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Natura Impact Statement

Cummeennabuddoge Wind Farm

Cummeennabuddoge Wind (DAC)

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1 Introduction

1.1 Purpose of report

In Article 6(3) of the EC Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora – The Habitats Directive, any project or plan which is not directly connected with or necessary to the management of a European site but would be likely to have a significant effect either alone or in combination with other plans or projects shall be subject to an Appropriate Assessment of its implications for the European site in view of that site's conservation objectives. In light of the findings and subject to the provisions of Article 6(4) of the Habitats Directive, the Competent Authority shall agree to the plan or project only after ensuring that it will not affect the integrity of the European site. Whilst mitigation may be taken into account at the Appropriate Assessment stage it is not to be considered when initially screening the project in order to determine whether or not an Appropriate Assessment (AA) is needed.

Article 6(4) makes provision that if a negative assessment is made of the implications of the project on the site, and in the absence of other alternative solutions, the plan or project can go ahead for imperative reasons of overriding interest (IROPI) but that compensatory measures must be taken to ensure that the overall coherence of the site is protected/maintained. A distinction is to be drawn between mitigation and compensation.

Since this is a project, as defined by the Habitats Directive which is not directly connected with or necessary to the management of any nearby European sites, then screening for the requirement for AA and subsequent Appropriate Assessment if screening indicates a likely significant effect is identified will be required. This will be carried out by the Competent Authority, advised by the Statutory Nature Conservation Body. This Natura Impact Statement (NIS) has been prepared to provide the information necessary to allow the Competent Authority to conduct the screening for the Appropriate Assessment and carry out the Appropriate Assessment if required, connected with the application for the development of a wind farm at Cummennabuddoge.

1.2 Project Team

This NIS has been prepared by Jenny Bell, Technical Director Ornithology & HRA and Catherine Hibbert, Technical Director Ecology South, with additional support from their teams and from the Hydrology lead. Jenny had overall oversight for production of the report.

Jenny Bell BSc (Hons) is an ornithologist with more than 25 years' experience in both research and environmental consultancy sectors. She has developed extensive knowledge of survey methods and analysis on avian ecology. She has a particular expertise in Natura assessments related to Article 6(3) of the Habitats Directive having prepared reports to inform Appropriate Assessments in England, Wales, Scotland and Northern Ireland. Additionally, she has prepared Habitats Regulations Appraisals/Assessments on behalf of the Competent Authority both in England and Scotland.

Catherine Hibbert BSc (Hons) MCIEEM is experienced in authoring and technically reviewing Ecology EIA Chapters for onshore wind farms in upland habitats and producing statements to inform assessments on Internationally designated sites.

1.3 Assessment Methodology

The approach to the NIS was informed by published guidance (Environment, Heritage and Local Government, 2010) together with industry best practice (CIEEM, 2018) and a knowledge of relevant case law.

Methodology relevant to the SAC features only is presented below. The full methodologies of ecological and ornithological field surveys undertaken to inform the assessment are set out in Chapter 8: Biodiversity and Chapter 9: Ornithology, and their supporting Technical Appendices (TA). In particular, attention is drawn to TA 8.3 Aquatic Ecology and Fish Surveys as this document contains the background data for the information presented below.

Reference is also made to Chapter 11 Hydrology, Water Quality and Flood Risk for further water sampling and modelling.

1.3.1 Terrestrial and Aquatic Ecology

Summaries of the survey methods relevant to the features of the designated sites are set out in Table 1 below. Figures 8.2-8.7 from Chapter 8: Biodiversity illustrate the survey areas.

Table 1: Ecology Survey and Assessment Methods

Target Feature	Survey timing(s)	Method
Otter and water vole	12th July 2021 and 30th June 2022	Focussed on searching for field signs of otter and water vole, following methodologies outlined in Chanin (2003), Bang et al. (2006), NRA (2009), and Muir et al. (2013).
Fish habitat evaluation	17th, 18th, 19th and 23rd August 2021	The results of the aquatic habitat survey were used in conjunction with 'Ecology of the Atlantic Salmon' (Hendry and Cragg-Hine, 2003) to assess habitat suitability for salmonids at selected representative sites. An evaluation of lamprey nursery habitat was also carried out following Maitland (2003), as well as searches for juvenile lampreys using agitation sampling where suitable nursery habitat occurred. The results of the stream habitat surveys were used in conjunction with the leaflet 'The Evaluation of habitat for Salmon and Trout' (DANI, 1995) to assess habitat suitability for salmonids at selected representative sites.
Freshwater pearl mussel (FPM)	1st and 2nd September and 13th, 14th and 15th September 2021	Surveys were carried out under licence on selected watercourses following the NPWS guidance '*Margaritifera margaritifera* Stage 1 and Stage 2 survey guidelines, Irish Wildlife Manuals, No. 12' (Anon, 2004). Representative accessible locations on watercourses draining the proposed development were surveyed, with two sample areas (R4 and R5) on the River Clydagh and three sample areas on the River Flesk (R1 – R3) into which the Clydagh flows. Approximately 8.3km of the River Flesk was surveyed (115 transects).
Physico-chemical	15th October 2021	Water samples were taken at site 1 and site 4 using aseptic techniques and stored in a cooler box and sent for analysis

Target Feature	Survey timing(s)	Method
		to the Southern Scientific Laboratories. Both sites were assigned a chemical status on a scale of High-Good-Moderate-Poor-Bad based on water quality standards given in Surface Water Regulations (DoEHLG, 2009), the Freshwater Fish Directive (78/659/EEC) and the Salmonid Water Regulations (1988) gives chemical parameter thresholds for achievement of Water Framework Directive 'High' and 'Good' Status.

With reference to the aquatic surveys, these were variably undertaken across ten 'sites' and river reaches, dependent on their suitability for the species and survey methods. They included sample areas on Site and off-site, where the reaches sampled for freshwater pearl mussel (R1 – R5) were all within SAC watercourses. These are illustrated in Figure 8.6 and set out in Table 10 below.

Table 2: Aquatic survey areas

Site / Reach (R) No.	On or off-site	Survey Method / Target Species				
		Fish habitat	Fish survey	Biological	Physico-chemical	FPM
1	Off-site	Y	Y	Y	Y	N
2	Off-site	Y	Y	Y	N	N
3	On Site	Y	Y	Y	N	N
4	On Site	Y	Y	Y	Y	N
5	On Site	Y	Y	Y	N	N
6	On Site	Y	Y	Y	N	N
7	On Site	Y	Y	Y	N	N
8	On Site	Y	Y	Y	N	N
9	On Site	Y	Y	Y	N	N
10	Off-site	Y	Y	Y	N	N
R1 Flesk	Off-site within SAC	N	N	N	N	Y
R2 Flesk	Off-site within SAC	N	N	N	N	Y
R3 Flesk	Off-site within SAC	N	N	N	N	Y
R4 Clydagh	Off-site within SAC	N	N	N	N	Y
R5 Clydagh	Off-site within SAC	N	N	N	N	Y

Y = survey method employed. N = survey method not used / habitat not suitable.

1.3.2 Ornithology

A full account of the ornithology surveys carried out is provided in Chapter 9: Ornithology and the accompanying TA 9.1 of the EIAR. However, the surveys carried out which provided the field data used in this assessment, with respect to the qualifying interests of the SPAs are summarised here.

Vantage Point Surveys

Vantage point (VP) surveys were undertaken between the dates of 22/10/2018 and 30/03/2021. The VPs were conducted in compliance published guidance (NatureScot, 2017). These consisted of surveys of no more than three-hour duration from fixed locations chosen to provide optimal coverage of the Proposed Development. A minimum of 36 hours of observation to be carried out per vantage point for each set of six summer and six months of winter surveys amounting to 72 hours across each calendar year from each VP location.

Target species constituted non-passerine species listed under Annex I of the EU birds directive and species on schedule four of the 1976 Wildlife Act of Ireland. This list included the qualifying interests of the SPAs under consideration in this NIS.

Hen harrier *Circus cyaneus* Roost Survey

Eight vantage points were selected for observations, at dawn or dusk, of the land within a 2km buffer of the proposed development area with a view to identifying the presence of Hen harrier roosts in the area. These surveys were conducted over three consecutive winters, 2018-19, 2019-20 and 2020-21 with a total of 699.9 hours observation time spread across spread across the vantage points.

Hen harrier is a qualifying interest of the Mullaghanish to Musheramore Mountains SPA.

Breeding Raptor Survey

Breeding raptor surveys were carried out within a buffer of 5km around the Proposed Development site and consisted of a mixture of static vantage point observations from six different locations and transects walked along public rights of way, predominantly roads.

In 2019 four visits were carried out but in 2020 April surveys were not carried out due to Covid 19 restrictions on travel to site.

Two raptor species are qualifying interests of SPAs under consideration in this NIS; Merlin *Falco columbarius* and Hen harrier.

Breeding Bird Survey

In 2019 four visits were carried out but in 2020 April surveys were not carried out due to Covid 19 restrictions on travel to site. Methodology was broadly based on published methods (Brown, 1993) (Bibby *et al* 2000) (Gilbert, 1998)). The survey area extended 500m beyond the site boundary as recommended by guidance (NatureScot, 2017).

All species which are qualifying interests of the SPAs under consideration would be recorded on this survey, if observed.

Wintering Bird Survey

Methodology was broadly based on published methods (Bibby *et al*. (2000) (Gilbert, 1998)). Target species were raptors, waterbirds, gulls, and ground birds of conservation interest. Surveys were carried in in the winter of 2018-2019 and the winter of 2019-2020. There were four survey periods carried out in each winter, in October, December, January and March.

The species range included in this survey include species which are qualifying interests of the SPAs under consideration.

1.4 Natura Sites Considered

1.4.1 Special Areas of Conservation

There are four Special Areas of Conservation (SACs) within 10km of the Site. These, along with their special conservation interests and conservation objectives are in Table 3 below. A distance of 10km was considered a suitable search area to encompass sites which may be hydrologically connected to the Site.

Table 3: SACs within 10km of the Site

SAC Name	Distance	Special conservation interests	Conservation Objectives
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	Adjacent to the north	**Annex I habitats:** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*); Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*; Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation; Northern Atlantic wet heaths with *Erica tetralix*; European dry heaths; Alpine and Boreal heaths; *Juniperus communis* formations on heaths or calcareous grasslands; Calaminarian grasslands of the *Violetalia calaminariae;* Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); Blanket bogs (* if active bog); Depressions on peat substrates of the *Rhynchosporion*; Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) and *Taxus baccata* woods of the British Isles. **Annex II species:** *Geomalacus maculosus* (Kerry Slug), *Margaritifera margaritifera* (Freshwater Pearl Mussel), *Euphydryas aurinia* (Marsh Fritillary), *Petromyzon marinus* (Sea Lamprey), *Lampetra planeri* (Brook Lamprey), *Lampetra fluviatilis* (River Lamprey), *Salmo salar* (Salmon), *Rhinolophus hipposideros* (Lesser Horseshoe Bat), *Lutra lutra* (Otter),	Favourable conservation status of a habitat is achieved when: • its natural range, and area it covers within that range, are stable or increasing, and • the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and • the conservation status of its typical species is favourable. The favourable conservation status of a species is achieved when: • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

SAC Name	Distance	Special conservation interests	Conservation Objectives
		Trichomanes speciosum (Killarney Fern), *Najas flexilis* (Slender Naiad) and *Alosa fallax killarnensis* (Killarney Shad).	
Mullaghanish Bog SAC	75m south	Annex I habitat - Blanket bogs (* if active bog)	As above
St. Gobnet's Wood SAC	4km south	Annex I habitat - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	As above
Blackwater River (Cork/ Waterford) SAC	6km north east	Annex I habitats: Estuaries; Mudflats and sandflats not covered by seawater at low tide; Perennial vegetation of stony banks; *Salicornia* and other annuals colonising mud and sand; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); Mediterranean salt meadows (*Juncetalia maritimi*); Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation; Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). **Annex II species:** Freshwater Pearl Mussel, White-clawed Crayfish, Sea Lamprey, Brook Lamprey, River Lamprey, Twaite Shad, Salmon, Otter and Killarney Fern.	As above

1.4.2 Special Protection Areas

The search area used to define Special Protection Areas (SPAs) which had the potential to be significantly affected by the Proposed Development and so should be considered by the NIS was based upon guidance (National Parks and Wildlife Service, 2010). However this guidance acknowledges that it takes account of UK guidance so connectivity guidance published by NatureScot related to specific bird species (NatureScot 2016) was also taken into account when identifying SPAs which had the potential to be significantly affected by the Proposed Development. As such 15km (based on National Parks and Wildlife Service, 2010) was used as a general guide but was extended to 20km for SPAs with geese as qualifying features (based on NatureScot 2016).

This process identified three Special Protection Areas (SPA) within the search area; information is provided on these in Table 4.

Table 4: SPAs considered within this NIS

Site Name	Special Conservation Interests	Distance from the Proposed Development
Mullaghanish to Musheramore	Hen harrier *Circus cyaneus*	500m

Site Name	Special Conservation Interests	Distance from the Proposed Development
Mountains SPA		
The Gearagh SPA	Wigeon *Anas penelope* Teal *Anas crecca* Mallard *Anas platyrhynchos* Coot *Fulica atra* Wetland and Waterbirds	14.2km
Killarney National Park SPA	Greenland White-fronted goose *Anser albifrons* Merlin *Falco columbarius*	19km

Table 5 shows the conservation objectives for Mullaghanish to Musheramore Mountains SPA.

Table 5: Mullaghanish to Musheramore Mountains SPA Conservation Objectives

Attribute	Measure	Target
To restore the favourable conservation condition of hen harrier in Mullaghanish to Musheramore Mountains SPA, which is defined by the following list of attributes and targets:		
Population size	Number of confirmed breeding pairs	Maintain numbers at or above 3 confirmed breeding pairs
Productivity rate	Number of fledged young per confirmed pair	Maintain at least 1.0–1.4 fledged young per confirmed pair
Spatial utilisation by breeding pairs	Percentage	Restore the spatial utilisation of the SPA by breeding pairs to 100%
Extent and condition of heath and bog and associated habitats	Hectares; condition assessment	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation
Extent and condition of low intensity managed grasslands and associated habitats	Hectares; condition assessment	Restore the extent and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation
Extent and condition of hedgerows	Hectares; condition assessment	Maintain at least the length and quality of this resource to support the targets relating to population size, productivity rate and spatial utilisation
Age structure of forest estate	Percentage	Achieve an even and consistent distribution of age-classes across the forest estate
Disturbance to breeding sites	Level of impact	Disturbance occurs at levels that does not significantly impact upon breeding hen harrier

The conservation objectives for The Gearagh SPA are:

- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA; and

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

The conservation objectives for the Killarney National Park SPA are:

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

2 Proposed Development Description

This section has been summarised from Chapter 4 of the EIA, describes the Proposed Development in detail.

2.1 Proposed Development Site

The Proposed Development is located approximately 6km north of Ballymakeery town, in the Derrynasaggart Mountains, Co. Kerry. It encompasses the townlands of Cummeennabuddoge and Clydaghroe and is approximately 709ha in size. The proposed access route passes through the townlands of Cummeenavrick and Glashacormick, Co. Kerry. The majority of the grid connection runs through Co. Cork, running eastwards towards the existing Ballyvouskill substation.

The Proposed Development Site is connected to the N22 national road by an access track connected to the main site body. Land use at the Proposed Development Site currently consists of coniferous plantation with existing forestry tracks traversing the Proposed Development Site, and localised areas of cut forest. The grid connection route follows an existing forest track before diverting through undeveloped hillside and into agricultural fields, alongside a farm track before entering the Ballyvouskill 220kV substation site.

2.2 Development Outline

The Proposed Development comprises the following:

- 17 wind turbines and associated hardstand areas;
- The turbine dimensions are as follows:
  - a total tip height in the range of 199.5m minimum to 200m maximum inclusive;
  - hub height in the range of 118m minimum to 125.5m maximum inclusive; and
  - rotor diameter in the range of 149m minimum to 163m maximum inclusive.
- One 110kV permanent electrical substation including a control building with welfare facilities, electrical plant and equipment, security fencing, underground cabling, wastewater holding tank and ancillary structures and associated works;
- Underground electrical and communication cabling connecting the wind turbines to the proposed on site substation and associated ancillary works.
- 110kV Underground cabling between the new permanent substation and the existing 220/110kV Ballyvouskill Substation to facilitate export of electricity to the National Electricity Grid;
- One Meteorological Mast of 110m in height and associated hardstand area to be removed at the end of the operational period;
- New permanent access tracks and permanent upgrades to existing tracks, site access;
- Four borrow pits;
- Six permanent peat repository areas;
- Permanent placement of peat along sections of site access roads within the restrictions outlined in Technical Appendix 10-3 Peat Management Plan for the site;
- Three temporary construction compounds;

- Site drainage;
- Keyhole forestry felling to accommodate the construction and operation of the proposed development;
- Localised temporary works along the turbine delivery route in County Cork to facilitate the delivery of turbine components (namely temporary street furniture removal and vegetation clearance).
- Upgrading of existing site entrance at the local access road adjacent to the N22, Health and safety signage, information signage, and direction signage;
- All other associated site development works including necessary earthworks to facilitate the construction and operation of the Proposed Development over an operational lifespan of 35 years; and
- 10 year planning permission is being applied for.

The Proposed Development component parameters (length/area) are summarised in Table 6 below.

Table 6: Proposed Development Components

Proposed Development Components- Parameters	
Turbine	
17 wind turbines and associated hardstand areas with the following parameters: • A total tip height in the range of 199.5m minimum to 200m maximum inclusive; • Hub height in the range of 118m minimum to 125.5m maximum inclusive; • Rotor diameter in the range of 149m minimum to 163m maximum inclusive; and • Power output in the range of 6.0MW minimum to 7.2MW maximum, per turbine.	
Component	**Length /Area**
New Access Tracks (Founded)	19.04km
Upgrade Of Existing Access Tracks	6.99km
Turning Heads (5 No.)	2,945m^2
Turbine Foundation (17 No.)	22m diameter foundation 6,461m^2 total
Crane Hardstanding (17 No.)	185,842m^2
Met Mast Height	110m
Met Mast Hardstand Area	625m^2
Length of Internal Grid Connection Cables	89.7km (laid within access tracks), based on 4 arrays with 4 cables each.
Grid Connection Route to National Grid	3.6 km
Onsite Substation	8,411m^2
Peat Repository 1	30,586m^2
Peat Repository 2	19,948m^2
Peat Repository 3	32,264m^2
Peat Repository 4	10,254m^2
Peat Repository 5	16,333m^2
Peat Repository 6	17,460m^2
Borrow Pit 1	16,952m^2
Borrow Pit 2	45,357m^2
Borrow Pit 3	35,832m^2

Proposed Development Components- Parameters	
Turbine	
Borrow Pit 4	38,866m²
Temporary Construction Compound 1	7,500m²
Temporary Construction Compound 2	7,500m²
Temporary Construction Compound 3	4,878m²

2.3 Relevant Development Components

Full details can be found in Chapter 4; however relevant information to this NIS is included here.

2.3.1 Wind turbines

The location of the turbines are shown in EIAR Figure 1-2 and provided in Table 7.

Table 7: Proposed Turbine Locations

Turbine number	ITM X	ITM Y	Grid Ref
1	521909	583645	OV2190983645
2	521820	584122	OV2182084122
3	521304	583200	OV2130483200
4	521164	583642	OV2116483642
5	521201	584214	OV2120184214
6	520493	583186	OV2049383186
7	520532	583692	OV2053283692
8	520312	584085	OV2031284085
9	519746	582997	OV1974682997
10	519828	583554	OV1982883554
11	519030	582721	OV1903082721
12	519079	583259	OV1907983259
13	518641	583554	OV1864183554
14	518274	582399	OV1827482399
15	518326	582965	OV1832682965
16	517622	581933	OV1762281933
17	517644	582502	OV1764482502

2.3.2 Watercourse Crossings

A total of 14 watercourses will be crossed by the proposed development. 5 crossings are proposed along upgraded existing access tracks, 8 along new access tracks and 1 along the grid route.

A total of 8 new crossings over mapped watercourses are proposed along the new access tracks. The proposed grid connection route also crosses one mapped watercourse, but no in-channel works are proposed where the cable is to be laid under or over and existing culvert at that location.

The locations of these crossings are shown on EIAR Figures 1-2a to 1-2e.

Watercourse crossings have been designed to comply with Office for Public Works (OPW) design guidelines in relation to hydraulic performance and guidance provided in CIRIA C689 "Culvert Design and Operation Guide.

The form of the watercourse crossing is informed by aquatic surveys to determine the need to preserve watercourse substrate to ensure that fisheries and habitat objectives are maintained. The hydraulic design for watercourse crossings allows for clear span crossings (by bottomless culverts or similar) at 6 watercourse crossings, and the design and associated environmental assessments allows for either bottomless or closed culverts at 2 minor channels where the size and morphology of the channel is unlikely to be of fisheries value. The finalised form and design shall be informed by prior consultation with Inland Fisheries Ireland Environmental prior to implementation.

Watercourse crossings are sized to convey the "100-year" / 1% Annual Equivalent Probability (AEP) flood with free-inlet conditions, and so meet OPW Section 50 requirements for culverts in rural areas, and do not affect flooding elsewhere. All watercourse crossings will be subject to OPW approval under Section 50 of the Arterial Drainage Act, 1945, prior to construction.

Confirmatory inspections of each proposed watercourse crossing location will be carried out by the project civil/structural engineer and the project hydrologist and an aquatic ecologist prior to the construction of each crossing.

2.4 Construction

Subject to receipt of consent and deemed planning permission and sign off of pre-commencement conditions; construction works are anticipated to commence in 2028 with a total duration estimated at approximately 18-24 months.

A Construction Environmental Management Plan (CEMP) for the Proposed Development has been prepared as part of the EIA Report (Appendix 4-1). The CEMP details the principles and procedures for the environmental management of the Proposed Development during construction.

2.5 Operation and Decommissioning

The Proposed Development will have an operational lifespan of 35 years.

Once the Proposed Development ceases operation after the period of generation, all major equipment and structures will be removed from the Site or may be replaced with a new set of turbines subject to planning permission being obtained.

The potential for effects during the decommissioning phase of the Proposed Development have been assessed in this EIAR.

3 Description of Existing Environment

3.1 Terrestrial Ecology

Surveys predominantly focussed on the Site area itself, and thus were not directly within the SAC boundaries, with the exception of freshwater pearl mussel. The watercourses on Site also have connectivity to the SAC watercourses, hence are described below.Aquatic Ecology

The following aquatic habitats and species were recorded during the surveys which also potentially have affinities with the special conservation interests of the off-site SACs set out in 1.3.1

3.1.1 Aquatic Habitats

Figure references refer to the EIA Report figures.

F Freshwater; FW Watercourses; FW1 Eroding / upland rivers

As shown in Figure 8.6, approximately six first-order tributary streams of the Clydagh River rise within the Site and flow northwards from the first-order tributary streams to the river. Another tributary of the Clydagh River that rises within the Site drains south/southwest to it and passes close to the southwestern access point to the Site from the N22 National Primary Road.

The watercourses on Site are generally characterised by riffle-glide-pool sequences. They are shallow with a mean summer depth of 10cm-20cm. Significant substrate siltation caused by peat was observed at site 1 and site 8 (Figure 8-6) and evidence of enrichment in the form of filamentous algae was also recorded at these locations. There were extensive blooms of the bacteria *Leptothrix ochracea* on the benthos at site 5 and to a lesser degree, at site 4.

The aquatic plant community was dominated by the bryophytes *Fontinalis sp.* and *Chiloscyphus polyanthus*. These plants provide ecological niches for a variety of macroinvertebrates, which in turn feed fish and higher organisms.

There are networks of man-made drainage ditches (FW 4) across the Site associated with forest tracks and conifer plantation blocks. The large areas of actively and previously felled Sitka spruce forestry on Site are likely an ongoing source of peat silt and phosphate until such areas have revegetated and stabilised. Indeed, substrate conditions at site 1, located downslope of an area being felled and the time of the current surveys, was found to be impacted by peat silt and there was evidence of enrichment in the form of filamentous algae.

F Freshwater; FL Lakes and Ponds

Lough Carrignamork and Lough Gall are situated off-site between 50 – 200m from the southern Site boundary, the former within cutover bog habitat and the latter within wet heath. The lakes are not located within a SAC.

3.1.2 Aquatic Species

Fish Habitat Assessment and Electrofishing

Atlantic salmon and brown trout were recorded during the electrofishing of all watercourses draining the Site as shown in Figure 8.7. Salmon can be expected to occur in the lower reaches of the Clydaghroe, Mullaghanish streams which drain the Site. It is noted that site 7 than site 8 were located upstream and downstream of a track crossing the stream, respectively. Far fewer trout were recorded upstream than downstream. In addition, salmon (N=3) were recorded downstream but not upstream. Trout of smaller adult proportion can penetrate further into the headwaters of the upper Flesk and its tributaries and take advantage of spawning and nursery areas in 1st and 2nd order streams such as the Clydaghroe, Mulaghnaish and the streams at site 1, 3, 7 and 9, avoiding competition with salmon in these areas. The salmonids in the subject watercourses were mostly juvenile fish, highlighting the importance of these channels for the early life stages of trout and salmon.

Taking account of the size ranges in the watercourses studied, it is clear that the River Flesk is the comparatively most important water feature in the study area, supporting the greatest array of fish sizes. This is due to its large size and good water quality.

A total of 150 trout were captured and ranged in length from 4.2 cm to 20 cm. These fish had a mean length of 10.6 cm. A total of 55 salmon were captured and ranged in length from 5.1 cm to 11.8 cm. These fish had a mean length of 10.1 cm.

Based on the assemblages of instream macroinvertebrate life, generally good juvenile salmonid food supply exists in the headwaters of the streams draining the Site.

No lamprey were recorded.

Table 8 summarises each watercourse survey site, its suitability for salmon and Lamprey species and the survey results. Killarney shad is unique to a waterbody within the SAC and nor surveyed for on Site due to the lack of suitable habitat.

Table 8: Summary of suitability and records obtained for fish

Site Nos.	Suitability for Atlantic salmon	Suitability for Lampreys
1	Optimal for early life stages. Good/optimal salmonid nursery habitat. Moderate/poor suitability for spawning adults. Unsuitable for supporting adults through the year due to small size. Generally good food supplies Water quality affected by siltation and enrichment which reduce the quality of spawning and nursery habitat. **Brown trout recorded present**	Similar habitat requirements for spawning to small trout. Adequate spawning habitat in watercourses draining the Site, particularly for smaller lamprey species (brook lamprey). High energy of the area renders channel unsuitable for lamprey larvae due to lack of fine sediment. If lamprey occur, they are likely to be brook lamprey due to high river gradients (Reinhardt et al. 2009).
2	Optimal salmonid nursery value Good spawning value Good holding value and could also support larger salmonids in winter **Salmon and brown trout recorded present**	No lamprey value given higher gradient and spate nature of channel.
3	Very good nursery value	No lamprey nursery value given higher

Site Nos.	Suitability for Atlantic salmon	Suitability for Lampreys
	Poor spawning value Waterfall present downstream as a natural feature and a deep plunge pool could be a barrier to movement **Brown trout recorded present**	gradient and spate nature of channel. Waterfall present downstream as a natural feature and a deep plunge pool could be a barrier to movement.
4	Moderate spawning areas for trout but salmonid habitat diminished by adjoining afforested areas. Channel could provide moderate to good nursery habitat. Holding areas suboptimal for brown trout and unsuitable for other larger salmonids Poor water quality conditions likely to limit reproductive success (low oxygen levels) and early life stage suitability. **Brown trout recorded present**	Suboptimal for lamprey.
5	Poor water quality conditions likely to limit reproductive success (low oxygen levels) and early life stage suitability. **No fish recorded**	No lamprey value given the unsuitable gradient and likely spate of the channel.
6	Good/moderate spawning value. Fish habitat value diminished due to stream size, peat substrate and conifers. Optimal as salmonid nursery but poor holding for adult fish In addition, potential barrier to upstream movement due to a perched pipe **Brown trout recorded present**	In addition, potential barrier to upstream movement due to a perched pipe
7	Good nursery for salmonids. Poor spawning habitat. Holding value poor due to absence of deeper glide and pool habitat. A track crossing which separates sites 7 (upstream) and site 8 (downstream) represents a barrier to migrating salmonids. **Brown trout recorded present**	High energy of the area would not make the channel suitable for lamprey. In addition, potential barrier to upstream movement noted due to a drop caused by a track crossing the watercourse.
8	As site 7 **Salmon and brown trout recorded present**	As site 7
9	Moderate nursery habitat. Good salmonid spawning habitat. Too small for larger salmonids. **Brown trout recorded present**	Erosive nature makes it unsuitable for lamprey
10	Optimal nursery area. Moderate salmonid spawning. Poor pool quality in terms of holding adult fish **Salmon and brown trout recorded present**	No suitable lamprey nursery habitat, precluding the presence of this group. A search for juvenile lamprey in a sandy deposit in the River Flesk c. 1.5km downstream of site 10 via agitation sampling recorded none

Freshwater Pearl Mussel

Regarding the ecological quality objectives for FPM habitat, the watercourses within and adjacent to the Proposed Development Site channel generally fail on criteria for macroalgae and siltation (DoEHLG, 2009). Biological water quality ratings based on macroinvertebrates indicate that the water quality in the River Flesk is of adequate in terms of supporting FPM.

Using criteria in Anon (2004), the upper River Flesk is classified as a moderate priority river i.e., rivers with no prior records but with either igneous or sandstone bedrock underlying at least one third of their length; rivers flowing from lakes'. The upper reaches of the River Flesk are underlain by 'Devonian Old Red Sandstones'. The only watercourse in the study area that could possibly support FPM is the River Flesk. The tributaries of the River Flesk that drain the Proposed Development Site, as well as the River Flesk in its upper reaches are all above an elevation of 200 m. Such areas are indicated in Anon (2004) as not being likely to support FPM.

The surveys recorded a single FWPM. This mussel was found near the right bank of the River Flesk at survey reach R2 upstream of the N22 Bridge. It is considered that the FWPM population in the River Flesk has seriously declined and faces extinction.

FPM were not detected during the surveys carried out at all other surveyed reaches on the River Flesk. In general, macroalgal coverage within the survey reaches was frequent, and these conditions are considered unfavourable in terms of the species' habitat. Likewise, the sedimentation levels recorded were generally indicative of artificially induced siltation.

The presence of FPM in the Zone of Influence (ZOI) of the Proposed Development is therefore considered unlikely. The river reaches surveyed were considered to have overlapped with the ZOI of the Proposed Development regarding FPM. It is considered likely that the current FPM record from the River Flesk is beyond the ZOI of the Proposed Development, taking account of hydrological separation in excess of 17km (from site 10), dilution provided by other watercourses flowing into the River Flesk and recovery from pollution which takes place in rivers with distance downstream from sources.

3.1.3 Water Quality

Physico-chemical

Results of the on Site physico-chemical measurements at sites 1 and 3 are presented in Table 9 below. Laboratory physico-chemical results for these sites are presented in Table 10.

Table 9: Results of the on Site physico-chemical measurements

Parameter and unit	Site 1	Site 3
Conductivity (µS/cm)	75.5	78.6
Temperature (ºC)	11.2	11.7
Dissolved Oxygen (%)	93.2	87.5
Dissolved Oxygen (p.p.m.)	10.27	9.8
Total Dissolved Solids (mg/l)	53.7	41.7
Turbidity (NTU)	3.56	1.43
Turbidity (NTU)	3.82	1.3

Parameter and unit	Site 1	Site 3
Turbidity (NTU)	3.96	1.29
Turbidity (NTU) average	3.78	1.34
pH	7.3	7.89

Conductivity at both locations was low, as would be expected in watercourses draining peaty soils in a terrain where the solid geology is siliceous. Dissolved Oxygen concentrations were high, but slightly lower than the optimal of around 100%. pH at site 1 and site 3 was 7.3 and 7.89 respectively, readings typical of slightly acidic upland streams draining peatland. Further sampling points were undertaken during hydrological surveys and Chapter 11 Hydrology, Water Quality and Flood Risk and are included in the summary below.

Table 10: Laboratory physico-chemical results

Parameter and unit	Site 1	Site 3
Biological Oxygen Demand (BOD) (mg/L)	< 1.0	< 1.0
Suspended Solids (mg/L)	< 4	< 4
Total Ammonia (mg/L N)	< 0.02	< 0.02
Nitrate (mg/L N)	< 0.25	< 0.25
Nitrite (mg/L N)	< 0.005	< 0.005
Orthophosphate (mg/L P)	0.03	< 0 .01
Total Hardness (mg/L CaCO3)	17	12
Total Phosphorus (mg/L P)	0.04	< 0.04
Total Organic Carbon (TOC) (mg/L)	6.1	5.0

Biological Oxygen Demand (BOD)

BOD serves as an indicator of the presence of organic matter in a watercourse (eutrophication) and is a useful measure of water quality. BOD results at sites 1 and 3 were <1 mg/l, consistent with WFD high status with respect to this parameter. These results are within the recommended tolerance of 5mg/L O^2 for salmonid species which are vital for FWPM establishment. The results also achieve adherence to the 'Freshwater Fish Directive (78/659/EEC)' guidance of 3mg/L O^2 for salmonid waters.

Suspended Solids

Both sites had suspended solids levels of <4 mg/L which falls within the range of ≤25mg/L which is stated in the 'Salmonid Water Regulations (1988)' EPA, 2001).

Ammonia

Ammonia occurs naturally in rivers arising from the microbiological decomposition of nitrogenous compounds in organic matter. Fish and other aquatic organisms also excrete ammonia (EPA, 2001). Ammonia is naturally present in unpolluted waters in small amounts usually <0.02mg/L as N. Animal slurry, domestic sewage and industrial processes can all contribute to ammonia levels in water bodies. Ammonia may also be discharged directly into water bodies by some industrial processes or as a component of domestic sewage or animal slurry. The decay of organic waste is another factor leading to the addition of ammonia in waters (EPA, 2001).

Total Ammonia concentrations at sites 1 and 3 were <0.02 mg/L. In relation to the 'Quality of Salmonid Waters Regulations 1988' this parameter has an EQS of ≤1mg/L NH4, subject to conforming to the standard for non-ionized ammonia (EC, 1988). Both

sites meet this objective based on the sample taken, however this parameter should be measured for its quality of salmonid waters by using 95% of the results collected over a 12-month period for it to be considered an appropriate reading (EC, 1988). The result in the table above is single reading only in this regard.

The results for Ammonium was <0.129 for both sites is well below the mandatory values of the 'Freshwater Fish Directive (78/659 EEC) of <1mg/L NH4+.

Nitrite / Nitrate

There are no environmental quality standards for nitrate but average nitrate concentration values less than 4 mg/l NO3 (0.9mg/l N) and less than 8 mg/l NO3 (1.8mg/l N) are considered by the EPA to be indicative of high and good quality respectively (EPA, 2017). The results for both sites were < 0.25 mg/l which means these sites are considered to be of good quality, in accordance with EPA (2001) guidance.

Orthophosphate and Total Phosphorus

This chemical parameter does occur naturally in water bodies from geological sources. Orthophosphate is the most readily available form of the nutrient Phosphorous for plant uptake during photosynthesis and is generally considered to be the limiting nutrient for plant growth in freshwater. Elevated levels of this chemical can have a detrimental effect on aquatic life.

The result for orthophosphate for site 1 was <0.03 mg/L P and site 3 was < 0.01 mg/L P. The orthophosphate levels for the surveyed sites met the 'good' quality status requirements for the mean value stipulated in the SWR (2009) though the results for the sites was from a single reading. The main cause for elevated levels is from agricultural runoff from land and farmyards which can contain organic and artificial fertilisers and other effluents (EPA, 2001). The concentration of this parameter at site 1 was deemed elevated and the likely cause was considered related to clear-felling of commercial forestry upslope.

In the Freshwater Fish Directive [78/659/EEC], a Total Phosphorus concentration of less than 0.2mg/l for salmonids is regarded as indicative in order to reduce eutrophication (Planning, 1990). The total phosphorus concentration for site 1 and site 3 was 0.04 mg/l and <0.04 mg.

Total Hardness

Total Hardness values of 17 mg/L and 12 mg/L CaCO3 were obtained for site 1 and site 3 respectively. According to the EPA's classification table for water hardness (EPA, 2019), water in the study area is classified as soft. Harder water can reduce the effect of toxicity of some metals including zinc, copper, and lead (EPA, 2019).

Total Organic Carbon

The majority of organic carbon in water is made up of humic substances as well as partially degraded plant and animal materials. Organic carbon is resistant to microbial degradation (EPA, 2019). TOC values were 6.1 mg/L at site 1 and 5 mg/l at site 3. This parameter has no limit target specified in Irish legislation.

3.2 Ornithological Receptors

The following sections provide a summary of the findings of the survey work and desk study records with respect to species designated as Special Conservation Interests for the three SPAs being considered.

3.2.1 Mullaghanish to Musheramore Mountains SPA

Hen harrier

There was limited activity of Hen harrier over the Proposed Development and the survey area. Most of what was recorded was observed during the non-breeding season.

There was no evidence of breeding Hen harrier recorded during breeding raptor surveys. That there were no breeding Hen harriers on or close to the Proposed Development was further confirmed from the species' absence from vantage point surveys during the breeding season; there was one flight observed in March 2020 and all the remaining seven flights were recorded in the wintering period. A summary of vantage point activity is shown in Table 11 and can be seen on Figures 9-1a-b, Chapter 9: Ornithology. Only one flight was observed partially in the Proposed Development Site.

Table 11: Hen harrier activity recorded from vantage points

Year	Max no. of birds (per flight)	No. of Flights	Total Flight Time (bird secs)	Total Flight Time at Risk Height (bird secs)
2018/2019	2	6	193	130
2019/2020	1	2	143	0
2020/2021	0	0	n/a	n/a

Seven flights were observed during the non-breeding season. During the two winters of dedicated Hen harrier roost surveys a further seven flights were recorded (Figure 9-2). However, there were no Hen harrier roosts detected during these surveys.

3.2.2 The Gearagh SPA

Wigeon

There were no Wigeon recorded during surveys of the Proposed Development.

Teal

There were no Teal recorded during surveys of the Proposed Development.

Mallard

There was some activity of Mallard recorded in the vicinity of Lough Carrignamork and Lough Gal, on the southwest boundary of the Proposed Development during winter bird surveys. One flight involving two individuals was recorded during vantage point surveys (Table 12).

Table 12: Flight activity of Mallard from VPs

Year	Max no. of birds (per flight)	No. of Flights	Total Flight Time (bird secs)	Total Flight Time at Risk Height (bird secs)
2018/2019	n/a	0	n/a	n/a
2019/2020	2	1	96	0
2020/2021	n/a	0	n/a	n/a

There were also two sightings of Mallard during the breeding season; one of three birds on Comeenatrush Lough in June 2020 and a pair in flight during raptor surveys in June 2019.

Coot

There were no Coot recorded during surveys of the Proposed Development.

3.2.3 Killarney National Park SPA

Greenland White-fronted Goose

Greenland White-fronted geese were not recorded during surveys of the Proposed Development. Habitat suitability is very low for this species on the Proposed Development; Greenland White-fronted geese are a grazing species and do not make use of forest habitats.

Merlin

There was one historic record of Merlin in the 10km square which contains the Proposed Development.

There were also three sightings of Merlin during Hen harrier roost surveys; two on the same day of a male, likely to be the same individual, in March 2019 and a male in January 2020.

This species was not recorded during breeding season surveys or vantage point surveys.

4 AA Screening

4.1 SACs

4.1.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

The upper reaches of this SAC are off-site and adjacent to the northern Site boundary, where it then extends westwards covering an area of 1464ha. The upper reaches of the River Clydagh rise adjacent to the Site as part of the SAC and then flow westwards to join the River Flesk and other tributaries which form the Caragh River catchment.

Due to the valley topography, the minor watercourses on Site are all likely drain to the north and into the River Clydagh. Therefore, the Site is hydrologically connected to the River Clydagh which is part of the SAC. However, the river also forms an effective barrier meaning habitats on Site will not be connected to those as part of the SAC due to the intervening river. This watercourse will also act as an effective barrier to movement for some terrestrial species.

There is potential for indirect effects from the Proposed Development on the SAC watercourses and the species they support arising from changes in water quality, pollution or siltation events. For other SAC habitats and species, effects are less likely due to no connectivity. This is set out in Table 13 below.

Table 13: Screening of potential effects on Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

SAC Feature	Pathway for Effects	Screening Outcome
Oligotrophic waters containing very few minerals	Potential for suspended solids from construction works on Site to enter watercourses and adversely affect the water quality within the SAC	**Screened in to AA**
Oligotrophic to mesotrophic standing waters	No standing water habitat with hydrological connectivity downstream of the Site	No likely significant effects
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation;	Species for which the SAC is designated are not recorded in the watercourses on Site or in the adjacent reaches of River Clydagh. Downstream populations of this vegetation could be indirectly affected by pollution or siltation. The Conservation Objectives state that there is limited information on the locations of these species in the rivers, therefore it is not possible to state with confidence if effects are likely. Given the likely distance from the Site to populations of these plants, any effects are considered unnoticeable.	No likely significant effects
Wet heath	Present in narrow channels alongside Site watercourses which lead to River Clydagh. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Dry heath	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Alpine and sub-	Not present on Site. No connectivity to SAC	No likely significant

SAC Feature	Pathway for Effects	Screening Outcome
alpine heaths	habitat due to river as a barrier.	effects
Juniper scrub	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Calaminarian grassland	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Molinia meadows	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Blanket bogs (active)	Active blanket bog absent from the Site. Cutover bog present on Site in south-west with no connectivity to SAC.	No likely significant effects
Depressions on peat substrates of the *Rhynchosporion* vegetation	No evidence of habitat present on Site due to poor quality of bog habitat and small tracts of wet heath affected by coniferous plantations. No connectivity to this habitat within the SAC due to the river as a barrier.	No likely significant effects
Old oak woodlands	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)* and *Taxus baccata* woods of the British Isles.	Not present on Site. Whilst this Annex I habitat is reliant on the water environment, this will not be water received from the Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Yew woodlands	Not present on Site. No connectivity to SAC habitat due to river as a barrier.	No likely significant effects
Kerry slug	Present on Site, but Kerry slug on Site is not part of the SAC population due to the intervening river which is an effective barrier to movement	No likely significant effects
Freshwater pearl mussel	Conservation Objectives state that the distribution of this habitat and subtypes in the numerous SAC rivers and streams have not been documented. Not present in watercourses on Site. Single FWPM recorded 17km downstream from the Site in River Flesk which is within the SAC, into which the River Clydagh drains. However, the Conservation Objectives of the SAC show that the FWPM population as part of the SAC are distant from the Rivers Clydagh and Flesk, located in the Gearhammeen, Caragh and Currane systems. At their closest point, these populations and their catchments are c. 30 km west with no likely connectivity due to being in different catchments. The FWPM recorded is therefore an individual but not part of a viable SAC population.	No likely significant effects
Marsh fritillary	No sightings of the butterfly, its larvae or foodplant (Devil's-bit scabious) during surveys on Site. Site habitats are unsuitable for Devil's-bit scabious. Site does not provide suitable habitat for SAC species.	No likely significant effects
Sea lamprey and	No lamprey species recorded during surveys of	No likely significant

SAC Feature	Pathway for Effects	Screening Outcome
River lamprey	Site watercourses or off-site reaches of River Clydagh. Unsuitable for passage due to fast-flowing nature of watercourses, and lack of sandy/silty deposits make them unsuitable for larvae. Not likely present in watercourses which could be affected by the Proposed Development.	effects
Brook lamprey	No lamprey species recorded during surveys of Site watercourses or off-site reaches of River Clydagh. Watercourses potentially more suitable for this smaller lamprey species nut none recorded.	No likely significant effects
Killarney shad *Alosa fallax killarnensis*	Unique to Louch Leane, which is not connected to the Site watercourses.	No likely significant effects
Atlantic salmon	Recorded present on watercourse on Site which are connected to the SAC rivers.	**Screened in to AA**
Lesser horseshoe bat	Not recorded during bat surveys.	No likely significant effects
Otter	Not recorded on surveys but a mobile species which could range on the River Clydagh in the SAC which is connected to the on Site watercourses. Potential for disturbance effects during construction or indirectly if water quality effects could change fish populations as food sources.	**Screened in to AA**
Killarney fern	Not recorded on Site during surveys, its required habitat of humid rock faces in wooded ravines is not present on Site. The species is frost sensitive so exists at lower oceanic altitudes. If present in wider SAC off-site, its' location above the water line means there will be no pathway for effects.	No likely significant effects
Slender naiad	This rare aquatic plant is typically present in the Loughs within the SAC. These waterbodies are not connected to the watercourses on Site.	No likely significant effects

4.1.2 Mullaghanish Bog SAC

Mullaghanish Bog SAC designates open upland habitats which support Annex I blanket bog around the peak of Mullaghanish Mullach an Ois. It is located 75m south of the Site boundary and >100m from proposed infrastructure at its closest point. The Site is downgradient of the SAC. It lies at a higher elevation than the Site, upslope of it.

Due to the position of the SAC at a higher elevation to the Site, any proposed works associated with the Proposed Development (excavations or similar) are sufficiently lower in gradient that they cannot have any drainage or similar effect that would affect the integrity of the qualifying features.

The mosses present in bog habitats can be susceptible to damage from dust deposition. However, the substrate of the Site is wet and peaty, unlikely to give rise to dust. If dust were generated, in any case this would fall downslope i.e. away from the SAC, and would be intercepted by the conifer plantations between the proposed turbines and the SAC. This, as well as the distance means that secondary effects - in the form of habitat drying or dust deposition – are considered unlikely. Direct and indirect effects on Mullaghanish Bog SAC are therefore screened out.

4.1.3 St. Gobnet's Wood SAC

St. Gobnet's Wood SAC is located 4km to the south of the Site and is designated for old oak woodlands, due to the distance from the Site and the woodland not being susceptible to more distant hydrological effects. Effects on St Gobnet's Wood SAC are therefore screened out.

4.1.4 Blackwater River (Cork / Waterford) SAC

The hydrological studies have indicated that the water environment on Site drains entirely north westwards into the River Flesk catchment. Blackwater River (Cork / Waterford) is located 6km northeast, therefore there is no connectivity to the Site. This SAC is therefore screened out from further assessment due to lack of connectivity and distance.

4.2 SPAs

4.2.1 Mullaghanish to Musheramore Mountains SPA

The SPA is designated for its breeding population of Hen harriers with an estimated population of five breeding pairs at time of designation. Annual monitoring between 2017 - 2020 had shown a smaller population than this of two pairs between 2017 – 2019 before five pairs were recorded in 2020. This means the SPA has a four year mean of 2.8 +/- 1.3 pairs (NPWS, 2022).

No breeding Hen harrier were observed during surveys. There was activity recorded during the non-breeding season; the provenance of these birds is unclear as Hen harriers do wander widely - for example birds from Scotland and the Isle of Man have been recorded wintering in Ireland (O'Donoghue, 2020), but it is also considered they can also remain close to their breeding territories as well (*ibid*). As such, there is the possibility that birds from the SPA do make some use of the area during the wintering period and the fact that no birds were recorded during the breeding season does not mean that it can be categorically stated that no use of the area is made by the SPA population of breeding Hen harriers.

As such potential effects do need to be considered. These can include loss of or changes to habitat or habitat quality, displacement/disturbance, impacts on breeding productivity and increased mortality as a result of collision.

The Proposed Development will see the removal of commercial forestry plantation and the retention of open habitats around the turbines. Hen harrier habitat preferences include open habitats such as moorland and grassland, as well as newly planted forestry at the pricket stage, up until the canopy closes, where it becomes much less suitable for foraging Hen harrier (Madders, 2000). Little use is made of plantation forestry. As a result, habitat changes across the Proposed Development are likely to apparently increase the suitability for Hen harrier, with the removal of forestry and the replacement of it with open habitats more suitable for hunting. However increased edge effects associated with second generation plantation forestry or managed commercial forestry have been associated with poorer breeding outcomes (Sheridan, et al., 2020), which would have a negative effect on birds breeding within the study area. However, no breeding season use of the area has been observed; no foraging occurred during the breeding season and no breeding was recorded. Use has only

been made during the non-breeding season which would not directly affect breeding output. There is no evidence of how non-breeding season use of such habitats affects breeding output. As such, there would be no effect upon the productivity of the SPA breeding population, which is currently at 1.5 +/- 0.5 so is higher than the measure set out in the conservation objective (NPWS, 2022). There would be no likely significant effect upon the SPA population.

The conservation objectives also require maintenance of habitat types and quality within the SPA; however because the Proposed Development lies entirely without the SPA boundary habitat changes within the Proposed Development would not affect these conservation objectives. There would therefore be no likely significant effect upon the habitats present within the SPA.

The Proposed Development has potential to cause disturbance (particularly during the construction period) or displacement (during construction but also in the operational phase) due to potential avoidance of infrastructure by breeding Hen harrier. The conservation objectives seek to restore spatial use of the SPA by breeding Hen harrier to 100%.

The avoidance behaviour of Hen harriers towards wind farms and particularly turbines has been the subject of research in the UK. A study on Scottish wind farms (Pearce-Higgins, 2009) showed a 53% reduction in activity within 500 m of turbines; however this has not been replicated on more detailed long running studies of individual wind farms in Scotland (e.g. Edinbane wind farm (Fielding, 2015); also (Haworth, 2013)).

However, the closest point between the Proposed Development and the SPA is 500 m. Thus even if the effect identified by Pearce-Higgins was to occur at the Proposed Development, it would not affect spatial utilisation within the SPA as all turbines lie more than 500 m from the SPA boundary and so any reduction in activity would occur outwith the SPA. Additionally there was no evidence of use by breeding Hen harriers; an effect cannot occur if the area is not used by the species. As such, there cannot be a likely significant effect and further assessment is not required.

Concern has been raised about the impact of wind farms on productivity of breeding Hen harrier on or in the surrounding area. Two Irish studies (Wilson, Fernandez-Bellon, Irwin, & O'Halloran, 2015) (Fernandez-Bellon, Irwin, Wilson, & O'Halloran, 2015) have produced results apparently showing potentially reduced breeding productivity for nests within 1 km of wind farms. However neither study showed this as statistically significant; differences in productivity up to 1 km from the wind farms were not measurably different from those at greater differences, even though they were lower. While it has been suggested that this 'near significant' effect carries biological relevance, this would appear to be contrary to the scientific method which forms the basis of the NIS process.

Additionally with no breeding recorded during surveys, even if this effect does occur, there are no breeding territories within the locale for it to act upon. As such this cannot be considered a likely significant effect upon the productivity of the SPA population and Appropriate Assessment is not required.

The final potential effect to be considered is possible increased mortality as a result of collision risk which could have the effect of reducing the SPA population size.

With no flight activity observed during the breeding season no additional mortality as a result of collision risk has been estimated on the SPA population. There may be some,

but the level of flight activity has been so low as to be undetectable; this would correspond to a level of collision risk which would not cause additional mortality on the SPA population.

Flight activity was observed during the non-breeding season. Collision risk associated with this was estimated at 0.001 birds per year, which equates to one bird lost every 729 years or 0.048 birds lost over the life span of the Proposed Development. This is not therefore considered a likely significant effect upon the SPA population; while collision mortality cannot be ruled out since it is greater than zero, the likelihood of even one bird being killed is extremely low; such a low estimate of risk, on a population which may or may not include birds from the SPA population would not considered to be a likely significant effect.

As a result of the low level of activity of Hen harrier over the Proposed Development and the separation between the Proposed Development and the SPA, there are no likely significant effects identified and the Proposed Development could proceed without adverse effects on the Conservation Objectives of the SPA. Site integrity would be maintained.

4.2.2 The Gearagh SPA

The SPA is designated for its population of waterbirds; Wigeon, Teal, Mallard and Coot all have occurred in nationally important numbers, as well as for wetland habitats and waterbird species. Table 14 provides population estimates for these species taken from the Site Synopsis (National Parks and Wildlife Services, 2012).

Table 14: Population estimates of species listed as Special Conservation Interests

Species	Population estimate (2 year Mean 1994/5 – 1995/6)
Wigeon	1060
Teal	929
Mallard	478
Coot	369

Three of those species were not recorded during surveys of the Proposed Development. Mallard was present in small numbers on/around the Proposed Development, with birds observed on nearby loughs during the winter bird surveys. As such, effects on the SPA populations as a result of the Proposed Development are not considered further and there are no likely significant effects which can be identified.

It is highly unlikely that the Mallard observed during surveys form part of the SPA population given the ubiquitousness of the species in the wider countryside and the distance between the Proposed Development and the SPA (14.2km). Mallard observed during the non-breeding season were recorded on or around the loughs to the south of the Proposed Development and not actually within the Proposed Development. Construction areas are well away from the waterbodies (the nearest turbine is more than 500m away) and Mallard habituate readily to human activity, given their common occurrence in waterbodies closely associated with the presence of humans, such as in towns and cities.

As such, there are no likely significant effects of disturbance or displacement on local birds using the lough, which are highly unlikely to form part of the SPA population. There

would be no habitat loss for the species due to the distance between the Proposed Development and the waterbodies.

There was only one Mallard flight observed during vantage point surveys; there was no time spent at collision risk height so any additional mortality as a result of flight activity over the Proposed Development is too low to be estimated. There are therefore no likely significant effects of increased mortality.

As such, no likely significant effects are identified for the Special Conservation Interests of the SPA and Appropriate Assessment is not required. The Proposed Development could therefore proceed without adverse effect upon the SPA and the conservation objectives of the SPA could be maintained.

4.2.3 Killarney National Park SPA

The SPA is designated for populations of Greenland White-fronted goose and Merlin. The Site Synopsis (National Parks and Wildlife Services, 2014) identifies a non-breeding population of approximately 20 White-fronted geese and an estimated five pairs of breeding Merlin.

The Proposed Development lies 1km from the SPA; however this relates to road alterations to be made; the main area of development is more than 10 km from the SPA.

There were no observations of White-fronted geese during the surveys in support of the Proposed Development and the habitat present on the Proposed Development has limited suitability for foraging geese.

A literature review of foraging distances from roost for this species suggests that most foraging occurs no more than 8km from roost sites (Pendlebury, et al., 2011). As such, it would not be expected that there would be any interaction between the SPA population and the Proposed Development (excluding the area where the road is to be revised) and birds from the SPA will not fly out over the Proposed Development to feed. As a result, there would be no likely significant effect on the White-fronted goose population.

Similarly, the home range for breeding Merlin is considerably smaller than the distance between the Proposed Development and the SPA. Maximum home range recorded is 8km in Alaska, with Scottish populations not going beyond 5km (Pendlebury, et al., 2011). Given Merlin feed predominantly on small birds, there would be no reason for them to commute 19km, and possibly further depending on where the territories are within the SPA.

Additionally, there were no observations of Merlin during the breeding season on the Proposed Development with the with birds present on two surveys over the course of the surveys all occurring outside the wintering period. There is a very small possibility that these birds could form part of the breeding population of the SPA, given the lack of knowledge about where wintering birds from the SPA may go. Even if they were, the very low level of activity observed on the Proposed Development would mean it would not be considered supporting habitat. As such, there would be no adverse effects from changes to the site's habitat, especially given the birds were present over open habitats which would be increased by the Proposed Development. Merlin routinely fly at very low level; collision risk was not able to be estimated due to the fact they were not observed during vantage point surveys. However, with such few flights observed

and the low level of flight activity routinely used by Merlin, combined with the uncertainty about the source of the birds observed during winter surveys at the Proposed Development there would be no additional mortality as a result of the Proposed Development.

As such, no likely significant effects are identified for the Special Conservation Interests of the SPA and Appropriate Assessment is not required. The Proposed Development could therefore proceed without adverse effect upon the SPA and the conservation objectives of the SPA could be maintained.

4.3 Summary of Likely Significant Effects

Table 15 summarises the effects which have been identified as having potential to be significant and thus which should be considered further at Appropriate Assessment.

Table 15: Summary of Likely Significant Effects

Site	Qualifying feature	Likely significant effect
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	Oligotrophic waters containing very few minerals	Potential for suspended solids from construction works on Site to enter watercourses and adversely affect the water quality within the SAC
	Atlantic salmon	Atlantic salmon recorded in watercourses on Site and off-site. Potential effects on range if the Proposed Development introduces watercourse crossings as barriers, and effects from pollution during construction altering water quality.
	Otter	No evidence of otter recorded on Site. Potential for them to range occasionally on Site as food sources exist in the watercourses.

5 Appropriate Assessment

5.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

5.1.1 Potential Effects from Water Borne Pollution During Construction

Section 4 has identified the potential for the construction of the Proposed Development to result in pollution reaching the watercourses on Site which then in-turn drain into the River Clydagh as part of the SAC. Pollution could change the water quality, biology and chemistry of the river and consequently the SAC species it supports.

As part of the impact assessment process, hydraulic modelling was undertaken to assess the potential effects of the release of both suspended sediments on runoff from proposed site drainage on the River Clydagh as well as dispersion of nutrients downstream through the River Clydagh/River Flesk and into Lough Leane. This allowed an assessment of the potential effects on the SAC to be made.

Modelling was undertaken taking into account the mitigation set out in Section 6. The reason for this was that the Proposed Development could not proceed without measures in place to protect the aquatic environment. The mitigation proposed is relatively standard and based on tested good practice methods which are demonstrably effective at protecting watercourses, having been used on a large number of windfarms (and other similar developments). Given that there was no prospect of the Proposed Development going ahead without that mitigation in place, it was felt there was no need to model such an eventuality.

For nutrients, a detailed 1D ICM water quality model of the River Clydagh/River Flesk was developed to model the watercourse from immediately downstream of the Site Boundary to its confluence with Lough Leane. Full details of the model are provided in Appendix 11-2: Water Quality Assessment.

For each of the nutrients modelled, downstream dispersion through the River Clydagh/ River Flesk catchment is such that concentrations drop below the legislative limits and levels do not exceed the relevant EQS threshold levels at the point of discharge to Lough Leane.

For suspended solids, the hydraulic modelling simulated the transport and dispersal of sediments on the relevant water quality parameters described in section 3.1.3. The aim of the 2D 'far field study' is to assess compliance of total suspended solids (TSS) within the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC with EQS threshold levels and adherence with the relevant EU Water Quality Directives.

A detailed Infoworks ICM 2D hydrodynamic river model of the River Clydagh has been developed, allowing accurate determination of TSS pollutant concentrations in the SAC in the vicinity, and immediately downstream of the Proposed Development. Full details of the modelling have been provided in Appendix 11-2: Water Quality Assessment. The model simulations reflect embedded design and mitigation which would be applied to the Proposed Development (detailed below in Section 6) which ensures that settlement

is provided to manage all runoff up to clay range particles which are in suspension, and which are unlikely to settle without use of flocculent or similar.

The model results show that recommended limits of TSS concentrations are not exceeded at any point within the SAC. Figures showing distribution of concentrations are included in Appendix 11-2: Water Quality Assessment.

The following SAC features are dependent on the water environment and are considered in turn below in Tables 16-17. Otter are addressed in Section 5.1.2 due to potential effects arising from disturbance during construction on Site.

- Atlantic salmon
- Otter

Table 16: Assessment of Effects on SAC feature – Atlantic salmon

To maintain the favourable conservation status of Atlantic salmon		
Attribute	**Target**	**Assessment**
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. There are to be no artificial barriers on the Cummeragh/Finglas, Caragh, Ferta and Flesk/Laune systems; there are a number of natural waterfall barriers. The Proposed Development has the potential to introduce barriers to movement dependent on the design of the watercourse crossings.
Adult spawning fish	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The Flesk/Laune are currently exceeding both the 1 sea winter and multi sea winter CL. It is not anticipated there will be deterioration beyond current levels.
Salmon fry abundance (no. of fry / 5 minutes electro-fishing)	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers is currently exceeding their conservation limit (CL). Salmon fry in the 0+ age cohort were recorded during electrofishing surveys in sites 2, 8 and 10. These sites were electrofished for 10 minutes, whilst site 10 was depletion fished. Sites 2 and 8 each yielded 3 salmon in 10 minutes which falls short of the abundance threshold value. Site 10 yielded 49 salmon, but this was based on depletion fishing. The relatively low levels of salmon fry that exist in the sample areas on and off-site do not meet the abundance threshold value. It is not anticipated that the Proposed Development will significantly alter these values or the contribution the fry make to the salmon population in the wider SAC.
Out-migrating smolt abundance	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*). Marine salmon farming takes place in Kenmare Bay into which the Cummeragh discharges. There are no marine salmon farms in the Caragh, Ferta and Flesk/Laune estuaries. The estuaries are >40 km from the Proposed Development. Based on this, no adverse effects will occur.

Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are not preventing salmon from accessing suitable spawning habitat in the Cummeragh/Finglas, Caragh, Ferta and Flesk/Laune systems. The Proposed Development has the potential to introduce barriers to movement dependent on the design of the watercourse crossings.
Water quality	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA). Of the 10 watercourses sampled on and off-site, eight are of Q rating 4 or higher indicating they are unpolluted. Sites 4 and 5 scored 3-4 and 3 respectively, which fall short of this target. Currently, the water draining from some parts of the Site is not meeting this target. As The construction of the Proposed Development will involve felling of compartments of coniferous forestry, excavation of ground materials and introduction of man-made aggregate and concrete materials, all of which could potentially pollute site watercourses which then flow into the SAC and consequently harm Atlantic salmon. Modelling has shown that EQs would not be exceeded with respect to TSS or with nutrient release. Spillage of oils, chemicals, or cementitious material associated with temporary construction and arising due to improper Site management would be likely to cause a fundamental but temporary change in water quality in watercourses on the Site and similarly harm Atlantic salmon.

5.1.2 Potential Effects from Disturbance During Construction

During the construction works on Site, otter may range along the watercourses to forage and come into contact with temporary barriers to movement causing temporary disturbance. The potential effects are assessed in Table 17 below.

Table 17: Assessment of Effects on SAC Feature – Otter

To maintain the favourable conservation status of otter		
Attribute	**Target**	**Assessment**
Distribution	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013). The distribution of otter in the SAC is illustrated in the conservation objectives. The known populations are at least 5km distant from the Site. Therefore, whilst individual otter may range onto the Site, the Proposed Development will have no effects on the known distribution of the SAC otters.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1,936.8ha along river banks/lake shoreline/around ponds	The Proposed Development will not result in a significant decline of riverbank habitat. Therefore it will not affect the ability for this target to be upheld.
Extent of freshwater	No significant decline. Length mapped and	The Proposed Development will not result in a significant decline of terrestrial freshwater habitat. Therefore, it will not

To maintain the favourable conservation status of otter		
Attribute	**Target**	**Assessment**
(river) habitat	calculated as 1,246.2km	affect the ability for this target to be upheld.
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 2,710.3ha	There are no lakes within the Site boundary, therefore no effects are anticipated and this objective can be upheld.
Couching sites and holts	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006). No couches or lying up areas identified on the Site, and the cyclical nature of the disturbance resulting from forest operations will mean parts of the Site are less suitable on rotation. The works associated with the Proposed Development are unlikely to cause additional disturbance to that already ongoing.
Fish biomass available	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013). The potential effects on water quality set out above for Atlantic salmon could result in a decline in the salmon population. Being due to water quality, this is likely to affect other aquatic species which could result in a reduction in the prey available to otter.
Barriers to connectivity	No significant increase.	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed. The Proposed Development has the potential to introduce partial barriers to connectivity dependent on the design of the watercourse crossings.

5.1.3 Effects during Operation

There are not anticipated to be any further or additional effects on SAC features during operation.

5.2 Cumulative Effects

There are several other developments in progress or under consideration which are within the Clydagh catchment so have potential to also impact on the SAC. These are:

- Knocknamork Wind Farm substation and increase in tip height to the seven existing turbines;
- Grid connections for the following wind farms are proposed to run through the Proposed Development, largely along existing forestry tracks:
  - Gortyrahilly Wind Farm; and
  - Inchamore Wind Farm.

The EIAR for the Knocknamore Wind Farm substation found that with mitigation, there no significant residual effects on hydrology/water quality associated with the development. For the grid connections for Gortyrahilly and Inchamore Wind Farms, the

EIAR for each project found that any negative impacts arising from the development will be "localised and not significant".

The likelihood of a cumulative effect would be greatest where construction phases coincided and as such, mitigation will be proposed manage the risk of adverse cumulative effects. Based on the assessment in Chapter 8, this concluded that there was potential for cumulative effects during construction relating to impacts on water quality downstream, including effects on Qualifying Interests of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC.

6 Mitigation

6.1 Embedded Mitigation

Iterative design review included repositioning of all turbines and access tracks to avoid areas of deep peat and sensitive habitats to minimise potential for peat landslide risk and excavation.

The Proposed Development has been designed to minimise works in the vicinity of mapped watercourses and to minimise the need for new water crossing to reduce the risk of pollution and changes to watercourse morphology. Whilst seven watercourse crossings will be required for proposed new access tracks there will be no working within watercourses and bottomless box culverts will be used. This will ensure the watercourses are not modified for the SAC fish species and otter. As such there should be no working within watercourses to ensure no modifications to watercourse morphology.

The Proposed Development's drainage design has been designed specifically with the intention of having no negative impact on the water quality of the Site and its associated watercourses. No routes of any natural drainage features will be altered as part of the Proposed Development. Mitigation for all water features aims to preserve existing water quality ratings as far as practicably possible.

There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows, as directed by the Ecological Clerk of Works (ECoW) to avoid erosion or siltation of existing watercourses in the process. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones of 60m around significant watercourses (catchment >0.25 km^2) and 10m from minor watercourses (catchment <0.25 km^2) have been used to inform the layout of the Proposed Development. A Sustainable Urban Drainage System (SUDS) will be installed. Further information is presented in Chapter 11.

All works on Site will take place during daylight hours, and thus will avoid the time when otter are more likely to be active, thereby minimising the risk of direct disturbance.

6.2 Pre-construction

Prior to construction the following measures, some of which have already been done as part of the EIA Report, will be undertaken:

- The Construction and Environmental Management Plan (CEMP), Peat and Spoil Management Plan (PSMP) and Survey Water Management Plan (SWMP) will be implemented;
- The Site drainage and attenuation system will be installed prior to the main construction activities and includes excavation of drainage ditches and installation of settlement ponds and soakaways. The site-specific drainage scheme is required to attenuate, hydraulically (flow) and hydro-chemically (pollutants). See Chapter 11 Hydrology, Water Quality and Flood Risk for more information.
- EPA and Inland Fisheries Ireland will be consulted prior to construction on further requirements in relation to fish populations;

- Within one month prior to construction protected species surveys will be carried out up to 200m from infrastructure. They will focus on Kerry slug but also include any other protected species interest, such as otter. The survey will be undertaken by a suitably qualified ecologist. The results will inform the need to implement described mitigation in a targeted way (for example to protect any new otter resting places).

6.3 Construction

Full details of construction mitigation measures are contained in the CEMP, SWMP and PMP. These documents include information on the following ecology related activities:

- Works will be overseen by an Ecological Clerk of Works (ECoW) and their role and responsibilities are detailed in the CEMP.
- An ECoW will be present during construction to undertake regular Site inspections and oversee all sensitive habitat removal and works at watercourse crossings. The ECoW will have the authority to stop works where significant effects are considered likely to occur, and to instigate control/mitigation measures to rectify noncompliance. This adaptive response will be based on comprehensive water quality monitoring, allowing the contractor to respond to changes in water quality before that change is of a magnitude that would cause a significant environmental effect.
- Additionally the works programme for the site will take account of weather forecasts and predicted rainfall. Works will be suspended if forecasting suggests any of the following is likely to occur:
  - >10 mm/hr (i.e. high intensity local rainfall events);
  - >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
  - >half monthly average rainfall in any 7 days.
  - Prior to works being suspended the following control measures shall be completed:
    - Secure all open excavations; and
    - Provide temporary or emergency drainage to prevent back-up of surface runoff.
- A micro-siting margin to allow for adjustment of turbine, track, and equipment positions to suit actual ground conditions is proposed within 100m of infrastructure locations given in Chapter 3: Description of the Development. Micro-siting shall not exceed 100m in any direction and any variation of between 50m and 100m shall only be permitted following prior written approval of An Bord Pleanala in consultation with the NPWS and EPA, where relevant.

Watercourses as part of the SAC

Proposed mitigation measures, required to prevent adverse effects on the downstream SAC are detailed below. The mitigation measures relate to protection of water quality flowing into the SAC. Chapter 11 Hydrology, Water Quality and Flood Risk should be read in tandem with the summary of measures outlined below. The mitigation measures proposed are included within the CEMP and SWMP:

- Avoidance of sensitive aquatic areas where possible by implementing a 60m construction zone buffer, wherever possible. Details on buffer zones are provided in Chapter 11.

- For locations where works will be undertaken within water protection buffer zones (i.e., within 60m of watercourses), double silt fences will be installed around the watercourse to prevent sediment/silt infiltration into the watercourse.
- Specific mitigation measures, incorporated into the design of the development and through implementation of best practice methodologies will be employed where work inside buffer zones is proposed.
- Works for stream crossings will be carried out during the working window for instream works. This working window is defined by Inland Fisheries Ireland (IFI) as July to September to avoid vulnerable spawning salmonids/lamprey that may be present in downstream environments outside of this window. Any works outside of this period would require a derogation under the Local Authorities (Works) Act, 1949. There will be no works within watercourses at any time. This will ensure that run-off from the Proposed Development is less likely to enter the watercourses during the autumn and winter periods when higher rainfall levels are likely, thereby minimising the sedimentation entering the SAC rivers.
- There will be no crossing of rivers or streams by machinery during the construction phase, other than by constructed access routes, and all machinery must remain within the works corridor and utilise designated access routes.
- There will be no direct dewatering to watercourses during the construction phase. All outflows from drainage associated with construction will be by diffuse overland drainage at appropriate locations and through settlement ponds.
- Cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and will not be permitted to discharge to any waters, and control measures to be place will include:-
  - Appropriate bunded storage area for storage of fuels/oils, with onsite storage of hydrocarbons to be kept to a minimum;
  - Mobile double skinned fuel bowser will be used for re-fuelling on-site;
  - No refuelling will be permitted at works locations within the 60m hydrological buffer;
  - Spill kits will be readily available to deal with any accidental spillage;
  - There will be an emergency plan for the construction phase to deal with accidental spillages;
  - Ready-mixed concrete will be brought to site, with no batching of wet-cement products occurring on site;
  - Where possible pre-cast products will be installed, including all watercourse crossings;
  - Use of wet-cement products within the hydrological buffer will be avoided, insofar as possible;
  - Lined cement washout ponds will be used for chute cleaning, with minimal use of water take will imported onto the site; and
  - No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be permitted.

The SWMP include several measures to ensure no pollution/siltation of sensitive receptors. Those most relevant to SAC Qualifying Interests are given below:

- Wastewater emanating on-site (sewage, wastewater from site office) will be taken off-site for disposal/treatment at controlled facilities. To this effect, welfare facilities for construction site workers will include self-contained port-a-loos with an integrated waste holding tank. No water will be sourced on the site, nor will any wastewater be discharged to the site.
- Infiltration interception drains for upslope 'clean' water collection and dispersion;
- Flow attenuation and filtration check dams to reduce velocities, with consideration given to gradient with drains to determine spacing requirements; and
- Settlements ponds and buffered outfalls to control and store development runoff to allow settlement prior to discharge at greenfield runoff rates. No outflow will be permitted directly into natural watercourses.

The PSMP details soil/peat deposition areas to avoid impacting on water quality including:-

- Proposed spoil deposition areas will be located outside the 60m stream buffer zone;
- Silt fences, straw bales and biodegradable matting will be used to control surface water runoff for deposition areas; and
- Deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff.

Other measures are:

- In order to avoid run-off of silt-laden water impacting upon water quality within surface water features adjacent to the works corridor, reinstatement works including measures to re-vegetate disturbed areas through re-seeding and/or placement of saved turves will be undertaken immediately after construction works;
- During construction, turves will be stored separately from spoil (soil/rock). Separate storage of turves will ensure vegetation is not significantly damaged and that turves can be replaced as a top-mat to facilitate rapid re-instatement of the surface vegetation, thereby significantly reducing the likelihood of soil erosion and the likelihood of silt laden surface waters affecting water quality;
- To ensure control measures are implemented appropriately, an Ecological Clerk of Works (ECoW) and Environmental Manager will be employed for the duration of the construction works

A water quality monitoring program (WQMP) will be implemented to monitor effects on the surface water quality regime during the infrastructure construction, operational and decommissioning phases of the Proposed Development, in order to;

- Demonstrate that the mitigation measures and surface water management is performing as designed;
- Provide validation that the in-place mitigation measures are not having an adverse effect upon the environment;
- Indicate the need for additional mitigation measures to prevent, reduce or remove any effects on the water environment, such as additional temporary settlement or filtration structures or short-term flocculant dosing to suit observed site conditions.

Drainage design will reduce chemical, silt and other suspended pollutant transport by providing a "treatment train" of two to three stages of pollutant removal to all surface water runoff, nominally by:

- Ensuring that drainage swales are designed to convey flows at a low velocity by using a wide, flat bottomed drain;

- Providing settlement and filtration features in all linear drainage swales (check dams, filtration dams) to reduce flow velocity and encourage settlement;
- Encouraging appropriate vegetation growth in the base of all linear drainage to provide additional filtration to flows;
- Providing settlement ponds at turbine hard standing areas and other key discharge locations in order to provide treatment to contaminated runoff prior to discharge;
- Discharging surface water runoff over undisturbed vegetated ground, hence allowing any remaining silts and other pollutants to drop out of flows before entering the watercourse (having the effect of polishing the runoff);
- Preventing the discharge of surface water runoff flows directly to existing watercourses or drainage. All discharges shall seek to be via SuDS and buffer zones which will act as a filter strip, allowing deposition of suspended solids and other pollutants;
- Providing settlement features in water channels downstream of areas of peat infilling and ditch blocking area proposed as part of habitat management and enhancement planning.

Excavations and Spoil Management

Soil and subsoil excavation and movement will be undertaken in accordance with best practice guidelines such as Good Practice Guide for Handling Soils (MAFF, 2000) in order to minimise potential for silt laden runoff from spoil and excavations. Areas of stockpiled spoil including stored peat:

- will not be permitted within previously identified watercourse buffer zones; and
- will not be permitted to obstruct the flow of overland surface water with specific drainage to spoil mounds to be provided.

Otter

In addition to working hours avoiding the night-time when otter are more active, all excavations will also be covered or a ramp placed within them overnight. This will ensure that a ranging otter cannot be trapped.

7 Summary

7.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

7.1.1 Summary of Effects Prior to Mitigation

A likely significant effect was identified on the SAC qualifying interest of Oligotrophic waters containing very few minerals due to the potential for suspended solids to enter the watercourses as a result of construction activities. Modelling showed that TSS levels would not exceed EQs as a result of the construction activities, although that took account of the mitigation identified in Section 6 as the Proposed Development would not proceed without that mitigation in place given the sensitivity of the aquatic environment.

Prior to mitigation, likely significant effects were identified on the following conservation objectives for Atlantic salmon and otter.

Atlantic Salmon

- Distribution – presence of artificial barriers via installation of watercourse crossings
- Number and distribution of redds – spawning affected by presence of artificial barriers via installation of watercourse crossings
- Water quality – status of some of the watercourses on site is below WFD Q4. Modelling of nutrients showed that EQs would not be exceeded for nutrient discharge. This, as well as additional run-off into the watercourses during construction causing siltation and changes in water quality, or pollution events due to chemical incidents, could result in significant negative effects on the status of the SAC watercourses. In turn, this could affect the ability of Atlantic salmon to maintain favourable conservation status.

Otter

- Fish biomass availability - The potential effects on water quality set out above for Atlantic salmon could result in a decline in the salmon population. This is likely to affect other aquatic species which could result in a reduction in the prey available to otter.
- Barriers to connectivity – watercourse crossings could result in barriers to movement

7.1.2 Reassessment of Effects Following Mitigation

The mitigation measures set out in Section 6 have addressed the likely significant effects as follows.

Table 18: Re-assessment of effects on SAC following mitigation

SAC Feature	LSE	Mitigation	Residual Effects
Oligotrophic waters containing very few	Potential for suspended solids from construction works on Site to enter watercourses and adversely affect the water	No direct discharges to watercourses; buffers from all watercourses; no	No adverse effect

SAC Feature	LSE	Mitigation	Residual Effects
minerals	quality within the SAC	working in watercourses; CEMP; ECoW; SWMP; PSMP; PIP	
Atlantic salmon	Distribution: Artificial barriers caused by watercourse crossings	Bottomless culverts will be used in all watercourse crossings	No adverse effect
	Number and distribution of redds: Spawning affected by watercourse crossings introducing artificial barriers	Bottomless culverts will be used in all watercourse crossings	No adverse effect
	Water quality: Coniferous plantation felling, excavations and use of man-made construction materials could all cause changes in water quality, pollution and siltation in watercourses which lead into the SAC.	No direct discharges to watercourses; buffers from all watercourses; no working in watercourses; CEMP; ECoW; SWMP; PSMP; PIP; chemicals stored appropriately.	No adverse effect
Otter	Fish biomass availability: Effects on water quality could result in a decline in prey for otter	As above	No adverse effect
	Barriers to connectivity: Artificial barriers caused by watercourse crossings	Bottomless culverts will be used in all watercourse crossings	No adverse effect

8 Conclusions

A number of SACs and SPAs were identified within the search area for the Proposed Development. These have been screened for likely significant effects. Likely significant effects were identified on Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC for potential effects upon the oligotrophic waters, Atlantic salmon and otter populations. Likely significant effects on all other Natura sites were screened out.

For The Gearagh SPA and Killarney National Park SPA there were no occurrences of birds from the SPA populations on the Proposed Development Site and as such there were no likely significant effects upon those SPAs and the Proposed Development could proceed without adverse impact on the integrity of SPAs. The qualifying interest for Mullaghanish to Mushermore Mountains SPA, breeding Hen harrier, was not observed during breeding season surveys and so there was no evidence for use of the Site during the breeding season. Hen harrier were observed during the non-breeding season; the provenance for these birds was unknown but could include individuals from the SPA breeding population. Even allowing this, usage of the Proposed Development was so limited that no likely significant effect could be identified and the Proposed Development could proceed without adverse impact on the integrity of the SPA.

Appropriate assessment was carried out on the likely significant effects identified on the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC. Taking account of mitigation identified, the Proposed Development would not have any adverse impacts on the conservation interests of the SAC which would mean the conservation objective would be maintained. As such if the Proposed Development were to go ahead, there would not be an adverse effect on the integrity of the SAC.

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