YELLOW RIVER WIND FARM

APPROPRIATE ASSESSMENT: SCREENING

19/11/13

Prepared for

Jennings O'Donovan Consulting Engineers

by

Biosphere Environmental Services

29 La Touche Park, Greystones, Co. Wicklow

Tel: 01-2875249 E-mail: maddenb@eircom.net

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

This report has been prepared by Dr. Brian Madden of BioSphere Environmental Services in association with Jennings O'Donovan Consulting Engineers, to determine the potential impacts, if any, of the plan for a wind farm in the Yellow River area (Co. Offaly) on 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.

The assessment is based on the terrestrial and aquatic ecological assessments carried out for the Environmental Impact Assessment.

1.2 Regulatory Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as "The Habitats Directive" provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC) (better known as "The Birds Directive").

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement – see The Guidance for Planning Authorities issued by Department of Environment, Heritage and Local Government, December 2009):

> "*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication 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"

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, then it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

1.3 Stages of the Appropriate Assessment (AA)

This Natura Impact Statement 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'. The Guidance for Planning Authorities issued by the Department of Environment, Heritage and Local Government (December 2009) is also adhered to.

There are four distinct stages to undertaking an AA as outlined in current EU and DOEHLG guidance:

1. Appropriate Assessment Screening
2. Appropriate Assessment
3. Assessment of Alternatives in cases where significant impact cannot be prevented
4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI)

2. SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether appropriate assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site.

2. Whether the project will have a potentially significant effect on a Natura 2000 site, either alone or in combination with other projects or plans, in view of the site's conservation objectives.

Screening involves the following:

i. Description of plan or project

ii. Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives

iii. Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary

iv. Screening Statement with conclusions

2.1 Description of the Project

The proposed wind farm development is located in the Rhode area of Co. Offaly. The development is spread over a large area, roughly along an 11 km axis from E to W and a 7 km axis from north to south.

The sector to the west of the R400 road, comprising 12 turbines, is on former raised bog in the Derryarkin area. Some remnant raised bog and cutover bog occur in the Derryiron area, while other areas of former bog are converted to intensive grassland or commercial forestry. The sector to the east of the R400 road is divided by the main channel of the Yellow River. Most of the turbines here are on agricultural land used for both pastoral and arable practices, with several located within commercial forestry.

Overall, the general area in which the wind farm will be located is dominated by agricultural land. The presence of raised bogs is a feature of the landscape though most of these have been commercially developed by Bord na Móna or by local cutting.

The following is a summary of the characteristics of the development:

- Total site area **1,002.234 ha**
- Development footprint **33 ha**
- Peat Depth Range **0 – 3.6m**. Average peat depth **0.5 m** (Whitefords, Soils & Geology Report Chapter 6)
- Construction of foundations for 32 wind turbines (Excavations diameter 18m, Depth 2m)
- Hardstands, including turning area, set down area & ancillary crane area **Total Area 1,997m^2**
- Temporary construction compound, approximately **50 m x 30 m**.
- Clear fell of plantation forestry area 1.5 ha per turbine (four turbines T1; T25; T26 and T27 = 6 ha) plus part of T2 area = 0.77 ha plus areas felled for new roads, total clear felling 3.63 ha. (2,425m of road x 15 m wide corridor) **Overall Clear fell area Total 10.4 ha**
- T11 scrub area to be felled = **1.5 ha**
- Construction of approximately **18,275 m** of new access tracks having a minimum finished width of 5 m with passing bays
- Upgrading of approximately **5,916 m** of tracks by widening, strengthening and bend improvement.
- Installation of site drainage network.
- Installation of underground ducts and cabling from each turbine to the substation. Cable trenches, which will typically be 0.5 – 1.0m wide and 0.75 – 1.00m deep, will generally follow the edge of the site access tracks and will be installed in conjunction with the tracks. The excavated material will be laid alongside the trench for use in reinstatement following the laying of cables.
- Construction of an Substation Control Buildings and Compound on site area **1,850 m^2**
- Erection of 1 permanent meteorological mast, comprising a lattice steel tower
- Stream/River crossings **9**
- Upgrade of existing bridges **1**
- The terrain is sloping with gradients between 1:25 and 1:100.

The development site does not require a borrow pit as required stone and gravel will be sourced from local quarries.

Sensitive design has ensured that the wind farm infrastructure is largely outside areas rated as of ecological importance, especially the remnant area of raised bog at Derryiron.

2.2 European Sites Identification

In accordance with the European Commission Methodological Guidance (EC2001), a list of European sites that can be potentially affected by the project has been compiled. All SAC and SPA sites within a 15 km radius of the development site are considered (see Figure 1). Sites are as follows (site synopses are given in Appendix 1):

- Lough Ennell SAC (code 000685)
- Lough Ennell SPA (code 004040)
- River Boyne and River Blackwater SAC (code 002299)
- River Boyne and River Blackwater SPA (code 004232)
- Raheenmore Bog SAC (code 000582)
- Mount Hevey Bog SAC (code 002342)
- Split Hills and Long Hill Esker SAC (code 001831)
- The Long Derries SAC (code 00925)

2.2.1 Lough Ennell SAC

Lough Ennell is a large, limestone lake. The lake is classified as a mesotrophic system by the EPA though it had been eutrophic in the past. The margins of the lake support swamp and marsh vegetation types.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- Alkaline fens [7230]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected (NPWS 2011, Conservation objectives for Lough Ennell SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.2.2 Lough Ennell SPA

Lough Ennell is one of the most important midland lakes for wintering waterfowl, with nationally important populations of Mute Swan, Pochard, Tufted Duck and Coot. At times, the lake is utilised as a roost (with limited feeding) by the internationally important midland lakes population of Greenland White-fronted Goose (ca.400

strong) (this flock is now centred at Lough Iron and seldom uses Lough Ennell or the other large midland lakes, O. Crowe pers comm.). The site also attracts Golden Plover and Lapwing though these feed mainly outside of the SPA site. Lough Ennell is located approximately 10 km to the northwest of the Derryarkin sector of the wind farm site.

SPA Qualifying Interests

This site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by supporting a population of European importance of the following Annex I species:

- Pochard (*Aythya ferina*) [A059]
- Tufted Duck (*Aythya fuligula*) [A061]
- Coot (*Fulica atra*) [A125]
- Wetlands & Waterbirds [A999]

SPA Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable condition of the bird species listed as Special Conservation Interests for this SPA (NPWS 2011, Conservation Objectives for Lough Ennell SPA. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht).

2.2.3 River Boyne and River Blackwater SAC

This large site consists of the freshwater stretches of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers.

Overall, this SAC site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- River lamprey (Lampetra fluviatilis) [1099]
- Salmon (Salmo salar) [1106]
- Otter (Lutra lutra) [1355]
- Alkaline fens [7230]
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the

SAC has been selected. (NPWS 2011, Conservation objectives for River Boyne and River Blackwater SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.2.4 River Boyne and River Blackwater SPA

The site is a SPA as it is of special importance for Kingfisher. A survey in 2010 recorded 19 pairs of Kingfishers in the River Boyne and River Blackwater SPA. At the closest, the designated river is at a straight-line distance of approximately 14 km to the northeast of the development site.

SPA Qualifying Interests

This site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by supporting a population of European importance of the following Annex I species:

- Kingfisher (*Alcedo atthis*) [breeding]

SPA Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable condition of the bird species listed as Special Conservation Interests for this SPA. (NPWS 2011, Conservation Objectives for River Boyne and River Blackwater SPA. Generic Version 4.0. Department of Arts, Heritage & the Gaeltacht).

2.2.5 Raheenmore Bog SAC

Raheenmore Bog is a classic example of a largely intact raised midland bog. It is located approximately 4 km southwest of the Derryarkin sector of the site.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- Active raised bog [7110]
- Degraded raised bog still capable of natural regeneration [7120]
- Depressions on peat substrates of the Rhynchosporian [7150]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation objectives for Raheenmore Bog SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.2.6 Mount Hevey Bog SAC

Mount Heavy Bog SAC is located to the northeast of Kinnegad and approximately 9 km northeast of the northeastern sector of the proposed wind farm. The site is a good example of a mostly intact raised bog.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- Active raised bog [7110]
- Degraded raised bog still capable of natural regeneration [7120]
- Depressions on peat substrates of the Rhynchosporian [7150]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation objectives for Mount Hevey Bog SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.2.7 Split Hills and Long Hill Esker SAC

This esker ridge crosses the N5 Dublin to Galway road between Kilbeggan and Tyrellspass. The main habitat is semi-natural woodland, though there are several areas of species rich calcareous grassland. The SAC is located approximately 7 km west of the development site.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation objectives for Split Hills and Long Hill Esker SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.2.8 The Long Derries SAC

Located just over 3 km southeast of Edenderry, the Long Derries, Edenderry SAC is part of a low esker ridge running from Edenderry to Rathdangan. It primarily consists of glacial gravels interspersed with loam and peat soil. The dominant habitat is dry calcareous grassland, of which this is a particularly good example and includes a number of rare plant species. The SAC is located approximately 11 km southeast of the development site.

SAC Qualifying Interests

The SAC has been selected for the following Annex I habitats and Annex II species:

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210]

SAC Conservation Objectives

The general conservation objective for the site is to maintain or restore the favourable conservation of habitats (Annex I) and species (Annex II) for which the SAC has been selected. (NPWS 2011, Conservation objectives for the Long Derries SAC. Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht).

2.3 European Species Identification

2.3.1 Whooper Swan

A population of Whooper Swans, an Annex I species, winters within the site area. While this population is not associated with any Natura 2000 site, consideration is given as to whether the proposed development could have significant adverse impacts on the birds.

Background

Whoopers Swans were recorded in the improved grassland fields of the Derryarkin Farm sector of the site in 10 of 15 winter visits between November 2012 and April 2013. Numbers ranged from 3 to 82 (though it is known that over 100 swans were present during December 2012). The fields most often used were those adjoining the quarry complex, and especially fields no. 1 and 2 (see Figure 2). Swans were also recorded within fields no. 3, 4 and 5, and signs of recent usage were found in fields no. 6 and 7.

The Kilmurray quarry ponds were used by roosting swans occasionally.

These swans are part of a population that moved regularly between a cluster of feeding and roost sites in the immediate area, as follows (see Figure 3):

- Derryarkin farm (within development site – fields no. 1-4 (Figure 2) & site no. 1 in Figure 3) – used intensively for feeding, with occasional roosting on adjoining Kilmurray quarry ponds (R1 in Figure 3)
- Grassland fields south of access road leading into Derryarkin farm and Kilmurray quarry used for feeding (within development site – fields nos. 5-7 (Figure 2) & site no. 2 in Figure 3)
- Derryarkin cutaway bog – comprises the areas which adjoin Derryarkin farm to the north, northwest and northeast (site no. 3 in Figure 3). Provides feeding opportunities on wet bog and a safe roost site (Roadstone quarry pond – R2 in Figure 3)
- Grassland fields between Mongagh River and motorway (east side of R400) – general grid reference (N48 39 – site no. 4 in Figure 3)
- Grassland fields east side of R400 on Rochfortbridge side of motorway (grid ref. N480 407 – site no. 5 in Figure 3)

A further roost site may exist within the Bord na Móna Drumman site (grid ref N510 400) where a series of quarry ponds occur (R3 in Figure 3).

The above sites are part of a larger complex of sites used by swans extending to sites to the south of Rhode. It appears that the swans were concentrated at the above listed sites in the Derryarkin area in the early part of the winter (to January) and then most moved to various locations near to Rhode in the later part of the winter. The reason for the shift may have been due to better feeding opportunities though high levels of disturbance from regular farming activities at Derryarkin may also have caused the swans to move.

During daylight, the swans fed almost continuously and generally flew only short distances within the fields in response to feeding patterns or local disturbance. All internal movements within the feeding fields were at low levels (10-15 m). Six flightlines were recorded of birds arriving or departing from the fields, with one of birds flying to the Kilmurray quarry ponds to roost (see Figure 4). Only one flightline was observed of birds arriving from outside of the area – this involved a group of 15 swans which arrived from the southeast at c.15.40 hrs on 24th January 2013. These birds, which were recorded from the entrance road, were descending towards fields at height of less than 30 m. A similar number was later seen roosting on the Roadstone quarry at darkness.

Evaluation

The presence of Whooper Swan is significant as this species occurred within the Derryarkin sector of the study site on a regular basis. While the numbers of birds involved are substantial, the recorded peak of 82 Whooper Swans does not reach the national importance threshold of 130 for this species (after Boland & Crowe 2012).

Of particular interest was that the swans were using nearby quarry ponds (Roadstone & Kilmurray) as night roosts. This enabled the birds to feed well after darkness and then to take a short flight to the night roost.

2.4 Identification and Assessment of Potential Impacts: European Sites

Features of the development that have the potential to impact on the conservation objectives of the identified Natura 2000 sites are considered. A number of factors were examined at this stage and dismissed or carried forward for appropriate assessment as relevant. The following were examined in relation to potential impacts from the proposed works at the wind farm on SACs/SPAs within a 15 km radius of the Yellow River site:

- Impacts on habitats
- Potential impairment of water quality due to construction works
- Potential disturbance impact on bird species

Impacts on habitats

The proposed Yellow River wind farm does not impact on any Natura 2000 in a 15 km radius of the development. Approximate distances of the Natura 2000 sites from the development are as follows:

- Lough Ennell SAC & SPA: located approximately 10 km to northwest of the Derryarkin sector of the site
- River Boyne and River Blackwater SAC & SPA: at its closest point (the Boyne Aqueduct), the designated river is at a straightline distance of 14 km to the northeast of the development site
- Raheenmore Bog SAC: located approximately 4 km southwest of the Derryarkin sector of the site
- Mount Hevey Bog SAC: located 9 km northeast of the northeastern sector of the proposed wind farm
- Split Hills and Long Hill Esker SAC: located approximately 7 km west of the development site
- The Long Derries SAC: located approximately 11 km southeast of the development site.

It is concluded that the proposed project has no potential to affect habitats within any Natura 2000 site.

Potential impairment of water quality resulting from proposed works

Water quality within the Lough Ennel SAC & SPA, Raheenmore Bog SAC, Mount Hevey Bog SAC, Split Hills and Long Hill Esker SAC and the Long Derries SAC

could not be affected in any way by the proposed works as there are no hydrological linkages between the Yellow River development and these designated sites.

The River Boyne and River Blackwater SAC and SPA is located c.20 km downstream of the proposed wind farm development. One Annex II fish species, salmon, which is a qualifying interest in the SAC, occurs in the vicinity of the proposed wind farm. O'Connor (2006) surveyed for lamprey in the Mongagh River and stated "*River/brook lamprey (probably Lampetra planeri) were confirmed from this catchment*". River lamprey (*Lampetra fluviatilis*) is the only lamprey species which is a qualifying interest of the SAC and it is unlikely (but possible) that river lamprey occur in the vicinity of the proposed development.

Salmon would be most vulnerable to negative impacts from such a development in sections of river/stream habitat which provide high quality conditions for salmon spawning and juvenile life stages. Such conditions, however, are relatively scarce in the vicinity of the proposed development. Significant impacts could also be caused by any element of the development which obstructed movement of salmon in the Mongagh River where they are known to migrate to and from spawning areas in the Rochfortbridge tributary which is a few kilometres upstream of the proposed development. These potential impacts have been largely mitigated by avoidance in the design of the proposed wind farm. No crossings of the Mongagh River are proposed, and all proposed crossings of other rivers and streams will be by way of clear span bridges with support structures set back from the river and no in-stream works. Also in the wind farm design all turbine footprints and all proposed new tracks are located a minimum of 50m from any river or stream and a minimum buffer zone of 10m will be in place around all manmade drains. Even in the absence of other mitigation measures these impact avoidance measures would be expected to prevent any significant ex situ or cumulative impacts on salmon (or any other qualifying interest) of the SAC and SPA, which is located c.20 km downstream of the proposed development.

It is concluded that the project design and the comprehensive suite of mitigation measures which are specified in the EIS, will rule out the possibility of negative impacts on salmonid fish (or any other qualifying interest) on or immediately downstream of the proposed development site and especially within the SAC and SPA.

Disturbance to bird species

The Lough Ennell SPA is the only Natura 2000 site within a 15 km radius of the development which supports important populations of birds.

The baseline bird surveys carried out for the project did not detect any flightlines by wintering waterfowl between Lough Ennell and the Yellow River site. On this basis, and taking into account the distance between the two locations (i.e. c.10 km), it can be concluded with certainty that the works would not have disturbance effects on any bird species associated with Lough Ennel or indeed any other Natura 2000 site.

2.5 Identification and Assessment of Potential Impacts: European Species

Features of the development that have the potential to impact on the conservation objectives of the identified bird species of European significance are considered. As described, a wintering population of Whooper Swans occurs within the development site but this population is not associated with any Natura 2000 site.

The winter surveys showed that Whooper Swans visit the Derryarkin sector of the site on a regular basis through the winter and at times in significant numbers (though not at national importance level). All apart from one flight line recorded were movements within the site or to local roost and/or feeding sites. The swans using the site could be affected in a number of ways, as follow:

Disturbance during construction

Construction works on Turbines 1 to 7 would almost certainly deter wintering swans from using the feeding fields at Derryarkin. This would be a significant impact for the local swan population which was heavily dependent on these fields in December 2012 and January 2013.

This impact can be avoided completely by restricting works in this sector of the site to the April to October period inclusive.

Permanent loss of habitat

The footprint of turbines T3 to T6, which are the ones on improved pasture used by swans, is approximately 0.924 ha. This is a very small area of the grassland available to the swans in the immediate area and would not have a measureable negative impact.

Displacement from feeding areas and roost sites

Birds' avoidance responses to wind farms vary within and between species, but swans and geese are considered sensitive to these developments because they frequent open landscapes (Hotker et al. 2006). In a major review of the impacts of wind farms on swans and geese, Rees (2012) recorded displacement distances of 200-560 m for swans. She notes, however, that long-term post-construction studies, and thus information on whether birds adapt to the change in landscape, are rare. Reference is made to one such study by Fijn et al. (2012) which specifically analysed the proportion of swans wintering in the vicinity of a wind farm before and after construction. This study found a significant drop, post-construction, in the proportion of wintering Bewick's Swans using the area where wind turbines had been installed in Polder Wieringermeer, the Netherlands (from 1,099 to 530 birds). The study found evidence of habitation, with swans feeding closer to the turbines later in the study, but with fewer birds overall present in the study area. A further long-term post-construction study on whether birds adapt to the change in landscape found that Pink-footed Geese at sites in Denmark grazed closer to wind turbines *c.*20 years

after construction than 10 years previously (Madsen & Boertmann 2008). The study also found that the geese remained at a greater distance from the larger turbines.

Based on the international literature and the large size of the proposed turbines, it would seem probable that swans will avoid feeding within an area of at least 200 m (but possibly up to 500 m) of each turbine at least in the early operational phase. The relevant turbines are as follows:

- T2 – while turbine is on edge of conifer plantation, suitable grassland for feeding also occurs within a 200-500 m radius of the turbine
- T3 – turbine is within suitable grassland for feeding, with wet cutaway bog within 500 m radius to north
- T4 – turbine is within suitable grassland for feeding
- T5 – turbine is within suitable grassland, with wet cutaway bog within 500 m radius to north and west
- T6 – turbine is within suitable grassland, with scrub dominated cutaway bog (not suitable for feeding) within 500 m radius to north

Two of the turbines (T1 & T7) at Derryarkin are not in areas likely to be used by swans, as follows:

- T1 is within a conifer plantation and the swans would be unlikely to graze on grassland close to the forest edge
- T7 is located alongside remnant bog in the extreme eastern sector of a group of large fields which are used by swans. The remnant bog would not provide suitable feeding. While grassland occurs to the south and west, this is close to an access road and no swans were recorded here during the winter surveys.

It is probable that the wintering swans will no longer use the Kilmurray quarry ponds for roosting due to the proximity of two of the turbines (T4 & T6) but the larger Roadstone quarry to the north is unlikely to be affected as the nearest turbine (T5) is just over 500 m from it.

Overall, it is expected that feeding swans will be displaced from suitable grassland and wet bog feeding habitats around five of the turbines and that the Kilmurray quarry ponds may no longer be used as a roost site. It is not known whether, or in what space of time, the swans may habituate to the presence of the turbines and, indeed, Rees (2012) highlighted the need for post-construction studies in this respect.

While the impact of potential displacement from feeding habitat and a roost site is significant for the local swan population, the following points are noted:

1. The Derryarkin area is not a natural or traditional wintering site for swans and it can be assumed that they are only present in this area because of the presence of

intensive agricultural land for feeding and man-made quarry ponds for roosting.

2. There is already a significant level of disturbance in these fields due to regular farming and quarrying activities and the swans seem to have no problem resorting to other feeding sites in the wider area when disturbed.

3. Even without allowing for a degree of habituation to the presence of the turbines, there will still be substantial areas of improved grassland available to provide feeding in the immediate area. It is the intention of the local landowners to continue the current farming practices at all grasslands in the vicinity of T2 to T6 (excluding those used as part of the wind farm and those lands required to facilitate continuation of the commercial quarry activity), and therefore the lands will continue to be agricultural grassland, basically a well-managed, low sward.

Barrier effect

Rees (2012) cites eight published studies of flight behaviour which reported changes in flightlines for swans or geese initially seen heading towards turbines, at distances ranging from a few hundred metres to 5 km (the larger distances were by birds on migration); 50-100% of individuals/groups avoided entering the area between turbines, but in some cases the sample sizes were small. One of the studies, from the Hellrigg windfarm in the UK (cluster of four 80 m turbines), involved Whooper Swans with an estimated avoidance distance of >200 m. Commenting on studies to assess the barrier effect, Rees writes "*Avoidance of turbines should be related to whether or not flights were initially in line with the wind farm, rather than in relation to all bird movements in the area, as including the latter artificially boosts sample sizes used for calculating avoidance rates*."

As Derryarkin is not within a regular flight line by Whooper Swans, such as a route used by migrating birds or by birds commuting from a roost to a feeding site (or vice versa), it is considered that a potential 'barrier effect' impact is not relevant in this case. It is also noted that the layout for the proposed turbines is not on a linear plan or involves small clusters and that the turbines will be in the region of 500 m apart, which would encourage flying birds to pass between them.

Collisions with turbines

Jenkins et al. (2010) notes that theoretically, relatively large, heavy and socially interactive birds (e.g. swans and geese) are more susceptible to collision than small, light and relatively large-winged birds with acute vision. In a review of impacts of wind farms on swans and geese, Rees (2012) found that 72 swans or geese were reported as collision victims at 46 wind farms, but most (39 birds) were reported at 23 German wind farms where such data are collated, and even there only usually for c. 1 year post-construction. Two of the casualties were Whooper Swans, 25 were Mute Swans and four were unidentified swan species. While the review by Rees demonstrates that collisions do occur, she points out that swans and geese have good eyesight and that the review indicates that high levels of avoidance do occur.

During the short days of the mid-winter period, and especially during cold weather, Whooper Swans attempt to maximise available time spent feeding – this was well demonstrated during the present study when the swans continued to feed in virtual darkness and sometimes their departure from the fields only detected by their calls. For Whooper Swans, Brazil (2003) notes that during their typical very low-altitude flights between roosting and foraging sites they are, particularly in poor light, very much at risk from objects such as telephone and power lines and trees. Collisions are a particularly significant cause of swan mortality, accounting for 33-44% of casualties (Brazil 2003). It is noted, however, that most of the recorded collisions were with power lines or cables which the birds just cannot see. Although swans have a wide field of monocular vision to each side, suitable for detecting disturbance in any direction, they have only a narrow zone of binocular vision to the front and rear, and it appears they are rather poor at detecting thin horizontal objects ahead of them.

At Derryarkin, it is considered that swans feeding in local fields would be highly aware of the presence of the turbines in daylight and during normal weather conditions. Also, local flights within the feeding fields and to or from the night roost sites would normally be at low levels (less than 30 m) and well below the rotor sweep of the turbines (51.5 m distance from ground to blade sweep). Indeed, Larsen and Clausen (2002) found that on the basis of recorded heights of flocks in flight, wind parks with medium-sized turbines posed a greater risk than those with large rotors. From the available evidence, it is concluded that at Derryarkin there is some risk of collision with the turbines mainly when swans are commuting between feeding and roost sites in poor light or perhaps inclement weather. However, the risk is rated as being low because of the typical low altitude of the flight lines compared to the height of the rotor sweep. Mitigation to minimise the risk is suggested by the use of hazard warning lights on turbines 1 to 7 to make them more visible to the swans.

There will be no overhead power lines associated with the turbines and hence no risk of colliding with lines.

2.6 Assessment of Significance

This section considers the list of sites and species identified in sections 2.3 and 2.4. The sites are examined and, as considered appropriate or otherwise, excluded from further assessment on the basis that it can be demonstrated that the proposed project, alone or in–combination with other projects, could have no adverse effects on the integrity of the site as defined by the conservation objectives. Consideration is also given as to whether the favourable conservation status of the Whooper Swan can be maintained.

2.6.1 Lough Ennell SAC

The Lough Ennell SAC is selected for alkaline fens. As there are no direct or indirect linkages between the two sites (distance of c.10 km apart), it can be

concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

2.6.2 Lough Ennell SPA

The Lough Ennell SPA is selected for wetlands and various waterbird species. As there are no direct or indirect linkages between the two sites (distance of c.10 km apart), and no flighlines between the two locations are known, it can be concluded with certainty that the conservation objectives of the SPA will not be affected in any way by the proposed Yellow River wind farm project.

2.6.3 River Boyne and River Blackwater SAC

The River Boyne and River Blackwater SAC is selected for alluvial forest, alkaline fen, River Lamprey, Salmon and Otter.

As there are no direct linkages between the two sites (straighline distance of c.14 km apart) it can be concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

While there is a hydrological linkage between the Yellow River development area and the SAC (though a channel distance of up to 20 km between the locations), it can be concluded with a high degree of certainty that the sensitive project design and the comprehensive suite of mitigation measures which are specified in the EIS will rule out the possibility of negative impacts on salmonid fish (or any other qualifying interest) on or immediately downstream of the proposed development site and especially within the SAC

2.6.4 River Boyne and River Blackwater SPA

The River Boyne and River Blackwater SPA is selected for Kingfisher. As there are no direct or indirect linkages between the two sites (straightline distance of c.14 km apart), it can be concluded with certainty that the conservation objectives of the SPA will not be affected in any way by the proposed Yellow River wind farm project.

As discussed for the qualifying interests of the SAC, it can be shown with a high degree of certainty that the water quality of the SPA, and hence the food supply of Kingfisher, will not be adversely affected by the proposed wind farm project.

2.6.5 Raheenmore Bog SAC

The Raheenmore Bog SAC is selected for various bog habitats. As there are no direct or indirect linkages between the two sites (distance of c.4 km apart), it can be concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

2.6.6 Mount Hevey Bog SAC

The Mount Hevey Bog SAC is selected for various bog habitats. As there are no direct or indirect linkages between the two sites (distance of c.4 km apart), it can be concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

2.6.7 Spilt Hills and Long Hill Esker SAC

The Split Hills and Long Hill Esker SAC is selected for semi-natural dry grassland (orchid rich site). As there are no direct or indirect linkages between the two sites (distance of c.7 km apart), it can be concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

2.6.8 The Long Derries, Edenderry SAC

The Long Derries, Edenderry SAC is selected for semi-natural dry grassland (orchid rich site). As there are no direct or indirect linkages between the two sites (distance of c.11 km apart), it can be concluded with certainty that the conservation objectives of the SAC will not be affected in any way by the proposed Yellow River wind farm project.

2.6.9 Whooper Swan

It is considered that the local Whooper Swan population may be affected as follows:

- Disturbance during construction should works be carried out on turbines 1-7 between November and March.

- Permanent loss of grassland habitat – as this is a very small area (approximately 0.924 ha) of the grassland available to the swans in the immediate area this is unlikely to have a measureable negative impact on the swans

- Potential displacement from feeding areas around turbines nos. 2, 3, 4, 5 & 6. This could vary from a distance of 200 m to up 500 m around each turbine. Also likely displacement from the Kilmurray quarry pond roost.

- Risk of collision with turbines – this is considered low.

Mitigation measures are required to minimise the above impacts.

2.7 Conclusion of Screening

In order to determine the potential impacts of the proposed Yellow River wind farm on Natura 2000 sites and also on a local Whooper Swan population (Annex I species), a screening process was undertaken. The Yellow River site lies within a 15 km distance of eight Natura 2000 sites, namely Lough Ennell SAC, Lough Ennell SPA, River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA, Raheenmore Bog SAC, Mount Hevey Bog SAC, Split Hills and Long Hill Esker SAC and The Long Derries SAC.

There would be no direct impacts on any Natura 2000 site as a result of the proposed project. Consideration was given to possible impacts on the water quality of the various sites as a result of the proposed works and also on potential disturbance to bird species within the sites.

Following a rigorous assessment of the proposed project, it can be objectively shown that the sensitive design of the project, along with standard mitigation measures during construction phase, will ensure that the project, either alone or in-combination with other projects, will have no significant adverse impacts on the conservation objectives of any of the European sites in the area.

However, it is considered that the local Whooper Swan population could be potentially affected in a number of ways and mitigation is required to minimise such potential impacts.

It is concluded that progression to Stage 2 of the Appropriate Assessment process (i.e. preparation of a Natura Impact Statement) is not considered necessary for any of the Natura 2000 sites but is required for the Annex I Whooper Swan population.

3. APPROPRIATE ASSESSMENT

3.1 Introduction

In this section consideration is given as to whether the Yellow River Wind Farm Project could have significant adverse impacts on a local Whooper Swan population (Annex I species) when appropriate mitigation measures are applied.

As already noted, the population of Whooper Swans is not associated with any Natura 2000 site.

3.2 Background

Whoopers Swans were recorded in the improved grassland fields of the Derryarkin Farm sector of the site in 10 of 15 winter visits between November 2012 and April 2013. Numbers ranged from 3 to 82 (though it is known that over 100 swans were present during December 2012). The fields most often used were those adjoining the quarry complex, and especially fields no. 1 and 2 (see Figure 3). Swans were also recorded within fields no. 3, 4 and 5, and signs of recent usage were found in fields no. 6 and 7. The Kilmurray quarry ponds were used by roosting swans occasionally.

These swans are part of a population that moved regularly between a cluster of feeding and roost sites in the immediate area.

3.3 Overview of Impacts

It is considered that the local Whooper Swan population may be affected as follows:

- Disturbance during construction should works be carried out on turbines 1-7 between November and March.

- Permanent loss of grassland habitat – as this is a very small area (approximately 0.924 ha) of the grassland available to the swans in the immediate area this is unlikely to have a measureable negative impact on the swans

- Potential displacement from feeding areas around turbines nos. 2, 3, 4, 5 & 6. This could vary from a distance of 200 m to up 500 m around each turbine. Also likely displacement from the Kilmurray quarry pond roost.

- Risk of collision with turbines – this is considered low.

The mitigation measures which are required to minimise the above impacts are discussed in the following section.

3.4 Mitigation Measures

3.4.1 Seasonal restrictions on construction

Construction of turbines 1 to 7 will be outside of the period November to March (inclusive) so as to avoid disturbance to wintering swans.

3.4.2 Use of warning lights on turbines

Hazard warning lights (similar to aircraft warning lights) will be placed on the hubs of turbines 1 to 7 so as to minimise risk of collision during poor light conditions or inclement weather (fog etc.). These lights will be in use from November to March inclusive. It is recommended that the lights should be programmed to come on for 90 minutes before and after sunset and for 90 minutes before and after sunrise.

3.4.3 Maintenance of grassland for feeding swans

As discussed, it is considered likely that the Whooper Swans will avoid feeding in areas close to the turbines. The avoidance distances may be from 200 m (or even less) to possibly up to 500 m, though these distances are likely to diminish as the birds become accustomed to the presence of the turbines.

As the fields presently provide optimum feeding for the swans, it is the intention of the local landowners to continue the current farming practices at all grasslands in the vicinity of T2 to T6 (excluding those used as part of the wind farm and those lands required to facilitate continuation of the commercial quarry activity), and therefore the lands will continue to be agricultural grassland, basically a well-managed, low sward, which will provide feeding for Whooper Swans.

3.4.4 Monitoring of swans

The usage of the Derryarkin fields by wintering swans, including assessment of the benefits of the mitigation measures outlined above, will be monitoring in the winter prior to construction and then for a period of up to 5 years post construction. Particular attention will be given to the distances feeding swans approach to the turbines. Flight lines to and from the site will be recorded. The population will be

monitored in the context of the wider population in the Rhode area (similar to the surveys as carried out for the present project). These monitoring reports will be submitted to NPWS on an annual basis.

3.5 Analysis of "In-Combination" Effects

The Habitats Directive requires competent authorities to make an appropriate assessment of any plan or project which is likely to have a significant effect alone or in-combination with other plans and projects.

The assessment of potential impacts on Natura sites within a 15 km radius of the project area has shown that none of the sites could be affected either directly or indirectly by the proposed project. However, without appropriate mitigation a local Whooper Swan population will be potentially affected in a number of ways. The analysis of in-combination effects considers projects and landuses affecting or potentially affecting this population and whether the wind farm development is likely to add to an overall effect on their well being.

The following projects or landuses are considered in the context of possible in-combination effects.

Wind farms

Mount Lucas wind farm is located approximately 10 km south of the proposed Yellow River development. Mount Lucas is currently under construction and comprises 28 turbines with an output of 79.2 MW.

Apart from Mount Lucas, there are no other wind farms in the wider area (next wind farms are Carrig and Skehanagh in Co Tipperary, approximately 65 km to the southwest).

As there is a substantial distance between the development site and Mount Lucas, and considering there are no known Whooper Swan populations associated with the Mount Lucas site (source: Mount Lucas EIS), it is concluded that there would be no significant cumulative impact on Whooper Swans wintering in the wider area as a result of the proposed development.

Agriculture

While Whooper Swans can have strong attachment to traditional sites used every winter (such as natural flood plain grasslands), improved grasslands nowadays provide an important habitat for feeding swans (Boland et al. 2010). Typically swans move readily between agricultural sites (i.e. pasture but also arable fields) in response to disturbance events, changes in food availability, flooding, etc. Grazing fields that are used by swans tend to be large and open, with local wet areas a particularly useful feature.

In the Rhode area, farming is mainly grazing for sheep and cattle at a fairly intensive level. There would appear to be a large number of potentially suitable fields that could be used by swans, especially fields on reclaimed peat which still have local wet patches. At times of heavy rain, some fields may become more attractive for feeding swans. Should farming practices in fields change to perhaps low intensity grazing, swans are likely to abandon such fields.

It can be concluded that usage of agricultural fields by swans is entirely dependant on the current management practice in any one area and over the course of a few winters the birds would be expected to abandon some fields and exploit others that have become suitable.

The local Whooper Swan population at Derryarkin does not appear to be limited by grazing opportunities on agricultural land and the loss of a relatively small amount of grazing land as a result of the proposed development is unlikely to contribute to any adverse cumulative impact.

Disturbance

Wintering swans are prone to disturbance from people. They tend to habituate quickly to the presence of vehicular traffic, trains and industrial activities (such as quarrying) but the presence of a person in the near vicinity (say a few hundred metres) will invariably alert them and eventually cause them to flight.

There is fairly regular disturbance in the Derryarkin area due to ongoing farming activities. During the present study, the swans were observed to leave the fields on several occasions due to farm personnel attending to animals in adjoining fields. Usually they flew a short distance into another field or onto adjoining cutaway bog.

The proposed wind farm will not contribute disturbance to wintering swans during the construction phase as works in the fields that are used by swans will be outside of the winter period (see mitigation). During the operation phase, there will be occasional maintenance activity at the turbines which may cause localised disturbance. However, this on an infrequent basis and would only add a small amount to the existing regular disturbance from farm activities.

Overview of in-combination effects

The present assessment has shown that the main influence on the presence of the Whooper Swan population in the Derryarkin area is current farming practices. Changes in agriculture, such as lowering of farming intensity, could cause the swans to abandon fields that they presently use. Similarly, improvements to existing fields not currently used by swans could attract them in the future. Routine farming activities may cause disturbance to feeding swans. There is no evidence to indicate that the only other wind farm in the wider area (Mount Lucas) will have any adverse impacts on the Whooper Swan population in the area. It is concluded that the proposed Yellow River wind farm will not add significantly to any current adverse impacts on the Whooper Swan population.

3.6 Conclusion

Whilst the proposed development could potentially have an adverse impact on a local Whooper Swan population (Annex I species), it can be objectively shown that the sensitive design of the project along with the mitigation measures proposed will ensure that the project, either alone or in-combination with other projects or landuses, will have no significant adverse impacts on the conservation status of this important European species.

3.7 References

Boland, H., McElwaine, J.G., Henderson, G., Hall, C., Walsh, A. & Crowe, O. (2010) Whooper and Bewick's Swans in Ireland: results of the International Swan Census, January 2010. *Irish Birds* 9: 1-10.

Brazil, M. (2003) *The Whooper Swan*. Poyser, London.

Department of Environment, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. See www.npws.ie

Department of the Arts, Heritage & the Gaeltacht (2013). Protected sites in County Galway - listings and maps. See www.npws.ie

European Commission (1996). *Interpretation Manual of European Union Habitats*. Version Eur 15. European Commission, DG XI.

Jenkins, A.R., Smallie, J.J. & Diamond, M. (2010) Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278.

Larsen, J.K. & Clausen, P. (2002) Potential wind park impacts on whooper swan in winter: the risk of collision. *Waterbirds* 25 (Special Publication 1): 327-330.

Madsen, J. & Boertmann, D. (2008) Animal behavioural adaptation to changing landscapes: spring-staging geese habituate to wind farms. *Landscape Ecology* 23: 1007-1011.

Rees, E.C. (2012) Impacts of wind farms on swans and geese: a review. *Wildfowl* 62: 37-72.

APPENDIX 1

SITE SYNOPSES

SITE NAME: LOUGH ENNELL

SITE CODE: 000685

Lough Ennell is a large, open, steep-sided lake, located 3km south of Mullingar, Co. Westmeath. The lake bottom is of limestone with a marl deposit. The water is markedly alkaline and mesotrophic, possibly owing to effluents received from Mullingar town and to fertilizer inputs from farmland surrounding the lake. The River Brosna flows into the lake from the north, at Butler's Bridge, and out from the south.

Lough Ennell supports a diverse aquatic flora; seven Stonewort species have been identified including two Red Data Book species, *Chara denudata* and *C. tomentosa*. Scharff's Char (*Salvelinus scharffi*), a distinct race of char which was once found only in Lough Owel and Lough Ennell, is now thought to be extinct. Notable aquatic invertebrates recorded from the lake include *Tinodes maculicornis*, *Metalype fragilis, Limnephilus nigriceps* (Trichoptera); *Picromerus bidens*, *Monarthia humili* (Hemiptera) and *Donacia obscura* (Coleoptera).

Much of the lakeshore is rather dry, stony ground, which was formerly part of the lake bed but is now exposed by drainage, and colonised by calcareous grassland. Species such as Mountain Everlasting (*Antennaria dioica*), Hairy Lady's-mantle (*Alchemilla filicaulis* subsp. *vestita*), Frog Orchid (*Coelglossum viride*), Fairy Flax (*Linum catharticum*) and Yellow-wort (*Blackstonia perfoliata*) occur here. Alkaline fen, a habitat listed on Annex I of the EU Habitats Directive, is also found on the lake shore with species such as Grass-of-parnassus (*Parnassia palustris*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Bottle Sedge (*Carex rostrata*). In wet marshy patches along the shore Marsh-marigold (*Caltha palustris*), Brookweed (*Samolus valerandi*) and Lesser Water-plantain (*Baldellia ranunculoides*) are common.

Reedbeds and species-poor swamp vegetation occasionally fringe the lake, particularly around the points of inflow and outflow and on the eastern shore, around Tudenham Park. Common Reed (*Phragmites australis*) is abundant here. Water-plantain (*Alisma plantago-aquatica*), Cowbane (*Cicuta virosa*), Frogbit (*Hydrocharis morsus-ranae*) and Tufted Sedge (*Carex elata*) also occur. The latter two species are of note in that they are of occasional in the eastern midlands but are rarely recorded elsewhere. The rare Fibrous Tussock-sedge (*Carex appropinquata*) has been recorded here also. This species has a disjunct distribution, being recorded only from Co. Clare and from two midland counties (Westmeath and Offaly).

Mixed woodland of Beech (*Fagus sylvatica*), Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*) fringes the lakeshore to the northwest. Bluebell (*Hyacinthoides non-scripta*) and Lords-and-ladies (*Arum maculatum*) are among the woodland ground flora.

A species of blue-green alga (*Schizothrix fasciculata*), which forms little pebbles of lime that are cast up on the lakeshore, occurs in Lough Ennell and has not been recorded from anywhere else in Ireland.

Yellow Archangel (*Lamiastrum galeobdolon*), a rare plant listed in the Red Data Book, has been recorded in the woods along the eastern shores of Lough Ennell. This is the only record for this species outside the south-east of Ireland. The rare Myxomycete fungus, *Licea castanea*, has been recorded from woodland in the site.

This site shares an internationally important Greenland White-fronted Goose flock with Loughs Iron, Glen and Owel. The numbers of Geese which visit Lough Ennell are lower than for the other lakes: 9l birds (3 year average peak). Nationally important bird populations which have been recorded on Lough Ennell are: Cormorant (average peak l49; absolute maximum 448); Mute Swan (average peak 424); Pochard (average peak 889; maximum 2,600 on 8/ll/85); Tufted Duck (average peak 720) and Coot (average peak 639). All of these data were compiled from counts made over 3 seasons, l984/85 - l986/87. A single count of 522 Golden Plover was obtained in that period, i.e. a regionally important population.

Lough Ennell is an important amenity area, much used for fishing, boating and camping. Sections of the shoreline are managed for visitor access and amenity. The chemical composition of effluent from the Mullingar sewage treatment plant has a significant impact on the water quality of Lough Ennell. The mid-l970s saw the introduction of treatment of the sewage to reduce phosphates, with a resulting improvement in water quality (according to data compiled during l987-90). However, levels of planktonic algal growth in the lake water continue to fluctuate, in response to the variable efficiency of the phosphate removal facility at the sewage treatment plant and the re-mobilization of phosphate from the lake sediments.

Lough Ennell is of significance as a highly productive lake which supports a rich variety of lower plant and invertebrate species. Its lakeshore habitats, which include alkaline fen, a habitat listed on Annex I of the EU Habitats Directive, support a diverse flora. These habitats also provide important refuges for wildfowl.

SITE NAME: LOUGH ENNELL SPA

SITE CODE: 004044

Lough Ennell is a large, limestone lake. It has a length of approximately 6.5 km along its long axis and is mostly ca. 2 km wide. The River Brosna is the principal inflow and outflow river. It is a relatively shallow lake, with a maximum depth of ca. 30 m. The water is hard, with low colour and markedly alkaline pH. The lake is classified as a mesotrophic system by the EPA though it had been eutrophic in the past. The lake bottom is of limestone with a marl deposit.

Lough Ennell supports a diverse aquatic flora, with a particularly well-developed charophyte flora. 9including two Red Data Book species, *Chara denudata* and *C. tomentosa).* Reedbeds and species-poor swamp vegetation occasionally fringe the lake, particularly around the points of inflow and outflow and on the eastern shore, around Tudenham Park. Common Reed (*Phragmites australis*) is abundant here. Water-plantain (*Alisma plantago-aquatica*), Cowbane (*Cicuta virosa*), Frogbit (*Hydrocharis morsus-ranae*) and Tufted Sedge (*Carex elata*) also occur.. Much of the

lakeshore is rather dry, stony ground, which was formerly part of the lake bed but is now exposed by drainage, and colonised by calcareous grassland. Alkaline fen is also found on the lake shore. There are several islands within the lake. Lough Ennell is an important trout fishery.

Lough Ennell is one of the most important midland lakes for wintering waterfowl, with nationally important populations of Mute Swan (340), Pochard (738), Tufted Duck (1,303) and Coot (433). (All figures are average peaks for the 5 seasons 1995/96-1999/00). The population of Tufted Duck represents over 3% of the national total. At times, the lake is utilised as a roost (with limited feeding) by the internationally important midland lakes population of Greenland White-fronted Goose (ca.400 strong). The site also attracts Golden Plover (200) and Lapwing (673) though these feed mainly outside of the SPA site.

Lough Ennell is very vulnerable to pollution from agricultural and domestic sources though water quality has been satisfactory in recent years. A deterioration in water quality could affect bird populations (as shown by marked fluctuations in some populations in the past). Lough Ennell is an important amenity area, much used for fishing, boating and camping. Sections of the shoreline are managed for visitor access and amenity. Increases in such recreational activities could cause disturbance to the birds.

Lough Ennell is of ornithological significance for wintering waterfowl, with four species having populations of national importance. The occurrence of a further two species in the vicinity of the lake, Greenland White-fronted Goose and Golden Plover, is of particular note as these are listed in Annex I of the EU Birds Directive.

SITE NAME: RIVER BOYNE AND RIVER BLACKWATER

SITE CODE: 002299

This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Trimblestown Rivers. These riverine stretches drain a considerable area of Meath and Westmeath and smaller areas of Cavan and Louth. The underlying geology is Carboniferous Limestone for the most part with areas of Upper, Lower and Middle well represented. In the vicinity of Kells Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. There are many large towns adjacent to but not within the site. Towns both small and large, include Slane, Navan, Kells, Trim, Athboy and Ballivor.

The site is a candidate SAC selected for alkaline fen and alluvial woodlands, both 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 – Atlantic Salmon, Otter and River Lamprey.

The main areas of alkaline fen are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the local terrain produces frequent springs and seepages which are rich in lime. A series of base-rich

marshes have developed in the poorly-drained hollows, generally linked with these three lakes. Open water is usually fringed by Bulrush (*Typha latifolia*), Common Club-rush (*Scirpus lacustris*) or Common Reed (*Phragmites australis*) and this last species also extends shorewards where a dense stand of Great Fen Sedge or Saw Sedge (*Cladium mariscus*) frequently occurs. This in turn grades into a sedge and grass community (*Carex* spp., *Molinia caerulea*) or one dominated by the Black Bog-rush (*Schoenus nigricans*). An alternative direction for the aquatic/terrestrial transition to take is through a floating layer of vegetation. This is normally based on Bogbean (*Menyanthes trifoliata*) and Marsh cinquefoil (*Potentilla palustris*). Other species gradually become established on this cover, especially plants tolerant of low nutrient status e.g. bog mosses (*Sphagnum* spp.). Diversity of plant and animal life is high in the fen and the flora, includes many rarities. The plants of interest include Narrow-leaved Marsh Orchid (*Dactylorhiza traunsteineri*), Fen Bedstraw (*Galium uliginosum*), Cowbane (*Cicuta virosa*), Frogbit (*Hydrocharis morsus-ranae*) and Least Bur-reed (*Sparganium minimum*). These species tend to be restricted in their distribution in Ireland. Also notable is the abundance of aquatic Stoneworts (*Chara* spp.) which are characteristic of calcareous wetlands.

The rare plant, Round-leaved Wintergreen (*Pyrola rotundifolia*) occurs around Newtown Lough. This species is listed in the Red Data Book and is protected under the Flora Protection Order, 1999, and this site is its only occurrence in Co. Meath.

Wet woodland fringes many stretches of the Boyne. The Boyne River Islands are a small chain of three islands situated 2.5 km west of Drogheda. The islands were formed by the build up of alluvial sediment in this part of the river where water movement is sluggish. All of the islands are covered by dense thickets of wet, Willow (*Salix* spp.) woodland, with the following species occurring: Osier (*S. viminalis*), Crack Willow (*S. fragilis*), White Willow (*S. alba*), Purple Willow (*Salix purpurea*) and Grey Willow (*S. cinerea*). A small area of Alder (*Alnus glutinosa*) woodland is found on soft ground at the edge of the canal in the north-western section of the islands. Along other stretches of the rivers of the site Grey Willow scrub and pockets of wet woodland dominated by Alder have become established, particularly at the river edge of mature deciduous woodland. Ash (*Fraxinus excelsior*) and Birch (*Betula pubescens*) are common in the latter and the ground flora is typical of wet woodland with Meadowsweet (*Filipendula ulmaria*), Angelica (*Angelica sylvestris*), Yellow Iris, Horsetail (*Equisetum* spp.) and occasional tussocks of Greater Tussock-sedge (*Carex paniculata*).

The dominant habitat along the edges of the river is freshwater marsh - the following plant species occur commonly here: Yellow Flag (*Iris pseudacorus*), Creeping Bent (*Agrostis stolonifera*), Canary Reed-grass (*Phalaris arundinacea*), Marsh Bedstraw (Galium palustre), Water Mint (*Mentha aquatica*) and Water Forget-me-not (*Myosotis scorpioides*). In the wetter areas of the marsh Common Meadow-rue (*Thalictrum flavum*) is found. In the vicinity of Dowth, Fen Bedstraw (*Galium uliginosum*), a scarce species mainly confined to marshy areas in the midlands, is common in this vegetation. Swamp Meadow-grass (*Poa palustris*) is an introduced plant which has spread into the wild (naturalised) along the Boyne approximately 5 km south-west of Slane. It is a rare species which is listed in the Red Data Book and has been recorded among freshwater marsh vegetation on the banks of the Boyne in this site. The only other record for this species in the Republic is from a site in Co. Monaghan.

The secondary habitat associated with the marsh is wet grassland and species such as Tall Fescue (*Festuca arundinacea*), Silverweed (*Potentilla anserina*), Creeping Buttercup (*Ranunculus repens*), Meadowsweet (*Filipendula ulmaria*) and Meadow Vetchling (*Lathyrus pratensis*) are well represented. Strawberry Clover (*Trifolium fragiferum*), a plant generally restricted to coastal locations in Ireland, has been

recorded from wet grassland vegetation at Trim. At Rossnaree river bank on the River Boyne, is Round-Fruited Rush (Juncus compressus) found in alluvial pasture, which is generally periodically flooded during the winter months. This rare plant is only found in three counties in Ireland.

Along much of the Boyne and along tributary stretches are areas of mature deciduous woodland on the steeper slopes above the floodplain marsh or wet woodland vegetation. Many of these are planted in origin. However the steeper areas of King Williams Glen and Townley Hall wood have been left unmanaged and now have a more natural character. East of Curley Hole the woodland has a natural appearance with few conifers. Broad-leaved species include Oak (*Quercus* spp.), Ash (*Fraxinus excelsior*), Willows, Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Horse chestnut (*Aesculus* sp.) and the shrubs Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*) and Elder (*Sambucus nigra*). South-west of Slane and in Dowth, the addition of some more exotic tree species such as Wych Elm (*Ulmus glabra*), Beech (*Fagus sylvatica*), and occasionally Lime (*Tilia cordata*), are seen. Coniferous trees, Larch (*Larix* sp.) and Scots Pine (*Pinus sylvestris*) also occur. The woodland ground flora includes Barren Strawberry (*Potentilla sterilis*), Enchanter's Nightshade (*Circaea lutetiana*) and Ground-ivy (*Glechoma hederacea*), along with a range of ferns. Variation occurs in the composition of the canopy, for example, in wet patches alongside the river, White Willow and Alder form the canopy.

Other habitats present along the Boyne and Blackwater include lowland dry grassland, improved grassland, reedswamp, weedy wasteground areas, scrub, hedge, drainage ditches and canal. In the vicinity of Lough Shesk, the dry slopes of the morainic hummocks support grassland vegetation which, in some places, is partially colonised by Gorse (*Ulex europaeus*) scrub. Those grasslands which remain unimproved for pasture are species-rich with Common Knapweed (*Centaurea nigra*), Creeping Thistle (*Cirsium arvense*) and Ribwort Plantain (*Plantago lanceolata*) commonly present. Fringing the canal alongside the Boyne south-west of Slane, are Reed Sweet-grass (*Glyceria maxima*), Great Willowherb (*Epilobium hirsutum*) and Meadowsweet.

The Boyne and its tributaries is one of Ireland's premier game fisheries and it offers a wide range of angling from fishing for spring salmon and grilse to seatrout fishing and extensive brown trout fishing. Atlantic Salmon (*Salmo salar*) use the tributaries and headwaters as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the Habitats Directive. Atlantic Salmon run the Boyne almost every month of the year. The Boyne is most important as it represents an eastern river which holds large three-sea-winter fish from 20 –30 lb. These fish generally arrive in February with smaller spring fish (10 lb) arriving in April/May. The grilse come in July, water permitting. The river gets a further run of fish in late August and this run would appear to last well after the fishing season. The salmon fishing season lasts from 1st March to 30th September.

The Blackwater is a medium sized limestone river which is still recovering from the effects of the arterial drainage scheme of the 70's. Salmon stocks have not recovered to the numbers pre drainage. The Deel, Riverstown, Stoneyford and Trimblestown Rivers are all spring fed with a continuous high volume of water. They are difficult to fish in that some are overgrown while others have been affected by drainage with the resulting high banks.

The site is also important for the populations of two other species listed on Annex II of the E.U. Habitats Directive, namely River Lamprey (*Lampetra fluviatilis*) which is present in the lower reaches of the Boyne River while the Otter (*Lutra lutra*) can be found throughout the site. In addition, the site also supports many more of the

mammal species occurring in Ireland. Those which are listed in the Irish Red Data Book include Pine Marten, Badger and Irish Hare. Common Frog, another Red Data Book species, also occurs within the site. All of these animals with the addition of the Stoat and Red Squirrel, which also occur within the site, are protected under the Wildlife Act.

Intensive agriculture is the main landuse along the site. Much of the grassland is in very large fields and is improved. Silage harvesting is carried out. The spreading of slurry and fertiliser poses a threat to the water quality of this salmonid river and to the lakes. In the more extensive agricultural areas sheep grazing is carried out.

Fishing is a main tourist attraction on the Boyne and Blackwater and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The Eastern Regional Fishery Board have erected fencing along selected stretches of the river as part of their salmonid enhancement programme. Parts of the river system have been arterially dredged. In 1969 an arterial dredging scheme commenced and disrupted angling for 18 years. The dredging altered the character of the river completely and resulted in many cases in leaving very high banks. The main channel from Drogheda upstream to Navan was left untouched, as were a few stretches on the Blackwater. Ongoing maintenance dredging is carried out along stretches of the river system where the gradient is low. This is extremely destructive to salmonid habitat in the area. Drainage of the adjacent river systems also impacts on the many small wetland areas throughout the site. The River Boyne is a designated Salmonid Water under the EU Freshwater Fish Directive.

The site supports populations of several species listed on Annex II of the EU Habitats Directive, and habitats listed on Annex I of this directive, as well as examples of other important habitats. Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country, particularly in the north-east. The semi-natural habitats, particularly the strips of woodland which extend along the river banks and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site as does the presence of a range of Red Data Book plant and animal species and the presence of nationally rare plant species.

SITE NAME: RAHEENMORE BOG

SITE CODE: 000582

This raised bog developed in a small basin in the catchment of two major river systems i.e. the Brosna and the Boyne. It is situated about 5 km from Daingean. The peat is very deep, being up to 15 m in places. The bog has a well-developed hummock and hollow system.

The hummocks are often colonised by the mosses *Sphagnum imbricatum* and *S. fuscum*. Pool areas support Great Sundew (*Drosera anglica*), the moss *Sphagnum cuspidatum* and the liverwort (*Cladopodiella fluitans*). In places, moss lawns of *Sphagnum magellanicum* have infilled the pools. Overall, the cover of *Sphagnum* moss on the bog is very good. Away from the dome summit, Bog Asphodel (*Narthecium ossifragum*) flats dominate the peat surface.

Some sections of old cutaway bog has narrow strips of Downy Birch (*Betula pubescens*) woodland developing. Much of the rest of the cutaway is now un-improved pasture and wet grassland, rich in Rushes (*Juncus* spp.) and Purple Moor-grass (*Molinia caerulea*). Valerian (*Valeriana officinalis*), Meadowsweet (*Filipendula ulmaria*) and Brown Sedge (*Carex disticha*) can also be found in fields at the bog margins. In 1959, the very rare Rannock Rush (*Scheuchzeria palustris*), found only in its only Irish Station in a nearby bog, was transplanted to Raheenmore Bog. However, it has not been recorded recently and may be now extinct.

Raheenmore Bog is within the breeding territory of a pair of Merlin, a scarce species in Ireland and one that is listed on Annex I of the EU Birds Directive. Other typical bogland birds which breed include Red Grouse and Snipe.

The margins of the bog have been arterially drained in connection with the previous Boyne Drainage Scheme. This could result in desiccation of the bog. However, the majority of the bog dome is undrained and peat extraction has substantially discontinued. On the western side, mineral springs feeding the lagg zone still survive. (The lagg zone is the natural marginal drainage channel circumscribing the bog and receiving water from the bog and adjacent mineral soil). Although the north-eastern section suffered from burning in the past, the majority of the site is relatively unaffected by this practice at present.

Raheenmore Bog is a classical example of a Midland Raised Bog and the deepest remaining in Ireland. This habitat is increasingly under threat in this country and worldwide. The site is remarkably intact and is one of the few raised bogs where restoration of the lagg zone is feasible.

SITE NAME: MOUNT HEVEY BOG

SITE CODE: 002342

Mount Hevey Bog is situated approximately 4 km north-east of Kinnegad, in the townlands of Cloncrave, White Island, Aghamore, Kilwarden and Kilnagalliagh. The Meath-Westmeath county boundary runs through the centre of the bog. The site comprises a raised bog that includes both areas of high bog and cutover bog. The Dublin-Sligo railway runs through the northern part of the bog isolating two northern lobes. The northern lobes are adjacent to the Royal Canal.

The site is a candidate Special Area of Conservation selected for active raised bog, degraded raised bog and Rhynchosporion, habitats that are listed on Annex I of the E.U. Habitats Directive. Active raised bog comprises areas of high bog that are wet and actively peat-forming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, *Sphagnum* lawns, flushes and soaks. Degraded raised bog corresponds to those areas of cutover and high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes White Beak-sedge (*Rhynchospora alba*) and/or Brown Beak-sedge (*R. fusca*), and at least some of the following associated species, Bog Asphodel (*Narthecium ossifragum*), Sundews (*Drosera* spp.), Deergrass (*Scirpus cespitosus*), Carnation Sedge (*Carex panicea*).

The site consists of a long narrow bog separated into four sub-sections; the larger eastern section supports a wet quaking area with hummock/hollows and pool complex. Hummock/hollow complex also occurs in the south-west lobe and the north-west lobe of the site. An infilled lake is now a soak system. Forestry occurs on the most easterly section of the site. There is abandoned cutover all around this bog and particularly on the western section. There is some wet and actively regenerating areas of the cutover along the southern margins of the western lobe and along the railway.

Much of the high bog has vegetation typical of the Midlands Raised Bog type. The vegetation consists of Ling Heather (*Calluna vulgaris*), Cottongrass (*Eriophorum angustifolium* and *E. vaginatum*), Bog Asphodel, White Beak-sedge and midland indicator species Bog-rosemary (*Andromeda polifolia*) and the bog moss *Sphagnum magellanicum*. The wet quaking area in the eastern section of the bog has pools that support the bog moss *Sphagnum cuspidatum* with White Beak-sedge, Cottongrass and Ling Heather at the edges. The hummock/hollow complex supports a range of hummock-forming bog mosses, including *Sphagnum imbricatum* and *S. fuscum*, as well as other species such as *S. capillifolium, S. magellanicum and S. papillosum*. Other plants found in the hummock/hollow complexes are Bog-rosemary, Cross-leaved Heath (*Erica tetralix*), Bog Asphodel and Deergrass.

The infilled lake is wet and quaking and the vegetation is dominated by Purple Moor-grass (*Molinia caerulea*), Bog-myrtle (*Myrica gale*) and Downy Birch (*Betula pubescens*) with bog mosses *Sphagnum palustre* and *S. papillosum*. The birch trees appear to be between 20 and 30 years old and the Bog Myrtle is over 150 cm high. The edge of the former lake is clearly marked by robust plants of Ling Heather. Some areas of old abandoned cutover bog on the site are very wet and regenerating well, with a good cover of bog mosses, including such species as *Sphagnum cuspidatum, S. papillosum*, *S. capillifolium*, *S. auriculatum* and *S. subnitens.*

Current landuse on the site consists of limited mechanised peat-cutting, mostly on the eastern end of the high bog. There are areas of old peat cuttings all around the site with some very old abandoned regenerating cutover along the edge of the railway. The area to the east of the site has been afforested. Areas of cutover have been reclaimed for agricultural purposes. Damaging activities associated with these landuses include drainage throughout the site (both old and recent) and burning of the high bog. These are all activities that have resulted in loss of habitat and damage to the hydrological status of the site, and pose a continuing threat to its viability.

Mount Hevey Bog is a site of considerable conservation significance comprising as it does a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. The site supports a good diversity of raised bog microhabitats, including hummock/hollow complexes, pools, flushes and regenerating cutover, as well as a number of scarce plant species. Active raised bog is listed as a priority habitat on Annex I of the E.U. Habitats Directive. Priority status is given to habitats and species that are threatened throughout the E.U. Ireland has a high proportion of the total E.U. resource of this habitat type (over 60%) and so has a special responsibility for its conservation at an international level.

SITE NAME : SPLIT HILLS AND LONG HILL ESKER

SITE CODE : 001831

Split Hills and Long Hill Esker is a 5km long site which crosses the main Galway-Dublin road mid-way between Kilbeggan and Tyrrellspass in Co. Westmeath. It is a very prominent feature on the local landscape.

The main habitat is of semi-natural woodland dominated by Hazel (Corylus avellana), Ash (Fraxinus excelsior), and Hawthorn (Crataegus monogyna). Oak (Quercus robur), Wych Elm (Ulmus glabra) and Irish Whitebeam (Sorbus hibernica) are important constituents. There are very fine examples of these trees throughout the site: some Hazel trees, in particular, are impressive. The ground flora is species-rich and includes Primrose (Primula vulgaris), Enchanter's Nightshade (Circaea lutetiana), Golden Saxifrage (Chrysosplenium oppositifolium), Bluebell (Hyacinthoides non-scripta), Ground Ivy (Glechoma hederacea), Sanicle (Sanicula europaea) and other typical woodland plants. The scarce woodland grass, Wood Fescue (Festuca altissima), is present, and the scarce Bird's-nest Orchid (Neottia nidus-avis) has also been recorded here. The presence of Wych Elm is interesting in view of its decline due to Dutch Elm Disease.

Several areas of species-rich calcareous grassland occur, with typical calcicole species such as Yellow-wort (Blackstonia perfoliata), Carline Thistle (Carlina vulgaris), Mountain Everlasting (Antennaria dioica) and Early-purple Orchid (Orchis mascula). These occur on unstable old and active quarry faces, and on cleared woodland areas. Areas of scrub with Blackthorn (Prunus spinosa) and Gorse (Ulex europaeus) occur, and regenerating Hazel (Corylus avellana) scrub exists in some areas where woodland has been cleared. Other habitats in the site include a small lake and freshwater marsh with Slender Sedge (Carex lasiocarpa).

Narrow-leaved Bittercress (Cardamine impatiens) occurs among the woodland flora at this site. It is an annual or biennial, whose populations are known to 'disappear' in some years only to 'reappear' again. The species is protected under The Flora Protection Order (1999), and this is its only known location in Ireland. Another protected species, Hemp Nettle (Galeopsis angustifolia), occurs on more open ground on the esker.

The main threat to the esker is quarrying for sand and gravel: this activity already occurs on the site at several locations. Grazing is a critical factor affecting esker habitats. The presence of too many grazers causes damage to the ground vegetation in both woodlands and grasslands and prevents regeneration of woody species. If the grazing level is too low, grasslands are vulnerable to the encroachment of scrub at the expense of species which require open conditions. Fertiliser application, associated with agricultural improvement, also leads to a reduction in species-richness of grasslands.

Split Hill and Long Hill Esker is one of the finest and longest wooded eskers in the country, one of the very few woodlands in the area and a fine geomorphological feature of great scenic value. The trees are particularly well-grown and impressive and much of the woodland has developed naturally on its steep slopes. The presence of a very species-rich ground flora which includes a rare and legally protected plant, at its only known Irish location, makes this site of great botanical and ecological importance. The site also supports some excellent examples of calcareous grassland which is rich in orchids. The increasing rarity of this habitat (due to agricultural intensification) is recognised in that it is awarded priority status on Annex I of the European Habitats Directive.

SITE NAME: THE LONG DERRIES, EDENDERRY

SITE CODE: 000925

The Long Derries is located approximately 5 km south-east of Edenderry and is part of a low esker ridge running from Edenderry to Rathdangan. It primarily consists of glacial gravels interspersed with loam and peat soil.

The dominant habitat is dry calcareous grassland. This can be observed towards the north-western end where Carline Thistle (*Carlina vulgaris*), Marjoram (*Origanum vulgare*), Wild Thyme (*Thymus praecox*) and Cowslip (*Primula veris*) grow. An interesting feature is a number of used and unused gravel pits which are host to plants such as Mountain Everlasting (*Antennaria dioica*) and the rare Fine-leaved Sandwort (*Minuartia hybrida*) among others.

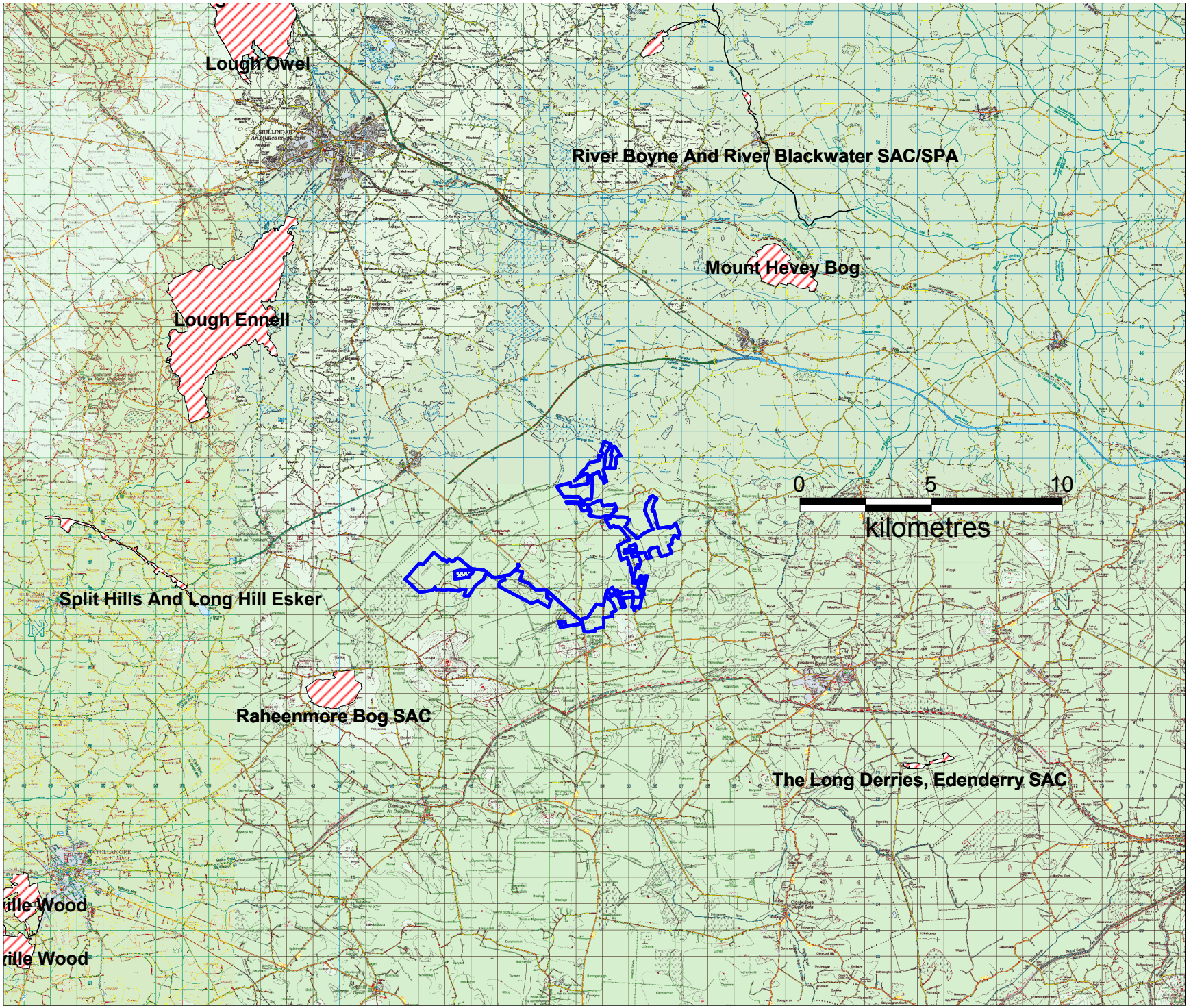
In places invading Hawthorn (*Crataegus monogyna*) forms blocks of scrub interspersed with open areas of calcareous grassland, as can be viewed in the eastern section. The eastern boundary grades into peatland where calcareous runnels are interspersed with miniature peat flushes. Here calcicole plant species are mixed with calcifuge ones such as Heather (*Calluna vulgaris*), Tormentil (*Potentilla erecta*), Lousewort (*Pedicularis sylvatica*) and Devil's-bit Scabious (*Succisa pratensis*).

An important aspect of this site is the presence of the rare, Red Data Book species, Blue Fleabane (*Erigeron acer*), and the legally protected (Flora Protection Order, 1987), Basil Thyme (*Acinos arvensis*) and Green-winged Orchid (*Orchis morio*). A large population of the latter species occurs in the grassland communities, including those in the transition to peatland zone. Blue Fleabane is found in grassland and gravel pits on the site, the latter habitat also supporting Basil Thyme.

The summer birdlife of this area includes Sand Martin, Whinchat, Whitethroat and Cuckcoo. Nightjar, a rare species listed in Annex I of the EU Birds Directive, breeds on the site. Partridge, an endangered species in Ireland and one listed in the Red Data Book, is known from the site. Badgers have setts along some of the mature hedgerows.

The western section of this site is used in connection with activities connected with the harvesting of peat. The eastern section of the site is grazed by cattle and horses. Grazing is essential for the preservation of the rare orchid, but overgrazing needs to be avoided. Shooting and motorbike scrambling are other activities occurring. Although gravel extraction has helped create habitats for some plant species, this could result in excessive damage if uncontrolled. Dumping of rubbish and old railway tracks is undesirable, as is interference with Badger setts.

The Long Derries is of botanical importance due to the presence of good quality dry, calcareous grassland, an interesting gravel pit flora and the presence of three rare plant species, two of which are legally protected. The presence of an interesting transition habitat from Esker to peatland, and a varied bird population, including the rare Nightjar and Partridge, adds to the site's importance.



NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
are Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

Key to Map Features

- Landholding
- Exclusions
- Offaly Special Protection Area
- Offaly Special Area of Conservation
- Offaly Natural Heritage Area
- Offaly Proposed Natural Heritage Area

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

NATURA IMPACT STATEMENT

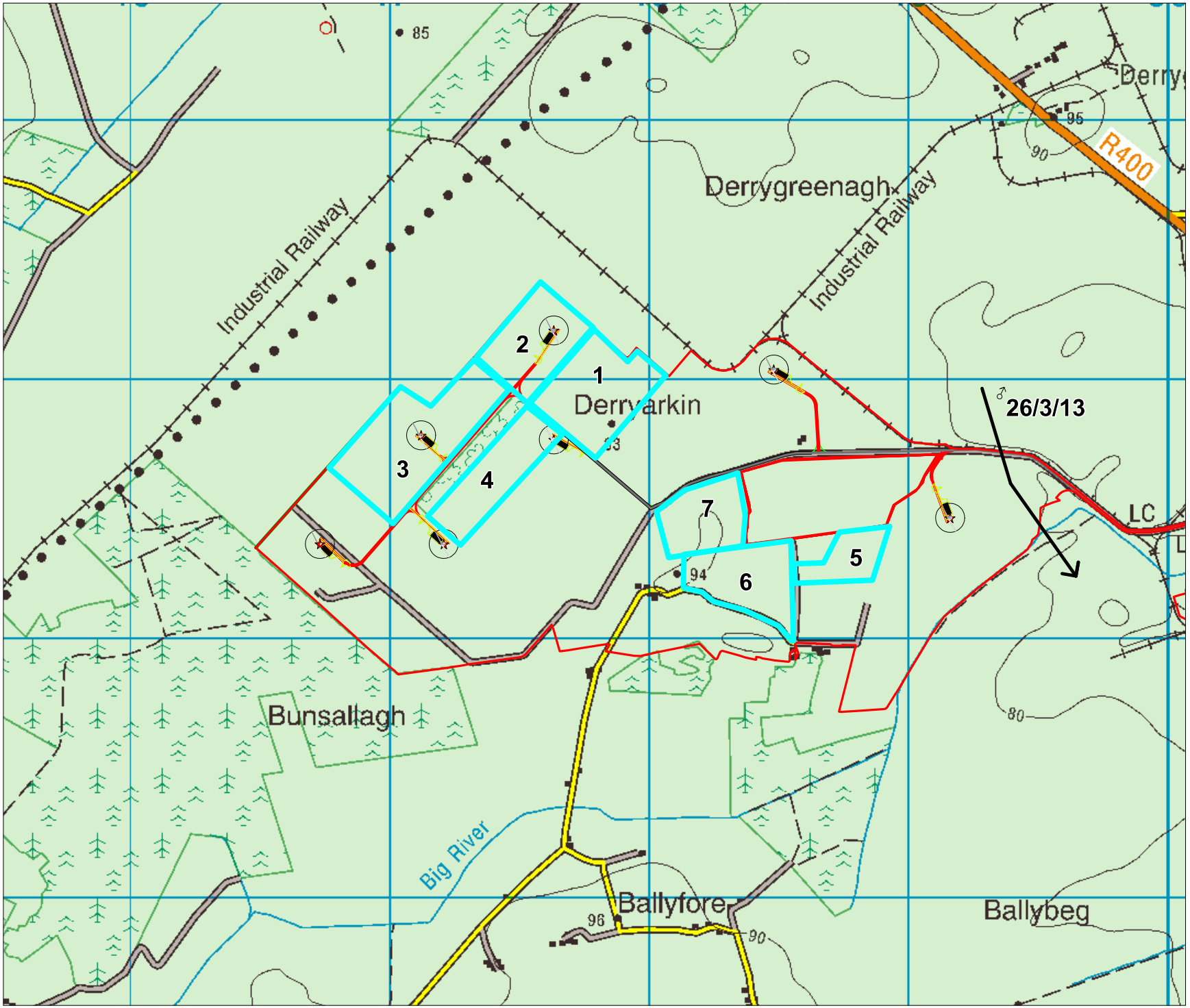
Drawing Title:

Figure 1 - Environmental Designations Map

Drawn By:	JC	Date:	30-05-13
Checked By:	NC	Date:	30-05-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/1	Revision:	

2010

CAD REF:



NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
are Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

LEGEND:

Landholding

Feeding Site

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

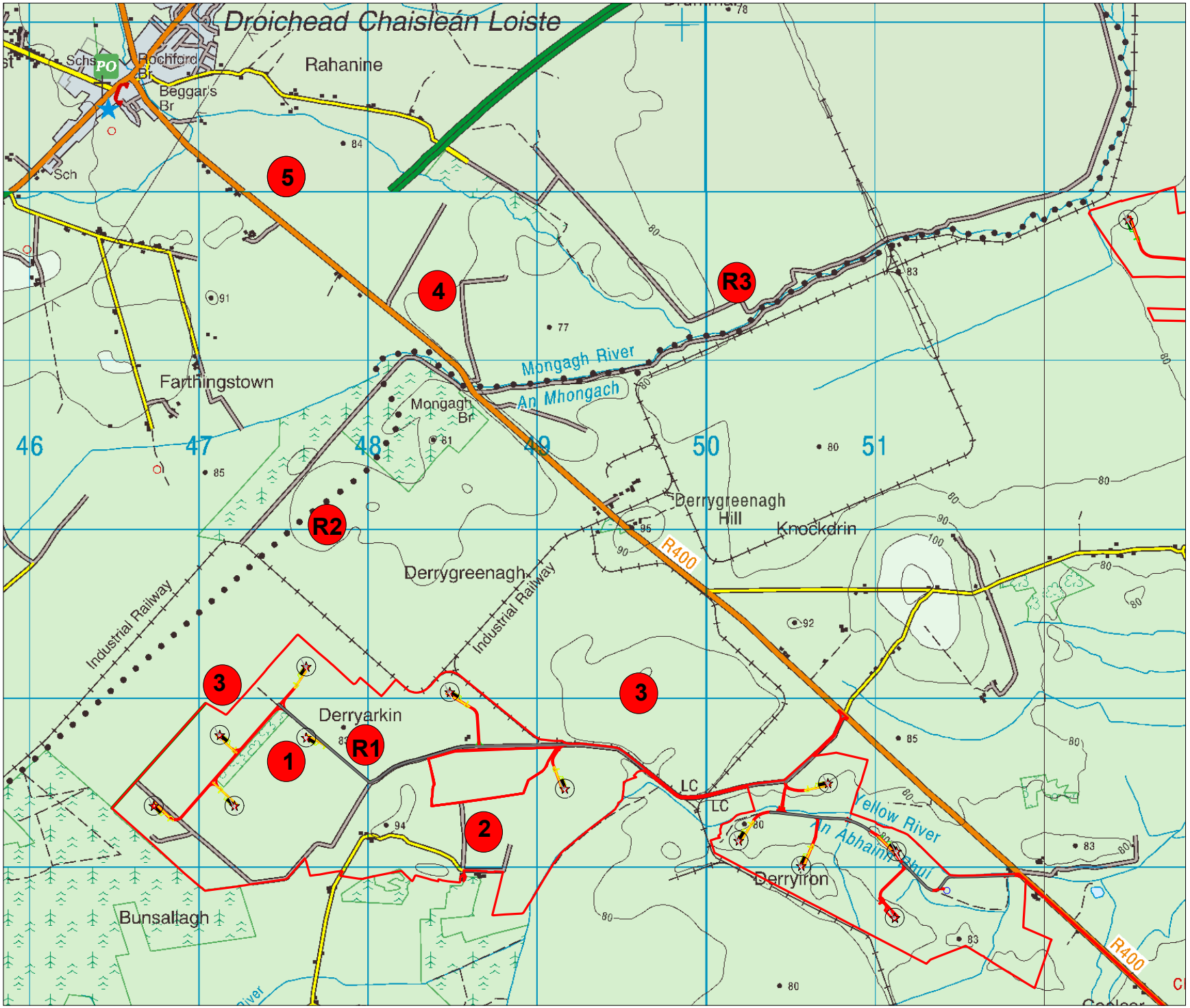
NATURA IMPACT STATEMENT

Drawing Title:

Figure 2 - Fields used by feeding Whooper Swans Winter 2012/13

Drawn By:	EMT	Date:	19-11-13
Checked By:	NC	Date:	19-11-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/2	Revision:	

CAD REF:



NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
re Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

LEGEND:

Landholding

Whooper Swan Feeding & Roosting Site 1

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

NATURA IMPACT STATEMENT

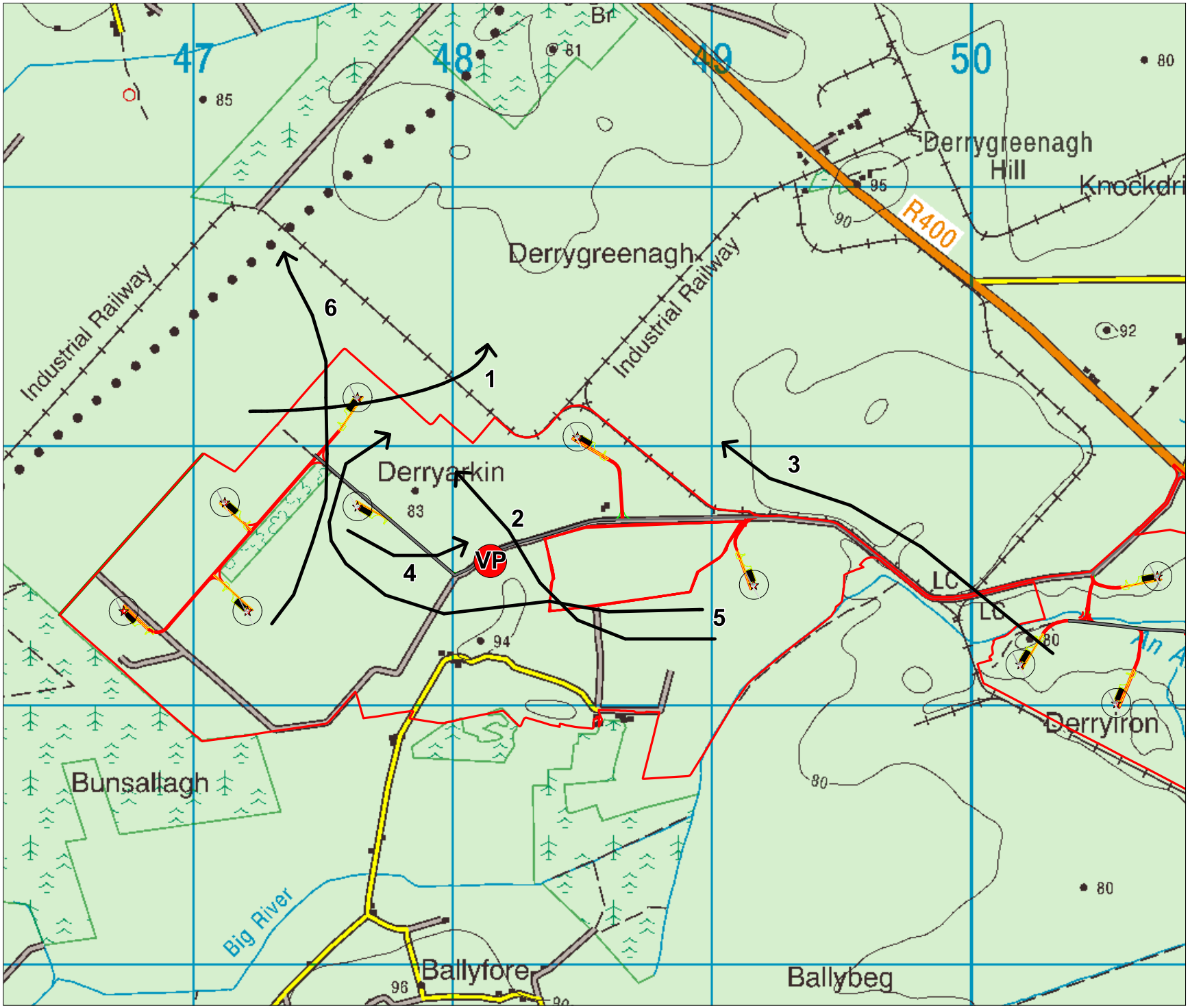
Drawing Title:

Figure 3
Whooper Swan Feeding & Roosting Sites

Drawn By:	EMT	Date:	19-11-13
Checked By:	NC	Date:	19-11-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/3	Revision:	

2010

CAD REF:



NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
re Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

LEGEND:

Landholding

Whooper Swan Flight Line

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

NATURA IMPACT STATEMENT

Drawing Title:

Figure 4
Whooper Swan Flight Lines

Drawn By:	EMT	Date:	19-11-13
Checked By:	NC	Date:	19-11-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/4	Revision:	

CAD REF:

NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
are Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

LEGEND:

Landholding

Hen Harrier Flight Line

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

NATURA IMPACT STATEMENT

Drawing Title:

Figure 5
Hen Harrier Flight Lines

Drawn By:	EMT	Date:	19-11-13
Checked By:	NC	Date:	19-11-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/5	Revision:	

CAD REF:

NOTES

Figured dimensions only to be taken from this drawing
All dimensions to be checked on site.
are in Metres and Relate to O.S. Datum Malin
are Referenced to Irish National Grid (I.N.G.)
e Survey of Ireland Licence No.EN 0002613
nment of Ireland

LEGEND:

Landholding

Hen Harrier Flight Line

Rev:	Description:	Drawn:	Ch'kd:	Date:

Client:

GREEN WIND ENERGY LTD

Client Representative:

JENNINGS O'DONOVAN & PARTNERS LIMITED
CONSULTING ENGINEERS

Project:

YELLOW RIVER WIND FARM

Stage:

NATURA IMPACT STATEMENT

Drawing Title:

Figure 5
Hen Harrier Flight Lines

Drawn By:	EMT	Date:	19-11-13
Checked By:	NC	Date:	19-11-13
Scales:	AS SHOWN		
Drawing No.	4909/NIS/5	Revision:	

CAD REF: