Planning and Environmental Consultants

Seskin Renewables Wind Farm

Aquatic Baseline Report

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Planning and Environmental Consultants

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1. INTRODUCTION

1.1 Background

MKO has been appointed to conduct an Aquatic Baseline Survey and subsequent Aquatic Baseline Report for the area within and in the vicinity of the proposed Seskin Wind Farm development (henceforth referred to as 'Proposed Development').

Desk studies and Aquatic Baseline Surveys were undertaken in July and December 2024. This report provides a baseline assessment of the aquatic condition of the lands within and in the vicinity of the Proposed Development and acts as an aquatic baseline record to which future records and monitoring can be compared.

1.2 Statement of Authority

Aquatic Baseline Surveys were undertaken by Aoife Joyce (B.Sc.) and Niamh Rowan (B.Sc.) of MKO on 3rd and 4th July 2024, and by Pat Roberts and Corey Cannon on 19th December 2024 (Otter survey). This report has been prepared by Niamh Rowan and has been reviewed by Aran von der Geest Moroney (B.Sc). Aoife, Niamh, Pat, Corey and Aran have extensive experience in undertaking ecological surveys and assessments for large scale infrastructural projects such as wind farms, railways, roads and flood relief schemes.

1.3 Survey Locations

The aquatic baseline surveys for the Proposed Development (Proposed Wind Farm and Proposed Grid Connection) took place in the vicinity Durrow, Co Laois and Ballyragget and Seskin, Co. Laois. Locations for survey sites in the vicinity of the Proposed Wind Farm are shown in Figure 1-1, locations for the Proposed Grid Connection survey sites are shown in Figure 1-2.

Improved agricultural grassland (GA1) is the dominant habitat in the landscape surrounding the survey locations. Aquatic Baseline surveys undertaken within the vicinity of the Proposed Wind Farm and Proposed Grid Connection covered both low order, upper reach streams and downstream, high order rivers. Nomenclature for surveyed watercourses follows that of the Environmental Protection Agency (EPA).

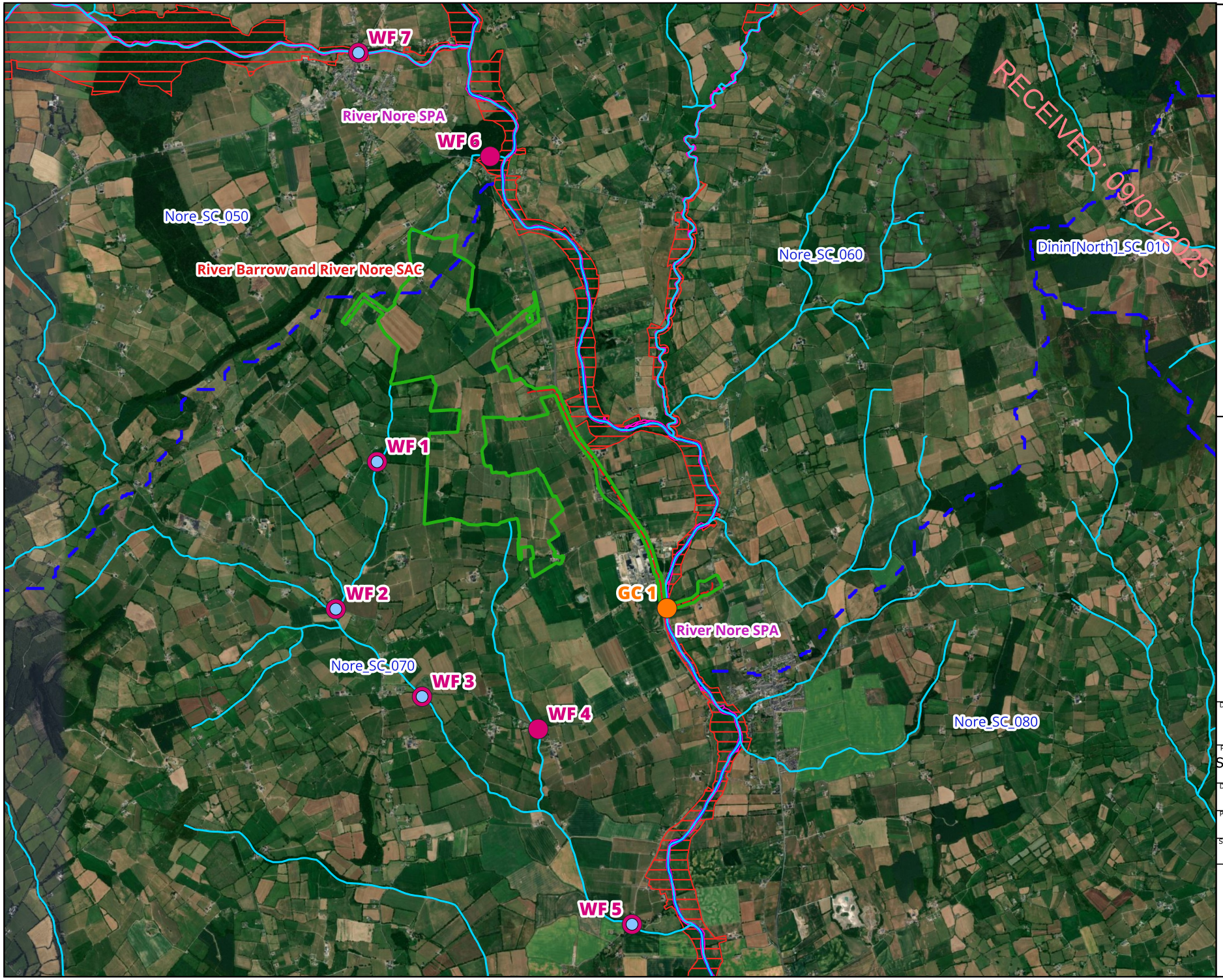
A total of seven Proposed Wind Farm survey sites across four EPA watercourses were selected for assessment (Table 1-1, Figure 1-1). The seven survey sites in the vicinity of the Proposed Wind Farm were located throughout the Nore hydrological catchment (catchment ID: 15), with two sites located within the Nore_SC_050 sub catchment and five sites located within the Nore_SC_070 sub catchment. Surveys were conducted on the Lisdowney_010, Nore_110, Nore_140 and Erkina_050 watercourses.

One survey site, located along River Nore within the within the Nore_SC_060 and Nore_SC_070 sub catchments, was selected for assessment along the Proposed Grid Connection (Table 1-1, Figure 1-2).

Table 1-1. Survey Site Locations within the vicinity of the Proposed Seskin Wind Farm Development.

Site no.	Watercourse	EPA name	EPA code	Hydrological catchment	Hydrological sub catchment	X (ITM)	Y (ITM)
Proposed Wind Farm Survey Locations							
WF 1	Lisdowney_010	Archerstown 15	15A16	Nore	Nore_SC_070	640986	673368
WF 2	Lisdowney_010	Archerstown 15	15A16	Nore	Nore_SC_070	640568	671870
WF 3	Nore_140	Lisdowney Stream	15L02	Nore	Nore_SC_070	641443	670982

WF 4	Nore_140	Ballyconra	15B86	Nore	Nore_SC_070	642622	670652
WF 5	Nore_140	Lisdowney Stream	15L02	Nore	Nore_SC_070	643573	668671
WF 6	Nore_110	Durrow Townparks	15D34	Nore	Nore_SC_050	642134	676464
WF 7	Erkina_050	Erkina	15E01	Nore	Nore_SC_050	640797	677516
Proposed Grid Connection Survey Locations							
GC 1	Nore_120	Nore	15N01	Nore	Nore_SC_060/ Nore_SC_070	643930	671875



Map Legend

- Proposed Wind Farm Survey Sites
- Proposed Grid Connection Survey Sites
- eDNA Survey Sites
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- WFD River Waterbodies
- WFD Hydrological Subcatchments
- EIAR Site Boundary
- Proposed Grid Connection Route

Drawing Title: Proposed Wind Farm Survey Locations

Project Title: Seskin Renewables Wind Farm

Drawn By	Checked By
NR	AvdGM
Project No.	Drawing No.
231103	Figure 1-1
Scale	Date
1:50,000	16.06.2025

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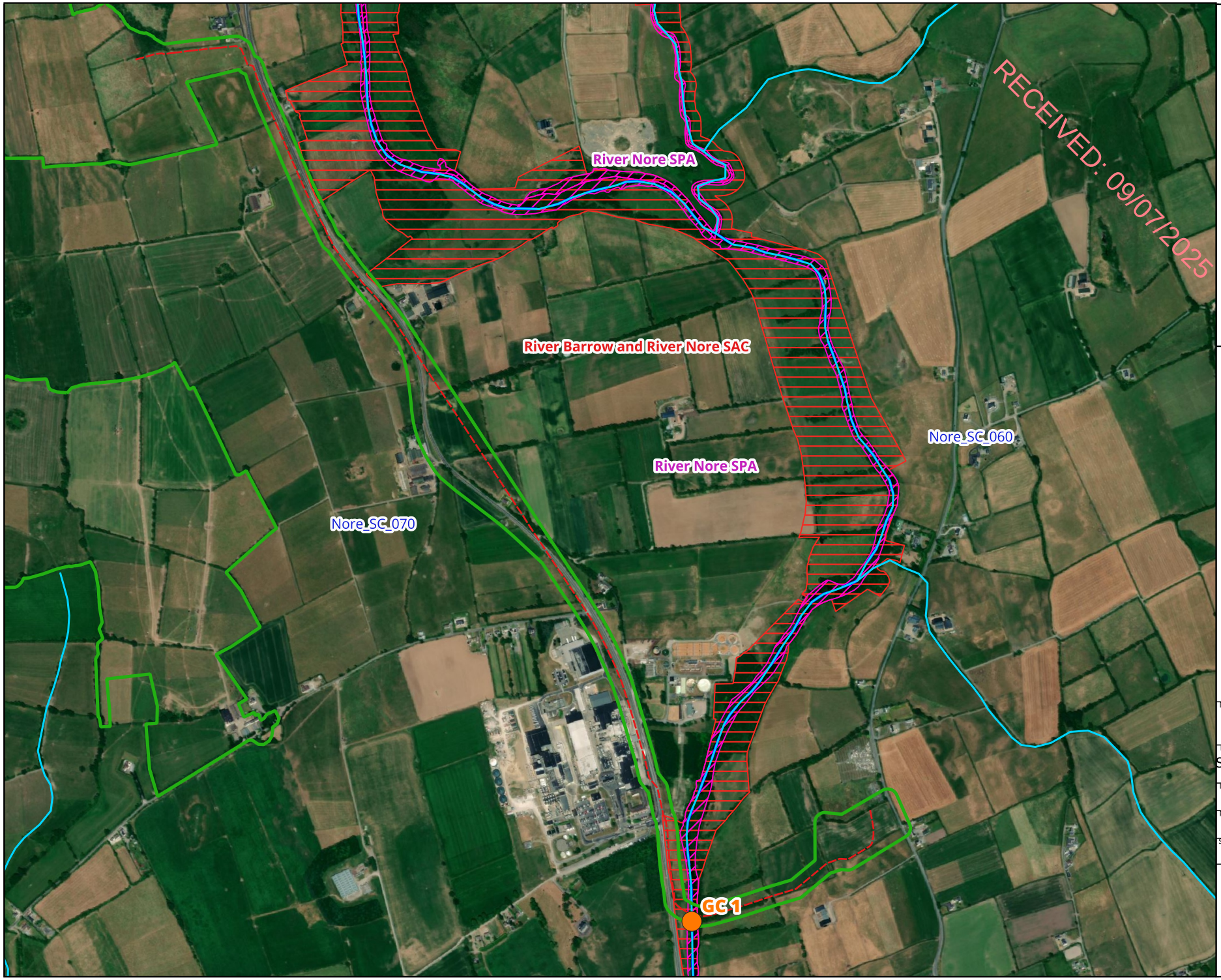

Map Legend

- Proposed Wind Farm Survey Sites
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- WFD River Waterbodies
- WFD Hydrological Subcatchments
- EIAR Site Boundary
- Proposed Grid Connection Route

Drawing Title
Proposed Grid Connection Survey Location

Project Title
Seskin Renewables Wind Farm

Drawn By	Checked By
NR	AvdGM
Project No.	Drawing No.
231103	Figure 1-2
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2. METHODOLOGIES

2.1 River Habitat Assessment

Aquatic Habitat Assessments/ Appraisals were undertaken in order to determine the riverine habitat types present at each of the survey locations within and in the vicinity of the Proposed Development. The survey design and methodologies were derived from current ecological best practice guidance documents. Habitats were classified in accordance with the national habitat classification system used in Ireland - A Guide to Habitats in Ireland (Fossitt, 2000).

Riverine habitat assessments were conducted utilising elements of the following methodologies and literature to characterise the selected sites along the watercourse:

- Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003),
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009),
- Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000).

All sites were assessed in terms of the following variables:

- Channel width and depth.
- Bank profiles, including bank height and composition.
- Substrate type, listing substrate fractions in order of dominance.
- Flow type.
- In-stream macrophyte and aquatic bryophytes occurring and the prominence of each (DAFOR scale).
- Water clarity and colouration.
- Riparian vegetation composition.

The survey was devised to gather ecological baseline information including any habitat features that could potentially support protected Qualifying Interest species associated with EU designated sites within the wider area. In addition, surveys considered the potential presence of problematic invasive alien species, with an emphasis on those species listed on the 'Third Schedule' of Regulations 49 & 50 of the Birds and Natural Habitats Regulations 2011. The assessments have regard to the NRA guidance document - Guidelines on management of noxious weeds and non-native invasive plant species on national roads (National Roads Authority (NRA, 2010)).

During the site visit, additional information on any other species of local biodiversity value occurring within the site was recorded in order to provide a complete baseline understanding of the development site.

2.2 Fisheries Habitat Assessment

An assessment of the riverine habitats at each sample location was undertaken to determine the potential for watercourses within the study area to support fish species, including Salmonids, Lamprey spp., and European eel, among other fish species likely to utilise watercourses within the study area.

Fisheries habitat assessments were conducted utilising elements of the following methodologies and literature to characterise the selected sites along the watercourse:

- Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003)
- Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000).

- 'Channels & Challenges. Enhancing Salmonid Rivers'. Irish Freshwater Fisheries Ecology & Management Series (O'Grady, 2006)
- 'Ecology of the Atlantic Salmon' (Hendry & Cragg-Hine, 2003)
- Life Cycle Unit method (Kennedy, 1984; O'Connor & Kennedy, 2002)
- 'Ecology of the River, Brook, and Sea Lamprey' (Maitland, 2003)
- NPWS Irish Wildlife Manuals lamprey surveys (O'Connor, 2004; O'Connor, 2006; and O'Connor, 2007)

2.3 Electrofishing Surveys

Electrofishing operations for the purpose of forming baseline fisheries data of the Proposed Wind Farm site were undertaken on the 3rd and 4th July 2024.

A 5- or 10-minute timed electrofishing survey was undertaken at each of the survey locations, to determine the presence/absence of fish species within the study area while adhering to best practice methodology (Electric Fishing in Wadeable Reaches, Central Fisheries Board (CFB, 2008)), as well as European standards for electrofishing (CEN, 2003). Two suitably qualified ecologists conducted electrofishing operations at the electrofishing locations as per Fig 1-1, using an E-fish EF-500B-SYS Electric Fishing Backpack System.

Fish captured during electrofishing operations at each site were kept in a holding container with oxygenated water. Stress to fish via temperature and low oxygen levels via frequent freshwater changes and monitoring of water temperature within the holding container, ensuring temperatures of 20°C were not surpassed. All fish temporarily captured during the survey were identified to species level and measured. All fish temporarily captured were allowed to recover and subsequently returned to the watercourse in the vicinity of where they were collected.

Biosecurity measures were followed as per Section 2.7 below.

2.4 Macroinvertebrate Surveys

A two-minute kick-sample and stone-wash, as well as a 1 min hand search of larger substrata or organic material (e.g., submerged tree limbs/vegetation) was performed at each of the survey locations, as per methodology used by the Environmental Protection Agency (EPA) as part of the Water Framework Directive (WFD) River Monitoring Programme (Toner *et al.,* 2005).

Dislodged fauna were caught in a one metre square standard hand net (250 mm x 250 mm, 300 mm bag depth, 1 mm mesh size) situated downstream of the sampler disturbing the stream/riverbed substrate. The sampler moved upstream and across the channel while performing the kick-sample to ensure all micro-habitats presents within the watercourse were surveyed. All material collected in the net was transferred via rinsing to a white heavy duty plastic tray (485 x 335 x 80mm) filled with water for identification of macroinvertebrates in situ. Large stones and organic material within the sample such as leaves, twigs, algae or bryophytes were examined for any macroinvertebrates present and subsequently removed from the tray.

Specimens present in the sample were identified to the lowest possible taxonomic level using the FBA Guide to Freshwater Invertebrates (Dobson *et al.*, 2012). The Q-value system assigns macroinvertebrate taxonomic groups to one of five WFD status pollution sensitivity groups (from A, most pollution sensitive to E, most pollution tolerant). The Q-value is calculated based on the relative abundance of Pollution Sensitive Group A and B taxa to Pollution Tolerant Group C, D and E taxa within the sample, and the surveyed stretch of watercourse is assigned an associated pollution status. The EPA Quality (Q)-Rating System is summarised in Table 2-1.

Table 2-1. EPA Quality (Q) Rating System.

Biotic Index	Quality Status	Quality Status	Quality Class	Condition
Q5, Q4-5	High	Unpolluted	Class A	Satisfactory
Q4	Good	Unpolluted	Class A	Satisfactory
Q3-4	Moderate	Slightly Polluted	Class B	Unsatisfactory
Q3, Q2-3	Poor	Moderately Polluted	Class C	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously Polluted	Class D	Unsatisfactory

2.5 Otter Surveys

Otter surveys were conducted as per TII/NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all Otter signs, e.g., spraint, scat, prints, slides, trails, couches and holts both upstream and downstream of proposed survey locations. Within the Proposed Wind Farm study area, otter surveys were conducted 150m upstream and downstream of all survey points. Due to the small-scale nature of works proposed to be undertaken along the Proposed Grid Connection, as well as high levels of disturbance from the existing road, Otter surveys were conducted in the vicinity of grid route survey locations. In addition to the width of the rivers, a 10m riparian buffer (both banks) is considered to comprise part of the Otter habitat (NPWS 2009. Threat Response Plan: Otter (2009-2011).

2.6 eDNA Surveys

The Proposed Wind Farm is located almost entirely within the Nore Upper SAC Freshwater Pearl Mussel *(Margaritifera margaritifera)* Catchment, with some of the Proposed Wind Farm and associated survey sites located within the Nore Middle Freshwater Pearl Mussel catchment, classified as having "Other extant populations" of *Margaritifera*. The Proposed Wind Farm and associated survey sites are located downstream of NPWS mapped White-clawed Crayfish *(Austropotamobius pallipes)* records. As such, environmental DNA (eDNA) sampling for both Freshwater Pearl Mussel (FPM) and White-clawed Crayfish (WcC), as well as Crayfish Plague were undertaken in select watercourses within the study area.

To detect populations FPM and WcC, or the presence of Crayfish Plague within the Proposed Wind Farm study area, a composite water sample was collected from the watercourse at each of the selected eDNA survey sites in July 2024 and analysed for FPM, WcC and Crayfish Plague. eDNA sampling sites were strategically chosen to maximise longitudinal (instream) coverage within the catchment, facilitating the likelihood of species detection.

Each composite (500ml) water sample was collected from each watercourse, with 20 x 25ml samples taken along the watercourse, for a representative geographic spread at the site. The composite sample was filtered and fixed on site using a sterile proprietary eDNA sampling kit. The sample was stored at room temperature and sent to the laboratory for analysis following return from site.

Given the high sensitivity of eDNA analysis, a single positive qPCR replicate is considered as proof of the species' presence. Whilst an eDNA approach is not currently quantitative, the detection of the target species' DNA indicates the presence of the species at and or upstream of the sampling point.

2.7 Biosecurity Measures

Biosecurity measures which were implemented followed *IFI Biosecurity Protocol for Field Survey Work*, (IFI, 2010). Due to increasingly prevalent spread of crayfish plague in Ireland and to prevent the

spread of aquatic invasive species, all equipment was scrubbed and cleaned prior to and post works with Virkon Aquatic. Additionally, all equipment was cleaned with Virkon Aquatic between survey sites to minimise the potential for the spread of invasives between watercourses/ survey sites. Any instance of invasive species was recorded and conveyed to IFI via electrofishing data returns.

3. DESK STUDY

A Desk Study was conducted to gather baseline information from online sources and records on the aquatic habitats and aquatic dependent species within the vicinity of the survey area.

In preparation of the desk study, the following sources were used to gather information:

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA, Water Framework Directive (WFD),
- Review of OS maps and aerial photographs of the survey area.

3.1 EPA Water Quality.

The EPA Envision map viewer was consulted on 2nd July 2024 regarding the water quality status and risk of the rivers which comprise the Proposed Wind Farm and Proposed Grid Connection survey locations.

Table 3-1 presents a summary of the waterbody WFD status for 2013-2018, waterbody WFD status for 2016-2021 and WFD 3rd Cycle River Waterbodies Risk Projection, as well as details of the corresponding Proposed Wind Farm and Proposed Grid Connection survey locations.

Table 3-1. WFD Status and Risk of surveyed watercourses within the vicinity of the Proposed Wind Farm.

Proposed Wind Farm and Proposed Grid Connection survey locations	Watercourse	EPA name	EPA code	Catchment	Sub Catchment	Waterbody WFD Status for 2013-2018	Waterbody WFD Status for 2016-2021	WFD 3rd Cycle River Waterbodies Risk Projection
Proposed Wind Farm Survey Locations								
WF1	Lisdowney_010	Archerstown 15	15A16	Nore	Nore_SC_070	Good	Moderate	At risk
WF 2	Lisdowney_010	Archerstown 15	15A16	Nore	Nore_SC_070			
WF 3	Nore_140	Lisdowney Stream	15L02	Nore	Nore_SC_070	Good	Good	Not at risk
WF 4	Nore_140	Ballyconra	15B86	Nore	Nore_SC_070			
WF 5	Nore_140	Lisdowney Stream	15L02	Nore	Nore_SC_070			
WF 6	Nore_110	Durrow Townparks	15D34	Nore	Nore_SC_050	Good	Good	Not at risk
WF 7	Erkina_050	Erkina	15E01	Nore	Nore_SC_050	Moderate	Moderate	At risk
Proposed Grid Connection Survey Locations								
GC 1	Nore_120	Nore	15N01	Nore	Nore_SC_060/ Nore_SC_070	Good	Moderate	At risk

The EPA Envision map viewer was consulted on 17th December 2024 regarding the water quality status of watercourses which comprise the Proposed Wind Farm and grid route survey locations. There were nine EPA monitoring points within the vicinity of the Proposed Wind Farm and Grid Connection Study areas (Table 3-2).

Table 3-2. EPA Water Quality Data.

Watercourse	Sampling Station	Location	Sampling Year	Q-Value & Water Quality Status
Lisdowny_010 (Lisdowney Stream), 0.55km upstream of survey site WF 3	Bridge North of Lisdowney Crossroads [Station Code: RS15L020100]	E 241096.21, N 171295.01	2022	Q3–4 – Moderate
Nore_140 (Lisdowney Stream), 0.05km upstream of survey site WF 3	Bridge East of Lisdowney Crossroads [Station Code: RS15L020200]	E 241462.38, N 170979.97	1991	Q3 - Poor
Nore_130, 0.9km upstream of confluence with Nore_140	1.5 km d/s Ballyragget [Station Code: RS15N011500]	E 244004, N 169342	1991	Q3–4 – Moderate
Nore_010, 0.35km downstream of survey site WF6	Tallyho Bridge [Station Code: RS15N011300]	E 242319.98, N 176225.61	2022	Q4 - Good
Nore_120, 5.8km downstream of survey site WF 6	Northeast of Ballyconra (u/s of Glanbia) [Station Code: RS15N011380]	E 244169.75, N 172460.47	2020	Q3–4 – Moderate
Nore_120, 7.5km downstream of survey site WF 6, 0.35km upstream of survey site GR 2	0.5 km u/s Ballyragget [Station Code: RS15N011400]	E 244309, N 171108	2020	Q3–4 – Moderate
Nore_130, 7.8km downstream of survey site WF 6, at survey site GR 2	Bridge in Ballyragget [Station Code: RS15N011450]	E 244524.4, N 170820.7	2022	Q4 - Good
Erkina_050 (Erkina), 0.3km upstream of survey site WF 7	Footbridge 0.5 km u/s of Durrow Bridge [Station Code: RS15E010500]	E 240567, N 177481	1991	Q3–4 – Moderate
Erkina_050 (Erkina), 0.05km upstream of survey site WF 7	Durrow Bridge [Station Code: RS15E010550]	E 240891, N 177473	2022	Q3–4 – Moderate

3.2 Salmonid River Status.

Watercourses designated as Salmonid Waters under S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations (1988) are those fresh waters classified under the first schedule, which are *'capable of supporting Salmon (Salmo salar), Trout (Salmo trutta), Char (Salvelinus) and Whitefish (Coregonus)'* species. Survey site GC1 is located along the River Nore, which is a protected river designated under the Salmonid Regulations. Additionally, all Proposed Wind Farm survey sites are located upstream of the mainstem River Nore, with sites WF 5, WF 6 and WF 7 located approx. 0.7km, 0.15km and 1.2km upstream of the confluence of their respective watercourse locations with the mainstem River Nore.

3.3 NPWS Data

3.3.1 Freshwater Pearl Mussel

Proposed Wind Farm aquatic survey locations WF 6 and WF 7 and Proposed Grid Connection survey location GC1 is located within the Nore Upper *Margaritifera* sensitive area, which is listed as catchment of SAC populations of Freshwater Pearl Mussel listed in S.I. 296 of 2009.

The remaining survey sites are located within the Nore Middle catchment, listed as a catchment of other extant populations of Freshwater Pearl Mussel outside of SAC populations.

3.3.2 White-clawed Crayfish

Point distribution incidence of the Annex II and V species White-clawed Crayfish (*Austropotamobius pallipes*) has been recorded by NPWS upstream of the vicinity of the Proposed Wind Farm study area, approx. 5.2km upstream of survey site WF 7, and 12.3km upstream of GC1. There are no records of White-clawed Crayfish within or directly adjacent to the Proposed Wind Farm or Proposed Grid Connection.

3.3.3 Inland Fisheries Ireland

Surveys were conducted by IFI as part of water sampling for the Water Framework Directive, in the immediate vicinity of survey sites WF 3, WF 5 and WF 7 in July-October 2021. Atlantic Salmon (*Salmo salar*), Brown Trout (*Salmo trutta*), European Eel (*Anguilla anguilla*), Lamprey sp. (*Petromyzontidae*), Minnow (*Phoxinus phoxinus*) and Stone Loach (*Barbatula barbatula*) were recorded during surveys.

3.3.4 Annex I habitats

There are no mapped instances of freshwater Annex I habitats in the immediate vicinity of the Proposed Wind Farm or Proposed Grid Connection study areas. A 94.5ha area of alluvial woodland is located approx. 0.75km upstream of survey site WF 7, and a further 47ha of alluvial woodland is located 5.8km and 7.2km upstream of the mainstem River Nore confluences with the Erkina and Durrow_Townparks watercourses, along which survey sites WF 7 and WF 6 are located, respectively.

3.3.5 FPO Macrophytes

Aquatic plant species protected under the Flora (Protection) Order 2022 (S.I. No. 235/2022) were not recorded within the 10km hectads of S46 or S47.

4. FIELD SURVEY RESULTS

4.1 Aquatic Survey Results.

Aquatic Baseline Surveys undertaken in the vicinity of the Proposed Wind Farm included:

- River habitat assessment,
- Fisheries habitat assessment,
- Electrofishing surveys,
- Macroinvertebrate surveys,
- Otter Surveys,
- eDNA surveys.

Aquatic Baseline Surveys undertaken along the Proposed Grid Connection included:

- River habitat assessment,
- Fisheries habitat assessment,
- Macroinvertebrate surveys,
- Otter Surveys.

Sections 4.1.1 and 4.1.2 summarise survey findings for fisheries, macroinvertebrate and macrophyte assessments at each survey site, as well as the physical attributes and habitats present within each watercourse in the vicinity of the Proposed Wind Farm and Proposed Grid Connection study areas. No significant constraints or limitations in gathering information were encountered.

Appendix I presents a collated record of the species found at each survey location electrofishing was conducted on.

Appendix II presents a collated record of the Q-Values assigned across all survey locations.

4.1.1 Proposed Wind Farm Survey Locations

4.1.1.1 WF Survey Site 1 (WF 1)

Survey site WF 1 was located along the upper reaches of the Archerstown River (EPA code: 15L02, IG Ref.: S 41039 73335). Properties of the watercourse at this sample location are provided in Table 4-1 and a representative photograph of the survey location is shown in Plate 4-1.

This highly modified stretch of **Eroding/Upland River (FW1)** was characterised by a narrow, laterally confined channel with heavily eroded earthen banks. The watercourse profile was comprised of a series of slow flowing, shallow riffle, with sections of standing water with no perceptible flow. Evidence of livestock entry into the watercourse from surrounding pastural land use was indicated by actively poached banks and faecal contamination within the watercourse, resulting in a high degree of siltation, slight brown water colouration and moderately turbid water. Channel substrate was predominantly composed of silt, with isolated areas of heavily compacted cobble and boulder outcrop, also overlain with fine sediments derived from the poached banks.

Water depth was shallow (averaging approx. 0.1m) along the surveyed stretch, with the exception of a silty pool up to 0.3m in depth directly downstream of an under-road 2-span culvert with an instream abutment. The watercourse was also culverted at the downstream survey extent by a concrete pipe culvert and associated concrete livestock crossing.

A sparse vegetative riparian buffer existed between the watercourse margins and surrounding pastural **Wet grassland (GS4).** Emergent and bankside vegetation included Glaucous sedge *(Carex flacca)*, Meadowsweet *(Filipendula ulmaria)*, Perennial ryegrass *(Lolium perenne),* Nettle *(Urtica dioica),* Bramble *(Rubus fructicosus agg.)*, Ribwort Plantain *(Plantago lanceolata),* Creeping buttercup *(Ranunculus repens)*, Daisy *(Bellis perennis),* Crested Dog's-tail *(Cynosurus cristatus),* Yorkshire fog *(Holcus lanatus)*, Hard rush *(Juncus inflexus),* Marsh thistle *(Cirsium palustre)* and *Poa spp.* grass. Submerged and emergent Fool's Watercress *(Heloscadium nodiflorum)* was present along much of the watercourse. The watercourse was unshaded, with no riparian treeline or standalone trees along the entire surveyed stretch.

Table 4-1. Properties of the watercourse at survey location WF 1.

Properties	Record			
Average Depth (m)	0.1			
Average Bank Width (m)	1			
Wet Width (m)	0.6			
Flow	Low			
Colouration	Slightly brown			
Clarity	Slightly turbid			
Bank height (m)	LHB	0.2–0.4	RHB	0.2–0.4
Dominant Substrates	Boulder (>128mm): 5% Cobble (>32–128mm): 30% Gravel (8-32mm): 30% Sand (0.25–2mm): 10% Silt (<0.25mm): 25%			
Substratum Condition	Heavily compacted cobble, loose silt			

Lamprey *spp.* spawning and salmonid spawning and nursery potential were assessed as *Poor* given the given the predominance of larger, compacted substrata, the headwater location and heavy degree of siltation. Sparse marginal sheltering features (undercut earthen banks and overhanging vegetation), submerged Fool's watercress and coarser channel substrate provided occasional instream refuge for juvenile salmonids (namely Brown trout). Limited salmonid nursery habitat was therefore assessed as *Poor*.

European eel and salmonid holding potential were assessed as *Negligible* and *Poor*, respectively given the shallow water depth. Despite the presence of some marginal silt beds, culverts both upstream and downstream of the surveyed stretch of watercourse features may preclude migration of lamprey *spp.* throughout the watercourse, making lamprey ammocoete access to these fine sediment beds unlikely during periods of low flow as observed at the time of survey.

Overall, this site provided *Low* fisheries value to all life cycle stages. However, watercourse connectivity to higher quality spawning, nursery and holding habitat for all fish species may be improved in periods of higher flow, when culverts and other instream barriers are adequately wetted and passable.

No otter signs were observed at site WF 1. Otter foraging and commuting potential for this localised stretch of the Archerstown watercourse was assessed as *Low* due to small watercourse size, limited pray availability (low fisheries habitat value), surrounding active agricultural land use, absence of riparian cover, a shallowly wetted channel and poor overall connectivity as a result of historic channel modifications and culverting.

No kingfisher signs were identified in the vicinity of WF 1, which provided *Negligible* foraging or burrowing habitat for the species.

Results of the 5-minute qualitative electrofishing survey conducted at this site (using methodologies described in Section 2.3) are presented in Table 4-2

Table 4-2. Electrofishing results at survey location WF 1.

Species	Length (cm)
Brown Trout (*Salmo trutta*)	7.5
Brown Trout (*Salmo trutta*)	5.5

Biological water quality based on Q-sampling was calculated as **Q3 – Poor** for survey site WF 1, on the basis of low macroinvertebrate diversity and density. Pollution sensitive Group A and Group B taxa, as well as Group D and E Pollution Tolerant were absent from the sample, with Group C 'Pollution tolerant' taxa dominated by *Gammarus*. Results of Q-Value assessment are summarised in Table 4-3.

Table 4-3. Results of macroinvertebrates sample at survey location WF 1.

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	-	-
Group B – Moderately Pollution Sensitive	-	-
Group C – Pollution Tolerant	*Baetis rhodani*	2
	Chironomidae sp.	2
	Corixidae sp.	5
	Elmidae sp.	3
	Hydracarina sp.	1
	Gammarus sp.	28
Group D – Very Pollution Tolerant	-	-
Group E – Most Pollution Tolerant	-	-

Plate 4-1. A representative image of Survey Site WF 1

4.1.1.2 WF Survey Site 2 (WF 2)

Survey site WF 2 was located along the upper reaches of the Archerstown River (EPA code: 15A16, IG Ref.: S 40620 71840), approx. 0.15km downstream of the confluence between the Archerstown and Aharney watercourses. Properties of the watercourse at this sample location are provided in Table 4-4 and a representative photograph of the survey location is shown in Plate 4-2.

This **Eroding/Upland River (FW1)** displayed evidence of historical channelisation and embankment extending from the left-hand bank into surrounding **Improved agricultural grassland (GA1)**. With the exception of a localised area of deeper pool approx. 0.4m in depth located under the single-span stone arch bridge at the downstream survey extent, average water depth was 0.15m. The watercourse profile comprised low energy, slow flowing glide, with interspersed sections of semi-compacted boulder/cobble-dominant shallow riffle along the survey stretch.

Sloping clay and earthen banks which are likely submerged in periods of higher flow extended into the channel margins from sections of previously poached banks. Wetted channel width ranged from 0.7–2.5m along the survey stretch. Exposed boulder/cobble outcrops and interstitial f finer gravels were heavily overlain with silt, with a high degree of enrichment evident through luxuriant growths of filamentous green algae atop the in-channel substrate. Water displayed no evident colouration. Water was clear when undisturbed, with plumes of silt evident underfoot upon disturbance of the channel bed during sampling.

Marginal vegetation covering much of the left-hand bankside included Cleaver *(Galium aparine),* Cock's Foot *(Dactylis glomerata),* Common Couch *(Elymus repens)*, Cow Parsley *(Anthriscus sylvestris),* Creeping Buttercup *(Ranunculus repens),* False Brome *(Brachypodium sylvaticum),* Nettle *(Urtica dioica),* and Yorkshire Fog *(Holcus lanatus),* with emergent stands of Great Willowherb *(Epilobium hirsutum).* Isolated Hawthorn *(Crataegus monogyna)* along the left-hand bank and a continuous treeline of Blackthorn *(Prunus spinosa)*, Hawthorn, Hazel *(Corylus avellana)* and Sycamore *(Acer pseudoplatanus)* along the right-hand bank provided high shading to the river margins, limiting macrophyte growth to marginal Fool's Watercress, Watercress *(Nasturtium officinale)* and Water mint *(Mentha aquatica).*

Excessive siltation and high filamentous algae coverage, combined with a barrier to migration in the form of an artificial step-pool directly upstream of the bridge, provided *Low* fisheries value at site WF 2. A lack of any appropriately sized, clean, mobile gravels saw a lack of any suitable salmonid or lamprey *spp.* spawning habitat. While siltation was excessive across coarser channel substrate, the lack of well aerated, stable yet permeable and sheltered silt and sand beds provided little-to-no lamprey *spp.* ammocoete habitat.

Well shaded river margins which provided otherwise *Moderate* localised salmonid nursery were also limited by siltation and nutrient enrichment. Shallow water depth and a lack of in-channel refugia or marginal sheltering features (e.g., undercut banks) upstream of the step-pool provided *Poor* salmonid holding habitat. Downstream of the instream step feature, deeper water provided localised *Moderate* salmonid holding and adult European eel habitat.

Otter signs in the form of spraint and prints were observed along the survey stretch for site WF 2, indicating that Otter utilise this particular stretch of the Archerstown river.

Heavily vegetated banks provided *Negligible* burrowing habitat for Kingfisher, while the river provided potentially opportunistic, albeit *Poor* quality foraging habitat for the species. No Kingfisher burrows were recorded in the vicinity of WF 2.

Table 4-4. Properties of the watercourse at survey location WF 2.

Properties	Record
Average Depth (m)	0.15
Average Bank Width (m)	1.5

Wet Width (m)	0.7–2.5			
Flow	Slow			
Colour	No apparent colouration			
Clarity	Clear when undisturbed			
Bank height (m)	LHB	1.4	RHB	1.6
Dominant Substrates	Bedrock: 15% Cobble (>32–128mm): 40% Gravel (8-32mm): 20% Silt (<0.25mm): 25%			
Substratum Condition	Semi-compacted boulder and gravel outcrops with localised interstitial gravels and a high degree of siltation.			

Results of the 10-minute qualitative electrofishing survey conducted at this site (using methodologies described in Section 2.3) are presented in Table 4-5.

Table 4-5. Electrofishing results at survey location WF 2.

Species	Length (cm)
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	7.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.25
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.8
Brown Trout (*Salmo trutta*)	7.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.4
Brown Trout (*Salmo trutta*)	6.2
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.9
Brown Trout (*Salmo trutta*)	5.8
Brown Trout (*Salmo trutta*)	5.9
Brown Trout (*Salmo trutta*)	10.5
European eel *(Anguilla anguilla)*	16

Kick-sampling was carried out in areas of riffle and glide. Biological water quality based on Q-sampling was calculated as **Q3-4 –Moderate** for survey site WF 2, on the basis of moderate macroinvertebrate diversity and density. Pollution Sensitive Group A and B taxa (six individuals across three taxa) represented ~10 % of the sample. The sample was composed predominantly of Group C 'Pollution Tolerant' taxa, dominated by *Gammarus sp.* 'Very' and 'Most' Pollution tolerant' taxa Groups D and E were absent from the sample. Results of kick-sampling summarised in Table 4-6.

Table 4-6. Results of macroinvertebrates sample at survey location WF 2

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	*Chloroperlidae sp.*	*1*
	Ecdyonurus sp.	*2*

Group B – Moderately Pollution Sensitive	*Goeridae sp.*	3
Group C – Pollution Tolerant	*Baetis rhodani*	17
	Chironomidae sp.	1
	Gammarus sp.	27
	Hydropsychidae sp.	2
	Philopotamidae sp.	4
	Serratella ignita	7
Group D – Very Pollution Tolerant	-	-
Group E – Most Pollution Tolerant	-	-

Plate 4-2. A representative image of Survey Site WF 2.

4.1.1.3 WF Survey Site 3 (WF 3)

Survey site WF 3 was located along the upper reaches of the Lisdowney Stream (EPA code: 15L02, IG Ref.: S 41496 70951), approx. 1.1km downstream of the confluence of the Archerstown and Seskin North watercourses with the Lisdowney Stream. Properties of the watercourse at this sample location are provided in Table 4-7 and representative photographs of the survey location are shown in Plate 4-3 and Plate 4-4.

Table 4-7. Properties of the watercourse at survey location WF 3.

Properties	Record
Depth (m)	0.3–0.6
Bank Width (m)	2–4
Wet Width (m)	1–3
Flow	Low
Colour	Slightly yellow
Clarity	Clear when undisturbed, with plumes of silt readily remaining in suspension when disturbed underfoot

Bank height (m)	LHB	1.5	RHB	2
Dominant Substrates	Boulder (>128mm): 20% Cobble (>32–128mm): 40% Gravel (8-32mm): 15% Fine gravel (2-8mm): 15% Silt (<0.25mm): 10%, forming a continuous layer over much of the channel substrata			
Substratum Condition	Semi-compacted			

This modified stretch of **Eroding/Upland River (FW1)** displayed evidence of artificial channel-bed reinforcement, with the presence of an instream abutment, concrete bridge apron and consequent step-pool formation. Vegetated earthen riverbanks were largely natural at the upstream survey extent, with evidence of historically reinforced and/or resectioned banks along sections of steep, high bank faces toward the downstream survey extent. These sections of earthen bank displayed areas of exposed rock, as well as densely vegetated Ivy *(Hedera helix)* and Bramble **Scrub (WS1)**. More naturalised areas of bankside were vegetated with Cleaver (*Galium aparine*), Common Hogweed (*Heracleum sphondylium*), False Brome (*Brachypodium sylvaticum*), Herb Robert *(Geranium robertianum*), Nettle (*Urtica dioica*), Rose Species (*Rosa* sp.), Willowherb Species (*Epilobium* sp.), and Wood Dock (*Rumex sanguineus*). Land use extending beyond Riparian treelines and bramble scrub and from both the right- and left-hand banks was composed of **Improved agricultural grassland (GA1).**

The watercourse profile comprised low energy, slow flowing glide, with infrequent sections of shallow riffle. Exposed cobble and boulder banks lined much of the channel margins, with the channel narrowly wetted at several points of the downstream survey extent. Localised moderate energy flow occurred in the immediate vicinity of the 2-span stone arch bridge and associated bridge apron, which created an artificial step-pool sequence and a small free-fall. Average water depth was 0.3m, with areas of deeper pool downstream of the bridge apron.

While water was clear when undisturbed, the watercourse displayed a high degree of siltation and nutrient enrichment. Plumes of silt readily entered and remained in suspension when the channel bed was disturbed, and Filamentous Green Algae and Sewage Fungus were abundant, particularly across and directly downstream of the concrete bridge apron. Water displayed a slight yellow colouration. Channel substrata, including cobble and boulder banks and interstitial gravels were heavily overlain with silt, Water displayed no evident colouration.

Treelines of Ash *(Fraxinus excelsior),* Elm *(Ulmus sp.),* Hazel, Sycamore and Hawthorn provide a high degree of shading to the river margins at the upstream survey extent adjacent to the bridge structure, with continuous canopy creating a tunnelled section of channel toward the downstream survey extent. Fallen tree limbs extended into and across the channel at this point of the watercourse. Upstream of the bridge, much of the channel was tunnelled by continuous treelines and choked with Bramble. Instream macrophytes were absent from the channel as a result of heavy shading.

Dense filamentous algae coverage, a high degree of siltation and excessive channel shading, coupled with large, coarse channel substrate and channel bed modifications, provided *Poor* salmonid and lamprey *spp.* spawning. Overhanging marginal vegetation provided localised *Moderate* salmonid nursery, while the standalone scour pool directly downstream of the bridge apron provided an isolated area of *Moderate* salmonid holding habitat and adult European eel habitat. Boulder/cobble banks exposed at the time of survey may provide *Moderate* refuge to fish when submerged in periods of higher flow. The highly enriched nature of this section of watercourse, in combination with a lack of stable sand/silt beds and a barrier to migration in the form of a bridge apron, meant suitable lamprey *spp.* ammocoete habitat was negligible.

No otter signs were observed at site WF 3. Given the localised moderate fisheries potential of this survey site, in combination with marginal refugia and bankside features which may be utilised by feeding otters, otter foraging and commuting potential for this section of the Lisdowney Stream was assessed as *Moderate.*

Bank faces were densely vegetated and compacted with exposed root structures and boulder, providing *Poor* quality habitat for Kingfisher burrows. Similar to WF 2, this site provided opportunistic *Poor* quality foraging habitat, give the highly enriched nature of the watercourse. No Kingfisher burrows were recorded in the vicinity of WF 3.

Results of the 10-minute qualitative electrofishing survey conducted at this site (using methodologies described in Section 2.3) are presented in Table 4-8.

Table 4-8. Electrofishing results at survey location WF 3.

Species	Length (cm)
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	7.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	4.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	15.5
Brown Trout (*Salmo trutta*)	11.5
Brown Trout (*Salmo trutta*)	11.5
Brown Trout (*Salmo trutta*)	9.5
Brown Trout (*Salmo trutta*)	11
Atlantic Salmon (*Salmo salar*)	6
Atlantic Salmon (*Salmo salar*)	6
Atlantic Salmon (*Salmo salar*)	4
Atlantic Salmon (*Salmo salar*)	4.5
Atlantic Salmon (*Salmo salar*)	5
Atlantic Salmon (*Salmo salar*)	4
Atlantic Salmon (*Salmo salar*)	4.5
Atlantic Salmon (*Salmo salar*)	4
Atlantic Salmon (*Salmo salar*)	4.5
Atlantic Salmon (*Salmo salar*)	10.5

Atlantic Salmon (*Salmo salar*)	11.5
Atlantic Salmon (*Salmo salar*)	9.5
Atlantic Salmon (*Salmo salar*)	11
Atlantic Salmon (*Salmo salar*)	10
Atlantic Salmon (*Salmo salar*)	10

Kick-sampling was carried out in areas of riffle and glide. Biological water quality based on Q-sampling was calculated as **Q3-4 –Moderate** for survey site WF 3. Pollution Sensitive Group A and B taxa (five individuals across three taxa) represented ~8% of the sample. The sample was composed predominantly of Group C 'Pollution Tolerant' taxa, of which *Gammarus sp.* was the dominant taxa. 'Very' and 'Most' Pollution tolerant' taxa Groups D and E were absent from the sample. Results of kick-sampling summarised in Table 4-9.

Table 4-9. Results of macroinvertebrates sample at survey location WF 3.

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	*Chloroperlidae sp.*	1
Group B – Moderately Pollution Sensitive	*Polycentropodidae sp.*	3
	Sericostomatidae sp.	1
Group C – Pollution Tolerant	*Baetis rhodani*	11
	Chironomidae sp.	5
	Gammarus sp.	40
	Gyrinidae sp.	1
Group D – Very Pollution Tolerant	-	-
Group E – Most Pollution Tolerant	-	-

Plate 4-3. A representative image of the downstream extent of Survey Site WF 3.

Plate 4-4. A representative image of the upstream extent of Survey Site WF 3.

4.1.1.4 WF Survey Site 4 (WF 4)

Survey site WF 4 was located along the Ballyconra (EPA code: 15B86, IG Ref.: S 42675 70622). Properties of the watercourse at this survey location are provided in Table 4-10 and representative photographs of the survey location are shown in Plate 4-5 and Plate 4-6.

Table 4-10. Properties of the watercourse at survey location WF 4.

Properties	Record			
Average Depth (m)	< 0.05 in wetted sections of channel, with several areas completely unwetted			
Average Bank Width (m)	1.5			
Wet Width (m)	0.3–0.5			
Flow	Low–Dry			
Colour	Brown			
Clarity	Slightly turbid even when undisturbed			
Bank height (m)	LHB	1.4	RHB	0.3
Dominant Substrates	Boulder (>128mm): 5% Cobble (>32–128mm): 5% Fine gravel (2-8mm): 20% Clay and silt(<0.25mm): 70%			
Substratum Condition	Loose and unconsolidated clay and silt			

This stretch of negligibly wetted–almost dry, historically modified **Eroding/Upland River (FW1)** watercourse displayed almost no perceptible flow. Any water present in the channel was brown in colour and displayed a moderate degree of turbidity, even when undisturbed. Plumes of silt and clay readily entered and remained in suspension when disturbed in wetted sections. Access to the

watercourse downstream of the bridge was precluded by the presence of an under-road culvert and densely vegetated, steep sided banks. Stands of impassable vegetation at this downstream extent included dense stands of Meadowsweet, Hedge Bindweed *(Calystegia sepium)*, Common Reed *(Phragmites australis)* classified as **Reed and large sedge swamps (FS1)** and marginal Bramble dominant **Scrub (WS1).**

The watercourse profile upstream of the bridge comprised interspersed areas of exposed boulder, cobble and gravel substrata, with soft, silt and clay channel substrate underfoot in the centre of the channel. Unstable riparian mudflats extended from wetted sections at the channel margins and were littered with woody material, fallen tree limbs and detritus. Similar to downstream of the culvert, the channel margins were heavily vegetated (tunnelled at points) with stands of Great Willowherb, Nettle and Common Hogweed. Instream macrophytes were absent, while small patches of emergent Fool's watercress were present in wetted sections of the channel margins.

Given the steep nature of the left-hand bank upstream of the culvert, the left-side of the channel may have been subject to historic modification (e.g. channel deepening and embankment). Grass species such as Yorkshire fog and Cock's Foot vegetating the left-hand embankment and extended back into **Improved agricultural grassland (GA1)** and **Dry calcareous and neutral grassland (GS1)**, upstream and downstream of the culverted section of watercourse, respectively. Contrastingly, the low, sloping right-hand bank composed of unconsolidated, soft earth and clay was largely unvegetated, with the exception of featured Blackthorn and invasive Snowberry *(Symphoricarpos albus)* **Scrub (WS1).**

Areas of insufficient water depth, no perceptible flow and excessive shading provided *Negligible* spawning, nursery or holding habitat for European eel, salmonid or lamprey species at survey site WF 4. Given the poor-quality channel substrate and barriers to migration in the form of culverting and dense, in-channel vegetation, fisheries habitat downstream of the bridge was also *Poor* and likely only utilised by fish species such as three-spined stickleback *(Gasterosteus aculeatus*). Due to a lack of sufficiently wetted channel, kick-sampling and electrofishing could not take place at survey site WF 4.

No Otter signs were observed at site WF 4. Given low fisheries value and barriers to migration arising from the highly modified nature of this stretch of watercourse, Otter foraging and commuting habitat were assessed as locally *Poor,* with this stretch of watercourse likely only used opportunistically for commuting in periods of higher flow.

No kingfisher signs were identified in the vicinity of WF 4, which, given the highly tunnelled and unwetted nature of the watercourse, provided *Negligible* foraging or burrowing habitat for the species.

Plate 4-5. A representative image of an inaccessible stretch of Survey site WF 4, downstream of the culvert.

Plate 4-6. A Representative image of Survey Site WF 4, upstream of the culvert.

4.1.1.5 WF Survey Site 5 (WF 5)

Survey site WF 5 was located on the Lisdowney Stream (EPA code: 15L02, IG Ref.: S 43623 68635), approx. 0.7km upstream of the confluence of Lisdowney Stream with the mainstem River Nore. Properties of the watercourse at this sample location are provided in Table 4-11 below and a representative photographs of the survey location are shown in Plate 4-7 and Plate 4-8.

Table 4-11. Properties of the watercourse at survey location WF 5.

Properties	Record
Depth (m)	0.4–0.6
Bank Width (m)	2–3
Wet Width (m)	1.7–2.0
Flow	Low – moderate
Colour	No distinct coloration
Clarity	Clear when undisturbed. Plumes of silt evident underfoot
Bank height (m)	LHB 0.8 RHB 0.8
Dominant Substrates	Boulder (>128mm): 25% Cobble (>32–128mm): 20% Gravel (8-32mm): 20% Fine gravel (2-8mm): 10% Silt (<0.25mm): 25%, forming a continuous layer over much of the channel substrata
Substratum Condition	Semi-compacted

This boulder dominant stretch of **Eroding/Upland River (FW1)** was comprised of a series of slow flowing glide interspersed with occasional riffle, terminating in a pool of water impounded by an artificial rock ramp placed diagonally across the channel width. Water velocity downstream of the rock ramp was comparatively faster than upstream, with a slightly steeper channel bed gradient and more natural river profile. Other modifications along this stretch of watercourse included an earthen embankment and rock armour reinforcement along the right and left-hand banks, respectively, which created a laterally confined channel upstream of the rock-ramp. Exposed cobble banks and an additional artificially placed boulder ramp extended along the banks from under a clear-span concrete bridge structure, with outfall pipes along both banks.

Channel substrate was heavily silted, with abundant filamentous green algae and sewage fungus growth throughout. Water was clear with no distinct colouration but exhibited a high degree of siltation when channel substrate was disturbed underfoot. Instream macrophytes were largely absent from the watercourse and given the reinforced nature of the immediate bank faces, emergent macrophytes were absent. Boulders lining the banks were covered with abundant *Rhynchostegium riparioides.* Beyond the bank reinforcement, bankside vegetation included stands of Common Reed, Rough meadowgrass *(Poa trivialis),* Cock's foot, Herb Robert, Great Willowherb, Hedge Bindweed, Nettle and Dock *(Rumex sp.).* Land use extending from the left- and right-hand banks was composed of **(Dry meadows and) Grassy verges (GS2)** and a field of Oat *(Avena sativa)* **Arable crop (BC1)** and **Amenity grassland (improved) (GA2)** and **Buildings and artificial surfaces (BL3)** in the form of standalone residential developments and road, respectively.

Slower flow across coarse, compacted cobble-boulder dominant substrate, in combination with heavy siltation and excessive algal and sewage fungus growth provided negligible salmonid and lamprey *spp.* spawning habitat upstream of the rock ramp, with a high degree of siltation and filamentous green algae persisting even in the more naturalised sections of the downstream survey extent. Localised areas of *Moderate* cobble salmonid nursery were also subject to heavy siltation, but areas of cobble riffle in particular provided instream refugia. Stable, well aerated sand and silt beds were absent from this section of watercourse. Therefore, lamprey ammocoete habitat was assessed as *Negligible*

The upstream survey extent was highly shaded by sections of undercut earth bank and in combination with submerged crevices between rock armour, created locally excellent European eel habitat. Similar marginal features and overhanging vegetation atop deeper water provided good marginal salmonid holding habitat. The shallow drop created by the artificial rock ramp did not appear to preclude upward migration of salmonid fish, given the flow pathways between each boulder in the ramp.

Otter spraint was identified at several points along the survey stretch for WF 5, atop boulders along the right-hand bank. Survey site WF 5 provided good commuting and foraging habitat for otter, given the high fisheries value, with several bankside areas suitable for feeding.

Bank tops were vegetated and bank faces reinforced with rock armour, limiting the potential habitat for Kingfisher burrows. However, the section of watercourse at WF 5 provided *Moderate* potential foraging habitat for Kingfisher. No Kingfisher burrows were recorded in the vicinity of WF 5.

Results of the 10-minute qualitative electrofishing survey conducted at this site (using methodologies described in Section 2.3) are presented in Table 4-12. Species recorded include Atlantic salmon, Brown trout and European eel. In addition to the two eels which were caught and released, a further eight were missed (i.e., not captured for measurement) during electrofishing.

Table 4-12. Electrofishing results at survey location WF 5.

Species	Length (cm)
Atlantic Salmon (*Salmo salar*)	5.5
Atlantic Salmon (*Salmo salar*)	10.5
Atlantic Salmon (*Salmo salar*)	9.5
Atlantic Salmon (*Salmo salar*)	11.5
Atlantic Salmon (*Salmo salar*)	12.5
Atlantic Salmon (*Salmo salar*)	11.5
Atlantic Salmon (*Salmo salar*)	10
Atlantic Salmon (*Salmo salar*)	11
Atlantic Salmon (*Salmo salar*)	10.5
Atlantic Salmon (*Salmo salar*)	14
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	10.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	4.5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	25.5
Brown Trout (*Salmo trutta*)	24.5
Brown Trout (*Salmo trutta*)	14.5
Brown Trout (*Salmo trutta*)	12
Brown Trout (*Salmo trutta*)	12.5
Brown Trout (*Salmo trutta*)	12

Brown Trout (*Salmo trutta*)	14.5
Brown Trout (*Salmo trutta*)	13.5
Brown Trout (*Salmo trutta*)	13
Brown Trout (*Salmo trutta*)	20.5
Brown Trout (*Salmo trutta*)	10.75
Brown Trout (*Salmo trutta*)	13.5
Brown Trout (*Salmo trutta*)	10.5
Brown Trout (*Salmo trutta*)	13.5
Brown Trout (*Salmo trutta*)	14.5
Brown Trout (*Salmo trutta*)	14.5
Brown Trout (*Salmo trutta*)	14
Brown Trout (*Salmo trutta*)	12
European eel *(Anguilla anguilla)*	20
European eel *(Anguilla anguilla)*	22

Kick-sampling was carried out in areas of riffle and glide. Macroinvertebrate diversity and density were *Moderate*. The Q rating assigned to survey location WF 5 was assigned **Q4 –Good**, on the basis that at least one Group A 'Very Pollution Sensitive' taxon was present in reasonable numbers, Group B 'Moderately Pollution Sensitive' taxa were present in reasonable numbers (27 individuals across three taxa, ~30% of the sample). Group C 'Pollution Tolerant' taxa were the dominant group in the sample, with 55 individuals across 12 taxa (making up ~60% of the sample). Results of the kick-sample are summarised in Table 4-13.

Table 4-13. Results of macroinvertebrates sample at survey location WF 5

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	*Chloroperlidae sp.*	4
	Ecdyonurus sp.	5
Group B – Moderately Pollution Sensitive	*Glossomatidae sp.*	17
	Goeridae sp.	7
	Sericostomatidae sp.	3
Group C – Pollution Tolerant	*Baetis rhodani*	11
	Chironomidae sp.	3
	Corixidae sp.	4
	Elmidae sp.	2
	Gammarus sp.	6
	Hydracarina sp.	2
	Hydropsychidae sp.	1
	Philopotamidae sp.	2
	Poolycentropodidae sp.	2
	Rhyacophila sp.	3
	Seratella ignita	14
	Simuliidae sp.	5
Group D – Very Pollution Tolerant	-	-
Group E – Most Pollution Tolerant	-	-

Plate 4-7. A representative image of the upstream extent of Survey Site WF 5.

Plate 4-8. A representative image of the downstream extent of Survey Site WF 5.

Plate 4-9. Otter spraint found along boulders at Survey site WF 5.

4.1.1.6 WF Survey Site 6 (WF 6)

Survey site WF-6 was located on the Durrow_Townparks watercourse (EPA code: 15D34, IG Ref.: S 42185 76437) within Knocknatrina Woods, Co. Laois. Properties of the watercourse at this sample location are provided in Table 4-14 below and a representative photograph of the survey location is shown in Plate 4-10.

Table 4-14. Properties of the watercourse at survey location WF 6.

Properties	Record			
Depth (m)	< 0.05 in wetted sections of channel, with several areas completely unwetted			
Bank Width (m)	0.5 but largely no defined bank widths			
Wet Width (m)	0.3			
Flow	Dry			
Colour	Brown (where wetted)			
Clarity	Turbid (where wetted)			
Bank height (m)	LHB	Poorly defined, sloping banks, <0.05m in height	RHB	Poorly defined, sloping banks, <0.05m in height
Dominant Substrates	Boulder (>128mm): 5% Cobble (>32–128mm): 10% Gravel (8-32mm): 10% Fine gravel (2-8mm): 20% Silt (<0.25mm): 55%			
Substratum Condition	Loose			

This section of **Eroding/Upland River (FW1)** (Durrow_Townparks) was largely unwetted at the time of survey, with isolated sections of shallowly wetted, undefined channel. Channel substrate was largely clay, earth and silt, with infrequent, largely unwetted stone-based substrata at the upstream extent. Any wetted sections of channel were 0.01–0.05m in depth and heavily silted and turbid even when undisturbed, with a brown water colouration.

The channel profile for this stretch of watercourse was not clearly demarcated, with no clear channel margins or flow path (in wetted areas) and exposed, gradually sloping earthen banks amid the wider **(Mixed) broadleaved woodland (WD1)**. Areas of wetted channel were littered with woody material, detritus and fallen tree limbs. Woodland canopy composed of Beech *(Fagus sylvatica),* Elder *(Sambucus nigra),* Elm *(Ulmus sp.)* and Sycamore *(Acer pseudoplatanus)* provided heavy shading to the entire area. Woodland ground flora included areas of Bramble and Hawthorn **Scrub (WS1)**, as well as Cleaver *(Galium aparine),* Creeping Buttercup *(Ranunculus repens),* Elder *(Sambucus nigra),* Dog's Mercury *(Mercurialis perennis),* Hart's-Tongue Fern *(Asplenium scolopendrium),* Herb Robert, Ivy, Meadowsweet, Nettle, and Wood Dock.

The accessible length of the Durrow_Townparks watercourse within Knocknatrina woods was walked to assess areas suitable for kick-sampling and electrofishing surveys, with much of the unculverted length of watercourse unsurveyable due to either dry or insufficiently wetted channel. Consequently, kick-sampling and electrofishing could not be carried out at survey site WF 6. At the time of survey, WF 6 provided *Negligible* fisheries habitat. No otter signs were found in the vicinity of survey site WF 6. No kingfisher signs were identified in the vicinity of the unwetted channel at WF 6.

Plate 4-10. A representative picture of Survey Location WF 6.

Plate 4-11. A short, insufficiently wetted section of cobble-dominant watercourse at Survey site WF 6.

Plate 4-12. A completely unwetted section of channel along the walked stretch for Survey site WF 6.

4.1.1.7 WF Survey Site 7 (WF 7)

Survey site WF 7 was located on the Erkina River (EPA code: 15E01, IG Ref.: S 40847 77491), directly upstream of the 5-span stone arch bridge at Durrow Firestation, Co. Laois. Properties of the watercourse at this sample location are provided in Table 4-15. Plate 4-13 and Plate 4-14 show representative photographs of the survey location.

Table 4-15. Properties of the watercourse at survey location WF 7.

Properties	Record
Depth (m)	0.6–1.2
Bank Width (m)	15–18
Wet Width (m)	15–18
Flow	Slow–Moderate
Colour	No distinct coloration
Clarity	Very clear when undisturbed. Slight plumes of silt evident underfoot but cleared quickly by moderate velocity flow
Bank height (m)	LHB 0.8 RHB 0.6
Dominant Substrates	Boulder (>128mm): 20% Cobble (>32–128mm): 30% Gravel (8-32mm): 40% Silt (<0.25mm): 10%
Substratum Condition	Semi-compacted

Along the Erkina River, the upstream survey extent of this stretch of watercourse was most consistent with the profile of a **Depositing/Lowland River (FW2),** with continuous smooth glide, moderate flow, deep water (up to 1.2m) and extensive mats of Water-crowfoot *(Ranunculus sp.)*, associated with the following Annex I Habitat: *'3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation'* across the channel. Cobble and boulder outcrops directly upstream of the first bridge structure created flow patterns more aligned with a section of **Eroding/Upland River (FW1)**. Interstitial gravel substrate was found most widespread across the channel. Patches of sewage fungus were also locally abundant along the river margins at this site. Other macrophytes included marginal stands of Branched bur-reed *(Sparganium erectum)* and Fine-leaved water dropwort *(Osenanthe aquatica)*, as well as emergent patches of Watercress. Given the **Amenity grassland (improved) (GA2)** land use in the vicinity of the survey site, bankside vegetation was limited to Reed Canary-grass *(Phalaris arundinacea)*, Nettle and Willowherb *(Epilobium sp.)*. Lithophytic vegetation growing from the bridge (classed **as BL1, Stone walls and other stonework**) included Red Valerian *(Centranthus ruber)*.

An artificial rock ramp directly upstream of the first of two bridge structures created an area of swift, chute flow over larger, coarse boulder and cobble substrate. Water depth below both bridges was comparatively shallower, with riffle pattern flow across a higher proportion of stone-based channel substrate than the upstream survey extent.

Other channel modifications included a historically resectioned, bare earth right-hand bank face, which displayed evidence of embankment. Additionally, the left-hand bank was reinforced with a concrete wall **(BL3, Buildings and artificial surfaces)** running along the underside of a wooden jetty. Land use in the vicinity of the survey stretch was largely related to urban use, with **Amenity grassland (improved) (GA2)** and further **Buildings and artificial surfaces (BL3)** in the form of gardens, residential areas and infrastructure related to recreational water resources.

Water was very clear when undisturbed with no colouration. A slight degree of siltation was evident upon disturbance of the river margins, particularly in areas of dense sewage fungus. However, turbid water was quickly cleared by moderate velocity flow. Shading was largely absent from the watercourse, particularly at the downstream survey extent toward Durrow town. Overhanging Willow trees *(Salix sp.)*, particularly along area of undercut right-hand bank, provided adequate shading and refugia,

creating excellent marginal holding habitat for salmonids and adult European eel. The presence of excessive sewage fungus, very deep water and a lack of appropriately sized, mobile, clean gravel beds provided negligible salmonid or lamprey *sp.* spawning habitat, particularly in the slow flow, impounded flow upstream of the rock ramp. Abundant instream Water Crowfoot and diverse flow patterns created by a variety of channel substrate created excellent refugia suitable for salmonid nursery habitat across the whole channel. The shallow step created by the rock ramp did not appear to preclude upward migration of salmonid and eel species, given the flow pathways available between boulders in the ramp structure. A lack of any stable, well sheltered silt and sand beds saw negligible habitat for lamprey *sp.* ammocoete.

No otter signs were observed in the vicinity of survey site WF 7. Despite the semi-urban location and high level of human activity in the vicinity of the stretch of watercourse, the Erkina River at this survey location provides *Good* commuting and foraging for otter, being a high fisheries value habitat with good connectivity to the wider catchment.

Resectioned and reinforced bank faces in the vicinity of WF 7 provided *Negligible* burrowing habitat for Kingfisher. However, given the presence of available perches at the river margins, this section of watercourse at WF 7 provided *Good* potential foraging habitat for Kingfisher. No Kingfisher burrows were recorded in the vicinity of WF 7.

Results of the 10-minute qualitative electrofishing survey conducted at this site (using methodologies described in Section 2.3) are presented Species recorded include Atlantic salmon, Brown trout, European eel and Minnow. In addition to the three eels which were caught and released, a further three were missed (i.e., not captured for measurement) during electrofishing.

Table 4-16. Electrofishing results at survey location WF 5.

Species	Length (cm)
Atlantic Salmon (*Salmo salar*)	6
Atlantic Salmon (*Salmo salar*)	11.5
Atlantic Salmon (*Salmo salar*)	13.5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	7.3
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.6
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	7.3
Brown Trout (*Salmo trutta*)	6.2
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	5.5

Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5.7
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	7
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	5
Brown Trout (*Salmo trutta*)	5.4
Brown Trout (*Salmo trutta*)	5.5
Brown Trout (*Salmo trutta*)	6
Brown Trout (*Salmo trutta*)	22.5
Brown Trout (*Salmo trutta*)	18.5
Brown Trout (*Salmo trutta*)	14.8
Brown Trout (*Salmo trutta*)	12.5
Brown Trout (*Salmo trutta*)	13
Brown Trout (*Salmo trutta*)	13
Brown Trout (*Salmo trutta*)	12.3
Brown Trout (*Salmo trutta*)	17.5
Brown Trout (*Salmo trutta*)	11
Brown Trout (*Salmo trutta*)	16
Brown Trout (*Salmo trutta*)	27
Brown Trout (*Salmo trutta*)	13
Brown Trout (*Salmo trutta*)	11
Brown Trout (*Salmo trutta*)	12.5
Brown Trout (*Salmo trutta*)	12
Minnow *(Phoxinus phoxinus)*	6.5
Minnow *(Phoxinus phoxinus)*	7.5
Minnow *(Phoxinus phoxinus)*	6.5
European eel *(Anguilla anguilla)*	37
European eel *(Anguilla anguilla)*	36
European eel *(Anguilla anguilla)*	23

Kick-sampling was carried out in areas of riffle and glide. Macroinvertebrate diversity and density were moderate. The Q rating assigned to survey location WF 7 was assigned **Q3 –Poor**, on the basis that Group A 'Very Pollution Tolerant' taxa were absent from the sample, with Group C taxa making up ~92% of the sample (162 individuals across 11 taxa). Numbers for the Group C taxa *Simuliidae sp.* were excessive in the sample. Group B 'Moderately Pollution Sensitive' taxa were represented by 14 individuals across 2 taxa of cased caddisfly. Results of the kick-sample are summarised in Table 4-17.

Table 4-17 Results of macroinvertebrates sample at survey location WF 7

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	-	-
Group B – Moderately Pollution Sensitive	*Goeridae sp.*	1
	Limnephilidae sp.	13
Group C – Pollution Tolerant	*Baetis rhodani*	38
	Gammarus sp.	5
	Hydropsychidae sp.	12
	Philopotamidae sp.	10

	Planorbidae sp.	1
	Potamopyrgus sp.	11
	Rhyacophila sp.	2
	Seratella ignita	7
	Simuliidae sp.	70
	Tipulidae sp.	1
	Valvatidae sp.	*4*
Group D – Very Pollution Tolerant	*Glossiphonidae sp.*	*1*
Group E – Most Pollution Tolerant	-	-

Plate 4-13. A representative image of the upstream extent of Survey site WF 7.

Plate 4-14. A representative image of the downstream extent of Survey site WF 7.

4.1.2 Proposed Grid Connection Survey Locations

4.1.2.1 GC Survey Site 1 (GC1)

Survey site GC1 was located along the River Nore (Nore_120, EPA code: 15N01, IG Ref.: S 43983 71845). Properties of the watercourse at this sample location are provided in Table 4-18. Plate 4-15 shows a representative photograph of the survey location.

Table 4-18. Properties of the river at Survey site GC1.

Properties	Record			
Average Depth (m)	0.8–1.2			
Bank Width (m)	20			
Wet Width (m)	20			
Bank height (m)	LHB	1.6	RHB	1.2
Flow	Moderate flow and fast velocity			
Colour	No distinct colouration			
Clarity	Clear when undisturbed			
Dominant Substrates	Boulder (>128mm): 5% Cobble (>32–128mm): 60% Gravel (8-32mm): 20% Silt (<0.25mm): 15%			
Substratum Condition	Compacted			

This surveyed stretch of **Depositing/Lowland River (FW2)** was characterised by slow flowing, deep glide across the channel width (approx. 20m). Although this section of the River Nore displayed a straight channel profile, the wider River Nore displayed a meandering profile. Channel substrate was predominantly compacted cobble, with a patchy distribution of filamentous green algae growth and moderate siltation atop channel bed substrata. Cock's foot, Yorkshire Fog and *Poa spp.*, as well as Nettle, Creeping buttercup *(Ranunculus repens),* Meadow buttercup *(Ranunculus acris)* and Cuckoo flower *(Cardamine pratensis).* Vegetated earthen banks extended into Perennial Rye Grass *(Lolium*

perenne) dominant ***Improved Agricultural Grassland (GA1)*** from the left- and right-hand banks. Earthen banks were eroded and undercut, and in combination with overhanging vegetation, provided marginal refugia. Water was very clear when undisturbed, with plumes of silt evident when channel substrate was disturbed underfoot, particularly along marginal silt beds.

The channel was largely unshaded, with the exception of marginal and emergent stands of Reed Canary grass, Great willowherb and Branched bur-reed which provided instream refugia. Overhanging Willow *(Salix spp.)* branches provided further shading to the channel margins, as well as areas of slower, sheltered flow suitable for adult European Eel holding habitat.

Biological water quality based on Q-sampling was calculated as **Q3-4 –Moderate** for survey site GC1, on the basis that at least one 'very pollution sensitive' Group A taxon was present in low numbers (one *Heptagenidae sp.* and one *Chloroperlidae sp.).* two individuals from one Group B 'Moderately Pollution Sensitive' taxa were present in the sample, while Group C 'Pollution Tolerant' taxa were dominant (~94% of the sample), with *Ephermellidae sp.* mayfly and *Philopotamidae* caddis fly being the most numerous taxa. Results of the kick-sample are summarised in Table 4-19.

Table 4-19. Results of macroinvertebrates sample at GC1.

Indicator Group	Taxon	Abundance
Group A – Very Pollution Sensitive	*Chloroperlidae sp.*	3
	Heptagenidae sp.	1
Group B – Moderately Pollution Sensitive	*Limnephilidae sp.*	2
Group C – Pollution Tolerant	*Baetis rhodani*	11
	Chironomidae sp.	8
	Gammarus sp.	6
	Hydropsychidae sp.	14
	Lumbricidae sp.	1
	Philopotamidae sp.	23
	Planorbidae sp.	1
	Rhyacophilidae sp.	4
	Seratella ignita	22
	Simuliidae sp.	1
Group D – Very Pollution Tolerant	-	-
Group E – Most Pollution Tolerant	-	-

Semi-compacted cobble-dominant channel substrate overlain with silt and patchy filamentous green algae coverage, combined with a lack of instream refugia provided *Poor-Moderate* salmonid and lamprey *spp.* spawning habitat, while localised *Good* salmonid nursery was present, particularly along the more sheltered and vegetated river margins. Patches of water crowfoot (*Ranunculus spp.*) are present downstream of survey site GC1 offering moderate – good nursery habitat for salmonids where it occurs. Lamprey ammocete habitat was present, although *Moderate* in quality, along areas of marginal silt bed. Deep, slow flowing glide provided adequate depth and flow type for *Good* salmonid holding, while marginal refugia provided by stands of emergent ***Reed and large Sedge swamps (FS1)*** and overhanging tree limbs created localised areas of *Good* European eel habitat.

Signs of otter were recorded along the Proposed Grid Connection route at the point where it crosses the River Nore. Multiple signs of otter were recorded in the form of prints, slides, spraints, and feeding remains. Representative images of otter signs can be seen in Plate 4-16, Plate 4-17, Plate 4-18 and Plate 4-19.

Due to the quantity of Otter signs within the vicinity of GC1, an additional dedicated otter survey was undertaken in the winter season when vegetation had died back and features were most visible. A non-breeding otter holt was recorded along the right bank of the River Nore in the proximity of GC1. Following the deployment of a trail camera, the holt was confirmed to be active. The holt was in

regular use by a single individual during the time the camera was deployed (from 19.12.2024 to 14.01.2025). Based on the footage captured it is not considered to be a natal holt.

No kingfisher signs were identified in the vicinity of GC1. However, the stretch of the River Nore at this site provided *Good* potential foraging habitat for Kingfisher.

Plate 4-15. A representative image of the downstream extent of Survey site GC1.

Plate 4-16. Otter prints observed downstream of survey site GC1

Plate 4-17: Otter print recorded within the vicinity of GC1 during the multidisciplinary walkover survey.

Plate 4-18. Salmon head remains from feeding otter in the vicinity of survey site GC1

Plate 4-19. Otter spraint observed in the vicinity of Survey site GC1.

Plate 4-20: Otter recorded by trail camera approximately 165m upstream of GC1.

4.2 eDNA Results.

Environmental DNA (eDNA) surveys were undertaken on watercourses at five survey locations (WF 1, WF 2, WF 3, WF 5 and WF 7). Survey locations were chosen to maximise the chance of detecting eDNA from target species and to estimate the approximate extent of their presence where detected.

Freshwater Pearl Mussel (*Margaritifera margaritifera*) (FPM), White-clawed crayfish (*Austropotamobius pallipes*) (WcC) and Crayfish plague (*Aphanomyces astaci*) were tested for at each location. Both FPM and Crayfish plague were not detected at any of the survey locations, considered as evidence of the species' absence at and/or upstream of the sampling locations. Positive eDNA results for WcC were found at survey site WF 3, considered as evidence of the presence of WcC at and/or upstream of the sampling location WF3. eDNA results can be found in Appendix III.

4.3 Otter Survey Results

All watercourse within the Proposed Wind Farm site and along the Proposed Grid Connection route were surveyed for signs of otter. No signs of were recorded within the boundaries of the Proposed Wind Farm site. Otter spraint and prints were recorded at survey site WF2. Otter sprain was recorded at survey site WF 5 (Plate 4-9).

Signs of otter were recorded along the Proposed Grid Connection route where it runs adjacent and crosses the River Nore. Multiple signs of otter were recorded in the form of prints, spraints and feeding remains (Plate 4-16, Plate 4-17, Plate 4-18, Plate 4-19), as well as an otter holt along the right bank of the River Nore. Following the deployment of a trail camera the holt was confirmed to be active (Plate 4-20). The holt was in regular use by a single individual during the time of camera deployment. Based on the footage captured it is not considered to be a breeding holt.

5. DISCUSSION

5.1 Proposed Wind Farm Aquatic Baseline Assessment

Watercourses surveyed within the vicinity of the Proposed Wind Farm consisted primarily of modified **Eroding/Upland Rivers (FW1)**, surrounded predominantly by agricultural and pastural land use. Many watercourses within the vicinity of the wind farm (WF 1–WF 5, sites inclusive) exhibited visible enrichment, with sewage fungus and excessive filamentous green algae growth across channel bed substrate. Cobble was the dominant channel bed substrate across many of the sites, although the compacted and highly silted nature of substrata often limited potential spawning habitat. The highly modified nature of WF 1 as a result of livestock poaching, lack of riparian buffer and intensive agricultural land use limited this site to almost negligible overall fisheries potential, while sites such as WF 4 and WF 6 offered no fisheries potential as a result of negligibly wetted–completely dry channels as a result of historic modification, culverting and diversion. Sites WF 2 and WF 3 provided overall moderate fisheries potential, which was again often limited by excessive watercourse enrichment from surrounding land use, barriers to migration in the form of impassable bridge aprons and excessive tunnelling. Despite barriers to migration and excessive enrichment at WF 5, fisheries potential at this site was assessed as overall high, given the abundant instream and marginal refugia provided by boulder channel and bank substrate and a variety of instream microhabitats.

Despite the presence of abundant patches of sewage fungus, site WF 7 provided the highest value fisheries habitat, which displayed a river profile more closely associated with a **Depositing/Lowland River (FW2).** Historic rock ramp integration created a variety of flow types across the channel and in combination with abundant instream macrophyte coverage, overhanging tree limbs and undercut banks created high fisheries potential. Fish species caught across the survey sites included Brown Trout, Atlantic Salmon, European eel and Minnow (listed in order of most to least common).

Q-value scores calculated for the survey sites in the vicinity of the wind farm ranged from **Q3 –Poor** to **Q3-4 –Moderate** and **Q4 –Good,** with the lowest scoring sites being WF 1and WF 7, and highest scoring site being WF 5.

Both eDNA surveys and available NPWS records showed no positive records for Freshwater Pearl Mussel (FPM) upstream of the Proposed Wind Farm Survey sites. Proposed Wind Farm aquatic survey locations WF 6 and WF 7 are located within the Nore Upper *Margaritifera* sensitive area, which is listed as catchment of SAC populations of FPM, while remaining survey sites are located within the Nore Middle catchment, listed as a catchment of other extant populations of FPM outside of SAC populations.

FPM data from NPWS showed point locations along the River Nore, approx. 500m downstream of the Durrow_Townparks watercourse (on which survey site WF 6 is located), and approx. 2.2km upstream of the confluence of the Erkina River with the mainstem River Nore.

eDNA surveys for White-clawed Crayfish (WcC) were negative for all but survey site WF 3. NPWS data showed point locations for WcC approx. 4.3km upstream of the Erkina River confluence with the mainstem River Nore, and approx. 5km upstream of survey site WF 7, located along the Erkina River. eDNA surveys provided no positive results for crayfish plague in the vicinity of the Proposed Wind Farm.

No otter holts or couches were identified at the survey sites in the vicinity of the Proposed Wind Farm. Otter signs in the form of spraints and prints were found at survey sites WF 2 and WF 5, indicating that otter actively utilise these watercourses (namely Lisdowney Stream). Given the high fisheries potential and good connectivity of other sites within the vicinity of the Proposed Wind Farm it is likely that otter also actively utilise the stretch of watercourse at WF7 (Erkina River) for commuting and foraging.

5.2 Proposed Grid Connection Route Aquatic Baseline Assessment

The watercourse surveyed as part of the Proposed Grid Connection was located along a **Depositing/Lowland River (FW2)** section of the River Nore, characterised by wide, meandering river profiles, deep glide and predominantly compacted cobble. Deep pool and glide, combined with marginal refugia in the form of undercut banks, overhanging tree bows and marginal and emergent vegetation provided high fisheries value habitat for salmonid fish and European eel in the vicinity of sites GC1. Coarse, compacted channel bed substrate was not conducive to lamprey *spp.* spawning and ammocete habitat.

Land use surrounding the Proposed Grid Connection crossing point was composed of both managed and unmanaged agricultural and pastural land, as well as artificial surfaces associated with urban development and road networks. The Proposed Grid Connection sites displayed a moderate degree of siltation.

Instream macrophytes were largely absent from the surveyed sections of the River Nore, with patches of *Ranunculus spp.* identified at downstream of survey site GC1. Marginal vegetation species, e.g., Branched Bur-reed and Common Club-rush, associated with reed and large sedge swamp habitat were abundant along the river margins at the Proposed Grid Connection crossing point. Willow species were frequent along the bank tops and channel margins.

The Q-value score calculated for survey site GC1 was **Q3-4 (Moderate)**.

The Proposed Grid Connection crossing point passes through the River Barrow and River Nore SAC, which is designated for the QI species Otter. Otter signs were identified along the banks within the vicinity of GC1 (spraint, prints, feeding remains). In addition, an active, non-breeding otter holt was recorded along the right bank of the River Nore in the proximity of survey site GC 1. The holt was found to be in regular use by a single individual. Based on camera trap footage, it is not considered to be a natal holt. Otter have been shown to be in frequent use of the River Nore upstream, downstream and in the vicinity of the Proposed Grid Connection crossing point.

6. CONCLUSION

This report provides a comprehensive baseline of aquatic habitats in the vicinity of the Proposed Wind Farm Development and Proposed Grid Connection Route.

Watercourses near the Proposed Wind Farm were largely modified **Eroding/Upland Rivers (FW1)**, within agricultural landscapes, with a river profile more consistent with a **Depositing/Lowland River (FW2)** at survey sites WF 7 and GC 1. Siltation and enrichment pressures were evident throughout the surveyed sites, with evidence of historical modification at several sections of surveyed watercourses.

Survey sites WF 1, WF 4 and WF 6 provided *Negligible–Poor* potential fisheries habitat, limited by modified watercourse profiles and negligibly wetted channels, respectively. WF 2 and WF 3 had moderate fisheries potential, hindered by enrichment and migration barriers. Survey sites WF 7 and GC 1 offered the highest quality fisheries habitat, with varied substrate composition and flow pattern diversity, with good instream cover provided by dominant *Ranunculus spp.* at WF 7.

Fish species recorded in electrofishing surveys included Minnow, Brown Trout, European eel and Atlantic Salmon. Salmon were present at three survey sites (WF 3, WF 5 and WF 7), with survey site WF 7 providing the best quality salmonid habitat for juvenile and adult fish, while salmonid spawning was limited across the survey sites. European eel were recorded in low densities at survey sites WF 2, WF 5 and WF 7, with WF 5 and WF 7 providing the best quality eel habitat across the surveyed sites. No lamprey ammocoetes were recorded during targeted electro-fishing and this was considered to reflect the lack of suitable nursery habitat within the vicinity of the Proposed Wind Farm development, in addition to the presence of sub-optimal or absent suitable spawning habitat and poorly connected, unwetted sections of watercourse, particularly at sites WF 4 and WF 6.

Biological water quality as indicated by Q-value scores also ranged between survey sites, from **Q3 – Poor** (WF 1, WF 7) to **Q3-4 –Moderate** (WF 2, WF 3, GC 1) and **Q4 –Good** (WF 5). No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples.

Despite survey sites WF 6 and WF 7 being located within the Nore Upper *Margaritifera* sensitive area, no Freshwater Pearl Mussel was detected via eDNA sampling. White-clawed Crayfish was detected at WF 3, with no evidence of crayfish plague via eDNA sampling. Otter signs (prints, spraints and/or feeding remains) were observed at WF 2, WF 5 and GC 1, suggesting active use of those watercourses. Additionally, a non-natal otter holt was identified in the proximity of GC1. No kingfisher burrows were identified in the vicinity of any of the survey sites.

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APPENDIX I

ELECTROFISHING SPECIES RECORDS AT ALL PROPOSED WIND FARM SURVEY LOCATIONS

Appendix I: Electrofishing species records at survey locations in the vicinity of the Proposed Wind Farm				
Survey Location	Fish Species			
	Anguilla anguilla	*Salmo trutta*	*Salmo salar*	*Phoxinus phoxinus*
WF 1	No	Yes	No	No
WF 2	Yes	Yes	No	No
WF 3	No	Yes	Yes	No
WF 4	Not fished (negligibly wetted channel)			
WF 5	Yes	Yes	Yes	No
WF 6	Not fished (negligibly wetted channel)			
WF 7	Yes	Yes	Yes	Yes

APPENDIX II

Q-VALUES AT ALL SURVEY LOCATIONS

Appendix II: Q-Values at all Survey Locations (Proposed Wind Farm and Proposed Grid Connection Underground Cable Route)	
Survey Location	Q-Value and WFD Status
Proposed Wind Farm	
WF 1	Q3 – Poor
WF 2	Q3-4 – Moderate
WF 3	Q3-4 – Moderate
WF 4	N/A (negligibly wetted channel)
WF 5	Q4 – Good
WF 6	N/A (negligibly wetted channel)
WF 7	Q3 – Poor
Proposed Grid Route	
GC 1	Q3-4 – Moderate

APPENDIX III

PROPOSED WIND FARM eDNA RESULTS

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eDNA Report

Technical Report

SureScreen Scientifics

Folio No: 3140-2024
Purchase Order: 231103
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Issue Date: 26.07.2024
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SureScreen Scientifics

RECEIVED: 09/07/2025

eDNA Analysis

Summary

When aquatic organisms inhabit a waterbody such as a pond, lake or river they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm the presence or absence of the target species within the waterbody.

Results

Lab ID	Site Name	OS Reference	Target Species	Sample Integrity Check	Result	Positive Replicates
FK2120	2 Seskin		Crayfish plague	Pass	Negative	0
			Freshwater pearl mussel	Pass	Negative	0
			White-clawed crayfish	Pass	Negative	0
FK2197	1 Seskin		Crayfish plague	Pass	Negative	0
			Freshwater pearl mussel	Pass	Negative	0
			White-clawed crayfish	Pass	Negative	0
FK2201	7 Seskin		Crayfish plague	Pass	Negative	0
			Freshwater pearl mussel	Pass	Negative	0
			White-clawed	Pass	Negative	0

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		crayfish			
FK2199	5 Seskin	Crayfish plague	Pass	Negative	0
		Freshwater pearl mussel	Pass	Negative	0
		White-clawed crayfish	Pass	Negative	0
FK2198	3 Seskin	Crayfish plague	Pass	Negative	0
		Freshwater pearl mussel	Pass	Negative	0
		White-clawed crayfish	Pass	Positive	7

Matters affecting result: none

Reported by:Chelsea Warner

Approved by: Chelsea Warner

Folio No:	3140-2024
Purchase Order:	231103
Contact:	MKO
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Received Date:	12.07.2024

SureScreen Scientifics

Methodology

Samples have been analyzed for the presence of target species eDNA following readily available and scientifically published eDNA assays and protocols.

The analysis is conducted in two phases. The sample first goes through an extraction process where the filter is incubated in order to obtain any DNA within the sample. The extracted sample is then tested via real-time PCR (also called q-PCR) for each of the selected target species. This process uses species-specific molecular markers (known as primers) to amplify a select part of the DNA, allowing it to be detected and measured in 'real time' as the analytical process develops. qPCR combines amplification and detection of target DNA into a single step. With qPCR, fluorescent dyes specific to the target sequence are used to label targeted PCR products during thermal cycling. The accumulation of fluorescent signals during this reaction is measured for fast and objective data analysis. The primers used in this process are specific to a part of mitochondrial DNA only found in each individual species. Separate primers are used for each of the species, ensuring no DNA from any other species present in the water is amplified. If target species DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If target DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent the risk of false positive and false negative results. True positive controls, negative controls, and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared. Stages of the analysis are also conducted in different buildings at our premises for added security. SureScreen Scientifics Ltd is ISO9001 accredited and participates in Natural England's proficiency testing scheme for GCN eDNA testing.

Interpretation of Results

Sample Integrity Check:

Laboratory Arrival:

When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results. Any samples which fail this test are rejected and eliminated before analysis.

Degradation and Inhibition check:

Analysis of the spiked DNA marker to see if there has been degradation or inhibition of the kit or sample, between the date it was made to the date of analysis. Degradation of the spiked DNA marker may indicate a risk of false negative results. If inhibition is detected, samples are purified and re-analyzed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result:

Presence of eDNA (Positive/Negative/Inconclusive)

Positive: DNA was identified within the sample, indicative of species presence within the sampling location at the time the sample was taken or within the recent past.

Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for species presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. Even a score as low as 1/12 is declared positive. 0/12 indicates negative species presence.

Negative: eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of species absence, however, does not exclude the potential for species presence below the limit of detection.

Inconclusive: Controls indicate inhibition or degradation of the sample, resulting in the inability to provide conclusive evidence for species presence or absence.