Appendix 6-2 – Aquatic Report

TOBIN
CONSULTING ENGINEERS
BUILT ON KNOWLEDGE

Cloghercor Wind Farm Ltd

Cloghercor Wind Farm, Co. Donegal

Aquatic Report February 2023

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1.0 INTRODUCTION

Cloghercor Wind Farm Ltd. are proposing to develop a wind farm development at Cloghercor, Co. Donegal. It is proposed to supply the power from the Cloghercor Wind Farm to the Irish electricity network via loop-in 110kV underground cables (approximately 4.01km cable length within approximately 3.36km of internal access roads) to the existing overhead 110kV power line in the townland of Cloghercor, Co. Donegal. Further information on the proposed project is provided in Section 3.0 of this report.

This report has been prepared by suitably, qualified ecologists within TOBIN Consulting Engineers (TOBIN) on behalf of Cloghercor Wind Farm Ltd. to accompany a planning application for the proposed project (a Statement of Authority is provided in Section 2.3 of this report). TOBIN undertook freshwater aquatic assessments for the proposed wind farm development.

The proposed wind farm site is comprised of forestry, upland blanket bog and lakes. A number of watercourses flow through the subject site. All the watercourse flow in a north-westerly direction towards the Gweebarra River which flows in a south-westerly direction before discharging to the Atlantic Ocean approximately 7km from the western site boundary. The subject site is mountainous in nature with ground levels ranging from approximately 1mOD at the north-western corner of the subject site up to 275mOD at the southern boundary of the subject site. The site falls in a westerly direction, with the western boundary of the subject site low lying, and the eastern side of the subject site considerably higher.

The purpose of this report is to identify, quantify, and communicate the risks to aquatic species or habitat, if any. The report assesses at the entire land holding including the proposed wind farm, as one subject site.

2.0 METHODOLOGY

2.1 Desk Study and Information Sources

The ecological desktop study completed for the proposed project comprised of a review of the following key datasets and information sources:

- Identification of European sites within the Zone of Influence (ZoI) of the proposed wind farm area through the identification of potential pathways/links from the proposed wind farm area and European sites and/or supporting habitats;
- Review of the National Parks and Wildlife Service (NPWS) site synopsis, Natura 2000 data forms and Conservation Objectives for European sites identified through potential pathways from the proposed upgrade[1];
- NPWS datasets on Annex I habitats and Annex II species;
- Review of available literature and web data. This included a detailed review of the NPWS database of areas designated (and proposed) for nature conservation[2] and National Biodiversity Data Centre (NBDC)[3] websites and database including mapping and

[1] National Parks and Wildlife Service: https://www.npws.ie/protected-sites
[2] National Parks and Wildlife Service: https://www.npws.ie/maps-and-data
[3] National Biodiversity Data Centre (NBDC): https://maps.biodiversityireland.ie/Map

available reports for relevant sites and in particular Qualifying Interests and Special Conservation Interests described and their Conservation Objectives;

- Review of Inland Fisheries Ireland (IFI) research data. This included reviewing research studies carried out for the Habitats Directive and Red Data Book Fish species within the receiving environment[4];
- Information and data on water catchments from the River Basin Management Plan 2018-2021[5];
- GSI Online mapping[6];
- Environmental Protection Agency (EPA) Appropriate Assessment tool[7];
- Information and data on water catchments from the River Basin Management Plan 2018-2021[8];
- Google Maps/Bing Maps;
- Ordnance Survey of Ireland maps;
- Heritage map viewer[9]; and
- Review of previous ecological assessments undertaken within the area.

2.2 Consultations

A pre-planning consultation letter was sent to Inland Fisheries Ireland (IFI) on the 21st of June 2021 (with a follow up in September 2022) to inform the Departments of the proposed project and to discuss potential environmental sensitivities associated with the proposed works.

TOBIN received information from IFI in response to the proposed windfarm development Consultation on the 6th October 2022.

The response highlighted that the proposed site is located within the Gweebarra River catchment. It highlighted its location, size and the rivers and lakes located within it. It also outlined the significant importance of this catchment in relation to fisheries. Links to previous fisheries research reports in relation to the Gweebarra fish stock surveys were provided in the response.

Based on this knowledge and information, it recommended mitigation measures and guidelines to adhere to throughout the lifespan of the development.

An initial email response received on the 23rd July 2021 had contained generic information relating to EIAR considerations for large wind farm projects.

2.3 Statement of Authority

Sinead O'Reilly (M.Res.) is a Senior Ecologist with TOBIN Consulting Engineers. She holds an honours degree in Zoology from University College Dublin and Research Masters in Science in

[4] https://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html
[5] https://www.catchments.ie/guide-water-framework-directive/
[6] http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
[7] EPA Appropriate Assessment tool: https://gis.epa.ie/EPAMaps/AAGeoTool
[8] EPA: www.catchments.ie
[9] Data from the Heritage Map Viewer accessed through the heritage map viewer: https://heritagemaps.ie/WebApps/HeritageMaps/index.html

Freshwater Ecology from University of Glasgow. Ms O Reilly has over 14 years of professional experience in scientific research in freshwater ecology and environmental consultancy specialising in fisheries. Sinead has prepared and delivered annual research reports, research papers, preparation of screenings for Appropriate Assessment (AA), Natura Impact Statements (NIS), Invasive Species reports, mammal survey reports and other relevant documents. Sinead has a strong technical background as a freshwater ecologist and has extensive field survey experience in all freshwater habitats, terrestrial habitats and mammal activity across Ireland.

Cian Ó Ceallaigh (BSc (Hons), MSc) of Ó Ceallaigh Ecology is an Associate member of the Chartered Institute of Ecology and Environmental Management (ACIEEM) who has extensive botanical and habitat knowledge (FISC Level 4, 2018) and has worked as a professional ecologist in Ireland and Britain since 2017. Cian has experience undertaking AA Screening reports in Ireland as well as Preliminary Ecological Appraisals (PEAs) and other species-specific survey reports in Britain.

2.4 Aquatic Field Surveys

2.4.1 Lake Survey

An ecological survey of the Lough Aneans More (hereafter referred to as the Lake) was carried out on the 18th of August 2022 by Cian Ó Ceallaigh.

Habitats were described and mapped following the standard scheme for classifying habitats in Ireland. The dominant plant species were recorded, and habitats were classified according to their vegetation types. Where appropriate consideration was given to whether habitats qualify, or could qualify, as corresponding Annex 1 habitats. Relative plant species abundance was estimated using the DAFOR scale[10]. The scientific names for plant species use nomenclature given in An Irish Flora (Parnell, J. & Curtis, T., 2012[11]).

To determine whether the Lake contains Annex I habitat(s) (namely 3110, 3130 or 3160), its margins were walked and species within the benthic zone were identified and recorded. An interpretation of the lakes' plant communities/Annex habitat(s) was then carried out using the species recorded and information on the lakes' physical characteristics. Guidance was taken from O Connor (2015)[12] to aid interpretation of potential Annex habitats within the Lake.

2.4.2 River Surveys

A baseline aquatic ecological assessment was carried out on selected streams and rivers of the Mulnamin Beg_010 throughout the proposed wind farm site where accessible. These steams were all located on the north western side of the proposed wind farm site within proximity to the proposed turbine locations. The biological water quality establishment would provide baseline readings against which future water quality targets could be gauged. These values should not deteriorate as a result of works associated with the project. According to the Water Framework Directive (2000/60/EEC) target 'good status' i.e. Q4 is required in all Irish Rivers.

[10] The DAFOR scale has been used to estimate the frequency and cover of the different plant species as follows: Dominant (D) - >75% cover, Abundant (A) – 51-75% cover, Frequent (F) – 26-50% cover, Occasional (O) – 11-25% cover, Rare (R) – 1-10% cover., The term 'Locally' (L) is also used where the frequency and distribution of a species are patchy and 'Edge' (E) is also used where a species only occurs on the edge of a habitat type.
[11] Parnell J. and Curtis T. (2012) Webb's An Irish Flora. Cork: Cork University Press 8th ed.
[12] O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland

Surveys were conducted by Tobins Senior Ecologist Sinead O' Reilly during base flow conditions between 20th-22nd September 2021. The locations of the survey sites are given in Table 2-1 and also shown in Figure 2-1 below. These surveys included an aquatic assessment of the riverine habitat available to support fish and aquatic species, an assessment of the macroinvertebrate community and an analysis of the biological water quality of the watercourse. The purpose of the surveys was to assess the overall aquatic habitat value of the streams and rivers within and downstream of the proposed wind farm, particularly in relation to protected species such as Atlantic salmon (*Salmo salar*), lamprey (*Lampetra* spp.) and white-clawed crayfish (*Austropotamobius pallipes*).

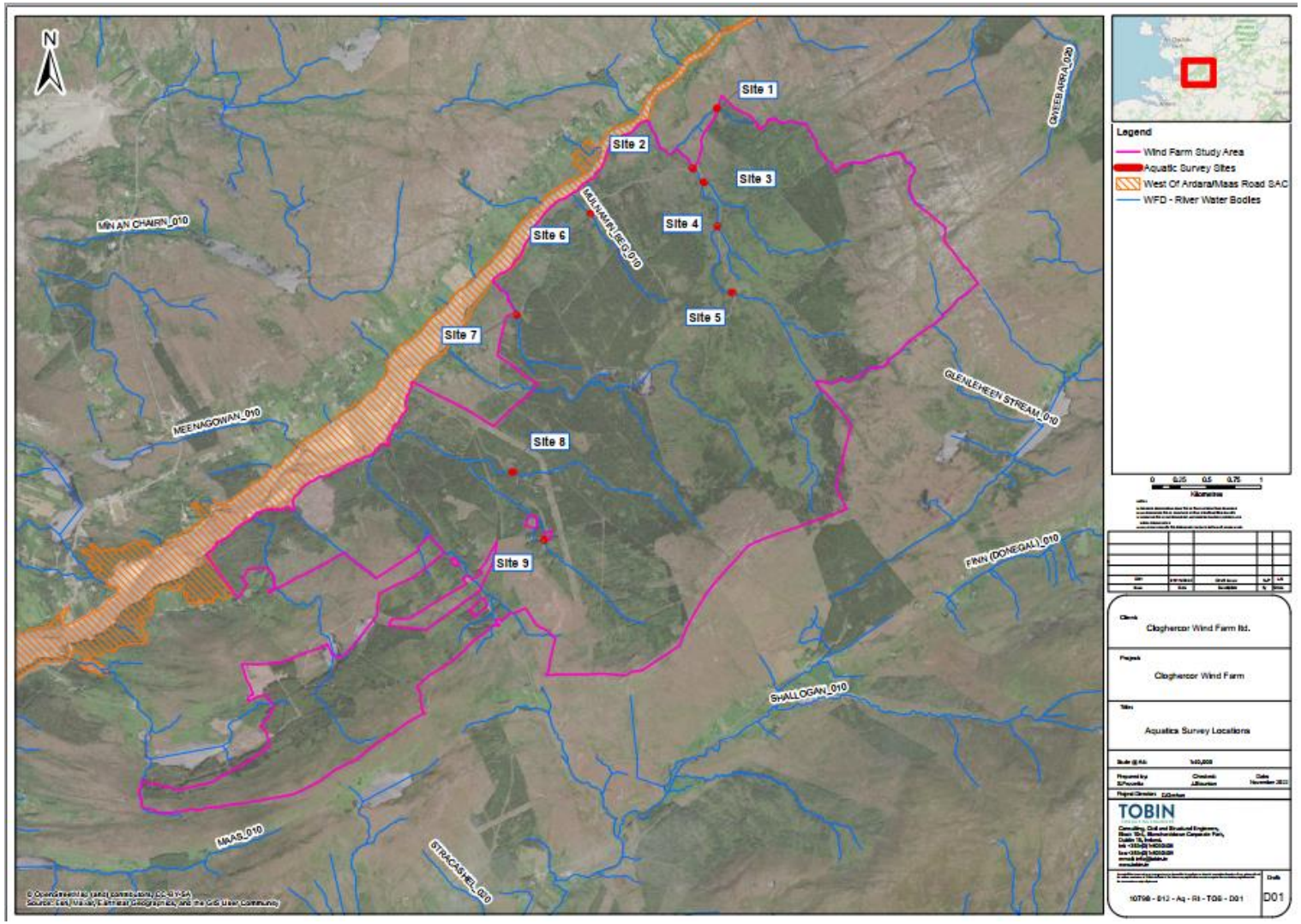
Nine survey sites were, where feasible, selected relevant to the proposed works areas including installation sites for turbines and road crossings. Sites were selected based on their location within and outside the proposed wind farm site boundary, available access, previous Q-Value Status from EPA surveys, and stream order, giving a good representation of the overall aquatic ecology throughout the study area.

Due to the topography of the site and very limited access, it was not feasible to survey sites downstream of the site boundary line. These aquatic survey locations were not directly within the footprint of any proposed turbine. No surveys were conducted in the Gweebarra estuary which is located directly outside the site boundary. Rare / protected / conservation interest aquatic species such as Otter were also searched for at each survey site. The site locations are provided in the table below.

Table 2-1: Location of Sampling Sites within the Proposed Wind Farm Site

Site Number	River Waterbody Code	Catchment	ITM (x)	ITM (y)
Site 1	IE_NW_38M290990	38 Gweebarra-Sheephaven	585618	904456
Site 2	IE_NW_38M290990	38 Gweebarra-Sheephaven	585401	903906
Site 3	IE_NW_38M290990	38 Gweebarra-Sheephaven	585507	903785
Site 4	IE_NW_38M290990	38 Gweebarra-Sheephaven	585625	903374
Site 5	IE_NW_38M290990	38 Gweebarra-Sheephaven	585780	902761
Site 6	IE_NW_38M290990	38 Gweebarra-Sheephaven	584453	903486
Site 7	IE_NW_38M290990	38 Gweebarra-Sheephaven	583787	902560
Site 8	IE_NW_38M290990	38 Gweebarra-Sheephaven	583738	901120
Site 9	IE_NW_38M290990	38 Gweebarra-Sheephaven	584037	900502

Figure 2-1: Location of Sampling Sites Within the Proposed Wind Farm Site



2.4.2.1 Riverine Habitat Survey

A broad aquatic habitat assessment was conducted at the nine selected sampling sites utilising elements of the methodology given in the Environment Agency's *'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003'* (EA, 2003[13]) and the Irish Heritage Council's *'A Guide to Habitats in Ireland'* (Fossitt, 2000).

All sites were assessed in terms of:

- Stream width and depth and other physical characteristics.
- Substrate type, listing substrate fractions in order of dominance, i.e. bedrock, boulder, cobble, gravel, sand, silt etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area.
- In-stream macrophyte, bryophytes occurring and their percentage coverage of the stream bottom at the sampling sites.
- Riparian vegetation composition.

Each sampling site along the watercourse was described in terms of the important aquatic habitats and species recorded (i.e. based on their conservation value). This determined the ecological evaluation of each aquatic survey site and informed site-specific mitigation for the proposed wind farm.

Watercourse characteristics including bankside vegetation, substrate and flow rate were recorded onsite.

A number of physical habitat variables were measured at each site. These included; the percentage of overhead shade present, percentage of substrate type and instream cover, bank height and bank width. The percentage of riffle, glide and pool was also measured over each site surveyed.

2.4.2.2 General Fisheries Habitat

A broad appraisal / overview of the upstream and downstream habitat at each site was also undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat. River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (EA, 2003) and Fishery Assessment Methodology (O'Grady, 2006)[14] to broadly characterise the river sites (i.e. channel profiles, substrata etc.).

An assessment was made on the suitability of the habitat for aquatic species of conservation concern (e.g. White-clawed Crayfish, River Lamprey (*Lampetra fluviatilis)*, Brook Lamprey (*Lampetra planeri*) and Atlantic salmon). Aquatic surveys were conducted along the selected sites and consisted of kick sampling for invertebrates to assess water quality. The data collected was robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the proposed wind farm on ecological receptors. During these surveys, areas

[13] Environment Agency (2003). River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual: 2003. Bristol.
[14] O'Grady, M.F. (2006) Channels and challenges: enhancing Salmonid rivers. Irish Fresh- water Fisheries Ecology and Management Series: Number 4. Central Fisheries Board, Dublin.

of scientific and/or conservation interest in the vicinity of the proposed wind farm were investigated.

Aquatic plants as well as rare and/or protected plant species and non-native flora were recorded at each site where present. Plant species nomenclature followed '*New Flora of the British Isles*' (Stace 1997)[15]. The results of the physical habitat study were used in conjunction with an advisory leaflet from the Department of Agriculture for Northern Ireland, '*The Evaluation of habitat for Salmon and Trout*' to assess habitat suitability for salmonids. An evaluation of potential lamprey habitats within the study area was made with reference to NPWS Irish Wildlife Manuals lamprey surveys (O'Connor, 2007[16]).

2.4.2.3 Macroinvertebrate Survey

Semi-quantitative sampling of benthic (or bottom dwelling) aquatic macroinvertebrates was undertaken at selected sites using standard EPA kick-sampling methods (EPA 2021). Stone washings and vegetation sweeps were also undertaken to ensure a representative sample of the fauna present at each site was collected. The Quality Rating (Q) System (Toner *et al.,* 2005)[17] and the Small Streams Risk Score (SSRS) was used to obtain a water quality rating for each site.

The Biological River Classification System (Q-Scheme)

Biological water quality was assessed by the Q-value methodology, following the Standard Operating Procedures of the EPA (2021). The Biological River Quality Classification System (Q-Scheme) has been in use in Ireland since 1971. It has undergone a number of modifications since then and has been included in the Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998. It is routinely employed by the EPA.

In order to determine the biological quality of the river, the Q-scheme index is used whereby the analyst assigns a Biotic Index value (Q-Value) based on macroinvertebrate results. For the purpose of this assessment benthic invertebrates have been divided into five indicator groups according to tolerance of pollution, particularly organic pollution (Lucey *et al.*, 1999)[18]. The Biotic Index is a quality measurement for freshwater bodies that range from Q1 – Q5 with Q1 being of poorest quality and Q5 being pristine/unpolluted (see Table 2-2).

Table 2-2: Biotic Index scoring system for the Q-Scheme

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4,	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

[15] Stace, C.A. (1997). New Flora Of The British Isles, Second edition 1130 pages. Cambridge University Press, Cambridge.
[16] O'Connor, W. (2007) *A survey of juvenile lamprey populations in the Corrib and Suir catchments*, Irish Wildlife Manuals No. 26. National Parks and Wildlife Service.
[17] F, Toner & J, Bowman & J, Clabby & Lucey, J. & Mcgarrigle, Martin & Concannon, C. & Clenaghan, C. & Cunningham, Peter & Delaney, J. & O'Boyle, Shane & MacCárthaigh, M. & Craig, M.. (2005). Water Quality in Ireland 2001-2003.
[18] Lucey, J., Bowman, J. J., Clabby, K. J., Cunningham, P., Lehane, M., MacCarthaigh, M., McGarrigle, M. L. & Toner, P.F. (1999). Water quality in Ireland 1995-1997. EPA. Ireland. 796pp.

Small Stream Risk Score

The Small Streams Risk Score (SSRS) is a biological risk assessment system for identifying rivers that are definitely 'at risk' of failing to achieve the 'good' water quality status goals of the Water Framework Directive (WFD). It was developed by the EPA in association with the Western River Basin District (WRBD) in 2006.

The SSRS method is a rapid field methodology for risk assessment that is based solely on Macroinvertebrate indicators of water quality and their well-understood response to pollution. Importantly the SSRS score indicates whether or not the stream is at risk from pollution and not the ecological health of the stream. The SSRS score ranges from 0-11.2.

In this method, the macroinvertebrates present in the water course are analysed and a grade of water quality is given to the water course based on the numbers and types of macroinvertebrate species present. The system looks at five main groups of macroinvertebrate;

- Ephemeroptera (Mayfly)
- Plecoptera (Stonefly)
- Trichoptera (Caddis Fly)
- G.O.L.D. (Gastropods, Oligochaetes, Leeches, Diptera)
- Asellus

Each group is given a score based on the number of taxa present and their abundance. Species that are more sensitive to pollution (e.g. Mayfly) are given a higher score and those that are more tolerant of pollution (e.g. Asellus) are given a lower score. To obtain the final score, the score associated with each group is added together and divided by 5 to get an average result. This average is then multiplied by two to give the final Small Streams Risk Score (SSRS). Table 2-3 below shows the categories associated with the final score.

Table 2-3: Small Streams Risk Score Categories

SSRS score	Quality Status
<6.5	Stream at Risk
>6.5-7.25	Indeterminate stream may be at risk
>7.25	Probably not at risk

A semi-quantitative, two-minute macroinvertebrate kick-sample was collected from the riverbed, from the faster flowing riffle habitats where possible. A further one-minute hand search was carried out to locate macroinvertebrates that may have remained attached to the underside of the cobbles. This sampling approach is sufficient to achieve a suitable representation of taxa for bioassessment. Occasionally, when the substratum (e.g. bedrock) or flow conditions made kick-sampling difficult, or the abundance of macroinvertebrates collected was extremely low, it was necessary to spend a longer amount of time sampling the river to accumulate a sufficient diversity and abundance of macroinvertebrates. This sampling approach requires avoidance of obvious localized disturbance (e.g. cattle access points) which may adversely influence the sample taken.

Kick sampling involved the use of a standard 500µm mesh D-shaped kick net, which was placed on the riverbed with the mouth of the net directed upstream. The area just upstream of the net was disturbed (with the foot, in a kicking motion) for two minutes in order to dislodge

invertebrates, which were subsequently caught in the net. The surveyor moved in a diagonal direction upstream to ensure that different micro-habitats in the waterbody, such as fast moving riffles, glides and pools were included in the sample during the two minutes. The percentage of time allocated to each habitat was estimated based on the percentage each habitat present within the sample area. This ensured that a representative sample of the site was collected. After kick sampling, stone washing and weed sweeping were also carried out at available habitats.

Once a live sample was collected, the macroinvertebrate assemblages of each sample were identified and counted on the river bank. The resulting species list was then used to assign a Biotic Index value (Q-Value, SSRS) to the sampled streams. This involved recording the taxa present at a suitable and attainable taxonomic resolution and their categorical relative abundance determined using approximate counts. Once all taxa and their relative abundance were recorded, the sample was returned to the river.

2.4.2.4 Biosecurity

A biosecurity protocol recommended by IFI was also adhered to during the surveys. All equipment and PPE used was disinfected with Virkon® prior to and post-survey completion, and best practice precautions were employed to prevent the potential spread of invasive species and water-borne pathogens between sites, according to standard IFI biosecurity protocols[19].

3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

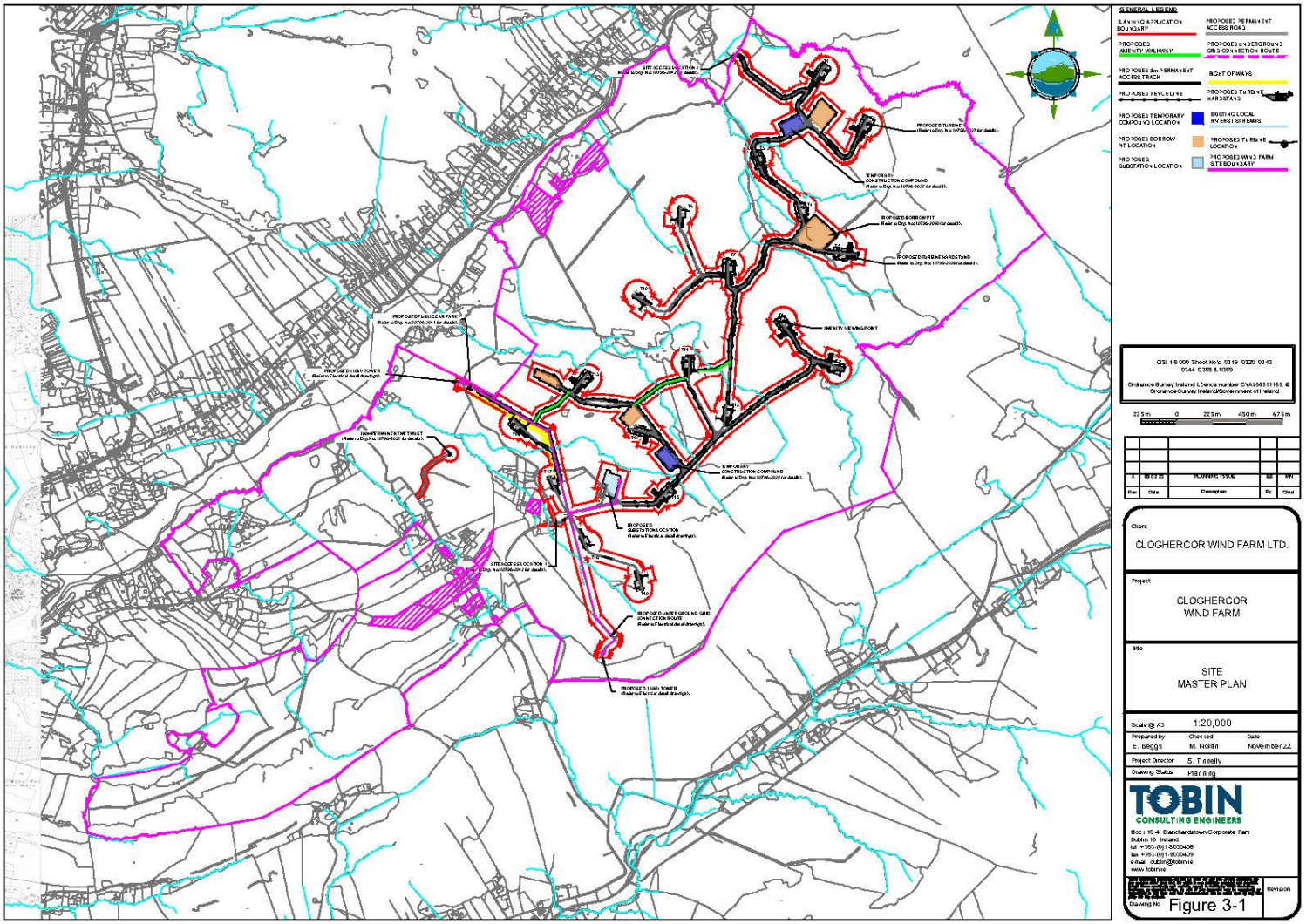
3.1 Site Location

The proposed wind farm infrastructure (see Figure 3-1) is located in the townlands of Clogherachullion,Cloghercor and Derryloaghan, Co. Donegal. The associated works to allow transport of turbines to site are located within the townlands of Cloghercor, Derryloaghan, Aghaveevoge, Cashelreagh Glebe, Darney, Drumard, Drumnacross, Shallogan More, Straboy and Tullycumber Co. Donegal. The proposed grid connection (including the proposed substation and connection masts) is located within the townland of Cloghercor Co. Donegal.

The proposed wind farm site is located within upland blanket bog and conifer plantation lands that is approximately 1945 hectares (ha) (19,450,000m²). The majority of the site boundary is defined by forestry, roads and estuary waters. The L6483 local road travels though the site along the north west from the R252 to the R250 giving the site two entrance locations.

[19] research_biosecurity_biosecurity_for_fieldsurveys_2010.pdf (fisheriesireland.ie)

Figure 3-1: Site Location Map and Site Layout of the Proposed Wind Farm



3.2 Overview of Proposed Project

A summary of the overall proposed project is as follows:

- Erection of 19 no. wind turbines with an overall blade tip height range from 18 5m to 200 m, a rotor diameter range from 149 m to 164 m, a hub height range from 112 m to 125 m, and all associated foundations and hard-standing areas in respect of each turbine;
- Construction of new site entrance with access onto the L6483 local road for the construction phase (operational phase maintenance traffic only), and utilisation of a permitted forest entrance (Pl. Ref. 1951040) to the L6483 as a second construction phase site access point. A third site entrance on the L6483 will form the operational phase public entrance to the wind farm;
- Improvements and temporary modifications to 5 no. locations adjacent to the public road to facilitate delivery of abnormal loads and turbine delivery on the R262 and N56 in the townlands of Tullycumber, Drumard, Darney, Cashelreagh Glebe and Aghayeevoge;
- Construction of an area of temporary hard standing to function as a blade transfer area to facilitate turbine delivery on the R262 in the townland of Drumnacross;
- Widening of sections of the L6363 and L6483 within the road corridor (up to 4.5 m running width) to facilitate delivery of abnormal loads/turbines in the townlands of Cloghercor, Shallogan More, Derryloaghan and Straboy;
- Construction of 2 no. temporary construction compounds with associated temporary site offices, parking areas and security fencing;
- Installation of 1 no. permanent meteorological mast with a height of 100 m;
- 4 no. borrow pits;
- Construction of new internal site access roads and upgrade of existing site roads, to include passing bays and all associated drainage;
- Construction of drainage and sediment control systems;
- Construction of 1 no. permanent 110kV electrical substation including:
    - 1 no. EirGrid control building containing worker welfare facilities and equipment store;
    - 1 no. Independent Power Producer (IPP) control building containing HV switch room, site offices, kitchen facilities, storeroom and toilet amenities.
    - All electrical plant and infrastructure and grid ancillary services equipment;
    - Parking;
    - Lighting;
    - Security Fencing;
    - Wastewater holding tank;
    - Rainwater harvesting equipment;
    - All associated infrastructure and services including site works and signage;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection (approximately 4.1km cable length within trenches on approximately 3.36 km of internal access roads) to the existing 110 kV overhead line in the townland of Cloghercor, Co. Donegal, with two new 16m and 21m high steel lattice end masts at each interface;
- Removal of 13 no. existing wooden polesets and 1 no. steel lattice angle mast between the two new interface end masts;
- 2 no. watercourse (stream) crossings on the grid connection route;

- All related site works and ancillary development including berms, landscaping, and soil excavation;
- Forestry felling to facilitate construction and operation of the proposed project and any onsite forestry replanting;
- Development of a permanent public car park with seating/picnic tables at the end of the construction phase of the development at the location where the proposed grid connection intersects the L6483;
- Permanent recreational facilities including marked walking trails along the site access roads and paths, and associated recreation and amenity signage; and
- Approximately 252 ha of biodiversity enhancement lands located over 3km from the proposed wind turbines.

The proposed project, described above, includes all elements of the proposed development (to which this planning application relates) including any works required on public roads to accommodate turbine delivery. The proposed project has been considered and has been addressed as part of the EIAR, with offsite forestry replanting considered within cumulative assessments. These offsite forestry replanting sites will be individually assessed as part of the forestry licencing process.
A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought for the proposed project.

It should be noted that a Construction Environmental Management Plan (CEMP) has been prepared for the proposed project and is included within the planning application submission. A list of construction activities has been provided in the CEMP and is also discussed in the NIS.

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The proposed wind farm development (see

Figure 3-1) is located within a peatland and forested landscape, between Doochary, Lettermacaward and Glenties, in Co. Donegal. The site of the proposed wind farm is located approximately 22km north of Donegal town, and approximately 32km southwest of Letterkenny.

The site of the proposed wind farm is located within townlands of Cloghercor, Cloghercullion, Derryloaghan, Cleengort, Derk More and Derk Beg Co. Donegal. The proposed grid connection (including the proposed substation and connection masts) is located within the townland of Cloghercor Co. Donegal.

The proposed wind farm site is located within upland blanket bog and conifer plantation lands that is approximately 1945ha (19450000m^2). The majority of the site boundary is defined by forestry, roads and estuary waters. An unnamed local road travels though the site along the north west from the R252 to the R250 giving the site two entrance locations. The solar farm proposed will be located across all of the lands.

A description of the existing aquatic environment, which was informed by desktop assessment and field surveys, is provided hereunder.

4.1 Desktop Assessment

A search of the NBDC database[3] was carried out for species protected under the EU Habitat Directive and for species listed under the Third Schedule of the Birds and Natural Habitats Regulations (2011) within the 10km grid square B80 and G89, which encompasses the entirety of the proposed wind farm site.

4.1.1 Protected Flora and Fauna

With regards aquatic flora, there is no record of protected flora located within this grid squares. There is a record of the protected freshwater fauna species. Freshwater Pearl Mussel (*Margaritifera margaritifera*) has been recorded at three locations, Mullanieran Bridge, West Donegal, Mullanmore, West Donegal and Mullantiboyle, West Donegal. The total abundance recorded from all three sites was 40 molluscs. Further downstream in grid square G79, there is a record of over 2490 molluscs recorded at Site S, Owenea River, West Donegal and another 3350 molluscs recorded at Owenea Bridge, Owenea River, West Donegal. These recordings were all taken during Non-marine molluscs - Northern Ireland survey and recorded into the All Ireland Non-Marine Molluscan Database of 1993 - 1994.

There is a historic record of European Otter (*Lutra lutra*) at grid G822994 located at Lough, east of Cleengort Hill - east inlet recorded in 1980. A more recent record show otter located at G797995 Cleengort, in 2014. This is recorded in Atlas of Mammals in Ireland 2010-2015 database. This recording is located 1.5km downstream from the proposed wind farm site boundary.

4.1.1.1 Previous Inland Fisheries Ireland research surveys:

Lough Barra Fish Stock Survey, July 2019[20]

[20] Corcoran, W., Connor, L., Bateman, A., Cierpial, D., Coyne, J., McLoone, P., Twomey, C., Rocks, K., Gordon, P., Lopez, S., Matson, R., O' Briain, R., and Kelly, F.L. (2020) Fish Stock Survey of Lough Barra, July 2019. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

A total of three fish species (sea trout are included as a separate 'variety' of trout) were recorded in Lough Barra in July 2019, with 151 fish being captured. These included 131 Brown trout (*Salmo trutta*), one Sea trout (*Salmo trutta*), eight Atlantic salmon, and thirteen Eel (*Anguilla anguilla*).

Brown trout (all varieties) ranged in length from 9.0cm to 21.2cm with three age classes present, ranging from 1+ to 3+, the dominant age class was 2+ indicating reproductive success in three of the previous four years.

One sea trout measuring 23.7cm and aged at 2.0+ was recorded. Eight salmon parr ranging from 6.0cm to 12.8cm were also captured. All salmon that had an age recorded were in the 1+ class. Thirteen eels ranging from 33.0cm to 58.0cm.

Lough Barra has been assigned an ecological status of "Good" for 2019 based on the fish populations present. In previous years the lake was also assigned a fish status of "Good" in 2008 and 2014 and a status of "High" in 2011.

Gweebarra River Catchment survey 2019[21]

A total of 17 sites were surveyed in the catchment between the 23rd of July and 7th of August in 2019 to determine the status of their fish stocks. Three fish species were recorded at seventeen sites surveyed on the Gweebarra River catchment in 2019.

Salmon was the most abundant species captured and was present at 13 sites. Salmon ranged in length from 2.2 to 12.9cm. Brown trout were also common and recorded at most sites (16 sites), ranging in length from 3.5 to 22.2cm. Three age classes for salmon, 0+, 1+, 2+ were recorded and all ages from 0+ to 3+ for both brown trout. Eel was also relatively frequent and recorded at ten sites.

Fives sites were assigned a fish ecological status of high, six sites as Good and the remaining six as Moderate. High status sites were limited to the Gleneheen and Owenwee sub-catchments. Survey sites on the Gweebarra River main channel and three tributaries elsewhere did not achieve the required status of Good. This is related to absence or low densities of juvenile salmonids (age 0+), indicating poor recruitment at those sites.

4.1.2 Invasive Species

There is no record of invasive aquatic species located within the 10km grid square of the proposed wind farm site. Two high impact terrestrial invasive plant species were identified within the proposed wind farm site during field surveys. These were Rhododendron (*Rhododendron ponticum*) and Japanese knotweed (*Reynoutria japonica*). An Invasive Species Management Plan for these has been included in the CEMP.

4.1.3 Surface Water

4.1.3.1 Eroding/Upland Rivers

Across the mountain itself there are two watercourses, the Mulnamin Beg_010 (waterbody code: IE_NW_38M290990) and Glenleheen stream_010 (waterbody code: IE_NW_38G070300). These water courses are part of the Gweebarra_SC_010 subcatchment.

The majority of these are small order streams and rivers of Mulnamin Beg_010 which spans across the proposed wind farm site and also a large number surrounding it. All of these waters are categorised as FW1 Eroding/Upland Rivers (Fossit, 2000). This includes natural watercourses, or sections of these, that are actively eroding, unstable, and where there is little or no deposition of fine sediment.

The Glenleheen stream_010 is located on the south west of the mountain which flows into the Gweebarra River (Gweebarra_020) before it also enters into the Gweebarra Estuary. One stream of the Glenleheen stream_010 is located within the proposed wind farm site.

[21] O'Briain, R., Matson, R., Gordon, P., Lopez, S., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., Gavin, A., McLoone, P., Twomey, C. and Kelly, F.L. (2019) Sampling Fish in Rivers 2019 – Gweebarra River Catchment, Factsheet No. 2019/05. National Research Survey Programme. Inland Fisheries Ireland

4.1.3.2 Transitional waters

The majority of Mulnamin Beg_010 streams and rivers flow northwest, directly into the Gweebarra Estuary (water body code: IE_NW_120_0100) located outside the proposed wind farm site boundary.

The Gweebarra Estuary is part of the designated European site; West of Ardara/Maas Road SAC (site code: 000197) located northwest of the site.

4.1.3.3 Coastal waters

The Gweebarra Estuary flows directly into the Gweebarra Bay (water body code: IE_NW_120_0000). This is water body is located 6.5km west of the proposed wind farm site.

All of these waters are of steep gradient and higher flow rate, representing natural watercourses typical eroding/upland rivers (FW1), that are actively eroding, unstable, where there is little or no deposition of fine sediment. These streams and rivers remain largely unaltered and do not suffer from urban encroachment and associated point sources of pollution.

The Gweebarra River catchment is located in north County Donegal within the North Western River Basin District and covers an area of approx. 122 km². The River Barra rises between the Glendowan and Derryveagh mountains and flows for approximately 32km in a south westerly direction through Lough Barra. The Gweebarra River flows out of Lough Barra and continues in a south westerly direction through the village of Doocharry and meets the sea at Gweebarra Bay. The main tributaries are the Owenwee, Cloghernagore and Croagheen rivers. The catchment has one relatively large lake present, Lough Barra. The Gweebarra River is a spate river and includes 16km of estuarine water. This catchment's geology is mixed between granite, slate, shale and schist, with rough pasture and blanket bog as the as the dominant land uses. The river receives a good run of salmon and sea trout and is well regarded as an angling river. A large proportion of the upper catchment forms part of the Cloghernagore Bog and Glenveagh National Park Special Area of Conservation (SAC) while the lower part of the catchment is situated within the West of Ardara/Maas Road SAC.

The Gweebara catchment area and the surrounding SAC provide prestige habitat and spawning habitat for various species of freshwater fish, these include Atlantic salmon, Brown trout, Sea trout and Eel. The Gweebarra river is known to contain Atlantic salmon, Sea trout, Brown trout and Eel as well as Freshwater Pearl mussel.

4.1.4 EPA Water Quality

A search of the EPA Unified GIS Application[22] and the EPA Catchments database[23] was conducted for this water body and its water quality.

There are no WFD monitoring stations located along the Mulnamin Beg within close proximity to the proposed project to indicate that the overall water quality in this area. The River Waterbody Status of the Mulnamin Beg_010 is 'Good' in the vicinity of the proposed wind farm site. The WFD Risk status is currently unknown. No other biological water quality data is available for the selected tributaries in the survey.

[22] Available at https://gis.epa.ie/EPAMaps/. Accessed in Oct 2022.
[23] Available at https://www.catchments.ie/. Accessed in Oct 2022.

There are two monitoring stations (RS38G020300 and RS38O070250) located on the Gweebarra River (Gweebarra_020) before it enters the Gweebarra estuary. According to the EPA, the biological water quality at station RS38G020300 during 2021 achieved a range Q3-4 and the biological water quality at station RS38O070250 achieved Q4, 'good status' during 2021, which indicates it is meeting the requirements of the WFD (2000/60/EEC). The EPA has assigned WFD River Waterbody Approved Risks to the Gweebarra River and listed it listed as 'Not at risk'. Data from the most recent EPA water quality monitoring surveys are available online [24]. The River Waterbody Status of the Gweebarra Estuary is 'Good' in the vicinity of the proposed wind farm site. The WFD Risk status is currently "At Risk".

The Waterbody Status of the Gweebarra Estuary is 'Good' in the vicinity of the proposed wind farm site. The WFD Risk status is currently "At Risk".

It has been established the proposed wind farm infrastructure footprint only drains into the Mulnamin Beg_010 WFD river water body. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed project, the hydrological pathway from the proposed project is considered an effective pathway for impacts from the proposed project once the first WFD coastal water body is reached as the Gweebarra estuary is located on the proposed wind farm site boundary.

4.2 Field Survey Results

TOBIN ecologist Sinead O Reilly carried out an aquatic survey across the watercourse within the proposed wind farm site between the between 20th-22nd September 2021, following best practice guidance methodologies (National Road Authority [NRA], 2009)[25] and following the Standard Operating Procedures of the EPA (2021)[26]

An ecological survey of the Lough Aneans More was carried out on the 18th of August 2022 by Cian Ó Ceallaigh.

The sites were searched for evidence of Annex I habitats and Annex II species listed on the EU Habitats Directive (92/43/EEC)). The sites were also searched for the presence of invasive plant species listed in Part 1 of the Third Schedule of S.I No. 477 of 2011, European Communities (Birds and Natural Habitats) Regulations (2011).

The findings of the field surveys were used to inform the AA Screening and NIS Report. The survey area included lands within the zone of influence (ZoI) of the proposed project. The current guidance on ecological assessments (CIEEM, 2018)[27] states that:

" *The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries*" and that " *The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change."*

[24] https://www.catchments.ie/data/#/waterbody/IE_SE_14F010061?_k=1bsic8
[25] National Roads Authority (NRA; now known as Transport Infrastructure Ireland) (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes.
[26] EPA (2021). Standard Operating Procedure for River Biological Monitoring Field Sampling Surveys. Version 1.10. EPA internal publication
[27] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine.

The ZoI was therefore defined through desk-based assessment with regard to the sensitivity of habitats and species likely to be present / previously recorded in the locality of the proposed wind farm site, areas with connectivity (physical, hydrological or ecological) to the proposed project, consideration of potential impacts which may arise from the proposed project and reference to relevant scientific papers and guidelines (NRA, 2008; SNH, 2016 & Cutts *et al.* 2013). The ZoI was therefore established as the proposed wind farm site plus a 150m buffer. All findings of the surveys, relative to this assessment, are outlined hereunder.

4.2.1 Lake Survey Results

The following habitats and flora species were recorded and mapped (see Figure 4-1) during the survey:

FL2 Acid oligotrophic lakes

The lake comprised a nutrient poor acid lake which had a brown colour due to it being surrounded by peat-based habitats and having an underlying granite bedrock. A stream flows into the lake from its northern end and is likely to result in some amount of pollution from the nearby forestry habitat.

A stream flows out of the lake at its western most point. The substrate around the margin was a mixture of rocks and organic lake sediment. Its eastern banks were shallower and notably rockier whereas the western banks had a steeper gradient and the substrate was not visible in most instances.

The habitat is largely void of vegetation, however a narrow strip of floating and submerged plants were recorded in places along the lakes margins. The south-western corner, where the lake was shallowest with abundant emergent rocks, had the best examples of the Lakes submerged/floating flora. This included the following species: Jointed rush (*Juncus articulates*), bulbous rush (*Juncus bulbosus*), a bladderwort (*Utricularia intermedia*) and *Sphagnum spp.* which were frequent along the lakes margin.

Floating club-rush (*Isolepis fluitans*), broadleaved pondweed (*Potamogeton natans*), common spike rush Eleocharis palustris, common sedge Carex nigra and another species of bladderwort (either *U. australis* or *U. vulgaris*) were recorded as occasional. Common cotton grass (*Eriophorum angustifolium)* and floating bur-reed (*Sparganium angustifolium*) were also recorded as rare throughout.

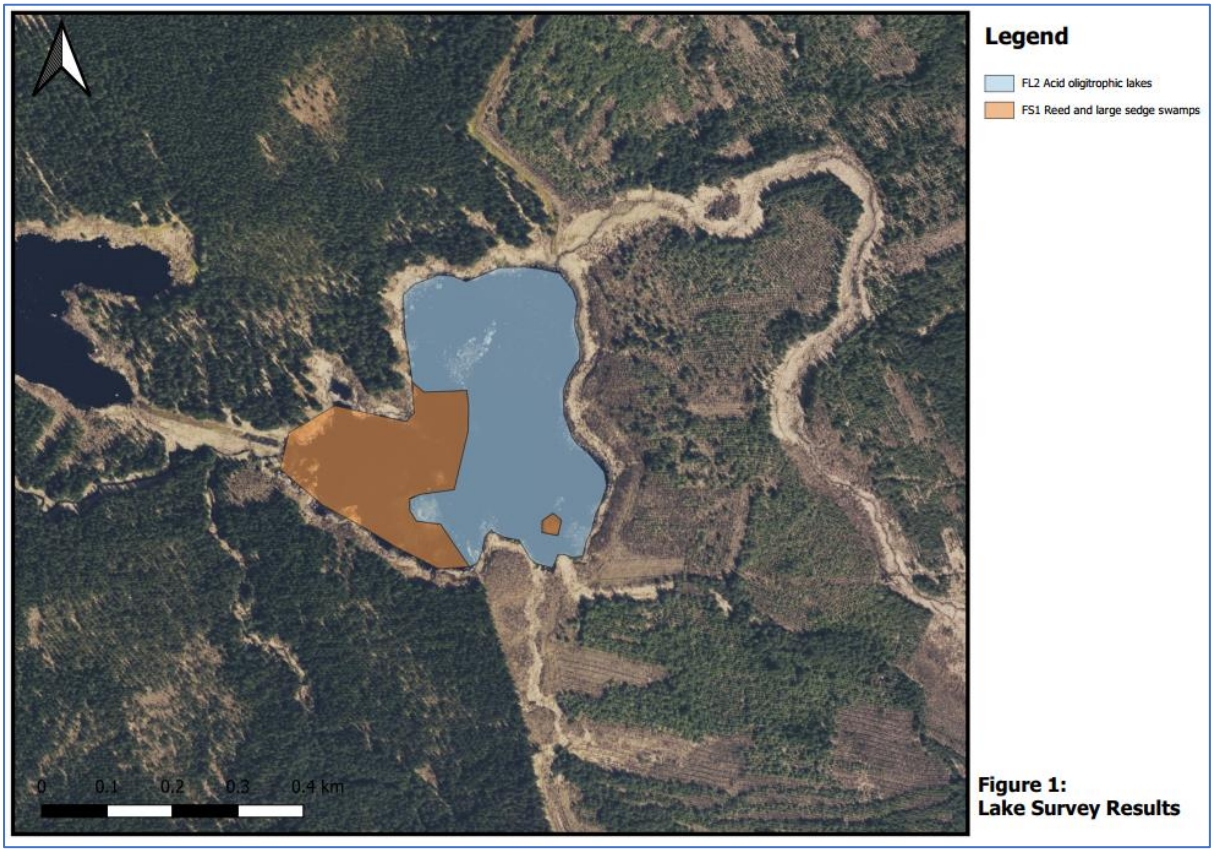
FS1 Reed and large swamp sedges

A large stand of tall (approx. 1m) emergent vegetation was recorded in the eastern half of the lake. It covered nearly one third of the lake and had abundant common reed (*Phragmites australis)* and common clubrush (*Schoenoplectrus lacustris)* (see Plate 4-1). The habitat was species poor but had components of the vegetation described above mixed through it. A smaller stand of this habitat was present in the south-western corner of the Lake, it comprised a mixture of abundant common reed and an unidentified species of sedge (likely a *Carex* sp.), which was frequent.

No Annex I habitats of the EU Habitats Directive were recorded within or in the immediate vicinity of the site, nor Annex II species. No plant species listed under the Flora Protection Order (FPO), or plant species listed as rare or vulnerable were recorded during the surveys. Figure 4-1 displays the habitat map of the study area.

Plate 4-1: FS1 Reed and Large Swamp Sedges Present within Lough Aneans More

Figure 4-1: Habitat Map of Lough Aneans More



4.2.2 River survey results

A brief site summary outlining both instream and adjoining habitats as well as physical characteristics is provided below. Scientific names are provided at first mention only. Habitat codes are given according to Fossit (2000).

Site 1

Site 1 on the Mulnamin Beg_010 represented an upland eroding watercourse (FW1; Fossit, 2000) flowing through an area of blanket bog and conifer plantation. The stream was situated at the base of a gently sloping hill and was cut into a peat based U-shaped channel (see Plate 4-2**Plate 4-2**). Averaging depth of 5cm, and 2m wide, the site featured 40% boulder, 30% cobble, 20% cobble, 5% sand and 5% mud/silt substrata. The harder substrata was embedded in peat. The stream had a sinuous natural form with bank undercutting present on both sides. Glide habitat dominated (70%) with localised pools (20%). Instream vegetation was limited to rare Potamogeton sp. 5% and Batrachospermum (40%). Peat staining was also present.

The site was bordered by upland blanket bog riparian buffer downstream of a WD4 conifer plantation. Species such as tufted grass (*Deschampsia cespitosa*), ling heather (*Calluna vulgaris*), soft rush (*Juncus effusus*), bramble (*Rubus fructicosus agg.*), devil's bit scabious (*Succisa pratensis*) and bog myrtle (*Myrica Gale*) were common. The riparian vegetation caused light shading (<25%).

Plate 4-2: Site 1, A Small Upland Stream in Upland Blanket Bog

Site 2

Located downstream of a bridge on the local road site 2 is a small upland eroding watercourse (FW1) flowing down into Gweebarra estuary. It flows along the boundary of upland forested area which supports a conifer plantation. The channel was U-shaped and had an average width of 3m and average depth of 11cm and a bank height of 1m on both sides. It was fast flowing and of high energy, flowing over a steep gradient. The channel cascaded over bedrock with (80%) boulders, (10%) cobble, (5%) gravel and (5%) gravel. The substrata was compacted and bedded given the high flows. The stream profile was dominated glide habitat (45%) with pool (35%) and riffle (20%) present. The water was peat stained.

In addition to the conifer plantation on the left bank, the site was bordered by Willow (Salix spp.) and Bracken (*Pteridium aquilinum*) borders on the right bank (see Plate 4-3). Other frequent species included ling heather, bog myrtle, holly (*Ilex aquifolium*), bramble and purple moor grass (*Molinia caerulea*). Instream vegetation included *Marsupella emarginata* moss on top of instream boulders. In addition, due to its high energy nature, there was a reduced capacity for the stream to support macrophytes. There was light shading present at the sampling site and evidence of under cutting on both banks.

Plate 4-3: Site 2, A High Energy Upland Stream Along the Boundary of a Conifer Plantation

Site 3

Located 160m upstream of site 2, site 3 was a small upland eroding watercourse (FW1) and tributary of site 2. The channel was U-shaped and had an average width of 2.5m and average depth of 2cm and a steep bank height of 3m on both sides. It was moderate flowing, flowing over a gradual gradient (see Plate 4-4).

Within this peat stained water course, the substrata contained boulders (70%), cobble (20%) and gravels (10%). Given the gentle gradient of this stream, it was glide dominant (60%) with equal proportions of riffle and pool. The small channel had a sinuous pattern through the upland blanket bog. This habitat supported ling heather, Rowan (*Sorbus subg. Sorbus*), devil's bit scabious, soft rush, tufted grass, willow (*Salix spp.*) and male fern (*Dryopteris filix-mas*). Mosses such as *Sphagnum spp.*, *Polytrichum spp.* and big shaggy-moss (*Rhytidiadelphus triquetrus*) were common on the wet sloping banks adjoining the stream. There was light shading present. There was no instream vegetation present due to the high peat staining and high energy nature of the site with the exception of Sphagnum spp., present on boulders.

Plate 4-4:Site 3 (facing downstream) A Small Upland Stream Flowing Through Upland Blanket Bog

Site 4

Site 4 was located 580m upstream of Site 2 on the same watercourse. Again, this stream was a small upland eroding watercourse (FW1). The channel was cascading in nature, bank height of 2.5m, 6m wide, 6cm deep on average and dominated by riffle and equal proportions of glide and pool habitat with one localized deeper pool in one section (>1.5m deep). The stream flowed over a moderate gradient through a semi-natural V-shaped valley as it bordered the WD4 conifer plantation on the left bank and PB2 upland blanket bog on the right bank (see Plate 4-5Plate 4-5). The riparian habitat contain species including bog myrtle, ling heather, willow, bracken (*Pteridium aquilinum*) and tufted grass. Given the high energy, the substrata were composed primarily of boulder (80%) with cobble (10%) and low fractions of coarse gravels (10%). There was no soft sediment present and the water was peat stained.

Instream macrophyte and bryophyte growth was sparse given the high energy of the channel, although some water feather moss (*Plathyhpnidium ripariodes*) grew on top of instream boulders.

Plate 4-5: Site 4 (facing upstream), A Medium Cascading High-energy Stream

Site 5

Site 5 was an upland eroding channel (FW1) with peat-stained water located 620m upstream form site 4. The channel width and water width were both 1.5m, with average depths ranging 6.5cm. The channel retained a semi-natural profile with 35% riffle, 45% glide and 20% pool habitats flowing through boulder cascade reaches (see Plate 4-6). The bank height was variable between 1.0m and 1.5m but graded into a V-shaped valley downstream. The substrata were dominated by boulder (40%) and cobble (40%) with smaller quantities of coarse, medium and fine gravel (20% combined).

The riparian habitat comprised of ling heather, soft rush and tufted grass. These buffered the Sitka spruce (WD4) plantation for 20-30m on each bank. No macrophytes were present given the heavily peat-stained water. Fountain feather-moss (*Hygroamblystegium tenax*) was locally frequent on submerged boulders with yellow fringed moss on the topsides of boulders. Common water moss (*Fontanalis antipyretica*) was present very locally on large boulders instream. There was a large presence of filamentous algae present within the watercourse indicating a sign of nutrient enrichment from the conifer plantation.

Plate 4-6: Site 5 (facing upstream), A Medium Cascading High-Energy Stream Flowing Through a Conifer Plantation

Site 6

Site 6 was a very narrow upland stream (FW1) with heavily peat-stained water at the time of survey. The channel width and water width were both 0.3m wide and the depth ranging between 2cm. Bank height was variable between 0.5 and 1m and the channel was broadly V-shaped (see Plate 4-7). The stream retained a semi-natural profile flowing through the conifer plantation (WD4) and Upland blanket bog (PB2). the survey section featured a mix of with 20% riffle, 70% shallow glide and 10% pool habitats.

The substrata were dominated by boulder (70%), cobble (30%) and gravel (5%) and small with smaller quantities of sand (5%). The boulders and cobbles were, however, bedded in peat with evident heavy siltation and also moderate compaction. Softer sediment areas were also heavily compacted given the relatively high flows.

The riparian habitat comprised of bog myrtle, gorse (*Ulex europaeus*), rowan, tufted grass, bramble, holly, male fern and hard fern (*Blechnum spicant*). Some Fountain feather-moss was present on the boulders within the stream. There was also some liver worth (*Lumularia cruciate*) present on the banks of the channel.

Plate 4-7: Site 6, A Small Narrow Cascading High-energy Stream

Site 7

Located along the border of a conifer plantation and also along the side of the local access road, site 7 was a small upland eroding watercourse (FW1) flowing in an upland forested area which supported mature Sitka spruce (*Picea sitchensis*) (WD4) upstream (see Plate 4-8). The channel was U-shaped, 0.5 wide with a 0.4m bank height. It was slow flowing and of moderate energy, flowing over a relatively gentle gradient. The stream depth averaged 5cm. The channel cascaded over bedrock with 85% boulder, 5% cobble, 5% coarse gravel and 5% sand. The substrata were compacted and bedded. The stream profile was dominated by pool habitat (60%) with 30% glide and localised riffle (10%). The stream changed into a V-shaped valley downstream of the road crossing. Peat deposits were also present. In addition to Sitka spruce, the site was bordered by soft rush, rowan, tufted grass, holly, bracken and bog myrtle.

Instream growth was limited to Common water moss on top of instream boulders. The high shading (>75%) from steep vegetated banks (many undercut) reduced the capacity of the stream to support macrophytes, in addition to its high energy nature.

Plate 4-8: Site 7, A Small Narrow Cascading High-energy Stream

Site 8

Site 8 was an upland eroding channel (FW1) with peat-stained water (see Plate 4-9). The bank height was 1.0m but graded into a V-shaped valley downstream and the channel width and water width were both 1.0m, with average depths ranging 8.5cm. The channel retained a semi-natural profile with 5% riffle, 85% glide and 10% pool habitats flowing through boulder cascade reaches. The substrata were dominated by boulder (85%) and cobble (10%) with smaller quantities of coarse, medium and fine gravel (5% combined).

The riparian habitat comprised of ling heather, bog myrtle and tufted grass. These buffered the Sitka spruce (WD4) plantation for 20-30m on each bank. No macrophytes were present given the heavily peat-stained water. Common water moss (*Fontanalis antipyretica)* was present very locally on large boulders instream. There was no presence of filamentous algae present within the watercourse considering the potential for nutrient enrichment from the conifer plantation.

Plate 4-9: Site 8 (facing upstream), A Medium Cascading High-Energy Stream Flowing Through a Conifer Plantation

Site 9

The stream was a small upland eroding watercourse (FW1). The channel was cascading in nature, it had a bank height of 1.5m on both banks, it was 2m wide, and 28cm deep on average (see Plate 4-10). The site was dominated by equal proportions of pool and glide habitat with no riffle present. The stream flowed over a moderate gradient through a semi-natural V-shaped valley populated by Sitka spruce. Species including bracken, willow, rowan, Sitka spruce, ling heather and hard fern were abundant along riparian corridors. Given the high energy, the substrata was dominated by large boulders (90%) with cobble (5%) and low fractions of coarse gravels (5%) present. There was no soft sediment present and the water was peat stained.

There was no instream macrophyte and bryophyte growth present given the high energy of the channel and high riparian shading (>75%), although some yellow fringe moss (*Racomitrium aciculare)* grew on top of instream boulders.

Plate 4-10: Site 9 (facing upstream), A High-energy Boulder Dominated Stream Flowing Through a Conifer Plantation

4.2.3 Kick Sampling Results

A detailed list of the macroinvertebrate taxa recorded during the survey in September 2021 with the classification of macroinvertebrate species recorded at each site in terms of their pollution sensitivity is provided in Table 4-1. The Q-value ascribed to each site, together with current ecological status, classified in accordance with the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 (S.I. 77 of 2019) is given in Table 4-2.

Table 4-1: Macroinvertebrates Recorded During the Kick Sampling Surveys

Group/organism	Species	Relative Abundance									EPA Class Pollution sensitivity group
		Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	
Stoneflies (Plecoptera)											
Perlodidae						2	4			1	**A**
Leuctridae		1									**A**
Nemouridae			4	4							**A**
Chloroperlidae					3						**A**
Cased caddis flies (Tricoptera)											
Limnephilidae					3	4	5		3	2	**B**
Rhyacophila sp.	*Ryacophila dorsalis*			1	1						**C**
Hydropsychidae	*Hydropsyche siltalai*				1						**C**
Goeridae		1		1							**B**
Beetles (Coleoptera)											
Hydrophilidae								1			**C**
Total No. of organisms		**2**	**4**	**6**	**8**	**6**	**9**	**1**	**3**	**3**	

Table 4-2: Biological Sampling Results

Sampling Site	Q-value	SSRS score	SSRS category	Water Framework Directive Ecological Status
1	4-5	3.2	Stream at risk	High
2	5	3.2	Stream at risk	High
3	4-5	2.4	Stream at risk	High
4	4	4	Stream at risk	Good
5	4-5	3.2	Stream at risk	High
6	4-5	4	Stream at risk	High
7	3	0	Stream at risk	Moderate
8	4	1.6	Stream at risk	Good
9	4-5	2.4	Stream at risk	High

Biological water quality data as prescribed by the (EPA; Toner et al. 2005), group invertebrates into classes whereby very pollution intolerant species are denoted class A, and species with greater pollution tolerance fall into successive classes (B through E respectively). As such, the presence or absence of these groups and their relative abundances facilitates an assessment of biological river health. The results from these sites are discussed in this context in order to interpret potential changes in the riverine community composition. Table 4-1 and Table 4-2 list all of the species recorded for each of the sites surveyed (i.e. sites 1-9). and show by colour separation the EPA taxonomic classes as prescribed above.

The Q-values assigned to each site take into account that at this time of year, Group A (highly pollution sensitive) species are far lower in occurrence than at other times, due to several species stonefly (Plecoptera), as well as a few of the indicator species of mayfly (Ephemeroptera) being mainly in the adult or egg stages of their life cycles.

Sites 1-3 were located on the north east of the site. The composition of the samples had low numbers of macroinvertebrates present, however these were dominated by numbers of pollution intolerant class A invertebrates. The class A invertebrates included two stonefly species, *Leuctra hippopus*, and *Nemoura erratica.*

Class B invertebrates (also pollution intolerant) were identified in sites 1 and 3 containing cased cadis *Goera pilosa*. Site 3 also contained one class C invertebrate (more pollution tolerant), the cased cadis *Rhyacophila dorsalis*.

The presence of small numbers of class B and C invertebrates, and the dominance of class A indicated that the samples within sites 1, 2 and 3 were representative of unpolluted Q4-5 and Q5 (high status) water quality.

Site 4-6 contained Class A and B macroinvertebrates (stoneflies and cased caddis) and site 4 also contained Class C cased caddis. These sites were representative of unpolluted Q4 and Q4-5 (good and high status) water quality.

Site 7 only contained one macroinvertebrate. This was a beetle from the family Hydrophilidae. This site had the lowest count of macroinvertebrates from all the sampling sites. This site was representative of moderately polluted Q3 (Moderate status) water quality.

Sites 8 and 9 both had low numbers of macroinvertebrates present. Site 8 only contained Cased caddis (*Limnephilidae sp.)* while site 9 contained Stone fly (*Perlodidae sp.)* and Cased caddis (*Limnephilidae sp.*). These sites were representative of unpolluted Q4 and Q4-5 (good and high status) water quality.

Table 4-3: Results of the General Physical Habitat Assessment at the Nine Sites within the Proposed Development

Site	Mean Dept (cm)	Instream vegetation (%)	Bank Height (m)	Bank Width (m)	Riffle (%)	Glide (%)	Pool (%)	Shade (%)	Boulder (%)	Cobble (%)	Gravel (%)	Sand (%)	Silt (%)
1	5	5	1	2	5	70	25	25	40	30	20	5	5
2	11	0	1	3	20	45	35	25	80	10	5	5	0
3	2	40	3	2	20	60	20	25	70	20	10	0	0
4	6	20	2.5	.6	40	20	40	25	80	10	10	0	0
5	6.5	25	1	1.5	35	45	20	0	40	40	20	0	0
6	2	40	.5	.35	20	70	10	50	60	30	5	5	0
7	5	30	.4	.5	10	30	60	75	85	50	5	5	0
8	8.5	0	1	1	5	85	10	50	85	10	5	0	0
9	28	30	1.5	2.5	0	50	50	75	90	5	5	0	0

4.2.4 Fauna

During the aquatic surveys, signs of otters were searched for along the Mulnamin Beg_010 WFD river water body and Lough Aneans More where accessible, and along drainage ditches located within the proposed wind farm site. No signs of otter (tracks, slides and spraints) or holts/resting sites were found within the study area.

The lamprey survey of the rivers involved assessing the substrate for the percentage of silt, and taking a sample of the silt (at the river banks edge) with a hand net. Due to no silt been present in any of the sampling sites, lamprey scoop surveys could not be carried out.

The survey of the river for its suitability for White-clawed crayfish and salmonid potential entailed assessing the substrate of the river, shading due to vegetation, flow, pools and riffles.

5.0 DISCUSSION

5.1 Lough Aneans More

The margins of the Lake habitat FL2 Acid oligotrophic lakes are considered to correspond with the Annex I Habitat 3110 Oligotrophic isoetid lake habitat. Evidence to support this decision are given below based on descriptions for the Annex I Habitat given by O Connor (2015):

- The physical and chemical characteristics of the Lake fit the description given by O Connor (2015) - *'occurs in soft-water, nutrient poor…. lakes frequently associated with acid bedrock catchments (notably granite and old red sandstone) overlain by peatland'*;

- Plant species of the isoetid growth form are characteristic of the vegetation (the Lake contained some of the example species listed. Namely bulbous rush, pondweed species and floating pondweed; and

- Other species listed for this habitat were present (e.g. floating club rush and bladderwort species).

Although the Annex I habitat 3130 Mixed Najas flexilis lake habitat is considered quite similar to 3110 the absence of the characteristic species slender naiad *Najas flexilis* and the relatively species poor nature of the Lake suggests a better fit with Annex I Habitat 3110 Oligotrophic isoetid lake habitat.

5.2 Macroinvertebrates

Overall it is clear that all nine sampling sites had very poor diversity of macroinvertebrate species present within the proposed wind farm which mostly composed of stonefly and cased caddis. All sites sampled (Sites 1-9) received a range of values from Q3 to Q5 rating indicating a range from unpolluted to moderately polluted water quality and range from "Moderate to High" ecological status. However the SSRS score for all nine sites ranged from 0-4 indicating that these streams are "At Risk" of failing to meet "Good" ecological status. This is due to the very low number of macroinvertebrates present (See Table 4-1).

All nine sites contained a low number of macroinvertebrate species count, macroinvertebrate diversity and richness. Site 7 contained the lowest number of taxa and only one species present.

The steep vegetated banks (many undercut) reduced the capacity of the stream to support macrophytes, and very high energy have limited the diversity and abundance of species present across all sites.

There was no evidence of the macroinvertebrate class Ephemeroptera present through any of the samples. As shown in the results, only Plecoptera were recorded. Plecoptera are herbivores and are generally found in cold, well oxygenated, fast-moving streams[28].

Along with the Plecoptera, both Ephemeroptera and Tricoptera are often good indicators of cool, well oxygenated waters and are sensitive to pollution. In fact, these taxa are used as indicators of high water quality, and their abundance is quantified as the EPT index (Ephermoptera, Plecoptera, Tricoptera)[29]. It is likely that the particularly low abundance of Ephemeroptera and Tricoptera is due to both the river bed and a water quality issues.

5.3 Fisheries

5.3.1 Salmonids

Fisheries suitability and value was taken into account during the aquatic surveys. Suitable spawning and nursery habitat for salmonids, was accessed. Also the potential for lamprey (River and Brook), European eel and White-clawed crayfish presence was also accessed at each surveyed site.

Overall, all nine sites were located within or surrounded by upland blanket bog and conifer plantation habitat. These sites had little value as Salmonids habitat due to the upland, high energy nature of the watercourses present within the proposed wind farm site. The results of the General Physical Habitat Assessment is presented in Table 4-3.

The substrate was largely bedded in peat for Salmonids. There was very little spawning gravels present across all nine sites, with the largest percentage of gravels been 20% and this was at sites 1 and 5.

There was no visual evidence of fish present within any of the nine sites surveyed. Fish access was poor given the high elevation upland location. While trout can sometimes occur at steep gradients, the smaller size of the cascading boulder-pool profile within these sampled streams was not considered suitable for resident fish. There was limited holding habitat given the high energy flows of the streams. Site 4 had a large percentage of holding pool (40%) however the site was dominated by large boulders. Access for Salmonids from downstream was difficult given the natural high gradients and large boulders preventing migration upstream.

Spawning and nursery habitat in the lower reaches, for example at site 1, was impacted by siltation, filamentous algae and bedded gravels due to the adjacent peat and forestry influences. Overall, the upland eroding streams located with this proposed wind farm site hold poor quality spawning and nursery for salmonids given no presences of riffle and glide sequences and or a mixed substrata bed. There was no evidence of good spawning habitat that would be found in

[28] Feeley, H.B., Baars, J-R., Kelly-Quinn, M. & Nelson, B. (2020) Ireland Red List No. 13: Stoneflies (Plecoptera). National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.
[29] Ecology and Classification of North American Freshwater Invertebrates (Second Edition) 2001, Pages 733-775

deeper glides and in pools where mixed gravels and small cobbles would be present. There was no evidence of holding pools or suitable boulders for larger fish.

Based on the very low macroinvertebrates present within these streams, there is a low abundance of fish food present within these streams to sustain salmonid populations.

In general, smaller more upland watercourses lack or even absence of suitable spawning substrata and nursery habitat resulting from higher gradients, higher- energy flows and spate natures.

Stream gradient is known to be one of the principal determinants of juvenile salmonid production, with medium gradients most optimal in terms of successful recruitment and population persistence (Wood & Budy, 2009[30]; O'Grady, 2006[31]; Amiro, 1993[32]; Kennedy & Strange, 1982[33]). As would be expected in upland catchments exposed to pressures from afforestation and peat escapement. These sites were located in upland areas and invariably featured high-energy flows exposed to regular spate conditions, often flowing over moderate to steep gradients. Upstream fish access for salmonids was difficult or blocked entirely due to such physical characteristics in several cases.

Many of the watercourses surveyed were small, shallow, high-energy, upland eroding streams draining afforested and or blanket bog areas. These featured cobble/boulder-dominated substrata which were often bedded in peat and had a lack (not absence) of finer gravels for spawning. Smaller gravel fractions are vital in structuring salmonid populations (Meredith et al., 2017[34]; Hudy et al., 2010[35]), being necessary for successful spawning and egg development, and there is generally a strong correlation between the availability of spawning substrata and the size of populations (Montgomery et al., 1999[36]). Additionally, peat-based catchments such as that in the vicinity of Croagh wind farm are less productive than those flowing over other geologies (O'Grady, 2006), with reduced primary productivity, reduced macro-invertebrate communities, and, generally speaking, lower fish biomass (Richardson, 1993[37]). This can also be validated from the invertebrate samples collected in the current study that typically had lower overall diversity of species and also densities (pers. obs.). Channels with higher proportions of peat substrata can also suffer from increased siltation and bedding (compaction) of instream gravels and cobbles necessary for salmonid spawning, further limiting local populations. Compacted gravels can no longer function as salmonid spawning areas and it has been shown

[30] Wood, J., & Budy, P. (2009). The role of environmental factors in determining early survival and invasion success of exotic brown trout. *Transactions of the American Fisheries Society*, *138*(4), 756-767

[31] O'Grady, M.F. (2006) Channels and challenges: enhancing Salmonid rivers. Irish Fresh- water Fisheries Ecology and Management Series: Number 4. Central Fisheries Board, Dublin.

[32] Amiro, P. G. (1993). Habitat measurement and population estimation of juvenile Atlantic salmon (*Salmo salar*). *Canadian Special Publication of Fisheries and Aquatic Sciences*, 81-97.

[33] Kennedy, G. J. A., & Strange, C. D. (1982). The distribution of salmonids in upland streams in relation to depth and gradient. *Journal of Fish Biology*, *20*(5), 579-591.

[34] Meredith, C. S., Budy, P., Hooten, M. B., & Prates, M. O. (2017). Assessing conditions influencing the longitudinal distribution of exotic brown trout (*Salmo trutta*) in a mountain stream: a spatially-explicit modeling approach. *Biological invasions*, *19*(2), 503-519.

[35] Hudy, M, Coombs, J.A, Nislow K.H. & Letcher B.H. (2010) Dispersal and within-stream spatial population structure of brook trout revealed by pedigree reconstruction analysis. Trans Am Fish Soc 139:1276–1287

[36] Hudy, M, Coombs, J.A, Nislow K.H. & Letcher B.H. (2010) Dispersal and within-stream spatial population structure of brook trout revealed by pedigree reconstruction analysis. Trans Am Fish Soc 139:1276–1287

[37] Richardson, J.S. (1993). Limits to productivity in streams: evidence from studies of macroinvertebrates. *Canadian Special Publication of Fisheries and Aquatic Sciences*, 9-15.

that eggs laid in clean gravels which have subsequently been silted over by peat have failed to hatch (Crisp 1993[38], 2000[39]).

5.3.2 Lamprey

Lamprey spawning and nursery habitat was absent in all nine sites. Generally, survey sites located on upland watercourses not considered suitable for lamprey species. Suitable spawning habitat by way of finer, unbedded gravels were absent from all sites. Finer sediment accumulations suitable for larval (ammocoete) settlement were absent given the high-energy nature of the sites. The majority of sites represented upland eroding watercourses and naturally such sites do not encourage the deposition of fine, organic rich sediment required by larval lamprey (Goodwin et al., 2008[40]; Aronsuu & Virkkala, 2014[41]).

There were no lamprey ammocoete burial areas identified within the survey reach. There was no lamprey value due to the cascading, moderate gradient and bedded substrata and as such, there was little spawning value. There was an overall limit to spawning gravels across all the water courses.

5.3.3 European Eel

While eels are known for their remarkable ability to often climb and navigate even near-vertical structures as juveniles (glass eels), (Watz et al., 2019[42]; Tamario et al., 2019[43]; Podgorniak et al., 2015[44]), many sites were considered sub-optimal or even unsuitable for the species given the often high gradients, high-energy profiles and typically upland nature of the channels.

5.3.4 White-clawed Crayfish

The streams located with the proposed wind farm site did not have potential habitat for White-clawed crayfish due to unsuitable geology, peatland afforested catchments, high energy channels and unsuitable substrate habitat, especially gravels for crayfish hatchlings. There was also a lack of instream vegetation and suitable burrowing habitat required for crayfish. As such there is no suitable availability of refuges for this species.

There was no evidence of instream pressures with the exception of nutrient enrichment from the forestry plantation and there was no invasive species recorded on site. Overall, this site was considered a poor in fisheries value.

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[38] Crisp, D.T. (1993) The ability of UK salmonid alevins to emerge through a sand layer. Journal of Fish Biology, 43(4), 656-658.

[39] Crisp, D.T., (2000) Trout and Salmon. Ecology, Conservation and Rehabilitation. Blackwell Science: Oxford; 212

[40] Goodwin, C.E., Dick, J.T.A. & Elwood, R.W. (2008) A preliminary assessment of the distribution of the sea lamprey (*Petromyzon marinus* L), river lamprey (*Lampetra fluviatilis* (L.)) and brook lamprey (*Lampetra planeri* (Bloch)) in Northern Ireland. Biology and Environment: Proceedings of the Royal Irish Academy 109B, 47-52.

[41] Aronsuu, K. & Virkkala, P. (2014), Substrate selection by subyearling European river lampreys (*Lampetra fluviatilis*) and older larvae (*Lampetra* spp). Ecology of Freshwater Fish, 23: 644–655

[42] Watz, J., Nilsson, P. A., Degerman, E., Tamario, C., & Calles, O. (2019). Climbing the ladder: an evaluation of three different anguillid eel climbing substrata and placement of upstream passage solutions at migration barriers. Animal Conservation.

[43] Tamario, C., Calles, O., Watz, J., Nilsson, P. A., & Degerman, E. (2019). Coastal river connectivity and the distribution of ascending juvenile European eel (*Anguilla anguilla* L.): Implications for conservation strategies regarding fish-passage solutions. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *29*(4), 612-622

[44] Podgorniak, T., Angelini, A., Blanchet, S., de Oliveira, E., Pierron, F., & Daverat, F. (2015). Climbing experience in glass eels: A cognitive task or a matter of physical capacities? Physiology & behavior, 151, 448-455

6.0 OVERVIEW OF POTENTIAL IMPACTS IN RELATION TO AQUATIC SPECIES AND HABITATS

There are a number of elements associated with the proposed project that may give rise to direct and indirect impacts that have the potential to result in likely significant effects during the Construction, Operation and Decommissioning phases of the development on European sites either alone or in combination with other plans and projects. The significance of these impacts depends on the scale of the impact as well as the ecological condition and the sensitivities of the qualifying interests. Elements of the proposed project that may give rise to impacts which have been considered with regards to potential effects to European sites are discussed hereunder.

Elements of the proposed project that may give rise to impacts, which have been associated with potential effects on European sites are as follows:

- Loss of habitat as a result of the land works and construction of the proposed infrastructure;
- Release of sediment and pollutants which may be discharged into surface water particularly during the installation of bridges and/or high rainfall events;
- Movement of vehicles and machinery associated with construction works and the potential for spillages of oils, fuels or other pollutants which could be transported to the surface water system during rainfall events;
- Transportation, pouring of concrete onsite and washing of concrete lorry flume – risk for entry into surface water;
- Increased silt loading which may stunt aquatic plant growth, limit dissolved oxygen capacity and overall reduce the ecological quality of watercourses, with the most critical period associated with low flow conditions;
- The introduction or spread of invasive alien species due to construction works and during operation activities;
- Disturbance to fauna (e.g. through noise from construction activity and/or human presence) resulting in the displacement of affected species; and
- Accidental mortality of wildlife from construction machinery.

6.1 Establishing the Likely Zone of Influence of Potential Impacts

The current guidance on ecological assessments (CIEEM, 2018) states that:

"The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries" and that "The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change."

Guidance in AA of plans and projects in Ireland notes that a distance of 15km is recommended for the identification of relevant European sites (DEHLG, 2010)[45]. For some projects the distance could be much less than 15km, and in some cases less than 100m, but this must be

[45] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf

evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects.

Impacts associated with the loss of habitats will be confined to within the proposed wind farm site. The ZoI of habitat loss was therefore defined as all lands within the proposed d wind farm site. Consideration was also made to the proposed electrical connection routes.

With regards potential habitat degradation effects associated with the potential release of sediment and other pollutants to surface water, the ZoI of the proposed wind farm is considered to include receiving surface water bodies adjacent to, or downstream, of the proposed wind farm site during the Construction, Operational and Decommissioning Phases. Considering the sources for likely significant impacts on European sites (Section 6.1, for the definition of the ZoI for impacts associated with water pollution, hydrological connectivity will not be considered effective past the first water body of depositional nature is reached (e.g. lake water body; coastal water body). The hydrological pathway for impacts from the proposed wind farm works will then include all surface water bodies from the proposed wind farm site location until the Gweebarra Bay Coastal water body (Section 4.1.3).

Based on the proposed works in Section 3.0 and the type of construction impacts from proposed proejct, potential impacts from dust were not established for this proposed wind farm site.

Noise during the Construction Phase of the proposed project has the potential to cause disturbance to resting, foraging and commuting Qualifying and Special Conservation Interest species. Individual species will elicit differing behavioural responses to disturbance at different distances from the source of disturbance. Below is a summary of the documented ZoI for varying species:

- Transport Infrastructure Ireland (formally the National Roads Authority) has produced a series of best practice planning and construction guidelines[46] for the treatment of certain protected mammal species (i.e. Otter), which indicate that disturbance to terrestrial mammals would likely not extend beyond 150m for the type of works proposed.
- Cutts *et al.* (2013)[47] notes that different types of disturbance stimuli are characterised by different avifaunal reactions. However, as a general rule of thumb, the authors refer a distance of 300m to be used to represent the maximum likely disturbance distance for waterfowl.

The ZoI for noise/disturbance was therefore established as the proposed project site plus a 300m buffer.

6.1.1 Construction Phase Impacts

There are a number of elements from the construction phase of the proposed project that have potential to result in likely significant effects during the construction phase. The significance of these impacts depends on the ecological condition of the supporting habitats and the sensitivities of the qualifying interests located downstream of the proposed wind farm site.

[46] Ref: http://www.tii.ie/technical-services/environment/
[47] Hull.Cutts, N., Hemingway, K. and Spencer, J. (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects [Version 3.2]. Institute of Estuarine & Coastal Studies (IECS) University of Hull.

Potential construction phase impacts associated with the proposed project are discussed hereunder.

6.1.1.1 Accidental mortality

There is potential for the accidental mortality of wildlife during construction works. It may be caused by moving vehicles throughout the site on moving wildlife that may have been disturbed.

6.1.1.2 Loss of habitat

The proposed project will include the construction of an access road and access tracks within the upland blanket bog and conifer plantations. Soils will be excavated and exported from the site to facilitate the construction works which will result in a permanent loss of habitats. Hedgerows will be removed to facilitate road crossings and road expansion and some river bank will be removed to facilitate clear span bridge installations to allow for water crossings. This will result in a permanent loss in bankside vegetation.

The construction of the proposed works proposes works beside the Mulnamin Beg_010 to allow for the placement of clear span bridges. This will not result in a permanent loss of instream substrate or permanent loss of aquatic habitat due to the placement of clear span bridges. There will be no loss of habitat to the tributaries/first order streams located within the site boundary.

The habitats within the tributaries were identified as not being suitable spawning habitat for Atlantic salmon, brown trout or lamprey due to the high attitude and lack of spawning gravels. There will be no loss of instream vegetation within any watercourse that will result in a permanent, slight negative effect on biodiversity at a County geographical scale.

6.1.1.3 Runoff of Sediment and/or Construction Pollution

Fish, mollusc, crustaceans and semi aquatic species such as Otter can be affected by pollution events or litter that can lead to death or a reduced level of health or fitness (e.g., through reduced breeding or feeding success) in populations. Pollution events can also effect the habitat they use. The Mulnamin Beg_010 and Glenleheen stream_010 are located with the site boundary of the proposed wind farm site. As mentioned in Section 1.1, the Mulnamin Beg_010 flows towards the Gweebarra estuary which is also part of the West of Ardara/Maas Road SAC (site code: 000197) located north west of the site. The proposed wind farm is hydrologically connected to the West of Ardara/Maas Road SAC.

During the construction phase, site clearance, excavation activities, instalment of clear span bridges, culverts and the stockpiling of material have the potential to result in sediment laden runoff, if not appropriately managed. The runoff of sediment can result in the sedimentation of nearby watercourses. Excavation works along the riverbanks will be undertaken when installing the bridges. Increased silt loading in watercourses can stunt aquatic plant growth, limit dissolved oxygen capacity and reduce the overall ecological quality of watercourses, with the most critical period associated with low flow conditions.

Surface water runoff from the site drains to the Mulnamin Beg_010 WFD river water body via the drainage ditches. There is potential for the release of sediment and pollutants to surface water via surface water runoff from the proposed wind farm site during soil stripping and installation of access routes, fencing and bridges during the construction phase, rainfall events or accidental release/mobilisation of pollutants during the operation phase. The concentration of suspended solids and nutrients in the water column could increase and cause excessive fine silt deposition and degrade water quality of these rivers.

Movement and maintenance of vehicles and machinery associated with construction works has the potential for spillages of oils, fuels or other pollutants which could be transported to surface water, particularly during high rainfall events. The surface water runoff of contaminated surface water can result in the degradation of water quality and impacts to aquatic fauna and flora, particularly when concrete is present.

The storage of materials adjacent to any dry or wet surface water drainage features also has the risk for run-off or slippage during rainfall events.

The pouring of concrete will be required to facilitate the foundation works associated with the development. The transportation, pouring of concrete onsite and washing of concrete lorry flume – risk for entry into ground and surface water. Flooding of the construction site has potential to result in the release of increased volumes of pollutants, particularly suspended solids to the Mulnamin Beg_010 WFD river water body system.

There is no record of salmon present in either the Mulnamin Beg_010 and Glenleheen stream_010 within the proposed wind farm site. Survey results carried out on the water courses of the Mulnamin Beg_010 within the site boundary indicated no potential for salmon, lamprey or White-clawed crayfish presence along this section of watercourses. There is no riverine substrate suitable for spawning or nursery habitat for salmonids or lamprey due to the topography, habitat and high-energy of these upland eroding streams. There is also an abundance of large granite boulders within sections of these streams thus limiting potential for suitable glides or deep holding pools. The presence of the large boulders may act as a barrier to the migration of salmonids. There is also heavy shading present within sections of these upland streams resulting in limited to no instream vegetation been present.

Results from the nine kick sampling sites ranged from a Q3 Moderately polluted to Q5 high status and an SSRS scores range from 0 to 4.0 and which puts this water body "At risk". The Mulnamin Beg_010 has also recently received an ecological status of "Good" River Waterbody WFD Status 2013-2018 by the EPA and Risk Unknown.

Based on the current status of the waterbody immediately downstream there is no potential to impact salmon, lamprey or White-clawed crayfish during the construction phase due to their absence.

Water quality impacts on this waterbody could result in short-term, negative effects on aquatic biodiversity, at a County geographical scale.

6.1.1.4 Noise and Disturbance

Sensitive species can be disturbed and displaced from suitable habitat locations due to construction-related disturbance. The displacement of fauna species could potentially occur within the vicinity of the proposed project.

For example, otters require lying up areas throughout their territory where they are secure from disturbance (NPWS, 2013h) and construction activities can create disturbance which could reduce the suitability of terrestrial and estuarine habitats for this species.

Transport Infrastructure Ireland (formally the National Roads Authority) has produced a series of best practice planning and construction guidelines for the treatment of certain protected mammal species (i.e. otter), which indicate that disturbance effects to terrestrial mammals would not be expected to extend beyond 150m (NRA, 2006). The proposed wind farm site is set

back approximately 50m from the closest European site, the West of Ardara/Maas Road SAC with the nearest proposed works located over 500m from the SAC.

The proposed construction works will result in an increase in noise levels during the Construction Phase due to the presence of construction vehicles and machinery. Disturbance of species can occur as a result of noise emissions and visual disturbance from at the site of works.

The construction works will result in an increase in personnel and traffic movement to and from the site. Rock breaking and potentially blasting will be undertaken during the Construction Phase. The construction works will also result in an increase in personnel and traffic movement to and from the construction works locations. There will be disturbance impacts from these locations.

A temporary increase in noise levels and visual disturbance is expected within the work locations of the proposed wind farm site which may result in disturbance to wildlife within the immediate vicinity of the site. Sensitive species such as Otter can be displaced from suitable habitat locations. There may be temporary avoidance of the site by mammal species in the vicinity of the proposed works as a result of noise and vibrations associated with the works during working hours during the work.

In general, plant machinery will be designed to ensure that the maximum noise level 10m outside the site boundary do not exceed an equivalent continuous sound level beyond what is recommended in the BSI British Standards (BS5228-1:2009+A1:2014). The Construction Phase of the proposed project is anticipated to generate relatively low levels of noise, and only during permitted construction hours.

6.1.1.5 Dust

Excavation activities may also result in the temporary generation of dust in the locality of the works area. The Institute of Air Quality Management provide guidelines (Holman et al. 2014)[48] which prescribes potential dust emission risk classes to ecological receptors. Following the guidelines and considering the size of the proposed project, the scale of the earthworks were considered large (total site area >10,000m²). The guidelines specify that receptor sensitivity is 'High' up to 20m from the source and reduces to 'Medium' at 50m. Dust may also be generated from trackout due to heavy duty vehicle (HDV) movements from the site entrances. It is anticipated that HDV movement will range within 70 outward movements average per day which equates to 'Medium' trackout movement. The guidelines indicate that Medium trackout equates to dust occurring between 50-100m from the site. The construction works associated with the access road and network infrastructure will be at a much smaller scale. The generation of dust is likely to range between 25-50m form the works area.

The spatial limit of dust impacts was therefore determined as a 50m buffer from the proposed works area. The site is less than 50m from the Gweebarra estuary water body which is part of the West of Ardara/Maas Road SAC. The proposed wind farm site is set back approximately 50m from the Gweebarra estuary water body which is part of the West of Ardara/Maas Road SAC with the nearest proposed works located over 500m from the SAC.

[48] Holman, C., Barrowcliffe, R., Birkenshaw, D., Dalton, H., Gray, G., Harker, G., & Vining, L. (2014). IAQM Guidanceon the Assessment of Dust from Demolition and Construction. Institute of Air Quality Management, London (accessed 11.03.14).www.iaqm/wpcontent/uploads/guidance/dust_assessment.pdf.http://iaqm.co.uk/wpontent/uploads/guidance/iaqm_guidance_report_draft1.4.pdf.

6.1.2 Operational Phase Impacts

Potential operational phase impacts associated with the proposed project are discussed hereunder.

6.1.2.1 Noise and Disturbance

During the operational phase, the proposed project will function as a wind farm and thus there will be turbine noise and aviation lighting on the turbines related to the operation of the site. Minor noise disturbance may arise from traffic relating to site visitations and the maintenance of the site. The increase in human presence and noise levels during the operational phase is unlikely to impact the surrounding environment.

There is no artificial lighting anywhere else within the proposed for the proposed projcet. Therefore it is anticipated there will not be a disturbance to aquatic mammals as a result of the turbine noise and aviation lighting.

6.1.3 Decommissioning Phase Impacts

The proposed wind farm is expected to be operational for at least 35 years. On cessation of activities, the wind farm will be removed from site. Impacts during decommissioning are expected to be similar type and magnitude to those anticipated during the construction phase but generally of a shorter duration.

7.0 MITIGATION IN RELATION TO AQUATIC SPECIES AND HABITATS

The appraisal of the proposed project potential for giving rise to likely significant effects to West Of Ardara/Maas Road SAC European site concluded that, in the absence of appropriate mitigation measures, the proposed dproject may result in potential adverse effects on the qualifying interests of the, and also to distant European sites.

In accordance with Article 6(3) of the Habitats Directive, the following Mitigation measures are prescribed hereunder to avoid and/or reduce the significance of the potential impacts from the proposed project (Section 3.0) and prevent the occurrence of likely significant effects on European sites.

The following mitigation measures are set out in accordance with the European Commission (2001) guidance on the 'Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive (92/43/EEC)'. Mitigation is described with respect to:

- How the measures will avoid / reduce the adverse impacts on the site;
- The degree of confidence in their likely success;
- The timescale, relative to the project, when they will be implemented and secured; and
- How and when the measures will be monitored.

The construction works associated with the proposed project, in the absence of appropriate mitigation measures, could result in potential adverse effects on the qualifying interests of the West of Ardara/Maas Road SAC.

The mitigation measures are described with respect to:

- How the measures will avoid/reduce the adverse impacts on the site;
- The degree of confidence in their likely success;
- The timescale, relative to the project, when they will be implemented and secured; and
- How and when the measures will be monitored.

7.1 Construction Phase Mitigation Measures

Mitigation measures to be implemented during the construction phase of the proposed project are detailed hereunder.

7.1.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared, covering the potential environmental risks and the proposed environmental construction strategies that are to be carried out before and during the Construction Phase of the proposed project. It includes all the mitigation measures prescribed in the NIS, as well as scheduling of works and best practice measures to prevent environmental impacts. The CEMP will be a live document that will be updated according to changing circumstances on the project and to reflect activities on site. It is intended that the CEMP will be finalised by the appointed contractor prior to commencement of construction.

7.1.2 Appointment of Ecological Clerk of Works

A suitably qualified Ecological Clerk of Works (ECoW) will be appointed by the Contractor. The ECoW will ensure that all mitigation measures prescribed in the NIS and, consequently, in the CEMP are implemented during the Construction Phase of the proposed project. The duties of the ECoW will include, but are not limited to:

- Will liaise regularly with the appointed Contractor and will review all Method Statements;
- Will ensure all mitigation measures prescribed herein are implemented correctly and effectively prior to and throughout the duration of the Construction Phase as appropriate. This is essential in relation to possible peat shear;
- Will inspect the installation and removal of all mitigation measures;
- Will undertake regular inspections of all mitigation measures throughout the duration of the construction phase;
- Will carry out continual assessment to ensure the mitigation measures are effective including assessment of adjacent peats for cracking/instability;
- Daily spot checks on the adequacy of cleaning and storage of waste onsite;
- Inspecting compliance with spill kit replacement;
- Will carry out regular inspection of the silt control measures, such as silt fences;
- Will cess all works should slippage indicators develop and/or settlement arrangements are inadequate for suspended solid removal in surface waters;
- Will ensure a Peat reinstatement is completed according to a detailed restoration plan; and
- Have arrangements established in relation to a contact protocol for the relevant statutory bodies on progress of works.

Further responsibilities of the ECoW are detailed within the below mitigation measures.

7.1.3 Mitigation Measures for Water Quality Effects

During the construction phase of the proposed project all pollution control measures will be designed, installed, and maintained in accordance with CIRIA guidance for '*Environmental Good Practice on Site*' (C741), '*Control of Water Pollution from Linear Construction Projects. Technical guidance*' (C648)[49] and with regard to IFI guidance '*Guidelines on the Protection Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*' (IFI 2016)[50] to ensure the protection of watercourses located within the proposed wind farm site. Furthermore, further specific mitigation measures associated with the protection of water quality are outlined hereunder.

7.1.3.1 Sediment control measures

The following mitigation measures are prescribed to ensure the prevention of water quality degradation due to the runoff of construction pollution during the construction works:

- A construction methodology is recommended prior to any works commencing with a view to, among others, minimising the volumes of excavation that will be required. Site preparation and construction must adhere to best practice and conform to the publication *'Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites.'*
- Interception of suspended solids must be designed to comply with an upper limit of 25mg per litre for the discharge of Total Suspended Solids (TSS) to surface waters as specified in the Salmonid Waters Regulations, SI 293 of1988.
- Buffer zones should not be used for the storage of any materials.
- The welfare facilities will be located within the proposed wind farm site, setback a minimum of 50m from the streams and rivers of the Mulnamin Beg_010 or any drainage ditch.
- A number of CCTV poles will be located within the proposed wind farm site, setback a minimum of 10m from the drainage ditches and the river.
- Silt fences will be erected along any open drainage areas on the proposed wind farm site.
- Silt fencing will also be installed on site where appropriate during the proposed bridge access works, to prevent discharge into the streams and rivers of the Mulnamin Beg_010 and main works area.
- Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar) and not a mesh. The silt fences will be positioned to allow an appropriate working area, but should not occur within areas prone to flood, or below the high-water mark. Silt fencing will be installed as per the manufacturer's guidelines prior to any ground disturbance works. Silt fences will be installed under the ECoW supervision and will be maintained until all ground disturbance has ceased and vegetation re-established. Once installed, the silt fence should be inspected regularly during construction and more frequently during heavy rainfall events. The ECoW will also supervise the removal of the silt fences following the completion of the works. Silt

[49] CIRIA (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532). Available at: https://www.ciria.org//ProductExcerpts/C532.aspx . Accessed: December 2021.
[50] IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters. Available at: http://www.fisheriesireland.ie/fisheries-management-1/624-guidelines-on-protection-of-fisheries-during-constructionworks-in-and-adjacent-to-waters . Accessed: December 2021.

curtains and floating booms will also be used where deemed to be appropriate and this will be assessed separately at each individual location.

- Track rutting's by machinery movement must be kept to a minimum and no discharge or run off containing high sediment loads must occur from the site. In this regard a contingency plan should be established and strictly adhered to.
- Prior to the commencement of excavations, an area for stockpiling excavated material will be identified within the proposed wind farm site, a minimum of 50m of the streams and rivers of the Mulnamin Beg_010 or any drainage ditch. Any stockpiling of peat or other site materials will require careful management to ensure that slippage or collapse to any adjacent watercourses will not occur.
- The amount of excavated material is expected to be small, but stockpiling of large volumes of loose soil material onsite will be avoided, and surplus material removed from the site as soon as work is completed.
- Piling maybe considered for turbine bases at deep peat locations and these bases should be a minimum 50 metres from watercourses. This separation distance must be increased where fisheries sensitive waters occur.
- Excavation activities will not be carried out during or following heavy rainfall (i.e., if there is a yellow weather warning in place or 5mm in a 1-hour period). Excavations will be covered with tarp or similar material, during high rainfall to avoid the creation of surface water with high concentrations of suspended solids that would require dewatering.

7.1.3.2 Pollution control measures

- An emergency plan for the construction phase of the proposed projectto deal with accidental spillages will be drawn up, which all site personnel must adhere to and receive training in.
- If it is intended that oil or fuel be stored in or adjacent to the construction site, it must be kept in a bunded area (providing 110% capacity of the largest storage unit), 100m from any watercourse which appears on a 6" O.S. map of the site.
- Vehicle maintenance should not occur within 100m of any watercourse and all machinery must be in good working order, free from any leakage of fuel, oil or hydraulic fluid.
- The construction compound and parking will be located adjacent to the access road to the site, with wheel-washing facilities present at the site entrance.
- Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of all construction vehicles. All machine operators and site staff will be fully trained in the use of this equipment.
- No material or vehicles will be stored within 10m of drainage ditches.
- All machinery will be regularly maintained and checked for leaks. Services will only be undertaken within the construction compound or offsite.
- Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles / equipment will take place in designated hard surface, bunded areas within the construction compound or off site only. If it is not possible to bring machinery to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any

spillages that may occur. Refuelling will only occur within the construction compound or off site and under inspection by the ECoW.

- All concrete will be mixed off site and will be brought in as required and poured in place at site. No on-site batching will be permitted within the proposed wind farm site. Precast elements for the bridges, culverts and concrete works will be used.
- All concrete browsers will be washed down in dedicated concrete washout areas onsite located within the construction compound or off site. Concrete washings will not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility. No chemicals that are deleterious to aquatic organisms will be used in cleaning works. All raw, uncured waste concrete will be cured at a designated location within the construction compound or off site.
- All concrete works will be scheduled during dry weather conditions only to reduce the elevated risk of runoff.
- The welfare facility will be located within the proposed wind farm site, and setback a minimum of 50m from the drainage ditches and rivers. The temporary welfare facilities will not have any discharge to ground or surface waters.
- All wastewater will be collected in a large tank, and will be emptied as required by a licenced waste collector according to the manufacturer's guidelines.
- The temporary welfare facilities will not have any discharge to ground or surface waters. All wastewater will be collected in a large tank and will be emptied as required by a licenced waste collector according to the manufacturer's guidelines.

On completion of the works, all apparatus, plant, tools, offices, sheds, surplus materials, rubbish, and temporary erections or works of any kind will be removed from the site.

7.1.4 Management of Near-stream Works

All near-stream construction work will only be carried out during the period permitted by IFI according to the Eastern Regional Fisheries Board (2004) guidance *document "Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites",* that is, May to September inclusive. This time period coincides with the period of lowest expected rainfall and, therefore, minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses.

The following control measures will be implemented during the construction of the proposed development adjacent to the streams and rivers of the Mulnamin Beg_010 as per IFI guidance received:

- Roadside drains should not intercept large volumes of water from ground above. Any watercourse, however small that is intercepted by the access routes should preferably be bridged or culverted at that point. The use of fords must be avoided. Culverts should be of a size sufficient to avoid overloading, blocking or washout. The profile of any stream that is crossed must remain the same and any fish movement remain unhindered. Shooting velocities must be avoided. Floating roads must be considered where any peat encountered is one metre or more in depth. Piling maybe considered for turbine bases at deep peat locations and these bases should be a minimum 50 metres from watercourses. This separation distance must be increased where fisheries sensitive waters occur.

- Erosion of roadside embankments and cuttings should be avoided by using intercepting trenches or terracing. Embankments and cuttings should be kept at no greater slope than the normal angle of repose to encourage re-vegetation, otherwise added stabilisation may be required. It is essential that silt traps and settlement ponds are utilised and are capable of settling out materials prior to discharge off site. These ponds must take into account high precipitation events and designed accordingly, incorporating other treatment measures where necessary. The traps and ponds must be regularly inspected and maintained as required.
- Existing drainage channels should remain untouched.
- Works will not be carried out adjacent to the streams and rivers of the Mulnamin Beg_010 during the Annual Close Season. The timing of works will be considered on a site-specific basis and in agreement with the IFI;
- The Method Statement for the installation of the proposed settlement ponds will be agreed with IFI prior to construction;
- The area of disturbance of the watercourse bank will be the absolute minimum required for the works;
- Sediment control measures as listed above, will be located immediately downstream of the works. These will be inspected daily, maintained and cleaned regularly during the course of site works.
- Consideration should be afforded to the likely increase in surface water flow from the site which has the potential to alter the downstream prevailing hydrological regime and impact on the fisheries resource. In this regard attenuation measures should be identified and implemented in the surface water drainage arrangements.
- The works programme will take account of weather forecasts and predicted rainfall. All large excavations, subsoil and vegetation stripping will be avoided during adverse weather.
- Works should be suspended during heavy rains or when there is high risk of pollutants entering adjacent surface waters. Run-off volumes should not exceed the assimilative capacity of the receiving waters.
- Bank side clearance and riparian vegetation removal will be kept to a minimum.

7.1.5 Management of Invasive Species and Pathogens

In order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011), the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented.

The following mitigation measures are prescribed to control the translocation or spread of invasive species and / or pathogens.

7.1.5.1 Establishing Good Site Hygiene and a Bio-secure Zone

- Fencing will be established around each working area hosting the invasive species. In this case, the bio-secure zone will be 7m away from the visible plant parts. This will ensure all areas scheduled to be treated are included in the area fenced off. This will inform

personnel that access into and out of the area is restricted. Signage should be erected along the fencing to avoid unnecessary contact with the plant or surrounding contaminated soils.

- A RAMS must be provided by the contractor prior to commencement of any works.
- A designated wash-down area is to be created, where material from a power-washed vehicle can be effectively contained, collected and buried/removed off-site along with other contaminated material. The area must have a washable membrane or hard surface.
- Stockpile areas shall be chosen to minimise movement of contaminated soil.
- Any stockpiles must be marked and isolated.
- Using tracked machines within the contaminated area is likely to contribute to the spread of seeds and should be avoided.
- The onsite ECoW will monitor and oversee implementation for the plan.
- In the event of there being difficulty in sealing the area adequately, the contractor shall not move any contaminated soil from the excavation site, but shall refer back to the ECoW or Ecologist, who will consult with an appropriately qualified person to design alternative measures.

7.1.5.2 Decontamination of Vehicles

- Decontaminating will be carried out for vehicles involved with management of invasive species and may only take place within a designated wash-down area.
- Prior to arrival on site and on departure, the contractor's vehicles and equipment must be thoroughly cleaned. High-pressure steam cleaning, with water >60°C, is recommended for vehicles and equipment where reasonably feasible. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- Vehicles and machinery must be cleaned using stiff-haired brush and pressure washer, paying special attention to any areas that might retain seeds such as wheel tyre threads and wheel arches.
- All vehicles and machinery should be cleaned before and after using them to excavate contaminated material.
- All equipment (including footwear) that has come into contact with water or soils will be visually inspected for evidence of attached plant or animal material, or adherent mud or debris. This should be done before entering and leaving the site. Any attached or adherent material will be removed before entering or leaving the site;
- Run-off from wash-down area must be isolated and treated as contaminated material;
- All contractors will be required to sign a prepared form detailing the nature of the cleaning process carried out and the date on which this was conducted; and
- Please note no vehicles will enter watercourses during the construction or operation of the proposed project.

During construction works, the spread or introduction of alien invasive species and noxious weeds will be avoided by adopting appropriate biosecurity measures, as per guidance issued by

the Transport Infrastructure Ireland (TII) (2010)[51], Invasive Species Ireland Best Practice Management Guidelines[52] and Inland Fisheries Ireland (IFI)[53] with respect to the protocols developed for the control of the spread of alien invasive species to both the aquatic and terrestrial environment, including the following measures:

The presence of alien invasive species and requirement for actions (if any new invasive species are found to be present onsite) will be confirmed by a suitably invasive species specialist or qualified ecologist.

The following mitigation measures, are prescribed to control the translocation or spread of invasive species and / or pathogens:

- Biosecurity measures will be employed during the construction works associated with the drainage ditch works. The biosecurity measures will have regard to IFI Biosecurity Protocols including: 'IFI Biosecurity Protocol for Field Survey Work (December 2010)'.
- Site hygiene measures listed above in Section 7.1.5.1 will need to be put in place when managing existing invasive species to ensure that the further spread of invasive species is avoided.

All materials entering site must be checked to ensure their sources are free of invasive species, particularly soil and plant material. All machinery entering site must be cleaned and checked for invasive species prior to arrival onsite.

All machinery and equipment used during the drainage works will be inspected and will be completely dry prior to works commencing to prevent the risk of pathogen translocation. A 'Check, Clean, Dry' protocol will be undertaken with all equipment, machinery and vehicles entering and leaving the proposed wind farm site. All equipment/machinery used within the drainage ditch will checked for living plants and animals. Equipment and machinery used will be washed thoroughly and then allowed to dry for at least 48 hours.

7.2 Operational Phase Mitigation Measures

Mitigation measures which will be implemented during the operational are minimal due to the limited potential Operational Phase Impacts. However during the operation of the wind farm, the pollution control measures stated in Section 7.1.3.2 should be fully adhered to.

7.3 Decommissioning Phase Mitigation Measures

Given the classification of the potential impacts from the proposed project's decommissioning phase (i.e. of same nature as the potential impacts during the construction phase – Section 6.1.1), the mitigation measures proposed for the construction phase of the proposed project (Section 7.1), are also proposed for the proposed project's decommissioning phase.

In addition, all structures proposed to be removed, will be removed offsite, while below ground structures filled with clean and free from invasive species material. Hardstanding areas will be rehabilitated by covering with local topsoil and allowed to revegetate. Road infrastructure will be left in place.

[51] https://www.tii.ie/tii-library/environment/construction-guidelines/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf
[52] http://invasivespeciesireland.com/wp-content/uploads/2012/01/Himalayan-Balsam-BPM.pdf
[53] https://www.fisheriesireland.ie/Biosecurity/biosecurity.html

7.4 Mitigation Effectiveness

The appointed Contractor will be responsible for ensuring all mitigation measures listed above, including any additional planning conditions, are fully implemented during construction works. The above listed mitigation measures will be implemented prior to the construction works commencing and/or undertaken throughout the duration of the works.

The above mitigation measures are best practice and are proven technologies/methods. These mitigation measures, once correctly applied, will avoid, or reduce the magnitude of potential impacts on the receiving environment, therefore ensuring avoidance of adverse effects on the integrity of the West Of Ardara/Maas Road SAC.

8.0 CONCLUSION

In the absence of mitigation, the potential impacts on the West Of Ardara/Maas Road SAC is potential disturbance of qualifying interest species and/or a potential reduction in water quality from the release of suspended solids, and/or pollutants into the surface water system. However, following the application of mitigation measures, as detailed in Section 7, potential significant adverse effects will be avoided or reduced. Consequently, it is determined that there will be no risk of significant adverse effects on the qualifying interest habitats and species, or on the overall site integrity, nor in the attainment of the specific conservation objectives for the West Of Ardara/Maas Road SAC.