masts and construction of the substation compound. The electricity generated by the turbines will be cabled underground to the windfarm substation compound in Knockcurraghbola Commons. The windfarm will be connected to the National Grid at the Killonan Nenagh 110kV line c.20km to the west of the substation compound.

Technical operation and monitoring activities will be carried out remotely using computers and there will also be four full time maintenance personnel employed to monitor and maintain turbine operational safety and performance. The turbines have a design life of 25 years. All the electrical equipment - main transformer and individual turbine transformers, switch gear and control gear have a design life of 40 years. The options after 25 years would be to retrofit the turbines and continue generating or to decommission the wind farm and reinstate the site.

3.2 ACCESS REQUIREMENTS

The access requirements for the project can be divided into six phases:

- Civil engineering works

- Electrical works
- Wind turbine delivery and erection
- Routine inspection and maintenance
- Major maintenance and
- Final decommissioning

3.3 CIVIL ENGINEERING WORKS AND PROJECT PHASES

3.3.1 On site roads and hardstands

The Upperchurch Windfarm on-site roads (8km) and hardstands will be laid to a depth of 400mm with crushed stone. The roadway including both new and upgraded existing forestry and farm roads along with hardstanding areas will require approximately 4,010 loads of crushed stone. The developer will endeavour to win as much of this stone as possible from borrow pits onsite to reduce the volume of construction traffic.

3.3.2 Turbine Foundations

Foundations for the 22 turbines will require approximately 345m³ per base. This amounts to approximately 950 truckloads of ready mix concrete required for the 22 bases. Other building materials, including pre-cast concrete pipes for drainage will be procured locally. Crushed stone not won on site, sand and concrete products will be sourced from local suppliers.

3.3.3 Steel Reinforcing

14 tonnes per turbine will be needed. This amounts to approximately 15 deliveries by flatbed articulated truck in total.

3.3.4 Haul Route Surveys

Prior to construction, Pavement Condition Surveys to include FWD analysis, width and forward stopping sight distance analysis and culvert/bridge strength analysis, will be carried out on the local roads that transverse the Upperchurch windfarm site to determine suitability for use and whether they will require strengthening and/or restoration after the construction phase. Any strengthening or reinstatement required will be carried out by the developer in agreement with the Roads Department. The haul route proposed for Upperchurch Windfarm follows along the same haul route which has just been used for the construction traffic for Garracummer windfarm and previously for Glenough Windfarm. The main site entrance for Upperchurch Windfarm at Graniera (Site Entrance No.1) is situated along the Regional Road R503.

3.3.5 Traffic for Electrical Works

The following deliveries will be required

- articulated trucks carrying cable rolls – 1 load
- delivery trucks carrying equipment for the turbines - 1 load

3.3.6 Wind Turbine Delivery and Erection

The components will be delivered to the site by articulated trucks. The maximum load per axle, for delivery of the turbine components and construction materials will be confined to within legal limits.

A proposed route for carriage of turbine components from the M7 was discussed with the North Tipperary Area Roads Engineers. The entire haul route is within the Newport Area and the Thurles Area. Any strengthening or reinstatement required will be carried out by the developer in agreement with the roads engineers.

The erection of wind turbines involves the assembly and lifting into position of the main components of the turbine (the tower, nacelle and rotor assembly).

The following loads are required per turbine:

| Component | Transportation Requirement |
|------------------------|--|
| Nacelle (2 loads) | 2 truck load-carried on a 8 axle rear- steering trailer and 3 axletractor unit |
| Tower section (top) | 1 truck load (carried on 5 axle rear steering trailer and 3 axletractor unit) |
| Tower section (middle) | 1 truck load (carried on 5 axle rear steering trailer and 3 axletractor unit) |
| Tower section (bottom) | 1 truck load (carried on 5 axle rear steering trailer and 3 axletractor unit) |
| 3 Blades | 1 truck load per blade (carried on 2 axle rear steering trailer and 2 axle tractor unit) |

This amounts to approximately 8 truckloads per turbine with a total number of 176 deliveries over the delivery period for all 22 turbines. Axle weights per axle will not exceed legal limits.

3.3.7 Craning Requirements

A crane, with a lifting capacity of circa 500 tonnes, will be used to remove the heavier components from the trucks and this crane will also be used during the erection of the turbines. This crane will likely be an 8-axle crane weighing approximately 97 tonnes. It will be equipped with large low ground pressure tyres carrying approximately 12 tonnes per axle. A smaller crane will be used to remove the blades from the trailer and for assisting assembly (tailing of the turbines).

3.3.8 Routine Inspection and Maintenance

The operational phase will involve daily remote monitoring by the owner's operator and visits by maintenance crews to carry out scheduled and un-scheduled maintenance and repairs. A light four-wheel drive vehicle will be required for access for maintenance personnel.

3.3.9 Major Maintenance

On the few occasions of major component failure a crane would be needed to be brought on site. This major maintenance, if required, may involve the replacement of a gear box, blade or transformer component. While it is unlikely to be a regular event, these components would require to be lifted from position by crane for repair or replacement.

3.3.10 Final Decommissioning

If the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. The turbine transformers, substation building, compounds and monitoring masts will also be removed from site. It is likely that any turbine component will be reused as they have a life well in excess of the wind farm proposal i.e. greater than 25 years. Wind farm components may also be recycled.

3.4 METHOD STATEMENTS

Method statements are used to explain the 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 works (outlined above), environmental protection and risk assessments. Method statements are issued to all responsible personnel and those involved with the specified activity.

The proposed method of working is defined for an element of work taking into account the particular requirements of the project including site conditions, safety and environmental hazards, the contract drawings, project specifications or code of practice. This is to allow the personnel involved to be aware of the particular risks associated with the task. Method statements may include the proposed use of plant, personnel and materials required, as well as any permits or certification required. They have supporting drawings and documentation as required.

The principle aim of a method statement is to ensure that:

- the necessary resources are available prior to commencing;
- the tasks are planned out in advance;
- all environmental recommendations are adhered to; and
- safety legislation is adhered to, safe working methods are defined and all personnel are informed.

Upon appointment and prior to the commencement of any activities, particularly where there is environmental or safety risk, the Contractor will develop a written method statement. 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.

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 should be developed and appended to the EMP and communicated with the appropriate personnel.

Method Statements will be job-specific for the main activities. They will describe the task, the responsible personnel, the risks and the required controls or mitigation measures. The Appointed Contractor will apply a standard format for all statements.

Detailed method statements will be prepared by the appointed Contractor, prior to the commencement of the wind farm construction. A register of Method Statements required throughout the project will be maintained in the site office.

3.5 CONSTRUCTION SCHEDULE

It is estimated that the construction of the wind farm will take approximately 8 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.

At this stage, it is envisaged that the estimated Construction Timetable is as follows;

- Civil engineering works - 4 months
- Electrical works - 4 months, which be carried out in conjunction with the civil works.
- Turbine erection and commissioning – 16 weeks. Turbines are normally installed when the majority of the civil works are completed.

On appointment, the Contractor will provide a detailed construction schedule, which may 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. Use site won stone for construction in so far as is possible. Where rock is encountered, break out using breaker on hydraulic excavator.
- Construction of drainage per Surface Water Management Plan.
- Installation of meteorological mast.
- Excavation of the turbine bases and storage of soil locally for backfilling and re-use.
- Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for turbine tower section. Construct shuttering and fix any ducts to be cast in.
- Pour and cure concrete for turbine bases, removing shutters thereafter.
- Excavation of cable trenches; lay cables and backfill. Provide ducts at road crossings.

- Partially backfill foundations where necessary for crane operations.
- Erect towers, nacelles and blades.
- Complete earthings to towers and complete backfilling to foundations.
- Construction of substation compound.
- Complete electrical installation, SCADA system.
- ESB grid connection
- Commission and test all plant.
- Complete site works and site housekeeping.
- Demobilise temporary compound and offices.
- Provide any gates, landscaping and signage, which may be required.

4 ENVIRONMENTAL REQUIREMENTS

4.1 INTRODUCTION

The Upperchurch Wind Farm EIS identified mitigation measures that have to be put in place to minimise/eliminate potential for environmental impacts from the project. There are a number of environmental mitigation measures which are to be implemented during the construction stage, as required by the Environmental Impact Statement, the reply to Further Information, and any further controls or mitigation measures which may be conditioned upon grant of planning permission by North Tipperary County Council. Some of the mitigation measures included in the Ecological Management Plan are to be implemented in the early operational phase. These include ornithological surveys, water quality monitoring and monitoring of badgers and bats (Appendix 3).

4.2 ENVIRONMENTAL POLICY

Once appointed, the Contractor's Environmental Policy will be incorporated into future revisions and the following paragraph describes what is typically expected of such a policy.

The environmental policy for the Upperchurch project will be realistic and site specific. It will state a commitment to continual improvement of environmental performance. This will be achieved through the realisation of the environmental objectives and targets that are based on the identified environmental impacts associated with site activities. It will be used as a benchmark for environmental performance. The policy will be approved by the contractor's senior management, signed by the project manager and communicated to all employees associated with the development. A register of aspects will be implemented and relevant targets established to identify evidence of any impacts on the environment arising from the Upperchurch Windfarm development.

- The policy will be a controlled document and will be reviewed and revised as necessary.
- A copy of the policy will be located on the site staff notice board.
- A copy of the environmental policy will be included in this section of the construction management plan.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the environmental policy and its contents.

4.3 TABLE OF MITIGATION MEASURES AND PLANNING REQUIREMENTS

A table of the required mitigation measures has been compiled, based on the mitigation measures recommended in the EIS and in further detailed assessments conducted as part of the Further Information request. *This will require revision to include any measures relevant to planning conditions if granted by North Tipperary County Council.* This table is included in Appendix 1. The table identifies the environmental aspect and the overall responsibility for implementing each listed mitigation measure. Where there is a relevant environmental procedure or management plan, this is also cross-referenced.

Upon receipt of planning permission and appointment of the Contractor, the EMP and associated documentation, including the Table of Mitigation Measures, will require revision and finalisation.

4.4 ENVIRONMENTAL MANAGEMENT PROCEDURES

A selection of environmental management procedures are included below. These procedures will be used by the Appointed Contractor for the environmental management of the Upperchurch project. Once appointed, it is the Contractor's responsibility, to update and add relevant project-specific procedures to this EMP. The Contractor must ensure that procedures are communicated to all site staff, including sub-contractors, through induction, training and at relevant meetings.

The following procedures are included in this document as a preliminary selection. The Contractor, when appointed, will be responsible for formulating these procedures, and may wish to amend these procedures when appointed. 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 EIS and additional technical reports carried out as part of the further information planning stage. Furthermore, these procedures may be updated or amended pending specific conditions attached to planning permission.

| 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 |

4.4.1 Site Environmental Training and Awareness

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

4.4.2 Environmental Emergency Response Plan

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.

4.4.3 Wheel Wash and Dewatering Procedure

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

4.4.4 Concrete Control Procedure

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.

4.4.5 Fuel and Oil Management Plan

EMP-4: 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

4.4.6 Surface Water Management Procedure

EMP-5: 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.

4.4.7 Traffic Management Procedure

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

4.4.8 Protection of Archaeological and Cultural Heritage

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

4.4.9 Management of Excavation and Spoil

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

4.4.10 Management of Borrow Pits

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

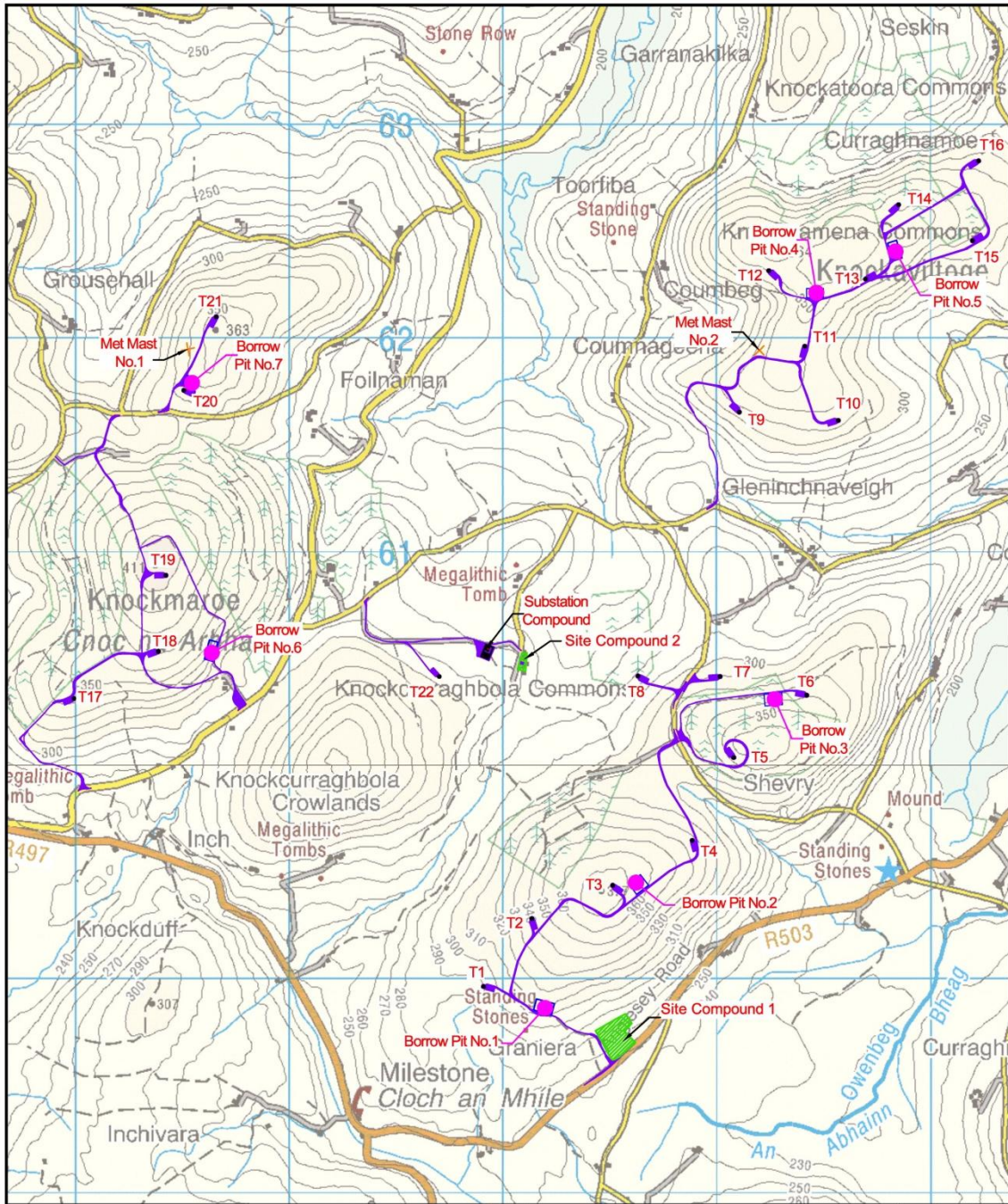
The Appointed Contractor will prepare a detailed Borrow Pit Management Plan prior to the works commencing to ensure all measures relating to excavation, stockpiling and drainage are described – for appropriate management and the protection of watercourses.


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



| | | | | | |
|---------|--|----------|-------------|-----------|--------------------------------|
| Project | Upperchurch Wind Farm | | | | |
| | Rev. | Date | Description | by | ch'd app |
| Title | Borrow Pit Locations | | | | |
| |  Malachy Walsh and Partners Consulting Engineers Cork Tralee London Limerick | | | | |
| Client | | | | | |
| | Scales (A4) | | 1:25,000 | | Drg. No. 15388- SK01 |
| Drawn | JK | 21.11.13 | | Rev. A | |
| Checked | HBR | 21.11.13 | | | |

4.4.11 Waste Management Plan

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

4.4.12 Air, Dust and Noise Management Plan

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

4.4.13 Site Reinstatement Procedure

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

4.4.14 Monitoring and Auditing Procedure

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

4.4.15 Environmental Accidents, Incidents and Corrective Actions

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

4.4.16 Environmental Complaints Procedure

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

4.4.17 Environmental Monitoring Committee Procedure

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

4.5 ENVIRONMENTAL MONITORING SCHEDULE

A *Preliminary Monitoring Schedule* is provided below and will be finalised pending the grant of planning permission, the incorporation of planning conditions and the appointment of the Contractor. The Appointed Contractor will assign an on-site Environmental Officer to monitor the construction activities on a day to day basis. The duties will include completing the required checklists (*to be developed*) and coordinating with the Project Ecologist, Project Archaeologist and the Geotechnical Engineer as required to ensure all environmental monitoring is carried out. The Appointed Contractor will finalise the environmental monitoring schedule prior to construction commencing on site.

| Aspect | Monitoring Required | Frequency | Note | Responsibility |
|-------------|-------------------------------|-------------|--|-----------------------|
| Water | Sediment & Erosion Controls | Daily | Daily Site Checks | Environmental Officer |
| Water | Fuel & Oil Storage inspection | Weekly | Weekly Site Audit | Environmental Officer |
| Water | Hydro-chemical Monitoring | Monthly | Year 1 (reduce Year 2 if no issues) | Environmental Officer |
| Water | Q-Sampling | Monthly | Year 1 (reduce Year 2 if no issues) | Environmental Officer |
| Water | Concrete Pours | As Required | To be scheduled with pours | Environmental Officer |
| Birds | Pre-Construction Surveys | As Required | Breeding Bird Survey | Ecologist |
| Birds | Post-Construction Surveys | As Required | 3 years / per method | Ecologist |
| Ecology | Material and Waste Storage | Weekly | Weekly Site Audit | Environmental Officer |
| Ecology | Habitat Monitoring | Annually | 5 Years | Ecologist |
| Ecology | Vegetation Monitoring | Annually | 5 Years | Ecologist |
| Ecology | Badger Surveys | Annually | 1 Pre-construction survey | Ecologist |
| Ecology | Badger Surveys | Annually | 3 years Post-construction survey | Ecologist |
| Ecology | Bat Surveys (pre-Con) | Annually | 1 Pre-construction survey | Ecologist |
| Ecology | Bat Surveys (post-Con) | Annually | 3 years Post-construction survey | Ecologist |
| Ecology | Fatality Survey (post-Con) | Annually | 1 Post-construction Birds & Bats | Ecologist |
| Archaeology | Archaeological Monitoring | As Required | Monitor groundworks, excavation | Archaeologist |
| Noise | Construction Noise Monitoring | As Required | During noisy activities closest to residential receptors | Noise Specialist |

The environmental Monitoring Schedule will take cognisance of all mitigation measures outlined in the EIS and any relevant measures conditioned by North Tipperary County Council. The Monitoring Schedule for

construction may also provide for the checking of equipment, materials storage and transfer areas and specific sediment and erosion controls.

4.6 ENVIRONMENTAL PERFORMANCE INDICATORS

The Appointed Contractor will outline the key performance indicators for the site in gauging successful site management in the prevention of pollution and the protection of the environment.

Environmental performance indicators may include:

- Number of environmental accidents logged;
- Number of environmental incidents logged;
- Breach of procedure and corrective actions;
- Number of environmental complaints received;
- Results of construction noise monitoring;
- Results of monthly water monitoring; and
- Results of site audits.

The performance indicators will be finalised by the Appointed Contractor and communicated to all relevant personnel and sub-contractors. The review periods for analysing site performance indicators must also be specified.

5 CONCLUSION

As described throughout this EMP, this is a *preliminary plan* which will require an update to all details pending the receipt of a grant of planning permission, any relevant planning conditions and the appointment of the Contractor.

This EMP provides the information which will be contained in the final Contractor-developed Plan at the construction stage of the project. The requirement on the Contractor to update these details has been explained, and there is a particular requirement for an update to the roles and responsibilities of those appointed on the site for the construction of the project.

Appendices

APPENDIX 1 TABLE OF ENVIRONMENTAL MITIGATION MEASURES

Following is a Table of Mitigation Measures identified through the Environmental Impact Assessment and through further technical reports. Pending planning permission, this table may require revision to include any conditional elements specified by North Tipperary County Council. This table includes mitigation of most relevance to the Contractor and the construction phase of the project.

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|-----------|---|--|----------------------------------|--|--------------------------------|
| Hydrology | Water quality impacts - sediment loading or pollution of stream. | 50m Constraint Buffer. | Appointed Contractor | With exception of one stream crossing (250m to north of T4), <u>no roads or turbine foundations within 50m of a watercourse.</u> | Monitoring and Audit Procedure |
| Hydrology | Water quality impacts - sediment loading or pollution of stream – from felling. | 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). | Developer & Appointed Contractor | All felled <u>brash will be removed</u> off site to avoid release and runoff of phosphorous into sensitive watercourses. | |
| Hydrology | Impact to watercourse from construction of stream crossing. | No construction activities during or after prolonged rainfall or an exceptional rainfall event. | Appointed Contractor | Construction activities at one location only - one stream crossing (250m to north of T4). | |
| Hydrology | Water quality impacts – flow from land drains. | 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. | Appointed Contractor | Construction of culverts at manmade land drains only. | |
| Hydrology | Impact to watercourse from construction of | Method statements for stream crossing, culverts and drainage to | Developer & | <u>Consultation required prior to construction</u> - with Inland Fisheries | Method Statements |

REFERENCE DOCUMENT

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|------------------|--|---|--|---|--|
| | stream crossing. | be developed in consultation with Inland Fisheries Ireland and South Eastern River Basin District and Shannon River Basin District prior to initiation of construction works. | Appointed Contractor | Ireland and South Eastern River Basin District and Shannon River Basin District. | (stream crossing and culverts) |
| Hydrology | Impacts to natural surface water flow – change to natural sediment regime. | Constructed Drainage – per designed Sediment and Erosion Control Drawings. | Appointed Contractor | Drainage to be constructed per <u>Surface Water Management Plan</u> (based on original Sediment and Erosion Control Plan and Drawings). | Surface Water Management Plan |
| Hydrology | Water quality impacts - pollution of stream or groundwater. | Fuel and Oil Management Plan And Concrete Control Plan | Appointed Contractor | Plans to be finalised by Contractor and to outline management and emergency measures. | Fuel and Oil Management Plan Concrete Control Plan |
| Ecology | Impact to bats | 50m Constraint Buffer. Maintain a buffer in design of wind farm layout. Buffer to turbine tip. Hedgerows in proximity to be removed to maintain this buffer. | Appointed Contractor | <u>No turbine blade tip is within 50m buffer</u> of bat habitat features (trees, hedge). | Felling Licence to incorporate tree felling for maintaining Bat buffer |
| Ecology | Impact on hedgerow (from removal) | 360m of new hedgerow will be planted to mitigate this loss of habitat. Existing hedgerows in poor condition will be planted with native species to increase their ecological value. | Appointed Contractor & Project Ecologist | Native species will be replanted within the proposed new hedgerows. | Ecological Management Plan |
| Ecology | Impacts to Aquatic Species | Constructed Drainage – per designed Sediment and Erosion Control Drawings. | Appointed Contractor | Drainage to be constructed per <u>Surface Water Management Plan</u> (based on original Sediment and Erosion Control Plan and Drawings). | Surface Water Management Plan |
| Ecology | Impacts to Aquatic Species | Fuel and Oil Management Plan | Appointed Contractor | Plans to be finalised by Contractor and to outline management and emergency measures. | Fuel and Oil Management Plan |

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|---------|---|--|--|---|--|
| Ecology | Impact to Aquatic Habitat | Method statements for stream crossing, culverts and drainage to be designed in consultation with Inland Fisheries Ireland and South Eastern River Basin District and Shannon River Basin District prior to initiation of construction works. | Developer & Appointed Contractor | <i>Consultation required prior to construction</i> - with Inland Fisheries Ireland and South Eastern River Basin District and Shannon River Basin District. | Method Statements (stream crossing and culverts) |
| Ecology | Impacts to Aquatic Species and Habitats | Wheel Wash Management, Dewatering and Concrete management | Appointed Contractor | Wheel Wash to be provided. Plans to be finalised by Contractor and to outline management and emergency measures. | Wheel Wash Plan Concrete Control Plan |
| Ecology | Impacts to Aquatic Species and Habitats from felling practice | Felling undertaken using good working practices per the 'Forestry Harvesting and Environment Guidelines' (2000a) and the 'Forestry and Water Quality Guidelines'(2000b). | Appointed Contractor | All <u>excess felled brush should be removed off site</u> to avoid release and runoff of phosphorous into sensitive watercourses. | Felling Licence |
| Ecology | Impacts to nesting birds from felling | 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). | Appointed Contractor & Project Ecologist | Bird survey to be completed <u>prior to felling</u> | Ecological Management Plan (Bird surveys) |
| Ecology | Impact to site due to felling and infrastructure | Exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation. | Developer & Project Ecologist | Management of re-vegetation to be incorporated into <u>Ecological Management Plan</u> | Ecological Management Plan |
| Ecology | Impact to species and habitats on site | An Ecological Management Plan (EMP) will be developed prior to construction to provide a framework for the conservation and enhancement of valuable features within the site. | Developer & Project Ecologist | <u>Ecological Management Plan</u> to include relevant monitoring. | Ecological Management Plan |

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|---------------------|--|---|----------------------------------|--|--|
| Ecology | Impact of lights on turbines impacting on birds and bats | Intermittent lighting is less likely to cause species to collide with turbines. The use of "white lights" on the turbines should be avoided. | Developer & Project Ecologist | | Lighting to be agreed in advance with the Irish Aviation Authority. |
| Ecology | Impact to water quality | Water Quality Monitoring Programme. | Developer & Project Ecologist | Monitoring to be carried out in years 1 and 2 of operation to determine if water quality has been impacted. | Ecological Management Plan |
| Noise and Vibration | Impact to community | Construction Noise Monitoring. It is recommended that noise monitoring is undertaken during the construction phase to ensure any limits set down by the planning authority are complied with. | Appointed Contractor & Developer | Mitigation will also monitor the effectiveness of any noise attenuation measures being employed. | Monitoring Procedure (and preliminary environmental monitoring schedule) |
| Noise and Vibration | Impact to community from blasting | <u>No blasting</u> will occur during the construction of the Upperchurch Wind Farm | Appointed Contractor & Developer | Mitigation by avoidance | |
| Transport | Traffic | Temporary facilities will be provided on the proposed site for construction traffic parking, temporary site offices and storage areas | Appointed Contractor | | |
| Transport | Traffic | Detailed pre-construction condition survey with county council engineer | Developer & 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. | |
| Transport | Traffic | In the interest of road safety during the construction stage, measures regarding traffic control will be | Appointed Contractor & Developer | Contractor to finalise Traffic Management Plan, in agreement with Developer and relevant authorities. | Traffic Management Plan |

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|---------------------|--|---|--|--|------------------------------------|
| Geotechnical | Impact on geotechnical environment causing instability | 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. | Appointed Contractor | Include in contractor's <u>method statement</u> | |
| Geotechnical | Impact on geotechnical environment causing instability | All site excavations and construction will be supervised by a suitably qualified engineer. | Appointed Contractor & Geotechnical Engineer | The contractor's <u>method statement</u> will be reviewed and approved by a suitably qualified geotechnical engineer prior to site operations. | Management of Excavation and Spoil |
| Geotechnical | Impact to soil and geology | All excavated earth materials must 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. | Appointed Contractor | Include in contractor's <u>method statement</u> . Ensure excavated material kept to minimum. | Management of Excavation and Spoil |
| Geotechnical | Impact to soil and geology | Any excavations will be backfilled as soon as is possible to prevent any infiltration of potentially polluting compounds to the subsurface. | Appointed Contractor | Include in contractor's <u>method statement</u> | |
| Geotechnical | Impact to soil and geology | Vehicular movements will be restricted to the footprint of the proposed development. | Appointed Contractor | Vehicles restricted to site roads and hardstands except for advancing excavations. | Site Drawings |
| Geotechnical | Impact to soil and geology and hydrology | Construct the access road network and upgrade the existing roads and the spine roads in particular so that they are capped with limestone or | Appointed Contractor | To reduce the potential for road degradation and indirectly for sediment loading in run-off. Include in contractor's <u>method</u> | |

REFERENCE DOCUMENT

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|--------------------|---|---|--------------------------------------|---|--|
| Air Quality | Impact of nuisance dust from construction | similar quality stone. Dust minimisation by selection of construction materials for the onsite road network to include the use of aggregate of not less than 5mm grade and to also ensure that surface dressing is compressed quickly. | Appointed Contractor | <u>statement</u> Include in contractor's <u>method statement</u> | Air, Dust and Noise Management Plan |
| Air Quality | Impact from vehicle emissions | Site machinery and vehicles onsite will not be left running unnecessarily. | Appointed Contractor | | Air, Dust and Noise Management Plan |
| Archaeology | Impact to Recorded Monument | Buffer zone of 30m recommended | Appointed Contractor | No development or temporary compounds to be placed within buffer zone | Protection of Archaeological and Cultural Heritage |
| Archaeology | Impact to unknown archaeology | Monitoring of groundworks associated with the development | Appointed Contractor & Archaeologist | Monitoring – under licence as appropriate | Protection of Archaeological and Cultural Heritage |



Malachy Walsh and Partners
Engineering and Environmental Consultants

**Environmental Management Plan
(Early Operational Phase)**

of
Upperchurch Wind Farm

On behalf of

ECOPOWER DEVELOPMENTS LIMITED

15388
November 2013

| Job number | Revision | Prepared by | Checked by | Status | Date |
|------------|----------|------------------|-------------|--------|------------|
| 15388-6007 | A | Helen Burman-Roy | Monica Kane | Final | 22/11/2013 |



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1 INTRODUCTION

1.1 ENVIRONMENTAL MANAGEMENT DURING EARLY OPERATIONAL PHASE

This document provides details on the Environmental Management Plan relevant to mitigation measures to be undertaken in the early Operational Phase. This document has been detached from the *construction phase* Environmental Management Plan due to the nature of separate 'Construction' and 'Operation and Maintenance' Contracts. It is likely that post-construction mitigation measures will be implemented on site after the Appointed Construction Contractor is finished with that contract phase. Relevant aspects of the operational phase are included as appropriate, including the monitoring as detailed in the Ecological Management Plan (appended to this EMP) and included in the (*preliminary*) Environmental Monitoring Schedule included as section 4.3.

This Plan will ensure adherence with all environmental mitigation measures recommended in the Environmental Impact Statement and in compliance with any planning conditions which may be attached to a Grant of Permission by North Tipperary County Council, relating to the operational phase of the wind farm. A Table of Mitigation Measures is included as Appendix 1. This table will require an update should planning permission be granted.

This Plan has been prepared by Malachy Walsh and Partners, on behalf of Ecopower Developments Limited, as an *Operational Phase* EMP at the planning stage of the project. The document aims to incorporate the relevant mitigation measures recommended in the Environmental Impact Statement, and any additional mitigation measures recommended by specialist reports prepared as part of a response to a Request for Further Information (RFI) from North Tipperary County Council.

1.2 PLANNING CONTEXT

Ecopower Developments Limited applied to North Tipperary County Council (NTCC) for permission to construct a wind farm at Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchnaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg, Seskin, Co. Tipperary in January 2013. 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. The permission sought is for 10 years and the application was supported by an Environmental Impact Statement and Appropriate Assessment (Natura Impact Statement). The NTCC Planning Reference is 13/51/0003. On 28th February 2013, NTCC issued a Request for Further Information which included the provision of a preliminary Environmental Management Plan.

The plan set out in this document will require revision and further input in the event of a grant of permission, to incorporate all details of the planning conditions and upon agreement of the Operation and Maintenance Contract, after the wind farm is constructed.

1.3 SCOPE OF THE OPERATIONAL EMP

The Environmental Management Plan for the operation of the Upperchurch Wind Farm will detail the measures to be carried out in the early phase post-Construction and throughout the operational lifetime of the wind farm, in compliance with the planning conditions of the grant of planning and relevant environmental mitigation measures. The EMP includes the following:

- Introduction
 - Background
 - Scope
 - Roles and Responsibilities
- Existing Site
- Environmental Requirements
 - Register of Mitigation Measures and Planning Requirements
 - Environmental Management Procedures
 - Environmental Monitoring Schedule

In as much as is possible at this stage of the project, the relevant information is included in the EMP.

1.4 ROLES AND RESPONSIBILITIES/MANAGEMENT STRUCTURE

The roles and responsibilities outlined below are indicative at this stage in the project and will be updated upon appointment of the Contractor.

1.4.1 Project Manager

The Developer will appoint a Project Manager (internal or external) for the operational phase of the wind farm, responsible for:

- the implementation of this Environmental Management Plan
- co-ordinating with the Project Ecologist

1.4.2 Project Ecologist

The Project Ecologist will be appointed by the Developer and is responsible for:

- ensuring implementation of ecological mitigation measures, such as post-construction surveys and hen harrier habitat management
- implementation of the Ecological Management Plan
- management of ecology related site landscaping and re-vegetation activities
- liaison with the project manager/Developer

2 EXISTING SITE

2.1 SITE DESCRIPTION OF OPERATIONAL WIND FARM

The site of the Upperchurch Wind Farm is located within a series of small hills or drumlins 2km to the west of Upperchurch village and 18 kilometres to the west of Thurles.

The constructed wind farm will consist of 22 wind turbines arranged in four clusters on the eastern margins of the Silvermine Mountains. The wind farm also comprises ancillary service roadways and a 110kV substation compound. The electricity generated by the turbines will be cabled underground to the wind farm substation compound in Knockcurraghbola Commons.

3 POST-CONSTRUCTION PROJECT PHASES

Upon completion of the construction and commission of the Upperchurch Wind Farm, the following are the main work phases. Most of the ecological management measures including ecological monitoring relate to the early operational phases of the windfarm, though some remain throughout the lifetime of the windfarm. (Refer to Appendix 1 Ecological Management Plan).

3.1.1 Routine Inspection and Maintenance

The operational phase will involve daily remote monitoring by the owner's operator and visits by maintenance crews to carry out scheduled and un-scheduled maintenance and repairs. A light four-wheel drive vehicle will be required for access for maintenance personnel.

3.1.2 Major Maintenance

During the operational phase, on the few occasions of major component failure a crane would be needed to be brought on site. This major maintenance, *if required*, may involve the replacement of a gear box, blade or transformer component. While it is unlikely to be a regular event, these components would require to be lifted from position by crane for repair or replacement.

Major Maintenance will be conducted under the Operation and Maintenance Contract and via provision of appropriate Method Statements and controls.

3.1.3 Final Decommissioning

If the site is to be decommissioned, cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. The turbine transformers, substation building, compounds and monitoring masts will also be removed from site. It is likely that any turbine component will be reused as they have a life well in excess of the wind farm proposal i.e. greater than 25 years. Wind farm components may also be recycled.

Final Decommissioning will be conducted under the appropriate Reinstatement Programme as agreed with the North Tipperary County Council (NTCC). Any plan will be implemented under the appropriate Method Statements and controls. A Reinstatement Programme has been prepared for the Upperchurch Wind Farm and submitted to NTCC (refer to 15388-6006 Upperchurch Reinstatement Programme).

4 ENVIRONMENTAL REQUIREMENTS

4.1 INTRODUCTION

The Upperchurch Wind Farm EIS identified mitigation measures that have to be put in place to minimise/eliminate potential for environmental impacts from the project. There are a number of environmental mitigation measures which are included in the Ecological Management Plan and must be implemented in the early operational phase. These include ornithological surveys, water quality monitoring, and the monitoring of badgers and bats. The Ecological Management Plan also includes measures to be implemented through the lifetime of the wind farm, including the provision of alternative hen harrier habitat and the management of that habitat (Refer to Appendix 1). Routine inspections and maintenance of sediment and erosion control measures can also be continued through the early operational phase of the wind farm (Refer to Environmental Management Procedures in section 4.3).

4.2 ALTERNATIVE HEN HARRIER HABITAT

In order to compensate for foraging habitat for hen harrier that would be lost or altered, due to the construction of the Upperchurch Wind Farm, it is proposed to provide alternative habitat, adjacent to the area of development.

When choosing suitable mitigatory habitat, the following have been considered;

- The alternative (mitigatory) habitat must be of a quality that is suitable for foraging hen harrier or that can be managed to become suitable for foraging hen harrier;
- 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

For details, refer to the Ecological Management Plan included as Appendix 2.

4.3 ENVIRONMENTAL MANAGEMENT PROCEDURES

There are limited environmental management procedures associated with mitigation measures for the operational phase. The three procedures included below are an indicative selection and follow on from the construction phase and the end of the Construction Contract. The site re-instatement will be completed as part of the final construction stage; however, the reinstated vegetation will be monitored in the early operational phase to ensure its establishment is a success. The procedures may be updated or amended pending specific conditions attached to planning permission.

| Ref: | Procedure: |
|-----------------|---|
| EMP-OP-1 | Monitoring and Auditing Procedure |
| EMP-OP-2 | Site Reinstatement Procedure (post construction) |
| EMP-OP-3 | Procedure for Ecological Management (post construction) |

4.3.1 Monitoring and Auditing Procedure

EMP-OP-1: Monitoring and Auditing Procedure

Purpose

To describe measures for environmental monitoring during the early operation of the wind farm and audit of control measures to ensure environmental protection

Scope

All monitoring activities of the aspects related to the project

Responsibility

Project Manager

Project Ecologist

Procedure

All mitigation measures and any relevant planning conditions will be monitored on site. The Developer's Project Manager will coordinate with the Project Ecologist to ensure all survey work and monitoring is carried out.

The Project Manager will manage the finalised Monitoring Schedule and ensure all environmental surveys and works are scheduled and carried out accordingly.

Monitoring is to be carried in adherence with the following;

- Ecological Management Plan (EcMP)
- Surface Water Management Plan

Routine inspections and maintenance of sediment and erosion control measures can be continued through the early operational phase of the wind farm (6 months post construction). Monthly water monitoring will also be carried out per the EcMP in the 1st year of operation.

All environmental records, including completed checklists, will be appropriately retained.

Details of Monitoring Procedure to be finalised by Project Manager in consultation with the Project Ecologist

4.3.2 Site Reinstatement Assessment Procedure

EMP-OP-2: Site Reinstatement Assessment Procedure

Purpose

To describe measures for the assessment of the site reinstatement in the early operational phase of the wind farm

Scope

All site areas, infrastructure, historic borrow pits and exposed areas; which were subject to the reinstatement plan

Responsibility

Project Manager

Project Ecologist

Procedure

The Project Manager will provide a copy of the Site Reinstatement Plan and the Ecological Management Plan to the Project Ecologist to ensure the site is reinstated successfully after the works and ecological enhancement measures are implemented.

The Project Ecologist will assess the success of the;

- Reinstatement of road verges (use of soil)
- Reinstatement of any temporary construction hardstands
- 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 the Assessment of Site Reinstatement to be finalised in consultation with the Project Ecologist

4.3.3 Procedure for Ecological Management (post construction)

EMP-OP-3: Procedure for Ecological Management (post construction)

Purpose

To describe measures for carrying out the ecological mitigation measures required in the early operational phase of the wind farm

Scope

All site areas and any area related to the required surveys, assessments and management.

Responsibility

Project Manager

Project Ecologist

Procedure

The Project Manager will engage the Project Ecologist to carry out the requirements of the Ecological Management Plan (included as Appendix) to ensure the required operational phase mitigation measures are completed. .

The Project Ecologist will oversee/carry out the following;

- Hydro-chemical monitoring – Monthly (year 1 - reduce year 2 if no issues)
- Q-sampling – Monthly (year 1 - reduce year 2 if no issues)
- Post-construction bird surveys – As required (3 years / per method)
- Hen Harrier Habitat monitoring – Annually
- Vegetation monitoring – Annually (5 years)
- Badger surveys – Annually (3 years post-construction survey)
- Bat surveys – Annually (3 years post-construction survey)
- Fatality survey (post-con – Annually (1 post-construction birds & bats)

All above monitoring and surveys will be completed to standard accepted methods.

Details of the various surveys to be arranged by the Developer/Project Manager post-construction in consultation with the Project Ecologist

4.4 ENVIRONMENTAL MONITORING SCHEDULE

A *Preliminary Monitoring Schedule* is provided below and will be finalised pending the grant of planning permission, the incorporation of planning conditions and the appointment of the Project Manager for this phase of work. The Project Manager will monitor the progress of the various elements of the required monitoring and survey work post construction.

| ASPECT | MONITORING REQUIRED | FREQUENCY | NOTE | RESPONSIBILITY |
|---------|--------------------------------|-------------|-------------------------------------|-----------------------|
| WATER | Hydro-chemical monitoring | Monthly | Year 1 (reduce year 2 if no issues) | Environmental officer |
| WATER | Q-sampling | Monthly | Year 1 (reduce year 2 if no issues) | Environmental officer |
| BIRDS | Post-construction surveys | As required | 3 years / per method | Ecologist |
| ECOLOGY | Hen Harrier Habitat monitoring | Annually | Ongoing monitoring | Ecologist |
| ECOLOGY | Vegetation monitoring | Annually | 5 years | Ecologist |
| ECOLOGY | Badger surveys | Annually | 3 years post-construction survey | Ecologist |
| ECOLOGY | Bat surveys | Annually | 3 years post-construction survey | Ecologist |
| ECOLOGY | Fatality survey (post-con) | Annually | 1 post-construction birds & bats | Ecologist |

5 CONCLUSION

This is a preliminary plan which requires finalisation upon the receipt of planning permission. This plan and the Environmental Monitoring Schedule will take cognisance of all mitigation measures outlined in the EIS and any relevant measures conditioned by North Tipperary County Council.

Appendices

APPENDIX 1 TABLE OF ENVIRONMENTAL MITIGATION MEASURES (OPERATIONAL PHASE)

Following is a Table of Mitigation Measures identified through the Environmental Impact Assessment and through further technical reports. Pending planning permission, this table may require revision to include any conditional elements specified by North Tipperary County Council. This table includes mitigation of most relevance to the Contractor and the construction phase of the project.

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|---------------------|--|---|-------------------------------------|--|--|
| Hydrology | Impacts to natural surface water flow – change to natural sediment regime. | Monitoring and maintenance of the constructed drainage – in early operational phase. | Project Manager & Project Ecologist | Drainage per <u>Surface Water Management Plan</u> (to be monitored in 6 months post construction). | Monitoring and Auditing Procedure (Op) |
| Hydrology / Ecology | Impacts to Aquatic Species and Habitats | Water Quality monitoring required in first 2 years of operation. If results of year 1 monitoring are favourable, the programme can be reduced for year 2. | Project Manager & Project Ecologist | <u>Hydro-chemical Monitoring and Q-Sampling</u> required. | Ecological Management Plan |
| Ecology | Impact on hedgerow (from removal) | 360m of new hedgerow will be planted to mitigate this loss of habitat. Existing hedgerows in poor condition will be planted with native species to increase their ecological value. | Project Manager & Project Ecologist | Native species will be replanted within the proposed new hedgerows. Success of establishment will be monitored in early operational phase. | Ecological Management Plan |
| Ecology | Impact to site due to felling and infrastructure | Exposed areas of the site that are slow to re-vegetate may need to be replanted with suitable vegetation. | Project Manager & Project Ecologist | Management of re-vegetation incorporated into <u>Ecological Management Plan</u> | Ecological Management Plan |

REFERENCE DOCUMENT

| Aspect | Impact | Mitigation Measure | Responsibility | Key Info/ Comments | Relevant Procedure |
|---------|--|---|-------------------------------------|---|---|
| Ecology | Impacts to birds from wind farm | Post-construction bird survey to be carried out at operational wind farm. | Project Manager & Project Ecologist | <u>3 Years per method</u> | Ecological Management Plan (Bird surveys) |
| Ecology | Impacts to bats from wind farm | Post-construction bat survey to be carried out at operational wind farm. | Project Manager & Project Ecologist | <u>3 Years</u> of annual surveys | Ecological Management Plan (Bird surveys) |
| Ecology | Impacts to badgers from wind farm | Post-construction badger survey to be carried out at operational wind farm. | Project Manager & Project Ecologist | <u>3 Years</u> of annual surveys | Ecological Management Plan (Bird surveys) |
| Ecology | Impacts to birds and bats from wind farm | Post-construction fatality surveys to be carried out at operational wind farm. | Project Manager & Project Ecologist | 1 x Fatality surveys for birds and bats | Ecological Management Plan |
| Ecology | Impacts to birds and bats from wind farm | Hen Harrier habitat management and monitoring | Project Manager & Project Ecologist | <u>Ecological Management Plan</u> includes relevant monitoring. | Ecological Management Plan |
| Ecology | Impact to species and habitats on site | An Ecological Management Plan (EMP) will be developed prior to construction to provide a framework for the conservation and enhancement of valuable features within the site. | Project Manager & Project Ecologist | <u>Ecological Management Plan</u> includes relevant monitoring. | Ecological Management Plan |
| Ecology | Impact to water quality | Water Quality Monitoring Programme. | Project Manager & Project Ecologist | Monitoring to be carried out in years 1 and 2 of operation to determine if water quality has been impacted. | Ecological Management Plan |

UPPERCHURCH WINDFARM

CONSENTED WINDFARM REFERENCE DOCUMENTS

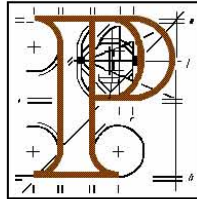
An Bord Pleanála Inspector's Report



ECOPOWER



An Bord Pleanála



Inspector's Report

PL22.243040

DEVELOPMENT:-

Ten year permission for 22 wind turbines with an overall height to 126.6 metres, 2 meteorological masts with an overall height of up to 80 metres with wind measuring equipment attached, access roads, electrical substation at Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin, Upperchurch, Co. Tipperary.

PLANNING APPLICATION

Planning Authority: North Tipperary County Council
Planning Authority Reg. No: 13/5/0003.
Applicant: Ecopower Developments Limited.
Application Type: Permission.
Planning Authority Decision: Grant Permission with conditions.

APPEAL

Appellants:

1. The Upperchurch Kilcommon Wind Awareness Group
2. Sinead and Tom Ryan
3. Paul and Edel Grace
4. Thomas, Bernadette and John O'Connell
5. Catherine and Patrick Maher
6. Pat and Elizabeth Lee
7. Ned and Carmel Buckley
8. Gerard and Mary Ryan Cooney
9. Emer Ó Siochrú and Toal Ó Muire
10. Tanya and James Embleton
11. Peter Sweetman and Associates
12. An Taisce

Observers Una Ryan and Adam Challen

Types of Appeal: Third Party.

DATE OF SITE INSPECTION: 22/04/2014 and 20/05/2014.

Inspector: **Derek Daly**

1.0 SITE DESCRIPTION.

The site is located in the townlands of Graniera, Shevry, Knockcurraghbola Commons, Knockmaroe, Grousehall, Cummer, Foilnaman, Gleninchaveigh, Coumnageeha, Coumbeg, Knocknamena Commons, Glenbeg and Seskin in a rural upland area of County Tipperary in close proximity to the boundary with County Limerick.

The area relating to the development is approximately 2 kilometres to the west of the village of Upperchurch and 17 kilometres west of the town of Thurles.

The area is an undulating hilly area in the transition zone between lowland areas to the east and southeast and upland areas to the west, namely the Slieve Felim Hills and the Silvermines Mountains to the northwest. Visually the area is very diverse with upland areas and valleys. The area is characterised with areas of active farmland incorporating a mix of field patterns with mature trees and hedgerows. The area is also characterised by areas of open grassland areas and areas of forestry in particular at the upper contours. There are single dwellings and farm buildings primarily fronting onto the local road network of the area. The main traffic arteries of the area are the R503 Limerick Thurles Regional Road and the R497 Nenagh Tipperary Regional Road.

2.0 THE PROPOSED DEVELOPMENT

The proposed development as initially submitted and stated in the public notices to the planning authority on the of 7th of January 2013 was for the following,

- 22 no. wind turbines with an overall height to 126.6 metres and a hub height of 81.6 metres.
- The 22 turbines will produce 150 million kWh.
- The turbines are located four distinct clusters which are not connected, comprising as follows,
- 8 no. turbines in the southwestern cluster located in the townlands of Graniera, Shevry and Knockcurraghbola Commons which I will refer to as cluster no.1. Within this cluster is turbine nos. 1 to 8 inclusive.
- 8 no. turbines in the northeastern cluster located in the townlands of Gleninchaveigh, Coumnageeha, Coumbeg and Knocknamena Commons, Glenbeg and Seskin which I will refer to as cluster no.2. Within this cluster is turbine nos. 9 to 16 inclusive.
- 1 no. turbine in the townland of Knockcurraghbola Commons, which I will refer to as cluster no.3; and located west of cluster no.1. Within this area is turbine no. 22.
- 5 no. turbines in the western cluster in the townlands of Knockmaroe, Grousehall, Cummer, Foilnaman which I will refer to as cluster no. 4. Within cluster are turbines 17, 18, 19, 21 and 22. (Please note. On the location map UWF-PARF1-07 there appears to be an error as there is no

20 indicated and two turbines demarcated as 22. In maps associated with the EIS there is a turbine 20 indicated).

- 2 no. meteorological masts up to 80 metres in height with wind measuring equipment attached one each located within the areas of grouping 2 and 4;
- Access roads including the construction of approximately 8 kilometres of new roads with a width of 5 metres and the widening and upgrading of approximately 3.9 kilometres of existing farm roads;
- 2 no. Site compounds. No.1 is located in close proximity to the R503 at Graniera in cluster 1 and site compound no.2 located within an existing residential and out building complex to the east of turbine no.22 in cluster 3.
- An electrical substation compound and control buildings measuring 59.745 metres by 36.730 metres located in cluster no.3 and enclosed by a 2.5 metres high fence with access gateway;
- The overall site has a stated area of 52.38 hectares but this relates to the built up area within the four groupings referred to including ancillary areas. There is, therefore, a broader and wider area outside of the four clusters which is affected by the development, which is indicated in documentation as 12km². The total overall site footprint for all aspects of the development is indicated as 110,210m².
- The proposal will involve the felling of approximately 4.35 hectares of conifer planting.

The application as submitted was for a ten year permission.

The application was accompanied by associated maps and drawings and Environmental Impact Statement which included a Natura Impact Statement and other reports.

Letters of consent from landowners were also received authorizing the use of lands for the development including infrastructure.

Further information was submitted to the planning authority on the 27th of November 2013 which included public notices.

The further information addressed the following;

- A cumulative impact assessment;
- A revised Natura Impact Statement. Appendix B of response item 1;
- A bat survey;
- A badger sett survey;
- A revised noise and vibration survey;
- An Ecological Management Plan
- An Environmental Management Plan

- A reinstatement programme and decommissioning programme
- Site compound details
- A revised landscape and visual assessment also considering cumulative impact with 12/51/0385
- Relocation of turbine 22 and an reassessment based on this relocation,
- Details of an appraisal of the structural stability of the turbines and the methodology of construction.
- Among the details submitted are references to the creation of new and alternative habitat suitable for foraging hen harrier.

3.0 PLANNING HISTORY.

P.A. Ref. No. 12/51//0385 / ABP PL. 22.242852 Appeal withdrawn

An application by ABO Wind Ireland Ltd for 5 wind turbines with a max height each of 126m, new access and up grading of existing tracks, substation, borrow pit and ancillary works.

Permission granted subject to 18 conditions.

Site is located approximately 6 kilometres east of Newport in the western area of the Slieve Felim Mountains.

It should be noted that the site is within an area where there have been applications for windfarm developments. A number of these developments are in adjoining planning authorities of South Tipperary and Limerick.

4.0 PLANNING AUTHORITY REPORTS AND DECISION.

The environment report dated the 27th of February 2013 recommended further information in relation to,

- A detailed reinstatement/restoration and aftercare programme which should include restoration of hedgerows recycling and reuse of waste materials, top soil planting and screening and general landscaping and restoration of slopes.
- The submission of an environmental management plan.
- The submission of an ecological management plan.
- Details relating to the site compound,
- Details relating to a revised noise and vibration impact statement.
- Further details relating to structural design of turbines in relation to stability.

The planning report dated the 28th of February 2013 refers to,

- The presence and visibility of other windfarms to the south and east, the means of access proposed for the development and nearby designated

sites.

- Provisions of the County Development Plan.
- The absence of an assessment of cumulative impacts in relation to visual impacts and designated sites and species.
- Reference is made to Roads Section recommendations.
- The report recommended further information be submitted in relation to nature conservation, noise and vibration, the submission of a preliminary ecological management plan, the submission of a preliminary environmental management plan, a restoration and aftercare programme, details of the site compound, further information on visual impact assessment, matters relating to the location of turbine 22 and details relating to the stability of the turbines.

The environment report dated the 24th of January 2014 recommends conditions on a range of matters in relation to the development.

The planning report dated the 24th of January 2014 refers to,

- Matters raised in the report dated the 28th of February 2013, the submission of further information based on the planning authority's request of further information, discussions with area engineers relating to construction access traffic, the absence of a response from DAHG in relation to nature conservation, a summary of the EIS, likely significant direct and indirect effects relating to a number of issues, a conclusion in respect of the EIS, Appropriate Assessment, planning appraisal, an overall conclusion and a recommendation to grant planning permission.

5.0 SUBMISSION BY OTHER AGENCIES DURING PLANNING APPLICATION

The **Department of Arts, Heritage and the Gaeltacht** made a submission in relation to **Nature Conservation** dated the 5th of February 2013 and refer to,

- Hen harriers from the adjacent SPA use the site for foraging and there would be a loss of potential foraging habitat,
- The site should be treated as if within the SPA, significant effects cannot be ruled out beyond a reasonable scientific doubt and such effects must be considered under Article 6 of the Habitats Directive.
- Reference is made to the distance travelled by nesting pairs for foraging in the nesting season and this is not taken into account in the submissions.
- A full assessment of the suitable habitat lost within 250 metres of the turbines will be required as this is an identified zone of displacement. The suitable habitat loss should include any conifer plantation that would be suitable for harrier foraging within the life time of the development including planting and felling dates of conifer plantations within the 250 metres radius of the turbines.

- The creation of a new and equivalent alternative habitat should be considered as a mitigation measure for that lost through potential displacement.
- A proper cumulative impact assessment has not been carried out in relation to nearby windfarm projects in relation to qualitative and quantitative assessment on the potential effects on the SPA.
- The bat work is considered incomplete.
- The planning authority will have to assess impact on whether there is the potential for significant negative impact on the water quality of the downstream SACs.
- A full survey of badger setts should be conducted.
- There is no detailed plan of how mitigatory hedgerow planting will be reconnected with existing hedgerows to maintain continuity or an assessment of the removal of mature hedgerows will have for bats or their foraging behaviour or other wildlife.

Mid West Regional Authority in a submission dated the 6th of February 2013 refer to

- The Mid West Regional Planning Guidelines 2010 to 2022 support the principle of renewable energy projects in the region.
- Reference is made to North Tipperary County Council Wind Capacity Study and Outline Landscape Strategy for North Tipperary 2009 and the County Development Plan chapters 5 and 10.
- Section 1.9 of the Wind Capacity Strategy and Outline Landscape Strategy for North Tipperary 2009 and Landscape Character Assessment 2009 has identified the Upperchurch areas as having the capacity to absorb windfarm development.
- The Regional Authority supports the principle of the development which is in keeping with local and regional objectives and policies on renewable energy.

The **HSE** made a submission/report dated the 8th of February 2013 which refers to,

- There is no evidence in the EIS of meaningful public consultation.
- Recommendations are made in relation to noise mitigation measures to be implemented.
- There is no identification or quantification of vibration impacts for the construction phase of the development.
- Recommendations are made in relation to shadow flicker including logging the occurrence at six houses for the first two years of operation.
- There are requirements in relation to water quality audits during the construction phase and the first two years of the operational phase.

Irish Aviation Authority in a submission dated the 24th of January 2013 refer to,

- In the event of permission the applicant is to agree a scheme of aviation warning lights with coordinates and elevational details of the turbines also to be supplied.

Inland Fisheries Ireland in a submission dated the 28th of February 2013 refers to,

- There is no objection in principle to the development but that a number of matters be taken into consideration,
- Pre cast concrete should be used rather than uncured cement,
- Silt deposition in streams should be prevented,
- A series of mitigation measures are outlined to protect the aquatic environment.

The **Department of Arts, Heritage and the Gaeltacht** made a submission in relation to **Archaeology** dated the 16th of December 2013 and refer to,

- The recommendations indicated in the EIS are concurred with.
- Conditions are indicated to be attached to any grant of planning permission.

The **HSE** made a further submission/report dated the 24th of January 2014 which refers to the additional information submitted and recommends,

- The applicant to provide appropriate mitigation measures for the exceedance of noise levels at H7 prior to a decision to grant planning permission.
- The applicant to carry out noise monitoring if permission is granted.
- Details to be submitted in relation to provision of a potable drinking water supply and details relating to the septic tank.

The **Department of Arts, Heritage and the Gaeltacht** in a submission dated the 4th of June 2014 to the Board in response to a section 131 request have made the following observations.

In relation to **Archaeology**,

- That condition no.5 of the P.A. decision be retained.

In relation to **Nature Conservation**,

- Reference is made to European Sites and the location of the Slieve Felim to Silvermines Mountains SPA (Site Code 4165); the Lower River Shannon cSAC (Site Code 2165) and the Lower River Suir cSAC (Site Code 2137) in the context of the appeal site.
- In relation to effects on the Slieve Felim to Silvermines Mountains SPA it is noted that the site is outside of the SPA.
- Reference is made to habitat coverage of the proposed windfarm and to figure 13-4 of the EIS and page 6 of the Ecological Management Plan; to

the loss of 95ha potential habitat through displacement and the creation of 128ha of suitable habitat as proposed by the applicant.

- The mitigation is considered to be adequate if properly implemented and monitored as proposed.
- It is noted it is unclear how this will be carried out and there is reference to use of section 47 agreement.
- In relation to the further information for AA reference is made to page 71 of the NIS on water quality mitigation measures and that the NIS does not specifically assess the potential in-combination effects of increased drainage rate from the site on stream and river bed and bank erosion, due to greater hydrographic peaks in the cSAC stream and river flows on the conservation objectives of the downstream cSACs.
- It is noted that the issue is addressed in the Sediment and Erosion Plan for a ten year storm event however it is recommended that an assessment be undertaken in the NIS or in AA by An Bord Pleanála of the effects of exceptional magnitude events in the future such as 1 in 50 or 1 in 100 year events and this is also relevant if it proposed to leave the road drainage network in place after decommissioning and if post-decommissioning drainage maintenance is likely.
- Conditions are recommended in the event that the Board decides to grant permission.

The matters raised are considered in the assessment section of this report.

6.0 THE PLANNING AUTHORITY'S DECISION

The planning authority's decision was to grant planning permission subject to 19 conditions. Among the conditions of note,

- Condition no.2 is permission for a period of 10 years.
- Condition no.3 relates to placement, finishes and agreement on the specification of turbines.
- Condition 4 relates to agreement on air navigation warning systems.
-
- Condition no.5 relates to archaeology.
- Condition no.6 relates to the implementation of mitigation measures relating to water quality.
- Condition no.7 relates to a survey of hen harriers prior to carrying out works in the period mid March and mid August of hen harriers/
- Condition no.8 relates to carrying out of a bird copse survey for a period of 3 years.
- Condition no.9 relates to implementation of mitigation areas identified in the course of the application for the hen harrier species.
- Condition no.12 relates to agreement on a traffic management plan.
- Condition no. 14 relates to a waste management plan.

- Condition no.16 relates to noise monitoring.
- Condition no. 18 relates to the provision of sanitary facilities.
- Condition no. 19 relates to the submission of a Section 48 financial contribution.

7.0 APPEAL SUBMISSIONS.

7.1 THIRD PARTY APPEALS.

The Upperchurch Kilcommon Wind Awareness Group in a submission indicate,

- The visual impact for such a development in the area would be immense.
- The development will negatively impact on tourism in the area.
- No assessment on tourism was carried out.
- There is a strategy Fáilte Slieve Felim currently active in bringing increased numbers of tourists into the area and the development is at odds with this.
- The visual impact will be greater than the documentation submitted by the applicant indicates.
- Trees which are indicated as lessening the visual dominance will at some stage in the future be removed.
- Issues arise in relation to noise and shadow flicker.
- Reference is made to section 10.13.6 of the current county development plan.
- The noise estimates are at variance with readings from another wind developer for the same residential properties and also fails to take account of wind direction and topography.
- The effects of infrasound are not taken into account.
- The development will impact on the amenities of properties.
- The development will devalue properties.
- The development will impact on private wells.
- There are health and safety concerns arising from the development.
- The EIS does not address impact on the local infrastructure in particular the road network.
- The development does not meet the legal requirements of the EIA Directive.
- The development cannot be assessed in isolation and cumulative impacts with other windfarm developments require to be assessed.
- The submission also includes a number of other submissions on property valuations, other Board decisions, 213125 and 242364, observations in relation to the EIS from Gerard Kelleher and Helen Leadbeater Kelleher, and a submission from Steven and Anne Popplewell, which include reference to a famine field.

Sinead and Tom Ryan in a submission indicate,

- The development will have a detrimental impact on their property in relation loss of value and also in relation to noise.
- Concerns are raised in relation to the effect of the development on an award winning pedigree herd.
- Concern is expressed in relation to effects on telecommunications.
- The development will impact on road infrastructure.
- There are concerns relating to visual impact and also in relation to health and safety.
- Impact on grouse is also referred to.

Mark Gillard on behalf of **Paul and Edel Grace** in a submission indicates,

- The development will have a detrimental impact on their property due to its scale, location and topography with particular reference to turbine 21.
- The Grace home is highlighted in the EIS as house no's 3 and 10 to the south of turbine 21.
- The relative ground levels increase the level of impact in relation loss of value.
- There will also be impacts in relation to shadow flicker and noise.
- Reference is made to section 10.13.6 of the current county development plan and the actual distance of their home from turbine 21.
- The level of impact is underestimated in the EIS.
- Reference is made to the consultation process for the revisions to the 2006 Wind Energy Development Guidelines.
- Reference is made to the visual impact of the development and that turbine 21 will be visually dominating and there is reference to refusal of turbines on the basis of proximity to dwellings and their visual impact.
- The appellants have concerns in relation to the impact on the stability of their dwelling.
- Issues are raised in relation to the impact on their private well and the local road infrastructure.
- There is an absence of information in relation to the actual make and type of turbine proposed.
- Concerns are raised in relation to the use of the meteorological mast for other purposes.
- There is no evidence that Appropriate Assessment was carried out by the planning Authority.
- Submissions include details of Board decisions.

Thomas, Bernadette and John O'Connell in a submission indicate,

- Concerns are expressed in relation to the impact of the development on their well and also the potential impact of flooding in the area of their house.

BKM Surveying on behalf of **Catherine and Patrick Maher** in a submission indicate,

- There is concern in relation to loss of value to their property and a loss of amenity.
- Reference is made to the impact on the Hen Harrier and other species.
- Reference is made to the impact of noise and also impact on water supplies.
- There is an absence of assessment on cumulative effects.
- The development fails to meet requirements of the EIA Directive.

Pat and Elizabeth Lee in a submission indicate,

- Reference is made to the impact on the landscape and the visual impact.
- Roads in the area are in poor condition and incapable of transporting the turbines.
- The development will be injurious to their residential amenity and impact on the value of their property.
- Reference is made to noise and shadow flicker impact and also to risks arising from ground disturbance.
- Reference is also made to the absence of Appropriate Assessment and the effects on the hen harrier.

Ned and Carmel Buckley in a submission indicate,

- The proposal is contrary to the current Wind Energy Planning Guidelines in respect of visual amenity.
- The proposal fails to respond to the specifics of the landscape context as set out in the Wind Capacity Strategy and Outline Landscape Strategy for North Tipperary 2009 and Landscape Character Assessment 2009.
- Public consultation was minimal and guided by economic motives rather than residential amenity and visual considerations.
- The development is large scale, spread over a large area and the cumulative impact is severe.
- The validity of the application is questioned.
- The development falls short of the draft guidelines in relation to noise and distance from houses.
- There is use of imperial scale on the drawings.
- The proposal will devalue their property.
- Reference is made to the Coillte forestry in the area which is an amenity to be enjoyed by all.
- The EIS is only a tokenistic exercise.

BKM Surveying on behalf of **Gerard and Mary Ryan Cooney** in a submission indicate,

- They cannot live in their home owing to the proximity of the proposed substation and turbines nos. 22, 8, 9, 10, 11 and 12.

- Turbine 22 is within 463.44 metres of their home and the substation 276.3 metres.
- Turbine 8 is directly south of their home and issues of shadow flicker arise.
- There are issues in relation to proximity to their property boundary.
- The proposal will devalue their home.

EOS Future Design on behalf of **Emer Ó Siochrú and Toal Ó Muire** in a submission indicate,

- The submission also includes a report from CHL Consultants on the impact of the proposed development on the ecotourism project on Coumnaageeha Farm, which refers to impacts in relation shadow flicker, visual impact and noise and concludes that the proposal will completely undermine the farm's potential to be operated as a residential ecotourism centre and should be abandoned if the windfarm proceeds.
- The observations made to the planning authority were largely ignored and in particular matters relating to tourism in the area; the development impact on their organic farm and the devaluing of the farm; the unacceptable noise impacts arising and the methodology used in assessing noise impacts; the unacceptable human health impacts; the impacts of noise and flicker on animals; the negative visual impact and negative impact of turbine siting; the negative impacts of associated works, on drinking water quality and wildlife. The proposal will impact and destroy local employment, is premature and represents speculative development.
- The appellants contend that the development should be refused with reference to unacceptable noise and loss of amenity and that the assessment of predicted noise impacts is not adequately evaluated in particular in relation to sensitive receptors and does not use updated methodology.
- The larger turbines will cause unacceptable health impacts to residents and visitors as they will generate different and more problematic noise impacts. Reference is made specifically to low frequency noise, which is not easily measured or predicted and generally not well perceived by the human ear.
- It is premature to give permission until these matters are reviewed and considered in the proposed revisions to the wind energy guidelines.
- The development is an unacceptable visual intrusion on the landscape and seriously reduces the enjoyment of their property by day and by night.
- There are no viewpoints from the approach roads to the Clodiagh Valley or from Eamonn an Chnoic walk in the EIS or further information.
- The development does not meet the planning authority's guidelines on wind capacity strategy.
- The development will impact on biodiversity and on listed species.
- The development will impact on water quality.

- The development will impact on the appellants' Dexter herd by causing movement of diseased badgers onto their farm and also affect other local farms.
- The development will give rise to unacceptable safety impacts to residents and visitors referring to separation distances from turbines and accidents involving wind turbines.
- There will be an impact on the tourism industry of the area.
- The development undermines the appellants' ecotourism project.
- The planning authority did not consult with Bord Fáilte or any tourism body concerning the impact of this development and the applicant did not consult with the appellants.
- The development will have negative socio-economic impacts on the national and local community referring to devaluing property and the cost of providing energy.
- Drawings are submitted in support of the submission.
- An Oral hearing is requested

Planning-Appeal.ie on behalf of **Tanya and James Embleton** in a submission indicate,

- The proposal is contrary to the current Wind Energy Planning Guidelines in respect of visual impact.
- The proposal fails to respond to the specifics of the landscape context as set out in the Wind Capacity Strategy and Outline Landscape Strategy for North Tipperary 2009 and Landscape Character Assessment 2009.
- Public consultation was minimal and guided by economic motives rather than residential amenity and visual considerations.
- The development is large and of industrial scale, spread over a large area and the cumulative impacts are therefore severe.
- The validity of the application is questioned.
- The development falls short of the draft guidelines in relation to noise and distance from houses.
- The ecological assessment undertaken in the EIS is inadequate.
- Not all objections made were taken into consideration.
- Turbines 14 and 16 will injure the appellants' residential amenities and devalue their property.
- The development will result in a proliferation and saturation of wind turbines in the area exceeding the ability of the landscape to absorb such man made intrusions.
- Reference is made to current guidance at national and regional level and the development is contrary to the landscape character recommendation and will be an intrusion on the landscape.
- Reference is made to the county development plan, to policy SERV 23 and that the development is out of kilter with the tightly packed farmed and fine grain landscape.

- There are shortcomings in the EIS with reference in this regard to noise, shadow flicker and ecological assessment.
- Reference is made to the inadequacy of the local road network.

Peter Sweetman and Associates in a submission indicate,

- Reference is made to granting permission without carrying out an Environmental Impact Assessment and Appropriate Assessment.
- Reference is made to CJEU Judgement in Case 50/09.
- Reference is made to the absence of assessment as required by Section 177V of the Planning and Development Act 2000 as amended.
- There is no information on the compensatory land for the hen harrier.
- There is no evidence of the sustainability of building more turbines.
- Why in the grant of permission is information submitted on certain dates excluded in condition no. 1 of the planning authority's decision to grant permission.
- Reference is also made to condition nos. 3, 4(a), 7, 8 9(a), 12 and 14(a) of the planning authority's decision in the context of the CJEU judgment and EU Directives.

An Taisce in a submission indicate,

- The local authority has breached the provisions of the Environmental Impact Assessment Directive, the Habitats Directive and relevant European Court judgments.
- Reference in this regard is made to Articles 3 and 5 of the EIA Directive and the significant information provision left to be resolved in conditions nos 3(g), 6, 7, 9, 12 and 18.
- Reference is made to the submission of the Department of Arts, Heritage and the Gaeltacht under a series of headings and that these were not adequately addressed.
- Reference is made to CJEU judgment in Case 50/09 and the absence of adequate assessment.
- Reference is made to concerns relating to hen harriers, to the SPA designated for hen harriers code 004156 and to CJEU judgment in Case 183/05 in this regard.

7.2 OBSERVERS

Una Ryan and Adam Challen in a submission indicate,

- They agree with estimates of loss of value to homes.
- Submissions made to the planning authority were ignored and failed to take into consideration valid concerns raised.
- They support the appeals lodged raising issues of noise, impacts on residents and shadow flicker.
- Concern is raised in relation to impact on internet signal.

- Ecological impacts and concerns raised in appeals are supported.

7.3 RESPONSE OF THE PLANNING AUTHORITY

The planning authority in a response to the grounds of appeal refer to,

- The planning authority is satisfied in relation to the methodology applied by the applicant with regard to noise and shadow flicker.
- In relation to visual amenity the approach applied generally adheres to the approach outlined in the guidelines and took account of planning authority guidance.
- The applicant submitted a NIS and further information based on a submission from the NPWS. In the absence of a response from the NPWS the planning authority are satisfied that the applicant's submissions address the issues raised.
- The planning authority does not consider that wind turbines being visible will necessarily result in walkers and other being dissuaded from visiting such areas.
- Issues relating to impacts on water quality are adequately dealt with.

7.4 RESPONSE OF APPELLANTS.

Emer Ó Siochrú and Toal Ó Muire submitted a report from the Mountaineering Council of Scotland in support of submissions made by appellants.

The Upperchurch Kilcommon Wind Awareness Group in a submission indicate,

- The appellant supports the appeal of Peter Sweetman and other appellants that the planning authority failed to carry out Appropriate Assessment.
- In this regard a critical review is submitted by Ecologists Ireland.
- Inadequate information was supplied, the surveys were insufficient in scope, intensity and do not fully comply with recommended best practice methodology.
- Reference is made to four species of concern which may occur in the area.
- Habitat maps are incomplete.
- There is an incomplete mammal survey.
- There is inadequate survey and assessment of birds with reference to collision risk, breeding lowland birds and absence of surveys at particular times of the year.
- There are concerns over the validity and justification for post construction monitoring given the lack of appropriate pre-construction survey and assessment.
- There is inadequate reference to the significance of impact on the SPA.

- There is an inadequate bat survey.
- Mitigation measures in relation water impacts require to be clarified.
- Support of issues raised in other appeals is also referred to in relation to the sustainability of the project, issues arising in relation to impacts, minimum distance from residential properties.
- The initial information submitted was deficient and required submission of substantial further information.

7.5 RESPONSE OF THE APPLICANT.

In a response to the grounds of appeal the applicant refers to the various appeal submissions and responded to the various submissions made,

In response to the appeal of the Upperchurch Kilcommon Wind Awareness Group,

- The applicant did consider the visual impact on tourism in the area and refers to section 9.2.6 of the EIS.
- The relevant loop walk to the proposal is Slí Éamoin an Cnoic which traverses the northeastern boundary of the proposal at turbine 15. The windfarm will not impede the walk and could provide linkage through the use of windfarm walks to other walks which might be planned in the future.
- Visual impact is considered in chapter 11 of the EIS and the significance of the development is outlined and complies with all of the relevant policies and guidelines for the receiving landscape in relation to wind energy developments.
- In relation to noise impact on property within 500 metres reference is made to section 10.13.6 of the county development plan.
- There is one sensitive receptor location within 500 metres identified as H3 and H10 on figure appendix 10.1 of the EIS and the sound predicted is within the guidelines parameters.
- Noise levels were predicted using the appropriate methodology.
- The type of turbine is as yet not selected but will have to operate within noise limits.
- The estimates of loss of land value are not based on verifiable sales prices.
- Potential for groundwater contamination is addressed in chapter 15 of the EIS; the Hydrological Impact Assessment and in the revised NIS. Measures are indicated as mitigation including the provision of a Sediment and Erosion Control Plan and other measures during the construction phase.
- There is also provision for an Environmental Management Plan.
- Construction access proposals are outlined in section 7.1.1 of the EIS.
- Habitats, flora and fauna were assessed and potential impacts were assessed.

- A winter and summer hen harrier study was conducted along with a bat survey and mammal survey. Field studies were undertaken with an overall assessment concluded.
- A cumulative visual effect and impact in the context of existing turbines was undertaken in section 11.3.3.3 of the EIS and a conclusion drawn in 11.3.3.4.
- The area was identified as suitable for windfarms based on local authority strategies carried out independent of the applicant.

In relation to enclosed submissions of Helen and Gerard Kelleher, Steven and Anne Popplewell

- They were not misled by the applicant,
- Their house is H47 and is expected to experience 8 hours of shadow flicker per annum
- There will be a buffer zone around the famine field as per chapter 12 of the EIS with reference to area BH-3.
- The construction of borrow pits is addressed in the EIS.
- The grid connection is not part of the application.

In relation to the appeal of Paul and Edel Grace,

- Their property is identified as H3 and H10 and noise and shadow flicker impacts are assessed in the EIS. Blocks of conifers will reduce the impact of shadow flicker.
- Turbine 21 will be fitted with a shadow flicker protection system to shut down the turbine until the shadow has passed.
- Visual impact is assessed in the EIS and reference to an omission of a turbine in PL23.225618 on residential amenity grounds is incorrect.
- A geotechnical report was prepared in relation to ground stability.
- The meteorological mast will not be used for telecommunications.

In relation to the appeal of Tanya and James Embleton,

- Their property is identified as H(B) and is located 973 metres from T14 and 913 metres from T16.
- Many of the responses are similar to previous responses.
- The development involved consultations with 40 landowners and with other local interests.

In relation to the appeal of Ned and Carmel Buckley,

- Their property is identified as H88 and is located 869 metres from T15.
- Employment and other economic benefits are outlined in the EIS.

In relation to the appeal of the O'Connell family,

- Their property is identified as H71 and is located 784 metres from T1.

- The developer will address the drain to stop run off of water and reference is made to drawing no.1 proposed flood mitigation method at H71 in this regard.

In relation to the appeal of Emer Ó Siochrú and Toal Ó Muire,

- Their property is identified as H28 and is located 581 metres from T9.
- The summary survey results of three studies quoted acknowledge that tourism and windfarms are compatible. The reference to a caravan park in Yorkshire is not a valid comparison to their appellants' enterprise.
- Visitors to an ecotourism farm are more likely to be interested in environmental issues.
- The windfarm nearest turbine to the east is T11 at 911 metres, to the south T8 at 1,306 metres and to the west T21 at 1,908 metres which is a distance way.
- Noise and shadow flicker are within limits for H28.
- The assertion on the impact on animals is not credible.
- There are proposals to address effects of works on stone walls, banks, hedges and trees.
- The draft guidelines are not relevant to this application.
- Reports of agencies around the world refute claims of negative health impacts.
- Visual impacts are addressed.
- Not all turbines will be lit at night ,it is not stated how the windfarm will destroy tourism in the area and the applicant was aware of the walks in the area

In relation to the appeal of Pat and Elizabeth Lee,

- Their property is identified as H23 and located 560 metres from T9 and many of the issues raised have already been commented upon.

In relation to the appeal of Sinead and Tom Ryan,

- Their property is identified as H(A) and is located 1,410 metres from T21 and 1,657 metres from T20 and many of the issues raised have already been commented upon.
- The turbine layout takes into account the signals that are transmitted from all telecommunication masts.
- Requirements in relation to health and safety will comply with all standards.

In relation to the appeal of Gerard and Mary Ryan Cooney,

- Their property is identified as H54 and is located 382 metres from the substation and 698 metres from T8
- All turbines are set back 189 metres from all third party boundaries.

In relation to the appeal of Catherine and Patrick Maher,

- Their property is identified as H73 and is located 622 metres from T22 and 520 metres from the substation.
- All turbines are set back 189 metres from all third party boundaries.

In relation to the appeal by An Taisce Articles 3 and 5 of the EIA Directive have been complied with.

- The applicant initially comments in relation to the requiring the submission of further drawings and other documentations in the decision to grant permission which the appellant infers as indicating a lack of information submitted.
- In relation to condition no. 3 the make of turbine will not exceed the dimensions in the final grant of permission.
- In relation to condition no.6 mitigation measures on water quality recommended in the EIS shall be implemented in full and the condition is a procedural matter and not a post consent agreement.
- Condition no. 7 arises only if a location of a hen harrier nest is found within 500 metres of a turbine or if the applicant wishes to continue works during the breeding season.
- In relation to condition 9(a) there is no post consent agreement with the planning authority required and 9(b) is a further protection to an agreement and mitigation already outlined.
- In relation to condition no. 12 this relates to a traffic management plan and there was a construction environment management plan submitted and until appointment of the contractor aspects of the plan cannot be put in place as this information will not be available until then.
- In relation to condition no. 18 details of sanitary arrangements were submitted during the application.
- The information requested by the NPWS was submitted by way of further information and no observations were submitted by the NPWS in relation to the further information.
- Consents were submitted by landowners in relation to the mitigation areas for the hen harrier.
- Surveys were carried out of the hen harrier in the winter and during the breeding season and a further survey will occur at pre construction stage to identify if any nests have occurred within 500 metres of a proposed turbine.
- In relation to the appeal by Peter Sweetman and Associates the issues raised have already been commented upon.

8.0 POLICY.

NATIONAL POLICY.

National policy on renewable energy has arisen primarily in response to international agreements, most particularly the UN Framework Convention on Climate Change and the Kyoto Protocol.

Current government policy in relation to renewables is outlined in the National Climate Change Strategy 2007 – 2012 which highlights the need for a radical strategy to meet the climate change commitments made under Kyoto.

Sustainable Development – A Strategy for Ireland, includes an emphasis on the use of renewable resources.

The National Spatial Strategy 2002 – 2020, states, “in economic development the environment provides a resource base that supports a wide range of activities that include agriculture, forestry, fishing, aqua-culture, mineral use, energy use, industry, services and tourism. For these activities, the aim should be to ensure that the resources are used in sustainable ways that put as much emphasis as possible on their renewability” (page 114).

National Biodiversity Plan 2002, was prepared in response to Article 6 of the Convention on Biological Diversity and ‘pays special attention to the need for the integration of the conservation and sustainable use of biological diversity into all relevant sectors.’

National planning guidance is provided in the Wind Energy Development - Planning Guidelines published by the Department of the Environment Heritage and Local Government in June 2006, which emphasise the importance of wind energy as a renewable energy resource and also where there is a presumption in favour of wind farm development in suitable circumstances.

The Guidelines state in Chapter 3 that the development plan must achieve a reasonable balance between responding to overall Government Policy on renewable energy and enabling the wind energy resources of the planning authority’s area to be harnessed in a manner that is consistent with proper planning and sustainable development. The assessment of individual wind energy development proposals requires to be conducted within the context of a ‘plan led’ approach.

Consideration of any wind energy development in or near designated areas of natural heritage must be subject to Ireland’s obligations under the Habitats Directive and the EU (Birds) Directive. The visibility of a proposed wind energy development from designated views or prospects would not automatically preclude an area from future wind energy development but the inclusion of such objectives in a development plan is a material factor that will be taken into consideration in the assessment of the planning application.

The environmental implications of wind farm developments are referred to in Chapter 5. It is recognised that natural heritage may be impacted by wind energy development but in coming to a decision, the planning authority should also consider the importance of the development of wind energy projects including those proposed on designated sites, in view of their strategic importance in contributing significantly to the achievement of the targets by decreasing dependence on fossil fuels, with subsequent reductions in greenhouse gas emissions.

Birds may be impacted by wind energy arising from disturbance, collision, mortality, barrier to movement and direct loss or degradation of habitats for breeding, feeding and or roosting purposes.

Noise impacts are discussed in Section 5.6 and it is stated that noise impact should be assessed by reference to the nature and character of noise sensitive locations i.e. any occupied house, hostel, health building or place of worship and may include areas of particular scenic quality or special recreational importance. In general noise is unlikely to be a significant problem where the distance from the nearest noise sensitive property is more than 500m.

Careful site selection, design and planning and good use of relevant software can help to reduce the possibility of shadow flicker in the first instance (Section 5.12). It is recommended in that shadow flicker at neighbouring offices and dwellings within 500 m should not exceed 30 hours per year.

Aesthetic considerations and the siting and design of wind farm developments are discussed in Chapter 6. Considerations are also given to landscape character types as a basis for practical application of siting and design guidelines.

COUNTY POLICY.

The operative plan is the North Tipperary County Development Plan 2010-2016.

In relation to zoning the site is located within an area defined A1 Landscape Area.

Relevant provisions include,

- SERV 22 is to facilitate continual development of renewable energy sources.
- SERV 23 is to facilitate the exploitation of the natural wind energy resource available subject to being in accordance with the guidelines set out in the County Landscape Character Area and other development plan policies in respect of the protection of the environment and complies with Wind Energy Development Guidelines 2006.

- ENV 2 is to assess applications for development of wind farms in accordance with the Landscape Character Assessment 2009.
- ENV 3 is to restrict development that would materially interfere with vulnerable landscapes.
- HERT 29 is to maintain the quality and conservation values of European Sites and other sites.
- HERT 29a is to restrict any development which would be harmful to or result in significant deterioration of habitats or species in European Sites and other sites.

Section 10.13 sets out standards in respect of proposed wind farm development.

North Tipperary Landscape Character Assessment 2009.

The map relating to landscape character types indicates that the appeal site is covered by Landscape Character Type 6 Farmed Foothills. Commercial coniferous forestry, potential for development of windfarms, Government Renewable Energy policy and development of visibly obtrusive single dwellings in the countryside are identified as a force for change in the Landscape Character Area.

The area is referred to in more detail as Landscape Character Area 7; Upperchurch-Kilcommon Hills and indicated in figure 8. The Key Characteristics are indicated as highly scenic pastoral landscape with rolling hills and valleys; sparsely populated particularly in central area with remote character and extensive views eastwards from elevated points across to Kilkenny and South Tipperary.

It is indicated that “this is a working landscape featuring pasture as the dominant landuse. It is in very good condition and indeed is highly scenic owing to the varied and interesting topography of rolling hills and valleys with vantage points that afford views. This high scenic quality renders this a significantly sensitive landscape. However, the nature of the varying topography is such that there is a capacity to accommodate development without undue deterioration in the scenic quality”.

In relation to principles for landscape management design guidance in respect of commercial forestry in upland areas should be provided in order to integrate this landuse into the landscape and criteria for the wind energy development and layout should be provided. No principles are outlined in relation to wind farms.

North Tipperary Wind Capacity Strategy and Outline Landscape Strategy 2009.

This strategy notes that subject area has suitable wind speeds for wind energy. The study rates landscapes based on their potential to accommodate wind farms having regard to landscape and visual criteria such as scale, openness, landform, landcover, complexity and pattern, settlement and infrastructure, perception of wilderness, perception of change, movement prominence, settings backdrops and horizons and Important skylines from main transport corridors. Figure AI identifies areas in the county which have adequate wind resources for wind farm development which includes the current planning application site.

Other Designations.

The site is in close proximity to the Slieve Felim to Silvermines Mountains Special Protection Area Site Code 004165. At its nearest point it is to the northwest of Knockmaroe Hill. The qualifying interest for the SPA is Hen Harrier and the conservation objective is to maintain or restore the favourable conservation condition of the Hen Harrier. The site also supports Merlin and Peregrine both Annex I species. Details relating to the conservation objectives and site synopsis of this SPA are included as appendices to the report. A map indicating the location of the SPA and the appeal site is also included as an appendix to the report. Turbine 21 is the nearest turbine approximately 500 metres distant from the SPA.

The site is also within the drainage catchment of the River Suir and also the River Shannon as watercourses on or in proximity to the site drain into these river catchments. The Lower River Suir cSAC Site Code 002137 and the Lower River Shannon cSAC Site Code 002165 are very large river based sites and are designated arising from having within them a large number of conservation interests both habitats and species. The appeal site is not within the boundary of either site. Please note figure 13-II-1 of NIS which outlines the Natura sites within 15 kilometres of the appeal site.

9.0 ASSESSMENT.

9.1 INTRODUCTION.

The proposed development was initially submitted to the planning authority on the 7th of January 2013. Substantial further information in response to a planning authority request for further information was submitted on the 27th of November 2013. Many aspects of the further information addressed matters relating to cumulative effects and impacts.

The development as applied for includes the following,

- 22 no. wind turbines with an overall height to 126.6 metres located in four distinct clusters which are not directly connected,

- 2 no. meteorological masts up to 60 metres in height with wind measuring equipment attached,
- Access roads, two site compounds an electrical substation compound and control buildings and ancillary works,
- The application as submitted was for a ten year permission.
- The application was accompanied by associated maps and drawings an Environmental Impact Statement which included a Natura Impact Statement as appendix 13-II of the original submission and a revised NIS as Appendix B in the submission of further information.

Having inspected the site and examined the associated documentation, the following are the relevant issues.

- Principle of development in a policy context.
- Environmental Impact Statement.
- Environment Impact Assessment.
- Appropriate Assessment

9.2 Principle of Development / Policy.

In section 7 of this I have outlined the policy context at national and county level relating to renewable energy with specific regard to wind energy. I have also outlined the provisions relating to landscape character with regard to the current North Tipperary County Development Plan.

At national level current planning guidance as provided in the Planning Guidelines for wind farm development emphasises the importance of wind energy as a renewable energy resource and in general there is a presumption in favour of wind farm development in suitable circumstances.

In relation to the county the current plan is the North Tipperary County Development Plan 2010-2016 and specifically in relation to the stated provisions and zoning the site is located within an area defined A1 Landscape Area which does not preclude windfarm development.

There are specific provisions in the plan in relation to renewable energy including SERV 22 and SERV 23 which facilitates continual development of renewable energy sources and also facilitate the exploitation of the natural wind energy resource available subject to being in accordance with the guidelines set out in the County Landscape Character Area and other development plan policies in respect of the protection of the environment and complies with Wind Energy Development Guidelines 2006.

There are also further policies ENV 2 which provides for the assessment of applications for development of wind farms in accordance with the Landscape

Character Assessment 2009 and ENV 3 to restrict development that would materially interfere with vulnerable landscapes.

The 2009 Landscape Character Assessment has identified landscape character types which identifies that the appeal site is within Landscape Character Type 6 Farmed Foothills. As part of the assessment, commercial coniferous forestry, the potential for development of windfarms and development of visibly obtrusive single dwellings in the countryside are identified as a force for change within the Landscape Character Area.

The appeal site and surrounding area is referred to in more detail as Landscape Character Area 7; Upperchurch-Kilcommon Hills and indicated in figure 8 of the assessment. I would largely agree with the overall assessment relating to the area as a highly scenic pastoral landscape with rolling hills and valleys which renders the area as a significantly sensitive landscape.

I would also note the comment in relation to the area that the nature of the varying topography is such that there is a capacity to accommodate development without undue deterioration in the scenic quality. This I believe would allow for consideration of the proposed development subject to assessing the impact on the receiving landscape. In overall terms I would consider that the landscape character assessment as applied to the appeal site and the wider area is reasonable.

In addition to the Landscape Character Assessment North Tipperary has also prepared a wind capacity strategy and an outline landscape strategy. The strategy uses a range of criteria as a basis for rating landscapes based on their potential to accommodate wind farms having regard to landscape and visual criteria. On the basis of these criteria figure A1 of the assessment has identified areas in the county which have adequate wind resources for wind farm development which includes the current planning application site.

In relation to the overall adoption of a plan led approach to identifying areas suitable for windfarm energy sources and development there is, I consider, a structured basis set out in the strategies as prepared and the process as followed is reasonable and complies with national guidance. The identification of the site as potentially suitable for windfarm development is reasonable but the strategies also it is noted do identify the appeal site as a sensitive landscape.

In overall terms the principle of locating windfarm development in the area which is the subject of this appeal is reasonable.

9.3 Environmental Impact Statement.

The application is accompanied by a Environmental Impact Statement.

In relation to the adequacy of the EIS, I consider that it contains the information specified in Schedule 6 of the Planning and Development Regulations 2001, as amended and can be considered as a contribution towards the process of assisting the relevant decision maker and the competent authority, in this case the Board, to enable a decision to be made.

The EIS has set out impacts and identified these under a series of headings and chapters including

- construction impacts and employment
- air and climate assessment
- socio economic assessment
- residential amenity
- landscape and visual assessment
- cultural heritage
- ecology
- geotechnical assessment
- hydrological impact.

The EIS and the further information have identified potential impacts in the absence of mitigation and also cumulative impacts in particular in relation to other windfarms.

9.4 Environmental Impact Assessment.

In accordance with the requirements of the European Directive 2011/92/EU and Section 171A of the Planning & Development Act 2000-2010, this process requires the Board, as the competent authority, to identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of the proposed development on the four indents listed in Article 3 of that Directive as set out below:

- a) Human beings, flora and fauna,
- b) Soil, water, air, climate and the landscape,
- c) Material assets and the cultural heritage, and
- d) The interaction between the factors mentioned in paragraphs (a), (b) and (c).

I would note that many of the appellants' submissions raise concerns and objections which would arise within the four indents (a) to (d) referred to above.

9.4.1 Impacts on human beings.

In relation to the impact on human beings the site is located within a landscape which is largely a farmed and living landscape with isolated farms and housing in

the countryside. As a consequence wind turbines will have an impact on the receiving landscape and the people who reside in the immediate area. There will also be effects in the wider context as there are two villages Upperchurch and Kilcommon in relative close proximity which will also be impacted by the development.

The appeal submissions of residents from the area have focused on a range of perceived impacts, some specific to individual houses and the location of individual turbines but there are objections which also raise matters relating to broader matters relating to impacts on local economy and on tourism.

I propose to consider impacts under a series of headings.

9.4.1.1 **Employment**

The impact of the development on employment chapter 7 and socio-economic impacts chapter 9 are assessed in the EIS wherein it is concluded that the development will give rise to substantial short-term employment creation in the construction phase and that it will not negatively impact on other employment in the area.

The third party appeals have focused on the overall impact of the development on initiatives to develop tourism in the area in particular hill walking and in some situations on farm operations. There is also reference to windfarm development inhibiting the growth of farm/rural based eco-tourism. I would note that there are a number of local initiatives individual and community based to promote tourism in the area and also development of viewing points along walking routes.

The presence of wind turbines in an area may or may not have a detrimental impact on visitors to an area and that is a matter of opinion as the applicant and appellants disagree on whether there is an adverse or positive impact. The proposals and layout presented does not interfere with any walkways developed in the area.

There is nothing to suggest that the presence of wind turbines has a detrimental impact on employment in an area or impacts on farm management and practice. In relation to tourism while the presence of turbines on the landscape does alter the visual appearance of the landscape there is nothing to suggest that their presence hinders the use of walking routes and tourism initiatives in rural areas.

9.4.1.2 **Noise**

Appendix 10-1 of the EIS relates to noise impact assessment and a revised noise and vibration assessment was also submitted by way of further

information. The documentation submitted outlines surveys and methodology applied and a model produced. In preparing an assessment of impact as no turbine make is specifically determined as the likely turbine to be erected on the site, a Vestas 90 was used to determine likely noise values. The modelling predicts impacts in both the construction and operational phases of the development which are outlined in tables 4 and 5.

A total of 93 dwellings are identified within 900m of the proposed windfarm (figure 1) and 10 noise monitoring points identified and modelling was then applied. Table 6 outlines identification of impacts based on predicted modelling.

Exceedance of permitted levels will occur during the construction phase based on the contours outlined on figure 2 of the EIS but I note that there is no house within 200 metres of the construction works.

Based on worst case scenario which includes adverse down wind direction houses located at H2, H5, H7 and H9 are the most impacted by the proposed development with levels above the planning guideline night limit of 43dBA during the operational phase of the development. In relation to these four houses, H2 is to be used as a site office, H5 is currently unoccupied and H7 and H9 are owned by landowners. The level of exceeding the guide limit is in the order of 2dBA.

The further information, which considers cumulative effects with other windfarm development, does not significantly affect the case presented and does not add additional impact.

What can be concluded from the noise assessment is that the development will impact in relation to noise as there will be a rise in noise levels from the current ambient noise levels associated with a rural area for many of the houses and sensitive receptors in the general and study area. The level of increase will however be within permitted levels for the most part even in a worst case scenario. There will also be impacts arising in the construction phase but they will be short term in duration.

9.4.1.3 Traffic

Traffic is largely assessed in the context of construction impacts outlined in chapter 7 of the EIS as it is during the construction phase that the impacts will occur on the road network. I would also refer to item 6, the submission of an Environmental Management Plan, and item 8 of the further information submitted relating to site compounds.

The details outlined indicate that materials relating to the development will be brought to the site via the regional road network to the site compound no.1 located off the R503 at Graneira.

The development will involve the use of existing farm roads, the upgrading of existing farm roads and the construction of new roads. In principal I would have no objection to the works as proposed provided appropriate roadside drainage is provided for. Roadside drainage and possible interference with existing drainage was raised in a number of appeal submissions. It is therefore of importance that existing roadside drainage is maintained and repaired if interfered with by any aspect of the development. I would in this regard note the submitted details provides for an overall drainage layout for the area addressing flow rates and includes measures for break of flow and attenuation.

The proposal will also involve movement of material along the existing local road network. The network varies greatly in road width and in alignment both horizontal and vertical. I would however note that the design provides for the minimum impact on the road network but construction traffic will traverse sections of narrow roads in particular for travelling to the locations of turbines 9 to 16 but also at a number of other points. During the construction phase this will have an impact leading to obstruction of these roads to road users. The impact will be short term in duration and can be managed through the application of appropriate construction management practice.

I would therefore agree that the development will impact on the road network and cause disruption to road users but the overall impact will be confined to the time span of the construction period. Impacts can I consider be addressed and mitigated by the implementation of the construction management plan.

9.4.1.4 **Shadow Flicker.**

Shadow flicker is referred to in chapter 10 of the EIS

Shadow flicker was raised in many submissions from appellants as a concern of adversely impacting on residential amenity. Table 1 indicates the predicted levels for the 93 dwellings within 900 metres of a turbine. 6 properties are identified as potentially having in excess of 30 hours per annum the standard as outlined in the guidelines based on modelling. These houses are assessed in table 2 where mitigation factors are outlined.

The potential for the greatest shadow flicker impact is house no. 33. According to the calculations and modelling undertaken by the applicant house no.33 could be affected for 52 hours per annum from 3 turbines. Means of mitigation are set out by the applicant and in relation to the six properties identified in table 2 it is indicated that a two year programme will be undertaken to establish actual levels of shadow flicker. On the basis of the programme measures will be put in place and the technology is available to reduce the level of exceedance if this is

identified as indicated in section 10.2.3 of the EIS. This is a matter I consider that can be addressed by condition in a grant of planning permission.

On the basis of information submitted I consider having regard to the separation distances to houses, which are considered to be acceptable. I am satisfied on the basis of the information on noise and shadow flicker submitted in connection with the planning application and the appeal; that any residual concerns and possible impacts likely to arise from shadow flicker can be addressed. I also consider that if exceedance arises after monitoring is carried out as proposed in the EIS it can be appropriately addressed by means of condition. The proposed development I consider would be capable of operating within the limits set out in the “Wind Energy Development Guidelines for Planning Authorities” issued by the Department of the Environment, Heritage and Local Government in June, 2006.

9.4.1.5 Other issues

A number of appellants have raised impacts in a general sense on their properties including reduction in property value.

There are divergent views expressed in relation to the development of a wind farm and that the scale of potential impact on the amenities of residential properties in the area. The nature and scale of potential impact will vary for any property depending on the relative distance, relative visual sight of turbines and other local factors. It can also be considered that with an increasing number of turbines on the landscape has led to some degree of acceptance that they are increasingly part of rural landscape. In a general sense the turbines are generally located in excess of 500 metres from residential properties. In relation impact on value this matter is difficult to fully assess and is largely a matter of personal perception largely relating to visual matters.

In a more general sense given the separation distance from houses no direct hazardous threat arises to these properties. I note that related concerns were raised in submissions in relation to damage to adjoining properties. In this regard I would refer to the details of an appraisal of the structural stability of the turbines and the methodology of construction included in the submission of further information. I would also note that the separation distances of turbines to adjoining properties comply and exceed current standards.

Overall in relation to impacts on human beings the impacts will vary in overall impacts and significance. The construction phase will be significant as there will be some level of disturbance arising in particular in relation to increased noise, air emissions and traffic but the overall range of impacts in the construction phase will be of a short term duration.

The implementation of the measures as outlined in the construction management plan will mitigate these impacts. In the operational phase many of the impacts arising in the construction state will decline and the impacts will largely relate to the incidence of shadow flicker and a different form and type of noise source. There will also be a visual change to the landscape. Visual impacts in this regard will be considered in section 9.5.5 of this report.

9.4.2 Flora and Fauna.

9.4.2.1 General.

In relation to flora and fauna there is an Ecological Impact Report (EcIA) in chapter 13 of the EIS. Other chapters of the EIS also indirectly consider potential effects and impacts on flora and fauna. It is also important to take into the documentation details relating to the submission of substantial further information submitted to the planning authority on the 27th of November 2013 which largely relates to a cumulative impact assessment in particular in relation to other windfarms, proposed and permitted and includes additional material to the original EIS. The further information also responds to matters raised in submissions to the planning authority in particular the submission of the Department of Arts, Heritage and the Gaeltacht.

Among the details submitted are references to the creation of new and alternative habitat suitable for foraging hen harrier. There is also a revised Natura Impact Statement which is Appendix B of response item 1; a bat survey; a badger sett survey; an Ecological Management Plan; an Environmental Management Plan; further details relating to the reinstatement programme and decommissioning programme.

In relation to the proposed development the overall area in which the four turbine clusters are located is a very diverse area with a range of habitats, including farmland which has open areas and relatively enclosed areas, commercial forestry in varying levels of maturity, upland areas and valleys and also river and watercourse channels. The mix of habitats is reflected in the survey of habitats in section 13.2.4 of the EIS. 13 habitats are identified with improved agricultural grassland being the predominant type of habitat. 4 pockets of upland blanket bog were also identified. In general it is largely a man-made habitat which is continuously altering as instanced by the relatively recent areas of commercial conifer planting.

The area is at the watershed of two significant river systems, the Lower River Shannon and the River Suir, both cSACs. The area is also a transition area between upland areas to the west and lowlands to the east with the area to the west part of a Special Protection Area covering the upland area.

The EcIA outlines the surveys carried out and evaluates both habitats and species focusing largely on those which have designation status. Potential impacts are outlined and addressed in tables 13-24 to 13-27 of the EIS in the absence of mitigation in the construction phase and in tables 13-31 to 13-32 in the operational phase. Cumulative impact is also addressed in the initial EIS and in greater detail in the further information submitted. Mitigation measures are also addressed with an emphasis on management and prevention in particular during the construction phase.

The EcIA as presented, I consider, has followed a methodology which is a reasonable approach in relation to survey, identification of impact, assessment of impact, mitigation and overall appraisal.

In relation to matters raised in submissions made in the course of the application and appeal. Other appeal submissions also raise matters in relation to the assessment of habitats and species. These matters will be addressed in the following sections of the report relating to impacts on habitats and species.

9.4.2.2 Impacts on habitats.

In relation to the current proposal there are no designated Natura 2000 sites located within the proposed site boundary.

There are a number of designated sites, however, identified in the EIS and the AA screening within 15km of the proposed development site. The Slieve Felim to Silvermines Mountains SPA site code 004165 is in close proximity to the northwestern boundary of the site and the primary conservation interest is identified as the hen harrier species.

Watercourses on the site form part of the river catchments of the Lower River Shannon cSAC site code 002165 which at its nearest point is approximately 2.7 km to the west of the appeal site and the River Suir cSAC site code 002137 which is 2.8 km to the east of the appeal site. In relation to these cSACs they are of significance for containing a large and diverse number of species and habitats. They are of interest and significance to the current appeal site as watercourses from the appeal site flow into these Natura sites and there are aquatic based conservation interests.

In relation to the habitats within the appeal site impacts were also assessed for the 13 identified habitats. In terms of habitat loss arising from the construction of roads, foundations and hardstandings, this was determined as 9.65ha primarily in the improved agricultural grass land and conifer plantations (tables 13-22 and 13-23). The significance of loss with and without mitigation is also evaluated and assessed.

In terms of identified impacts the primary issue which emerges relates to indirect impacts arising from the loss of drainage ditches and which in the absence of mitigation has potential to impact on aquatic species in receiving waters. In this regard the maintenance of water quality in both the construction and operational phases are of importance.

In this regard having identified the potential impacts which can arise the EIS outlines a series of mitigation measures primarily in the construction phase and also for the operation phase

Section 13.4 of the EclA and the details submitted by further information in particular outline measures in relation to the replacement of habitats displaced but also measures primarily aimed at avoidance of impact by in relation to the aquatic environment and habitats controls of runoff and control of sediment, controls on accidental discharges. The measures also include the implementation of an ecological management plan details of which were submitted by way of further information prior to the decision to grant planning permission.

On the basis of the information submitted the development will have impacts on the receiving habitats where the development works will occur. Many of the impacts will be localised and may involve some irreversible loss of current habitat. In general I am satisfied that the loss is not significant having regard to the prevalence of improved agricultural grassland and commercial forestry as the areas of habitat loss.

I note that the construction proposals will not involve works which directly or indirectly impact in the small pockets of blanket bog identified.

In relation to the details submitted, I consider that the potential impact on habitats on the site is not therefore significant. The impacts largely occur on areas with a long history of human intervention through farming and forestry cultivation. I also consider that subject to the mitigation measures as outlined that the proposed development is not likely to result in significant impacts and effects on any designated sites.

I would note that enhancement of habitats will occur largely arising from mitigation measures to provide for new hedgerows to replace and renew displaced hedgerows which in turn will address potential impacts to identified species.

9.4.2.3 Impacts on species.

The EIS presents details of survey in relation flora and fauna species within the study area and detailed studies in particular in relation to land based mammals and birds and also aquatic species.

9.4.2.4 Birds.

Hen harrier.

A number of the submissions received refer to the impact of the development on the habitat of the hen harrier, to the loss of habitat and foraging areas arising from displacement and also to the increased risk of collisions. These matters are of importance and require consideration. Although the site is not within the Slieve Felim to Silvermines Mountains SPA site code 004165 it is in close proximity to the northwestern boundary of the appeal site and the hen harrier is the primary conservation interest.

Surveys were carried out and the results of these surveys are outlined in the EIS. Following a request of further information further surveys and evaluation was submitted in particular in relation to the hen harrier species. As a consequence the appeal site has been identified as having the potential to be part of the foraging habitat of these species and potentially a nesting area.

The matter therefore to be considered is potential loss and displacement of potential foraging habitat arising from the development. This is also of significance as the current proposal should not be considered in isolation from other permitted and existing development which could affect habitat loss and displacement.

The applicant by way of further information has indicated that further surveys were conducted and the surveys indicate no evidence of hen harriers at the subject site. It was acknowledged that the site could form part of the foraging area; there is reference to the 250 metres buffer zone around individual turbines and also identification of habitats in the area which favour foraging activity.

In this regard, I would draw the Board's attention to the Ecological Management Plan (item 5 of f/i), which provides for the creation of an area of new and alternative habitat suitable for foraging hen harrier based on measures set down in the NPWS Hen Harrier Scheme for farmers.

These measures include,

- 123 hectares which will be managed to increase area of foraging habitat including rush management; 2,085 metres of hedgerows enclosures for native scrub and trees; inclusion of plastic fliers on electrical lines and enhancement of riparian corridors.

- Measures by landowners in relation to spreading, burning interference with drainage, retention of hedgerows, restrictions on use of poisons and new forestry plantation.
- Details are submitted identifying the areas to be developed in this regard.

In relation to cumulative impacts there is an assessment of 45 turbines in the wider area. These are outlined in table 1 page 9 of item 5 of the f/I and are considered in this cumulative assessment. It is indicated that the current proposal does not involve any loss of habitat or displacement within the SPA as the site is not within the SPA. In relation to foraging habitats for the hen harrier it is indicated that marginal or semi natural habitats which are permanently open are considered better habitats for hen harriers to conifer plantation which close in after 10 years.

To that end in the overall wider context of cumulative effects and examining a wider area through the application of an examination of Corine mapping, the applicant has indicated that there is an estimated total of 22,000ha of potential foraging habitat within the overall assessment area in which all the windfarms are located. The area of displacement arising from the proposed development is estimated as 95ha, which represents 0.5% of the overall area. The applicant contends any habitat displacement arising in the SPA will not arise from the development and any foraging loss arising within the proposed development will be offset by the mitigation measures proposed within the study area. The overall effect on the SPA will be neutral and not contribute to a significant effect on the SPA.

In this regard I would note that it is important to consider that hen harriers when foraging may travel outside of the boundary of the SPA site. It is important to state, however, as there is no loss of designated habitat arising, the question of providing or requiring to provide, for any loss of habitat does not arise in relation to this development.

Therefore although the appeal site is not within the SPA and there is no loss of habitat, the mitigation measures, are, I consider, reasonable in providing additional favourable foraging areas and will address any potential loss and displacement of foraging habitat arising from the proposed development within the appeal site. There have also been surveys carried out at different periods of the year, potential effects and risks were identified and mitigation measures are identified based on these studies and surveys. I would also note that pre construction further studies are proposed as it recognised that changing patterns of behaviour of the species can occur and this is proposed as part of overall mitigation and monitoring.

With the implementation of the Ecological Management Plan and other mitigation measures outlined including provision for ongoing monitoring I am satisfied that

potential effects are identified and addressed in relation to the species and the mitigation measures as detailed are reasonable and appropriate. Should the Board be minded to grant planning permission in this instance, it is recommended that these mitigation measures are conditioned.

I would note that the Department of Arts, Heritage and the Gaeltacht submission dated the 4th of June 2014 to the Board in relation to the loss through displacement of habitat coverage of 95ha and the creation by way of mitigation of 128ha of suitable habitat consider the mitigation to be adequate if properly implemented and monitored as proposed.

I would also note the Department of Arts, Heritage and the Gaeltacht submission dated the 4th of June 2014 to the Board has outlined conditions for the Board to consider if permission is granted including requiring the mitigation measures be implemented in full (condition no.1); a survey prior to the commencement of construction works for breeding hen harriers (condition no.2) and monitoring of hen harrier use of the site in years 2 and 3 after the commencement of operation of the wind turbines (condition no.3). These measures largely restate those outlined in documentation by the applicant and I would have no objections to the inclusion of these conditions in any grant of planning permission.

Other birds

The process as adopted by the EIS provides for survey by desk study and field study in relation to listed species and also for other studies. I would refer to table 13-20 in relation to the results of the surveys.

There is an identification of risks and impacts arising from the development in the construction phase arising mainly from disturbance and displacement without mitigation and in the operational phase without mitigation with the addition of potential collision considered.

I am satisfied that potential effects are identified and addressed in relation to bird species, the mitigation measures proposed including development of new hedgerows are reasonable and appropriate.

9.4.2.5 Mammals

Bats.

A bat survey and assessment was carried out in the initial EIS and in the further information further surveys were carried out at five locations. The documentation outlines the risks to the species including collision risk. It is indicated that the design of the site and management proposals which include the ecological management plan address the potential risk. Mitigation measures are indicated to

provide for safe pathways during flight and the provision of the new hedgerows as compensatory features are an integral part of the mitigation measures.

Based on the information submitted I consider that the proposed development has the potential to impact upon the bat population of the area. The potential threats and impacts are I consider identified, assessed and mitigation measures are outlined to mitigate against the risks and impacts identified. The mitigation measures as detailed are considered both reasonable and appropriate. Should the Board be minded to grant planning permission in this instance, it is recommended that these mitigation measures are conditioned.

Other mammals.

Surveys were carried out for protected terrestrial mammals as listed in table 13-10 of the EIS including badger, otter, Irish hare and red fox with no recorded listing of fallow deer, hedgehog and Irish stoat. Further details were submitted in relation to badger setts by way of further information.

Potential impacts are outlined in section 13.3 of the EIS and I would refer the Board to table 13-26 on assessment of impact in the absence of mitigation during the construction phase and table 13-31 during the operational phase without mitigation. Cumulative impacts are also assessed. Mitigation measures are outlined which include measures to be implemented during the construction phase and operation phase. It is also important to note that an Ecological Management Plan (EcMP) was produced which provides for ecological management and enhancement and as a vehicle to implement mitigation measures and provide for ongoing monitoring.

I am satisfied that in relation to mammals the process as outlined, survey, assessment and identification of mitigation measures is a reasonable approach. I consider the mitigation measures as detailed are considered reasonable and appropriate.

9.4.2.6 Aquatic species.

The methodology applied to other species is also applied in relation to aquatic species in particular species listed as conservation interest in the Lower Shannon River and Lower River Suir cSACs which have an identifiable pathway to the appeal site. In relation to the River Suir, the Turaheen, Owenbeg and Clodiagh Rivers are identified as potential pathways. In relation to the River Shannon, the Aughvana River a tributary of the Mulkear River, which joins the River Shannon upstream of Limerick City is identified. I would note that crossing of watercourses has been limited in the overall development which has reduced the potential risk of direct engagement of the development in both the construction and operational

phase. The appeal site is in excess of 2.5 kilometres upstream of the nearest point of any watercourse within the cSACs.

There is, in the absence of properly designed construction management programme, a risk of deterioration to the water quality of receiving surface watercourses and this is recognised in the submissions of the applicant. Mitigation measures and monitoring are outlined in the Ecological Management Plan (EcMP) and in item 6 submission of the further information details are submitted relating to an Environmental Management Plan, which provides a programme of works in the construction and operational phases. The Environmental Management Plan also identifies areas of responsibilities, details relating to individual components of the construction and measures to be implemented during the operational phase (section 4.4) and section 4.5 outlines an environmental monitoring schedule.

In addition to the measures already outlined there is also a sediment and erosion control plan to prevent sediment and potential pollution run off. The measures outlined include interception and diversion of clean water away from construction areas; attenuation measures in relation to sediment control; minimisation of removal of vegetation and the avoidance of working near watercourses during and after prolonged rainfall of an intense rainfall event; installation of silt control measures and other run off measures to prevent merging of clean and dirty water.

In this context I am satisfied that risks and impacts arising from the development to aquatic species have been identified and assessed and measures for mitigation and monitoring have also been identified. I am satisfied that the mitigation measures as detailed outlined in the assessment are reasonable and appropriate. Should the Board be minded to grant planning permission in this instance, it is recommended that these mitigation measures are conditioned.

In relation to flora and fauna the documentation as submitted has followed a methodology of identifying potential impacts having carried out survey work. The evaluation of risk has been carried out in the context of an absence of mitigation and in the context of mitigation measures including provision for ongoing monitoring in the context of an Environmental Management Plan. Cumulative impacts have also been considered and assessed. In overall terms I consider that subject to appropriate conditions that the development can be permitted.

9.5.1 Soil, water, air, climate and the landscape.

9.5.2 Soils and geology.

The issue of soils is considered in chapter 14 of the EIS: Geotechnical Impact Assessment and also in the wider context of geology and site drainage.

The site is an undulating topography located within a group of small hills peaking at between 363m OD and 411m OD and intervening valleys. The soil structure of the area reflects the variation of topography with a range of soil types and depth. Peat occurs in some of the upland area but has largely been removed through reclamation of land for agriculture and where it occurs is of a shallow depth.

I note that concern is expressed in submissions to potential risk of instability arising from the construction of the turbines and related infrastructure. In the EIS there is an assessment of potential impacts which largely arise from the construction activities associated with the erection of the turbines and the associated infrastructure chiefly the construction of internal access roads; the excavation of material from six burrow pits which will be used for the construction of these roads and the provision of a drainage network.

Given the nature of the soil composition based on the depth and nature of the soil and the underlying geology and based on information and site investigations submitted the sub surface conditions would appear to be stable. It is noted that excavation works proposed are not proposed in any peat area. I would in this regard also refer to item 11 of the further information submission which is a report on the stability of structures and also to mitigation measure as outlined in section 14.4 of the EIS.

9.5.3 Water

The issue of water, surface water and hydrology is considered in chapter 15 of the EIS: Hydrological Impact Assessment and also in the wider context of site drainage.

The site is located at the watershed of two major river catchments the River Suir draining to the east and the River Shannon to the west. The site in effect covers a wide area as it encompasses four distinct clusters of turbines. There are a number of minor watercourses within the wider area which join larger watercourses the Turaheen, Owenbeg and Clodiagh Rivers, which in turn are tributaries of the River Suir and are part of the South Eastern River Basin District and the Aughvana River, which is a tributary of the Mulkear River, which joins the Shannon upstream of Limerick City and which forms part of the Shannon River Basin District. Overall current water quality is surveyed and assessed in the EIS indicating good quality.

In relation to potential risks, given the nature and extent of construction works, in the absence of a coordinated construction management plan and the implementation of mitigation measure there are, I consider, risks to the water environment as new drainage patterns will occur arising from the construction of new internal roads and tree and vegetation felling with the consequent risk of

release of suspended solids to watercourses and a change in the rate of discharge. There are also risks from accidental discharge of construction material and hydrocarbons.

Section 15.4 of the EIS outlines mitigation measures in relation to the construction and operational phases emphasising the principle of mitigation by avoidance. Measures are in particular indicated for the construction phase in relation to surface water flow with the application of a sediment and erosion control plan (appendix 15-1), controls on cement and concrete spillage, procedures to address accidental spillage and the application of the working practices as proscribed by the Forest Service (page 710 of EIS). Measures in relation to groundwater flows are also indicated.

I note the reference in the Department of Arts, Heritage and the Gaeltacht submission dated the 4th of June 2014 to the Board. Specifically in relation to page 71 of the NIS on water quality mitigation measures there is reference that the NIS does not specifically assess the potential in-combination effects of increased drainage rate from the site on stream and river bed and bank erosion, due to greater hydrographic peaks in the cSAC stream and river flows on the conservation objectives of the downstream cSACs.

The DAHG submission does, however, note that the NIS does include as mitigation measures, the measures identified in the sediment and erosion control plan. The measures as outlined both in the NIS and erosion and sediment control plan does I note provide for measures including interception and diversion of clean water away from construction areas and also for attenuation measures in relation to sediment control prevention of stream and river bed and bank erosion.

I would refer to drawing no. 14708-5005 which relates to the construction of the proposed internal roads and which provides for separation of clean and dirty water side channels. There is an overall drainage layout for the site and within that layout provision of dirty water sediment ponds and weirs; minimisation of removal of vegetation and the installation of silt control measures. There is also, I would note, provision for the placement of check dams based on slope gradient along drains to slow down and attenuate run off and therefore to reduce scouring of ditches which in turn reduces risk of ditch erosion.

In relation to assessment of the effects of exceptional magnitude events in the future such as 1 in 50 or 1 in 100 year events rather than the ten year event carried out in the applicant's documentation any requirement of such assessment must be considered in the context of the nature of the works proposed.

The overall site has four sub clusters of development. Within each cluster the level of site works is largely limited to the access roads and the pads on which the turbines are constructed. In the context of this site the total overall site

footprint for all aspects of the development is indicated as 110,210m² (11.201 ha) and this is within a wider and broader area outside of the four clusters which is affected by the development, which is indicated in documentation as approximately 12km². This constitutes less than 0.01% of the overall land cover and includes existing roads and farm tracks which will form part of the development. The level and scale of runoff arising from the nature of the development proposed in this wider area will therefore I consider be very low.

There is provision in any event for attenuation and checking of flow rates even in exceptional events. Exceptional events were I am of the view considered by the applicant in the submissions made to minimise potential erosion of banks along watercourses.

I therefore consider that the measures outlined in the NIS and also in the sediment and erosion plan have adequately considered and assessed the matters of exceptional rainfall events raised in the DAHG submission.

In general I consider that the measures outlined are satisfactory in addressing the potential risks identified and are of importance in the general sense of protection of water quality. In overall terms I consider that subject to appropriate conditions that the development will not adversely impact on the aquatic environment.

9.5.4 Air and Climate

The issue of air and climate is considered in chapter 8 of the EIS.

In the construction phase the excavation of ground and removal of earth and soil and the haulage of material to the site and within the site have the potential to give rise to fugitive emissions and particulate matter and this is recognised in the EIS. Increased traffic will also generate increased emissions from the vehicles. Any impact I consider will be temporary in nature and confined to the immediate area. Mitigation measures are outlined to address impacts arising.

I do not consider that outside of the construction phase that residual impacts arise and the generation of renewable energy will if the development is constructed contribute to limiting CO₂ emissions.

9.5.5 Landscape

Chapter 11 of the EIS considers landscape and visual impact. I would also refer to item 9 of the further information submitted which is a revised landscape and visual assessment considering cumulative impact with 12/51/0385. Item 10 is also of material consideration where the relocation of T22 is further assessed.

In relation to the current proposal the development of 22 no. wind turbines with an overall height to 126.6 metres and a hub height of 81.6 metres represents a significant alteration in the landscape in particular as the turbines are located on hills and ridgelines. The appeal site forms part of a landscape where there are many houses and farms and in this respect the alteration of the landscape will therefore have an impact. This impact and concerns relating to this impact is reflected in many of the third party appeal submissions.

From the initial inspection of the site and wider area a number of considerations in relation to the landscape emerge.

- The site is located to the east of higher terrain consisting of uplands and ridgelines formed by the Slieve Felim Mountains / Keeper Hill and Silvermines Mountains running southwest to northeast which reduce visual impact.
- The site is located to the west of lowlands stretching to the east and southeast and the range of visibility in that direction of the appeal site is more evident.
- Within the immediate area of the site and the four clusters in which the turbines are located there is a diverse undulating topography. The level of visual impact will vary greatly but within this area one and/or more cluster will be clearly visible at any point within the immediate area.
- The area has a number of permitted and constructed windfarms and there is an overall cumulative impact to be considered.

The EIS presents a landscape and visual impact assessment report, in accordance with the various guidelines, in support of the proposed development. The assessment was carried out using both a desk top study as well as site surveys and includes a number of photomontages.

Reference is made in the EIS to the receiving landscape, to provisions of the county development plan, to the Wind Capacity Strategy and the Outline Landscape Strategy and the broad acceptance in these strategies to the favourable status of the area for the nature of the development proposed. There is also reference to LCA7 of the Outline Landscape Strategy.

In relation to the baseline studies based on modelling a Zone of Theoretical Visibility (ZTV) was produced (figure 10.1) which is produced as a worst case scenario in the absence of localised screening or local contour factors and has identified a theoretical visual impact which would broadly agree with my initial observations based on the site inspections and referred to above.

Further baseline studies assess impact based on a range of receptor types and a series of viewshed reference points (VRP) are outlined in table 9-1 of the EIS and also in table 9-1 of the further information. These are further assessed in the

context of impact using the criteria of visual receptor sensitivity and magnitude of visual impact.

An examination of the findings would confirm that the level of impact varies but the magnitude and significance of impact increases the nearer the receptor is to the proposed development. For example there will be a higher level of impact in the nearest villages of Upperchurch and Kilcommon than centres of population greater distant.

There will also be increased visual impact within the area and at points along developed walkways such as Slí Éamoin a Cnoic (VRP AV1).

In relation to impacts on visual matters, appellants Paul and Edel Grace; Tanya and James Embleton; Catherine and Patrick Maher; Pat and Elizabeth Lee; Ned and Carmel Buckley; Emer Ó Siochrú and Toal Ó Muire make reference to visual impact on their properties and the general area in their grounds of appeal and submissions to the planning authority and these submissions have been considered. Many of the properties in question are within 550 and 1,200 metres of a turbine or group of turbines.

In a general sense, within the general area of the four clusters, there will be varying levels of visual impact arising from the development. As already indicated the undulating nature of the landscape and the placement of the turbines in clusters does not provide for a uniform level of impact within the area. For example in the townland of Coumbeg to the south of the site of Garrunakilla School the nearest cluster of turbines nos. 9 to 16 although nearest in proximity will not be as readily visible as the other clusters in particular the cluster incorporating turbine nos. 17 to 2. This position is replicated throughout the area.

I would also note in support of this position that existing windfarm developments to the south are visible in some locations to a varying degree and not as readily visible from other locations within the appeal site area.

In relation to design and layout I consider that the development has followed the general guidance in relation to placement, separation and location on ridgelines.

Having considered the matter it is difficult to identify or come to a conclusion that removal of an individual turbine will to any degree affect the overall visual impact of the development or in any significant level an individual property or the wider area. Any omission would, I consider, be on the basis of omission of clusters rather than individual turbines.

In relation to impact from R503 and R497 the major traffic routes in the area and protected routes as identified in the county development plan my observation

would be that in some locations some or all of the turbines will be visible but not to a scale which, I consider, would be significant.

In overall terms, therefore, the principal impact will be the change of character of the area from what currently exists. The turbines by reason of their height will be visible and their placement on the higher elevations and ridges will accentuate this. There will be a distinct sense of visual impact from the village of Upperchurch. The matter however to consider is whether the level of impact is such as to detract significantly from the relatively rural character of the area.

In considering this it is noted that the area is acceptable within current county policy for consideration of wind turbines. The undulating and rolling nature of the landscape coupled with the diverse vegetation does provide for a level of absorption capacity for the nature and scale of the proposed development. Therefore accepting that the development will impact visually on the area it will not be to a significant degree, I consider, to adversely impact on the area. I also consider that, cumulatively when considered with existing and permitted wind energy developments the development will change the visual character of the area but in overall visual terms it will not be to a significant degree as to be considered to adversely impact on the area.

9.6.1 Material Assets.

The transportation of materials will have certain impacts on the structure and carrying capacity of the existing road network and in particular sections of the local road network in particular for the transportation of turbines and materials for three of the clusters during the construction phase and this I consider, is addressed in the relevant section of the EIS.

Electromagnetic interference with telecommunications signals may occur but there are mitigation measures to address this issue should it arise.

9.6.2 Cultural Heritage.

Cultural heritage is addressed in chapter 12 of the EIS.

The methodology applied in relation to cultural heritage is similar to that followed in other chapters of the EIS including field and desk studies to establish monuments and built heritage within a 4 kilometre radius of the area and these are indicated on maps within the EIS. No direct impacts are identified but it is acknowledged that previously unknown archaeological / cultural may be present. By way of mitigation ground works associated with the development will be monitored under licence.

In this regard I note the submission of Department of Arts, Heritage and the Gaeltacht in relation to Archaeology dated the 16th of December 2013 refers to recommendations indicated in the EIS should be concurred with and that conditions are indicated to be attached to any grant of planning permission.

I would agree that in the event of permission being granted conditions should be included in this regard.

9.7.1 Interactions and Cumulative Effects.

In the EIS and other documentation in particular the further information submitted the impacts are generally addressed under different headings. There are references throughout the document to interaction of potential different effects and also recognition of the potential of different impacts to potentially effect directly and indirectly matters such as ecology. Cumulative effects although addressed in the EIS are more specifically addressed in the further information submitted. With regard to the inter-relationships between matters referred in the assessment I am satisfied that these interactions have been satisfactorily addressed.

9.8 Other matters in relation to Environmental Impact Assessment.

There is reference in many appeal submissions to granting permission without carrying out an Environmental Impact Assessment and Appropriate Assessment. In relation to these matters many of the matters raised are addressed in other sections of this report. The application as submitted was accompanied by an EIS and NIS and further information was submitted arising from a request by the planning authority having considered the submitted documentation and submissions from other parties including prescribed bodies.

In relation to conditions included in the decision of the planning authority to grant planning permission there are a number of conditions stated requiring further agreement. Condition no. 3(g) requires agreement on the specification of the turbines which in the context that there is no definitive specification in relation to the exact manufacture of turbine which may be erected is I consider reasonable. Condition 4 relating to agreement on air navigation warning systems is also reasonable in the context of condition no. 3(g) and that the exact location would also be important for the IAA to be informed of.

Condition no.7 relates to a survey of hen harriers in advance of construction works is part of the mitigation measures outlined in the documentation and given that the species alters nesting sites it would be appropriate that a survey in advance of construction works were to occur. This condition is also supported in the DAHG submission of the 4th of June 2014. A similar position arises in relation

to condition no.8 relating to carrying out of a bird copse survey for a period of 3 years.

Condition no.9 relates to implementation of mitigation areas identified in the course of the application for the hen harrier species which I consider reasonable.

Condition no.12 relates to agreement on a traffic management plan. There is a construction management plan outlined in the documentation and an ongoing agreement and flexibility is reasonable as it would take into account any change in circumstances which may emerge.

10.0 APPROPRIATE ASSESSMENT.

The application also includes a Natura Impact Statement (NIS) appendix 13-11 of EIS and also a revised NIS (appendix B of response item 1 in submission of further information) in support of Appropriate Assessment (AA).

I would note that activities, plans and projects can only be permitted where it has been ascertained that there would be no adverse effect on the integrity of a Natura 2000 site, apart from in exceptional circumstances.

The primary issue to consider is whether the development individually and in combination with other plans or projects adversely affects the integrity of the European site concerned having regard to its conservation objectives.

The NIS in the screening process identifies designated sites within a 15 kilometre radius of the development (section 2.3.2) noting the appeal site is not located within a Natura site.

The drainage characteristics of the site are outlined based on surveys carried out which established that the site drains into two river catchment systems which have designated sites, the River Suir and the River Shannon within their catchments.

The identification of potential impacts, direct, indirect and secondary was considered in the NIS (section 2.3.5).

Having identified potential impacts and considered the significance of the potential impacts through the process screening six Natura sites are excluded and the assessment of potential focused on 3 Natura sites, the Lower River Shannon cSAC site code 002165, the Lower River Suir cSAC site code 002165 and the Slievefelim to Silvermines Mountains SPA site code 004165.

The NIS notes that the development will not result in direct habitat loss of a designated site or fragmentation of habitats.

Assessment was carried out in relation to disturbance and or displacement of species having regard to the conservation objects of the designated sites under the categories of aquatic, terrestrial, riparian and avian. Based on initial assessment stage 2 assessment was recommended.

In the stage 2 assessment, surveys were carried out to ascertain the existing environment and given the nature of the Lower River Shannon cSAC and the Lower River Suir cSAC, which cover large areas with diverse conservation objectives and a number of ecological features were screened and excluded. The process and methodology followed I consider was reasonable. The assessment I consider focused on habitats and species related to the aquatic and riparian environment which had a potential pathway link from the appeal site.

Potential impacts are assessed in the context of the location of conservation species relative to the subject site and also the issue of water quality given that watercourses form the pathway. Table 16 of the NIS outlines in summary the potential significance of impacts in the absence of mitigation measures. Having identified the potential impacts the mitigation measures are outlined many of which are outlined in sections of the EIS, which largely relate to construction management and the control of sediment runoff largely by the implementation of a sediment / runoff plan.

In overall terms the NIS concludes no impact on habitat and key species and also no fragmentation of habitats arising from the development in construction and operational phases

In relation to potential impacts the primary impact, direct and indirect, arising from the proposed development is, I consider, via watercourses as the site is within the catchment of two river catchments which downstream have conservation interests.

Direct potential impacts from surface water runoff are addressed by a series of mitigation measures to control runoff and sediment and these are outlined in detail in the submitted documentation.

I note the reference in the Department of Arts, Heritage and the Gaeltacht submission dated the 4th of June 2014 to the Board. Specifically in relation to page 71 of the NIS on water quality mitigation measures there is reference that the NIS does not specifically assess the potential in-combination effects of increased drainage rate from the site on stream and river bed and bank erosion, due to greater hydrographic peaks in the cSAC stream and river flows on the conservation objectives of the downstream cSACs.

There will be, I consider, should the proposed development proceed an overall management system in place in relation to the control of silt and particulate matter entering the watercourse should that event arise. Measures are proposed to control flow rates to and within drainage ditches prior to discharge to watercourses.

The other identifiable risks relate to seepage to water from accidental spillage of oils and hydrocarbons from the vehicles in the construction phase discharge to water is, I consider, low.

Specifically in relation to the assessment of the potential in-combination effects of increased drainage rate from the site the DAHG submission focuses on stream and river bed and bank erosion rather than the wider drainage areas. The DAHG submission does, however, notes that the NIS does include as mitigation measures, the measures identified in the sediment and erosion control plan being based on a 10 year storm event.

I would also note the mitigation proposals as outlined both in the NIS and erosion and sediment control plan does provide for measures including interception and diversion of clean water away from construction areas and also for attenuation measures in relation to sediment control prevention of stream and river bed and bank erosion. There is also, I would note, provision for the placement of check dams based on slope gradient along drains to slow down and attenuate run off and therefore to reduce scouring of ditches which in turn reduces risk of ditch erosion.

There is also an overall drainage layout for the site and within that layout provision of dirty water sediment ponds and weirs; minimisation of removal of vegetation and the installation of silt control measures.

In relation to assessment of the effects of exceptional magnitude events in the future such as 1 in 50 or 1 in 100 year events rather than the ten year event carried out in the applicant's documentation any requirement of such assessment must be considered in the context of the nature of the works proposed.

The overall site has four sub clusters of development. Within each cluster the level of site works is largely limited to the access roads and the pads on which the turbines are constructed. In the context of this site the total overall site footprint for all aspects of the development is indicated as 110,210m² (11.201 ha) and this is within a wider and broader area outside of the four clusters which is affected by the development, which is indicated in documentation as approximately 12km².

This constitutes less than 0.01% of the overall land cover and includes existing roads and farm tracks which will form part of the development with no attenuation

measures for any extreme storm events. The level and scale of runoff arising from the nature of the development proposed in this wider area will therefore I consider be very low.

There is provision in any event for attenuation and checking of flow rates even in exceptional events. Exceptional events were I am of the view considered by the applicant in the submissions made to minimise potential erosion of banks along watercourses.

I therefore consider that the measures outlined in the NIS and also in the sediment and erosion plan have adequately considered and assessed the matters of exceptional rainfall events raised in the DAHG submission.

In relation to avian interests the hen harrier which is the main conservation interest of the Slievefelim to Silvermines Mountains SPA site was also assessed. The appeal site is not within the boundaries of the SPA and it is important therefore to state that there is no loss of habitat within the SPA arising from the development. Surveys have indicated that no nesting of the species occur within the appeal site. It is also important to consider that hen harriers when foraging may travel outside of the boundary of the SPA site. In this regard however as there is no loss of designated habitat arising the question of providing or requiring to provide for any loss of habitat does not arise.

It is noted that the documentation submitted provides for a series of mitigation measures including the provision of alternative foraging areas to replace potential/possible foraging areas displaced as a result of the siting of turbines on the site. It is however important to state that irrespective of whether these alternative foraging areas offered by way of mitigation, are or are not provided, I am satisfied that no adverse effects arise from the development in relation to the Natura Site and any qualifying interest or objectives. It is not unreasonable to consider that if additional suitable lands for foraging are made available as a mitigation measure the provision of these additional foraging lands will actively assist the hen harrier species.

An issue to consider is whether the proposed development individually and in combination with other plans or projects would or would not adversely affect the integrity of a European site concerned having regard to its conservation objectives.

The NIS, I consider, has examined the issue of cumulative impacts in particular in relation to the hen harrier species where displacement and disturbance of foraging habitat can potentially arise. The current proposal as already stated is not within the SAC and therefore no loss of habitat arises. I am satisfied that no adverse effects arise from the development in relation to the Natura Site and any

qualifying interest or objectives arising from the proposed development individually and in combination with other plans or projects.

On this basis and having considered the matter I do not consider on the basis of the information presented that the development would adversely affect the integrity of any European site concerned having regard to conservation objectives.

There is I consider based on the information submitted nothing to suggest significant effects or any loss of a protected habitat or in the fragmentation of habitat and any qualifying interest.

In relation to the impact on qualifying species the NIS did, I consider, examine potential impacts. The NIS also did assess impacts in relation to identified potential impacts on the receiving environment in the context of source, pathway and receptor identifying a hydrological link between the site and the rivers Shannon and Suir in relation to water flows and the proximity between the source and receptor. I consider on the basis of the information presented that mitigation measures and site operational management procedures as outlined address potential impacts and effects identified.

On the basis of the information submitted and consideration and assessment of same, I do not consider that the development will adversely affect the conservation of a number of water dependent Annex II species or conservation objectives.

I therefore consider it reasonable to conclude on the basis of the information available that the proposed development, individually and in combination with other plans or projects would not adversely affect the integrity of any Natura site in view of those sites' conservation objectives or directly or indirectly any European site.

11.0 DEVELOPMENT CONTRIBUTION.

The local authority has in condition no. 15 included a contribution condition for €154,000 in accordance with the Development Contribution scheme. I consider that the requirement of payment of general financial contributions is reasonable.

12.0 OTHER MATTERS.

This is an application for a duration of ten years. I have no objection in principle to granting permission for ten years.

13.0 CONCLUSION AND RECOMMENDATION.

The development is for twenty two turbines located in four clusters. The rationale as set out for the development in the context of national and local policy is I consider reasonable.

Arising from my assessment above and based on the information available therefore I conclude that the proposed development will not give rise to significant adverse effects on the environment and that ongoing impacts are limited in terms of scale and significance and can be remediated.

I consider it important given the nature of the proposed development that mitigation measures outlined in the EIS and NIS and in particular the proposals outlined in relation to construction and ecological management are appropriately conditioned and implemented.

I also consider that the subject development, either individually or in combination with other plans or projects, will not adversely affect the integrity of a European site.

I therefore recommend that planning permission for a duration of ten years be granted in this instance based on the reasons and considerations and subject to the conditions set out below.

REASONS AND CONSIDERATIONS

Having regard to

- National policy on renewable energy as outlined in the *National Climate Change Strategy 2007 – 2012*; *Sustainable Development – A Strategy for Ireland*, includes emphasis on the use of renewable resources; *The National Spatial Strategy 2002 – 2020*; and national planning guidance is provided in the *Planning Guidelines-Wind Farm Development published by the Department of the Environment Heritage and Local Government in June 2006*,
- the provisions of the North Tipperary County Development Plan 2010-2016;
- The North Tipperary Landscape Character Assessment 2009;
- The North Tipperary Wind Capacity Strategy and Outline Landscape Strategy 2009
- The pattern of existing development and land uses within the vicinity of the site;
- the nature of the proposed development and the current established uses on the site,

- the submissions made in connection with the planning application and the appeal,

it is 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, and would be acceptable in terms of traffic safety and convenience.

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, and the report, assessment and conclusions of the Inspector in relation to the environmental impacts of the scheme. The Board considered that the environmental impacts of the proposed development are acceptable and, subject to compliance with the mitigation measures set out in the Environmental Impact Statement, and further conditions included by the Board in this order, the proposed development would not have unacceptable adverse effects 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 and the Inspector's report and submissions on file, 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 proposed development would, therefore, be acceptable in terms of 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 plans and particulars submitted to the planning authority on 7th January 2013, and as further amended by the plans and particulars submitted on the 27th 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 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. (a) No micro-siting is hereby permitted. The location of any turbine shall not be altered without a prior grant of planning permission.
(b) 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 by the applicant on the 7th January 2013 and as further amended on the 27th of November 2013, including the Construction Management Plan, and the mitigation measures contained within. The proposed construction methodology and excavations works shall be certified by a suitably qualified geotechnical engineer.

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) L90,10min
- 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 existing or permitted dwellings or 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.

(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. Details relating to the disposal of foul effluent shall be in accordance with the details submitted to the planning authority on the 27th of November 2013.

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

18. Mitigation measures in relation to the hen harrier species shall be provided in accordance with the details indicated in the Ecological Management Plan submitted to the planning authority on the 27th of November 2013.

A timescale for the provision of the enhanced foraging areas including rush management; 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 in consultation with the National Parks and Wildlife Service prior to the commencement of development works on the site.

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 also be agreed in consultation with the National Parks and Wildlife Service 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 of November 2013 shall be implemented by the applicant.

A timescale for the implementation of the measures outlined shall be agreed in consultation with the National Parks and Wildlife Service prior to the commencement of development works on the site.

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

- 20 The developer shall facilitate the preservation, recording and protection of archaeological materials or features that 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 operations (including geotechnical investigations) relating to the proposed development,
 - (b) employ a suitably-qualified archaeologist who shall monitor all site investigations and other excavation works, and
 - (c) provide arrangements, acceptable to the planning authority, for the recording and for the removal of any archaeological material which the authority considers it appropriate to remove.

Reason: In order to conserve the archaeological heritage of the site and to secure the preservation and protection of any remains that may exist within the site.

- 21 (a) Mitigation measures outlined in the EIS, NIS and other documentation submitted by the applicant 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 authorised 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 the Board to determine the proper application of the terms of the Scheme.

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

Derek Daly,

Senior Planning Inspector.

16th June 2014.