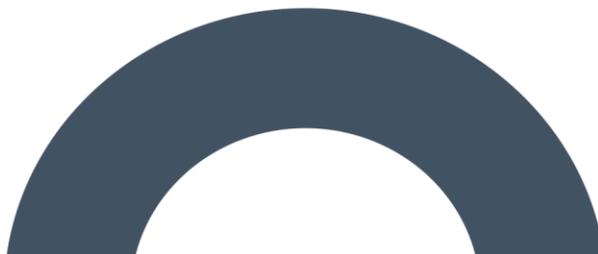


Natura Impact Statement

Coole Wind Farm,
Co. Westmeath





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Table of Contents

1.	INTRODUCTION	1
1.1	Background	1
1.2	Statement of Authority.....	1
2.	CONCLUSIONS OF ARTICLE 6(3) APPROPRIATE ASSESSMENT SCREENING REPORT	3
2.1	Lough Owel SAC.....	3
2.2	Lough Ennell SAC	3
2.3	Lough Owel SPA.....	5
2.4	Lough Ennell SPA	5
2.5	Lough Derravarragh SPA	5
2.6	Lough Iron SPA	6
3.	DESCRIPTION OF PROPOSED DEVELOPMENT	7
3.1	Site Location.....	7
3.2	Characteristics of the Proposed Development	8
3.2.1	Description of the project	8
3.2.2	Development Layout.....	8
3.3	Mitigation Measures and Best practice	10
3.3.1	Water quality.....	10
3.3.2	Hydrocarbons and Waste Material	13
4.	CHARACTERISTICS OF THE RECEIVING ENVIRONMENT	15
4.1	Ecological Survey Methodologies	15
4.1.1	Desk Study methodology.....	15
4.1.2	Scoping and Consultation	15
4.2	Ecological Survey Methodologies	16
4.2.1	Ecological Multidisciplinary Walkover Surveys	16
4.2.2	Bird Surveys	18
4.3	Desk Study Results.....	22
4.3.1	Lough Owel SAC	22
4.3.2	Lough Ennell SAC	25
4.3.3	Lough Owel SPA.....	26
4.3.4	Lough Ennell SPA	28
4.3.5	Lough Derravaragh SPA.....	30
4.3.6	Lough Iron SPA.....	31
4.3.7	EPA River Catchments and Watercourses	32
4.4	Ecological Survey results	33
4.4.1	Habitat survey	33
4.4.2	Fauna.....	50
5.	ASSESSMENT OF POTENTIAL EFFECTS AND ASSOCIATED MITIGATION	57
5.1	Potential for Direct Effects on the European Sites	57
5.2	Potential for Indirect Effects on the European Sites	57
5.2.1	Potential for Indirect Effect on Whooper Swan.....	57
5.2.2	Bird Disturbance.....	58
5.2.3	Deterioration of Water Quality	61
5.2.4	Operation Phase Mitigation	69
6.	ASSESSMENT OF RESIDUAL ADVERSE EFFECTS.....	71
6.1	Lough Owel SAC.....	71
6.1.1	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140]	71
6.1.2	Alkaline Fens [7230].....	73

6.1.3	Transition mires and quaking bogs [7140].....	75
6.1.4	White-clawed Crayfish [1092].....	76
6.1.5	Determination	77
6.2	Lough Ennell SAC.....	77
6.2.1	Alkaline Fens [7230].....	77
6.2.2	Determination	79
6.3	Lough Owel SPA.....	80
6.3.1	Wetland and Waterbirds [A999].....	80
6.3.2	Shoveler	81
6.3.3	Coot	82
6.3.4	Determination	82
6.4	Lough Ennell SPA	83
6.4.1	Wetland and Waterbirds [A999].....	83
6.4.2	Determination	83
6.5	Lough Derravarragh SPA	83
6.5.1	Wetland and Waterbirds [A999].....	84
6.5.2	Whooper Swan.....	84
6.5.3	Pochard.....	85
6.5.4	Tufted Duck.....	86
6.5.5	Coot	87
6.5.6	Determination	88
6.6	Lough Iron SPA	88
6.7	Invasive Species.....	88
6.8	Conclusion of Impact Assessment	89
7.	IN COMBINATION EFFECTS.....	91
7.1	Development context – Ecological Plans and Policies	91
7.1.1	Proposed Wind Farm Site.....	102
7.1.2	Applications in the Vicinity of the Proposed Wind Farm Site	102
7.1.3	Applications in the Vicinity of the Proposed Grid Connection Route.....	103
7.1.4	Forestry and Replanting	104
7.1.5	Other Wind Farm Sites.....	105
7.2	Other Projects.....	106
7.2.1	Projects Considered in Cumulative Assessment	106
7.3	Conclusion of Cumulative Assessment	107
8.	CONCLUDING STATEMENT	109
	BIBLIOGRAPHY	110

APPENDICES

Appendix 1	.....	Appropriate Assessment Screening Report (AASR)
Appendix 2	.....	EIAR Description Chapter
Appendix 3	.....	Construction and Environmental Management Plan (CEMP)
Appendix 4	.....	EIAR Hydrology Chapter
Appendix 5	.....	Aquatic Survey Report

TABLE OF TABLES

Table 3-1 Townlands within which the Project is located.....	7
Table 4-1 Scoping Response Summary.....	16
Table 4-2 Vantage Point Survey Effort.....	20
Table 4-3 Qualifying Interest and Conservation Objectives.....	23
Table 4-4 Site-specific threats, pressures and activities.....	23
Table 4-5 Qualifying Interest and Conservation Objectives.....	25
Table 4-6 Site-specific threats, pressures and activities.....	25

<i>Table 4-7 SCIs and Conservation Objectives.....</i>	<i>27</i>
<i>Table 4-8 Site-specific threats, pressures and activities.....</i>	<i>27</i>
<i>Table 4-9 SCIs and Conservation Objectives.....</i>	<i>28</i>
<i>Table 4-10 Site-specific threats, pressures and activities.....</i>	<i>29</i>
<i>Table 4-11 SCIs and Conservation Objectives.....</i>	<i>30</i>
<i>Table 4-12 Site-specific threats, pressures and activities.....</i>	<i>30</i>
<i>Table 4-13 Site-specific threats, pressures and activities.....</i>	<i>32</i>
<i>Table 4-14 Third Schedule Invasive Species.....</i>	<i>48</i>
<i>Table 4-15 Results of the physical habitat appraisals of the aquatic ecology and fisheries survey.....</i>	<i>50</i>
<i>Table 4-16 Results of the River Corridor Survey appraisals.....</i>	<i>51</i>
<i>Table 4-17 Results of the aquatic ecological appraisals (P=present, L=likely, A=absent).....</i>	<i>51</i>
<i>Table 4-18 Biological water quality and WFD status at survey sites (High/Good/Moderate/Poor/Bad).....</i>	<i>51</i>
<i>Table 5-1 Impact Assessment - Whooper Swan.....</i>	<i>57</i>
<i>Table 6-1 Targets and attributes associated with the conservation objectives for Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.....</i>	<i>71</i>
<i>Table 6-2 Assessment of development against targets and attributes of calcareous fens.....</i>	<i>73</i>
<i>Table 6-3 Targets and attributes associated with the conservation objectives for Transition mires and quaking bogs.....</i>	<i>75</i>
<i>Table 6-4 Assessment of development against targets and attributes of alkaline fens.....</i>	<i>77</i>
<i>Table 6-5 Assessment of development against targets and attributes of calcareous fens.....</i>	<i>78</i>
<i>Table 6-6 Example targets and attributes associated with the site-specific conservation objectives for Wetland and Waterbirds [A999].....</i>	<i>80</i>
<i>Table 6-7 Targets and attributes associated with the nominated conservation objectives for Shoveler.....</i>	<i>81</i>
<i>Table 6-8 Targets and attributes associated with the nominated conservation objectives for Coot.....</i>	<i>82</i>
<i>Table 6-9 Targets and attributes associated with the nominated conservation objectives for Whooper Swan.....</i>	<i>84</i>
<i>Table 6-10 Targets and attributes associated with the nominated conservation objectives for Pochard.....</i>	<i>86</i>
<i>Table 6-11 Targets and attributes associated with the nominated conservation objectives for Tufted Duck.....</i>	<i>86</i>
<i>Table 6-12 Targets and attributes associated with the nominated conservation objectives for Coot.....</i>	<i>87</i>
<i>Table 7-1 Review of land use and spatial plans 2014-2020.....</i>	<i>92</i>
<i>Table 7-2 Review of land use and spatial plans 2021 -2027.....</i>	<i>99</i>

TABLE OF FIGURES

<i>Figure 2-1 European Sites within 15km Buffer.....</i>	<i>4</i>
<i>Figure 3-1 Proposed Development Layout.....</i>	<i>9</i>
<i>Figure 3-2 Watercourse Crossings along Grid Connection Route.....</i>	<i>12</i>
<i>Figure 4-1 Habitat Map of main Windfarm Site.....</i>	<i>36</i>
<i>Figure 4-2 Habitat Map of Proposed Link Road.....</i>	<i>37</i>
<i>Figure 4-3 Proposed Junction Works Locations.....</i>	<i>46</i>
<i>Figure 4-4 Third Schedule Invasive Species Records.....</i>	<i>49</i>

1. INTRODUCTION

1.1 Background

McCarthy Keville O’Sullivan Ltd. (MKO) has been appointed to prepare a Natura Impact Statement to allow the competent authority to conduct an Appropriate Assessment under Part XAB of the Planning and Development Acts 2000-2019 of the proposed construction of a 15 No. turbine wind energy development including the grid connection, near Coole, in north Co. Westmeath.

An Appropriate Assessment Screening Report has been prepared and is provided in Appendix 1. This Appropriate Assessment Screening Report identified the European Sites upon which the Proposed Development has the potential to result in significant effects and the pathways by which those effects may occur. It has also identified those qualifying interests/special conservation interests that have the potential to be affected by the Proposed Development. The Screening Report identifies the European Sites upon which significant effects could not be excluded. Those sites will be assessed in this Natura Impact Statement.

This report has been prepared in compliance with Part XAB of the Planning and Development Acts 2000-2019, the Planning and Development Regulations 2001-2019 and relevant jurisprudence of the European and Irish courts. It has also been prepared in accordance with the European Commission guidance document Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2001), European Communities (2018) Managing Natura 2000 Sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg, European Commission and the Department of the Environment’s Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended 11 February 2010).

In addition to the guidelines referenced above, the following relevant guidance was considered in preparation of this report:

1. *Council of the European Commission (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal of the European Communities. Series L 20, pp. 7-49.*
2. *European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
3. *EC (2007) Guidance document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission.*
4. *EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.*
5. *CIEEM (2018) Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment.*

1.2 Statement of Authority

This report has been prepared by Laoise Kelly (BSc., MCIEEM) and reviewed by Pat Roberts (B.Sc. Environmental Science, MCIEEM). Pat has over 15 years’ experience in ecological management and assessment. Laoise Kelly has over 6 years’ professional ecological consultancy experience and both are full members of the Chartered Institute of Ecology and Environmental Management. The baseline ecological surveys were undertaken by John Hynes B.Sc. (Env.) M.Sc, MCIEEM, Pat Roberts B. Sc. Env,

MCIEEM, Pamela Boyle (PhD), Dr. Una Nealon (PhD), Laoise Kelly B.Sc. (Env.), MCIEEM and Susan Doyle B.Sc. (Env.) M.Sc. (Eco). All surveyors have relevant academic qualifications and are competent experts in undertaking habitat and ecological assessments to this level.

Field surveys in relation to ornithology were undertaken by John Carey, Lee Dark (BSc. MSc.), Eric Dempsey (BSc.), Declan Manley (BSc.), Patrick Manley (BSc.), Andrew O'Donoghue (BSc.) and Paul Troake (BSc.). All of the above surveyors are competent experts in their field.

All of the surveyors listed above are competent experts for the purposes of the preparation of this NIS and suitably qualified in ornithology and ecology.

2. CONCLUSIONS OF ARTICLE 6(3) APPROPRIATE ASSESSMENT SCREENING REPORT

The Article 6(3) Appropriate Assessment Screening report, that is provided as **Appendix 1** to this NIS, concluded that there was potential for the Proposed Development to result in significant effects on the following European Sites:

- Lough Owel SAC (000688)
- Lough Ennell SAC (000685)
- Lough Owel SPA (004047)
- Lough Ennell SPA (004044)
- Lough Derravaragh SPA (004043)
- Lough Iron SPA (004046)

The Qualifying Interests/Special Conservation Interests with the potential to be affected and the pathways by which any such effects may occur are set out below for each site. The location of the Proposed Development and connectivity with these EU designated sites is provided as Figure 2-1.

2.1 Lough Owel SAC

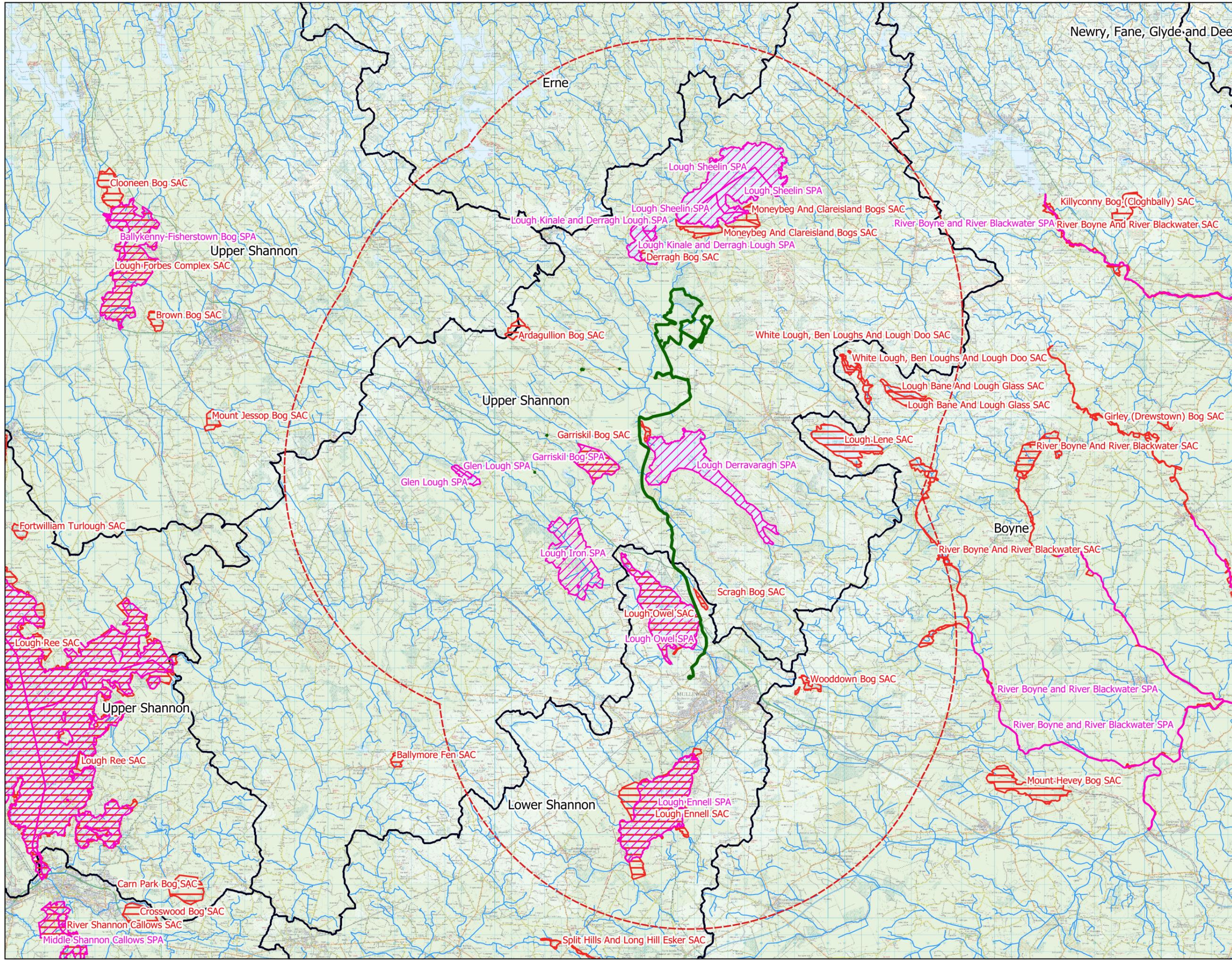
The SAC is located 12.5km south of the proposed wind farm site and the proposed grid connection route is located within the N4 road corridor along the boundary of the SAC. A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SAC. The proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the development potentially affecting the following habitats and species:

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]
- Alkaline fens [7230]
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]
- Transition mires and quaking bogs [7140]

2.2 Lough Ennell SAC

The SAC is located 24km south of the proposed wind farm site and 4.2km south of the proposed grid connection route. There is hydrological connectivity between the proposed grid connection route and the SAC approximately 8.8km (hydrological distance) downstream. Taking a precautionary approach, the proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the Proposed Development potentially affecting the following habitat:

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]
- Alkaline fens [7230]
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]
- Transition mires and quaking bogs [7140]



- Map Legend**
- EIAR Site Boundary
 - 15km Buffer from Site
 - Special Area of Conservation (SAC)
 - Special Protection Area (SPA)
 - WFD Catchments
 - EPA Mapped Watercourses

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15km Buffer to EU Designated Sites	
Project Title Coole Wind Farm, Co. Westmeath	
Drawn By HW	Checked By LK
Project No. 200445	Drawing No. Figure 2-1
Scale 1:200000	Date 2021.01.27

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2.3 Lough Owel SPA

The SPA is located 12.5km south of the proposed wind farm site and the proposed grid connection route is located within the N4 road corridor along the boundary of the SPA. A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SPA. Taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

In addition, taking a precautionary approach, given that the proposed grid connection route is located adjacent to the SPA boundary, a potential pathway for significant effect was identified in the form of bird disturbance and deterioration of habitat as described above in relation to wetland and waterbirds as a result of construction activity on the following species:

- Shoveler *Anas clypeata* [A056]
- Coot *Fulica atra* [A125]

2.4 Lough Ennell SPA

The SPA is located 24.3km south of the proposed wind farm site and 4.5km south of the proposed grid connection route. Due to this distance, there is no potential for significant indirect effects as a result of disturbance. There is hydrological connectivity between the proposed grid connection route and the SPA approximately 9.2km (hydrological distance) downstream. Taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the Proposed Development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

2.5 Lough Derravarragh SPA

The SPA is located 4.8km south of the proposed wind farm site and 70m east of the proposed grid connection route. The Proposed Development is located within the potential core foraging range of Whooper Swan which is an SCI species associated with the SPA (SNH Guidelines (2016)). The proposed grid connection route is located approximately 70m west of the SPA. Therefore, potential for disturbance to the remaining bird species associated with the SPA have also been considered. Given that the SPA is located hydrologically downstream of the Proposed Development site there is potential for indirect effects on surface water quality through the run off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the Proposed Development. The following SCIs were identified as having potential to be impacted by the Proposed Development and will be assessed further:

- Whooper swan *Cygnus cygnus* [A038]
- Pochard *Aythya ferina* [A059]
- Tufted duck *Aythya fuligula* [A061]
- Coot *Fulica atra* [A125]
- Wetland and Waterbirds [A999]

Lough Iron SPA

The SPA is located 11.4km south west of the proposed wind farm site, 3km from the proposed junction works in Joanstown and 4.3km west of the proposed grid connection route. The windfarm site is located outside the potential core foraging range of SCI species associated with the SPA (SNH Guidelines (2016)). It is also located outside the zone of sensitivity of any species that is listed as particularly sensitive to wind energy development in Mc Guinness et.al (2015).

There will be no direct effects on the supporting wetland habitat of waterbirds within the SPA. However, taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the Proposed Development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

3. DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Site Location

This Natura Impact Statement (NIS) has been prepared by McCarthy Keville O’Sullivan Ltd. (MKO) on behalf of Coole Wind Farm Ltd., as part of an application for planning permission for the construction of a 15 No. turbine wind energy development including the grid connection, near Coole, in north Co. Westmeath.

The proposed wind farm site is located approximately 2.4 kilometres north of Coole village (i.e. distance from Coole village centre to the main wind farm site boundary). The town of Castlepollard is located approximately 6.7 kilometres southeast of the wind farm site boundary, at its nearest point. The townlands in which the proposed wind farm site, ancillary works, grid connection route and junction accommodation works are located, are listed in Table 3-1.

Table 3-1 Townlands within which the Project is located

Development Works	Townland
Wind Farm, including Turbines and Access Roads, Substation, Construction Compound	Coole, Monkton, Camagh, Doon, Clonsura, Clonrobert, Mullagh, Newcastle and Carlanstown
Proposed Borrow Pit	Mullagh
Junction Accommodation Works	Boherquill, Coole, Corralanna, Culvin,Joanstown and Mayne
Grid Connection Route	Camagh, Monkton, Coole, Fearmore (Fore by), Newtown (Fore by), Mayne, Simonstown (fore by), Ballinealoe, Shrubbywood, Clonava, Lackan (Corkaree by), Soho, Ballynaclonagh, Abbeyland, Rathganny, Ballindurrow, Cullendarragh, Culleenabohoge, Ballynafid, Knightswood, Portnashangan, Culleen More, Farranistick, and Irishtown (Moyashel by)

A previous application for a wind farm development at this location was submitted by Coole Wind Farm Ltd. to Westmeath County Council on the 19th October 2017 and was considered under Pl. Ref. 17/6292. This application comprised of a wind farm consisting of up to 13 No. wind turbines with a tip-height of up to 175 metres, upgrade of existing internal access roads and provision of new internal access roads, an on-site substation, underground cabling, temporary construction compound and all ancillary infrastructure. Westmeath County Council issued their decision to refuse to grant permission on 12th December 2017 based on 1 no. refusal reason. This decision was appealed to An Bord Pleanála on 14th January 2018 and was considered under ABP-300686-18. An Bord Pleanála issued the decision to grant permission for the wind farm on 27th March 2019.

In preparing the NIS, the applicant and design team have considered in full the previous applications for the project, along with Further Information Requests received in relation to the project.

3.2 Characteristics of the Proposed Development

3.2.1 Description of the project

The Proposed Development comprises the provision of the following:

- Up to 15 No. wind turbines with a tip height of up to 175 metres and all associated foundations and hardstanding areas;
- 1 no. onsite electrical substation including a control building, associated electrical plant and equipment, welfare facilities and a wastewater holding tank;
- 1 no. temporary construction compound;
- Provision of new site access roads, upgrading of existing access roads and hardstand areas;
- Excavation of 1 no. borrow pit;
- All associated underground electrical and communications cabling connecting the turbines to the proposed onsite substation;
- Laying of approximately 26 km of underground electricity cabling to facilitate the connection to the national grid from the proposed onsite substation located in the townland of Camagh to the existing 110kV Mullingar substation located in the townland of Irishtown;
- Upgrade works to the existing 110kV Mullingar substation consisting of the construction of an additional dedicated bay to facilitate connection of the cable;
- Construction of a link road between the R395 and R396 Regional Roads in the townland of Coole to facilitate turbine delivery;
- Junction improvement works to facilitate turbine delivery, at the N4 junction with the L1927 in the townland of Joanstown, on land to the South East of railway line level crossing on the L1927 in the townland of Culvin, the L1927 and L5828 junction in the townland of Boherquill and the L5828 and R395 junction in the townland of Corralanna;
- Site Drainage;
- Forestry Felling;
- Signage, and;
- All associated site development works.
- This application is seeking a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

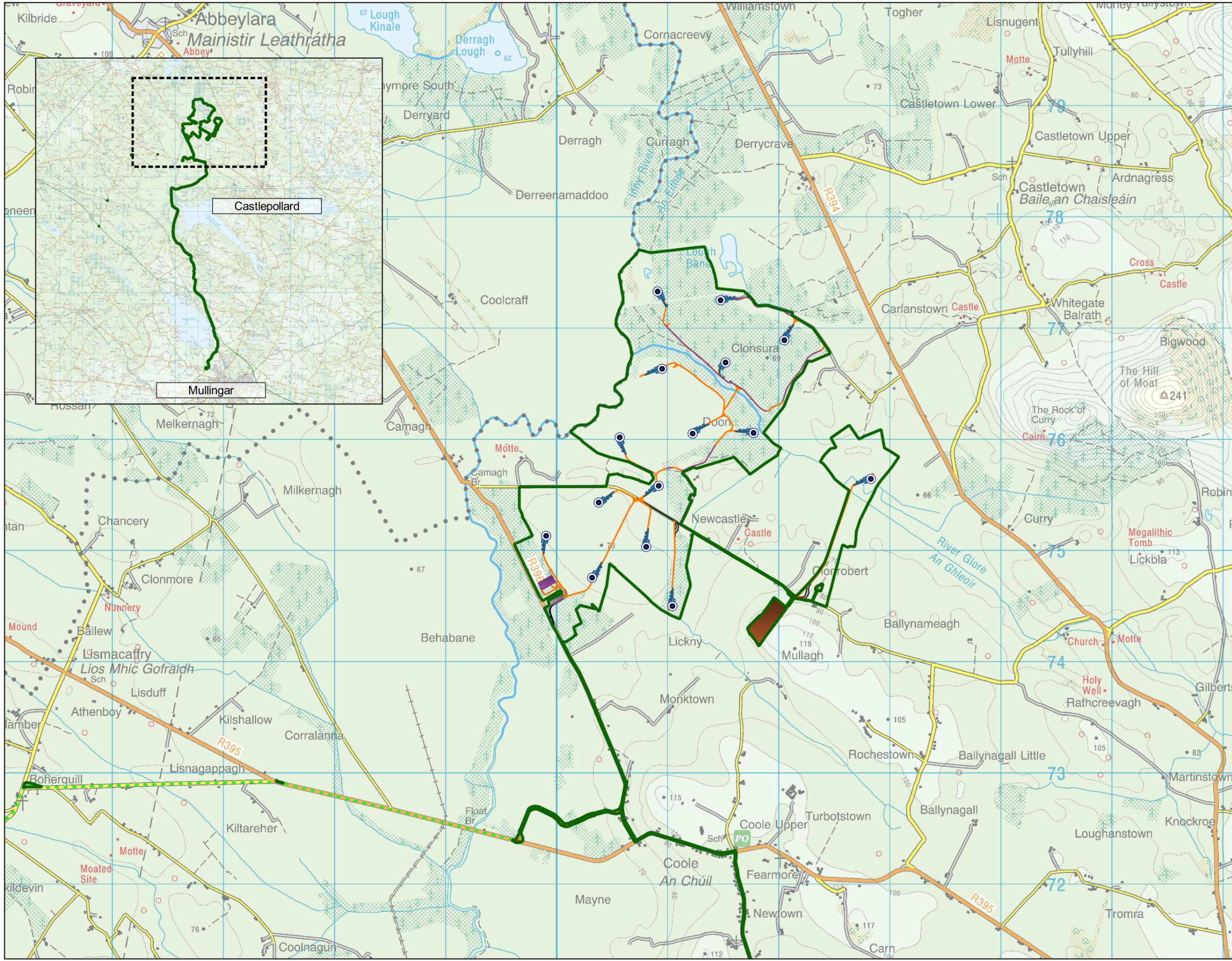
The Proposed Development will have an operational life of 30 years from the date of commissioning of the development and the application seeks a ten-year planning permission.

All elements of the Proposed Development, including grid connection and any works required on public roads to accommodate turbine delivery, have been assessed as part of this EIAR.

3.2.2 Development Layout

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing over the site. A constraints study, as described in Section 3.3.5, in Chapter 3 of the EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site.

The overall layout of the Proposed Development is shown on Figure 3-1. This figure shows the Proposed Development infrastructure as outlined above. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to the EIAR. The Description Chapter of the EIAR (Chapter 4) has been included as **Appendix 2** of this NIS.



- ### Map Legend
- EIAR Site Boundary
 - Proposed Turbine Layout
 - Proposed Hardstand
 - Proposed Borrow Pit
 - Construction Compound
 - Internal Roads (new)
 - Internal Roads (Upgrades to existing)
 - Proposed Junction Works
 - External Roads (Upgrades to Existing)
 - Proposed Onsite Substation
 - Proposed Grid Connection Route
 - Proposed Upgrade Works to Existing Mullingar Substation
 - - - Turbine Delivery Route
 - Temporary Hardcore Surfacing Areas

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Site Layout

Project Title	
Coole Wind Farm, Co. Westmeath	
Drawn By	Checked By
HW	LK
Project No.	Drawing No.
200445	Figure 3-1
Scale	Date
1:30000	2021.01.27

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3.3

Mitigation Measures and Best practice

The design of the Proposed Development, as described in Chapter 4 of the EIAR and provided in **Appendix 2**, sets out very clearly how the wind farm including the grid connection has been designed and will be operated in accordance with best industry practice to avoid any significant effects outside the site including the prevention of impacts on watercourses.

A Construction and Environmental Management Plan (CEMP) has been prepared and is included as **Appendix 3** of this report. The CEMP will be in place prior to the start of the construction phase. Best practice measures which form part of the design of the project are included in Chapter 4 (Description of the Proposed Development) and in the relevant chapters of the EIAR.

The CEMP also outlines that a Site Supervisor/Construction Manager and/or Environmental Manager will be appointed to maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. In addition, an Environmental Clerk of Works or Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and report to the Site Environmental Office. This structure will provide a “triple lock” review/interaction by external specialists during the construction phase. Some of the key features of the environmental management strategy are provided below.

3.3.1

Water quality

The Proposed Development has been designed so that all large-scale infrastructure such as turbine and site compounds are located as far from watercourses as possible. These best practice construction measures are designed to avoid impacts on areas that are outside the site including downstream watercourses. The development has been designed to maintain a drainage neutral situation to avoid drainage related impacts (See Chapter 9: Hydrology and Hydrogeology).

The Proposed Development includes a detailed drainage plan that is included in full in Chapter 9 (Hydrology and Hydrogeology) of the EIAR, included as **Appendix 4** of this report. This plan and all the associated measures have been taken into account in this assessment but are not included in full (to avoid repetition). The drainage philosophy overall is to minimise waters arising on site, to adequately treat any water that may arise and to ensure that the hydrological function of the watercourses on the site and in the wider catchment are not affected by the proposed works. This philosophy including all associated mitigation measures to protect local surface water quality are fully described in the Construction and Environmental Management Plan (CEMP) and Chapter 9 (Hydrology and Hydrogeology Chapter) of the EIAR, included as Appendix 3 and Appendix 4 respectively.

The Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*; and the Scottish Natural Heritage (SNH) *Good Practice During Wind Farm Construction* (SNH, 2019, 4th Edition) will also be adhered to.

Section 9.4 of the Hydrology and Hydrogeology Chapter (Chapter 9) of the EIAR accompanying this application (Appendix 4) sets out in full the mitigation measures that will be implemented to protect water quality.

The key mitigation measure during the construction phase is the avoidance of sensitive aquatic areas where possible, by application of suitable buffer zones (i.e. 50m to main watercourses, and 10m to main drains). All major infrastructure such as turbines, substations and site compounds will be over 50m from any main watercourse (identified on EPA watercourse mapper) and 10m from any large drainage channels on the site. The only works that will be inside these buffer zones will be where access roads cross drains throughout the site and where there is a proposed upgrade to an existing watercourse crossing. There will be 2 no. crossings over the River Glone as part of the Proposed Development. The first crossing comprises the replacement of an existing timber bridge with a 5m clear span bridge

connecting Turbines T5-T12 to Turbines T1-T4. The second crossing will comprise a new 5m clear-span bridge to provide access to T15. A third crossing will be required to provide access to Turbine T1 located to the north of an OPW drain. This will require a 3-metre clear span bridge. Figure 4-24 in Chapter 4 of the EIAR (Appendix 2) shows the typical clear span bridge design. There will be no in-stream works required as part of the Proposed Development. Additional control measures, which are outlined further on in this section, will be undertaken at the proposed watercourse and drain crossing locations.

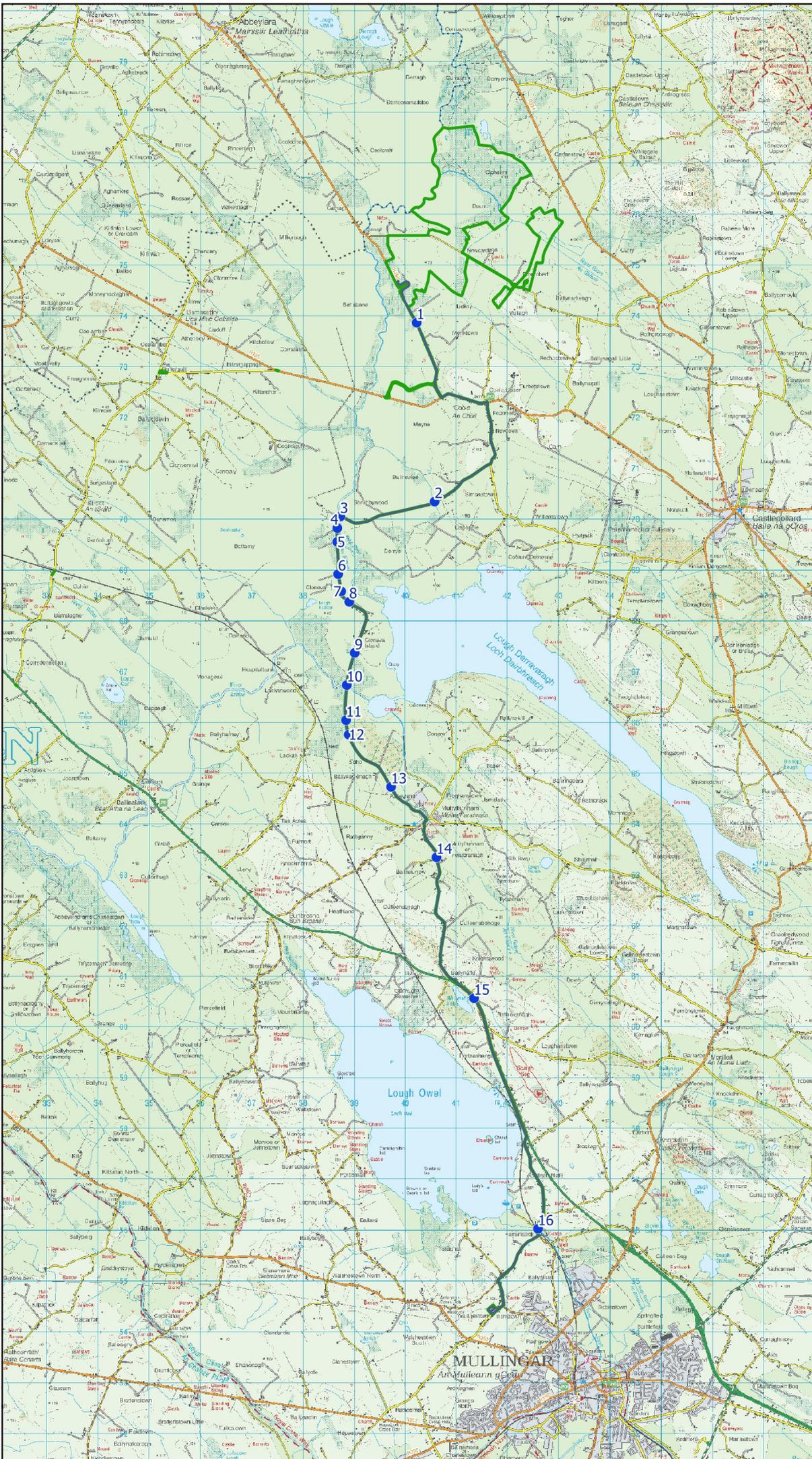
There are a total of 16 no. watercourse crossings along the Grid Connection Route, as shown in Figure 3-2. There are 7 no. river/stream crossings (Locations No. 2, 3, 4, 10, 14, 15 & 16), with the remaining crossings being classified as culverts. All the crossings are existing bridges and culverts along the public road.

No in-stream works are required at any of these crossings, however due to the proximity of the streams to the construction work at the crossing locations, there is a potential for surface water quality impacts during trench excavation work. Mitigation measures are outlined below.

A constraint/buffer zone will be maintained for all crossing locations where possible, whereby all watercourses will be fenced off. In addition, measures which are outlined below will be implemented to ensure that silt laden or contaminated surface water runoff from the excavation work does not discharge directly to the watercourse.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage to watercourses, and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone;



Map Legend

-  EIAR Site Boundary
-  Grid Connection Route Watercourse Crossing Locations
-  Proposed Grid Connection Route



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Drawing Title
Grid Connection Route Watercourse Crossing Locations

Project Title
Cooile Wind Farm, Co. Westmeath

Drawn By **EC** Checked By **MW**

Project No. **200445** Drawing No. **Figure 3-2**

Scale **1:100000** Date **11/02/2021**



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Increased surface water runoff during the operational phase of the Proposed Development was considered, due to the replacement of vegetated surfaces with impermeable surfaces including hardstand areas, amenity links and substation.

The operational phase drainage system will be installed and constructed in conjunction with the road and hardstanding construction work as described below:

- Runoff from individual turbine hardstanding areas will not be discharged into the existing drain network, but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces;
- Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;
- Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- Settlement ponds will be designed in consideration of the greenfield runoff rate.

Decommissioning phase impacts will be similar to construction phase but the potential for impacts will be significantly less given that much of the infrastructure will remain in-situ. Temporary drainage measures as outlined in the Hydrology and Hydrogeology Chapter of the EIAR (Appendix 2) and best practice fuel/hydrocarbon cement management will be employed as required.

3.3.2 Hydrocarbons and Waste Material

The use of hydrocarbons during the construction process leads to the potential for pollution to enter the wider environment, including drainage ditches and watercourses. Leaks in poorly maintained plant and machinery could lead to hydrocarbon dispersal over works areas. Leaks in fuel storage tanks and spillages during refuelling operations could lead to larger releases of hydrocarbons into the environment.

The Construction and Environmental Management Plan (CEMP) (Appendix 3) provides measures to avoid impacts on the wider environment as a result of pollution and are summarised below.

3.3.2.1 Refuelling, Fuel and Hazardous Materials Storage

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Onsite re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site (Wind Farm Site and Grid Connection Route) and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent

material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;

- Refuelling or maintenance of machinery will not occur within 100m of a watercourse;
- Fuels stored on site will be minimised;
- Any diesel or fuel oils stored at the temporary site compound will be bunded. The bund capacity will be sufficient to contain 110% of the storage tank's maximum capacity;
- The electrical control building at the Wind Farm Site will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within Environmental Management Plan. Spill kits will be available to deal with accidental spillages.

3.3.2.2 Cement Based Products Control Measures

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site/along the grid route works or near other ancillary construction activities. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only the chute will need to be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be directed into a dedicated concrete wash out pit. Decommissioning of this pit will occur at the end of the construction phase and water and solids will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- All concrete will be paced in shuttering and will not be in contact with soils or groundwater until after it has set;
- Use weather forecasting to plan dry days for pouring concrete; and,
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.

4. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

The ecological surveys that were undertaken to inform this NIS are fully described in this section. The specific surveys that were undertaken to assess the potential effects on the identified European Sites are described below.

4.1 Ecological Survey Methodologies

4.1.1 Desk Study methodology

The desk study undertaken for this assessment included a thorough review of the available ecological data associated with the study area of the Proposed Development. Sources of data included the following:

- Review of existing information obtained during the application made in 2017 as part of the permitted Coole Wind Farm.
- Review of NPWS Conservation Objectives supporting documents, site synopsis, standard data forms and supporting documents for EU Designated Sites,
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA), EPA (Envision), Water Framework Directive (WFD), Geological Survey of Ireland (GSI) and Inland Fisheries Ireland (IFI)
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper,
- Inland Fisheries Ireland (IFI) reports, where relevant/available,
- Review of NPWS Article 17 metadata and GIS database.
- Review of NPWS Article 12 metadata and GIS database.
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Project is located.
- Review of OS maps and aerial photographs of the site of the Proposed Development.
- Review of other plans and projects within the area.
- MKO field assessments and bird surveys carried out between 2015 and 2020 and as provided in full in the EIAR.

4.1.2 Scoping and Consultation

A detailed Scoping Document, providing details of the application site, the Proposed Development and the proposed scope of the EIAR, and inviting the comments and input of consultees, was prepared by MKO and circulated on the 31st August 2020. Copies of the scoping responses are included in Appendix 2-2 of the EIAR. Table 4.1 provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

The recommendations of the consultees have been taken into consideration in the preparation of this NIS.

Table 4-1 Scoping Response Summary

Consultee	Response
An Taisce	No response received to date
Bat Conservation Ireland	No response received to date
BirdWatch Ireland	No response received to date
Department of Agriculture, Food and the Marine	Response Received on 5 th November 2020
Department of Communications, Climate Action & Environment	No response received to date
Forest Service	No response received to date
Irish Wildlife Trust	No response received to date
Geological Survey of Ireland	Response received on 2 nd October 2020
Inland Fisheries Ireland	No response received to date
Irish Peatland Conservation Council	No response received to date
Irish Wildlife Trust	No response received to date
Waterways Ireland	No response received to date

4.2 Ecological Survey Methodologies

A comprehensive survey of the biodiversity of the entire site was undertaken by MKO on various dates throughout 2016, 2017, 2019 and 2020. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

4.2.1 Ecological Multidisciplinary Walkover Surveys

As part of the original Coole Wind Farm application that was granted in 2019, multidisciplinary walkover surveys associated with the windfarm site were undertaken by MKO in March, April, July, August and September 2016. The survey timing falls within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). Additional visits were also conducted outside the optimum survey period in March and October 2016 and in March 2017.

Surveys of the windfarm site including the proposed new turbine locations, 14 and 15, and the proposed new grid connection route were carried out on the 21st of November and 16th of December 2019 and the 31st of July and 23rd October 2020 which covered the optimal survey period. Bat surveys for the Wind Farm Site were carried out by Woodrow Sustainable Solutions over the spring, summer and autumn period in 2020. A visual inspection and driven transect of the grid connection route was carried out by MKO on 15th September 2020. These surveys provided up to date baseline data for the windfarm site as well as for the footprint of the new works proposed.

The walkover surveys were designed to detect the presence, or likely presence, of a range of protected species. The survey included a search for badger setts and areas of suitable habitat, potential features likely to be of significance to bats and additional habitat features for the full range of other protected species that are likely to occur in the vicinity of the Proposed Development (e.g. otter etc.). In addition, an inventory of other species of local biodiversity interest was compiled including invertebrates (butterflies, dragonflies, damselflies, beetles), plants, fungi etc.

The multi-disciplinary walkover surveys comprehensively covered the entire study area and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

Other targeted survey methodologies undertaken at the site are described in the following subsections.

4.2.1.1 Turbine Base and Infrastructure Locations

The locations of turbine bases, hard standing areas, the substation, the site compound, internal roads, haul road, borrow pit and grid connection route were visited during the multidisciplinary walkover surveys.

Botanical surveys for all turbines, road infrastructure, substation and all other infrastructure were undertaken. These surveys provided an understanding of the baseline and informed further survey work following finalisation of the proposed infrastructure layout. The habitat assessment surveys described in this report have been undertaken with reference to the following guidelines and interpretation documents:

- Perrin, P.M, Martin, J.R., Barron, J.R., Roche & O’Hanrahan, B. (2014) *Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland*. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service.
- Cross, J. & Lynn, D. (2013) *Results of a monitoring survey of bog woodland*. Irish Wildlife Manuals, No. 69. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) *Raised Bog Monitoring and Assessment Survey 2013*. Irish Wildlife Manuals, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.
- Commission of the European Communities (2007) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.
- Foss, P.J. & Crushell, P. 2008, *Guidelines for a National Fen Survey of Ireland, Survey Manual*. Report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.
- NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2*. Version 1.1. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2019). *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O’Neill

Plant nomenclature for vascular plants follows ‘*New Flora of the British Isles*’ (Stace, 2010), while mosses and liverworts nomenclature follows ‘*Mosses and Liverworts of Britain and Ireland - a field guide*’ (British Bryological Society, 2010).

4.2.1.2 Faunal Surveys

4.2.1.2.1 Aquatic surveys

In 2016, Ecofact Environmental Consultants were commissioned to undertake aquatic surveys of watercourses within and in proximity to the proposed wind farm site. The Aquatic Survey Report provides an overview of the habitats and plants, fish, aquatic macroinvertebrates and biological and chemical water quality at each of the 8 sampling locations. A description of site location, physical characteristics, habitats, vegetation community, macroinvertebrate community, biological water quality, chemical water quality and species specific survey results are detailed on a site by site basis. Surveys were undertaken in June 2016. The relevant extracts from the Aquatic Survey Report are provided as **Appendix 5** of the NIS.

Of the eight sampling locations, seven (Sites 1, 2, 3, 5, 6, 7 & 8) are pertinent to the Proposed Development. Sampling location 4 was located on the Mayne river and has no hydrological connectivity with the Proposed Development. Sample locations 1-3 are located on the River Inny downstream of the Proposed Development.

In addition to the above assessment, watercourse crossings associated with the proposed grid connection route and locations of Turbine 14 and 15 were assessed by MKO in 2019 and 2020. This comprised a visual assessment of the character of the watercourse, associated vegetation and connectivity with other watercourses and/or sites of interest downstream.

4.2.1.2.2 Invasive species survey

During the multi-disciplinary walkover surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended) (S.I. 477 of 2015).

4.2.1.2.3 Survey limitations

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or nocturnal/cryptic habits) was assessed.

4.2.2 Bird Surveys

Field surveys were undertaken during two survey periods: April 2015 – March 2017 and April 2018 - March 2020. The data provided in this report is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the subject site. Field survey methodologies have been devised to survey for the bird species composition and assemblages that occur within the study area. The study area varied with the target species and type of survey.

4.2.2.1 Initial Site Assessment

Based on the results of the desk study, consultation and reconnaissance site visits, the likely importance of the study area for bird species was ascertained. Based on the collated information available from the above preliminary assessment and adopting a precautionary approach, a site-specific scope for the ornithological survey was developed.

4.2.2.2 Survey Methodologies

The survey work undertaken between October 2015 and September 2017 and April 2018 and March 2020 forms the core dataset for the assessment of effects on ornithology. Separate sections to distinguish the two sets of surveys are clearly distinguished in this assessment.

In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with ‘*Recommended bird survey methods to inform impact assessment of onshore wind farms*’ (SNH, 2017).

The various survey types undertaken are described below.

4.2.2.2.1 Vantage Point Surveys

Flight activity data was collected from three vantage point locations (VPs 3, 4 and 5) (see Figure 7-1 in Chapter 7 of the EIAR) to inform a collision risk analysis and identify areas of ornithological importance within the wind farm site. The southern and eastern sections of the Site were surveyed between 2018 and 2020. While the northern section of the Site was surveyed before this, between 2015 and 2017. In total three fixed vantage points (VP3, VP5 in 2018-2020 and VP3, VP4 in 2015-2017) were required to provide adequate coverage of the proposed turbine layout. Further details are provided below.

Survey work 2018-2020

Vantage point surveys were undertaken in accordance with SNH guidance from April 2018 to March 2020. Surveys were conducted monthly throughout this survey period from four fixed vantage points (VP1, VP2, VP3 and VP5) to allow comprehensive coverage of a larger study area. The vantage point locations were selected by undertaking a viewshed analysis, as described below, and confirmed by a recce visit and initial field surveys in April 2018. Following a contraction of the proposed development area and turbine layout, only two of these four VPs have view sheds that overlap with the proposed turbine layout: VP3 and VP5.

Survey work 2015-2017

Vantage point surveys were previously undertaken to SNH guidance between October 2015 and September 2017. Surveys were conducted monthly throughout this survey period from two fixed vantage points (VP3 and VP4). Vantage point 4 provides coverage of the northern section of the wind farm site.

Figure 7-1 in Chapter 7 of the EIAR shows the locations of all vantage points relative to the development Site.

Viewshed Analysis

Viewshed analysis was carried out to show the coverage of the study area from three fixed vantage point locations (i.e. VPs 3, 4 and 5). Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 20 metres, which is representative of the minimum height considered for the Potential Collision Risk Area based on a worst-case scenario turbine model. While the relevance of being able to view as much of the site to ground level is acknowledged, the SNH guidance emphasizes the importance of visibility of the ‘collision risk volume’ when the data is to be used to estimate the risk of collisions with turbines by birds.

The viewshed analysis involved testing each VP location for its visibility coverage by creating a viewshed point 1.5 meters in height (to represent the height of observer) on a map using 10 metre contours terrain data. The relative height of forestry and its effects on visibility is also accounted for in the analysis. Using the ZTV software, a viewshed of 360 degrees was produced calculating an area 20 metres from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180 degrees to give the viewshed from each VP location in line with SNH (2017). A 500m buffer was applied to the outer most turbines of the proposed development in line with SNH (2017). The aim of the viewshed analysis is to establish whether the selected vantage points offer adequate coverage of the proposed turbine layout. The visible area within the view sheds at 20m are provided in Figures 7-2, 7-2-1, 7-2-2 and 7-2-3 in Chapter 7 of the EIAR.

Vantage points should provide the best views of potential turbine locations. Although there is a small gap in the view shed, as detailed in Figure 7-2 in Chapter 7 of the EIAR, the coverage of the site in general is considered adequate to inform the collision risk analysis, i.e. the Band Model (2007) presumes random movement of target species within the view shed, therefore given sufficient coverage of the site, the Band Model can account for gaps in the view shed.

Data Recording and Digitisation

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at each fixed location for six hours per month. Surveys were scheduled to provide a spread over the full daylight period including dawn and dusk watches to coincide with the highest peaks of bird activity. Target species were as listed in Appendix 7-1, Table 1-1 in Chapter 7 of the EIAR.

Survey effort for vantage point watches is presented in Appendix 7-2, Table 1-1 in Chapter 7 of the EIAR. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Table 4-2 below shows a summary of the VP survey work undertaken.

Table 4-2 Vantage Point Survey Effort

Survey Season	Months	Minimum Effort per VP
2015/2016 Non-Breeding Season (VP3, VP4)	Oct - Mar	36 hours/VP
2016 Breeding Season (VP3, VP4)	Apr - Sep	36 hours/VP
2016/2017 Non-Breeding Season (VP3, VP4)	Oct - Mar	36 hours/VP
2017 Breeding Season (VP3, VP4)	Apr - Sep	36 hours/VP
2018 Breeding Season (VP3, VP5)	Apr - Sep	36 hours/VP
2018/2019 Non-Breeding Season (VP3, VP5)	Oct - Mar	36 hours/VP
2019 Breeding Season (VP3, VP5)	Apr - Sep	36 hours/VP
2019/2020 Non-Breeding Season (VP3, VP5)	Oct - Mar	36 hours/VP

Observed flight activity was recorded as per defined flight bands which were chosen in relation to the dimensions of potential turbine models for the Site. Bands were split into 0-10m, 10-25m, 25m-175m and >175m. All recorded flight activity within the height bands 10-25m and 25-175m is considered to be within the Potential Collision Height (PCH) with regard to the rotor swept area, based on a worst-case scenario rotor swept area.

Each flight observation was assigned a unique identifier when mapped in the field and subsequently digitised using GIS software.

4.2.2.2.2 **Breeding Bird Surveys (Adapted Brown & Shepherd Survey)**

Breeding walkover surveys were undertaken to determine the presence of bird species of high conservation concern and identify areas of possible, probable or confirmed breeding territories within the study area. The survey methodology followed the adapted Brown and Shepherd method as outlined in Gilbert et al. (1998) and SNH (2017) ('adapted Brown and Shepherd surveys').

Transect routes were devised to ensure coverage of different habitat complexes within the study area. Transects were selected in order to survey every area of suitable breeding/foraging habitat to within 100m, where access allowed. Target species were waders, raptors, waterbirds, gulls and other birds of conservation concern. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Walkover surveys were carried out between daylight hours during the core breeding season months between April and June/July (in 2016, 2017, 2018 and 2019). The timing of visits followed the recommendations of Calladine et al. (2009). Following all survey visits, the field maps were analysed to determine the number and location of breeding territories. All non-breeding individuals and species encountered were also recorded.

Survey effort is presented in Appendix 7-2, Table 1-2 in Chapter 7 of this EIAR. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7-3 in chapter 7 shows the area surveyed.

4.2.2.2.3 **Breeding Raptor Surveys**

Breeding raptor surveys (i.e. birds of prey and owls) were undertaken within the study area and its immediate surrounds. Survey methodology was as outlined in Hardey et al. (2013), as per SNH (2017) recommendations. The aim of these surveys was to identify occupied territories and monitor their breeding success within the study area. Raptor surveys were undertaken onsite and to a 2km radius from the planning/development boundary, in the form of short VP watches and walked transects. These surveys were undertaken on a monthly basis during the core breeding season period (April to July, in 2016, 2017, 2018 & 2019). All areas of suitable habitat within 2km of the Site boundary were surveyed for the presence of raptor species.

Survey effort details are provided in Appendix 7-2, Table 1-3 in Chapter 7 of the EIAR. Figure 7-4 in Chapter 7 shows the areas surveyed.

4.2.2.2.4 **Winter Transect Surveys**

Winter transect surveys were undertaken to record the presence of bird species of high conservation concern within areas of potential suitable habitat in the study area and within 500m of same.

Transect routes, devised to ensure coverage of different habitat complexes, were visited within the study area during winter months. Methodology was broadly based on adapted Brown and Shepherd methods. Target species included raptors, waterbirds, gulls and ground birds of conservation interest. Along with target species, all additional species observed were recorded to inform the evaluation of supporting habitat.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 1-4 in Chapter 7 of the EIAR. Figure 7-5 in Chapter 7 shows the surveyed area.

4.2.2.2.5 Waterfowl Surveys

Significant wetland sites and waterbodies within five kilometres of the study area were surveyed for waterbird populations during the 2018/19 and 2019/20 migratory/winter seasons. The area surveyed exceeded the requirements of SNH (SNH, 2017), i.e., 500m for foraging wildfowl and one kilometre for roosting wildfowl. In addition, the Lough Iron waterbird population situated approximately 12.8km to the south-west of the proposed development Site was monitored one day per month during the same period, with a particular focus on Greenland white-fronted goose. The count methodology was in line with survey guidelines issued by SNH (2017) and BirdWatch Ireland (2015). Counts were undertaken during daylight hours from suitable vantage points at the wetland sites.

Survey effort, including details of survey duration and weather condition, is presented in Appendix 7-2, Table 1-5 in Chapter 7 of the EIAR. Figure 7-5 in Chapter 7 shows the surveyed area.

4.2.2.2.6 Breeding Woodcock Surveys

Breeding woodcock surveys were undertaken in accordance with Gilbert et al. (1998). Survey visits were undertaken in June 2016 and June 2017. The survey area extended 500m beyond the Site boundary and was focused in areas of suitable habitat. Surveys commenced one hour before sunset and continued for one hour after sunset or until it was too dark to see. Transects were slowly walked through areas of suitable woodland habitat onsite and to a 500m radius of the development area. All observations of woodcock (as well as the areas covered) are recorded on to a map. The aim of the survey was to record the presence of roding (displaying) male woodcock and thereby establish the distribution and abundance of the species in the study area. This survey method also allowed the observer to survey for owls, i.e. barn owls and long-eared owls.

Survey effort is presented in Appendix 7-2, Table 1-6 in Chapter 7 of the EIAR. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Figure 7-6 in Chapter 7 shows the transect routes surveyed.

4.2.2.2.7 Grid Connection Route

Ornithological surveys were conducted as part of the multidisciplinary surveys along the proposed grid connection route carried out by MKO in 2017, 2019 and 2020. These surveys were undertaken in addition to the dedicated bird surveys carried out between 2015 and 2017 as part of the permitted Coole Wind Farm. The grid connection works will be confined to the existing road corridor, conifer plantation and Mullingar substation.

4.3 Desk Study Results

4.3.1 Lough Owel SAC

The SAC is located 12.5km south of the proposed wind farm site and the proposed grid connection is located within the N4 road corridor along the boundary of the SAC. A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SAC. The proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the Proposed Development potentially affecting the following habitats and species:

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]
- Alkaline fens [7230]
- Transition mires and quaking bogs [7140]
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]

The relevant QIs and the associated conservation objectives are presented in Table 4-3.

Table 4-3 Qualifying Interest and Conservation Objectives

Qualifying Interest	Conservation Objective
Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> [3140]	To maintain the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara spp.</i> in Lough Owel SAC
Alkaline fens [7230]	To maintain the favourable conservation condition of Alkaline fens. in Lough Owel SAC
Transition mires and quaking bogs [7140]	To maintain the favourable conservation condition of Transition mires and quaking bogs in Lough Owel SAC
<i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]	To maintain the favourable conservation condition of White-clawed Crayfish. in Lough Owel SAC

4.3.1.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the SAC were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-4.

Table 4-4 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Low	F03.01	Hunting	Inside
Medium	D04	Airports, flightpaths	Inside
Medium	D03.01.02	Piers / tourist harbours or recreational piers	Inside
Low	J02.06.02	Surface water abstractions for public water supply	Inside
Medium	D03.01.02	Piers / tourist harbours or recreational piers	Inside
Low	J02.01	Landfill, land reclamation and drying out, general	Inside
Medium	G02.10	Other sport / leisure complexes	Inside
Medium	G01	Outdoor sports and leisure activities, recreational activities	Inside
Medium	H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities	Outside

A pathway for impact with regard to ‘Diffuse pollution to surface waters due to agriculture and forestry activities’ was identified as there will be some tree felling required as part of the Proposed Development.

4.3.1.2 Qualifying Interests

4.3.1.2.1 *Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.* [3140]

According to the detailed conservation objectives for this site, Lough Owel is one of the most important and best studied hard water lakes (3140) in Ireland. (Groves and Groves, 1893, 1895; John et al., 1982; Heuff, 1984; Pentecost, 2009; Roden and Murphy, 2013). It was in favourable conservation condition in 2011 (Roden and Murphy, 2013). Information relating to all attributes of the lake is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015). Owel is groundwater fed, has no surface water inlet and no functioning outflow. Fluctuations in lake water level are amplified at Owel by abstractions to provide 66% of Westmeath's drinking water and feed the Royal Canal (Quinlan, 2010). There is potential for deterioration in surface water quality of this aquatic habitat to occur as a result of the proposed works.

4.3.1.2.2 *Alkaline fens* [7230]

Alkaline fen has not been mapped in detail for Lough Owel SAC and thus the total area of the qualifying habitat in the SAC is unknown. However, it is known that the areas of alkaline fens (7240) in the SAC are small and occur in close association with transition mire and quaking bogs (7140) in two main areas at the north-west (Bunbrosna) and the south-west (Tullaghan) ends of Lough Owel. Though small in area, the habitat in the SAC is considered a representative example of fen associated with an alkaline lake and possibly springs (NPWS internal files). Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). There is potential for deterioration in surface water quality of this aquatic habitat to occur as a result of the proposed works.

4.3.1.2.3 *Transition mires and quaking bogs* [7140]

This habitat dominates two main areas of wetland vegetation in the SAC, at the north-west (Bunbrosna) and the south-west (Tullaghan) ends of Lough Owel. These areas comprise a mosaic of different vegetation types of varying degrees of wetness with the transition mire and quaking bog vegetation grading into alkaline fen (7230), wet grassland and wet woodland (NPWS internal files). Maintenance of a permanently high water level, remaining close to the peat surface all year, with water level fluctuations within natural ranges, is required for this wetland habitat. There is potential for deterioration in surface water quality of this aquatic habitat to occur as a result of the proposed works.

4.3.1.2.4 *Austropotamobius pallipes* (White-clawed Crayfish) [1092]

There are few geo-referenced records of white-clawed crayfish (*Austropotamobius pallipes*) from Lough Owel, but the species is mentioned in reports as being widespread in the lake. It is likely that the species is present in all the 1km squares that contain shoreline habitat. See also Reynolds (1988) and O'Connor et al. (2009). There have been outbreaks of crayfish plague (*Aphanomyces astaci*) in Ireland since 2015 and it is thought that human activity, especially the transport of disease vectors on contaminated equipment, has introduced and spread the disease, strict biosecurity is required. There should be no decline in water quality as defined by the targets set for lake habitat 3140 in Lough Owel SAC (see the conservation objective for 3140 in this volume). White-clawed crayfish (*Austropotamobius pallipes*) is tolerant of a wide range of water conditions except for the poorest quality and most acid waters. The water quality targets for lake habitat 3140 are more stringent than white-clawed crayfish require so no specific target is set for the species. There is potential for deterioration in surface water quality of the aquatic habitat associated with this species as a result of the proposed works.

4.3.2 Lough Ennell SAC

The SAC is located 24.2km south of the proposed wind farm site and 4.2km south of the proposed grid connection route. There is hydrological connectivity between the proposed grid connection route and the SAC approximately 8.8km (hydrological distance) downstream. Taking a precautionary approach, the proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the development potentially affecting the following habitat:

- Alkaline fens [7230]

The relevant QIs and the associated conservation objectives are presented in Table 4.5. The targets and attributes for these habitats, as described in the Site-specific Conservation Objectives document, were reviewed and considered in this assessment.

Table 4-5 Qualifying Interest and Conservation Objectives

Qualifying Interest	Conservation Objective
Alkaline fens [7230]	To maintain the favourable conservation condition of Alkaline fens in Lough Ennell SAC

4.3.2.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to effect on the SAC were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-6.

Table 4-6 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Medium	H06.01.01 -	Point source or irregular noise pollution	Outside
Low	B02.02 -	Forestry clearance	Outside
Low	F03.01 -	Hunting	Inside
Low	H01.08 -	Diffuse pollution to surface waters due to household sewage and waste waters	Inside
Low	H01.05 -	Diffuse pollution to surface waters due to agricultural and forestry activities	Inside
Low	A04.03 -	Abandonment of pastoral systems, lack of grazing	Both
Low	A04.01.01 -	Intensive cattle grazing	Both

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Low	J02.05.02 -	Modifying structures of inland water courses	Inside
Low	J02.01 -	Landfill, land reclamation and drying out, general	Inside
Low	F02.03.02 -	Pole fishing	Inside
Low	K03.01 -	Competition (fauna)	Inside
Low	H06.02 -	Light pollution	Inside
Low	D01.01 -	Paths, tracks, cycling tracks	Inside
Low	H06.01.01 -	Point source or irregular noise pollution	Inside
Low	B02.02 -	Forestry clearance	Inside

A pathway for impact with regard to ‘Forestry clearance’ were identified as there will be some tree felling required as part of the Proposed Development.

4.3.2.2 Qualifying Interests

4.3.2.2.1 Alkaline fens [7230]

According to the detailed conservation objectives for this site, alkaline fen has not been mapped in detail for Lough Ennell SAC and thus the total area of the qualifying habitat in the SAC is unknown. The habitat occurs in scattered areas around the shores of Lough Ennell and grades into reed swamp, freshwater marsh and wet woodland in places. It is best developed particularly at Robinstown, Derries, on the eastern side of the lake, and at the inlets and outlets of the River Brosna (NPWS internal files). Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Regional abstraction of groundwater may affect fen groundwater levels. There is potential for deterioration in surface water quality of this aquatic habitat to occur as a result of the proposed works.

4.3.3 Lough Owel SPA

The SPA is located 12.5km south of the proposed wind farm site and the proposed grid connection is located within the N4 road corridor along the boundary of the SPA. A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SPA. Taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the Proposed Development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

In addition, taking a precautionary approach, given that the proposed grid connection route is located adjacent to the SPA boundary, a potential pathway for significant effect was identified in the form of bird disturbance and deterioration of habitat as described above in relation to wetland and waterbirds as a result of construction activity on the following species:

- > Shoveler *Anas clypeata* [A056]
- > Coot *Fulica atra* [A125]

The relevant SCIs and their associated conservation objectives are presented in Table 4-7

Table 4-7 SCIs and Conservation Objectives

Special Conservation Interest (SCI)	Conservation Objective
Shoveler	Detailed conservation objectives are not available for this site. These SCI species have the generic conservation objective: <i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.’</i>
Coot	
Wetland and Waterbirds	<i>‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Owel SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’</i>

4.3.3.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the SPA were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-8.

Table 4-8 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Low	F03.01	Hunting	Inside
Medium	F02.03	Leisure fishing	Inside
Medium	B	Sylviculture, forestry	Outside
Medium	A08	Fertilisation	Outside
Low	J02	Human induced changes in hydraulic conditions	Inside

A pathway for impact with regard to ‘Sylviculture, forestry’ was identified as there will be some tree felling required as part of the Proposed Development.

4.3.3.2 Special Conservation Interests

The following relevant information on the special conservation interests of Lough Owel SPA has been extracted from the site synopsis (NPWS, 2014).

‘Lough Owel is one of the most important Midland lakes for wintering waterfowl, with nationally important populations of Shoveler (142) and Coot (1,825) -figures given are mean peaks for the five seasons 1995/96-1999/00. The populations for both of these species represent a significant proportion (c. 4.7% and 6.5%) of the respective All-Ireland totals. The lake is utilised by Pochard (291), Tufted Duck (227) and Goldeneye (75). The lake has been used as a roost by the internationally important Midland lakes Greenland White-fronted Goose population (200 recorded at the site in 2004/05). The lake also supports populations of Little Grebe (16), Great Crested Grebe (18) and Cormorant (32). Lough Owel is one of the most important fishing lakes in the Midlands and is especially good for Trout. The lake also holds an important population of White-clawed Crayfish (*Austropotamobius pallipes*), a species that is listed on Annex II of the E.U. Habitats Directive.

Lough Owel supports nationally important populations of two species, Shoveler and Coot. It is also notable as it is used as a roost site on occasion by the internationally important Midlands Greenland White-fronted Goose flock. Greenland White-fronted Goose is listed on Annex I of the E.U. Birds Directive. Lough Owel is a Ramsar Convention site.’

4.3.4 Lough Ennell SPA

The SPA is located 24.4km south of the proposed wind farm site and 4.5km south of the proposed grid connection route. Due to this distance, there is no potential for significant indirect effects as a result of disturbance. There is hydrological connectivity between the proposed grid connection route and the SPA approximately 9.2km (hydrological distance) downstream. Taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

The relevant SCIs and their associated conservation objectives are presented in Table 4-9.

Table 4-9 SCIs and Conservation Objectives

Special Conservation Interest (SCI)	Conservation Objective
Wetland and Waterbirds	<i>‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Ennell SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’</i>

4.3.4.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the SPA were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-10.

Table 4-10 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	E01	Urbanised areas, human habitation	Outside
High	A08	Fertilisation	Outside
Low	G05.01	Trampling, overuse	Inside
Medium	G01.02	walking, horseriding and non-motorised vehicles	Outside
Low	F03.01	Hunting	Inside
Medium	B	Sylviculture, forestry	Outside
Medium	G01.01	nautical sports	Inside
Medium	F02.03	Leisure fishing	Inside

A pathway for impact with regard to ‘Sylviculture, forestry’ was identified as there will be some tree felling required as part of the Proposed Development.

4.3.4.2 Special Conservation Interests

Lough Ennell SPA has been screened in for potential impact in relation to water pollution that could result in subsequent habitat deterioration of all species under the SCI Wetlands and Water birds. The following relevant information on the special conservation interests of Lough Ennell SPA has been extracted from the site synopsis (NPWS, 2014).

‘The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Pochard, Tufted Duck and Coot. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Ennell is one of the most important Midland lakes for wintering waterfowl, with nationally important populations of Pochard (738), Tufted Duck (1,303) and Coot (433) - all figures are mean peaks for the 5 winters 1995/96-1999/2000. The population of Tufted Duck represents over 3% of the all-Ireland population. The site is also utilised by an internationally important population of non-migratory Mute Swan (340). Other species which occur include Golden Plover (1,000 in 1998/99), Lapwing (673), Mallard (93), Little Grebe (30), Great Crested Grebe (24) and Goldeneye (22).

Lough Ennell is of ornithological significance for wintering waterfowl, with three migratory species having populations of national importance. The occurrence of Golden Plover in the vicinity of the lake is of note as this species is listed on Annex I of the E.U. Birds Directive. Lough Ennell is a Ramsar Convention Site.’

4.3.5 Lough Derravaragh SPA

The SPA is located 4.8km south of the proposed wind farm site and 70m east of the proposed grid connection route. The Proposed Development is located within the potential core foraging range of Whooper Swan which is an SCI species associated with the SPA (SNH Guidelines (2016)). The proposed grid connection route is located approximately 70m west of the SPA. Therefore, potential for disturbance to the remaining bird species associated with the SPA have also been considered. Given that the SPA is located hydrologically downstream of the Proposed Development site there is potential for indirect effects on surface water quality through the run off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the Proposed Development. The following SCIs were identified as having potential to be impacted by the Proposed Development and will be assessed further:

- Whooper swan *Cygnus cygnus* [A038]
- Pochard *Aythya ferina* [A059]
- Tufted duck *Aythya fuligula* [A061]
- Coot *Fulica atra* [A125]
- Wetland and Waterbirds [A999]

Table 4-11 SCIs and Conservation Objectives

Special Conservation Interest (SCI)	Conservation Objective
Whooper Swan	Detailed conservation objectives are not available for this site. These SCI species have the generic conservation objective: <i>‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’.</i>
Pochard	
Tufted Duck	
Coot	
Wetland and Waterbirds	Detailed conservation objectives are not available for this site. These SCI species have the generic conservation objective: <i>‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derravaragh SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’</i>

4.3.5.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the SPA were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-12.

Table 4-12 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Medium	F03.01	Hunting	Inside

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	A05.01	Animal breeding,	Outside
Medium	B	Sylviculture, forestry	Outside
Medium	F02.03	Leisure fishing	Inside
High	A08	Fertilisation	Outside

A pathway for impact with regard to ‘Sylviculture, forestry’ was identified as there will be some tree felling required as part of the Proposed Development.

4.3.5.2 Wetland and Waterbirds

Lough Derravaragh SPA has been screened in for disturbance to all SCI species as well as Wetland and Waterbirds. The following relevant extracts have been taken from the site synopsis for the SPA (NPWS, 2014);

‘Lough Derravaragh is one of the most important midland lakes for wintering waterfowl. It supports nationally important populations of Whooper Swan (102), Pochard (3,129), Tufted Duck (1,073) and Coot (1,358) - all counts are mean peaks for the five winters 1995/96-1999/2000. The Pochard population is of particular note as it represents over 6% of the all-Ireland population total, and at times has exceeded the threshold for international importance (i.e. 3,500). Other species which occur include Mute Swan (159), Little Grebe (42) Great Crested Grebe (34), Cormorant (34), Wigeon (207), Teal (52), Mallard (195), Pintail (6), Shoveler (12), Goldeneye (46), Golden Plover (158) and Lapwing (1,079). The lake is occasionally used as a roost site by small numbers of Greenland White-fronted Goose. Lough Derravaragh is of major ornithological importance as it regularly supports nationally important populations of four species, and at times is used by the internationally important population of Greenland White-fronted Goose which is based in the region. Also of note is that three of the species which occur at the site, Greenland White-fronted Goose, Whooper Swan and Golden Plover, are listed on Annex I of the E.U. Birds Directive. Lough Derravaragh is a Ramsar Convention site ‘

4.3.6 Lough Iron SPA

The SPA is located 11.4km south west of the proposed wind farm site, 3km from the proposed junction works in Joanstown and 4.3km west of the proposed grid connection route. The proposed wind farm site is located outside the potential core foraging range of SCI species associated with the SPA (SNH Guidelines (2016). It is also located outside the zone of sensitivity of any species that is listed as particularly sensitive to wind energy development in Mc Guinness et.al (2015).

There will be no direct effects on the supporting wetland habitat of waterbirds within the SPA. However, taking a precautionary approach, a potential pathway for indirect effects in the form of deterioration of water quality resulting from pollution, associated with the construction phase of the development was identified. Consequently, there is potential for deterioration of the wetland habitat of all SCI species. Impact on this wetland habitat is considered under the following SCI:

➤ Wetland and Waterbirds [A999]

4.3.6.1 Review of site-specific pressures and threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the SPA were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-13.

Table 4-13 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	B	Sylviculture, forestry	Inside
Medium	A04	Grazing	Inside
Medium	B	Sylviculture, forestry	Outside
High	A08	Fertilisation	Outside
Medium	A08	Fertilisation	Inside

A pathway for impact with regard to ‘Sylviculture, forestry’ was identified as there will be some tree felling required as part of the Proposed Development.

4.3.6.2 Wetland and Waterbirds

Lough Iron SPA has been screened in for potential impact in relation to water pollution that could result in subsequent habitat deterioration of all species under the SCI Wetlands and Water birds. The following relevant extracts have been taken from site synopsis for the SPA (NPWS, 2014);

‘Lough Iron is of international importance as a site for wintering waterfowl. It is a traditional haunt for the internationally important Midland lakes Greenland White-fronted Goose flock (426 - five year mean peak between 1994/95 and 1998/99). The site also supports an internationally important population of Whooper Swan (214) and nationally important numbers of Wigeon (1,229), Teal (759), Shoveler (164), Coot (293) and Golden Plover (2,200) - all figures are five year mean peaks for the period 1995/96 to 1999/2000).

Lough Iron SPA is of high ornithological importance, primarily for supporting internationally important populations of Whooper Swan and Greenland White-fronted Goose. The site also holds a notable diversity of other waterfowl, including dabbling duck, diving duck and waders. It is of note that three of the species which regularly occur, Greenland White-fronted Goose, Whooper Swan and Golden Plover, are listed on Annex I of the E.U. Birds Directive. Lough Iron is a Ramsar Convention site and a Wildfowl Sanctuary.’

4.3.7 EPA River Catchments and Watercourses

The Proposed Development site is located within three sub-catchments. The main proposed wind farm site is located in the Inny (Shannon) SC_20 with the proposed grid connection route located in the Inny (Shannon)_SC_30 and Brosna_SC_10.

The EPA Envision map viewer was consulted on 3rd February 2021 regarding the water quality status of the Rivers which run within and directly adjacent to the Study Area. The river Glore runs through the Study Area, and the River Monkton borders the mid-eastern boundary of the site. Both rivers join with the river Inny which borders the western edge of the boundary. The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample.

There are two sampling stations located adjacent to the study area, one on the river Glore downstream of the western border of the site at the Camagh bridge. This sampling station has been assigned a Moderate Status (Q3-4). A second sampling station in proximity is the bridge at Rockbrook located to the east of the site. This sampling station has been assigned a Good Status (Q4).

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The Water Framework Directive Status Report 2010 - 2015, published by the Environmental Protection Agency (EPA). The River Glore where it passes through the Proposed Development site has been assessed as 'At risk'. The River Inny along the western boundary of the main windfarm site has been assessed as 'At risk' along the Proposed Development site boundary and 'Not at risk' where it continues past the southern extent of the site. The River Inny is assessed as 'Not at risk' where it crosses the proposed grid connection route at Shrubbywood and 'At risk' where it discharges from Lough Derravaragh.

4.4 Ecological Survey results

4.4.1 Habitat survey

The Coole study area is dominated by Cutover Raised Bog (PB4) (see Plates 4-1 & 4-2 below). Much of Coole bog comprises milled peat and is divided up by drains, spaced approximately 15m apart, which separate long parallel Peat production fields. The lands to the east of the site comprise agricultural land. The edge of the main windfarm site is bordered by Conifer Plantation to the east and south while the lands surrounding T15 are predominantly agricultural in nature. The River Inny borders the west of the site and the River Glore, a tributary of the Inny, runs in an east to west direction through the study area.

Almost all the cutover bog within the study area has been used for peat production and the existing drainage network is maintained. Cutover bog areas are relatively dry with no vegetation cover, other than occasional plants recorded on the sloping banks of drains.

For ease of description, the main wind farm study area can be divided up into two distinct sections: North of the Glore River and South of the Glore River (including the section to the south of the local road which connects the R396 with the R394). In addition, the proposed borrow pit, grid connection and turbine delivery routes are also described in the sections below. A habitat map of the Proposed Development is provided in Figure 4-1 and 4-2.

North of the Glore River

This area is dominated by milled cutover bog. Conifer plantation is the dominant habitat to the north east and south. To the north east, the cutover bog is fringed by Non-Annex I Bog woodland (Plate 4-3). The bog woodland is quite open and the ground cover is dominated by Bramble (*Rubus fruticosus* agg.), Ivy (*Hedera helix*), Purple Moor-grass (*Molinia caerulea*) and Bracken (*Pteridium aquilinum*). Other species present include Broad Buckler Fern (*Dryopteris dilatata*), Heather (*Calluna vulgaris*),

Honeysuckle (*Lonicera periclymenum*) with occasional Hawthorn (*Crataegus monogyna*) and Gorse (*Ulex europaeus*). There are some narrow sections of Degraded raised bog (PB1), dominated by Ling Heather, along the margins. These areas are partially drained (Plate 4-4).

To the north, outside the site boundary is an area that has been stripped entirely of peat. This area is at a significantly lower gradient compared to the remaining cutover bog within the site boundary. To the west, the cutover bog is bordered by an intact area of remnant raised bog habitat which surrounds a small dystrophic lake (Plate 4-5). The dominant vegetation recorded from the remnant bog section comprised Ling (*Calluna vulgaris*) and Common Cottongrass (*Eriophorum vaginatum*). Bryophytes were abundant throughout with *Sphagnum cuspidatum*, *Sphagnum papillosum*, *Sphagnum magellanicum* and *Sphagnum capillifolium* recorded. The lichen *Cladonia portentosa* was common. The dystrophic lake was fringed by a floating mat of poor fen vegetation dominated by Bottle Sedge (*Carex rostrata*). Bog bean (*Menyanthes trifoliata*) was also recorded.

Continuing west, an area of Non Annex I bog woodland was recorded along with a fringe of wet grassland and scrub along the banks of the River Inny. Fringes of Reed and large sedge swamp (FS1), dominated by Common reed (*Phragmites australis*) were recorded immediately adjacent to the River Inny (Plate 4-6).

The Glore River is a tributary of the Inny and was classified as a Lowland depositing river (FW2). The Glore River marks the southern boundary of the northern section of the main proposed wind farm site. The watercourse was surrounded by a narrow strip of Mixed Broadleaved/conifer Woodland (WD2). Species recorded included Poplar (*Populus* sp.), Scots Pine (*Pinus sylvestris*), Spruce (*Picea sitchensis*) and Grey Willow (*Salix cinerea*).

A number of small silt ponds, associated with the existing onsite drainage network, occur and were classified as Other artificial lakes and ponds (FL8). The on-site drainage features (FW4) drain into the silt ponds (Plate 4-7). Vegetation recorded from the ponds included Pondweed (*Potamogeton natans*), Reedmace (*Typha latifolia*) and Water Horsetail (*Equisetum* sp.).

The banks of the Glore River were heavily vegetated (Plate 4-8). Species recorded included Reed Canary Grass (*Phalaris arundinacea*), Floating sweet grass (*Glyceria fluitans*), Hogweed (*Heracleum sphondylium*), Angelica (*Angelica sylvestris*), Great Willowherb (*Epilobium hirsutum*), Nettle (*Urtica dioica*), Creeping Thistle (*Cirsium arvense*), Brambles (*Rubus fruticosus* agg.), Meadowsweet (*Filipendula ulmaria*), Bindweed (*Calystegia sepium*). *Sparganium emersum* and Pondweed (*Potamogeton* sp.) were the only instream vegetation recorded. Small stands of Bracken (*Pteridium aquilinum*) were also recorded.

The proposed T15 is located to the east of the site within agricultural grassland categorized as Improved Agricultural Grassland (GA1)/Wet Grassland (GS4). The proposed access road to T15 will follow the local road (L5775) from the centre of the main windfarm site in an easterly direction before travelling north across a number of agricultural fields comprising Improved Agricultural Grassland (GA1), Dry Meadows and Grassy Verges (GS2) and a species rich Wet Grassland (GS4) located immediately north of the Glore River. The grassland habitats supported species including Meadowsweet (*Filipendula ulmaria*), Conglomerate Rush (*Juncus conglomeratus*), Meadow Buttercup (*Ranunculus acris*), Sheep Sorrell (*Rumex acetosa*), Yorkshire Fog (*Holcus lanatus*), Sweet Vernal grass (*Anthoxanthum odoratum*), Broadleaved Dock (*Rumex obtusifolius*), Silverweed (*Potentilla anserina*), Cock's-foot (*Dactylus glomerata*), Dandelion (*Taraxacum officinale* agg.) Nettle (*Urtica dioica*), Broadleaved Plantain (*Plantago lanceolata*) and Clover (*Trifolium* spp.) and did not correspond to any grassland habitat listed under Annex I. The access road will cross the River Glore via a clear span bridge to access the turbine location. The fields along the proposed access road are demarcated by Treeline (WL2) (Plate 4-9) and Hedgerow (WL1) (Plate 4-10) supporting species such as Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Willow (*Salix* spp.) and Hawthorn (*Crataegus monogyna*). Species within the field at the proposed Turbine 15 location included Yorkshire Fog (*Holcus lanatus*), Perennial Rye-grass (*Lolium perenne*), Sweet Vernal Grass (*Anthoxanthum odoratum*),

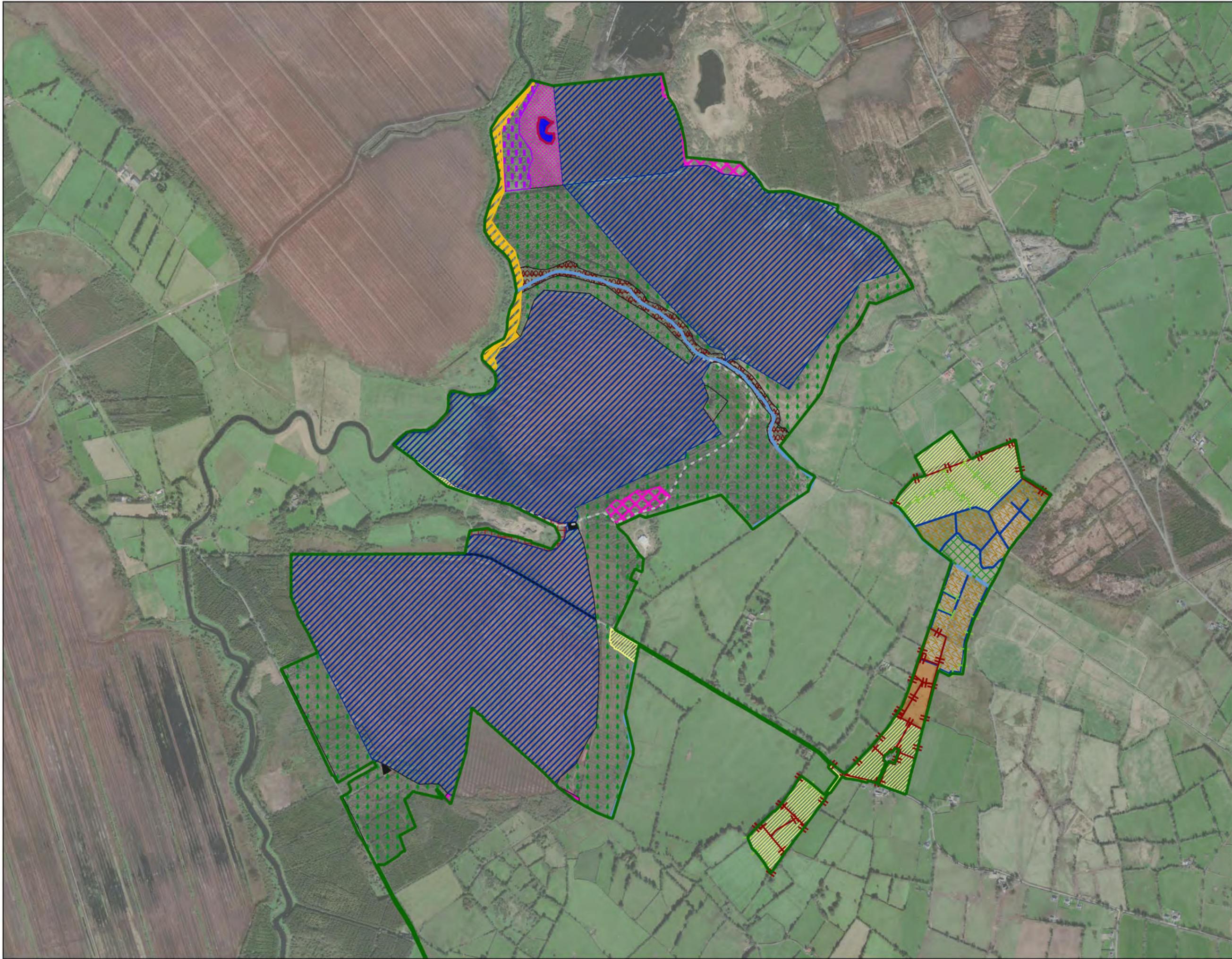
Conglomerate Rush (*Juncus conglomerataus*), Red Fescue (*Festuca rubra*), Tormentil (*Potentilla erecta*), Sheep Sorrell (*Rumex acetosa*) and Cock's-foot (*Dactylus glomerata*) (Plate 4-11).

South of the Glone River

This area is dominated by cutover bog. Conifer plantation, dominated by Lodgepole Pine and (*Pinus contorta*) and Spruce (*Picea sitchensis*) is the dominant habitat to the north and east. Exiting forestry access tracks were classified as Spoil and bare ground (ED2).

The River Inny forms the western boundary of the site. The watercourse is fringed by a narrow strip of Wet grassland (GS4). Toward the south western corner of the site is an area which is relatively dry and dominated by a mosaic of degraded/cutover bog and grassland dominated by Yorkshire Fog, Creeping Bent and occasional Soft Rush.

Continuing south, and crossing the existing local road, the study area continues to be dominated by Cutover bog. The proposed new access road to Turbine 14 leaves the local road and travels south traversing Conifer Plantation (WD4) supporting species of Lodgepole Pine and (*Pinus contorta*) and Spruce (*Picea sitchensis*) adjacent to this Cutover Bog (PB4) habitat. Turbine 14 will be located within this conifer plantation approximately 700m south of the local road as shown in Plate 4-12.



Map Legend

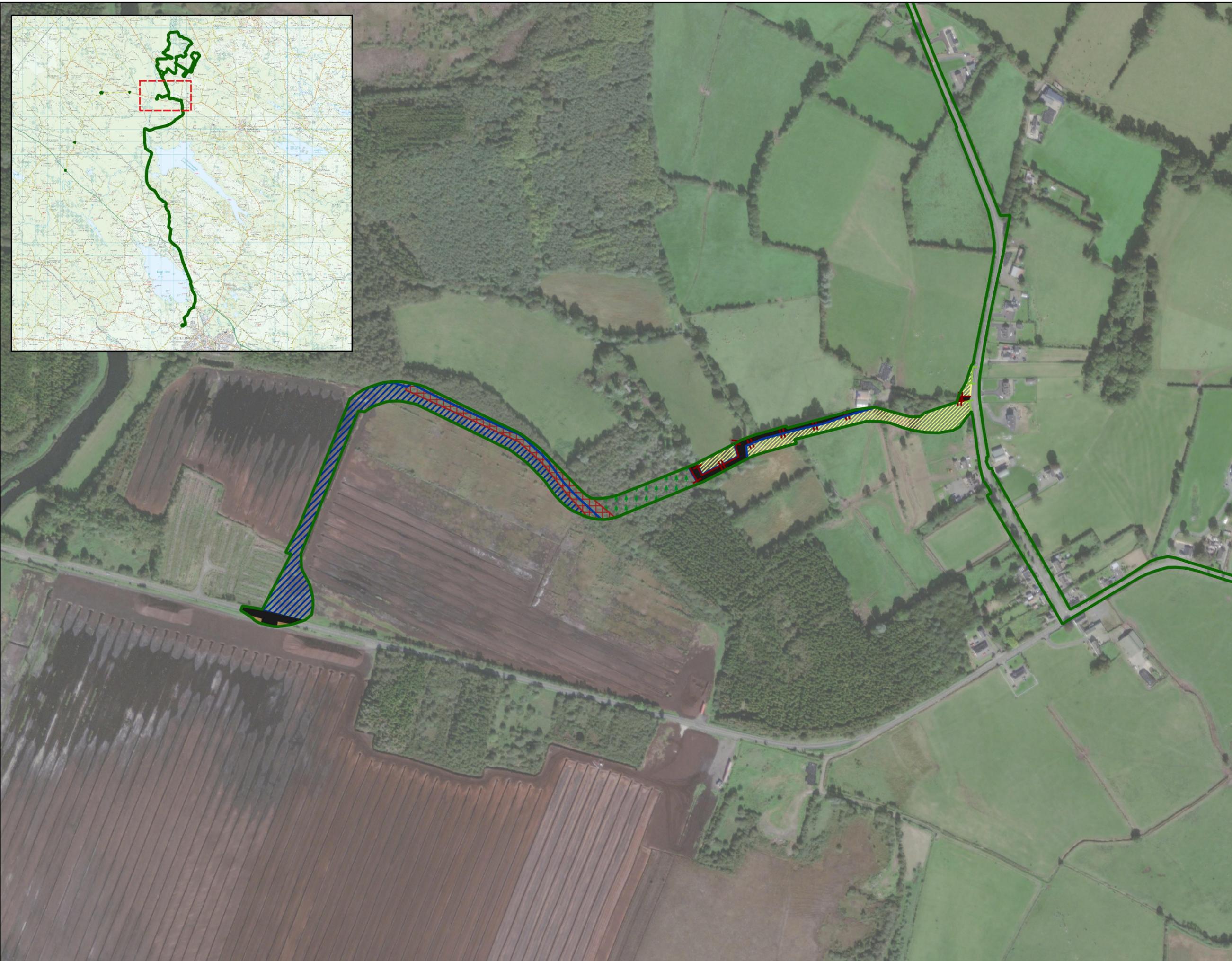
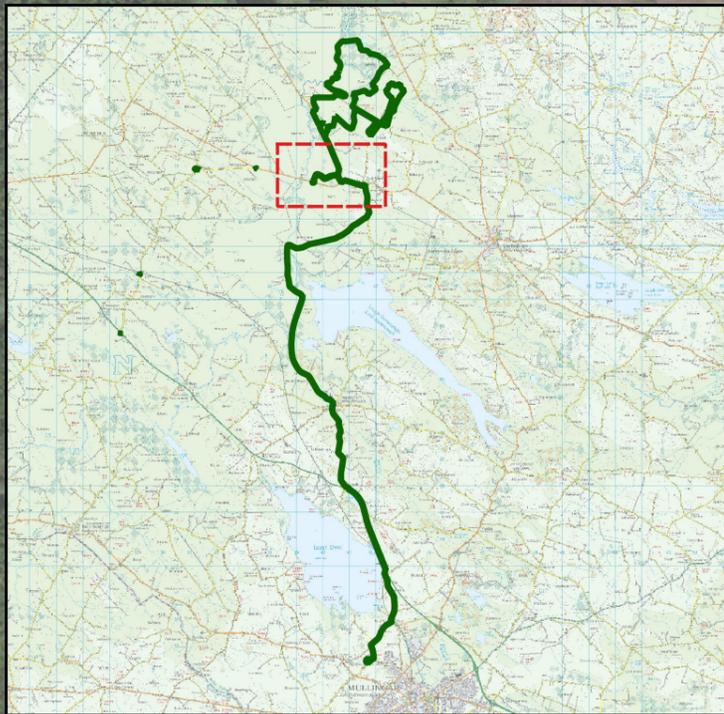
-  EIAR Site Boundary
-  Buildings and artificial surfaces (BL3)
-  Dystrophic lakes (FL1)
-  Improved agricultural grassland (GA1)
-  Dry meadows and grassy verges (GS2)
-  Wet grassland (GS4)
-  Wet grassland/Scrub (GS4/WS1)
-  Raised bog (PB1)
-  Cutover bog (PB4)
-  Poor fen and flush (PF2)
-  Mixed broadleaved/conifer woodland (WD2)
-  Conifer plantation (WD4)
-  Bog woodland (WN7)
-  Scrub (WS1)
-  Improved agricultural grassland/Wet Grassland mosaic (GA1/GS4)
-  Bog Woodland/Scrub mosaic
-  Spoil and Bare Ground (ED2)
-  Depositing/ Lowland Rivers (FW2)
-  Drainage Ditches (FW4)
-  Hedgerows (WL1)
-  Treelines (WL2)

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Habitat Map	
Project Title Coole Wind Farm, Co. Westmeath	
Drawn By HW	Checked By LK
Project No. 200445	Drawing No. Figure 4-1
Scale 1:15000	Date 2021.01.27

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Map Legend

- EIA Site Boundary
- Buildings and artificial surfaces (BL3)
- Dystrophic lakes (FL1)
- Improved agricultural grassland (GA1)
- Dry meadows and grassy verges (GS2)
- Wet grassland (GS4)
- Wet grassland/Scrub (GS4/WS1)
- Raised bog (PB1)
- Cutover bog (PB4)
- Poor fen and flush (PF2)
- Mixed broadleaved/conifer woodland (WD2)
- Conifer plantation (WD4)
- Bog woodland (WN7)
- Scrub (WS1)
- Improved agricultural grassland/Wet Grassland mosaic (GA1/GS4)
- Bog Woodland/Scrub mosaic
- Spoil and Bare Ground (ED2)
- Depositing/ Lowland Rivers (FW2)
- Drainage Ditches (FW4)
- Hedgerows (WL1)
- Treelines (WL2)

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Drawing Title: **Habitat Map - Link Road**

Project Title: **Coole Wind Farm, Co. Westmeath**

Drawn By: HW	Checked By: LK
Project No.: 200445	Drawing No.: Figure 4-2
Scale: 1:4500	Date: 2021.01.27

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Plate 4-1 Milled peat field (North of Wind Farm Site)



Plate 4-2 Milled peat field and typical drain (South of Glone River)



Plate 4-3 Bog Woodland WN7 Non Annex I (North western Wind Farm Site boundary)



Plate 4-4 Fringe of remnant Raised bog between Cutover Peat and Bog Woodland (North of Wind Farm Site)



Plate 4-5 Dystrophic Lake, fringing poor fen and remnant degraded raised bog.



Plate 4-6 River Inny, fringing reed swamp and adjacent wet grassland and willow scrub.



Plate 4-7 Silt Pond



Plate 4-8 Glore River Corridor



Plate 4-9 Example of Treeline (WL2) along the field boundaries on the proposed access road to Turbine 15



Plate 4-10 Young Hawthorn Hedgerow (WL1) along proposed access road to Turbine 15



Plate 4-11 Proposed location of T15 looking south categorised as a mosaic of Improved Agricultural Grassland (GA1)/Wet Grassland (GS4)



Plate 4-12 Proposed location of T14 within Conifer Plantation (WD4)

4.4.1.1.1 Proposed Borrow Pit

The proposed borrow pit is located approximately 700 metres east of the nearest proposed turbine location (T14). The proposed borrow pit is linked to the main area of the proposed wind farm site via the L5755 local road.

The habitats present at the borrow pit location included Improved agricultural grassland (GA1) surrounded by Hedgerow (WL1) and Treelines (WL2). The grassland is utilised for agricultural purposes. Species recorded from the sward included Perennial Ryegrass (*Lolium perenne*), Cocksfoot (*Dactylis glomerata*), Meadow Foxtail (*Alopecurus pratensis*), Meadow Grasses (*Poa* spp.), Creeping Thistle (*Cirsium arvense*), Chickweed (*Cerastium fontanum*), Soft Rush (*Juncus effuses*) and Nettle (*Urtica dioica*). Species recorded from the hedgerows included Hawthorn, Bramble, Dog Rose (*Rosa canina*). Treelines were dominated by Ash (*Fraxinus excelsior*) and Beech (*Fagus sylvatica*).

4.4.1.1.2 Habitats on the Grid Connection Route

The proposed grid connection route will be located within the carriageway/verge of existing public roads. There is no requirement to use habitats located outside the road carriageway except at the Northern and Southern ends where the connection points leave the public road for termination. All roads within/adjacent to the proposed cable route were classified as Building and Artificial Surfaces (BL3). Much of the cable route was bordered by a verge supporting Dry Meadows and Grassy Verges (GS2). Also present along the road, outside the working area, were Hedgerows (WL1), Treelines (WL2), Earth Banks (BL2), Stone Walls (BL1), Scrub (WS1), Spoil and Bare Ground (ED2), Flower Beds and Borders (BC4) and Buildings and Artificial Surfaces (BL3). No Annex I habitats were recorded within the road carriageway.

Habitats recorded beyond the road boundary included Improved Agricultural Grassland (GA1), Wet Grassland (GS4), Cutover Bog (PB4), Wet Heath (HH3) and Conifer Plantation (WD4). Less frequently recorded habitats included Mixed Woodland (WD2), Broadleaved Woodland (WD1), Amenity Grassland (GA2) and Reed and Large Sedge Swamps (FS1).

Peat Areas

Following consultation and correspondence with Westmeath County Council in relation to the proposed underground grid connection route, a peat stability assessment of sections of public roads underlain by peat of the grid connection route was carried out by Applied Ground Engineering Consultants (AGEC)¹, in April 2017. This geotechnical assessment report was previously submitted as part of the 13 Turbine Coole Wind Farm application, as detailed in Section 2.5.1 in Chapter 2 of the EIAR. The purpose of this assessment was to establish the ground conditions in three priority sections of road (as identified by Westmeath County Council at the time) with respect to construction of the underground cables and the potential effects on the structural integrity of the roads. While additional more detailed investigations have since been carried out into peat depths along the route, resulting in a more refined and robust construction methodology, the report findings in terms of ground conditions are still very useful, and are presented as Appendix 4-4 of Chapter 4 of the EIAR. The sections of road assessed by AGECE measure approximately 8 kilometres in total and are shown in Figure 4-15 of Chapter 4 of the EIAR and provided in Appendix 2 of the NIS. Following this, IONIC Consulting Engineers design of the cable and substation works required have incorporated any available historical data and reports described above, in addition to carrying out their own site investigations and are presented in Appendix 4-3 of the EIAR and Appendix 2 of the NIS.

To further investigate the grid connection route, a geophysical investigation was conducted by APEX Geophysics Ltd. in October 2019 to determine the presence/thickness of peat along the grid connection route. This has been provided as Appendix 4-5 of the EIAR. As detailed in Section 2.6.3 in Chapter 2 of the EIAR, the intended approach, i.e. confirming that the grid connection could be laid without

¹ AGECE Ltd were rebranded and became Fehily Timoney (FT) in 2019.

affecting the integrity of the road, was set out in correspondence issued to the Planning Authority in September 2017 as detailed in Section 2.6.3 of the EIAR. Following that, further details relating to construction methodology and design were discussed at the two pre-planning meetings that took place on the 15th of August 2019, and the 4th of February 2020. The approaches discussed in these meetings were considered satisfactory by the Planning Authority at that time.

In summary, where the existing road is located on peat, specific engineering designs have been carried out in order to accommodate the cable within the road corridor in these areas. Three such areas where this is required were originally identified by geotechnical assessment carried out by AGEC and measure approximately 8km in total as described in Appendix 4-4 of Chapter 4 of the EIAR. In addition, a geophysical investigation was produced by APEX in October 2019 to determine the presence/thickness of peat along the route. This has been provided as Appendix 4-5 of Chapter 4 of the EIAR. and has informed the proposed construction methodologies. There are six options for cable laying in peat areas as detailed in Chapter 4 of the EIAR. IONIC Consulting Engineers design of the cable and substation works required have incorporated any available historical data and reports described above, in addition to carrying out their own site investigations and are presented in Appendix 4-3 of the EIAR.

The below drawings are related to both public road and private road construction:

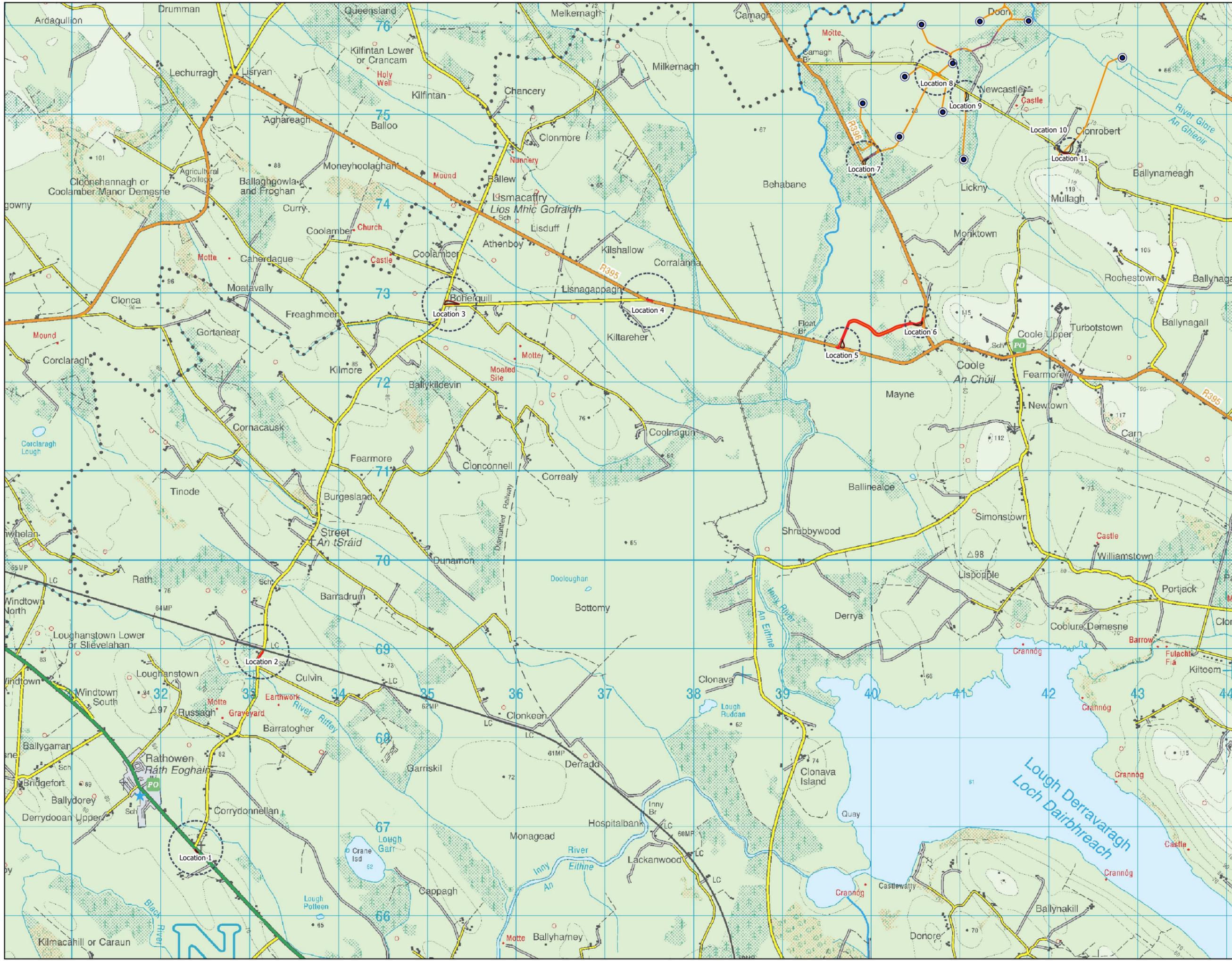
;

- Trench Type A (Through Floating Road Trench in Road with >2.5m to base of peat)
- Trench Type B (Through Floating Road Trench in Verge with >2.5m to base of peat)
- Trench Type C (Through Raised Floating Road Trench in Verge with <2.5m to base of peat)
- Trench Type D (Through Floating Road Trench in Verge with <2.5m to base of peat)
- Trench Type E1 (Through Floating Grid Route Track with >2.5m to base of peat)
- Trench Type E2 (Through Solid Grid Route Track with <2.5m to base of peat)

The exact location of the cable within the public road corridor will be subject to ESB/Eirgrid specifications and in agreement with Westmeath County Council prior to construction.

4.4.1.1.3 **Habitats on the Turbine Delivery Route**

The following locations are proposed for upgrade in order to facilitate the proposed turbine delivery route. These locations are shown in Figure 4-3 and described in the paragraphs below.



- ### Map Legend
-  Proposed Turbine Layout
 -  Internal Roads (new)
 -  Internal Roads (Upgrades to existing)
 -  Proposed Junction Works
 -  Proposed Junction Works Label
 -  Temporary Hardcore Surfacing Areas



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Drawing Title	
Turbine Delivery Route - Junctions	
Project Title	
Cooline Wind Farm Development	
Drawn By	Checked By
EC	MW
Project No.	Drawing No.
200445	Figure 4-3
Scale	Date
1:37500	04.01.2021



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Location 1 - N4 Junction with L1927 (Joanstown Townland)

Small areas of Amenity grassland (GA1) and Dry Meadows and Grassy Verges (GS2) (combined total approximately 0.03 ha) on road verge will be surfaced over to allow turbine delivery vehicles to make right-hand turn.

Location 2 – Railway Line Level Crossing on the L1927

Small area of Dry Meadows and Grassy Verges (GS2) and approximately 80m of hedgerow will be temporarily removed to facilitate abnormally sized turbine vehicles to negotiate the rail crossing.

Location 3- L1927 and L5828 Local Roads Junction (Boherquill Townland)

Road widening works are proposed to allow transport vehicles to make right-hand turn. This will result in the loss of road side Dry Meadows and Grassy Verges (GS2), Improved agricultural grassland and a heavily trimmed Hawthorn (*Crataegus monogyna*) dominated Hedgerow (WL1). The total area to be surfaced is approximately 0.31 ha.

Location 4 – Gentle right turn from L5828 onto R395

Road widening works are proposed to facilitate abnormally sized vehicles. This will result in the loss of a minor area of road side Dry Meadows and Grassy Verges (GS2) habitat.

Location 5 and 6 - Site access junctions A and B that provide access/egress onto proposed link road (linking R395 and R396)

The habitat to either side of the junction with the proposed link road as accessed from the R395 comprises an area of Dry Meadows and Grassy Verges (GS2) and Cutover Bog (PB4). The proposed area for surfacing measures approximately 0.34 hectares. There will be no impacts to the south of the R395 as there is oversail only at this junction. There will also be minor impacts to the west of the R396 at access junction B. Approximately 20m of treeline and 14m of hedgerow will require removal at Junction B access/egress from the R396.

Location 7 – Site access junction C that provides access to the site from the R396

It is proposed to widen the turn into the proposed wind farm site to the east of the R396 to facilitate the delivery of turbines. This will result in the loss of 0.21 hectares of trees and scrub associated with the edge of conifer plantation to facilitate hardcore surfacing measures.

Location 8 - Site access junction D which crosses the L5755

The swept path analysis undertaken for this location shows that the abnormally sized turbine vehicles will be able to negotiate this crossing with minor impacts on sections of hedge (over-sail) and grass verges.

Location 9 – Site access junction E which provides access to Turbine T14 located south of L5755

It is proposed to widen the turn into the proposed turbine T14 to the south of the L5755 to facilitate the delivery of the turbine. This will result in the loss of 0.21 hectares of Recolonising Bare Ground (ED3) and Scrub (WS1) dominated by Gorse (*Ulex europaeus*), Bracken (*Pteridium aquilinum*), Willow (*Salix* spp.) and Bramble (*Rubus fruticosus* agg.).

Location 10 – Site access junction F, which is the access junction off the L5755 to / from the proposed borrow pit

The analyses indicates that temporary visibility splays will be required at this junction in order to accommodate the construction vehicles. Approximately 80m of hedgerow will require removal along the proposed sightlines.

Location 11 - Site access junction G which provides access to turbine number 15 situated to the north of the L5755.

It is proposed to widen the turn into the proposed turbine T15 to the north of the L5755 to facilitate the delivery of the turbine. There are a number of mature Ash (*Fraxinus excelsior*) and Sycamore (*Acer pseudoplatanus*) trees that will require removal to facilitate the proposed works. These trees did not show any obvious signs of cracks or crevices but had occasional broken limbs and all supported dense ivy. As a result, these were assessed as having *Low-Moderate* potential to support roosting bats. The proposed area for hardcore surfacing measures 0.41 hectares and will result in the loss of Improved Agricultural Grassland (GA1).

4.4.1.1.4 Proposed Link Road West of Coole Village

The link road is described from east proceeding west. The proposed route diverges from the R396 to a minor access road (Building and Artificial Surfaces (BL3)), bordered by Drainage Ditches (FW4), Meadows and Grassy Verges (GS2), Treelines (WL2) and Earth Banks (BL2). Adjacent habitats include agricultural buildings (BL3) and Improved Agricultural Grassland (GA1).

Continuing west the proposed route traverses Conifer Plantation (WD4), comprising Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*), and an area of milled Cutover Bog (PB4) before connecting with the R395 Regional Road.

4.4.1.2 Botanical Species Present

Species listed in Annex II of the EU Habitats Directive or additional flora listed in the Flora (Protection) Order (2015) or red list of vascular plants (Jackson *et. al* 2016) were not recorded.

4.4.1.3 Invasive Alien Species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

No third schedule species were recorded within the wind farm site.

Bohemian Knotweed (*Fallopia bohemica*), Japanese Knotweed (*Fallopia japonica*), Himalayan Knotweed (*Persicaria wallichii*) and Rhododendron (*Rhododendron ponticum*) were recorded along the proposed transport and grid connection routes. The observations were of isolated patches on the roadside verge. (See Table 4-14 below). A map showing the locations of Third Schedule species recorded is shown in Figure 4-4.

Table 4-14 Third Schedule Invasive Species

Common Name	Scientific Name	Grid Ref:	Notes
Bohemian Knotweed	<i>Fallopia bohemica</i>	240923; 270540	Recorded on the immediate roadside verge, measuring approx. 20m x 15m
Rhododendron	<i>Rhododendron ponticum</i>	239010 267335	Recorded on the immediate roadside verge
Japanese Knotweed	<i>Fallopia japonica</i>	240469 263629	Recorded on the immediate roadside verge measuring approx. 7m x 3m
Japanese Knotweed	<i>Fallopia japonica</i>	242144 255351	Recorded on the immediate roadside verge measuring approx. 16m x 3m
Himalayan Knotweed	<i>Persicaria wallichii</i>	242601 256010	Along waters edge at bridge crossing of Lough Owel Feeder



Map Legend

- ▲ Bohemian Knotweed
- Himalayan Knotweed
- Japanese Knotweed
- Rhododendron
- EIAR Site Boundary

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Drawing Title
Invasive Species

Project Title
Coole Wind Farm, Co. Westmeath

Drawn By: **LK** Checked By: **PR**

Project No.: **200445** Drawing No.: **Figure 4-4**

Scale: **1:98852** Date: **01.02.2021**

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4.4.2 Fauna

4.4.2.1 Aquatic Fauna

Aquatic Ecological Surveys 2016

In 2016, Ecofact Environmental Consultants were commissioned to undertake aquatic surveys of watercourses within and in proximity to the Coole site. The relevant extracts from the Aquatic Survey Report are provided as **Appendix 5** on this NIS.

Of the eight sampling locations, seven (Sites 1, 2, 3, 5, 6, 7 & 8) are pertinent to the Proposed Development: Sampling location 4 was located on the Mayne river and has no hydrological connectivity with the Proposed Development. Sampling locations 1-3 are located on the River Inny downstream of the Proposed Development.

The Annex II species Atlantic Salmon was absent from all watercourses surveyed. No evidence of White-clawed Crayfish was recorded although it is noted that the species was recorded in a survey undertaken by Ecofact in 2013. Suitable substrate for Lamprey ammocoetes was recorded at each watercourse however the species was only recorded from survey areas 04, 06 and 07.

The tables below (4-15 to 4-18), extracted from the Ecofact Report, provide a summary of the Aquatic survey results.

Table 4-15 Results of the physical habitat appraisals of the aquatic ecology and fisheries survey

Site	Watercourse Name	Wetted width (m)	Mean Depth (cm)	Max Depth (cm)	Instream vegetation (%)	Bank Height (m)	Bank slope (°)	Bank Cover (%)	Canopy Cover (%)	Riffle (%)	Glide (%)	Pool (%)	Flow Velocity (m/s)	Rock (%)	Cobble (%)	Gravel (%)	Fine (%)	Shade (%)
1-3	Inny	28	1	2.5	40	1	75	95	0	0	20	80	0.2	0	0	20	80	10
4	Mayne	1.5	20	25	10	0.7	90	100	70	0	100	0	0.01	0	0	0	100	90
5	Glore	3	20	60	50	3	45	80	10	40	30	30	0.4	0	10	70	20	10
6	Glore	2.5	20	25	90	0.5	80	100	0	10	90	0	0.05	0	0	20	80	0
7	Glore	2.5	35	50	40	0.9	55	100	5	30	40	30	0.1	20	30	25	25	0
8	Monkstown	1.5	10	30	15	1	80	80	45	25	25	50	0.2	0	0	0	100	45

Table 4-16 Results of the River Corridor Survey appraisals

Site	River	Tributary	Segment code	EPA code	Order	Wetted width (m)	Drained (Y/N)	Gradient (Low/Med/High)	Siltation (Heavy/Moderate/Normal/Free)	Filamentous algae (Y/N)	Eroding banks (Y/N)	Braided channel (Y/N)
1-3	Inny	-	07_1712	07M03	4	28	Y	L	H	Y	N	N
4	Inny	Mayne	26_2450	26M92	1	1.5	Y	L	H	Y	N	N
5	Inny	Glore	26_2976	26G02	3	3	Y	L	M	Y	Y	N
6	Inny	Glore	26_13411	26G02	3	2.5	Y	M	M	Y	Y	N
7	Inny	Glore	26_3579	26G02	3	2.5	Y	M	N	Y	Y	N
8	Inny	Glore, Monkstown	26_2975	26M78	2	1.5	Y	L	H	Y	N	N

Table 4-17 Results of the aquatic ecological appraisals (P=present, L=likely, A=absent)

Site	Watercourse Name	Salmonid nursery (Y/N)	Salmonid fishery (Y/N)	Coarse nursery (Y/N)	Coarse fishery (Y/N)	Salmon (P/A)	Trout (P/A/L)	Coarse fish (P/A)	Eel (P/A/L)	Juvenile lamprey habitat (P/A)	Lamprey (P/A)	Crayfish (P/A)	FPM (P/A)	Floating river vegetation (Y/N)
1-3	Inny	A	A	Y	Y	A	A	A	A	P	A	A	A	A
4	Mayne	A	A	N	A	A	L	L	P	P	P	A	A	A
5	Glore	A	A	Y	A	A	P	A	P	P	L	A	A	A
6	Glore	Y	A	Y	A	A	P	P	P	P	P	A	A	Y
7	Glore	Y	A	Y	A	A	P	P	P	P	P	A	A	A
8	Monkstown	A	A	A	A	A	L	L	A	A	A	A	A	A

Table 4-18 Biological water quality and WFD status at survey sites (High/Good/Moderate/Poor/Bad)

Site	Watercourse Name	Q-value	Biological Status (Macroinvertebrates)	Morphological Status	Fish Status
1-3	Inny	Q4/Q3-4	G/M	P	P/B
4	Mayne	Q3	P	P	B
5	Glore	Q3-4	M	P	P/B
6	Glore	Q3-4	M	M	P/B
7	Glore	Q3-4	M	M/P	P
8	Monkstown	Q3	P	P/B	B

4.4.2.2 Birds – Windfarm Site

Detailed maps and raw data are provided in Chapter 7: Ornithology of the EIAR that was prepared in support of this application. The results of SCI species which have been identified in the Appropriate Assessment Screening Report (See Appendix 1) as occurring within the Likely Zone of Impact of the Proposed Development are provided below, namely:

- > Whooper Swan
- > Shoveler
- > Coot
- > Pochard
- > Tufted Duck

4.4.2.2.1 Whooper Swan

Raw survey data for whooper swan is provided in Appendix 7-4 in Chapter 7 of the EIAR. Results summary tables are present in Appendix 7-3 in Chapter 7 of the EIAR.

Vantage Point Surveys

- > 2015-2017 surveys

Whooper swan were observed on four occasions during the 2015-2017 Vantage Point Surveys at VP4 (see Appendix 7-4, Figure 7-1-1, Chapter 7 of the EIAR). Flights were recorded between the periods of November-March. Numbers recorded ranged from 1 to 7 birds. All flights were recorded within, or partially within, the potential collision risk zone. All observations were recorded within 500m of the wind farm site.

- > 2018-2020 surveys

Whooper swan were observed on five occasions during the 2018-2020 Vantage Point Surveys at VP3 and VP5 (see Appendix 7-4, Figure 7-1-1, Chapter 7 of the EIAR). Flights were recorded between the periods of October-March. Numbers recorded ranged from 1 to 14 birds. All flights were recorded within the potential collision risk zone. All observations were recorded within, or partially within, 500m of the wind farm site.

4.4.2.2.2 Winter Transect Surveys

- > 2015-2017 surveys

Whooper swan were observed on two occasions during the 2015-2017 Winter Transect Surveys (see Appendix 7-4, Figure 7-5-1, Chapter 7 of the EIAR). On the 30th of October 2016, a flock of twelve birds was observed on a flooded area approximately 2.6km south-west of the Site. On the 28th of January 2017, a flock of eight birds was observed within the Site boundary.

- > 2018-2020 surveys

Whooper swan were observed on only one occasion during the 2018-2020 Winter Transect Surveys (see Appendix 7-4, Figure 7-5-1, Chapter 7 of the EIAR). On the 20th of March 2020, three birds were observed travelling over cutover bog and improved agricultural grassland, approximately 1.7km south-west of the proposed wind farm site.

4.4.2.2.3 Waterfowl Surveys

- > 2015-2017 surveys

Whooper swan were recorded on twenty-three occasions during Waterfowl Surveys (see Appendix 7-4, Table 1-3, Chapter 7 of the EIAR). Seven observations occurred during the 2016/2017 winter season with a maximum flock number of 40 birds recorded feeding at Lough Derravaragh, approximately 5.4km south of the Site. Sixteen observations occurred during the 2016/2017 winter season with numbers of birds ranging from 3 to 18. Whooper swan were observed at Lough Bane, Lough Kinale and Derragh Lough, Lough Sheelin and Lough Derravaragh.

➤ 2018-2020 surveys

Whooper swan were recorded on ninety-five occasions during Waterfowl Surveys (see Appendix 7-4, Table 1-3, Chapter 7 of the EIAR). Eighty-nine of these observations were recorded at Lough Iron, approximately 12.8km to the south-west of the proposed wind farm site. Those observations correspond to birds travelling or feeding on the lough. Numbers ranged from 2 to 96 birds. The remaining five observations were recorded at Lough Bane, Sheeling Lough SPA and Lough Derravaragh SPA. A maximum of 7 birds were recorded within 500m of the wind farm site at Lough Bane on a single occasion.

There were no additional observations of this species during any of the other comprehensive surveys.

4.4.2.2.4 **Shoveler**

Raw survey data for Shoveler is provided in Appendix 7-4 in Chapter 7 of the EIAR. Results summary tables are present in Appendix 7-3 in Chapter 7 of the EIAR.

Winter Transect Surveys

➤ 2015-2017 surveys

Shoveler was recorded on a single occasion during Winter Transect Surveys (see Appendix 7-4, Figure 7-5-5, Chapter 7 of the EIAR). On the 28th of January 2017, a shoveler was flushed from Lough Bane, north of the Site.

Waterfowl Surveys

➤ 2015-2017 surveys

Shoveler were recorded on six occasions during the 2015/17 Waterfowl Surveys (see Appendix 7-4, Table 1-25, Chapter 7 of the EIAR). One observation occurred during the 2015/2016 winter season with a flock of 3 birds recorded feeding at Lough Derravaragh, situated approximately 5.4km to the south of the Site. The other five observations occurred during the 2016/17 winter season with numbers of birds ranging from 1 to 3. Shoveler were observed at Lough Bane, Derragh Lough, Bracklagh Lough, Lough Sheelin and Lough Derravaragh. Shoveler were recorded at Lough Bane within 500m of the wind farm site on a single occasion with one bird observed.

➤ 2018-2020 surveys

Shoveler was only recorded once during Waterfowl Surveys (see Appendix 7-4, Table 7-10, Chapter 7 of the EIAR). On the 7th of February 2020, an individual bird was observed feeding at Lough Derravaragh situated within 5.4km to the south of the proposed wind farm site and 1.9km east of the grid connection route.

There were no additional observations of this species during any of the other comprehensive surveys.

4.4.2.2.5 Coot

Raw survey data for coot is provided in Appendix 7-4 in Chapter 7 of the EIAR. Results summary tables are present in Appendix 7-3 in Chapter 7 of the EIAR.

Breeding Bird Surveys

Coot were only recorded on a single occasion during Breeding Bird Surveys (see Appendix 7-4, Figure 7-3-2). On the 26th of June 2019, an individual bird was recorded on a flooded area in bog, approximately 300m north of the proposed grid connection route.

Winter Transect Surveys

> 2015-2017 surveys

Coot were only recorded twice during the 2015-2017 Winter Transect Surveys (see Appendix 7-4, Figure 7-5-8, Chapter 7 of the EIAR). On the 14th of March 2016, two birds were observed along the cable route approximately 4km south of the Site. On the 27th of March 2017, four birds were observed at Lough Bane, adjacent to the Site boundary.

> 2018-2020 surveys

Coot were only recorded on a single occasion during Winter Transect Surveys (see Appendix 7-4, Figure 7-5-8). On the 20th of March 2020, an individual bird was recorded on a bog pond, approximately 180m north of the proposed grid connection route.

Waterfowl Surveys

> 2015-2017 surveys

Coot were recorded on one hundred and thirty-eight occasions during Waterfowl Surveys (see Appendix 7-4, Table 1-36, Chapter 7 of the EIAR). The species was recorded from the following sites: Lough Bane, Derragh Lough, Lough Kinale and Derragh Lough, Lough Sheelin, Bracklagh Lough and Lough Derravaragh. A maximum number of 1,565 coot was recorded at Lough Sheelin located approximately 4km from the Proposed Development Site. Coot were recorded at Lough Bane within 500m of the wind farm site on two occasions with a maximum of one bird observed.

> 2018-2020 surveys

Coot were recorded on one hundred and eighty-nine occasions during Waterfowl Surveys (see Appendix 7-4, Table 7-16, Chapter 7 of the EIAR). The species was recorded from the following sites: Lough Bane, Derragh Lough, Lough Kinale and Derragh Lough, Lough Sheelin and Lough Derravaragh. A maximum number of 760 coot was recorded at Lough Sheelin located approximately 4km from the Proposed Development Site. Coot were recorded at Lough Bane within 500m of the wind farm site on a single occasion with one bird observed.

There were no additional observations of this species during any of the other comprehensive surveys.

4.4.2.2.6 Pochard

Raw survey data for pochard is provided in Appendix 7-4, Chapter 7 of the EIAR. Results summary tables are present in Appendix 7-3, Chapter 7 of the EIAR.

Waterfowl Surveys

> 2015-2017 surveys

Pochard were recorded on thirty-two occasions during the 2015/17 Waterfowl Surveys (see Appendix 7-4, Table 1-28, Chapter 7 of the EIAR). Thirteen observations occurred during the 2015/16 winter season with a maximum flock number of 483 birds recorded feeding at Lough Sheelin, approximately 4km north-east of the Proposed Development Site. Nineteen observations occurred during the 2016/17 winter season with numbers of birds ranging from 2 to 211. Pochard were observed at Lough Kinale and Derragh Lough, Lough Sheelin, Bracklagh Lough and Lough Derravaragh.

> 2018-2020 surveys

Pochard were recorded on thirty occasions during Waterfowl Surveys (see Appendix 7-4, Table 1-28, Chapter 7 of the EIAR). Fourteen observations occurred during the 2018/2019 winter season with a maximum flock number of 142 birds recorded feeding at Lough Sheelin, approximately 4km north-east of the Proposed Development Site. Sixteen observations occurred during the 2019/2020 winter season with numbers of birds ranging from individuals to 225. Pochard were observed at Lough Bane, Derragh Lough, Lough Kinale and Derragh Lough, Lough Sheelin, Bracklagh Lough and Lough Derravaragh. Pochard were recorded at Lough Bane within 500m of the wind farm site on a single occasion with one bird observed.

There were no additional observations of this species during any of the other comprehensive surveys.

4.4.2.2.7 Tufted Duck

Raw survey data for tufted duck is provided in Appendix 7-4. Results summary tables are present in Appendix 7-3.

Waterfowl Surveys

> 2015-2017 surveys

Tufted duck were recorded on eighty-eight occasions during the 2015/17 Waterfowl Surveys (see Appendix 7-4, Table 1-3, Chapter 7 of the EIAR). Thirty-five observations occurred during the 2015/16 winter season with a maximum flock number of 552 birds recorded feeding at Lough Kinale, approximately 2km north-west of the proposed wind farm site. Fifty-three observations occurred during the 2016/17 winter season with numbers of birds ranging from individuals to 668 birds. Tufted duck were observed at Derragh Lough, Lough Kinale and Derragh Lough. Lough Sheelin, Bracklagh Lough and Lough Derravaragh.

> 2018-2020 surveys

Tufted duck were recorded on ninety-nine occasions during Waterfowl Surveys (see Appendix 7-4, Table 7-14, Chapter 7 of the EIAR). Fifty observations occurred during the 2018/2019 winter season with a maximum flock number of 384 birds recorded feeding at Lough Sheelin, approximately 4km north-east of the proposed wind farm site. Forty-nine observations occurred during the 2019/2020 winter season with numbers of birds ranging from individuals to 408 birds. Tufted duck were observed at Derragh Lough, Lough Kinale and Derragh Lough. Lough Sheelin, Bracklagh Lough and Lough Derravaragh.

There were no additional observations of this species during any of the other comprehensive surveys.

Incidental Observations

Incidental observations were also recorded during VPs watches (see Appendix 7-4, Table 7-3, Chapter 7 of the EIAR). These included evidence of roosting from areas of cutover milled peat, on dates between 2015-2017 and 2018-2020 and non-visual records of calling birds.

There were no additional observations of this species during any of the other comprehensive surveys.

4.4.2.3 Birds - Grid Connection Route

Bird surveys were conducted as part of the multidisciplinary surveys along the proposed grid connection route carried out by MKO in 2017, 2019 and 2020. These surveys were undertaken in addition to the dedicated bird surveys carried out between 2013 and 2017 as part of the permitted Coole Wind Farm. The grid connection works will be confined to the existing road corridor, conifer plantation and Mullingar substation. No supporting habitat for any SCI species was present, therefore no potential for any habitat loss exists. In addition, due to the location of the works within the existing road corridor and conifer plantation, no potential for disturbance or displacement was identified.

Whooper Swan which is an SCI of Lough Derravaragh SPA was recorded on the River Inny approximately 56m from the road corridor and 1km from the boundary of Lough Derravaragh SPA. No other Annex I or SCI species associated with any European site were recorded.

5. ASSESSMENT OF POTENTIAL EFFECTS AND ASSOCIATED MITIGATION

5.1 Potential for Direct Effects on the European Sites

The proposed wind farm site lies entirely outside of the boundaries of EU designated sites. The proposed grid connection is located within the existing N4 corridor along the boundary of Lough Owel SAC and Lough Owel SPA and will not impact on any habitat listed for protection under these designated sites. There is no potential for direct impact on any EU site.

5.2 Potential for Indirect Effects on the European Sites

Following the extensive surveys and assessments undertaken, no potential for disturbance, displacement or collision risk were identified in respect of the wind farm development itself for any species other than Whooper Swan associated with Lough Derravarragh SPA. The wind farm site is located within the core foraging range of this species. The potential for disturbance, displacement and collision risk for Whooper Swan is considered in Section 5.2.1 below.

Potential indirect effects on QI/SCI species of Lough Derravarragh and the other Screened In European Sites have been identified in the form of deterioration of habitat as a result of water quality and with disturbance associated with the grid connection route and junction works only. These are discussed in sections 5.2.2 and 5.2.3.

5.2.1 Potential for Indirect Effect on Whooper Swan

Lough Derravarragh SPA is located 4.8km south of the proposed windfarm site and 70m east of the proposed grid connection route. The development is located within the potential core foraging range of Whooper Swan which is an SCI species of Lough Derravarragh SPA (SNH Guidelines (2016)). Consequently, the potential for direct and indirect impacts on Whooper Swan is assessed further in Table 5-1 below.

Table 5-1 Impact Assessment - Whooper Swan

Analysis of potential effects on Whooper Swan	
Disturbance and Displacement	<p>Based on the surveys carried out between 2015-2017 and 2018-2020, most observations of Whooper Swan were of flocks recorded at Lough Iron, approximately 12.8km from the Proposed Development Site, during specific Waterfowl Surveys. The species was infrequently recorded on Site or within 500m of the proposed turbine layout. The three largest flocks (numbered 14, 9 and 7) were recorded flying over areas of cutover bog. There was no evidence of roosting within 1km of the Proposed Development Site.</p> <p>The Proposed Development Site is dominated by cutover bog. This is not considered suitable for wintering whooper swan. The unfavourable nature of most onsite habitats (i.e. cutover bog) limits the potential for construction activities to result in ecologically significant habitat loss for whooper swan.</p>

Analysis of potential effects on Whooper Swan	
	<p>This species was rarely recorded utilising habitats within the Site boundary/within 500m of the Site boundary during the winter season. The frequency of observations and numbers per observation were both low.</p> <p>Given low numbers recorded and the abundance of similar suitable habitat in the wider surroundings of the Proposed Development significant impacts are not predicted.</p> <p>No regular feeding grounds were recorded on Site or within 500m of the same. No evidence of roosting was recorded within the Site boundary or to a 1km radius of the Site.</p> <p>Whooper swan were rarely recorded flying over the Proposed Development area. Survey results indicates that the development Site does not lie on a migratory corridor for whooper swan. Therefore, no barrier effect is predicted.</p> <p>During surveys of the grid connection route in 2017, 2019 and 2020, one Whooper Swan was recorded on the River Inny located approximately 56m from the proposed grid connection route.</p> <p>Whooper swan are not dependent on the habitats recorded within the Proposed Development site boundary and there is no potential for adverse effect on the populations of Whooper Swan associated with Lough Derravarragh SPA which is located over 4.8km south of the proposed windfarm site and 70m east of the proposed grid connection route. Works in relation to the grid connection route will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. Furthermore, it is unlikely that any significant displacement impact will result during the operational phase given the low level of Whooper Swan activity on Site.</p>
Collision	<p>Whooper Swan was recorded flying within the potential collision risk zone during Vantage Point surveys. A “Random” collision risk analysis has been undertaken and full details are provided in Appendix 7-5 of Chapter 7 of the EIAR.</p> <p>The collision risk has been calculated at a ratio of 0.14 collisions per year, or one bird every 7 years. Annual mortality of adult whooper swan has been calculated at 20% per annum (Brazil, 2003). If 0.14 collisions were to occur per year, it would mean that the losses at the proposed wind farm would increase the annual mortality of the county population (i.e. 389) by 0.18%.</p> <p>The predicted collision risk is therefore negligible (<1%) in the context of recorded population. There will be no adverse effect on the population of Whooper Swan associated with Lough Derravarragh SPA.</p>

5.2.2 Bird Disturbance

A potential pathway for indirect effects in the form of bird disturbance was identified, potentially affecting the following SPAs as a result of proximity to the proposed wind farm site and/or grid connection route:

- Lough Owel SPA (004047)
 - Shoveler *Anas clypeata* [A056]
 - Coot *Fulica atra*

- Lough Derravaragh SPA (004043)
 - Whooper swan *Cygnus cygnus* [A038]
 - Pochard *Aythya farina* [A059]
 - Tufted duck *Aythya fuligula* [A061]
 - Coot *Fulica atra* [A125]

This section describes the measures that are in place to mitigate adverse negative effects associated with the Proposed Development on avian receptors. Effects on avian receptors have been addressed in two ways:

- Design of the Proposed Development.
- Management of the development phases.

5.2.2.1 Mitigation by Design

The Proposed Development has been designed to avoid ecologically sensitive areas and has been constraint led from the initial design phase. The project design has followed the basic principles outlined below to eliminate the potential for ecological effects on KERs where possible and to minimise such effects where total elimination is not possible.

The development has been designed to:

- avoid any direct, in-direct or residual adverse effects on European sites or other designated sites for nature conservation.
- to avoid effects on habitats that correspond to those that are listed on Annex I of the EU Habitats Directive outside of the European and nationally designated sites.
- minimise direct or indirect effects on any habitats or species that were classified as being of National, County or Local Importance (Higher Value) in the design of the scheme

Through careful planning and design, direct or indirect effects on receptors of International, National & County importance have been avoided at the design stage. In addition, the proposed development layout minimises the potential for effects on receptors of Local Importance (Higher Value).

During the site surveys, it was noted that all works associated with the proposed grid connection route will be undertaken in the road, short term and typical of road maintenance works. No works are proposed outside the confines of the road corridor and given the nature and scale of the temporary cable laying works no adverse effects relating to disturbance are anticipated. The project design has followed the basic principles outlined below to eliminate the potential for significant effects on avian receptors:

The project design has followed the basic principles outlined below to eliminate the potential for significant effects on avian receptors:

- The grid connection route has been selected to utilise built infrastructure for the majority of its length (i.e. cables to be laid within public roads). Cables will be laid underground to avoid effects on roadside hedgerows and disturbance to nesting birds.

5.2.2.2 Mitigation During Construction, Operation and Decommissioning

The following section describe the mitigation and best practise measures to be implemented during each phase of the Proposed Development.

5.2.2.3 Construction Phase Mitigation

A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP will be in place prior to the start of the construction phase. Best practice measures which form part of the design of the project are included in Chapter 4 of the EIAR. The CEMP is included as an Appendix to Chapter 4 and provided as Appendix 3 of this NIS. A summary of the some of the main points included in the CEMP are provided below and in the following sections:

- All removal of woody vegetation will be undertaken in accordance with Section 40 of the Wildlife Act 1976 as amended.
- The removal of woody vegetation will be undertaken outside the bird breeding season which runs from the 1st of March to the 31st of August inclusive. Where sections of woody vegetation are removed for the purposes of the junction and road upgrades, these will be replaced with suitable hedge/tree species which are common in the local context.
- In line with best practise, no construction works are permitted 1st of March to the 31st of August inclusive within a 350m radius of the lapwing breeding territories, as provided in Confidential Appendix 7-7 in Chapter 7 of the EIAR.
- In line with best practise, no construction works are permitted 1st of March to the 31st of August inclusive within a 500m radius of the barn owl breeding site, as provided in Confidential Appendix 7-7 in Chapter 7 of the EIAR.
- During the construction phase, noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds.
- Plant machinery will be turned off when not in use.
- All plant and equipment for use will comply with the industry best practise Construction Plant and Equipment Permissible Noise Levels Regulations and other relevant legislation.
- An Ecological Clerk of Works (ECoW) will be appointed. Duties will include:
 - Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.
 - Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Development site.
 - Oversee management of ornithological and ecological issues during the construction period and advise on ornithological issues as they arise.
 - Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
 - Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.

5.2.2.4 Operational Phase Mitigation

The predicted collision risk potentially resulting from the turbines with Whooper Swan was assessed as negligible (<1%) in the context of the recorded population. There will be no adverse effect on the population of Whooper Swan associated with Lough Derravarragh SPA. No operational phase impacts requiring mitigation were identified.

5.2.2.5 Decommissioning Phase Mitigation

The following measures are proposed for the decommissioning phase:

- During the decommissioning phase, disturbance limitation measures will be as per the construction phase.
- Plant machinery will be turned off when not in use.
- All plant and equipment for use will comply with industry best practise Construction Plant and Equipment Permissible Noise Levels Regulations.

5.2.3 Deterioration of Water Quality

There is hydrological connectivity between the Proposed Development and downstream European Sites via watercourses within the site boundary.

The proposed works have the potential to cause deterioration in surface water quality during the construction, operational and decommissioning phase of the development due to the release of pollutants including suspended solids and hydrocarbons, potentially affecting the following QIs/SCIs, in the absence of mitigation:

- Lough Owel SAC (000688)
 - Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]
 - Alkaline fens [7230]
 - Transition mires and quaking bogs [7140]
 - *Austropotamobius pallipes* (White-clawed Crayfish) [1092]
- Lough Ennell SAC (000685)
 - *Alkaline fens* [7230]
- Lough Owel SPA (004047)
 - Wetland and Waterbirds [A999]
- Lough Ennell SPA (004044)
 - Wetland and Waterbirds [A999]
- Lough Derravaragh SPA (004043)
 - Wetland and Waterbirds [A999]
- Lough Iron SPA (004046)
 - Wetland and Waterbirds [A999]

5.2.3.1 Mitigation by Design

The design of the Proposed Development, as described in Chapter 4 of the EIAR (see Appendix 2 of this NIS) and in the CEMP, Appendix 4-4 of Chapter 4 (see Appendix 3), sets out very clearly how the Proposed Development, including the underground cabling, has been designed and will be operated in accordance with best industry practice to avoid any significant effects outside the site including the prevention of impacts on watercourses. This design includes suitable precautionary mitigation to make certain that the Proposed Development will not adversely affect the integrity of European sites.

The development has been designed to avoid effects on the watercourses that provide connectivity to relevant European Sites. This section demonstrates how this has been achieved:

- All major infrastructure such as turbines, substations and site compounds will be over 50m from any main watercourse (identified on EPA watercourse mapper) and 10m from any large drainage channels on the site.
- There will be 2 no. crossings over the River Glore as part of the Proposed Development. The first crossing comprises the replacement of an existing timber bridge with a 5m clear span bridge connecting Turbines T5-T12 to Turbines T1-T4. The second crossing will comprise a new 5m clear-span bridge to provide access to T15. A third crossing will be required to provide access to Turbine T1 located to the north of an OPW drain. This will require a 3-metre clear span bridge. Figure 4-24 in Chapter 4 of the EIAR (Appendix 2) shows the typical clear span bridge design. There will be no instream works required as part of the Proposed Development. The typical construction methodology for the installation of clear span bridges is provided below:
 - The access road on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
 - All drainage measures along the proposed road will be installed in advance of the works.
 - The abutment will consist of concrete panels which will be installed on a concrete lean mix foundation to provide a suitable base. The base will be excavated to rock or competent ground with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no instream works required.
 - Access to the north or opposite side of the river for excavation and foundation installation will require the installation of pre-cast concrete slab across the river to provide temporary access for the excavator.
 - All pre-cast concrete panels and slabs/beams will be installed using a crane which will be set up on the southern side of the stream and will be lifted into place from the stream back with no contact with the watercourse.
 - A concrete deck will be poured over the beams/slabs which span across the river. This will be shuttered, sealed and water tested before concrete pouring can commence.
- The upgrade of existing access tracks and construction of new tracks will involve some works within 50m of watercourses and new watercourse crossings. However, no instream works are proposed, and a suite of measures are in place to avoid any adverse effects on watercourses. These measures are described in full in the Chapter 9 'Hydrology' of the EIAR that is included in full as Appendix 2 of this NIS.
- No construction materials or construction waste will be placed within a 50-metre buffer zone around watercourses during the windfarm.

5.2.3.2 Morphological Changes to Surface Watercourses and Drainage Patterns

Diversion, culverting, road and grid cable crossing of surface watercourses can result in morphological changes, changes to drainage patterns and alteration of aquatic habitats. Construction of structures over watercourses has the potential to significantly interfere with water quality and flows during the construction phase.

It is proposed that 1 no. existing watercourse crossings will be upgraded and 2 no. new watercourse crossings will be required to facilitate the wind farm access roads within the Wind Farm Site. These crossings are further described in Section 4.8.3 of Chapter 4 and included in Figures 4-23 to 4-25 (see Appendix 2 of the NIS).

Along sections of proposed and existing access roads, the Grid Connection Route cable will be constructed within the road crossing. Section 4.8.7.5 in Chapter 4 of the EIAR (Appendix 2 of NIS) details the water crossing locations along the proposed Grid Connection Route and describes the proposed crossing construction methodology. Additional details are presented below.

- Where possible all proposed new stream crossings will be bottomless culverts and the existing banks will remain undisturbed. No in-stream excavation works are proposed and therefore there will be no impact on the stream at the proposed crossing location;
- Within the Wind Farm Site where the Grid Connection Route runs adjacent to a proposed access road or an existing access road proposed for upgrade, the Grid Connection Route cable will pass over the culvert (where one exists or is proposed) within the access road;
- Where a Grid Connection Route cable stream crossing is required, the cable will pass over the watercourse via suspended ducting thereby avoiding any morphological impacts;
- Any guidance / mitigation measures proposed by the OPW or the Inland Fisheries Ireland will be incorporated into the design of the proposed crossings. A 10m buffer is applied to the main drain (i.e. drain D1) to allow for future OPW maintenance;
- Works will be completed in accordance with the requirements of “Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters”; and,
- All access road river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent.

5.2.3.3 Construction Phase Mitigation

Mitigation measures have been incorporated into the Proposed Development for the prevention of water pollution. The Proposed Development includes a detailed drainage plan that is shown in the design drawings included in Appendix 9-3 of the EIAR and included as Appendix 4 to this NIS. This plan and all the associated measures have been taken into account in this assessment. The drainage philosophy overall is to minimise waters arising on site, to adequately treat any water that may arise and to ensure that the hydrological function of the watercourses on the site and in the wider catchment are not affected by the proposed works. This philosophy including all associated mitigation measures to protect local surface water quality are fully described in the CEMP (see Appendix 3) and Chapter 9 ‘Hydrology’ of the EIAR (see Appendix 4).

The Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*; and the Scottish Natural Heritage (SNH) *Good Practice During Wind Farm Construction* (SNH, 2019, 4th Edition) will also be adhered to.

All detailed mitigation measures for the protection of water quality are fully described below and in Section 4.7, Chapter 4 of the accompanying EIAR (Appendix 2 of this NIS), the CEMP, Appendix 4-4 of Chapter 4 (see Appendix 3) and Sections 9.5.3 – 9.5.4 Chapter 9 ‘Water’ of the EIAR (provided here in Appendix 4 of the NIS). The following subsections describe the mitigation measures proposed for the construction phase of the Proposed Development.

5.2.3.3.1 Wind Farm Site Watercourse Crossings

It is proposed to replace the existing timber bridge over the River Glore within the proposed wind farm site with a 5-metre clear span bridge. The proposed bridge crossing will form part of the internal site road network, connecting Turbines T5-T12 to Turbines T1-T4. The crossing location is at Grid

Reference E 641,560 N 776,452, as shown in Figure 4-23 of Chapter 4 of the EIAR and Appendix 2 of this NIS. The design avoids the need for in-stream works.

A second crossing will be required to provide access to Turbine T1 located to the north of an OPW drain. This will require a 3-metre clear span bridge as shown on Figure 4-24 (see Chapter 4 of the EIAR and Appendix 2 of this NIS) which shows the typical clear span bridge design.

A third crossing will be required to provide access to Turbine T15 over the River Glore. This will require a 5-metre clear span bridge as shown in Figure 4-25 which shows the typical clear span bridge design (see Chapter 4 of the EIAR and Appendix 2 of this NIS). The clear span bridge's will be constructed to the specifications of the OPW bridge design guidelines 'Construction, Replacement or Alteration of Bridges and Culverts - A Guide to Applying for Consent under Section 50 of the Arterial Drainage Act, 1945', and in consultation with Inland Fisheries Ireland. Abutments will be constructed from precast units combined with in-situ foundations, placed within an acceptable backfill material.

5.2.3.3.2 **Underground Cable Watercourse/Culvert Crossings**

A general description of the various construction methods employed at watercourse/ culvert crossings are described in the following paragraphs below. A list of the stream crossings along the underground cable route and the proposed crossing method at each location is provided in Table 4-3, Chapter 4 (Appendix 3 of this NIS).

The stream crossing locations are shown in Figure 4-21 of Chapter 4 of the accompanying EIAR (Appendix 2 of this NIS). The crossing locations for all culvert crossings are also shown on the underground cable route drawings included as Appendix 4-1, Chapter 4 of the accompanying EIAR (Appendix 2 of this NIS). Details of all culvert crossing are also provided in Appendix 4-7, Chapter 4 of the accompanying EIAR (Appendix 2 of this NIS).

5.2.3.3.3 **Crossings over Culverts– Option 1**

The watercourse at any of the crossings will not be disturbed because no instream works or bridge/culvert alterations are proposed. Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Where adequate cover exists above a culvert, the ESB/Eirgrid specified flat formation ducting arrangement will be used where the cable ducts pass over a culvert maintaining 300mm minimum clearance to the top of the culvert. A heavy duty steel plate will be placed over the ducts as distance between the road surface and the ducts will have been reduced. See Figure 4-27 in Chapter 4 of the EIAR.

5.2.3.3.4 **Crossing under Piped Culverts– Option 2**

Where adequate cover does not exist between the top of the culvert and the finished surface of the road the cable ducts will be passed under the culvert as outlined in Figure 4-28 in Chapter 4 of the EIAR. A 300mm minimum separation distance will be maintained between the top of the ducts and the bottom of the piped culvert. A heavy duty steel plate will be placed above the ducting extending for 1m at either side of the culvert.

5.2.3.3.5 **Flatbed Formation over Culverts – Option 3**

Where cable ducts are to be installed over an existing culvert where sufficient cover cannot be achieved to install the ducts as per option 1, the ducts will be laid in a shallow trench the depth of which will be determined by the location of the top of the culvert. The ducts will be laid in this trench in a flatbed formation over the existing culvert and will be encased in 6mm thick steel galvanized plate with a 30N concrete surround as per ESB/Eirgrid specification. This method of duct installation is further detailed in Figure 4-29 in Chapter 4 of the EIAR.

5.2.3.3.6 **Outside of Bridge Decking – Option 4**

Where sufficient cover and road width isn't available to place the ducting in the bridge decking, the cable can be placed in an stainless steel conduit with a minimum wall thickness of 4mm secured to the outside of the bridge deck supported by cleats at 1m intervals as per ESB/Eirgrid specifications. This method of crossing a bridge structure is detailed in Figure 4-30 in Chapter 4 of the EIAR.

5.2.3.3.7 **Directional Drilling – Option 5**

In the event that none of the above methods are appropriate, directional drilling will be utilised. The directional drilling method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes) or similar. The launch and reception pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced into void and enables the annulus which has been created to support the surrounding sub soil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any potential adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to an approved disposal site.

Backfilling of launch and reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. The directional drilling methodology is further detailed in Figure 4-31 in Chapter 4 of the EIAR.

5.2.3.3.8 **Construction Phase Drainage Management**

Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site. The following best practice drainage measures have been incorporated into the Proposed Development for the protection of surface water quality, as fully described in Section 4.2.4 of the CEMP, Appendix 4-4 of Chapter 4 (see Appendix 3):

- Interceptor drains will be installed up gradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.
- Collector drains or swales are shallow drains that will be used to intercept and collect runoff from construction areas of the site during the construction phase. Drainage swales will

remain in place to collect runoff from roads and hardstanding areas of the proposed development during the operational phase.

- The velocity of flow in the interceptor drains and collector drains, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the collector drain is non-erosive. Check dams will also be installed in some existing artificial drainage channels that will receive waters from works areas of the site.
- A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site, or areas where they are not likely to give rise to peat stability issues.
- Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.
- Stilling ponds will be used to attenuate runoff from works areas of the site during the construction phase, and will remain in place to handle runoff from roads and hardstanding areas of the proposed development during the operational phase.
- A “siltbuster” or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales.
- Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.
- Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where watercourse crossings take place.
- Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.
- All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.

5.2.3.3.9 **Hydrocarbons and Waste Material**

The use of hydrocarbons during the construction process leads to the potential for pollution to enter the wider environment, including drainage ditches and watercourses. Leaks in poorly maintained plant and machinery could lead to hydrocarbon dispersal over works areas. Leaks in fuel storage tanks and spillages during refuelling operations could lead to larger releases of hydrocarbons into the environment.

The CEMP, Appendix 4-4 of Chapter 4 (see Appendix 3) provides measures to avoid impacts on the wider environment as a result of pollution and are summarised below.

Refuelling, Fuel and Hazardous Materials Storage

The following mitigation measures, as described in the CEMP, Appendix 4-4 of Chapter 4 (see Appendix 3) are proposed to avoid release of hydrocarbons at the site:

- Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. However, for construction machinery that will be based on-site continuously, a limited amount of fuel will have to be stored on site in bunded areas.

- On-site refuelling of machinery will be carried out at dedicated refuelling locations 100m from watercourses using a mobile double skinned fuel bowser. The fuel bowser, a double-axle custom-built refuelling trailer or similar will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the proposed wind farm. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use.
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The electrical control building should be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within Emergency Response Plan (Section 6 of the CEMP). Spill kits will be available to deal with an accidental spillage.

5.2.3.3.10 **Concrete Pouring**

Because of the scale of the main concrete pours that will be required to construct the Proposed Development, the main pours will be planned days or weeks in advance. Special procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These may include:

- Using weather forecasting to assist in planning large concrete pours, and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

5.2.3.3.11 **Outline Peat Stability Management Plan**

Minimal peat excavation is likely to be required on site due to the proposed construction techniques for the site. With the exception of Turbine T5 and T15, all turbines and their associated crane hardstands are likely to require a piled foundation as a result of the depth of peat and soft lacustrine deposits present. In addition, piled foundations may be required for the substation building. It is anticipated that the substation platform and construction compound platform will likely be constructed using floating

techniques. The proposed construction method for all the new proposed access roads is a floated technique.

The total estimated volume of peat and overburden to be excavated during the construction phase of the proposed development is 97,980m³. These quantities were calculated by FT as part of the Peat and Spoil Management Plan presented in Appendix 4-2 of the EIAR

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on proposed wind farm development and the surrounding environment. Peat failure excludes localised movement of peat that could occur below an access road, creep movement or erosion type events. In the absence of appropriate mitigation, the consequence of peat failure at the study area may result in:

- > Death or injury to site personnel;
- > Damage to machinery;
- > Damage or loss of access tracks;
- > Drainage disrupted;
- > Site works damaged or unstable;
- > Contamination of watercourses, water supplies by sediment particulates; and,
- > Degradation of the environment.

A Geotechnical & Peat Stability Assessment Report has been prepared by AGECE which provides a Geotechnical Risk Register for the site and includes details of the required mitigation/control measures. These mitigation measures are summarised below and in Appendix 8-1 of the EIAR.

The peat stability assessment indicates that there is insignificant risk of peat failure. The following mitigation measures are recommended and should be taken into account when preparing Construction Method Statements for the proposed development:

- > Avoidance of uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge.
- > Avoidance of unstable excavations. All excavations shall be suitably supported to prevent collapse and development of tension cracks.
- > Avoidance of placing fill and excavations in the vicinity of steeper peat slopes, that is at the crest or toe of the slope.
- > Installation and regular monitoring of geotechnical instrumentation, as appropriate, during construction in areas of possible poor ground, such as deeper peat deposits.
- > Site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions to be assessed by suitably experienced geotechnical engineer.
- > Regular briefing of all site staff (e.g. toolbox talks) to provide feedback on construction and ground performance and to promote reporting of any observed change in ground conditions.
- > Routine inspection of wind farm site by contractor to include an assessment of ground stability conditions (e.g. cracking, excessive floating road settlement, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc).
- > Peat movement monitoring posts will be installed upslope and downslope of access roads and at locations where peat depths are greater than 4.0m.

5.2.3.4 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) analyses will be carried out by either the Environmental Manager or the Project Hydrologist at all surface water monitoring locations. In-situ field monitoring will be completed on a weekly basis. In-situ field

monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The supervising hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

5.2.3.5 Monitoring Parameters

The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:

- > pH (field measured)
- > Electrical Conductivity (field measured)
- > Temperature (field measured)
- > Dissolved Oxygen (field measured)
- > Total Phosphorus
- > Chloride
- > Nitrate
- > Nitrite
- > Total Nitrogen
- > Ortho-Phosphate
- > Ammonia N
- > Biochemical Oxygen Demand
- > Total Suspended Solids

5.2.4 Operation Phase Mitigation

As detailed in Chapter 9 (Hydrology and Hydrogeology) of the EIAR, included as **Appendix 4**, the operational phase drainage system will be installed and constructed in conjunction with the road and hardstanding construction work as described below:

- > Runoff from individual turbine hardstanding areas will not be discharged into the existing drain network, but discharged locally at each turbine location through settlement ponds and buffered outfalls onto vegetated surfaces;
- > Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;
- > Swales/road side drains will be used to collect runoff from access roads and turbine hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- > On steep sections of access road transverse drains ('grips') will be constructed where appropriate in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- > Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- > Settlement ponds, emplaced downstream of road swale sections and at turbine locations, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- > Settlement ponds will be designed in consideration of the greenfield runoff rate.

5.2.4.1 Decommissioning Phase Mitigation

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with the same model of cranes that were used for their erection. The turbine will be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable recycling or recovery facility.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in environment emissions such as noise, dust and/or vibration.

Site roadways will be in use for purposes other than the operation of the Proposed Development by the time the decommissioning of the Proposed Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required.

A Decommissioning Plan has been prepared (Appendix 4-11, Chapter 4 of the EIAR, provided in Appendix 2 of this NIS) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in the accompanying EIAR and within this NIS

6. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for significant effects on each of the individual Qualifying Interests (QIs) and Special Conservation Interests (SCIs) that were identified as being at risk of potential effects in the AA Screening Report are assessed in this section in view of the Conservation Objectives of those habitats and species.

6.1 Lough Owel SAC

A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SAC. The proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the development potentially affecting the following habitats and species:

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]
- Alkaline fens [7230]
- Transition mires and quaking bogs [7140]
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092]

6.1.1 Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* [3140]

The identified pathways for effect are deterioration in water quality during the construction phase of the development, potentially resulting in deterioration of the downstream Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.* habitat.

The conservation objective for this QI is:

‘To maintain the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. in Lough Owel SAC.’

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objective document (NPWS, 2018). An assessment of the Proposed Development against the nominated attributes and targets for this habitat is provided in Table 6-1 below.

Table 6-1 Targets and attributes associated with the conservation objectives for Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.*

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes.	This habitat was not identified within or adjacent to the Proposed Development site. All works are restricted to the existing N4 road. A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution	

Attribute	Target	Assessment
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	<p>pollution in European Sites during the construction, operational and decommissioning phase.</p> <p>Taking into consideration the preventative measures to avoid impact, it can be concluded that the Proposed Development will not result in any impacts which could adversely affect the extent of this habitat within the SAC.</p> <p>Following the implementation of mitigation as described above, any potential pathway for effect on this habitat is robustly blocked. There will be no alteration to the hydrological regime, lake substratum, water quality or fringing habitat area as a result of the Proposed Development.</p>
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	
Hydrological regime: water level fluctuations	Maintain/restore appropriate hydrological regime necessary to support the habitat	
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	
Water quality: transparency	Maintain/restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	
Water quality: nutrients	Maintain/restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	
Water quality: phytoplankton biomass	Maintain/restore appropriate water quality to support the habitat, including high chlorophyll a status	
Water quality: phytoplankton composition	Maintain/restore appropriate water quality to support the habitat, including high phytoplankton composition status	
Water quality: attached algal biomass	Maintain trace/absent attached algal biomass (<5% cover)	
Water quality: macrophyte status	Maintain high macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	
Water colour	Maintain appropriate water colour to support the habitat	
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	
Turbidity	Maintain appropriate turbidity to support the habitat	

Attribute	Target	Assessment
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3140	

6.1.2 Alkaline Fens [7230]

The identified pathways for effect are deterioration in water quality during the construction phase of the Proposed Development, potentially affecting this downstream habitat. Following the precautionary principle, there is potential for water pollution to result in deterioration of the substrate on which this habitat is formed and potential impediment of ground flora and regeneration of sedge and reed species that predominate in this habitat.

The conservation objective for this habitat is:

‘To maintain the favourable conservation condition of Alkaline fens in Lough Owel SAC.’

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objective document (NPWS, 2018). The targets and attributes for this habitat have been reviewed and considered in relation to the current development and are described in Table 6-2.

Table 6-2 Assessment of development against targets and attributes of calcareous fens

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	This habitat was not identified within or adjacent to the Proposed Development site. All works are restricted to the existing N4 road.
Habitat distribution	No decline, subject to natural processes	<p>A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water pollution in European Sites during the construction, operational and decommissioning phase.</p> <p>Taking into consideration the preventative measures to avoid impact, it can be concluded that the Proposed Development will not result in any impacts which could adversely affect the extent of this habitat within the SAC. There will be no alteration to any alkaline fen habitat within the SAC in terms of size, habitat area or distribution associated with the Proposed Development.</p>
Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges	Following the implementation of mitigation, the pathway for any effect on this habitat is robustly blocked such that there is no potential for alteration to the ecosystem function of this
Ecosystem function: peat formation	Maintain active peat formation, where appropriate	

Attribute	Target	Assessment
Ecosystem function: hydrology - groundwater levels	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	habitat within the SAC associated with the Proposed Development.
Ecosystem function: hydrology - surface water flow	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions	
Ecosystem function: water quality	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	Following the implementation of mitigation as described above, any potential pathway for effect on this habitat is robustly blocked. The Proposed Development will have no impact on the ecological processes that influence the vegetation composition of this habitat.
Vegetation composition: brown mosses	Maintain adequate cover of typical brown moss species	
Vegetation composition: typical vascular plants	Maintain adequate cover of typical vascular plant species	
Vegetation composition: native negative indicator species	Cover of native negative indicator species at insignificant levels	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 10%	
Vegetation composition: soft rush and common reed cover	Total cover of soft rush (<i>Juncus effusus</i>) and common reed (<i>Phragmites australis</i>) less than 10%	
Vegetation structure: litter	Total cover of litter not more than 25%	
Physical structure: disturbed bare ground	Cover of disturbed bare ground not more than 10%	
Physical structure: tufa formations	Disturbed proportion of vegetation cover where tufa is present is less than 1%	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local	

Attribute	Target	Assessment
	distinctiveness, subject to natural processes	

6.1.3 Transition mires and quaking bogs [7140]

The identified pathways for effect are deterioration in water quality during the construction phase of the Proposed Development. Following the precautionary principle, there is potential for water pollution to result in deterioration of the substrate on which this habitat is formed and potential impediment of ground flora.

The conservation objective for this QI is:

‘To maintain the favourable conservation condition of Transition mires and quaking bogs in Lough Owel SAC

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objective document (NPWS, 2018). An assessment of the Proposed Development against the nominated attributes and targets for this habitat is provided in Table 6-3 below.

Table 6-3 Targets and attributes associated with the conservation objectives for Transition mires and quaking bogs

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	This habitat was not identified within or adjacent to the Proposed Development site. All works will be restricted to the existing N4 road.
Habitat distribution	No decline, subject to natural processes	A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water pollution in European Sites during the construction, operational and decommissioning phase. Taking into consideration the preventative measures to avoid impact, it can be concluded that the Proposed Development will not result in any impacts which could adversely affect the extent of this habitat within the SAC.
Ecosystem function: soil nutrients	No decline, subject to natural processes	Following the implementation of mitigation as described above, any potential pathway for effect on this habitat is robustly blocked. There will be no alteration to the ecosystem function or hydrological regime as a result of the Proposed Development.
Ecosystem function: peat formation	Maintain soil pH and nutrient status within natural ranges	
Ecosystem function: hydrology - groundwater levels	Maintain, or where necessary restore, appropriate water levels necessary to support the natural structure and functioning of the habitat	

Attribute	Target	Assessment
Ecosystem function: hydrology – flow patterns	Maintain, or where necessary restore, appropriate topography and water movement regime necessary to support the natural structure and functioning of the habitat	
Ecosystem function: water quality	Maintain, or where necessary restore, appropriate water quality to support the natural structure and functioning of the habitat	
Community diversity	Maintain variety of vegetation communities, subject to natural processes	Following the implementation of mitigation as described above, any potential pathway for effect on this habitat is robustly blocked. The Proposed Development will have no impact on the ecological process that influence the vegetation composition of this habitat.
Vegetation composition: typical vascular plants and bryophytes	Maintain adequate cover of typical vascular plant and bryophyte species	
Vegetation composition: native negative indicator species	Native negative indicator species at insignificant levels	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Physical structure: drainage	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	
Physical structure: disturbed bare ground	Cover of disturbed bare ground not more than 10%.	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	

6.1.4 White-clawed Crayfish [1092]

The identified pathways for effect are deterioration in water quality during the construction phase of the Proposed Development, potentially affecting this downstream habitat. Following the precautionary principle, there is potential for water pollution to result in deterioration of the habitat which supports White-clawed Crayfish.

The conservation objective for this species is:

‘To maintain the favourable conservation condition of White-clawed Crayfish in Lough Owel SAC.’

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objective document (NPWS, 2018). The targets and attributes for this habitat have been reviewed and considered in relation to the Proposed Development and are described in Table 6-4.

Table 6-4 Assessment of development against targets and attributes of alkaline fens

Attribute	Target	Assessment
Distribution	No reduction from baseline. See map 5	The supporting habitat for this species was not identified within or adjacent to the Proposed Development site during the surveys. All works will be restricted to the existing N4 road.
Population structure: recruitment	Juveniles and/or females with eggs should be present in all occupied 1km squares, subject to natural processes and availability of suitable habitat	
Negative indicator species	No instances of disease	A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water pollution in European Sites during the construction, operational and decommissioning phase.
Water quality	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of lake habitat 3140	Taking into consideration the preventative measures to block any pathway for effect, it can be concluded that the Proposed Development will not result in any impact which could adversely affect White-clawed Crayfish or the aquatic habitat which supports this species.
Habitat quality: heterogeneity	No decline in heterogeneity or habitat quality	

6.1.5 Determination

Following an examination, evaluation and analysis, in light of best scientific knowledge, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on Lough Owel SAC.

6.2 Lough Ennell SAC

The SAC is located approximately 4.2km south of the proposed grid connection route and 24.2km from the proposed wind farm site. There is hydrological connectivity between the proposed grid connection route and the SAC approximately 8.8km (hydrological distance) downstream. The proposed works have the potential to cause deterioration in surface water quality through the run-off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the development potentially affecting the following habitat:

- Alkaline fens [7230]

6.2.1 Alkaline Fens [7230]

The identified pathways for effect are deterioration in water quality during the construction phase of the Proposed Development, potentially affecting this downstream habitat. Following the precautionary principle, there is potential for water pollution to result in deterioration of the substrate on which this habitat is formed and potential impediment of ground flora and regeneration of sedge and reed species that predominate in this habitat.

The conservation objective for this habitat is:

‘To maintain the favourable conservation condition of Alkaline fens in Lough Ennell SAC.’

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objective document (NPWS, 2018). The targets and attributes for this habitat have been reviewed and considered in relation to the current development and are described in Table 6-5.

Table 6-5 Assessment of development against targets and attributes of calcareous fens

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	<p>This habitat was not identified within or adjacent to the Proposed Development site during the surveys and no works will take place within 4.2km of the SAC.</p> <p>A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water pollution in European Sites during the construction, operational and decommissioning phase.</p> <p>Taking into consideration the preventative measures to avoid impact, it can be concluded that the Proposed Development will not result in any impacts which could adversely affect the extent of this habitat within the SAC. There will be no alteration to any calcareous fen habitat within the SAC in terms of size, habitat area or distribution associated with the Proposed Development.</p>
Habitat distribution	No decline, subject to natural processes	
Ecosystem function: soil nutrients	Maintain soil pH and nutrient status within natural ranges	<p>Following the implementation of mitigation, the pathway for any effect on this habitat is robustly blocked such that there is no potential for alteration to the ecosystem function of this habitat within the SAC associated with the Proposed Development.</p>
Ecosystem function: peat formation	Maintain active peat formation, where appropriate	
Ecosystem function: hydrology - groundwater levels	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	
Ecosystem function: hydrology - surface water flow	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions	
Ecosystem function: water quality	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	

Attribute	Target	Assessment
Community diversity	Maintain variety of vegetation communities, subject to natural processes	Following the implementation of mitigation as described above, any potential pathway for effect on this habitat is robustly blocked. The Proposed Development will have no impact on the ecological process that influence the vegetation composition of this habitat.
Vegetation composition: brown mosses	Maintain adequate cover of typical brown moss species	
Vegetation composition: typical vascular plants	Maintain adequate cover of typical vascular plant species	
Vegetation composition: native negative indicator species	Cover of native negative indicator species at insignificant levels	
Vegetation composition: non-native species	Cover of non-native species less than 1%	
Vegetation composition: native trees and shrubs	Cover of scattered native trees and shrubs less than 10%	
Vegetation composition: soft rush and common reed cover	Total cover of soft rush (<i>Juncus effusus</i>) and common reed (<i>Phragmites australis</i>) less than 10%	
Vegetation structure: litter	Total cover of litter not more than 25%	
Physical structure: disturbed bare ground	Cover of disturbed bare ground not more than 10%	
Physical structure: tufa formations	Disturbed proportion of vegetation cover where tufa is present is less than 1%	
Indicators of local distinctiveness	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	

6.2.2 Determination

Following an examination, evaluation and analysis, in light of best scientific knowledge, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on Lough Ennell SAC.

6.3 Lough Owel SPA

The proposed grid connection route is located within the existing N4 corridor along the boundary of the SPA. A watercourse flows under the N4 where the cable is to be laid and provides hydrological connectivity with this SPA.

The proposed works have the potential to cause deterioration of water quality during the construction, phase of the development. These effects could occur in the form of release of suspended solids or hydrocarbons during the works associated with the laying of cable for the grid connection. These impacts could potentially affect the wetland habitat of the SCI species associated with the SPA. Impact on this wetland habitat is considered under the following SCI:

- ‘Wetland and Waterbirds [A999]

On a precautionary basis, due to the close proximity of the grid connection route, a potential pathway for indirect effects was identified in the form of bird disturbance and deterioration of habitat as described above in relation to wetland and waterbirds affecting the following species:

- Shoveler *Anas clypeata* [A056]
- Coot *Fulica atra* [A125]

6.3.1 Wetland and Waterbirds [A999]

The identified pathways for effect are deterioration in water quality and therefore habitat quality during the construction phase of the development. Following the precautionary principle, this could potentially affect food availability and the nesting/foraging value of the wetland habitat.

The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Owel SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’

There are no specific conservation objectives for this SPA. As a result, example objectives for this wetland habitat have been taken from other sites with site-specific conservation objectives in order to provide further assessment as per the table below.

Table 6-6 Example targets and attributes associated with the site-specific conservation objectives for Wetland and Waterbirds [A999].

Attribute	Target	Assessment
Habitat area	The permanent area occupied by wetland habitat should be stable other than that occurring from natural patterns of variation.	<p>There will be no direct loss or decrease in wetland habitat associated with the Proposed Development as the footprint of the development is entirely outside of the boundary of the SPA.</p> <p>The potential for indirect effect as a result of deterioration in water quality during the construction phase was considered. Deterioration of water quality could potentially lead to adverse impacts on food availability and nesting/foraging habitat.</p>

Attribute	Target	Assessment
		<p>A range of mitigation measures, outlined in Section 3.3 of this report, in the hydrology chapter of the accompanying EIAR (Appendix 4) and in the accompanying CEMP (Appendix 3) are in place to avoid water pollution in any European Site during the construction, operational and decommissioning phase.</p> <p>Taking into consideration the preventative measures to avoid impact, it can be concluded that the Proposed Development will not result in any impacts which could adversely affect the extent of this habitat within the SPA. There will be no deterioration in the condition of downstream wetland habitat and therefore no reduction in habitat area as a result of the Proposed Development.</p>

6.3.2 Shoveler

According to the bird surveys carried out between 2015-2017 and 2018-2020, this species was not recorded at the proposed wind farm site (including 500m buffer). The Proposed Development has no potential to result in direct habitat loss, displacement or barrier effect on this species. Following the precautionary principle, the potential for the construction of the grid connection adjacent to the SPA has the potential to result in disturbance to this species.

The development Site is not of significance to this species.

No site-specific conservation objectives are available for Lough Owel SPA, however other sites with this SCI species were reviewed to further inform the assessment. The extrapolated targets and attributes for this SCI have been reviewed and considered in relation to the current development as described below.

Table 6-7 Targets and attributes associated with the nominated conservation objectives for Shoveler

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	The proposed grid connection works will be short -term in duration and restricted to the existing N4 road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance.. There is no potential for the Proposed Development to adversely affect the population trend within the SPA.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by Shoveler, other than that occurring from natural patterns of variation.	The proposed grid connection works will be short -term in duration and restricted to the existing N4 road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. The Proposed

		Development will not adversely affect the distribution of the species within the SPA.
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6.3.3 Coot

According to the bird surveys carried out between 2015-2017 and 2018-2020, this species was recorded within 500m of the wind farm site on only three occasions when birds were observed on water at Lough Bane (adjacent to the Site boundary). The maximum number of birds recorded was one.

The development Site is not of significance to this species.

No site-specific conservation objectives are available for Lough Owel SPA, however other sites with this SCI species were reviewed to further inform the assessment. The extrapolated targets and attributes for this SCI have been reviewed and considered in relation to the current development as described below.

Table 68 Targets and attributes associated with the nominated conservation objectives for Coot

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	<p>Following the extensive bird surveys undertaken, it was concluded that the Wind Farm Site is not of significance to this species.</p> <p>The proposed grid connection works will be short-term in duration and restricted to the existing N4 road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance.</p> <p>There is no potential for the Proposed Development to adversely affect the population trend within the SPA.</p>
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by Shoveler, other than that occurring from natural patterns of variation.	<p>Following the extensive bird surveys undertaken, it was concluded that the Wind Farm Site is not of significance to this species.</p> <p>The proposed grid connection works will be short-term in duration and restricted to the existing N4 road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance.</p> <p>The Proposed Development will not adversely affect the distribution of the species within the SPA.</p>

6.3.4 Determination

Following an examination, evaluation and analysis, in light of best scientific knowledge, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on Lough Owel SPA.

6.4 Lough Ennell SPA

The SPA is located 4.5km south of the proposed grid connection route and 24.4km south of the proposed wind farm site. Due to this distance there is no potential for significant indirect effects as a result of disturbance. There is hydrological connectivity between the proposed grid connection route and the SPA approximately 9.2km (hydrological distance) downstream. Taking a precautionary approach, a potential pathway for indirect effects in the form of surface water deterioration through the run off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase was identified. These impacts could potentially affect the wetland habitat of the SCI species associated with the SPA. Impact on this wetland habitat is considered under the following SCI:

- Wetlands and Waterbirds

6.4.1 Wetland and Waterbirds [A999]

The identified pathways for effect are deterioration in water quality and therefore habitat quality during the construction phase of the development. Following the precautionary principle, this could potentially affect food availability and the nesting/foraging value of the wetland habitat.

Site specific conservation objectives documents are not available for this site. The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Ennell SPA as a resource for the regularly-occurring migratory waterbirds that utilise it’.

There are no specific conservation objectives for this SPA. As a result, example objectives for this wetland habitat have been taken from other sites with site-specific conservation objectives in order to provide further assessment. To avoid repetition this assessment is provided above in Table 6-7.

6.4.2 Determination

Following an examination, evaluation and analysis, in light of best scientific knowledge, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on Lough Ennell SPA.

6.5 Lough Derravarragh SPA

Given that the SPA is located hydrologically downstream of the Proposed Development site there is potential for indirect effects on surface water quality through the run off of silt, hydrocarbons, cementitious material and other pollutants during the construction phase of the Proposed Development. These impacts could potentially affect the wetland habitat of the SCI species associated with the SPA. Impact on this wetland habitat is considered under the following SCI:

- Wetland and Waterbirds [A999]

The Proposed Development is located within the potential core foraging range of Whooper Swan which is an SCI species associated with the SPA (SNH Guidelines (2016)). The proposed grid connection route is located approximately 70m west of the SPA. Therefore, potential for disturbance to the remaining bird

species associated with the SPA have also been considered. The following SCIs were identified as having potential to be impacted by the Proposed Development and will be assessed further:

- > Whooper swan *Cygnus cygnus* [A038]
- > Pochard *Aythya ferina* [A059]
- > Tufted duck *Aythya fuligula* [A061]
- > Coot *Fulica atra* [A125]

6.5.1 Wetland and Waterbirds [A999]

The identified pathways for effect are deterioration in water quality and therefore habitat quality during the construction phase of the Proposed Development. Following the precautionary principle, this could potentially affect food availability and the nesting/foraging value of the wetland habitat.

The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Derravarragh SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’

There are no specific conservation objectives for this SPA. As a result, example objectives for this wetland habitat have been taken from other sites with site-specific conservation objectives in order to provide further assessment. To avoid repetition this assessment is provided above in Table 6-7.

6.5.2 Whooper Swan

A potential pathway for indirect effects was identified in the form of bird disturbance, displacement and collision risk on Whooper Swan. A full assessment of the effects of the proposed wind farm on Whooper Swan is provided in Chapter 7: Ornithology of the EIAR. An assessment of the effects in relation to the SPA populations is provided in this NIS.

No detailed Conservation Objectives are available for Lough Derravarragh SPA. However, targets and attributes for the conservation of this SCI species are available in detailed Conservation Objectives for other SPAs (River Shannon and River Fergus Estuaries SPA). Such targets and attributes are representative of factors considered in the conservation of the SCI species in other areas and were considered in the preparation of this assessment.

Site specific conservation objectives documents are not available for this site. The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’.

An assessment of the Proposed Development against the nominated attributes and targets for this species is provided in Table 6-9 below.

Table 6-9 Targets and attributes associated with the nominated conservation objectives for Whooper Swan

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	No significant effect on the local population of whooper swan is predicted. The species was infrequently recorded on Site or within 500m of the proposed turbine layout during the extensive surveys undertaken. The proposed grid connection works are located 70m from the SPA boundary and 1.9km of

Attribute	Target	Assessment
		Lough Derravarragh itself. The proposed grid connection works will be short -term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the population trend within the SPA.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by whooper swan, other than that occurring from natural patterns of variation.	No significant effect on the local population of whooper swan is predicted. The species was infrequently recorded on Site or within 500m of the proposed turbine layout during the extensive surveys undertaken. The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short -term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. The Proposed Development will not adversely affect the distribution of the species within the SPA.

6.5.3 Pochard

Following the precautionary principle, the potential for the construction of the proposed grid connection route located 70m west of the SPA has the potential to result in disturbance to this species.

During the extensive surveys undertaken, there was only one record of an individual bird within 500m of the Site boundary. Therefore, the maximum number on Site does not correspond with the classification criteria for National or International Importance (Burke et al., 2018).

The Proposed Development has no potential to result in direct habitat loss, displacement or barrier effect on this species. No pathways for direct or indirect effects exist.

Given the very low level of activity recorded on Site for pochard during an extensive four-year period survey, it is concluded that the development Site is not of significance to this species.

No detailed Conservation Objectives are available for Lough Derravarragh SPA. However, targets and attributes for the conservation of this SCI species are available in detailed Conservation Objectives for other SPAs (River Shannon and River Fergus Estuaries SPA). Such targets and attributes are representative of factors considered in the conservation of the SCI species in other areas and were considered in the preparation of this assessment.

Site specific conservation objectives documents are not available for this site. The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’.

An assessment of the Proposed Development against the nominated attributes and targets for this species is provided in Table 6-10 below.

Table 6-10 Targets and attributes associated with the nominated conservation objectives for Pochard

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short-term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the population trend within the SPA.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by whooper swan, other than that occurring from natural patterns of variation.	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short-term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the distribution within the SPA.

6.5.4 Tufted Duck

Following the precautionary principle, the potential for the construction of the grid connection located 70m west of the SPA has the potential to result in disturbance to this species.

During the extensive surveys undertaken, this species was not recorded at the proposed wind farm site (including 500m buffer). The Proposed Development has no potential to result in direct habitat loss, displacement or barrier effect on this species.

No detailed Conservation Objectives are available for Lough Derravarragh SPA. However, targets and attributes for the conservation of this SCI species are available in detailed Conservation Objectives for other SPAs (River Shannon and River Fergus Estuaries SPA). Such targets and attributes are representative of factors considered in the conservation of the SCI species in other areas and were considered in the preparation of this assessment.

Site specific conservation objectives documents are not available for this site. The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’.

An assessment of the Proposed Development against the nominated attributes and targets for this species is provided in Table 6-11 below.

Table 6-11 Targets and attributes associated with the nominated conservation objectives for Tufted Duck

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The

Attribute	Target	Assessment
		proposed grid connection works will be short -term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the population trend within the SPA.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by whooper swan, other than that occurring from natural patterns of variation.	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short -term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the distribution within the SPA.

6.5.5 Coot

Following the precautionary principle, the potential for the construction of the grid connection located 70m west of the SPA has the potential to result in disturbance to this species.

During the extensive surveys undertaken, this species was recorded within 500m of the wind farm site on only three occasions when birds were observed on water at Lough Bane (adjacent to the Site boundary). The maximum number of birds recorded was one. No regular commuting/migratory flights were recorded that would constitute evidence of connectivity between the SPA and the Proposed Development area. The evidence of surveys was that the small local population was largely resident during the winter months in local wetlands.

No detailed Conservation Objectives are available for Lough Derravarragh SPA. However, targets and attributes for the conservation of this SCI species are available in detailed Conservation Objectives for other SPAs (River Shannon and River Fergus Estuaries SPA). Such targets and attributes are representative of factors considered in the conservation of the SCI species in other areas and were considered in the preparation of this assessment.

Site specific conservation objectives documents are not available for this site. The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA’.

An assessment of the Proposed Development against the nominated attributes and targets for this species is provided in Table 6-12 below.

Table 6-12 Targets and attributes associated with the nominated conservation objectives for Coot

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short -term in duration

Attribute	Target	Assessment
		and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the population trend within the SPA.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by whooper swan, other than that occurring from natural patterns of variation.	The proposed grid connection works are located 70m from the SPA boundary and 1.9km of Lough Derravarragh itself. The proposed grid connection works will be short-term in duration and restricted to the existing road corridor. There will be no loss of potential supporting habitat for any SCI species. The proposed grid connection works will be similar in nature, scale and duration to road maintenance works and will not result in any adverse effects as a result of disturbance. There is no potential for the Proposed Development to adversely affect the distribution within the SPA.

6.5.6 Determination

Following an examination, evaluation and analysis, in light of best scientific knowledge, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on Lough Derravarragh SPA.

6.6 Lough Iron SPA

The identified pathways for effect are deterioration in water quality and therefore habitat quality during the construction phase of the development. Following the precautionary principle, this could potentially affect food availability and the nesting/foraging value of the wetland habitat.

The conservation objective for this SCI is:

‘To maintain or restore the favourable conservation condition of the wetland habitat at Lough Iron SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.’

There are no specific conservation objectives for this SPA. As a result, example objectives for this wetland habitat have been taken from other sites with site-specific conservation objectives in order to provide further assessment. To avoid repetition this assessment is provided above in Table 6-7.

6.7 Invasive Species

Third Schedule invasive species Bohemian Knotweed, Japanese Knotweed, Himalayn Knotweed and Rhododendron were recorded along the proposed grid connection route (see Table 4-14). The following mitigation will be adhered to in relation to these species:

- All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally.

- Stands of Knotweed will be clearly demarcated by temporary fencing and tracking within them will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral Knotweed rhizomes.
- Where works occur within 7m of a Knotweed stand these will be carried out under the supervision of a suitably qualified ecologist.
- Where a Knotweed stand is encountered along the road the grid connection will be laid on the opposite side of the road to avoid excavation of potential Knotweed root material insofar as possible.
- Should removal of Knotweed off site be required this will be done so under the supervision of an ecologist in line with NPWS licencing.
- The machinery must be thoroughly cleaned down under supervision of an ecologist prior to moving away from the Knotweed contaminated area.
- All contractors and staff will be briefed about the presence, identification and significance of Knotweed before commencement of works.
- Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly cleaned down prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down on site to prevent the spread of invasive plant species such as Knotweed and Rhododendron. All clean down must be undertaken in areas with no potential to result in the spread of invasive species.
- When working at locations in proximity to natural watercourses, a suitable barrier will be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal.
- Any soils or subsoils contaminated with invasive species will be sent for disposal to an appropriately licenced facility..

The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority - *The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (NRA 2010) and Irish Water (2016) *Information and Guidance Document on Japanese Knotweed*.

6.8 Conclusion of Impact Assessment

Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on any European Site.

It will not prevent the QIs/SCIs of any European Sites from achieving favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

‘conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2;

The conservation status will be taken as ‘favourable’ when:

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

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Development will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Designated Sites, namely the following:

- > Lough Owel SAC (000688)
- > Lough Ennell SAC (000685)
- > Lough Owel SPA (004047)
- > Lough Ennell SPA (004044)
- > Lough Derravaragh SPA (004043)
- > Lough Iron SPA (004046)

7. IN COMBINATION EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative and/or in-combination impacts on European Sites was conducted. This assessment focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects was identified at the screening stage (Appendix 1). This included a review of online Planning Registers, development plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects.

7.1 Development context – Ecological Plans and Policies

The following development plans have been reviewed and taken into consideration as part of this assessment:

- Westmeath County Development Plan 2014-2020
- Westmeath Biodiversity Action Plan 2014 -2020
- Draft Westmeath County Development Plan 2021 – 2027

The review focused on policies and objectives that relate to Natura 2000 sites and natural heritage. Policies and objectives relating to sustainable land use were also reviewed and are detailed in Table 7-1 and Table 7-2. .

Table 7-1 Review of land use and spatial plans 2014-2020

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p>NATURA 2000 SITES: POLICIES & OBJECTIVE</p> <p><u>P-NAT1</u></p> <p>To protect and conserve wild bird species and their habitats, especially rare or vulnerable species and regularly occurring migratory species.</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.</p> <p>There will be no impact on designated sites as a result of deterioration in water quality. Best practice preventative measures will be implemented to avoid effects on water quality, as outlined in section 3.3 of this report, the hydrology chapter (Appendix 4) and in the CEMP (Appendix 3). There will be no adverse effects on sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.</p> <p>There will be no impact on European designated sites as a result of the Proposed Development. The development will not affect the conservation status of any QI species or habitat or SCI species of any EU designated site. The development will not prevent the QIs/SCIs of the European Sites from achieving favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive.</p>
<p><u>P-NAT2</u></p> <p>To protect and conserve Special Areas of Conservation, candidate Special Areas of Conservation, Special Protection Areas and candidate Special Protection Areas, designated by the National Parks and Wildlife Service of the Department of the Arts Heritage and the Gaeltacht under the EU Birds and Habitats Directives respectively.</p>	
<p><u>P-NAT3</u></p> <p>To protect plant, animal, species and habitats which have been identified by the Habitats Directive, Birds Directive, Wildlife Act (1976) and (Amendment Act) 2000, and the Flora Protection Order S.I.No. 94 of 1999.</p>	
<p><u>P-NAT4</u></p> <p>To assess any plan or project in accordance with Article 6 of the Habitats Directive, and assess whether the Plan or project is likely to have a significant effect on the site either individually or cumulatively upon the integrity, conservation objectives and qualifying interest of any Natura 2000 site.</p>	
<p><u>P-NAT5</u></p> <p>To require environmental assessment such as EIA (Environmental Impact Assessment) and/or ecological appraisal for development not directly connected with or necessary to the management of a European site, or a proposed European Site and which are likely to have significant effects on the European site either individually or cumulatively.</p>	

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p><u>P-NAT6</u></p> <p>To consult with the Prescribed Bodies when assessing development proposals affecting sites of biodiversity value, with particular emphasis on the Natura 2000 network of sites.</p>	
<p><u>P-NAT7</u></p> <p>To ensure that the Local Authority in fulfilling its responsibility in the supply of services and infrastructure, zoning of lands and undertaking and authorising development, addresses the potential effects on biodiversity and the needs of priority habitats and species within or adjoining sites as identified in the NPWS Report ‘The status of EU Protected Habitats and Species in Ireland’ NPWS 2008.</p>	
<p><u>P-NAT8</u></p> <p>To identify and provide appropriate buffer zones between designated ecological sites and local biodiversity features and areas zoned for development.</p>	
<p><u>P-NAT9</u></p> <p>To prepare Strategic Habitat Management Plans for Natura Sites in consultation with the National Parks and Wildlife Service and relevant stakeholders.</p>	
<p><u>O-NAT1</u></p> <p>To promote the maintenance and as appropriate, achievement of favourable conservation status of habitats and species and to improve the ecological coherence of the Natura 2000 network, by maintaining and where appropriate, developing features in the landscape which are of major importance for wild fauna and flora.</p>	

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p><u>Rural Enterprise Policies</u></p> <p><u>P-RE8</u></p> <p>To encourage and support the agencies and stakeholders involved in the management of the Industrial Peatlands to develop a Holistic Plan that meets the environmental, economic and social needs of these areas.</p>	
<p><u>Natural Heritage Policies</u></p> <p><u>P-NH8</u></p> <p>To provide for an intrinsic network of enhanced natural resources of clean water, biodiversity, nature conservation areas, landscape, peatlands, wetlands, parks, open spaces and agricultural land.</p>	
<p><u>Peatland Policies and Objectives</u></p> <p><u>P-PTL1</u></p> <p>To protect the county’s designated peatland areas and landscapes, including any historical walkways through bogs and to conserve their ecological, archaeological, cultural, and educational heritage.</p>	
<p><u>P-PTL2</u></p> <p>To ensure that peatland areas which are designated for protection under international and national legislation for their habitats, are conserved and managed appropriately to conserve their ecological, archaeological, cultural and educational significance.</p>	

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p><u>P-PTL3</u></p> <p>To require the preparation of Hydrological Reports for significant developments within and in close proximity to peatlands, and to take account of same in the assessment of impacts on the integrity of peatland ecosystems.</p>	
<p><u>P-PTL4</u></p> <p>To plan and prepare for the future sustainable and environmentally sensitive use of large industrial bog sites when peat harvesting finishes and to encourage a balanced approach to the redevelopment of cutaway bogs, including habitat creation, in conjunction with adjacent Local Authorities. This plan will have regard to both National and Regional frameworks with regard to the future use of peatlands, including cutaway bogs.</p>	
<p><u>P-PTL5</u></p> <p>To exercise control of peat extraction, both individually and cumulatively, which would have significant impacts on the environment.</p>	
<p><u>O-PTL1</u></p> <p>To continue to identify and map peatland sites of high local ecological value and protect them for their biodiversity.</p>	
<p><u>O-PTL2</u></p> <p>To investigate the planning status of peat extraction in North Westmeath and to take appropriate enforcement action where appropriate.</p>	

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p><u>O-PTL3</u></p> <p>To work with other bodies such as the NPWS and Coillte to support the conservation of peatlands.</p>	
<p><u>O-PTL4</u></p> <p>To consider designating peatlands at Coolnagun, Corlanna, Lower Coole, Mayne, Ballinealoe and Clonsura as archaeological heritage areas, where it is considered an ancient trackway or road may have been constructed.</p>	
<p><u>O-PTL5</u></p> <p>To work in partnership with relevant stakeholders on suitable peatland site(s) to demonstrate best practice in sustainable peatland conservation, management and restoration techniques and to promote their heritage and educational value subject to Ecological Impact Assessment and Appropriate Assessment, as appropriate.</p>	
<p><u>O-PTL6</u></p> <p>To support the preparation of a Sustainable Holistic Management Plan for the future use of the Industrial Peatlands in the county, which recognises the role of peatlands in carbon sequestration. Landscape Management Policies P-LLM7. To explore with the relevant agencies the future potential of cut away peatlands, including opportunities for habitat creation or amenity and recreation areas such as community woodlands or parklands.</p>	
<p><u>General Energy Policies</u></p>	
<p><u>P-EN5</u></p> <p>To support the sustainable development of the infrastructure required to assist the Midland Region in the delivery of renewable energy, particularly in the context of the need to make a transition from peat to renewable energy.</p>	

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p><u>Wind Energy Policies and Objectives</u></p> <p><u>P-WIN2</u></p> <p>To strictly direct large-scale energy production projects, in the form of Wind Farms, onto cutover cutaway peatlands in the county, subject to environmental, landscape, habitats and wildlife protection requirements being addressed. In the context of this policy, industrial scale/large-scale energy production projects are defined as follows: Projects that meet or exceed any of the following criteria: - Height: over 100m to blade tip, or - Scale: More than five turbines - Output: Having a total output of greater than 5MW</p>	
<p><u>O-WIN1</u></p> <p>To prepare and implement a Management Plan for the Industrial Peatlands in the county, in consultation with stakeholders and adjacent Local Authorities, during the lifetime of the plan. Said plan shall focus on recreational opportunities, renewable energy, hydrological and ecological considerations and shall be subject to environmental assessment and the requirements of Article 6 of the Habitats Directive.</p>	
Westmeath Biodiversity Action Plan 2014-2020	
<p><u>Actions for Biodiversity</u></p> <p>Actions for Biodiversity are divided under the following headings :</p> <ul style="list-style-type: none"> > Protection and Development of the Ecological Network > Monitoring and Research > Raising Awareness <p>Protection and Development of the Ecological Network</p> <ul style="list-style-type: none"> > Promoting habitats connectivity through: 	<p>The Biodiversity Plan was comprehensively reviewed, with particular reference to Actions that relate to the Natura 2000 network. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.</p>

Draft Westmeath County Development Plan 2014 - 2020	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<ul style="list-style-type: none"> ▪ Raising awareness, ▪ Incorporating planning and legislation, ▪ Education, Protection, ▪ Establishing new connections. <p>➤ Preparing management plans for conservation worthy habitats.</p> <p>Monitoring and Research</p> <ul style="list-style-type: none"> ➤ Identifying Local Biodiversity Sites. ➤ Assessing gaps in knowledge on Westmeath biodiversity. ➤ Seeking to fill these gaps by both professional and volunteer bodies (applies also to Raising Awareness). ➤ Facilitating free public access to information on Westmeath biodiversity (applies also to Raising Awareness). <p>Raising Awareness</p> <ul style="list-style-type: none"> ➤ Promoting and/or delivering biodiversity education among Members of the Public and Local authorities employees. ➤ Facilitating and promoting free public access to nature enjoyment. ➤ Raising pride of local biodiversity. ➤ Bringing together communities in protecting, enhancing and enjoying nature (applies also to Protection and Development of the Ecological Network). 	

Table 7-2 Review of land use and spatial plans 2021 -2027

Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p>CPO 12.4: It is Council policy to protect and conserve Special Areas of Conservation, candidate Special Areas of Conservation, Special Protection Areas and candidate Special Protection Areas, designated under the EU Birds and Habitats Directives respectively.</p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.</p> <p>There will be no impact on designated sites as a result of deterioration in water quality. Best practice preventative measures will be implemented to avoid effects on water quality, as outlined in section 3.3 of this report, the hydrology chapter (Appendix 4) and in the CEMP (Appendix 3). There will be no adverse effects on sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.</p> <p>There will be no impact on European designated sites as a result of the Proposed Development. The development will not affect the conservation status of any QI species or habitat or SCI species of any EU designated site. The development will not prevent the QIs/SCIs of the European Sites from achieving favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive.</p>
<p>CPO 12.5: It is Council policy to Ensure that no plans, programmes, etc. or projects giving rise to significant cumulative, direct, indirect or secondary impacts on European Sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans, programmes, etc. or projects).</p>	
<p>CPO 12.6: It is Council policy to ensure that any plan or project that could have a significant adverse impact (either by themselves or in combination with other plans and projects) upon the conservation objectives of any Natura 2000 Site or would result in the deterioration of any habitat or any species reliant on that habitat will not be permitted.</p>	
<p>CPO 12.7: It is Council policy to assess any plan or project in accordance with Article 6 of the Habitats Directive to determine whether the plan or project is likely to have a significant effect on the site either individually or cumulatively upon the integrity, conservation objectives and qualifying interest of any Natura 2000 Site.</p>	
<p>CPO 12.8: It is Council policy to require an ecological appraisal for development not directly connected with or necessary to the management of Natura Sites, or a proposed Natura Site and which are likely to have significant effects on that site either individually or cumulatively.</p>	
<p>CPO 12.9: It is Council policy to identify and provide appropriate buffer zones between Designated Sites and local biodiversity features and areas zoned for development</p>	

Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p>CPO 12.10: It is Council policy prepare Strategic Habitat Management Plans for Natura 2000 Sites in Council ownership in consultation with the National Parks and Wildlife Service and relevant stakeholders.</p>	
<p>CPO 12.11: It is Council policy promote the maintenance and as appropriate, achievement of favourable conservation status of habitats and species and to improve the ecological coherence of the Natura 2000 network, by maintaining and where appropriate, developing features in the landscape which are of major importance for wild fauna and flora.</p>	
<p>CPO 12.12: It is Council policy to require that new development proposals affecting designated sites have regard to the sensitivities identified in the SEA Environmental Report prepared in respect of this plan.</p>	
<p>CPO 12.13 It is Council policy to protect, manage and enhance the natural heritage, biodiversity, landscape and environment of County Westmeath, in recognition of its importance as both a non-renewable resource and a natural asset.</p>	<p>Any treeline and/or hedgerow removed as part of the Proposed Development will be replaced as part of the design of the project. Where removal of woodland is required to widen roads within the site between T5 and T9 these works will be kept to a minimum and the woodland will be retained as part of the operation of the windfarm. All tree removal within the development site has been accounted for in the replanting assessment for this project.</p>
<p>CPO 12.23 It is Council policy to protect and where possible enhance biodiversity and ecological connectivity, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, geological and geo-morphological systems, other landscape features, natural lighting conditions, and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones in the context of Article 10 of the Habitats Directive. Appropriate mitigation and/or compensation to conserve biodiversity, landscape character and green infrastructure networks will be required where habitats are at risk or lost as part of a development.</p>	
<p>CPO 12.24 It is Council policy to recognise that nature conservation is not just confined to designated sites and acknowledge the need to protect non-designated habitats and landscapes and to conserve the biological diversity.</p>	
<p>CPO 12.25 Prevent the spread of invasive species within the plan area, including requiring landowners and developers to adhere to best practice guidance in relation to the control of invasive species.</p>	
<p>CPO 12.26 Ensure that proposals for development do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species are or were previously present, the applicant will be required to submit a control and management program for the particular invasive species as part</p>	<p>Invasive species listed on the Third Schedule of the European Communities Birds and Habitats Regulations 2011 (S.I. 477/2011) have been identified along the proposed grid connection route. No invasive species were recorded within the Wind Farm Site. Site specific</p>



Draft Westmeath County Development Plan 2021 - 2027	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<p>of the planning process and to comply with the provisions of the European Communities Birds and Habitats Regulations 2011 (S.I. 477/2011).</p> <p>CPO 12.27 Support, as appropriate, the National Parks and Wildlife Service’s efforts to seek to control and manage the spread of non-native invasive species on land and water. Where the presence of non-native invasive species is identified at the site of any Proposed Development or where the proposed activity has an elevated risk of resulting in the presence of these species, details of how these species will be managed and controlled will be required.</p>	<p>mitigation in relation to these species has been described within this NIS to prevent the spread of invasive species during the proposed works.</p>

7.1.1 Proposed Wind Farm Site

A review of Westmeath Council Planning Register shows the following planning applications lodged within the site of the currently proposed wind farm:

Forestry Entrances Pl. Ref. No. 98/1092

Planning application by Coillte Teo, for new forestry entrances. Permission was granted by the Planning Authority on the 03/12/98 subject to 2 no. conditions.

Permitted Coole Wind Farm Pl. Ref. No. 17/6292/ABP-300686-18

Coole Wind Farm Ltd. applied to Westmeath County Council in October 2017 for planning permission for the construction of a wind farm consisting of 13 no. wind turbines, upgrade of existing internal access roads and provision of new internal access roads, an on-site substation, underground cabling, temporary construction compound and all ancillary infrastructure. Permission was refused by the Planning Authority, however, the Board granted permission for the proposal following a first party appeal under PL25M.300686 in March 2019.

All elements of the permitted project, including an assessment of the proposed cable route were assessed as part of the EIS/EIAR submitted with the above application.

Grid Connection

A planning application for the electrical connection of the permitted Coole wind farm to the national grid which included for expansion of the above-mentioned onsite substation and upgrade works to the existing Mullingar substation was submitted to Westmeath County Council on 22nd May 2020 and was considered under Pl. Ref 20/6121. This application was lodged following An Bord Pleanála confirming that permission should be lodged with Westmeath after considering the S182A status or otherwise of the grid connection works under PL25M.304794. A Further Information Request (FIR) was issued by Westmeath County Council on the 17th July 2020 in relation to that application. That application was subsequently withdrawn. A copy of the Further Information Request is included in Appendix 2-1 of this EIAR. Table 1-2 below provides a summary of the various further information points that were raised and references where these points have been dealt with within the EIAR and application documentation.

In preparing this EIAR for the Proposed Development, the applicant and design team have considered in full the previous applications for both Coole Wind Farm and the Coole Grid Connection, along with the Further Information Request that was issued in July 2020.

7.1.2 Applications in the Vicinity of the Proposed Wind Farm Site

The majority of planning applications in the immediate vicinity of the proposed wind farm site are related to the provision and/or alteration of one-off housing and agricultural developments. Applications which are not of an individual domestic or agricultural nature in the vicinity of the EIAR study area include the following:

Peat Operations

- **Pl Ref. 88/313:** Planning application to retain peat moss processing plant and buildings at Doon, Castlepollard. The planning authority granted planning permission on 10th February 1989.
- **ABP-307853-20** - Substitute Consent - Extra Time Westland Horticulture Limited due to be submitted 23rd day of November, 2020,

- **ABP 305835** – Leave to Apply Substitute Consent by Westland Horticulture for peat harvesting on lands at Lower Coole, Mayne, Ballinealoe and Clonsura County Westmeath was granted on 1st May 2020
- **ABP 307281-20** - Substitute Consent Application for Peat Extraction Mounddillon, Duil na Gun, Co. Westmeath, Milkernagh, Co. Westmeath and Co. Longford and Coolcraff, Co. Longford. Due to be decided 5th October 2020

Other Applications

- **Pl Ref. 11/2043:** Planning application relating to Turbotstown House for alterations to the existing return wing and associated south - east elevation as well as removal of later internal partition and the provision of a reversible enclosure of the basement stairwell to main house pantry including ancillary associated works to a building listed as a protected structure, No. 261. The planning authority granted planning permission on the 23rd September 2011 subject to 7 no. conditions.
- **Pl. Ref.81/699:** Planning application for erection of a 38kV sub-station at Tromra. The Planning Authority granted permission on the 29th October 1981.

7.1.3 Applications in the Vicinity of the Proposed Grid Connection Route

The grid connection route from the permitted Coole Wind Farm site is in the general vicinity of over 100 no. valid planning applications made to Westmeath County Council. The majority of these applications are for residential development and were lodged since the early 1980s. The proposed grid connection route is also immediately adjacent to and/or within the general vicinity of a range of consented commercial developments, particularly within Multyfarnham, and ancillary agricultural infrastructure. Of those applications submitted the following are of note:

Energy Infrastructure

- Planning Ref. 18/6063 - Planning Application for a ten-year permission for the construction of an energy storage facility, including an electrical substation building, battery modules, transformer/invertor station modules and ancillary infrastructure (Planning Ref. 186063), located c. 220m west of the proposed grid connection route. The development was granted planning permission by Westmeath County Council in February 2019. This decision was subsequently appealed to An Bord Pleanála. An Bord Pleanála granted permission for the development in July 2019.
- Planning Ref. 81/699: Planning application for erection of a 38 kV sub-station at Tromra. The Planning Authority granted permission on the 29th October 1981.

Peat Operations

- Planning Ref. 88/313: Planning application to retain peat moss processing plant and buildings at Doon, Castlepollard. The planning authority granted planning permission on 10th February 1989.

Residential

- Planning Ref. 16/6001 - Planning Application for the development of 28 no. houses to be constructed in three phases. The planning authority granted planning permission in January 2017.

Community Facilities

There are several applications for community facilities, e.g. education and recreational facilities, located adjacent to or within general proximity of the proposed grid connection, as listed below. The majority of these applications have been submitted within the last 5 no. years.

- Planning Ref. 06/2334 - To remove existing prefabricated classroom and to extend existing school to provide a replacement classroom with toilets, staff room, resource room, wheelchair toilet facilities and a P.E. room. The Planning Authority granted permission for the Proposed Development in January 2007.
- Planning Ref. 10/2021 - To alter & extend part of the existing agricultural training collage buildings to provide a Cancer counselling and retreat centre and a suicide and training centre. The Planning Authority granted permission for the Proposed Development in August 2010.
- Planning Ref. 13/6091 - New single storey classroom extension (45sqm) to the rear of the existing building and the provision of a staff carparking area. The Planning Authority granted permission for the Proposed Development in February 2014.
- Planning Ref. 17/6116 - Change of use of a former agricultural yard to a horticultural based sessional training centre. The Planning Authority granted permission for the Proposed Development in November 2017.
- Planning Ref. 17/6112 - New single storey side extension (42.65 sqm) to the existing building comprising of a new classroom/toilet, disabled toilet and lobby, car-parking. The Planning Authority granted permission for the Proposed Development in July 2017.
- Planning Ref. 18/6174 - The installation of a multi-purpose playground unit. The Planning Authority granted permission for the Proposed Development in August 2018.
- Planning Ref. 18/6233 - A proposed sports and recreational development adjacent to the existing Community Centre and playing field. Permission is also sought to upgrade the existing car parking area and to construct a new car parking area with a total number of 224 spaces and 2 no. bus parking bays. The Planning Authority granted permission for the Proposed Development in December 2018.

7.1.4 Forestry and Replanting

The majority of the proposed wind farm site is occupied by commercial cutover peat, with some areas occupied by commercial forestry. As part of the Proposed Development, some tree felling is required within and around the development footprint to allow the construction of turbine bases, access roads and other ancillary infrastructure. There are two turbines within the Proposed Development that are located within an area of forestry; T5 and T14. It should be noted that all forestry on the site of the proposed wind farm was originally planted as a commercial crop and will be felled in the coming years should the proposed wind farm proceed or not.

In line with the Forest Service's published policy on granting felling licenses for wind farm developments, areas cleared of forestry for turbine bases, access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative location.

A total of 16.36 hectares of new forestry will be replanted as a condition of any felling licence that might issue in respect of the Proposed Development. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service.

The replacement replanting of forestry can occur anywhere in the State subject to licence. A potential replanting area has been identified in the townland of Maheraboy, approximately 1.4 kilometres east of

Ballaghderreen, Co. Roscommon. An area at this site measuring 16.53 hectares has been granted Forest Service Technical Approval for afforestation. If these replant lands become unavailable, other similarly approved lands will be acquired for replanting should the proposed wind farm receive planning permission. A description of the proposed replanting land and an assessment of the potential impacts including cumulative impacts associated with afforestation at this location are presented in Appendix 4-6 of the EIAR and provided in Appendix 2 and have been taken into account as part of this assessment.

7.1.5 Other Wind Farm Sites

There is only 1 No. permitted wind turbine located within 20 kilometres of the proposed wind turbines, as shown in Figure 2-2 in Chapter 2 of the EIAR. The relevant planning history of wind farm applications within the wider area is summarised below. This record lists the main relevant application in relation to the wind turbine applications. It is not intended to be exhaustive and list every application associated with the sites.

7.1.5.1 County Westmeath

Dryderstown Wind Turbine

- **Pl Ref 12/2054:** Application by Reforce Energy Ltd. for a single electricity generating wind turbine of hub height up to 64m and rotor diameter up to 48m, a hardstanding, Control Building, Associated site roads, drainage & site works
- **Development Address:** Dryderstown, Delvin. The site is located approximately 21 kilometres southeast of the nearest proposed wind turbine.
- **Decision:** 1 no. turbine granted by the Planning Authority (Westmeath County Council) subject to 12 no. conditions.

Crowinstown Wind Farm

- **Pl. Ref. 08/2174:** Application by Gaelectric Developments Ltd. seeking to amend planning ref 03/2064 (An Bord Pleanála Ref 25C.205586) relating to the development of a wind farm comprising of 3 wind turbine generators, 1 control building, 1 control building compound, associated access roads and 1 meteorological tower. This amendment seeks to increase the height of the wind turbine generators from a hub height of 78m to 85m and the rotor diameter from 72m to 80m. This will result in a maximum rotor blade tip height of 125m previously 114m. In addition, this application seeks to amend condition 2 to allow the 20-year permission period to commence from the commissioning date of the wind farm rather than from the date of the grant which was 22nd of June 2004.
- **Development Address:** Townlands of Crowinstown Great, Delvin, Co. Westmeath The site is located approximately 24.9 kilometres southwest of the nearest proposed wind turbine.
- **Decision:** 3 no. turbines granted by the Planning Authority (Westmeath County Council) subject to 13 no. conditions.

Proposed Ballivor Wind Farm

- Bord na Móna is proposing to develop a wind farm within the Ballivor Bog Group located in Counties Meath and Westmeath. This project is currently undergoing pre-application consultation with An Bord Pleanála under the provisions of ABP 307471-20. The proposed development will be located on bogs within the Ballivor Bog Group in counties Meath and Westmeath, namely Ballivor, Bracklin, Carranstown, Lislogher and

Lislogher West bogs. The site is located approximately 25.6 kilometres southwest of the nearest proposed Coole wind turbine.

Proposed Bracklyn Wind Farm

- Gaeltech Energy Developments Ltd is proposing to develop a wind farm of approximately 11 no. turbines in the townland of Bracklin, Co. Westmeath. The project is at the early design and consultation stage. The site is located approximately 24.9 kilometres southwest of the nearest proposed wind turbine.

7.1.5.2 County Cavan

Existing Ballyjamesduff Wind Turbine

- **PI Ref 14/103ABP Ref. PL 02.243776:** Application by Liffey Energy for a development consisting of the erection of a single turbine with a hub height of 100m and rotor diameter of 103m, overall height not exceeding 152m and all associated site development works, including foundations, crane hardstanding, access track and underground cabling. Also, the construction of 20kV switchroom building with a floor area 50sqm, and temporary alteration of existing factory entrance of the L30130.
- **Development Address:** Townlands of Cloggagh, Ballyjamesduff
This site is located approximately 16.4 kilometres northeast of the the nearest proposed wind turbine.
- **Decision:** 1 no. turbines granted by the Planning Authority (Cavan County Council) subject to 11 no. conditions.

Proposed Ballyjamesduff Wind Turbine

- **PI Ref 19/447 ABP Ref. PL 02.309478:** Application by Liffey Energy for a development consisting of the erection of a single turbine with a maximum height of 169m, associated access and reinstatement works including turbine foundation, hardstanding area, site access tracks, 1 no. temporary site entrance and underground electrical cabling.
- **Development Address:** Townlands of Kilquilly and Cloggagh, Ballyjamesduff
This site is located approximately 16 kilometres northeast of the the nearest proposed wind turbine.
- **Decision:** Cavan County Council refused permission for the proposed on 22nd January 2021, however the application was appealed to An Bord Pleanála with the case due to be decided by 23rd June 2021.

7.2 Other Projects

7.2.1 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts and for which all relevant data was reviewed include those listed below.

Peat Extraction

Commercial peat harvesting at the Proposed Development site, as described in Section 2.6.2 in Chapter 2 of the EIAR.

Forestry

Some areas within the site are planted with commercial forestry.

Road Scheme

Proposed upgrade to a 52km section of the N4 between Mullingar and Longford (Roosky). A second Public Consultation on the Route Corridor Options is currently underway.

Other Wind Turbines

There is only one turbine permitted within a 20-kilometre radius of the proposed development site, located near Ballyjamesduff, Co. Cavan, as detailed in Section 2.7.4 above. This turbine is located approximately 16.4 kilometres from the nearest proposed turbine location at Coole. An application for a single turbine approximately 10 kilometres North East of the proposed development site has been appealed to An Bord Pleanála (Pl Ref 20/105 / ABP-307863-20) and is due to be decided by 14th December 2020.

Where the potential for the Proposed Development to result in adverse effects on European Sites on its own was identified, there was potential for it to contribute to in combination effects when considered in combination with other plans and projects. In the absence of mitigation, the potential for the Proposed Development to contribute to in combination effects on water quality within downstream the following SACs and SPAs:

- Lough Owel SAC (000688)
- Lough Ennell SAC (000685)
- Lough Owel SPA (004047)
- Lough Ennell SPA (004044)
- Lough Derravaragh SPA (004043)
- Lough Iron SPA (004046)

In addition, and following the precautionary principle, the Proposed Development has the potential to contribute to disturbance and displacement effects on the following SPAs:

- Lough Owel SPA (004047)
- Lough Derravaragh SPA (004043)

Following the implementation of the best practice measures outlined in section 5 of this report, in the hydrology chapter of the EIAR accompanying this application (Appendix 2) and in the CEMP (Appendix 3), all potential impact pathways have been blocked. There is therefore no potential for the Proposed Development to contribute to any in-combination impact on EU Designated Sites in combination with other plans and projects.

Conclusion of Cumulative Assessment

Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on any European Site and cannot contribute to any cumulative or in-combination effect when considered alongside any other plan or project.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was there any potential for different (new)



impacts resulting from the combination of the various projects and plans in association with the Proposed Development.

8. **CONCLUDING STATEMENT**

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction, and operation of the Proposed Development does not adversely affect the integrity of any European sites.

Following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on any European Sites, either alone or in combination with other plans or projects.

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