

Natura Impact Statement

Lyrenacarriga Wind Farm





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Appendix 2 Chapter 10 ‘ Water’

Appendix 3 EIAR Chapter 4 Description of the proposed developemnt

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1. INTRODUCTION

1.1 Background

McCarthy Keville O’Sullivan Ltd. (MKO) has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment of a proposed wind energy development and all associated infrastructure at Lyrenacarriga and adjacent townlands, located in Counties Waterford and Cork.

An Appropriate Assessment Screening Report has been prepared and is provided in Appendix 1 to this document. This Article 6(3) Appropriate Assessment Screening Report has 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 2001-2020 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, the Department of the Environment’s Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended 11 February 2010) and the European Commission (2020) Commission notice Guidance document on wind energy developments and EU nature legislation (European Commission, 2020¹).

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 European Commission (2020), Commission notice Guidance document on wind energy developments and EU nature legislation, Online, Available at: https://ec.europa.eu/environment/nature/natura2000/management/docs/wind_farms_en.pdf, Accessed, 20.12.2020

1.2

Statement of Authority

Field assessments were undertaken by David McNicholas (B.Sc., M.Sc., MCIEEM), Irene Sullivan (B.Sc.), Julie O’Sullivan (B.Sc., M.Sc.) and Luke Dodebier (BSc, Qualifying CIEEM) in 2018, 2019 and 2020. David has over 10 years professional ecological consultancy experience. This report has been prepared by Julie O’Sullivan and David McNicholas. Julie is an experienced ecologist with over 5 years professional experience. Luke is an experienced ecologist with over 2 years professional ecological consultancy experience. Irene is an ecologist experienced in undertaking habitat and ecological assessments.

Dedicated bird surveys of the site were undertaken between September 2016 to September 2018 and October 2019 to March 2020. The scope of works and survey methodology was devised by Chartered Ecologist Dr Patrick Crushell (PhD, MCIEEM). Field surveys were undertaken by Tony Nagle (MSc.), Alan McCarthy (BSc.) and Jack Kennedy (BSc.). All surveyors are competent experts in the field of ornithology.

This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John is a highly experienced ecologist with over 10 years’ professional experience in environmental management and ecological assessment.

1.3

Structure and Format of this NIS

This NIS firstly provides a summary of the findings of the Article 6(3) Appropriate Assessment Screening Report. This clearly identifies the European Sites that have the potential to be significantly affected by the proposed development and the pathways by which they might be affected. This sets out the scope of the NIS. Following this, all elements of the Proposed Development are fully described in Section 3, as is the baseline environment in Section 4 with respect to the relevant QI/SCI of the screened European Sites.

Section 5 provides an assessment of the potential for adverse effects on the identified European Sites and prescribes mitigation to robustly block any identified pathways for impact. Section 6 provides an assessment of residual effects taking into consideration the proposed mitigation.

In Section 7, the potential in combination effects of the Proposed Development on European Sites, when considered in combination with other plans and projects was considered. A concluding statement is provided in Section 8.

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, identified the potential for the proposed development to result in significant effects on the following European Sites:

- Blackwater River (Cork/Waterford) SAC
- Blackwater Estuary SPA
- Ballymacoda Bay SPA

Each of these sites are discussed individually below in terms of the Qualifying Interests/Special Conservation Interests (SCIs) with the potential to be affected and the pathways by which any such effects may occur. The location of the proposed development in relation to these EU designated sites is provided as Figure 2.1.

2.1

Blackwater River (Cork/Waterford) SAC

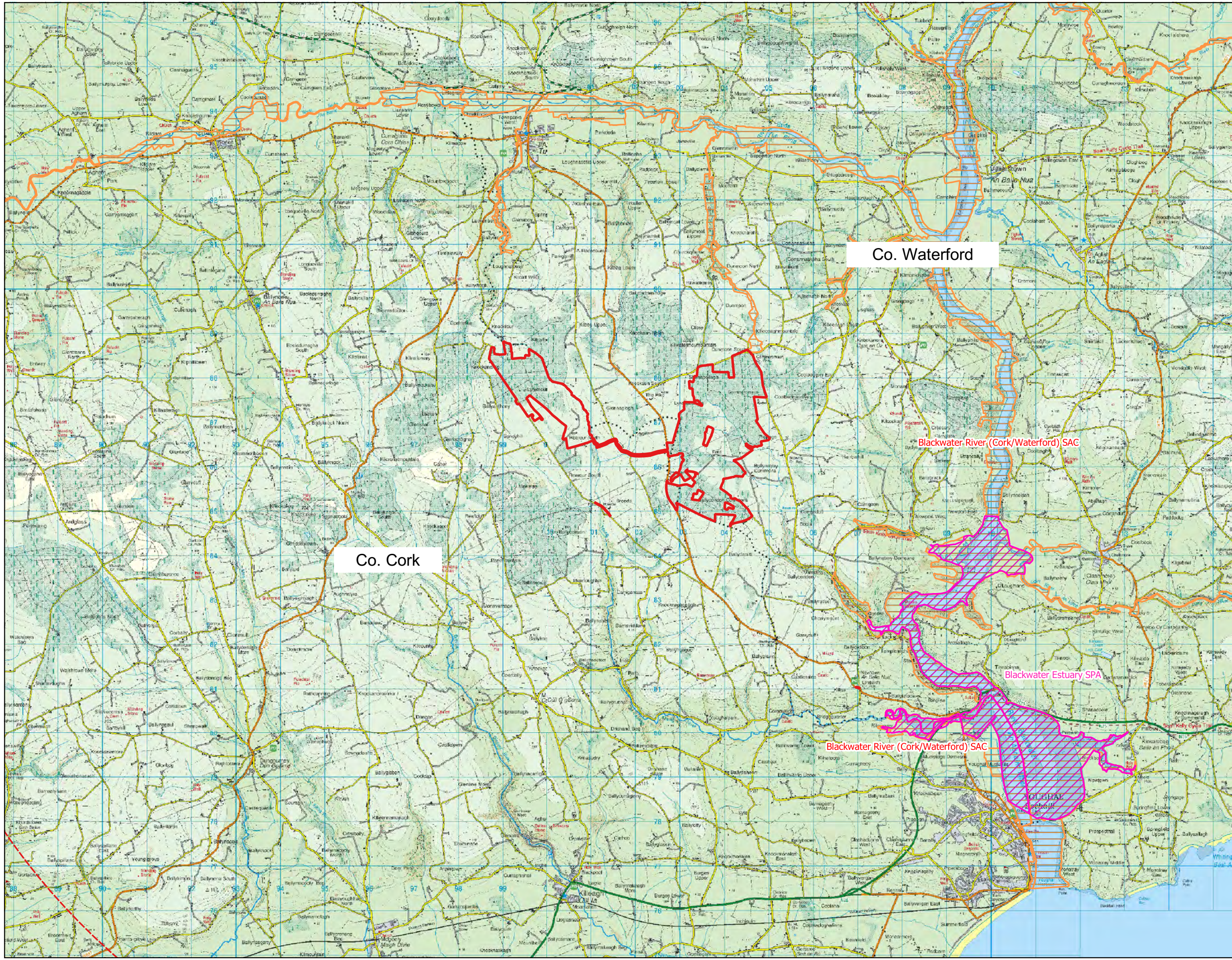
The individual pathways for effect that were identified in Table 3.1 of the AA Screening Report (Appendix 1) and the QIs with the potential to be affected are described below.

This European Site is located adjacent to the site boundary of the proposed development, to the north-east of the development site. There is no potential for direct impact as the proposed development is outside of the Special Area Conservation (SAC) boundary. There is connectivity between the proposed development and this SAC via watercourses within the site boundary, including the Glenaboy, the Glendine and the Tourig Rivers.

The proposed works have the potential to cause deterioration in water quality during the construction, and decommissioning phase of the development due to the release of pollutants including suspended solids and hydrocarbons, potentially affecting the following downstream aquatic habitats and supporting habitats for aquatic fauna:

- Sea Lamprey *Petromyzon marinus*
- Brook Lamprey *Lampetra planeri*
- River Lamprey *Lampetra fluviatilis*
- Twaite Shad *Alosa fallax*
- Atlantic Salmon *Salmo salar* (only in freshwater)
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Salicornia and other annuals colonizing mud and sand
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Otter *Lutra lutra*
- Mediterranean salt meadows (*Juncetalia maritimi*)
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche Batrachion* vegetation
- *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno- Padion*, *Alnionincanae*, *Salicionalbae*)

As potential for impact on Atlantic salmon has been identified above as a result of water quality deterioration, potential for indirect impact on freshwater pearl mussel (*Margaritifera margaritifera*) has been identified as the species depends on salmonids during part of its early reproduction stage.



Map Legend

- County Boundary
- Site Boundary
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

Co. Waterford

Co. Cork

Blackwater River (Cork/Waterford) SAC

Blackwater Estuary SPA

Blackwater River (Cork/Waterford) SAC



Site Location

Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H. Witter	D. McNicholas
Project No.	Drawing No.
170749	Figure 2-1
Scale	Date
1:75000	2021-01-05

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The proposed development also has the potential to cause disturbance/displacement related effects to otter during the construction, operational and decommissioning phases of the development.

2.2 Blackwater Estuary SPA

This European Site is 3.5km to the south-east of the development site. Although the proposed development is located outside of the Special Protected Area (SPA) boundary, a potential pathway for direct effects was identified in the form collision risk to Golden Plover. Golden plover is designated for its wintering population within this SPA and were recorded onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this species of Special Conservation Interest (SCI) cannot be excluded and further assessment was deemed to be required on foot of completion of the Appropriate Assessment Screening Report.

From a highly precautionary perspective, a potential pathway for indirect effects has been identified in the form of deterioration of water quality resulting from pollution, associated with the construction of the development. The proposed development site has hydrological connectivity to this SPA via watercourses within the site boundary, including the Glenaboy, the Glendine and the Tourig Rivers. Taking a highly precautionary approach, and in the absence of mitigation, the proposed works have the potential to cause deterioration of water quality during the construction, operational and decommissioning phase of the development potentially affecting the downstream SCI ‘Wetland and Waterbirds’. The SCI ‘Wetland (A999)’ covers supporting habitat for all wetland SCI species associated with the SPA.

A potential pathway for indirect effects was identified in the form of bird disturbance and displacement to Golden Plover. Golden plover is designated for its wintering population within this SPA. Golden plover were recorded onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this species of Special Conservation Interest (SCI) cannot be excluded and further assessment was deemed to be required on foot of completion of the Appropriate Assessment Screening Report Ballymacoda Bay SPA

2.3 Ballymacoda Bay SPA

This European Site is 10.7km to the south-east of the development site. A potential pathway for direct effect was identified in the form of bird collision risk to lesser black-backed gull, black-headed gull and golden plover.

A potential pathway for indirect effects was identified in the form of bird disturbance/ displacement to lesser black-backed gull, black-headed gull and golden plover.

The wind farm site is located within the potential core foraging range of the following SCI species as per Thaxter *et.al* 2012:

- > Lesser black-backed gull (*Larus fuscus*)
- > Black-headed Gull *Chroicocephalus ridibundus* (Wintering)
- > Golden Plover (*Pluvialis apricaria*)

The potential for significant effects on these SCI species, as a result of disturbance/ displacement and collision, cannot be excluded further assessment was deemed to be required on foot of completion of the Appropriate Assessment Screening Report.

3. DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Site Location

The proposed development site is located approximately 5 kilometres southeast of Tallow, Co. Waterford and approximately 15 kilometres northwest of Youghal Co. Cork. The proposed project is located in the townlands of Lyremountain, Lyre, Knockanarrig, Ballyanthony, Rearour North and Breeda in County Cork and in the townlands of Knockrour, Lyrenacarriga, Shanapollagh, Dunmoon South, Coolbeggan West, Propoge, Ballynatray Commons, Ballycondon Commons, Kilcalfmountain, Kilcalf West, Kilcalf East, Glennaglogh in County Waterford. The site location is shown in Figure 2.1.

3.2 Characteristics of the Proposed Development

3.2.1 Description of the project

The Proposed Development comprises:

- i. Construction of up to 17 No. wind turbines with a maximum overall blade tip height of up to 150 metres;
- ii. 1 no. Meteorological Mast with a maximum height of up to 112 metres;
- iii. Construction of 1 no. staff welfare and storage facility including waste water holding tank;
- iv. 1 no. permanent 110 kV electrical substation with 2 no. control buildings with welfare facilities, 10 no. battery containers, battery switchgear building, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;
- v. Underground cabling connecting the turbines to the proposed substation and connection from the proposed substation to the national grid via a 110 kV loop in connection.
- vi. Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;
- vii. Construction of an access track in the townlands of Breeda and Rearour South to facilitate turbine delivery;
- viii. Junction improvement works in the townland of Killea to facilitate turbine delivery;
- ix. 3 no. borrow pits;
- x. 2 no. temporary construction compounds;
- xi. Site Drainage;
- xii. Forestry Felling;
- xiii. Signage; and
- xiv. All associated site development works.

All elements of the proposed project as described in this chapter, including grid connection, forestry felling and replanting and any works required on public roads to accommodate turbine delivery, have been assessed as part of this Natura Impact Statement (NIS).

This application seeks a ten-year planning permission and 30-year operational life from the date of commissioning of the entire wind farm.

The below subsections provide a description of the main infrastructure proposed as described in Chapter 4 of the accompanying EIAR (Appended here in Appendix 3 of the NIS for completeness).

3.3 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 3.6 of the accompanying EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site. The Proposed Development layout makes maximum use of the existing access road and tracks within the site.

The overall layout of the Proposed Development is shown on Figure 3.1. This drawing shows the proposed locations of the wind turbines, electricity substation, borrow pits, construction compound, internal roads layout and the main site entrance. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1, Chapter 4 of the accompanying EIAR, provided as Appendix 3 of this NIS.

3.3.1 Site setup

A suite of best practice environmental control and measures have been incorporated into the design of the Proposed Development for the construction, operation and decommissioning phase of the Proposed Development. Measures for the protection of water quality have been incorporated into the initial site setup phase, including the installation and management of site compounds, fuel storage areas, material storage areas are set out in this NIS (see relevant appendices) along with additional mitigation measures prescribed in Section 5. These are fully described in the Construction Environmental Management Plan (CEMP), see Appendix 4-4 to the EIAR (included as Appendix 3 of this NIS), Section 10.5.2 Chapter 10 ‘Water’ of the EIAR (included as Appendix 2 of this NIS), the project description as described in Chapter 4 of the EIAR (see Appendix 3 of this NIS) and additional measures also provided in Section 5.4 of this NIS. Such measures will ensure that there is no potential for water quality deterioration associated with site setup and construction.

3.3.2 Construction details

3.3.2.1 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level. The size of the foundation will be dictated by the turbine manufacturer, and the final turbine selection will be the subject of site specific conditions and suitability. Different turbine manufacturers use different shaped turbine foundations, ranging from circular to hexagonal and square, depending on the requirements of the final turbine supplier and a foundation area large enough to accommodate these modern turbine models has been assessed in this NIS. The turbine foundation transmits any load on the wind turbine into the ground. The typical horizontal and vertical extent of a turbine’s foundation is shown in Figure 4-2, Chapter 4 of the EIAR, provided here in Appendix 3 of this NIS.

3.3.2.2 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing areas are extended to cover the turbine foundations once the turbine foundation is in place. The sizes, arrangement and positioning of hard standing areas are dictated by turbine suppliers. The hard-standing area is intended to accommodate a crane during turbine assembly and erection. The proposed hard standing areas shown on the detailed layout drawings included in

Map Legend

- Proposed 110 kV Substation
- Proposed Compound
- Proposed Borrow Pit
- Collector Cabling Route
- Proposed Met Mast
- Proposed Turbine Location
- Existing Road Proposed for Upgrade
- Proposed New Road
- Site Location
- Regional Road



MAP TITLE: Proposed Layout	MAP NO.: Figure 3.1	SCALE: 1:20,000
PROJECT TITLE: 170749 - Lyrenacarriga Wind Farm	DATE: 18-11-2020	
DRAWING BY: L Meehan	CHECKED BY: Michael Watson	ISSUE NO.: 170749-2020.11.18-D2
MKO Ltd., Tuam Road, Galway, Ireland, H91 VW84. Email: info@mccarthys.ie Tel: +353 (0)91 735611		

Appendix 4-1, Chapter 4 of the accompanying EIAR (included here in Appendix 3 of this NIS) and are indicative of the sizes required, but the extent of the required areas at each turbine location may be optimised on-site depending on topography, position of the site access road, the proposed turbine position and the turbine supplier's exact requirements. It should be noted that the assessment undertaken in this NIS takes account of the maximum required footprint required.

3.3.2.3 Assembly Area

Levelled assembly areas will be located on either side of the hard-standing area as shown on Figure 4-4, Chapter 4 of the accompanying EIAR (included here in Appendix 3 of this NIS). These assembly areas are required for offloading turbine blades, tower sections and hub from trucks until such time as they are ready to be lifted into position by cranes and to assist the main crane during turbine assembly. The exact location and number of assembly areas will be determined by the selected turbine manufacturer. It should be noted that the assessment undertaken in this NIS takes account of the maximum required footprint required.

3.3.2.4 Site Roads

3.3.2.5 Road Construction Types

Existing site access roads provide access within much of the site of the Proposed Development and to connect the wind turbines and associated infrastructure. Existing tracks will need to be upgraded and new access roads will need to be constructed.

The Proposed Development makes use of the existing forestry road network insofar as possible. It is proposed to upgrade approximately 10.7 kilometres of existing roads and tracks, and to construct 4.1 kilometres of new access road on the site.

3.3.2.5.1 Upgrade of Existing Access Roads or Tracks

The existing tracks onsite were constructed using the excavate and replace construction technique. The general construction methodology for upgrading of existing sections of excavated roads or tracks, as presented in the Geotechnical Assessment Report prepared by Fehily Timoney engineering consultants (see Appendix 4-2, Chapter 4, Appendix 3 of this NIS), is summarised below.

- a. *Excavation will be required on one or both sides of the existing access track to a competent stratum.*
- b. *Granular fill to be placed in layers in accordance with the designer's specification.*
- c. *The surface of the existing access track will be overlaid with up to 300mm of selected granular fill.*
- d. *Access roads to be finished with a layer of capping across the full width of the road.*
- e. *A layer of geogrid/geotextile may be required at the surface of the existing access road in areas of excessive rutting (to be confirmed by onsite engineer).*
- f. *For excavations in spoil, side slopes shall be not greater than 1 (v): 2. This slope inclination will be reviewed during construction, as appropriate.*
- g. *The finished road width will be approximately 5m.*
- h. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road.*
- i. *A final surface layer shall be placed over the existing access track, as per design requirements, to provide a suitable road profile and graded to accommodate wind turbine construction and delivery traffic.*

A Figure 4-5, Chapter 4 of the accompanying EIAR (included here in Appendix 3 of this NIS).

3.3.3 Borrow Pit

It is proposed to develop 3 No. on-site borrow pits as part of the Proposed Development. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Following removal of the rock from a borrow pit, it is proposed to partially restore the borrow pit by storing excavated spoil generated from construction activities.

The locations of the proposed borrow pits are shown in Figure 4.1, Chapter 4 of the accompanying EIAR (see Appendix 3 of this NIS).

Post-construction, the borrow pits areas will be subject to landscaping to remove any excessive gradients or leading edges to eliminate any fall risk. The borrow pit areas will be regraded at the edges to prevent potential for steep edges that may pose a health and safety risk. Appropriate health and safety signage will also be erected at locations around the borrow pit areas

3.3.4 Electricity Substation

It is proposed to construct a 110 kV (kilovolt) electricity substation within the site, as shown in Figure 4-1, of Chapter 4 of the EIAR, (included as Appendix 3 of this NIS). The proposed substation site is located within an area of forestry adjacent to an existing access road.

The footprint of the proposed onsite electricity substation compound measures approximately 2.9 hectares and will include two wind farm control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the wind farm substation to the national grid. The layouts and elevations of the proposed substation is shown on Figures 4-12 and 4-13, Chapter 4, Appendix 3 of this NIS. The construction and exact layout of electrical equipment in the onsite electricity substation will be to EirGrid / ESB Networks specifications parameters assessed.

Further details regarding the connection between the site substation and the national electricity grid are provided in Section 4.3.7, Chapter 4, Appendix 3 of this NIS.

The substation compound will be surrounded by an approximately 2.4-metre high steel palisade fence in line with standard ESB requirements, and internal fences will also segregate different areas within the main substation.

3.3.4.1 Wind Farm Control Buildings

The wind farm control buildings will be located within the substation compound. Control building 1 (the substation control building) will measure approximately 375 square metres in area and 8 metres in height. Control building 2 (switchgear room) will measure approximately 215 square metres in area and 7 metres in height. Layout and elevation drawings of the control buildings are included in Figures 4-14 and 4-15 Chapter 4, Appendix 3 of this NIS.

The wind farm control buildings will include staff welfare facilities for the staff that will work on the Proposed Development during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Development there will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement of the Proposed Development does not necessitate a potable source. It is proposed to harvest rainwater from the roofs of the buildings, and if necessary, bottled water will be supplied for drinking.

It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to

wastewater treatment plants. It is not proposed to treat wastewater on-site, and therefore the EPA's 2009 'Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)' does not apply. Similarly, the EPA's 1999 manual on 'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels' also does not apply, as it too deals with scenarios where it is proposed to treat wastewater on-site.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the site's turbines, wind measurement devices and electricity substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the site to a licensed facility.

3.3.5 Site Cabling

Each turbine will be connected to the on-site electricity substation via an underground 20 or 33 kV (~~kilovolt~~) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, along the sides of roadways or within the centre of the road. The route of the cable ducts will follow the access track to each turbine location and are visible on the site layout drawings included as Appendix 4-1, Chapter 4, provided in Appendix 3 of this NIS. Figure 4-17, Chapter 4, provided in Appendix 3 of this NIS, shows two variations of a typical cable trench, one for off-road trenches (to be installed on areas of soft ground that will not be trafficked) and one for on-road trenches (to be used where trenches run along or under a roadway).

Clay plugs will be installed at regular intervals of not greater than 50 metres along the length of the trenches to prevent the trenches becoming conduits for runoff water. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. This material will be imported onto the site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction.

3.3.6 Grid Connection

A connection between the proposed development site and the national electricity grid will be necessary to export electricity from the proposed wind farm. It is proposed to construct a 110 kV substation within the site and to connect from here via a 110 kV loop-in connection to the existing 110kV network which runs through the site. It is proposed to connect the two turbine clusters via underground cabling located within existing agricultural land and within the public road corridor. The cabling route measures approximately 3.3 km. The grid connection routes are illustrated in Figure 4-18, Chapter 4, provided in Appendix 3 of this NIS.

3.3.7 Meteorological Mast

One permanent meteorological (met) mast is proposed as part of the Proposed Development. The met mast will be equipped with wind monitoring equipment at various heights. The mast will be located approximately 410 metres southeast of Turbine 17, as shown on the site layout drawing in Figure 3-1, Chapter 4, provided in Appendix 3 of this NIS.

The mast will be a self-supporting slender structure up to 112 metres in height. The mast will be constructed on a hard-standing area sufficiently large to accommodate the crane that will be used to erect the mast, adjacent to an existing track. The met mast location was chosen as there is existing

infrastructure at this location. The met mast structure is shown in Figure 4-19, Chapter 4, provided in Appendix 3 of this NIS.

3.3.8 Temporary Construction Compound

Two temporary construction compounds are proposed as part of the proposed development. They are located approximately 601 meters southeast of Turbine 1 and 150 meters northeast of Turbine 13 respectively.

Each compound measures 80 meters by 50 meters, with a footprint of 4,000 m² in area. The location of the proposed construction compounds is shown on the site layout drawing in Figure 4.1, Appendix 3.

The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. The layout of the construction compounds is shown on Figures 4-20 and 4-21, Appendix 3. Construction materials and turbine components will be brought directly to the proposed turbine locations following their delivery to the site.

Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by an appropriately consented waste collector to wastewater treatment plants.

3.3.9 Tree Felling and Replanting

3.3.9.1 Tree Felling

The majority of the proposed wind farm site is occupied by commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, access roads and the other ancillary infrastructure.

It should be noted that forestry on the site of the proposed wind farm is a commercial crop and will be felled in the future should the proposed wind farm proceed or not.

A total of 45.6 hectares of forestry is required to be permanently felled within and around the footprint of the Proposed Development. Figure 4.22, Appendix 3, shows the areas to be felled as part of the Proposed Development.

The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore, the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Development. The Replanting Assessment is provided in Appendix 4-3 of the accompanying EIAR.

3.3.10 Site Drainage

The drainage design for the Proposed Development has been prepared by Hydro Environmental Services Ltd. (HES). The drainage design has been prepared based on the extensive experience of the project team of afforested wind farm sites and a number of best practice guidance documents referred to in Chapter 10 'Water' of the accompanying EIAR (see Appendix 2 of this NIS).

Details of all proposed drainage measures incorporated into the proposed development are fully described in Section 4.7, Chapter 4 of the EIAR, Section 10.4.2, Chapter 10 'Water' (Appendix 2) and

Section 2.3.2.4 of the CEMP, see Appendix 4-4, Appendix 3 of this NIS and briefly summarised here in the following paragraphs.

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. The Proposed Development's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the Proposed Development and turbine locations and associated new roadways were originally selected to avoid natural watercourses, and existing roads are to be used wherever possible. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Development.

The routes of any natural drainage features will not be altered as part of the Proposed Development. Turbine locations have been selected to avoid natural watercourses and a minimum setback of 75 metres has been maintained. there are a total of 13. no. new and proposed upgraded water crossing, these include *'2 no. new stream crossings and 6 no. existing stream crossing upgrades'* as part of access road construction and upgrades on the site. *'In addition, a total of 3 no. existing crossings will be upgraded and 2 no. new crossings constructed on the proposed collector cabling route between the two turbine clusters and at the proposed new link road near Breeda Bridge'*. The locations of the crossings are shown on Figure 4-7, Chapter 4 (Appendix 3 of this NIS).

There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

Further information on the requirements for upgrade and road widening is provided in Section 4.7.2, Chapter 4 of the EIAR, see Appendix 3.

3.3.10.1 Watercourse/Culvert Crossings on Collector Route

It is proposed to connect the two clusters of turbines via a section of underground collector cabling measuring approximately 3.3 kilometres in length. This cabling will connect the western turbines to the substation located within the eastern cluster of turbines, see Figure 4-16, Appendix 3.

There is a total of 2 no. watercourse crossings along the collector cable route; 1 no. existing culvert crossing and 1 no. open channel stream/watercourse crossing. The locations of these crossings are shown above in Figure 4-7, Appendix 3. The watercourse crossing methodologies for the provision of the grid connection at these locations is set out below with the most appropriated option being selected

for each crossing. Instream works are not required at any watercourse crossing along the proposed collector route.

The preferred methodologies for the provision of the collector at these locations is set out in Section 4.8.6.3, Chapter 4, see Appendix 3, which provides a summary of the watercourse crossing/culvert survey and description of works for all crossings. The construction methodology has been designed to eliminate the requirement for in-stream works. The four main culvert crossing methodologies are as follows:

- Standard Trefoil Formation over Piped Culvert Crossings – Option 1
- Flatbed Formation over Bridges/Culverts – Option 2
- Directional Drilling – Option 3

3.4 Operation

The Proposed Development is expected to have a lifespan of approximately 30 years. Planning permission is being sought for a 30-year operation period commencing from the date of full operational commissioning of the Proposed Development. During the operational period, on a day-to-day basis, the wind turbines will operate automatically, responding by means of meteorological equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected and data relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day.

Further details of the maintenance and monitoring requirements are fully described in Section 4.10, Chapter 4 of the EIAR, see Appendix 3 of this NIS.

3.5 Decommissioning

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 will be separated and removed off-site for recycling. Turbine foundations will remain in place underground and will 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 environmental emissions such as noise, dust and/or vibration.

Site roadways will be in use for purposes other than the operation of the 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. Underground cables, that are redundant, will be removed and the ducting left in place.

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 Ecological Multidisciplinary Walkover Surveys

Multidisciplinary ecological walkover surveys were conducted on the 31st of August 2018, 5th of October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020 in line with NRA (2009) guidelines (*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*). The surveys were conducted by David McNicholas (BSc., MSc. MCIEEM), Julie O’Sullivan (B.Sc, M.Sc) and Irene Sullivan (B.Sc.). All habitats within and adjacent to the proposed development site were readily identifiable during the site visit. Habitats were identified in accordance with the Heritage Council’s ‘*Guide to Habitats in Ireland*’ (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in ‘*Best Practice Guidance for Habitat Survey and Mapping*’ (Smith et al., 2011). 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).

4.1.2 Otter Survey

Dedicated otter surveys were carried out on the 31st of August 2018, 5th of October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. The otter surveys were conducted as per NRA (2006) guidelines. Drainage ditches and watercourses within and adjacent to the works area and were surveyed 150m upstream and downstream of the proposed works area. This involved a search for otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. A detailed description of the otter surveys carried out are described in Chapter 7 of the accompanying EIAR.

4.1.3 Bird Surveys

Field surveys were undertaken during the survey period September 2016 to September 2018 and October 2019 to March 2020. The winter 2019/20 surveys were undertaken to record the distribution and abundance of golden plover locally. A detailed ornithological impact assessment has been prepared as part of the planning application documentation, see Chapter 8 of the accompanying EIAR. A summary of the survey methodologies and associated survey effort is provided here in the following subsections with a summary of the results associated with the relevant SCI species identified for further assessment in the Appropriate Assessment screening report provided in Appendix 1. The data provided in the accompanying ornithology impact assessment report is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the subject site. In addition, Vantage Point (VP) surveys were carried out in the months of October, November and December 2018 to determine if there were any changes to the levels of activity from the previous two-year survey period.

Field survey methodologies were devised to survey for the bird species composition and assemblages that occur within the study area.

4.1.3.1 Initial Site Assessment

A reconnaissance site visit was undertaken by Dr Patrick Crushell on the 1st of July 2016 to assess the potential value of habitat on site in relation to the target species identified during the desk study. During the visit potential locations for Vantage Point surveys were also identified. An additional site visit undertaken by Tony Nagle on the 19th of July 2016 to assess the habitats and confirm the suitability of the previously identified vantage point locations prior to commencing surveys in September 2016.

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.

4.1.3.2 Survey Methodologies

The survey work undertaken between September 2016 and September 2018 and October 2019 to March 2020 forms the core dataset for the assessment of effects on ornithology. The winter 2019/20 surveys were undertaken to record the distribution and abundance of golden plover locally and have been utilised to inform this NIS. 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.

4.1.3.2.1 Vantage Point Surveys

Vantage point surveys were undertaken in accordance with SNH guidance from September 2016 to September 2018. As previously discussed, sites 1, 2 and 3 were continuously surveyed from six fixed vantage point locations between September 2016 and September 2018 (see Figure 8.1, Chapter 8 of the accompanying EIAR, provided in Appendix 4 of this NIS). In October 2017 VP1 was relocated slightly (see VP1a), while VP2 was relocated in August 2018 (see VP2a) to allow for optimised coverage of the evolving development site boundaries.

Site 1 is no longer included within the current development site but was continuously surveyed throughout the 2-year survey period. The survey data collected at Site 1 provided useful supporting information and is included in the assessment of potential displacement impacts.

The locations of the vantage point surveys are presented in Figure 8.1, Appendix 4 of this NIS, and the survey effort is presented in Table 4-1.

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 ensure all times when target species were likely to be present were surveyed including dawn, day and dusk watches.

Survey effort for vantage point watches is presented in Table 1, Appendix 8-2, Chapter 8 of the accompanying EIAR. This includes full details of dates, times, survey locations, survey duration and weather conditions for each survey. Table shows a summary of the VP survey work undertaken.

Table 4-1 Vantage Point Survey Effort

Survey Season (Number of VPs)	Months	Minimum Effort per Month
2016/2017 Non-Breeding Season (10VPs)	Sep - Mar	6 hours/VP/month

Survey Season (Number of VPs)	Months	Minimum Effort per Month
2017 Breeding Season (10VPs)	Apr - Aug	6 hours/VP/month
2017 Breeding Season Continued (6VPs)	September	6 hours/VP/month
2017/2018 Non-Breeding Season (6VPs)	Oct - Mar	6 hours/VP/month
2018 Breeding Season (6VPs)	Apr - Sep	6 hours/VP/month

Observed flight activity was recorded as per defined flight bands which were chosen in relation to the maximum dimensions of proposed turbine models for the site. Bands were split into 0-20, 20-140m, 140m-175m and 175m+. The combined values of bands 20-140m and 140-175m is considered potential collision height (PCH), based on a worst-case scenario for turbine modelling.

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

4.1.3.2.2 Waterbird Surveys

Significant wetland sites within 10km of the study area were surveyed for waterbird populations (i.e. waders, waterfowl, gulls, grebes and rails). The survey area extended approximately 10km outside the site boundary which exceeds the 500m recommendation stipulated in SNH Guidance. The extensive surveys aimed to provide contextual information for the Proposed Development site when compared to areas of suitable wintering habitat elsewhere in the surrounding hinterland. Count methodology was in line with survey methodology guidelines issued by SNH (2017) and BirdWatch Ireland (2015). Monthly counts were undertaken at each target wetland site to cover the winter season. Counts were conducted during daylight hours from suitable vantage points at the wetland sites.

4.1.3.2.3 Golden Plover Surveys

Additional surveys for golden plover were undertaken between October 2019 and March 2020. Surveys were undertaken in suitable habitat to a 12km radius of the proposed development area. The core foraging range of golden plover during the winter months is 12km (Gillings and Fuller, 1999²). The aim of the survey was to record the distribution and abundance of the local golden plover population. Estuarine habitat within the 12km survey radius was surveyed during the three hours either side of low tide. Survey methodology was based on methods outlined in Lewis & Tierney (2014). Golden plover also utilise terrestrial habitats for foraging and roosting. Terrestrial habitats likely to support wintering flocks of golden plover were also surveyed.

Survey effort, including details of survey duration and weather condition, is presented in Table 6, Appendix 8-2, Chapter 8 of the accompanying EIAR. Figure 8.7, Appendix 4 of this NIS shows the surveyed area.

4.2 Desk Study

4.2.1 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:

² Gillings, S & Fuller, R.J. 1999. Winter ecology of Golden Plovers and Lapwings: a review and consideration of extensive survey methods. Research Report no. 224. ISBN: 1-902576-18-7 56pp

- 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),
- 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.

4.3 Desk Study Results

4.3.1 Blackwater River (Cork/Waterford) SAC

The following downstream aquatic QI habitats and QI Species have the potential to be affected through deterioration of water due to pollution during the construction phase of the development;

- Sea Lamprey *Petromyzon marinus*
- Brook Lamprey *Lampetra planeri*
- River Lamprey *Lampetra fluviatilis*
- Twaite Shad *Alosa fallax*
- Atlantic Salmon *Salmo salar* (only in freshwater)
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Salicornia and other annuals colonizing mud and sand
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Otter *Lutra lutra*
- Mediterranean salt meadows (*Juncetalia maritimi*)
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho Batrachion* vegetation
- *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno- Pacion, Alnionincanae, Salicionalbae*)

As potential for impact on Atlantic salmon has been identified above as a result of water quality deterioration, potential for indirect impact on freshwater pearl mussel (*Margaritifera margaritifera*) has been identified as the species depends on salmonids during part of its early reproduction stage.

There is potential for indirect effects due to disturbance and displacement related impacts during construction, operation and decommissioning of the proposed development to the following species:

- Otter (*Lutra lutra*)

4.3.1.1 Review of conservation objectives

The relevant QIs and the associated conservation objectives are presented in Table 4-1. These have been taken from the NPWS (2012) Conservation Objectives supporting document for the Blackwater River (Cork/Waterford) SAC. This document has been reviewed in the preparation of this NIS and additional species/habitat specific information is also provided in the preceding paragraphs and sections.

Table 4-1 Qualifying Interest and Conservation Objectives (Version 01, 2012³)

³ NPWS (2012) Conservation Objectives: Blackwater River (Cork/Waterford) SAC 002170. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Qualifying Interest	Conservation Objective
Sea Lamprey <i>Petromyzon marinus</i>	To restore the favourable conservation condition of Sea Lamprey in the Blackwater River (Cork/Waterford) SAC
Brook Lamprey <i>Lampetra planeri</i>	To maintain the favourable conservation condition of Brook Lamprey in the Blackwater River (Cork/Waterford) SAC
River Lamprey <i>Lampetra fluviatilis</i>	To maintain the favourable conservation condition of River Lamprey in the Blackwater River (Cork/Waterford) SAC
Twaite Shad <i>Alosa fallax</i>	To restore the favourable conservation condition of Twaite Shad in the Blackwater River (Cork/Waterford) SAC
Atlantic Salmon <i>Salmo salar</i> (only in freshwater)	To maintain the favourable conservation condition of Atlantic Salmon in the Blackwater River (Cork/Waterford) SAC
Estuaries	To maintain the favourable conservation condition of Estuaries in the Blackwater River (Cork/Waterford) SAC
Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Blackwater River (Cork/Waterford) SAC
<i>Salicornia</i> and other annuals colonizing mud and sand	To maintain the favourable conservation condition of <i>Salicornia</i> and other annuals colonizing mud and sand in the Blackwater River (Cork/Waterford) SAC
Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	To restore the favourable conservation condition of Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) in the Blackwater River (Cork/Waterford) SAC
Otter <i>Lutra lutra</i>	To restore the favourable conservation condition of Otter in the Blackwater River (Cork/Waterford) SAC
Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	To maintain the favourable conservation condition of Mediterranean salt meadows in the Blackwater River (Cork/Waterford) SAC
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho Batrachion</i> vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho Batrachion</i> vegetation in the Blackwater River (Cork/Waterford) SAC
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnionincanae</i> , <i>Salicionalbae</i>)	To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnionincanae</i> , <i>Salicionalbae</i>) in the Blackwater River (Cork/Waterford) SAC

4.3.1.2 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 4-2.

Table 4-2 Site-specific threats, pressures and activities

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Medium	E02	Industrial or commercial areas	Outside
High	A08	Fertilisation	Outside
High	A03	Mowing / cutting of grassland	Inside
Low	C01.01	Sand and gravel extraction	Outside
Medium	J02.01	Landfill, land reclamation and drying out, general	Outside
Medium	E01	Urbanised areas, human habitation	Outside
Low	B	Sylviculture, forestry	Inside
Low	D01.04	Railway lines, TGV	Inside
High	A04	Grazing	Inside
Low	E03.01	Disposal of household / recreational facility waste	Inside
Medium	I01	Invasive non-native species	Outside
Low	G02	Sport and leisure structures	Outside
Medium	I01	Invasive non-native species	Inside
High	A08	Fertilisation	Inside
Low	J02.01	Landfill, land reclamation and drying out, general	Inside
Low	K01.01	Erosion	Inside
Low	G01.01	Nautical sports	Inside
Medium	B	Sylviculture, forestry	Outside
Medium	F02.03	Leisure fishing	Inside
High	A04	Grazing	Outside
Low	D01.02	Roads, motorways	Inside

No additional pathways for impact with regard to the listed threats and pressures for this SAC were identified.

4.3.1.3 Qualifying Interests

4.3.1.3.1 Lamprey Species

The Blackwater River SAC is designated for sea lamprey, brook lamprey and river lamprey. According to map 10 the site-specific conservation objectives document all three lamprey species (*Petromyzon* spp.) have been recorded in a tributary of the River Blackwater, the River Bride, approximately 3km

downstream of the development site. The Inland Fisheries Ireland Water Framework Directive map⁴ was consulted on 20/11/2020. Inland Fisheries Ireland fish stock surveys recorded lamprey species in the River Blackwater in 2010 and on the River Bride in 2012.

The blackwater catchment has previously been surveyed for lamprey (King and Linnane, 2004). During the survey, fourteen sites were fished on the Bride with two sites resulting in no juvenile lamprey. The lamprey population was comprised almost entirely of juvenile river / brook lamprey with juvenile sea lamprey accounting for circa 8% of the numbers captured. The population structure of the pooled data indicated the presence of only one 0+ river / brook juvenile, indicative of limited spawning of river / brook lamprey in this channel (King and Linnane, 2004).

Thirteen sites in the lower reaches of the main Blackwater River Channel, between Mallow and Cappoquin were surveyed. The survey found that “the population was composed of circa 30% juvenile sea lamprey, mostly ranging in size from 6 – 15.5 cm, larger size groups were well represented across the majority of sites with a significant number of fish in the 6.5 – 14.5 cm range and in general, the lamprey captured in the lower reaches, downriver of Mallow, were dominated by larger, older size groups”, (King and Linnane, 2004). The Glendine River was also electrofished as part of these surveys, yielding no juvenile lamprey, in accordance with CEN (2003)^{5,6}.

The River Blackwater and its tributaries were also surveyed from spawning grounds. Surveys of the River Bride and the Glenaboy River found no sea lamprey redds. The only river lamprey spawning site encountered was at Rathcormack Bridge, River Bride. No brook lamprey spawning sites were encountered.

4.3.1.3.2 **Twaite Shad (*Alosa fallax*)**

According to the site-specific conservation objectives document in some catchments, artificial barriers block twaite shads’ upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Major weirs on the Blackwater prevent potential exploitation of adult spawning grounds.

Regular breeding has been confirmed in the River Blackwater in recent years (King and Linnane, 2004; King and Roche, 2008). The blackwater catchment was surveyed for lamprey in 2003, with 16 young shad captured in netting operations during the scientific survey, (King and Linnane, 2004).

4.3.1.3.3 **Salmon (*Salmo salar*)**

According to the site-specific conservation objectives document (NPWS, 2012), artificial barriers block salmon’s upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. Large weirs on the Blackwater may delay salmon upstream migration in certain water conditions but do not generally prevent access to spawning areas.

The Inland Fisheries Ireland Water Framework Directive map was consulted on 20/11/2020. Inland Fisheries Ireland fish stock surveys recorded Salmon in the River Blackwater in 2010 and on the River Bride in 2012.

4.3.1.3.4 **Otter (*Lutra lutra*)**

According to the site-specific conservation objectives (NPWS, 2012) the extent of freshwater (river) habitat is 5999.54km. The river length calculated on the basis that otters will utilise freshwater habitats

⁴ IFI, 2020, IFI National Research Survey Programme – Map viewer, Online, available at: <https://ifigis.maps.arcgis.com/apps/webappviewer/index.html?id=9a31fedb077c4fb2991184842b7ef025>, Accessed: 20/11/2020

⁵ Water Quality—Sampling of Fish with Electricity. European Standard. Ref. No. EN 14011:2000.

⁶ IFI, 2008, Sampling for Fish for the Water Framework Directive – River 2008. Online, Available at: http://www.wfdfish.ie/wp-content/uploads/2010/04/ERFB_rivers_report_2008.pdf, Accessed, 11.12.2020

from estuary to headwaters. The site-specific conservation objective document states that the extent of terrestrial habitat is mapped and calculated as 103ha above high water mark and 1165.7ha along riverbanks and around ponds.

4.3.1.3.5 **Estuaries**

According to the site-specific conservation objectives (NPWS, 2012) the extent of habitat area was estimated as 1208ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive.

4.3.1.3.6 **Mudflats and sandflats not covered by seawater at low tide**

According to map 4 of the site-specific conservation objectives (NPWS, 2012) the extent of habitat area was estimated as 284ha using OSi data.

4.3.1.3.7 **Salicornia and other annuals colonizing mud and sand**

Habitat is known to occur at Foxhole, Black Bog and Tourig, as per Curtis and Sheehy-Skeffington (1998). However, the entire extent is unmapped. According to the site-specific conservation objectives document, further unsurveyed areas may be present within the site. *Salicornia* is an annual species, so its distribution can vary significantly from year to year. It is therefore assessed as potentially occurring at the closest location to the site from a precautionary perspective.

4.3.1.3.8 **Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

According to the site-specific conservation objectives document (NPWS, 2012), the full extent of this habitat within the SAC is unknown and further unsurveyed areas may be present within the site. The known distribution of this habitat is provided in map 6 of the site-specific conservation objectives document.

4.3.1.3.9 **Mediterranean salt meadows (*Juncetalia maritimi*)**

According to the site-specific conservation objectives document (NPWS, 2012), the full extent of this habitat within the SAC is unknown and further unsurveyed areas may be present within the site. The known distribution of this habitat is provided in map 6 of the site-specific conservation objectives document. Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). One sub-site that supports Mediterranean salt meadows was mapped (1.36ha) and additional areas of potential saltmarsh (8.67ha) were identified from an examination of aerial photographs, giving a total estimated area of 10.03ha.

4.3.1.3.10 **Water courses of plain to montane levels with the *Ranuncion fluitantis* and *Callitricho-Batrachion* vegetation**

According to the site-specific conservation objectives document (NPWS, 2012), the full extent of this habitat within the SAC is unknown and further unsurveyed areas may be present within the site.

The full distribution of this habitat and its sub-types in this site are currently unknown. The basis of the selection of the SAC for the habitat was the presence of plant species listed in the Interpretation Manual (European Commission, 2007), recorded during the Natural Heritage Area (NHA) survey of the river (internal NPWS files). Further records of these and other aquatic plant species in the Blackwater can be found in Green (2008) and O'Mahony (2009). The dominant floating-leaved species appears to be the common and widespread stream water-crowfoot (*Ranunculus penicillatus* subsp. *penicillatus*) (Green, 2008, O'Mahony, 2009). No high conservation value sub-types are known to occur in the SAC and further survey is required to determine whether any such are present. Only one rare/threatened

vascular plant species is known to occur in the SAC, the protected opposite-leaved pondweed (*Groenlandia densa*), which is abundant in the tidal stretches around Cappoquin (Green, 2008).

4.3.1.3.11 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnionincanae, Salicionalbae)

According to the site-specific conservation objectives document (NPWS, 2012), the full extent of this habitat within the SAC is unknown and further unsurveyed areas are almost certainly present within the site. The known extent of this habitat within the SAC is shown in Map 7 of the SSCO document (NPWS, 2012). The minimum area of this habitat is estimated as at least 19.2ha, based on six sites surveyed by Perrin et al. (2008).

4.3.2 Blackwater Estuary SPA

A potential pathway for indirect effects was identified in the form of deterioration of water quality resulting from pollution, associated with the construction of the development. The proposed development site has hydrological connectivity to this SPA via watercourses within the site boundary, including the Glenaboy, the Glendine and the Tourig Rivers. In the absence of mitigation and taking a precautionary approach, the proposed works have the potential to cause deterioration of water quality during the construction, operation and decommissioning phases of the development potentially affecting the downstream SCI ‘Wetland and Waterbirds’.

A potential pathway for indirect effects was identified in the form of bird disturbance, displacement and collision risk to Golden Plover. Golden Plover were recorded regularly onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this SCI species cannot be excluded and further assessment is provided below within this NIS.

4.3.2.1 Review of Conservation Objectives

The relevant SCI and the associated conservation objective is presented in Table 4.4. These have been taken from the NPWS (2012) Conservation Objectives supporting document for the Blackwater Estuary SPA. This document has been reviewed in the preparation of this NIS and additional species/habitat specific information is also provided in the preceding paragraphs and sections. The relevant target and attributes for the SCIs, as described in the Site-specific Conservation Objectives document, were reviewed and considered in this assessment.

Table 4.3 Qualifying Interest and Conservation Objectives (Version 1, NPWS, 2012⁷)

Special Conservation Interest (SCI)	Conservation Objective
Wetland and Waterbirds	To maintain the favourable conservation condition of the wetland habitat in Blackwater Estuary SPA as a resource for the regularly occurring migratory waterbirds that utilise it.
Golden Plover (<i>Pluvialis apricaria</i>)	To maintain the favourable conservation condition of Golden Plover in Blackwater Estuary SPA.

⁷ NPWS (2012) Conservation Objectives: Blackwater Estuary SPA 004028. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

4.3.2.2 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 SPA were reviewed and considered in relation to the proposed development. These are provided in Table 4.5.

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

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
High	D01.02	Roads, motorways	Inside
Low	F03.01	Hunting	Inside
Medium	A08	Fertilisation	Outside
High	E01	Urbanised areas, human habitation	Outside
Low	A04	Grazing	Inside
Medium	G01.01	Nautical sports	Inside
Medium	F02.03	Leisure fishing	Inside

No pathways for impact with regard to any site-specific threats, pressures and activities were identified.

4.3.2.3 Wetlands and Waterbirds

The following relevant information has been extracted from the NPWS site synopsis for the SPA:

‘The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Wigeon, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Redshank. 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. The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for an excellent diversity of waterfowl species. At high tide, the birds roost along the shoreline and salt marsh fringe, especially in the Kinsalebeg area. The site supports an internationally important population of Black-tailed Godwit (620) and has a further seven species with nationally important populations: Wigeon (953), Golden Plover (2,628), Lapwing (3,054), Dunlin (1,807), Bar-tailed Godwit (161), Curlew (1,007) and Redshank (520) - all figures are mean peaks for the five winters 1995/96 to 1999/2000.

The Blackwater Estuary SPA is an internationally important wetland site on account of the population of Black-tailed Godwit it supports. It is also of high importance in a national context, with seven species having populations which exceed the thresholds for national importance. The occurrence of Little Egret, Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the E.U. Birds Directive. The Blackwater Estuary is also a Ramsar Convention site.’

4.3.2.4 Golden Plover (*Pluvialis apricaria*)

As per the NPWS (2012⁸) The baseline data upon which the SPA populations is based are derived from the 5-year mean peak counts for the period 1995/96 – 1999/00 (I-WeBS). The baseline population for golden plover is 2,628.

The supporting document also states that ‘*numbers have fluctuated with a period of increasing numbers from 1994/95 to 1998/99. Numbers then declined to a dataset low in the season 2001/02. Since then numbers have shown more stability and increased during the early 2000’s, hence the short-term trend for increase*’.

4.3.3 Ballymacoda Bay SPA

Potential for direct effect was identified in the form of collision risk to lesser black-backed gull, black-headed gull and golden plover. A potential pathway for indirect effects was identified in the form of bird disturbance/ displacement to lesser black-backed gull, black-headed gull and golden plover.

The wind farm site is located within the potential core foraging range of the following SCI species as per Thaxter et al. (2012) and Gillings and Fuller (1999)⁹:

- Lesser black-backed gull (*Larus fuscus*)
- Black-headed Gull *Chroicocephalus ridibundus* (Wintering)
- Golden plover (*Pluvialis apricaria*)

The potential for significant effects on these SCI species cannot be excluded and further assessment is required and provided below.

4.3.3.1 Review of Conservation Objectives

The relevant SCI and the associated conservation objective is presented in Table 4.6. These have been taken from the NPWS (2015) Conservation Objectives supporting document for the Ballymacoda Bay SPA. This document has been reviewed in the preparation of this NIS and additional species/habitat specific information is also provided in the preceding paragraphs and sections. The target and attributes for the relevant SCIs, as described in the Site-specific Conservation Objectives document, were reviewed and considered in this assessment.

Table 4-5 Qualifying Interest and Conservation Objectives (Version 1, NPWS, 2015¹⁰)

Special Conservation Interest (SCI)	Conservation Objective
Lesser black-backed gull (<i>Larus fuscus</i>)	To maintain the favourable conservation condition of Lesser Black-backed Gull in Ballymacoda Bay SPA
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	To maintain the favourable conservation condition of Black-headed Gull in Ballymacoda Bay SPA
Golden plover (<i>Pluvialis apricaria</i>)	To maintain the favourable conservation condition of golden plover in Ballymacoda Bay SPA

⁸ NPWS, 2012, Conservation Objectives Supporting Document, Version 1, Blackwater Estuary Special Protection Area, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

⁹ Gillings, S & Fuller, R.J. 1999. Winter ecology of Golden Plovers and Lapwings: a review and consideration of extensive survey methods. Research Report no. 224. ISBN: 1-902576-18-7 56pp

¹⁰ NPWS (2015) Conservation Objectives: Ballymacoda Bay SPA 004023. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

As per the NPWS (2014¹¹) The baseline data upon which the SPA populations is based are derived from the 5-year mean peak counts for the period 1995/96 – 1999/00 (I-WeBS). The baseline population for each of the Screened in QI species is as follows:

- Lesser black-backed gull (*Larus fuscus*) - 5,051
- Black-headed Gull *Chroicocephalus ridibundus* (Wintering) - 1,560
- Golden plover (*Pluvialis apricaria*) - 10,920

4.3.3.2 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 SPA were reviewed and considered in relation to the proposed development. These are provided in Table 4.7.

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

Negative Impacts			
Rank	Threats and Pressures		Inside/Outside
Medium	I01	Invasive non-native species	Inside
Low	G01.02	Walking, horseriding and non-motorised vehicles	Inside
Low	F03.01	Hunting	Inside
Medium	A08	Fertilisation	Outside
High	A04	Grazing	Outside

No pathways for impact with regard to any site-specific threats, pressures and activities were identified.

4.3.3.3 Wetlands and Waterbirds

The following relevant information has been extracted from the NPWS site synopsis for the SPA:

‘The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Wigeon, Teal, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull, Common Gull and Lesser Black-backed Gull. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. 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. Ballymacoda Bay is of high ornithological importance for supporting an excellent diversity and large number of wintering waterbirds – it is of international importance because it regularly supports an assemblage of over 20,000 birds. The site provides both feeding and roosting areas for the birds. Furthermore, both Golden Plover (10,920) and Black-tailed Godwit (765) occur here in internationally important numbers (all counts given are mean peaks for the five year period 1995/96-1999/2000).

¹¹ NPWS, 2014, Conservation Objectives Supporting Document, Version 1, Ballymacoda Bay SPA, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

The site is also notable for supporting nationally important populations of some gull species in autumn and winter: Black-headed Gull (1,560), Common Gull (1,120) and Lesser Black-backed Gull (5,051). A total of 107 species were recorded from the site between 1971 and 1988.

Ballymacoda Bay SPA is one of the most important sites in the country for wintering waterfowl. It qualifies for international importance on the basis of regularly exceeding 20,000 wintering birds but also for its Golden Plover and Black-tailed Godwit populations. In addition, it supports nationally important populations of a further fourteen species. Two of the species which occur, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive. Ballymacoda Bay is also a Ramsar Convention site' (NPWS, 2014).

4.3.4 EPA River Catchments & Watercourses

The proposed development land is located within the Blackwater (Munster) hydrological catchment and the Bride (Waterford) subcatchment and the Tourig subcatchment. The development site has a number of watercourses that flow within and adjacent to the site, including the Gortnafira stream, a tributary of the Glenaboy River, the Tourig River, the Ballynatray Commons stream and the Glendine River.

The EPA Envision map viewer was consulted on 20th of August 2019 regarding the water quality status of the watercourses which run adjacent to the Study Area. 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. The EPA sampling station result provide a baseline against which any water quality changes occurring in the future can be measured.

The Gortnafira stream, a tributary of the Glenaboy River, flows in a north-westerly direction from the western part of the development site. This river discharges to the Glenaboy river approximately 30m downstream. This watercourse was surveyed in 2018 at the confluence of these two rivers, at survey station 'Ballyclogh Bridge (Survey code: RS18G050200)', 30m downstream of the development site and had Q value score of 'Q4 – Good'.

The Tourig River originates in the western part of the development site and flows in a south-easterly direction along the site boundary, ultimately discharging to the Blackwater Estuary. This River was surveyed in 2018 at survey station 'Bridge North of Meenoughter (Survey code: RS18T030300)', 3.3km downstream of the development site and had Q value score of 'Q4 – Good'.

The Ballynatray commons stream (EPA Code: IE_SW_18G070300) is a tributary of the Glendine River and flows in a south-easterly direction through the eastern part of the development site. The Glendine River originates within the eastern part of the development site and flows in a south-easterly direction, discharging to the blackwater. This watercourse was surveyed in 1990 at the EPA survey station 'Glendine (Blackwater) - Bridge SSW of Browns Crossroads (Survey code: RS18G070100)' and had a Q value score of 'Q4-5 – High'. The Glendine River was also surveyed in 2018 at survey station 'Glendine Church East of Ballycondon (Survey code: RS18G070290)', 2.9km downstream of the development site and had Q value score of 'Q4 – Good'.

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 Gortnafira stream has been assessed as 'not at risk'. The Glenaboy River has been assessed as 'at risk', from the confluence of the Gortnafira stream and the Glenaboy River. All the other watercourses within the site have been assessed as 'not at risk' including the Glendine River, the Ballynatray Commons stream and the Tourig River. All the watercourses within the site have a River Waterbody

WFD status 2010- 2015 status of ‘Good’, with the exception of the Glenaboy River north of the confluence of the Gortnafira Stream, which has a ‘Moderate’ status.

4.4 Ecological Survey results

4.4.1 Habitats within the EIAR Study Area Boundary

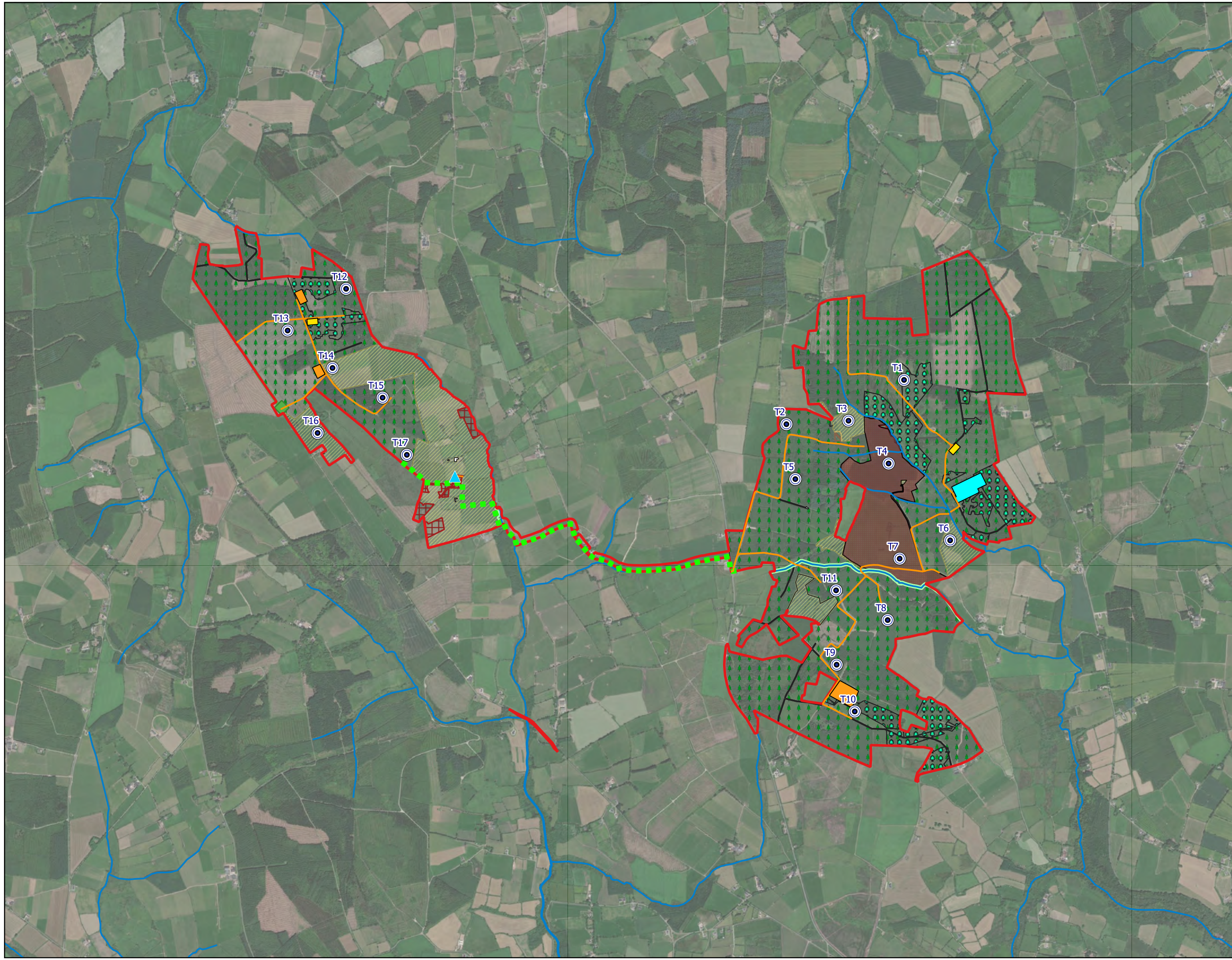
The majority of the study area is dominated by plantation forestry, comprising mainly of Sitka spruce (*Picea sitchensis*) and Lodgepole pine (*Pinus contorta*) (Plate 4-1 and Plate 4-2), see Figure 4-1, as well as large plantations of Eucalyptus (*Eucalyptus* sp.), see Plate 4-3. The site is accessible via a network of existing forestry access tracks and forestry rides. The remainder of the wind farm infrastructure site is dominated by Improved agricultural grassland (GA1) and Arable crops (BC1). The grid connection route is also predominantly located within Improved agricultural grassland (GA1) and existing roads. The below paragraphs provide a description of the habitats recorded within the study area boundary with particular focus on those occurring within and adjacent to the development footprint.

4.4.1.1 Conifer plantation (WD4)

This includes forestry (WD4) of various ages (including clear-felled areas, semi-mature and mature stands, along with immature pre-thicket areas of both first and second rotation. Sitka spruce and Lodgepole pine are the dominant species, typically 8-10m tall. Mature conifer plantation is interspersed with immature stands. The understorey is typically species-poor in forestry plantations and vegetation normally restricted to a few bryophytes and ferns which include, hard fern (*Blechnum spicant*) and *Thuidium tamariscum*.

As the forestry was originally planted on peatland habitats, forestry rides or areas where forestry failed to achieve closed canopy are dominated by ling heather (*Calluna vulgaris*), heath rush (*Juncus squarrosus*), purple moor-grass (*Molinia caerulea*) and gorse (*Ulex europaeus*). These areas make up a very small area of the overall forestry plantation.

The majority of the proposed wind farm infrastructure is located within Conifer plantation (WD4) habitat which includes Turbines T1, T2, T5, T8, T9, T10, T11, T12, T13, T15 and T17, the temporary construction compounds, borrow pits and new site roads.



- ### Map Legend
- Site Boundary
 - Proposed 110kV Substation
 - Proposed Turbine
 - ▲ Proposed Met Mast
 - Proposed Borrow Pit
 - Collector Cabling Route
 - Proposed Compound
 - Proposed New Road
 - Existing Road Proposed for Upgrade
 - Eroding/Upland Rivers (FW1)
 - Arable Land (BC1)
 - Buildings and artificial surfaces (BL3)
 - Improved agricultural grassland (GA1)
 - Dense bracken (HD1)
 - Conifer plantation (WD4)
 - Wet willow-alder-ash woodland (WN6)
 - Scrub (WS1)
 - Broadleaved Woodland (WD1-EUC)
 - Hedgerows (WL1)
 - Treelines (WL2)

Microsoft product screen shots reprinted with permission from Microsoft Corporation



Habitat Map	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 4-1
Scale	Date
1:1	2020.01.05

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Plate 4-1 Example of Conifer plantation (WD4) within the study area



Plate 4-2 Example of second rotation Conifer plantation (WD4) within the study area and heath type vegetation occurring beneath.

4.4.1.2 Eucalyptus plantation

Large areas of the site have been planted by Eucalyptus (*Eucalyptus* sp.). This occurs in a mosaic with coniferous plantation forestry described above. An example of this eucalyptus plantation is provided in Plate 4.3. As the eucalyptus plantation was originally planted on peatland habitats, plantation rides and much of the understory is dominated by ling heather (*Calluna vulgaris*), heath rush (*Juncus squarrosus*), purple moor-grass (*Molinia caerulea*) and gorse (*Ulex europaeus*).



Plate 4-3 Example of Eucalyptus plantation within the study area.

4.4.1.3 Improved agricultural grassland (GA1) & Wet grassland (GS4)

Improved agricultural grassland is the other dominant habitat type occurring within the study area. The sward was dominated by grass species such as perennial rye grass (*Lolium perenne*) with other grass species regularly occurring including; Yorkshire fog (*Holcus lanatus*) smooth meadow-grass (*Poa pratensis*), rough meadow-grass (*Poa trivialis*), sweet vernal-grass (*Anthoxanthum odoratum*) and creeping bent (*Agrostis stolonifera*), see Plate 4-4. Herb species typical of agricultural grassland were present and included white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*), plantains (*Plantago* spp.), docks (*Rumex* spp.), thistles (*Cirsium* spp.), chickweed (*Stellaria media*) and ragwort (*Senecio jacobea*). Where grazing may not have been intense in the period prior to habitat surveys and where rush species had begun to take hold, improved agricultural grassland habitat graded into Wet grassland (GS4) in areas, see Plate 4-5. Detailed botanical records from these grassland habitats, where infrastructure is proposed, is provided in Appendix 7-1. A significant proportion of the proposed development infrastructure is located in this habitat including turbines no. T3, T14 and T16, as well as their associated infrastructure i.e. site access road, hardstand and blade set-down area.



Plate 4-4 Improved agricultural grassland (GA1).



Plate 4-5 Example of improved agricultural grassland (GA1) grading into wet agricultural (GS4)

4.4.1.4 Arable crop (BC1)

Parts of the site are dominated by arable land, typically for the growth of barley/oats. Among the arable dominated sward, other species recorded included annual meadow grass (*Poa annua*), pineappleweed

(*Matricaria discoidea*) and redshank (*Persicaria maculosa*). An example of this habitat is provided in Plate 4-6.



Plate 4-6 Example of arable lands occurring within the proposed development footprint.

4.4.1.5 Scrub (WS1)

There were a number of small areas of scrub within the study area, see Plate 4-7. This area usually occurred where vegetation had established between forestry and the surrounding lands. The vegetation was generally dominated by willows (*Salix* sp.) and hawthorn (*Crataegus monogyna*) with an understorey of Bramble (*Rubus fruticosus* agg.).



Plate 4-7 Example of scrub habitat occurring within the site boundary.

4.4.1.6 Wet willow-alder-ash woodland (WN6)

Wet willow-alder-ash woodland (WN6) was recorded along rivers that bisect the site. Tree species were dominated by ash (*Fraxinus excelsior*), willow (*Salix* sp.) and alder (*Alnus glutinosa*). Ground cover plants recorded included ivy (*Hedera helix*), nettle (*Urtica dioica*), wood dock (*Rumex sanguineus*), Enchanter's Nightshade (*Circaea lutetiana*), see Plates 4-8 and 4-9.



Plate 4-8 Wet willow-alder-ash woodland (WN6) occurring in close proximity to a proposed river crossing upgrade.



Plate 4-9 Wet willow-alder-ash woodland (WN6) occurring in close proximity to a proposed river crossing upgrade.

4.4.1.7 Buildings and artificial surfaces (BL3)

Sections of local tarmac roads and existing unbound forestry access tracks that occur within the study area have been classified as Buildings and artificial surfaces (BL3). Plate 4-10 provides an example of the on-site forestry access roads occurring within the study area boundary. The proposed metmast and welfare unit will be located in an area of Buildings and artificial surfaces (BL3) comprising of old concrete foundations, see Plate 4-11.



Plate 4-10 Example of existing on site access roads (BL3)



Plate 4-1 Example of Buildings and artificial surfaces (BL3) in which the proposed metmast and welfare unit will be located.

4.4.1.8 Eroding/upland rivers (FW1)

A number of small streams cross the study area, see Plate 4-12. These streams measure up to approximately two metres in width and are generally characterised by a bottom substrate of mud on cobbles and small boulders. The aquatic macrophyte flora present included Fool's watercress (*Apium nodiflorum*), Watercress (*Rorippa nasturtium-aquaticum*), Water Mint (*Mentha aquatica*) and Common Duckweed (*Lemna minor*). These small, slow-flowing streams are classified as depositing/lowland rivers.



Plate 4-2 Example of small stream assessed as Eroding/upland rivers (FW1) recorded within the EIAR study area boundary.

4.4.1.9 Drainage ditches (FW4)

Obviously linear man-made ditches that contained flowing water have been classified as drainage ditches (FW4), see Plate 4-14. Where these occur within or in close proximity to plantation forestry, they were generally species poor and modified in nature.



Plate 4-3 Drainage ditch (FW4) occurring within the site boundary.

4.4.110 Hedgerows (WL2)

Hedgerows recorded within the site boundaries are associated with field boundaries within the study area. Many are established along raised banks (Plate 4.15). The species that most frequently occurred were hawthorn, blackthorn (*Prunus spinosa*), willow, bramble and gorse with occasional individuals of other species like ash and sycamore.



Plate 4-14 Hedgerow (WL1) occurring within the site boundary

4.4.1.11 **Treelines (WL2)**

Treelines were mapped along the field boundaries within the study area, see Plate 4-16. The commonest tree species encountered were ash, willow, birch and sycamore.



Plate 4-16 Example of treeline occurring along field boundary within the study area

4.4.1.12 Invasive species

Both Rhododendron (*Rhododendron ponticum*), see Plate 4-17, and Giant hogweed (*Heracleum mantegazzianum*) were encountered within the study area. Both species are listed on the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015). No additional species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded during the surveys.



Plate 4-17 Example of *Rhododendron* recorded within the EIAR study area boundary.

4.4.1.13 Habitats along the Collector Cable Route

The following description of the habitats occurring along the proposed collector cable route starts at the south-eastern part of the study and describes the habitats that occur along the route as they occur in a generally westerly direction.

The collector cable route leaves the site access track off the R634 (west of Turbine 11) before crossing the R634 (BL3) into agricultural fields comprising of improved agricultural grassland (GA1). This route running in parallel with an existing watercourse, however, is offset by an appropriate buffer i.e. in excess of 10 metres, see Appendix 2. The collector cable route then runs adjacent to a hedgerow before being located within a local road (see Plate 4-18) for approximately 500 linear metres. At this point the collector cable route crosses the Glennaglogh River within the road infrastructure (see Plate 4-19). There will there be no requirement for instream work.

The turbine connector route then moves east from the local road through Improved agricultural grassland (GA1) adjacent to an established hedgerow. The turbine connector route will then cross the River Tourig, utilising an area where the riverside vegetation has been historically cleared to allow livestock access the river for drinking water. This therefore avoids any need for significant riparian vegetation removal (see Plate 4-21).

The turbine connector route then crosses a number of fields comprising predominantly of Improved agricultural grassland (GA1) divided by hedgerows (WL1) before connecting to T17 within the southeast of the site.



Plate 4-18 Local road along which the turbine connector route will be located for approx.. 500m.



Plate 4-19 The Glennaglogh River, located along the turbine connector route, which will be located within the existing road over the bridge.



Plate 4-20 Improvised agricultural grassland (GA1) and hedgerow (WL1) along which the proposed turbine connector route will be located.



Plate 4-21 The turbine connector route will cross the River Tourig, utilising an area where the riverside vegetation has been historically cleared to allow livestock access the river for drinking water.

No botanical species protected under the Flora (protection) Order (1999, as amended 2015), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the site and no suitable habitat occurs within the site. All species recorded are common in the Irish landscape.

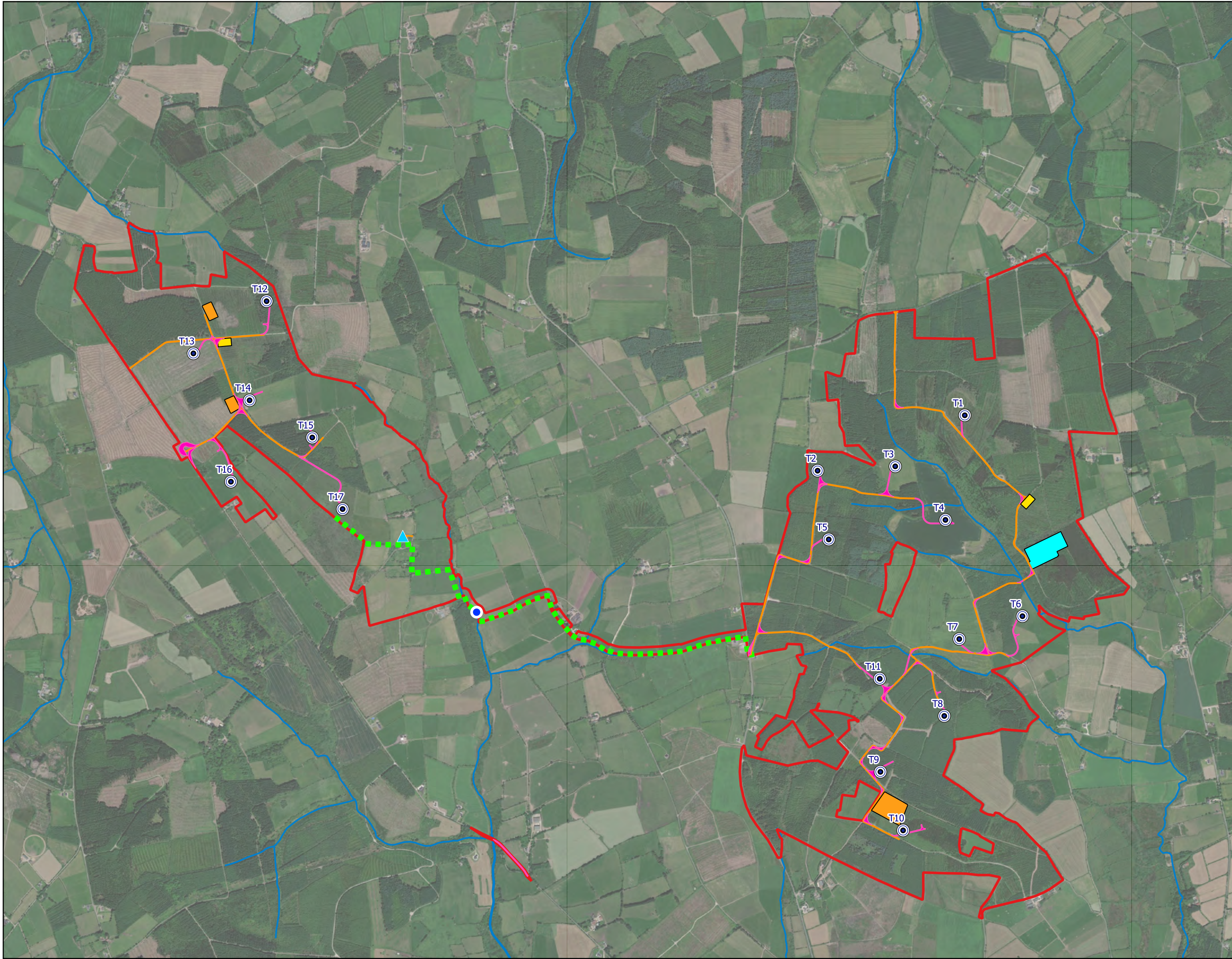
4.4.2 Invasive species

The invasive species *Rhododendron* was recorded within the proposed development site. No non-native invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2015) were recorded during the site visit.

4.4.3 Faunal Surveys

4.4.3.1 Otter

A comprehensive search for otter was undertaken of drainage ditches, the unnamed watercourse adjacent to the works area and a number of the main watercourses that drain the site on the 31st of August 2018, 5th of October 2018, 26th of September 2019 and 29th May 2020. A single otter sign, i.e. an otter spraint, was recorded downstream of the proposed connector cable route along the River Tourig. The location of the otter record within the study area boundary is shown in Figure 4- & No otter holts, slides or prints were recorded. The main watercourses were assessed as providing suitable commuting and foraging habitat for the species and it suggests that otter may occur within the EIAR site boundary, at least on occasion. The fisheries potential of the upper reaches of watercourses within the site is poor, small vegetated drainage ditches, and therefore otter are more likely to utilise the lower reaches of the watercourses, downstream of the proposed development site. The findings suggest that the site of the proposed development is not used by a population of otter of greater than local importance. However, where the species occurs within the downstream SAC, the species has been assessed as of International importance.



Map Legend

- Site Boundary
- Proposed 110kV Substation
- Proposed Turbine
- ▲ Proposed Met Mast
- Proposed Borrow Pit
- - - Collector Cabling Route
- Proposed Compound
- Proposed New Road
- Existing Road Proposed for Upgrade
- EPA Mapped Watercourses
- Otter spraint

Microsoft product screen shots reprinted with permission from Microsoft Corporation

OTTER SURVEY RESULTS	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 4-2
Scale	Date
1:20000	2020.11.12

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4.4.3.2 Birds

A map of the vantage point survey locations is provided in Figure 8-1 and Figure 8-9, Appendix 4.

4.4.3.2.1 Golden Plover

The core survey data for golden plover is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5, Chapter 8 of the accompanying EIAR. Results summary tables are present in Appendix 8-3, Chapter 8 of the accompanying EIAR. The below paragraphs provide a synopsis of the survey findings.

Core Vantage Point Surveys

There were 22 observations of golden plover recorded during the VP surveys (see Figure 8.1.1, Appendix 4. Twenty flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3. Of this total only nine were recorded within or partially within 500m of the proposed turbine layout. All flight activity was associated with the wintering season only. Numbers ranged from 1-200 birds. The majority of the golden plover observed were recorded in foraging habitat (e.g. agricultural grassland offsite), as shown in Figure 8.1.1, Appendix 4. The associated flight activity is strongly associated with the foraging habitat available in the agricultural grassland.

Waterfowl Surveys

There were three observations of golden plover recorded during dedicated waterfowl surveys, all of which were in excess of 4.5km from the proposed development site (see Table 4, Appendix 8-3, Chapter 8 of the accompanying EIAR). Two of these occurred around Newport East, approximately 4.8km east of the Development Site. On the 2nd of November 2016 a flock of 1,429 birds were observed, while on the 14th of December 2016 a flock of five golden plover were observed.

The remaining observation consisted of a flock of nine birds recorded at Ferrypoint (approximately 10km southeast of the Development Site) on the 15th of March 2017.

Golden Plover Surveys

There were fourteen observations of golden plover during the dedicated golden plover surveys within 12km survey radius of the proposed development. Observed flocks ranged from 35 to 6,500 individuals. Flocks were observed in three areas, the Blackwater Estuary SPA, the Ballymacoda Bay SPA and along the river Blackwater near Tallow, approximately 5km north of the proposed development area. The mean population recorded during these surveys was 1,860.

There were six observations of golden plover at the Blackwater Estuary SPA, ranging from 85 to 2,500 birds. There were six observations within the Ballymacoda Bay SPA, ranging from 170 to 6,500 birds. Of these, only three observations were within the core foraging range of golden plover from the proposed development area. Within the core foraging range of the proposed development area, flock sized ranged from 1,000 to 6,500 birds. There was one observation of golden plover along the River Blackwater near Tallow, this was an observation of a flock of 50 birds in December 2019. Observations are presented in Figure 8.7.1, Appendix 4.

Supporting Data

There were nine observations recorded during surveys at Site 1 VP1(a), more than one kilometre from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects. In addition to these nine observations, there was also a

record of a flock of 136 golden plover, observed roosting at Site 1 on the 18th of December 2016. The flock was recorded more than one kilometre from the proposed development area.

There were four observations of golden plover during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Figure 8.1.1, Appendix 4). All four observations occurred during the 2016/17 winter season survey period and occurred in excess of 1.7km east of the proposed development boundary. Three observations occurred at Site 6 while the remaining observation was from Site 5. The three observations at Site 6 were all of a flock of 130 birds in flight between October and November. The remaining observation from Site 5 consisted of a flock of 14 birds recorded on the 21st of March 2017.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

4.4.3.2.2 **Black-headed Gull**

The core survey data for this species is provided in Appendix 8-4, Chapter 8 of the accompanying EIAR. Results summary tables are present in Appendix 8-3, Chapter 8 of the accompanying EIAR.

Core Vantage Point Surveys

Black-headed gull were only recorded twice during core Vantage Point (VP) surveys between September 2016 and September 2018 (see Figure 8.1.6, Appendix 4). On the 7th of November 2016 a flock of three birds were observed flying within PCH, in addition a single bird was observed flying at PCH on the 4th of December 2016.

Waterfowl Surveys

There were 55 observations of black-headed gull during dedicated waterfowl surveys, all of which were in excess of 3km from the proposed development site (see Table 6, Appendix 8-3, Chapter 8 of the accompanying EIAR). Birds were recorded at 14 different survey sites during the winter 2016/17 survey season. Numbers recorded ranged from individual birds to a flock of 237 birds.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

4.4.3.2.3 **Lesser Black-backed Gull**

The core survey data for lesser black-backed gull is provided in Appendix 8-4 and supporting survey data is provided in Appendix 8-5, Chapter 8 of the accompanying EIAR. Results summary tables are presented in Appendix 8-3, Chapter 8 of the accompanying EIAR.

Core Vantage Point Surveys

There were 43 observations of lesser black-backed gull flights during the two years of VP surveys (see Figure 8.1.7, Appendix 4). The vast majority of these observations occurred within 500m of the proposed turbine layout. Forty-one flights were recorded within potential collision height from the VP surveys at Site 2 or Site 3.

Numbers recorded ranged from individuals to a flock of 120 birds. Only twelve flights were recorded during the core-breeding season months (April – August). Of these twelve flights only one occurred during May, three in July while the rest occurred in August.

In addition, there was an observation of an individual bird, perched during a VP survey at Site 2 VP1 on the 9th of November 2016.

Waterfowl Surveys

There were 19 observations of lesser black-backed gull during dedicated waterfowl surveys for the 2016/17 winter season. Birds were recorded at eight different survey sites during the winter 2016/17 survey season, each of which were in excess of 4km from the proposed development site (see Table 7 Appendix 8-3, Chapter 8 of the accompanying EIAR). Numbers recorded ranged from an individual bird to a flock of 347 birds

Supporting Data

Two flights were recorded during surveys at Site 1 VP1(a), both of which were more than 1.5km from the nearest proposed turbine. These flights have been considered in the discussion and evaluation of potential disturbance displacement effects.

There were eleven additional observations of lesser black-backed gull during vantage point surveys across the four discontinued sites between September 2016 and August 2017 (see Figure 8.1.7, Appendix 4). Numbers recorded ranged from individuals to a flock of 59 birds.

Lesser black-backed gull was observed on one occasion during the additional vantage point surveys conducted in October to December 2018. A single bird was observed at Site 3.

No additional observations of this species were recorded during the extensive surveys between 2016 and 2018.

5. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

5.1 Potential for Direct Effects on the European Sites

As the proposed development is located entirely outside on any EU designated site, no potential for direct effect has been identified on the Blackwater River (Cork/Waterford) SAC. The only potential for direct effect identified was the potential for collision risk, associated with SCI species occurring within the study area. This is further described below for the relevant SPAs, i.e. Blackwater Estuary SPA and Ballymacoda Bay SPA.

5.1.1 Blackwater Estuary SPA

The only SCI species of the Blackwater Estuary SPA recorded within the study area was golden plover. Consequently, the potential for collision mortality was identified as a potential direct impact on the species. A collision risk analysis has been undertaken and full details are provided in Chapter 8 Ornithology of the EIAR, accompanying the application. The collision risk has been calculated for the above SCI species along with an assessment of effect. The collision risk has been calculated at a rate of 3.76 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). The predicted collision risk is considered insignificant (>1%) in the context of county populations. This is therefore considered insignificant in the context of the local, county, national and international population. For the reasons outlined above, adverse effects with regard to collision is not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect golden plover populations associated with Blackwater Estuary SPA.

5.1.2 Ballymacoda Bay SPA

The following SCI species were recorded within the study area:

- > Lesser black-backed gull (*Larus fuscus*)
- > Black-headed Gull *Chroicocephalus ridibundus* (Wintering)
- > Golden plover (*Pluvialis apricaria*)

In addition, the wind farm site is located within the potential core foraging range of the above SCI species as per Thaxter et al. (2012) and Gillings and Fuller (1999). Consequently, the potential for collision mortality was identified as a potential direct impact on the species. A collision risk analysis has been undertaken and full details are provided in Chapter 8 of the EIAR, accompanying the application. The collision risk has been calculated for the above SCI species and is provided in Table 5-1 along with an assessment of effect.

Table 5-1 Collision risk and associated assessment of effect for each of the identified SCI species

SCI Species	Collision Risk	Assessment of Effect
Lesser black-backed gull	The collision risk has been calculated at a rate of 6.83 collisions per year. Annual mortality of adult lesser black-backed gull has been calculated at approximately 10% per annum (Wanless et al, 1996). The predicted collision risk is deemed <i>Low (1-5%)</i> in the context of the county population, as per Percival (2003).	Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect lesser black-backed gull populations associated with Ballymacoda Bay SPA.
Black-headed gull	Black-headed gull were only recorded twice during core Vantage Point (VP) surveys between September 2016 and September 2018. Given the low occurrence of the species within the study area, as described in Section 4.4.3.2.2 of this NIS, the accompanying ornithological chapter of the EIAR (Chapter 8) has not identified any potential for effect on the population at any geographic scale.	Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect black-headed gull populations associated with Ballymacoda Bay SPA.
Golden plover	The potential for collision mortality was identified as a potential direct impact on the species. A collision risk analysis has been undertaken and full details are provided in Chapter 8 Ornithology of the EIAR, accompanying the application. The collision risk has been calculated for the above SCI species along with an assessment of effect. The collision risk has been calculated at a rate of 3.76 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). The predicted collision risk is considered insignificant (>1%) in the context of county populations. This is therefore considered insignificant in the context of the local, county, national and international population.	For the reasons outlined above, adverse effects with regard to collision are not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect golden plover populations associated with Ballymacoda Bay SPA.

5.2 Potential for Indirect Effects on the European Sites

5.2.1 Otter Disturbance/Displacement

The proposed development site lies adjacent to Blackwater River (Cork/Waterford) SAC, which is designated for Otter. Therefore, the potential for indirect effects on Otter in terms of disturbance/displacement were identified for further assessment.

In relation to disturbance, otter are predominantly crepuscular in nature and it is anticipated that construction activity will mostly be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies (1987), (Durbin 1993). (Green & Green 1997). Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of Otter were unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between Otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey & Rochford, 2006).

5.2.1.1.1 Best Practice Preventive Measures

Pre-Construction Otter Survey

Although only a single sign of Otter was recorded i.e. a single scat, located on the River Tourig south of the proposed collector route crossing, no otter holts were recorded and it is therefore likely that the watercourses occurring within the site do not support a significant Otter population.

Turbine locations have been selected to avoid natural watercourses (located over 75 metres from EIA mapped watercourses). Only minor culvert upgrade works are proposed. Therefore, there is no potential for the Proposed Development to result in any barrier to the movement of otter.

From a highly precautionary perspective, prior to any works being carried out, a pre-construction Otter survey will be undertaken by a qualified ecologist to ensure that Otter has not taken up residence within or close to the proposed works area. Should any holt be encountered during the pre-construction surveys, it will be subject to exclusion procedures as outlined in the TII/NRA guidelines (2006) in consultation with the National Parks and Wildlife Service (NPWS).

It is not anticipated that disturbance/displacement related impacts will prevent or obstruct Otter from reaching favourable conservation status as per Article 1 of the EU Habitats Directive.

5.2.2 Deterioration of Water Quality

Apart from the new watercourse crossings and upgrade of existing watercourse crossings (and associated sections of existing forestry tracks) which are described in Section 10.5.2, Chapter 10, Appendix 2, all other areas of the Proposed Development infrastructure are away from areas on the site that have been determined to be hydrologically sensitive. The footprint of the Proposed Development has been specifically designed to avoid the large watercourses within the study area (i.e. all significant infrastructure has been located over 75 metres from EPA mapped watercourses), see Sections 10.5.2.10, Chapter 10 of the EIAR, Appendix 2 of this NIS.

A general description of the various construction methods employed at watercourse crossings are described in Section 3.3.10 of this NIS and in 4.7, Chapter 4 of the EIAR, Appendix 2 of this NIS. The measures minimise potential for impact on the receiving environment.

From a precautionary perspective, there is potential for the construction activity to result in the runoff of silt, nutrients and other pollutants such as hydrocarbons and cementitious material into these watercourses. This could result from the removal of scrub and forestry, culverting of drainage ditches, minor movement of excavated materials or the use of concrete and other construction materials. The Proposed Development will cross a number of small drainage ditches, which are not themselves ecologically sensitive but do provide connectivity to the larger watercourses that surround the site.

A potential pathway for impact in the form of deterioration of water quality during construction works as a result of water run-off was identified with respect to the following QIs/SCIs, in the absence of mitigation:

- Blackwater River (Cork/Waterford) SAC
 - Sea Lamprey *Petromyzon marinus*
 - Brook Lamprey *Lampetra planeri*
 - River Lamprey *Lampetra fluviatilis*
 - Twaite Shad *Alosa fallax*
 - Atlantic Salmon *Salmo salar* (only in freshwater)
 - Estuaries
 - Mudflats and sandflats not covered by seawater at low tide
 - Salicornia and other annuals colonizing mud and sand
 - Atlantic salt meadows (*Glaucopuccinellietalia maritima*)
 - Otter *Lutra lutra*
 - Mediterranean salt meadows (*Juncetalia maritimi*)
 - Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho Batrachion* vegetation
 - *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno- Padion, Alnionincanae, Salicionalbae*)

- Blackwater Estuary SPA
 - Wetland and Waterbirds

The above (Wetlands) includes supporting wetland habitat for all wetland SCI species.

The below subsections describe the mitigation measures incorporated into the Proposed Development for the protection of water quality during the construction, operation and decommissioning phases. These are in addition to those already described in Section 3.3.10.

5.2.2.1 Mitigation by Design

The design of the Proposed Development, as described in Chapter 4 of the EIAR (see Appendix 3 of this NIS) and in the CEMP (Appendix 4-4, Chapter 4, Appendix 3 of this NIS), sets out very clearly how the Proposed Development, including the underground turbine collector 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:

- The proposed development has been designed so that all infrastructure, except for access roads, is located over 75 metres from watercourses significant watercourses i.e. those mapped by the EPA¹².

¹² EPA, 2020, Online map viewer, <https://gis.epa.ie/EPAMaps/>

- 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 10 ‘Water’ of the EIAR that is included in full as Appendix 2 of this NIS. They are also described in Section 3.3 ‘Site Drainage’ of this NIS.
- No construction materials or construction waste will be placed within a 50-metre buffer zone around watercourses during the construction of the windfarm.
- New site access roads have been designed to minimise excavation arisings, see Section 4.3.2, Chapter 4 of the EIAR (Appendix 3 of this NIS).
- The development has been designed to maintain a drainage neutral situation to avoid drainage related impacts (See Chapter 10: ‘Water’, Appendix 2 of this NIS).
 Hard standing areas have been designed to the minimum size necessary to accommodate the maximum turbine model specifications, see Section 4.3.1.3, Chapter 4 of the accompanying EIAR.

5.2.2.2 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 included in full in Section 4.7, Chapter 4 of the EIAR (Appendix 3 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 water quality are fully described in the Construction and Environmental Management Plan (CEMP) and Chapter 10 ‘Water’ of the EIAR, included as Appendix 2 and Appendix 3 (in Chapter 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.

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 3 of this NIS), the CEMP (in Appendix 3 of this NIS) and Sections 10.5.2 Chapter 10 ‘Water’ of the EIAR (provided here in Appendix 2 of the NIS). The following subsections describe the mitigation measures proposed for the construction phase of the Proposed Development.

5.2.2.2.1 Underground Cable Watercourse/Culvert Crossings

As described in Section 10.5.2.8, Chapter 10 ‘Water’ (see Appendix 2), diversion, culverting and bridge crossing of watercourses can result in morphological changes, changes to drainage patterns and alteration of aquatic habitats. Construction of structures over water courses has the potential to significantly interfere with water quality and flows during the construction phase.

There is a total of 2 no. watercourse crossings along the collector cable route, 1 no. existing culvert crossing and 1 no. open channel stream/watercourse crossing.

A general description of the various construction methods employed at watercourse/ culvert crossings are described in the following paragraphs. A list of the stream crossings along the underground turbine collector route and the proposed crossing method at each location is provided in Section 4.3.2.2, Chapter 4 (Appendix 3 of this NIS).

The stream crossing locations are shown in Figure 4-7 (Appendix 3 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 3 of this NIS). Details of all culvert crossing are also provided in Section 4.9.5.3 and Appendix 4-7, Chapter 4 of the accompanying EIAR (Appendix 3 of this NIS).

As described in Section 4.3.6, Chapter 4 of the accompanying EIAR, see Appendix 3, ‘Clay plugs will be installed at regular intervals of not greater than 50 metres along the length of the trenches to prevent the trenches becoming conduits for runoff water. While the majority of the cable trenches will be backfilled with native material, clay subsoils of low permeability will be used to prevent conduit flow in the backfilled trenches. This material will be imported onto the site should sufficient volumes not be encountered during the excavation phase of roadway and turbine foundation construction’. Such measures will also prevent water pollution during construction.

Crossing Using Standard Trefoil Formation – Option 1

Watercourses will not be directly impacted upon since no instream works or bridge/culvert alterations are proposed. Where adequate cover exists above an bridge/culvert or where a new bottomless box culvert or clear-span structure has been installed, the standard ESB approved trefoil arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench as outlined in Figure 4-29, Chapter 4 of the EIAR (Appendix 3 of this NIS).

Flatbed Formation over Bridges/Culverts – Option 2

Where cable ducts are to be installed over an existing bridge/culvert crossing where sufficient cover cannot be achieved by installing the ducts in a trefoil arrangement, the ducts will be laid in a much shallower trench the depth of which will be determined by the location of the top of the culvert or the depth of excavatable material over a bridge. The ducts will be laid in this trench in a flatbed formation over the existing culvert and will be incased in 6mm thick steel galvanized plate with a 35N concrete surround as per ESB Networks specification. This method of duct installation is further detailed in Figure 4-30, Chapter 4 of the EIAR (Appendix 3 of this NIS).

Where a bridge or culvert has insufficient cover depth to fully accommodate the required trench, the ducts can be laid in a flatbed formation partially within the existing road surface. Where this option is to be employed, the ducts will also be encased in steel with a concrete surround as per EirGrid and/or ESB Networks specifications. In order to achieve cover over these ducts and restore the carriageway of the road, it may be necessary to raise the pavement level locally to fully cover the ducts. The increase road level will be achieved by overlaying the existing pavement with a new wearing course as required. Any addition of a new pavement will be tied back into the existing road pavement at grade. After the crossing over the culvert has been achieved, the ducts will resume to the trefoil arrangement within a standard trench. This method of duct installation is further detailed in Figure 4-31, Chapter 4 of the EIAR (Appendix 3 of this NIS).

Directional Drilling – Option 3

The directional drilling method of duct installation is carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The 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 in to void and enables the annulus which has been created to support the surrounding subsoil 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 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 a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring, as listed below, will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exists.

- The area around the Clear Bore™ batching, pumping and recycling plants shall be bunded using terram and sandbags in order to contain any spillages;
- One or more lines of silt fences shall be placed between the works area and adjacent rivers and streams on both banks;
- Accidental spillage of fluids shall be cleaned up immediately and transported off site for disposal at a licensed facility; and,

Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works. This will ensure containment of drilling arisings and drilling flush.

The directional drilling methodology is further detailed in Figure 4-32, Chapter 4 of the EIAR (Appendix 3 of this NIS).

Additional water protection measures for Culvert Crossings

In addition to the above construction methodologies, the following measures have been prescribed in Section 10.5.2.8, Chapter 10 ‘Water’, Appendix 2 of this NIS and will also be implemented in full for the protection of local and downstream water quality:

- All current guidance / mitigation measures set out by the OPW or the Inland Fisheries Ireland¹³ (IFI) are incorporated into the design of the proposed crossings;
- As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2004) guidance document “Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites”, i.e., May to September inclusive. This time period coincides with the period of lowest expected rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to watercourses (any deviation from this will be done in discussion with the IFI);
- During the near stream construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction phase. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas; and,
- All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with the above and in conjunction with OPW guidelines/requirements on application for a Section 50 consent.

¹³ Inland Fisheries Ireland (2016): *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*

All additional water protection measures prescribed in Chapter 10 ‘Water’, Appendix 2 of this NIS, for the protection of water quality will be implemented in full.

5.2.2.2.2 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 water quality, as fully described in Section 3.2.4.2 of the CEMP, see Appendix 4-4, Appendix 3 of this NIS:

- Interceptor drains will be maintained 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/roadside drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, 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. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

5.2.2.2.3 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) (see Appendix 4-4, Appendix 3 of this NIS) 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 Section 10.5.2.5, Chapter 10 ‘Water’ of the accompanying EIAR (see Appendix 2 of this NIS), are proposed to avoid release of hydrocarbons at the site:

- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, double skinned fuel bowser or an equivalent fuel truck will be re-filled off site, 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;
- Onsite refuelling will be carried out by trained personnel only;

- A permit to fuel system will be put in place;
- Fuels stored on site will be minimised. Fuel storage areas if required 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 plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages is included within the CEMP (see Appendix 4-4, Appendix 3 of this NIS). Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.

The above measures will be implemented in full, along with those additional measures set out in the CEMP, see Appendix 4-4, Appendix 3 of this NIS.

5.2.2.2.4 Cement Based Products Control Measures

The following mitigation measures, as described in Section 10.5.2.7, Chapter 10 ‘Water’ of the accompanying EIAR (see Appendix 2 of this NIS), are proposed to avoid release of cement based pollutants at the site:

- No batching of wet-cement products will occur on site. 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.
- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water practicable. 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 will be undertaken at lined cement washout ponds.
- Lined cement washouts that will be inspected and maintained at programmed intervals.
- Weather forecasting will be used to plan dry days for pouring concrete.
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

As described in the CEMP, see Appendix 4-4, Appendix 3 of this NIS, the small volume of water that will be generated from washing of the concrete lorry’s chute will be directed into a concrete washout area, lined with an impermeable membrane. The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents is tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste at a licenced waste disposal facility.

5.2.2.2.5 Monitoring

As described in the CEMP, see Appendix 4-4 contained within Appendix 3 of this NIS, daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work will be immediately be stopped, and a geotechnical assessment undertaken.

Turbidity monitors or sondes will be installed at locations surrounding the wind farm site. The monitoring locations will be selected as part of the final drainage design before construction commences in consultation with the Project Hydrologist. The Project Hydrologist will advise on the optimum locations for continuous water monitoring. The sondes will provide continuous readings for turbidity levels in the watercourse. This equipment will be supplemented by daily visual monitoring (during the construction phase) at their locations. 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

The above measures will both determine that the proposed mitigation measure are working as planned as well as informing the need for any alterations to the onsite mitigation and drainage design. All such measures will be overseen and implemented by a dedicated project Environmental Clerk of Works.

5.2.2.3 Operation Phase Mitigation

The operational phase drainage measures incorporated into the proposed development design will remain in place for the duration of the project to avoid any potential operational phase run-off from hard stands. Details of all proposed drainage measures incorporated into the proposed development are fully described in Section 4.7, Chapter 4 of the EIAR (Appendix 3), Section 10.5.4, Chapter 10 ‘Water’ (Appendix 2) and Section 3.2.4 of the CEMP (see Appendix 4-4, Appendix 3 of this NIS). The below measures are a summary of the main water protection measures incorporated into the design of the proposed development. They will be installed and constructed in conjunction with the road and hardstanding construction work as described below, as set out in Section 10.5.3.1, Chapter 10 ‘Water’ (Appendix 2):

- > 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 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.

With the implementation of the Proposed Development drainage measures as outlined above, there will be no potential for impact on downstream watercourses and thus no potential for adverse effect on downstream EU designated sites.

5.2.2.4 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 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.

The electrical cabling connecting the turbines and the connection to the substation will be removed from the underground cable ducting at the end of the useful life of the proposed development. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

The potential for effects during the decommissioning phase of the proposed development has been fully assessed in the accompanying EIAR and within this NIS.

The potential impacts on water quality associated with the decommissioning phase of the proposed development will be similar to those associated with the construction phase. Therefore, all measures described in Section 5.2.2.2 of this NIS and associated Appendices will be implemented in full during decommissioning for the protection of water quality and downstream designated sites.

5.2.3 Bird Disturbance

5.2.3.1 Identification of relevant SCI species

Blackwater Estuary SPA

A potential pathway for indirect effects was identified in the form of bird disturbance/ displacement to golden plover. Golden plover were recorded onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this SCI species cannot be excluded and further assessment is required. This is described in the below paragraphs.

Ballymacoda Bay SPA

A potential pathway for indirect effects was identified in the form of bird disturbance/ displacement to lesser black-backed gull, black-headed gull and golden plover.

The wind farm site is located within the potential core foraging range of the following SCI species as per Thaxter et al. (2012) and Gillings and Fuller (1999):

- Lesser black-backed gull (*Larus fuscus*)
- Black-headed Gull *Chroicocephalus ridibundus* (Wintering)

➤ Golden Plover (*Pluvialis apricaria*)

5.2.3.2 Assessment of potential effect

5.2.3.2.1 Golden plover

As described above, golden plover were recorded within the site during dedicated bird surveys. The accompanying ornithological impact assessment (Chapter 8 of the EIAR) has assessed the potential for disturbance/ displacement and habitat loss as a result of the proposed development to golden plover and the relevant information is provided below.

Disturbance/Decrement (construction phase)

‘There is potential for construction activities to result in disturbance of foraging golden plover however this is unlikely to significantly impact this species given the majority of the impacted land is of limited ecological value to golden plover, i.e., commercial forestry. Furthermore, the wider surroundings contain extensive areas of optimal foraging habitat (e.g., agricultural grassland) to render any potential impact inconsequential’.

‘No evidence of roosting activity occurred within proximity of the development site’.

‘There is no evidence to suggest that the proposed development site lies on a migratory/ regular commuting route for the species, therefore a barrier effect is not anticipated.’

‘Significant displacement effects are not predicted’.

Disturbance/Decrement (operational phase)

‘It is noted that significant displacement impacts are not predicted, given the majority of the proposed turbines are sited in commercial forestry’. ‘Additionally, there are extensive areas of suitable habitat in the wider area, outside any potential displacement buffer, should any potential displacement effect occur. Significant displacement effects are not predicted’.

Direct Habitat Loss (construction)

‘No evidence of roosting was recorded onsite. While there are areas of suitable foraging habitat within the proposed development site (i.e. arable grassland), the site is largely dominated by conifer plantation. The majority therefore of the land that will be lost to the development footprint is of limited ecological value to golden plover’.

‘There is an abundance of more favourable foraging habitat (e.g. agricultural grassland) in the surrounding area that will remain post construction’.

‘Significant effects with regard to direct habitat loss are not predicted’.

Direct Habitat Loss (operational)

‘Direct or indirect effects are not anticipated’.

5.2.3.2.2 Lesser Black-Backed Gull

As described above, lesser black-backed gull were recorded within the site during dedicated bird surveys. The accompanying ornithological impact assessment (Chapter 8 of the EIAR) has assessed the potential for disturbance/ displacement and habitat loss as a result of the proposed development to lesser black-backed gull and the relevant information is provided below.

Disturbance/Decrement (construction)

‘The vast majority of observations of this species involved commuting flights across the site. The commercial forestry where most of the proposed infrastructure will be located is not of ecological value to this species. There is however some foraging habitat of the proposed development site (e.g. agricultural grassland)’.

‘On a precautionary basis it is assumed that some temporary displacement may occur around the margins of the site. However, given the extent of suitable habitat in the wider area; significant displacement effects are not predicted’.

Disturbance/Decrement (operational)

‘There is an abundance of suitable habitat in the surrounding areas. Significant displacement effects are not predicted’.

Direct Habitat Loss (construction)

‘The species was frequently recorded during vantage point surveys commuting across the proposed development site. The wider landscape contains large areas of agricultural grassland it is likely that birds crossing the site were moving between foraging sites. The majority of proposed development infrastructure will be sited in commercial forestry, a habitat of limited ecological value to this species’.

‘Significant effects with regard to direct habitat loss are not anticipated’.

Direct Habitat Loss (operational)

‘Direct or indirect effects are not anticipated’.

5.2.3.2.3 Black-headed Gull

As described above, black-headed gull were recorded within the site during dedicated bird surveys. The accompanying ornithological impact assessment (Chapter 8 of the EIAR) has assessed the potential for disturbance/ displacement and habitat loss as a result of the proposed development to black-headed gull and the relevant information is provided below.

As described in Section 8.6, Chapter 8 of the accompanying EIAR *‘Only two observations of this species during the extensive suite of surveys undertaken, both of which occurred during the 2016 winter months.’*

There is no evidence to suggest that the proposed development site is of significance to this species.

No pathways for significant direct or indirect effects were identified.

In two years of vantage point surveys, this species was recorded on two occasions flying across the proposed development site. This level of flight activity is considered to result in negligible collision risk’.

5.2.3.3 Mitigation

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 Operation, Construction and Decommissioning Phases.

5.2.3.3.1 **Mitigation by Design**

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

- Hard standing areas have been designed to the minimum size necessary to minimise habitat loss.
- The underground turbine collector route connecting the two cluster of turbines has been selected to utilise built infrastructure i.e. public roads, existing forestry roads, firebreaks and improved agricultural grassland.

5.2.3.3.2 **Mitigation During Construction, Operation and Decommissioning**

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

Construction Phase Mitigation

The following measures are proposed for the construction phase:

- A Construction and Environmental Management Plan (CEMP) has been prepared. The CEMP will be in place prior to the start of the construction phase. The CEMP is included as an Appendix 4-4, Appendix 3 of this NIS.
- 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.
- Plant machinery will be turned off when not in use.
- All plant and equipment for use will comply with the 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.

Protection of downstream water quality and associated supporting aquatic habitats

As the on-site drainage provides connectivity to downstream potential supporting habitat for waterbirds, deterioration in water quality has been assessed. The mitigation measures described for the protection

of water quality in Section 5.2.2 and associated appendices, will ensure that there is no potential adverse indirect effect on the SCI species as a result of any deterioration in water quality.

Operational Phase Mitigation

No operational phase impacts requiring mitigation were identified. However, as described in Section 8.11.2 of the Ornithological impact assessment, Chapter 8 of the accompanying EIAR, in line with best practise measures, a detailed post-construction Bird Monitoring Programme has been prepared for the operational phase of the Proposed Development. This is provided in full in Appendix 8-7, Chapter 8 of the EIAR. The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the lifetime of the project. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 & 15 of the life-time of the wind farm. Monitoring measures are derived from guidelines issued by the Scottish Natural Heritage (SNH, 2009). The following individual components are proposed:

- Flight activity surveys: vantage point surveys
- Targeted bird collision surveys (corpse searches) will be undertaken with trained dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

Decommissioning Phase Mitigation

The potential impacts on water quality associated with the decommissioning phase of the proposed development will be similar to those associated with the construction phase. Therefore, all measures described in Section 5.2.2.2 of this NIS and associated Appendices will be implemented in full during decommissioning for the protection of water quality and downstream designated sites.

The potential impacts associated with disturbance/displacement during the decommissioning phase of the proposed development will be similar to those associated with the construction phase. Therefore, all measures described in the preceding sections above will be implemented in full.

6. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for adverse 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 Blackwater River (Cork/Waterford) SAC

An assessment of residual effects on relevant QI habitats and species, following the implementation of mitigation is provided in the following paragraphs.

6.1.1 Brook Lamprey (*Lampetra planeri*)

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6-1 below.

Table 6-1 Targets and attributes associated with nominated site-specific conservation objectives for Brook Lamprey

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	<p>There will be no direct effect as the proposed development is located outside of the Designated Site.</p> <p>The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 ‘Water’ of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p> <p>There will be no barriers to connectivity as a result of the proposal.</p> <p>There will be no impact on the population structure of juveniles or juvenile density.</p> <p>There will be no impact on the extent and distribution of spawning habitat or the availability of juvenile habitat.</p>
Population structure of juveniles	At least three age/size groups present	
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive.	

6.1.1.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5 of this report it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect bBrook lamprey associated with the Blackwater River (Cork/Waterford) SAC.

6.1.2 River Lamprey (*Lampetra fluviatilis*)

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6-2 below.

Table 6-2 Targets and attributes associated with nominated site-specific conservation objectives for River Lamprey

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	<p>There will be no direct effect as the proposed development is located outside of the Designated Site.</p> <p>The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 ‘Water’ of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p>
Population structure of juveniles	At least three age/size groups present	
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	
Extent and distribution of spawning beds	No decline in extent and distribution of spawning beds	

Attribute	Target	Assessment
spawning habitat		this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Availability of juvenile habitat	More than 50% of sample sites positive	There will be no barriers to connectivity as a result of the proposal. There will be no impact on the population structure of juveniles or juvenile density. There will be no impact on the extent and distribution of spawning habitat or the availability of juvenile habitat.

6.1.2.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Sections 3 and 5 of this report it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect River Lamprey associated with Blackwater River (Cork/Waterford) SAC.

6.1.3 Sea Lamprey (*Petromyzon marinus*) [1095]

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6.3.

Table 6-3 Targets and attributes associated with site-specific conservation objectives for *Petromyzon marinus* (Sea Lamprey)

Attribute	Target	Assessment
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary.	There will be no direct effect as the proposed development is located outside of the Designated Site.
Population structure of juveniles	At least three age/size groups present	The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 'Water' of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Juvenile density in fine sediment	Juvenile density at least 1/m ²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive.	

6.1.3.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Sections 3 and 5 of this report, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect ‘*Petromyzon marinus*’ (Sea Lamprey) [1095] associated with the Blackwater River (Cork/Waterford) SAC.

6.1.4 Twaite Shad (*Alosa fallax*)

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6.4 below.

Table 6-4 Targets and attributes associated with nominated site-specific conservation objectives for Twaite Shad

Attribute	Target	Assessment
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary.	<p>There will be no direct effect as the proposed development is located outside of the Designated Site.</p> <p>The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 ‘Water’ of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p> <p>There will be no barriers to connectivity as a result of the proposal.</p> <p>There will be no impact on the population structure.</p> <p>There will be no impact on spawning habitat quality extant or distribution or spawning quality.</p> <p>There will be no decline in water quality as a result of the proposal.</p>
Population structure: age classes	More than one age class present.	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	No lower than 5mg/l	
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plant) growth.	

6.1.4.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Sections 3 and 5 of this report, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect ‘Twaite Shad’ associated with the Blackwater River (Cork/Waterford) SAC.

6.1.5 Salmon (*Salmo salar*) [1106]

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6.5 below.

Table 6-5 Targets and attributes associated with nominated site-specific conservation objectives for *Salmo salar* (Salmon)

Attribute	Target	Assessment
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary.	There will be no direct effect as the proposed development is located outside of the Designated Site.
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded.	The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 'Water' of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	
Out-migrating smolt abundance	No significant decline.	There will be no barriers to connectivity as a result of the proposal.
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes.	
Water quality	At least Q4 at all sites sampled by EPA	There will be no impact on the population structure of adult spawning fish, salmon fry abundance, smolt abundance, number and distribution of redds. There will be no decline in water quality as a result of the proposal.

6.1.5.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5 of this report, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect Salmon associated with the Blackwater River (Cork/Waterford) SAC.

6.1.6 Otter (*Lutra lutra*) [1355]

The identified pathways for effect are deterioration in water quality and disturbance during the construction, operation and decommissioning phases of the proposed development.

A comprehensive search for otter was undertaken along the drainage ditches and watercourses within and adjacent to the site. A single otter sign, i.e. an otter spraint, was recorded downstream of the proposed connector cable route along the River Tourig. The location of the otter record within the EIAR study area boundary is shown in Figure 4-2. No holts, slides or prints were recorded.

An assessment of the proposed development against the attributes and targets for this species is provided in Table 6.6 below.

Table 6-6 Targets and attributes associated with the site-specific conservation objectives for Otter

Attribute	Target	Assessment
Distribution	No significant decline	<p>A single otter sign, i.e. an otter spraint, was recorded downstream of the proposed connector cable route along the River Tourig. The location of the otter record within the EIAR study area boundary is shown in Figure 4-2. No other signs of otter, including holts, slides or prints were recorded.</p> <p>The findings suggest that the site of the proposed development is not used by a population of otter of greater than local importance.</p> <p>There is no impact pathway which could lead to a decline in the distribution of this species for which the SAC has been designated associated with the proposed development</p>
Extent of terrestrial habitat	No significant decline	<p>There will be no decline in the extent of terrestrial or freshwater habitat associated with the proposed development. There will be no instream works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p>
Extent of marine habitat	No significant decline	
Extent of freshwater (river) habitat	No significant decline	
Extent of freshwater (lake) habitat	No significant decline	
Couching sites and holts	No significant decline	<p>No couches or holts were identified within the development site boundary and none were identified in the vicinity of the proposed works. There will be no decline in couching or holt sites associated with the proposed development.</p> <p>As outlined in Section 5, prior to any works being carried out, a pre-construction Otter survey will be undertaken by a qualified ecologist to ensure that Otter has not taken up residence within or close to the proposed works area.</p> <p>Should any holt be encountered during the pre-construction surveys, it will be subject to exclusion procedures as outlined in the TII/NRA guidelines (2006).</p>
Fish biomass available	No significant decline	<p>There will be no decline in availability of fish biomass associated with the proposed development. Pathways that would allow impacts to occur were considered in the design of the proposed development and a range of measures, outlined in Section 5, are in place to avoid all water pollution during construction.</p>

Attribute	Target	Assessment
Barrier to connectivity	No significant increase	The proposed development will not result in any barrier to connectivity within or outside the SAC.

6.1.6.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect ‘Otter (*Lutra lutra*)’ associated with the *Blackwater River (Cork/Waterford) SAC*.

6.1.7 Estuaries

An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.7 below.

Table 6-7 Targets and attributes associated with the site-specific conservation objectives for Estuaries

Attribute	Target	Assessment
Habitat area	The permanent habitat area is stable or increasing, subject to natural processes.	There will be no decline in habitat area as a result of the proposal.
Community extent	Maintain the extent of the <i>Mytilus edulis</i> -dominated community, subject to natural processes.	The proposed development is located entirely outside of the SAC and in the upper reaches of the catchment, a significant distance hydrologically from the coastal environment.
Community structure: <i>Mytilus edulis</i> density	Conserve the high quality of the <i>Mytilus edulis</i> -dominated community, subject to natural processes.	There will be no alteration in community, extent, structure or distribution as a result of the proposal and no deterioration in the condition of marine habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Community distribution	Conserve the following community types in a natural condition: Intertidal estuarine s and y mud community complex; Subtidal estuarine fine sand with <i>Bathyporeia</i> spp. community complex; Sand and mixed sediment with polychaetes and crustaceans community complex; Coarse sediment community complex.	

6.1.8 Mudflats and sandflats not covered by seawater at low tide

An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.8 below.

Table 6-8 Targets and attributes associated with the site-specific conservation objectives for Mudflats and sandflats

Attribute	Target	Assessment
Habitat area	The permanent habitat area is stable or increasing, subject to natural processes.	<p>There will be no decline in habitat area as a result of the proposal. The proposed development is located entirely outside of the SAC and in the upper reaches of the catchment, a significant distance hydrologically from the coastal environment.</p> <p>There will be no alteration in community, extent, structure or distribution as a result of the proposal and no deterioration in the condition of marine habitat due to the proposed works.</p> <p>The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p>
Community extent	Maintain the extent of the <i>Zostera</i> and <i>Mytilus edulis</i> dominated community, subject to natural processes.	
Community structure: <i>Zostera</i> shoot density	Conserve the high quality of the <i>Zostera</i> -dominated community, subject to natural processes.	
Community structure: <i>Mytilus edulis</i> density	Conserve the high quality of the <i>Mytilus edulis</i> dominated community, subject to natural processes.	
Community distribution	The following community types should be conserved in a natural condition: Intertidal estuarine sandy mud community complex and Sand and mixed sediment with polychaetes and crustaceans community complex.	

6.1.9 Salicornia and other annuals colonizing mud and sand

An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.9 below.

Table 6-9 Targets and attributes associated with the site-specific conservation objectives for Salicornia and other annuals colonizing mud and sand

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession	<p>There will be no decline in habitat area or change in habitat distribution as a result of the proposal. The proposed development is located entirely outside of the SAC and in the upper reaches of the catchment, a significant distance hydrologically from the coastal environment.</p> <p>‘<i>Salicornia</i> and other annuals colonising mud and sand (1310)’ is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is</p>
Habitat distribution	No decline, or change in habitat distribution, subject to natural processes	

Attribute	Target	Assessment
		<p>suitable and there is regular tidal inundation.</p> <p>This habitat does not occur within, or immediately adjacent to the site.</p>
Physical structure: sediment supply	Maintain natural circulation of sediments and organic matter, without any physical obstructions	<p>The natural processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the proposed development, as there will be no alteration of the flood regime or physical barriers affecting flooding.</p> <p>There will be no alteration in the physical structure as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p>
Physical structure: creeks and pans	Maintain creek and pan structure, subject to natural processes, including erosion and succession	
Physical structure: flooding regime	Maintain natural tidal regime	
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	<p>According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, peat-cutting, turf cutting, poaching and overuse, none of which will occur as a result of the proposed development.</p> <p>There will be no alteration in the physical structure or vegetation structure or composition as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this</p>
Vegetation structure: vegetation height	Maintain structural variation within sward	
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and sub-communities	Maintain the presence of species-poor communities with typical species listed in saltmarsh Monitoring Project (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species: <i>Spartina anglica</i>	No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.	

Attribute	Target	Assessment
		NIS) are in place to avoid all water pollution during construction, operation and decommissioning.

6.1.10 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

The identified pathways for effect are deterioration in water quality during the construction phase of the development. An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.10 below.

Table 6-10 Targets and attributes associated with the site-specific conservation objectives for Atlantic salt meadows

Attribute	Target	Assessment
Habitat Area	Area stable or increasing, subject to natural processes, including erosion and succession.	There will be no decline in habitat area or change in habitat distribution as a result of the proposal. The proposed development is located entirely outside of the SAC and in the upper reaches of the catchment, a significant distance hydrologically from the coastal environment.
Habitat distribution	No decline or change in habitat distribution, subject to natural processes.	
Physical structure: sediment supply	Maintain natural circulation of sediments and organic matter, without any physical obstructions.	The processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the proposed development, as there will be no alteration of the flood regime or physical barrier affecting flooding.
Physical structure: creeks and pans	Maintain creek and pan structure, subject to natural processes, including erosion and succession.	
Physical structure: flooding regime	Maintain natural tidal regime.	There will be no alteration in the physical structure as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, poaching and overuse,
Vegetation structure: vegetation height	Maintain structural variation within sward	

Attribute	Target	Assessment
Vegetation structure: vegetation cover	Maintain more than 90% of the saltmarsh area vegetated.	none of which will occur as a result of the proposed development.
Vegetation composition: typical species and sub-communities	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (Mc Corry and Ryle, 2009)	There will be no alteration in the physical structure or vegetation structure or composition as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	

6.1.11 Mediterranean salt meadows (*Juncetalia maritimi*)

The identified pathways for effect are deterioration in water quality during the construction phase of the development. An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.11 below.

Table 6-10 Targets and attributes associated with the site-specific conservation objectives for Mediterranean salt meadows

Attribute	Target	Assessment
Habitat Area	Area stable or increasing, subject to natural processes, including erosion and succession.	There will be no decline in habitat area or change in habitat distribution as a result of the proposal. The proposed development is located entirely outside of the SAC and in the upper reaches of the catchment, a significant distance hydrologically from the coastal environment.
Habitat distribution	No decline or change in habitat distribution, subject to natural processes.	
Physical structure: sediment supply	Maintain natural circulation of sediments and organic matter, without any physical obstructions.	The processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the proposed development, as there will be no alteration of the flood regime or physical barrier affecting flooding.
Physical structure: creeks and pans	Maintain creek and pan structure, subject to natural processes, including erosion and succession.	
Physical structure: flooding regime	Maintain natural tidal regime.	There will be no alteration in the physical structure as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of

Attribute	Target	Assessment
		measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, peat-cutting, turf cutting, poaching and overuse, none of which will occur as a result of the proposed development. There will be no alteration in the physical structure or vegetation structure or composition as a result of the proposal and no deterioration in the condition of this habitat due to the proposed works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Vegetation structure: vegetation height	Maintain structural variation within sward.	
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated.	
Vegetation composition: typical species	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (Mc Corry and Ryle, 2009)	
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%	

6.1.12 Watercourses of plain to montane levels with the *Ranuncion fluitantis* and *Callitricho Batrachion* vegetation

The identified pathways for effect are deterioration in water quality during the construction phase of the development. An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.12 below.

Table 6-11 Targets and attributes associated with the site-specific conservation objectives for Watercourses of plain to montane levels

Attribute	Target	Assessment
Habitat distribution	No decline, subject to natural processes	The full extent of this habitat within the SAC is unknown. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of
Habitat area	Area stable or increasing, subject to natural processes	

Attribute	Target	Assessment
		the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Hydrological regime: river flow	Maintain appropriate hydrological regimes	The proposed development will not result in any changes to the hydrological regime of any watercourse.
Hydrological regime: tidal influence	Maintain natural tidal regime	
Substratum composition: particle size range	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (typically sands, gravels and cobbles)	No instream works will take place as part of the proposed development, therefore there will be no impact on the substratum composition of downstream watercourses.
Water quality: nutrients	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
Vegetation composition: typical species	Typical species of the relevant habitat sub-type should be present and in good condition	There will be no alteration in the vegetation composition of this habitat within the SAC. No instream works will take place.
Floodplain connectivity: area	The area of active floodplain at and upstream of the habitat should be maintained	The proposed development will not result in any changes to the hydrological regime of any watercourse and floodplain connectivity will be maintained.

6.1.13 ***Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno- Padion*, *Alnionincanae*, *Salicion albae*)**

The identified pathways for effect are deterioration in water quality during the construction phase of the development. An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.13 below.

Table 6-12 Targets and attributes associated with the site-specific conservation objectives for Alluvial forests

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes.	This habitat was not identified within or immediately downstream of the proposed development site during the surveys.
Habitat distribution	No decline.	
Woodland Size	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size.	
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	There will be no alteration to the woodland structure of Alluvial forests within the SAC as a result of the proposed development.
Woodland Structure: community diversity and extent	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Hydrological regime: Flooding Depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	There will be no alteration to the hydrological regime as a result of the proposed development.
Woodland structure: dead wood	At least 30m ³ /ha of fallen timber greater than 10cm diameter; 30snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	There will be no alteration to the woodland structure of Alluvial forests within the SAC as a result of the proposed development.
Woodland structure: veteran trees	No decline	
Woodland structure: indicators of local distinctiveness.	No decline	
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%.	There will be no alteration to the vegetation composition of Alluvial forests within the SAC as a result of the proposed development.
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (<i>Alnus glutinosa</i>), willows (<i>Salix</i> spp.) and, locally, oak (<i>Quercus robur</i>) and ash (<i>Fraxinus excelsior</i>).	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control.	

6.1.14 Freshwater pearl mussel (*Margaritifera margaritifera*)

As potential for impact on Atlantic salmon has been identified above as a result of water quality deterioration, potential for indirect impact on freshwater pearl mussel (*Margaritifera margaritifera*) has been identified as the species depends on salmonids during part of its early reproduction stage. An assessment of the proposed development against the attributes and targets for this habitat is provided in Table 6.14 below.

Table 6-134 Targets and attributes associated with nominated site-specific conservation objectives for freshwater pearl mussel

Attribute	Target	Assessment
Distribution	Maintain at 161km. See map 8	<p>There will be no direct effect as the proposed development is located outside of the Designated Site. In addition, the proposed development is located within a separate sub-catchment. Therefore, impacts are restricted to the potential for impact on host fish upon which the species depends during the early stages of its lifecycle.</p> <p>There will be no alteration to population size, structure or adult mortality as a result of the proposed development.</p> <p>There will be no alteration in habitat extent as a result of the proposed development.</p> <p>There will be no impact on water quality, substratum quality or the hydrological regime as the proposed development is located within a separate sub catchment.</p>
Population size	Restore to 35,000 adult mussels	
Population structure: recruitment	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	
Population structure: adult mortality	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	
Habitat extent	Restore suitable habitat in more than 35km (see map 8) and any additional stretches necessary for salmonid spawning	
Water quality: macroinvertebrate and phytobenthos (diatoms)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Restore substratum quality- filamentous algae: absent or trace (<5%)	
Substratum quality: sediment	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	
Substratum quality: oxygen availability	Restore to no more than 20% decline from water column to 5cm depth in substrate	
Hydrological regime: flow variability	Restore appropriate hydrological regimes	
Host fish	Maintain sufficient juvenile salmonids to host glochidial larvae	The only identified pathway for indirect effect on host fish is via indirect water quality deterioration. This was considered in the

		design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR & the project CEMP (both provided in Appendix 3 of this NIS) and Chapter 10 ‘Water’ of the associated EIAR (Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.
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6.1.14.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5, and in the Construction and Environmental Management Plan (CEMP), it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect the above listed QI habitats or species associated with the Blackwater River (Cork/Waterford) SAC.

6.2 Blackwater Estuary SPA

› Wetland and Waterbirds [A999]

Indirect impacts of water pollution on the habitats of waders and wildfowl listed as SCIs of this SPA are included in the assessment of wetlands and waterbirds.

6.2.1 Wetland and Waterbirds [A999]

An assessment of the proposed development against the attributes and targets for this SCI habitat is provided in Table 6.15 below.

Table 6-14 Targets and attributes associated with the site-specific conservation objectives for Wetland and Waterbirds [A999].

Attribute	Target	Assessment
Wetland Habitat Area	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 871ha, 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 habitat loss as a result of deterioration in water quality was considered.</p> <p>There will be no instream works. The only identified pathway for effect is via indirect water quality deterioration. This was considered in the design of the proposed development and a range of measures (outlined in Sections 3.3 and 5 of this NIS, Chapter 4 of the EIAR (Appendix 3 of this NIS), the project CEMP and Chapter 10 ‘Water’ of the associated EIAR, Appendix 2 of this NIS) are in place to avoid all water pollution during construction, operation and decommissioning.</p>

6.2.2 Golden Plover (*Pluvialis apricaria*)

A potential pathway for indirect effects was identified in the form of bird disturbance, displacement and collision risk to Golden Plover. Golden plover were recorded onsite during winter months. Due to the nature and timing of these observations and the proximity of the site from the SPA, the potential for significant effects on this SCI species cannot be excluded and further assessment is required.

An assessment of the proposed development against the attributes and targets for this SCI species is provided in Table 6.16.

Table 6-15 Targets and attributes associated with the site-specific conservation objectives for Golden Plover.

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	<p>The dominant habitat within the proposed development is conifer plantation. This habitat is not favoured by golden plover. The majority of the golden plover observed were recorded in foraging habitat (e.g. agricultural grassland offsite), as shown in Figure 8.1.2.1, Chapter 8 of the accompanying EIAR.</p> <p>The collision risk has been calculated at a rate of 3.76 collisions per year. Annual mortality of adult golden plover has been calculated at 27% per annum (Sandercock, 2003). The predicted collision risk is considered insignificant (>1%) in the context of county populations. This is therefore considered insignificant in the context of the local, county, national and international population. For the reasons outlined above, adverse effects with regard to collision, direct habitat loss, disturbance or displacement are not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect golden plover populations associated with Blackwater Estuary SPA. There is therefore no potential for alteration to the population trend or distribution of the species for which the SPA has been designated.</p>
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by Golden Plover, other than that occurring from natural patterns of variation.	

6.2.2.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5, and in the Construction and Environmental Management Plan (CEMP), it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect the above listed SCIs associated with the Blackwater Estuary SPA.

6.3 Ballymacoda Bay SPA

A potential pathway for indirect effects was identified in the form of bird disturbance, displacement and collision risk to Lesser black-backed gull, Black-headed Gull and Golden Plover. The wind farm site is located within the potential core foraging range of the following SCI species as per Thaxter et al. (2012) and Gillings and Fuller (1999):

- Lesser black-backed gull (*Larus fuscus*)

- > Black-headed Gull *Chroicocephalus ridibundus* (Wintering)
- > Golden Plover (*Pluvialis apricaria*)

The potential for significant effects on these SCI species cannot be excluded and further assessment is required.

6.3.1 Lesser black-backed gull (*Larus fuscus*)

An assessment of the proposed development against the attributes and targets for this SCI species is provided in Table 6.17 below.

Table 6-16 Targets and attributes associated with the site-specific conservation objectives for Lesser Black-backed gull.

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	The collision risk has been calculated at a rate of 6.83 collisions per year. Annual mortality of adult lesser black-backed gull has been calculated at approximately 10% per annum (Wanless et al, 1996).
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by lesser black-backed gull, other than that occurring from natural patterns of variation.	The predicted collision risk is deemed <i>Low (1-5%)</i> in the context of the county population, as per Percival (2003). For the reasons outlined above, adverse effects with regard to collision, direct habitat loss, disturbance or displacement are not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect lesser black-backed gull populations associated with Ballymacoda Bay SPA. There is therefore no potential for alteration to the population trend or distribution of the species for which the SPA has been designated.

6.3.2 Black-headed Gull (*Chroicocephalus ridibundus*) (Wintering)

An assessment of the proposed development against the attributes and targets for this SCI species is provided in Table 6.18 below.

Table 6-17 Targets and attributes associated with the site-specific conservation objectives for Black-headed gull.

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	Black-headed gull were only recorded twice during core Vantage Point (VP) surveys between September 2016 and September 2018. Given the low occurrence of the species within the study area, as described in Section 4.4.3.2.2 of this NIS, the ornithological assessment (Chapter 8 of the accompanying EIAR) has not identified any potential for effect on the population at any geographic scale.
Distribution	There should be no significant decrease in the range, timing and intensity of use of areas by black-headed gull, other than that occurring from natural patterns of variation.	

		For the reasons outlined above, adverse effects with regard to collision, direct habitat loss, disturbance or displacement are not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect black-headed gull populations associated with Ballymacoda Bay SPA. There is therefore no potential for alteration to the population trend or distribution of the species for which the SPA has been designated.
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6.3.3 Golden plover (*Pluvialis apricaria*) (Wintering)

An assessment of the proposed development against the attributes and targets for this SCI species is provided in Table 6.19 below.

Table 6-18 Targets and attributes associated with the site-specific conservation objectives for Golden plover.

Attribute	Target	Assessment
Population trend	Long term population trend stable or increasing	As the species was not recorded during the extensive suite of bird surveys undertaken, as described in Section 4.4.3.2.2 of this NIS, the ornithological assessment (Chapter 8 of the accompanying EIAR) has not identified any potential for effect on the population at any geographic scale.
Distribution	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation	For the reasons outlined above, adverse effects with regard to collision, direct habitat loss, disturbance or displacement are not anticipated. Based on the field survey results, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect golden plover populations associated with Ballymacoda Bay SPA. There is therefore no potential for alteration to the population trend or distribution of the species for which the SPA has been designated.

6.3.3.1 Determination on potential for adverse residual effects

Based on the above, and following implementation of best practice measures that are outlined in Section 5, and in the Construction and Environmental Management Plan (CEMP), it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed development will not adversely affect the above listed SCIs associated with Ballymacoda Bay SPA.

6.4 Conclusion of Impact Assessment

Taking cognisance of best practice measures incorporated into the project design the Proposed Development will not result in adverse impacts on the integrity of the European Sites. It 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. 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 of the following European Designated Sites:

- Blackwater River (Cork/Waterford) SAC,
- Blackwater Estuary SPA,
- Ballymacoda Bay SPA.

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 been reviewed and taken into consideration as part of this assessment:

- > Waterford County Development Plan 2011 – 2017
- > Cork County Development Plan 2014
- > National Biodiversity Action Plan 2017-2021
- > The Regional Planning Guidelines for the South East 2010-2022

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.

Table 7-1 Review of land use and spatial plans

Waterford County Development plan 2011 – 2017	
Key Policies/Issues/Objectives Directly Related to European Sites In The Zone of Influence	Assessment of Potential Impact on European Sites
<i>Objective CP3: To recognise the value of the County’s natural coastal defences including estuaries, dunes and sand dunes and ensure their protection</i>	<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 5 of this report, the hydrology chapter and in the CEMP (both of which are provided as Appendices to this NIS for completeness). 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.</p>
<i>Policy NH2: To conserve, manage and enhance the natural heritage, biodiversity, landscape and environment of County Waterford in recognition of its importance as a non-renewable resource, the unique identity and character of the County and as a natural resource asset.</i>	
<i>Policy NH3: To ensure as far as possible that development does not impact adversely on wildlife habitats and species. In the interests of sustainability, biodiversity should be conserved for the benefit of future generations.</i>	
<i>Policy NH4: To protect plant, animal species and habitats which have been identified by the Habitats Directive, Bird Directive, Wildlife Act (1976) and Wildlife (Amendment) Act 2000 and the Flora Protection order S.I. No. 94 of 1999.</i>	
<i>Policy NH6: To conserve the favourable conservation status of species and habitats within Special Areas of Conservation and Special Protection Areas.</i>	
<i>Policy NH9: To ensure that development proposals in areas identified as being of nature conservation value will not impact adversely on the integrity and habitat value of the site.</i>	
<i>Policy NH10: To protect and conserve pNHAs and NHAs in the County.</i>	

<p>Policy NH15: <i>To maintain good ecological status of wetlands and watercourses in support of the provisions of the Water Framework Directive and Ramsar Convention.</i></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 5 of this report, Chapter 10 Water of the EIAR and in CEMP Appendix 4-4 to the EIAR (both of which are provided as Appendices to this NIS for completeness). There will be no adverse effects on watercourses or sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.</p>
<p>Policy NH16: <i>The preservation of riparian corridors is a requirement for the protection of aquatic habitats and facilitation of public access to waterways. No development shall take place within a buffer zone of 15m measured from the top of the riverbank.</i></p>	
<p>Objective NH3: <i>To protect riparian habitats along watercourses by maintaining an ecological buffer zone of at least 15m from the top of the watercourse riverbank. The Council will consult with the Fisheries Authority on the establishment and protection of riparian habitats where appropriate.</i></p>	
<p>Cork County Development Plan 2014</p>	
<p>County Development Plan Objective HE 2-1: Site Designated for Nature Conservation <i>Provide protection to all natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites.</i></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>County Development Plan Objective HE 2-2: Protected Plant and Animal Species <i>Provide protection to species listed in the Flora Protection Order 1990, on Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements.</i></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 5 of this report, Chapter 10 Water of the EIAR and in CEMP Appendix 4-4 to the EIAR (both of which are provided as Appendices to this NIS for completeness). 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>County Development Plan Objective HE 2-3: Biodiversity outside Protected Areas <i>Retain areas of local biodiversity value, ecological corridors and habitats that are features of the County’s ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-</i></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.</p>

<p><i>natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.</i></p>	
<p>County Development Plan Objective HE 2-4: Protection of Wetlands</p> <p><i>Ensure that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats.</i></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 5 of this report, Chapter 10 Water of the EIAR and in CEMP Appendix 4-4 to the EIAR (both of which are provided as Appendices to this NIS for completeness). There will be no adverse effects on watercourses or sensitive aquatic receptors listed as QIs/SCIs of European Sites, as a result of deterioration in water quality.</p>
<p>National Biodiversity Action Plan 2017-2021</p>	
<p><i>Target 6.2 - Sufficiency, coherence, connectivity and resilience of the protected areas network substantially enhanced by 2020.</i></p>	<p>There will be no adverse effects designated sites or biodiversity as a result of the proposed development.</p> <p>The Proposed Development will not impact on connectivity within the wider area and will maintain watercourses within and adjacent to the development site in good condition.</p>
<p>The Regional Planning Guidelines for the South East 2010-2022</p>	
<p>PPO 8.6 Planning Authorities should provide for the following biodiversity objectives through County and City Development Plans and Local Area Plans:</p> <p><i>- Protect natural heritage sites designated or proposed for designation in National and European legislation, and in other relevant International Conventions, Agreements and Processes (e.g. Ramsar sites, Special Protection Areas, Special Areas of Conservation, Natural Heritage Areas, statutory nature reserves).</i></p>	<p>There will be no adverse effects designated sites or biodiversity as a result of the proposed development.</p> <p>The Proposed Development will not impact on connectivity within the wider area and will maintain watercourses within and adjacent to the development site in good condition.</p>

<p><i>- Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation, on plant, animal and bird species and habitats protected by law and that developments affecting Natura 2000 sites are assessed in compliance with Article 6 of the Habitats Directive.</i></p> <p><i>- Protect geological sites of national and international interest.</i></p>	
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7.1.1 Other Projects

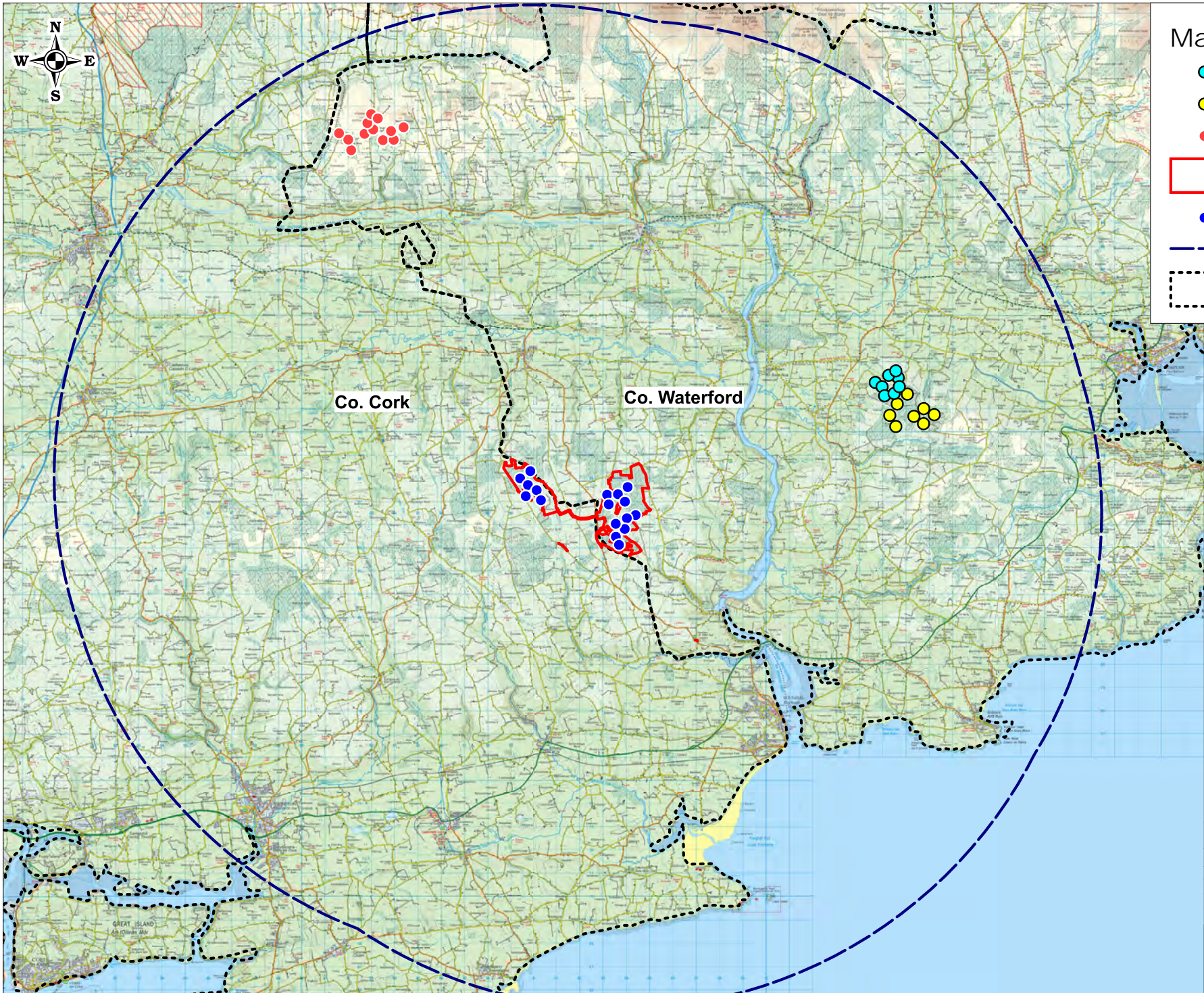
Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the proposed development and was verified on the 20/10/2020. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g. individual EISs/EIARs, layouts, drawings etc.) for all relevant projects. These are listed below.

7.1.1.1 Other Wind Farm Sites

Within the wider area, there have been a number of planning applications for wind farm developments (comprising two or more turbines) lodged within a 20-kilometre radius of the EIAR study area. These are listed in Tables 7-2 and 7-3 below. These wind farms applications are based on a review of the Waterford County Council and Cork County Council Planning Register and include those listed in the following subsections.

7.1.1.1.1 County Waterford

Table 7.1 lists the existing and permitted wind farms located in Co. Waterford within 20-kilometre radius of the proposed development site. The locations of the wind farms are shown in Figure 7-1.



Map Legend

- Woodhouse Turbine
- Knocknamona Turbine
- Barranfaddock Turbine
- Site Location
- Proposed Turbine
- 20km Distance from Site
- County Boundary

Co. Cork

Co. Waterford

MAP TITLE: Other Wind Farms	
PROJECT TITLE: Lyrenacarriga Wind Farm	
MAP NO.: Figure 7-1	
DRAWING BY: L Meehan	CHECKED BY: M Watson
SCALE: 1:220,000	DATE: 31-08-2020
OS SHEET NO.: 2008	

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Table 7-2 Wind Farm Planning Applications: Co. Waterford

Planning Ref. No.	Description	Decision
Barranafaddock Wind Farm		
04/1559	12 wind turbines (80 m hub height and 80 m blade diameter), a 40m high wind measuring anemometer pole, a 110 kV sub-station including control building, and all associated works.	Granted by Waterford County Council (WCC) 22/06/2005 Granted by An Bord Pleanála 22/11/2005
10/371	5-year extension of duration of PD 04/1559.	Granted by WCC 29/11/2010
11/400	Permission for a modification to the permitted Barranafaddock Wind Farm (Planning Ref. 04/1559 & An Bord Pleanála reference number PL 24.213290). The modifications include a proposed increase in turbine hub height (to 80m) of three of the permitted eleven turbines, an increase in rotor diameter of all turbines to 90m (from 80m) and the micro-siting of ten of the permitted turbines.	Granted by WCC 04/01/2012
13/465	Proposed amendments to Planning Condition No. 3 of planning reference PD: 13/32 (Extension to Barranafaddock Wind Farm) and Planning Condition No. 2 of planning reference PD: 11/400 (Modifications to Barranafaddock Wind Farm) which relate to the operational period of the permitted wind farm.	Granted by WCC 13/01/2014
Woodhouse Wind Farm		
04/1788	Eight wind turbines, access tracks, a fenced Switchyard comprising single-story Control Building and Substation and anemometer mast.	Granted by WCC 25/04/2005
10/45	Minor modifications to a previously approved wind farm development comprising eight wind turbines (Reg Ref: 04/1788) The modifications include an increase in permitted tower height (70m to 80m) and blade length (42m to 45/46m) minor re-alignments of internal access tracks: relocation of four.	Granted by WCC 18/05/2010
10/175	Extension of Duration for Wind farm comprising eight wind turbines (04/1788).	Granted by WCC 08/07/2010
Knocknamona Wind Farm		
14/600109	12 no. wind turbines, overall height of up to 126.6 metres, 1 no. meteorological mast up to 80 metres in height and all ancillary site works.	Refused by WCC Granted by An Bord Pleanála 14/12/2016
Knocknalougha		
00/615	Wind Farm (12 wind turbines) towers not exceeding 60m. in height, rotor diameter not exceeding 62m, and all ancillary works.	Granted by WCC Refused by An Bord Pleanála 17/07/2001
03/1204	Erection of a wind farm comprising 7 wind turbines with towers up to 46m in height and rotor diameter up to 62m and ancillary equipment for electricity generation including substation control building and monitoring mast.	Granted by WCC Refused by An Bord Pleanála 23/09/2004

7.1.1.1.2 County Cork

Table 7.3 lists the existing and permitted wind farms located in Co. Cork within 20-kilometre radius of the proposed development site. The locations of the wind farms are also shown in Figure 7-1.

Table 7.3 Wind Farm Planning Applications: Co. Cork

Planning Ref	Description	Decision
Ardglass Wind Farm		
15/6587	Seven wind turbines with a maximum ground to blade tip height of up to 140m, and associated all ancillary infrastructure.	Granted by CCC Refused by An Bord Pleanála 28/06/2016
Knocknagappagh		
02/4588	Development of a wind farm include 2 no. 1 MW wind turbines, 1 no. 40m wind monitoring mast, control house and service roadways.	Granted by CCC 09/12/2003
08/9956	Completion of wind farm development to include 2 no. 1 MW wind turbines, 1 no. 40m wind monitoring mast, control house and service roadways granted under pl.reg.no.02/4588	Granted by CCC 19/03/2009
Crocane		
02/4699	Development of 2 no. 1 MW wind turbines, service roadways and control house in Crocane.	Granted by CCC 15/12/2003
08/9780	Completion of 2 no. 1 MW wind turbines, service roadways and control house granted under Pl. Req. No. 02/4699 (new permission to expire on 22/01/2012).	Granted by CCC 10/03/2009

7.1.1.2 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. Where relevant, these applications have been considered in the design of the project and are considered in this NIS. Further details are provided in the following subsections.

7.1.1.3 County Waterford

At the time of writing, there are no applications relating to significant commercial or infrastructural proposals, e.g. energy generation, transmission, industry etc., lodged within approximately 2km of the proposed wind farm within County Waterford. Planning applications in the vicinity predominantly relate to the provision of one-off housing and agricultural development. In addition, a number of small scale planning applications were also reviewed within 2 km of the proposed wind turbine infrastructure. These planning applications are of a small scale nature no in-combination impact pathways were identified.

7.1.1.4 County Cork

Similar to the above, at the time of writing, there are no applications relating to significant commercial or infrastructural proposals lodged within approximately 2km of the proposed wind turbine infrastructure within County Cork. The planning applications in the vicinity predominantly relate to agricultural or one-off housing associated developments. A list of the planning applications identified within 2 km of the proposed wind turbine infrastructure can be viewed in Appendix 2-1 of the

accompanying EIAR but are not repeated here due their small scale nature and absence of in-combination impact pathways.

7.1.2 Conclusion of Cumulative Assessment

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:

- Blackwater River (Cork/Waterford) SAC
- Blackwater Estuary SPA
- Ballymacoda Bay SPA

Following the implementation of the best practice measures outlined in Sections 3 and 5 of this NIS , in the ‘Water’ Chapter 10 of the EIAR accompanying this application Chapter 4 (Appendix 3 of this NIS) and in the CEMP (see Appendix 4-4, Appendix 3 of this NIS), 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 when considered in combination with other plans and projects.

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 European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

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