APPENDIX 1

AQUATIC BASELINE REPORT

Aquatic baseline report for the proposed Crumhach Wind Farm, Co. Sligo

Prepared by Triturus Environmental Ltd. for MKO

February 2025

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Table of contents

1. Introduction 4

1.1 Background 4

1.2 Project description 4

2. Methodology 5

2.1 Selection of watercourses for assessment 5

2.2 Aquatic site surveys 5

2.3 Fisheries assessment & habitat appraisal 6

2.4 White-clawed crayfish survey 6

2.5 Freshwater pearl mussel survey 14

2.6 Biological water quality (Q-sampling) 14

2.7 Lacustrine macro-invertebrate communities 14

2.8 Macrophytes and aquatic bryophytes 14

2.9 Otter signs 15

2.10 Aquatic ecological evaluation 15

2.11 Biosecurity 15

3. Desktop review 16

3.1 Survey area description 16

3.2 Fisheries 16

3.3 Protected aquatic species 16

4. Results of aquatic surveys 19

4.1 Sites within or with connectivity to the site boundary 19

4.2 Proposed Grid Connection Route sites (27 no. watercourse crossings) 21

4.3 White-clawed crayfish 22

4.4 Freshwater pearl mussel 22

4.5 Biological water quality & macro-invertebrates 22

4.6 Otter signs 23

5. Discussion 39

5.1 Fisheries 39

5.2 White-clawed crayfish 40

5.3 Macro-invertebrates & biological water quality pressures 40

5.4 Otter 41

5.5 Annex I aquatic habitats 42

6. References 43
7. Appendix A – survey site summaries 46
8. Appendix B – fisheries assessment report 130
9. Appendix C – Q-sample results (biological water quality) 131
10. Appendix D – freshwater pearl mussel report 143

1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by MKO to conduct baseline aquatic surveys to inform EIAR preparation for the proposed Crumhach Wind Farm (hereafter referred to as the Proposed Project), inclusive of the Proposed Wind Farm and Proposed Grid Connection Route, located approximately 4.5km south of the village of Dromore West, Co. Sligo (**Figure 2.1**).

Undertaken on a catchment-wide scale, this report provides a baseline assessment of the aquatic ecology including fisheries and biological water quality, as well as protected species and habitats in the vicinity of the Proposed Project, inclusive of the Proposed Turbines and the Proposed Grid Connection Route. Aquatic surveys were undertaken during May, July and September 2024.

1.2 Project description

A full description of the Proposed Project is provided in the Environmental Impact Assessment Report (EIAR) used to support consenting applications.

2. Methodology

2.1 Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the proposed wind farm project, inclusive of the Proposed Grid Connection Route and Proposed Turbines were considered as part of the current assessment. Thus, a total of *n*=61 riverine sites and *n*=12 lacustrine sites were selected for detailed aquatic assessment (see **Table 2.1, Figures 2.1-2.3** below). The courses and nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Riverine survey sites in vicinity of the Site were present on the Easky River (35E01), Letterunshin (35L56), Owenminna River (35O05), Buncrowey River (35B09), Rathgoonaun River (35R06), Carrownrush River (35C66), Grangebeg Barr River (35G64), Ballygreighan Barr River (35B80), Dunneill River (35D06), Doonbeakin River (35D09), Cashelboy River (35C83), Lugdoon River (35L27), Grange More River (35G39), Lugdoon Stream (35L01) and numerous unnamed streams and rivers (**Table 2.1**). The Proposed Grid Connection Route was surveyed at proposed crossings of the Altans Stream (35A29), Ballyeeskeen River (35B40), Ardkill Stream (35A61), Kilrusheighter River (35K35), Portavaud River (35P02), Ballinlig River (35B50), Barnabrack River (35B30), Tanrego Intake (35T25), Lugnadeffa River (35L35), Lugawarry River (35L36), Stonehall River (35S25), Carrigeenboy River (35C19), Doonamurray Stream (35D38), Doonflin River (35D10), Dunmoran Trib West River (35D07), Dunmoran River (35D16), Knoxspark River (35K39), Owenmore River (35O06), Unshin River (35U01), Ballygrania River (35B81) and an unmapped stream. A total of 5 no. lakes and 7 no. ponds/wetlands within the proposed site boundary were also surveyed (**Table 2.1**).

The survey sites were located within the Easky_SC_010, Dunmoran_SC_010, Owenmore [Sligo]_SC_040 and Owenmore [Sligo]_SC_030 river sub-catchments in hydrometric area 35 (Sligo Bay & Drowse). The proposed site boundary shared downstream hydrological connectivity (via several watercourses) with the Ox Mountains Bogs SAC (002006). The Proposed Grid Connection Route crossed watercourses located within the Ballysadare Bay SAC (000622) (1 no. site) and the Unshin River SAC (001989) (2 no. sites). The proposed site boundary shared downstream hydrological connectivity with the Easky *Margaritifera* sensitive area.

Please note this aquatic report should be read in conjunction with the final Environmental Impact Assessment Report (EIAR) prepared for the Proposed Project. More specific aquatic methodology is outlined below and in the appendices of this report.

2.2 Aquatic site surveys

Aquatic surveys were conducted on the 2nd to 7th July and 11th to 14th September 2024, with a Stage 1 freshwater pearl mussel survey completed in May 2024. Survey effort focused on both instream and riparian habitats at each aquatic sampling location and included a fisheries assessment (electro-fishing and or fisheries habitat appraisal), white-clawed crayfish survey, macrophyte and aquatic bryophyte survey and biological water quality sampling (Q-sampling) or invertebrate sweep sampling (where applicable) (**Table 2.1**). This holistic approach informed the overall aquatic ecological evaluation of

each site/watercourse in context of the Proposed Project and ensured that any habitats and species of high conservation value would be detected to best inform mitigation.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted 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) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. Sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth, channel form) including associated evidence of historical drainage
- Substrate type and relative condition, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition and bordering land use practices

2.3 Fisheries assessment & habitat appraisal

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on riverine watercourses in the vicinity of the Proposed Project in July and September 2024 (**Table 2.1, Figures 2.1-2.2; Appendix A**), following notification to Inland Fisheries Ireland, under the conditions of Department of the Environment, Climate and Communications (DECC) licences. The survey was undertaken in accordance with best practice (CFB, 2008; CEN, 2003) and Section 14 licencing requirements.

Furthermore, a fisheries habitat appraisal of all aquatic survey sites (**Table 2.1**), inclusive of lacustrine sites, was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species. The baseline assessment also considered the quality of spawning, nursery and holding habitat for salmonids and lamprey within the vicinity of the survey sites. For detailed survey methodology, please refer to accompanying fisheries assessment report in **Appendix A.**

2.4 White-clawed crayfish survey

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken at the aquatic survey sites in July and September 2024 under a National Parks and Wildlife (NPWS) open national licence (no. C20/2024), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2023), to capture and release crayfish to their site of capture. As per Inland Fisheries Ireland aquatic biosecurity recommendations, the crayfish sampling started at the uppermost site(s) of the wind farm catchment/sub-catchments in the survey area to minimise the risk of transfer invasive propagules (including crayfish plague) in an upstream direction.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). An appraisal of white-clawed crayfish habitat at each site was conducted based on physical habitat attributes (Gammell et al., 2021; Peay, 2003), water chemistry and incidental records in

mustelid spraint. Additionally, a desktop review of crayfish records within the wider survey area was completed.

Table 2.1 Summary of *n*=73 aquatic survey sites in the vicinity of the Crumhach Wind Farm, Co. Sligo & Mayo

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
Sites within or with connectivity to the EIAR site boundary						
A1	Unnamed stream	n/a	Trasgarve	Easky_SC_010	544732	825222
A2	Easky River	35E01	Trasgarve	Easky_SC_010	544448	825098
A3	Letterunshin River	35L56	Crowagh or Dunneill	Easky_SC_010	543241	825878
A4	Easky River	35E01	Tawnamore	Easky_SC_010	539871	825646
A5	Unnamed stream	n/a	Crowagh or Dunneill	Easky_SC_010	543140	826123
A6	Unnamed stream	n/a	Crowagh or Dunneill	Easky_SC_010	542987	826683
A7	Unnamed river	n/a	Tawnatruffaun	Easky_SC_010	539662	828004
A8	Owenminna River	35O05	Crowagh or Dunneill	Easky_SC_010	544516	826353
A9	Owenminna River	35O05	Crowagh or Dunneill	Easky_SC_010	544027	827000
A10	Owenminna River	35O05	Rathgoonaun	Easky_SC_010	541407	829658
A11	Unnamed river	n/a	Dunowla	Easky_SC_010	545816	826307
A12	Buncrowey River	35B09	Tawnadremira	Easky_SC_010	545288	827086
A13	Buncrowey River	35B09	Crowagh or Dunneill	Easky_SC_010	543942	827297
A14	Unnamed river	n/a	Crowagh or Dunneill	Easky_SC_010	544344	828056
A15	Unnamed river	n/a	Crowagh or Dunneill	Easky_SC_010	543832	828160
A16	Buncrowey River	35B09	Crowagh or Dunneill	Easky_SC_010	542125	829620
A17	Rathgoonaun River	35R06	Crowagh or Dunneill	Easky_SC_010	542429	829819
A18	Buncrowey River	35B09	Buncrowey	Easky_SC_010	540511	831023
A19	Easky River	35 E01	Camcuill	Easky_SC_010	539919	833311
A20	Carrownrush River	35C66	Farranmacfarrell	Easky_SC_010	542871	831296
A21	Carrownrush River	35C66	Knockacullen	Easky_SC_010	541682	833933
L1	Lough Croane	n/a	Tawnadremira	Easky_SC_010	545555	825804
L2	Lough Anlaba	n/a	Tawnadremira	Easky_SC_010	545801	825886
L3	Lough Nacrowagh	n/a	Tawnadremira	Easky_SC_010	545205	826628

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
L4	Lough Brickeagh	35B09	Tawnadremira	Easky_SC_010	545465	827079
L5	Lough Nafullow	n/a	Tawnadremira	Easky_SC_010	545023	827744
P1	Pond	n/a	Tawnadremira	Easky_SC_010	545707	825897
P2	Pond	n/a	Tawnadremira	Easky_SC_010	545842	825950
P3	Pond	n/a	Tawnadremira	Easky_SC_010	545901	826104
P4	Pond	n/a	Tawnadremira	Easky_SC_010	545589	825923
P5	Pond	n/a	Crowagh or Dunneill	Easky_SC_010	544927	827641
P6	Pond	35O12	Crowagh or Dunneill	Easky_SC_010	544737	826420
P7	Pond	n/a	Crowagh or Dunneill	Easky_SC_010	544818	827634
B1	Grangebeg Barr River	35G64	Ballygreighan Barr	Dunmoran_SC_010	548545	827673
B2	Ballygreighan Barr River	35B80	Kingsmountain	Dunmoran_SC_010	548372	827942
B3	Unnamed stream	n/a	Kingsmountain	Dunmoran_SC_010	547634	828139
B4	Unnamed stream	n/a	Kingsmountain	Dunmoran_SC_010	547380	828251
B5	Ballygreighan Barr River	35B80	Dunowla	Dunmoran_SC_010	546762	828355
B6	Unnamed stream	n/a	Ballyglass	Dunmoran_SC_010	545075	829049
B7	Dunneill River	35D06	Crowagh or Dunneill	Dunmoran_SC_010	544460	829243
B8	Dunneill River	35D06	Dunneill	Dunmoran_SC_010	543228	832926
B9	Doonbeakin River	35D09	Dunowla	Dunmoran_SC_010	545953	829641
B10	Doonbeakin River	35D09	Carrowcor Bridge	Dunmoran_SC_010	544328	833575
B11	Cashelboy River	35C83	Kingsmountain	Dunmoran_SC_010	546968	830039
B12	Lugdoon River	35L27	Kingsmountain	Dunmoran_SC_010	547388	830171
B13	Grange More River	35G39	Lugdoon	Dunmoran_SC_010	547601	830241
B14	Unnamed stream	n/a	Lugdoon	Dunmoran_SC_010	547780	830295
B15	Lugdoon Stream	35L01	Ballyeeskeen	Dunmoran_SC_010	546318	833107
Proposed Grid Connection Route watercourse crossings						
C1	Altans Stream	35A29	Dunowla	Dunmoran_SC_010	545716	831111

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
C2	Unmapped stream	n/a	Dunowla	Dunmoran_SC_010	545698	831531
C3	Ballyeeskeen River	35B40	Dunowla	Dunmoran_SC_010	545852	832024
C4	Ardkill Stream	35A61	Dunowla	Dunmoran_SC_010	545893	832334
C5	Kilrusheighter River	35K35	N59 road crossing	Dunmoran_SC_010	548676	832626
C6	Portavaud River	35P02	N59 road crossing	Dunmoran_SC_010	557113	831714
C7	Ballinlig River	35B50	N59 road crossing	Dunmoran_SC_010	557773	831371
C8	Barnabrack River	35B30	N59 road crossing	Dunmoran_SC_010	559740	830013
C9	Tanrego Intake	35T25	N59 road crossing	Dunmoran_SC_010	560423	829490
C10	Lugnadeffa River	35L35	N59 road crossing	Dunmoran_SC_010	561772	828316
C11	Lugawarry River	35L36	N59 road crossing	Dunmoran_SC_010	562230	828209
C12	Stonehall River	35S25	N59 road crossing	Dunmoran_SC_010	562971	828382
C13	Carrigeenboy River	35C19	R284 road crossing	Owenmore (Sligo)_SC_030	571042	826702
C14	Doonamurray Stream	35D38	R284 road crossing	Owenmore (Sligo)_SC_030	571212	826493
C15	Doonamurray Stream	35D38	R284 road crossing	Owenmore (Sligo)_SC_030	571335	826408
D1	Doonflin River	35D10	N59 road crossing	Dunmoran_SC_010	550778	832495
D2	Dunmoran Trib West River	35D07	N59 road crossing	Dunmoran_SC_010	553713	833114
D3	Dunmoran River	35D16	N59 road crossing	Dunmoran_SC_010	554297	832993
D4	Unmapped stream	n/a	N59 road crossing	Dunmoran_SC_010	556058	832270
D5	Knoxspark River	35K39	R290 road crossing	Owenmore (Sligo)_SC_010	567129	828604
D6	Owenmore River	35O06	R290 road crossing	Owenmore (Sligo)_SC_010	567923	826548
D7	Unshin River	35U01	R290 road crossing	Owenmore (Sligo)_SC_030	569431	825946
D8	Carrigeenboy River	35C19	R290 road crossing	Owenmore (Sligo)_SC_030	570805	826879
D9	Unmapped stream	n/a	R284 road crossing	Owenmore (Sligo)_SC_030	570974	826787
D10	Ballygrania River	35B81	R284 road crossing	Owenmore (Sligo)_SC_030	572362	825624

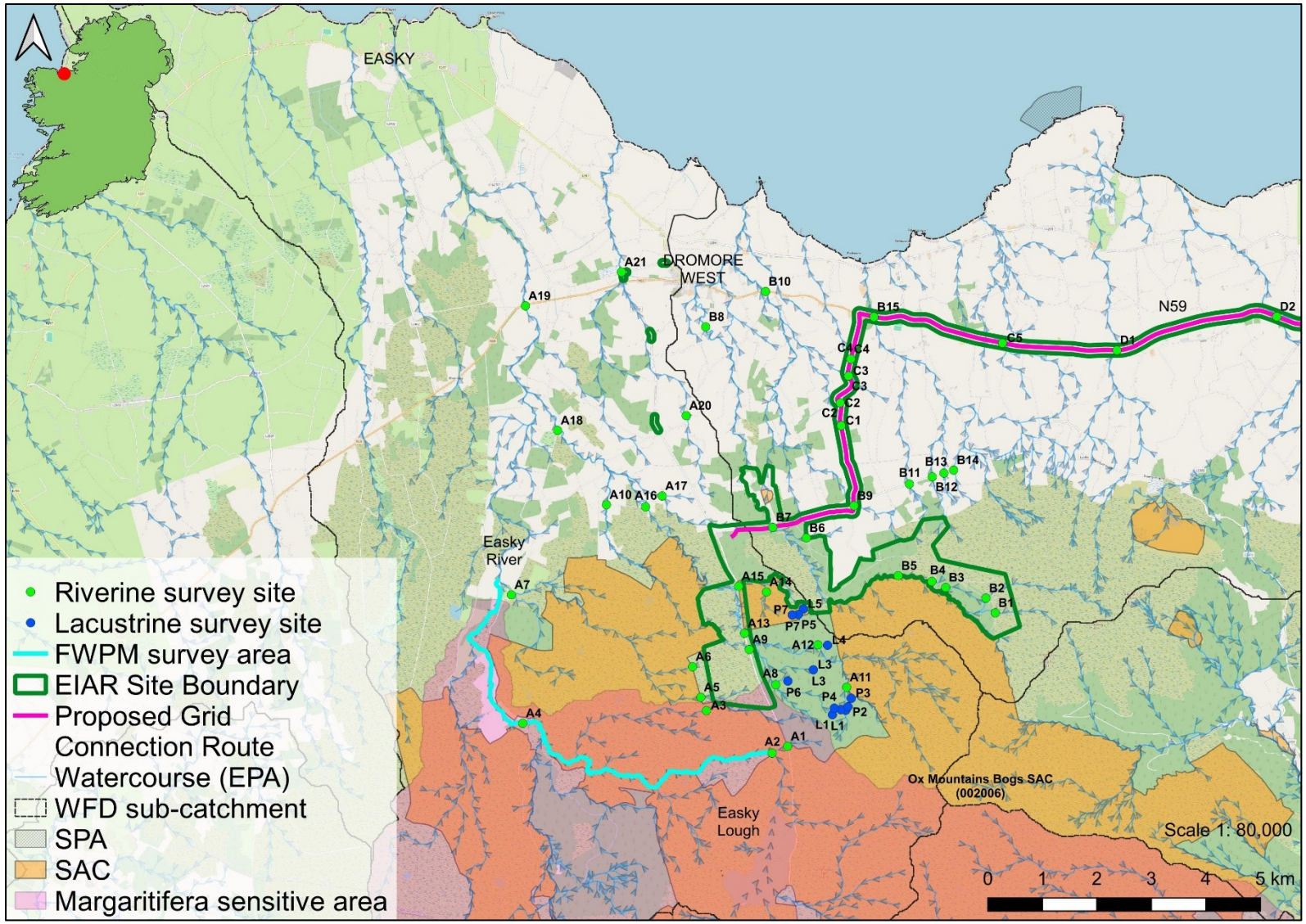

Figure 2.1 Overview of the aquatic survey sites in the vicinity of Proposed Wind Farm, Co. Sligo, 2024

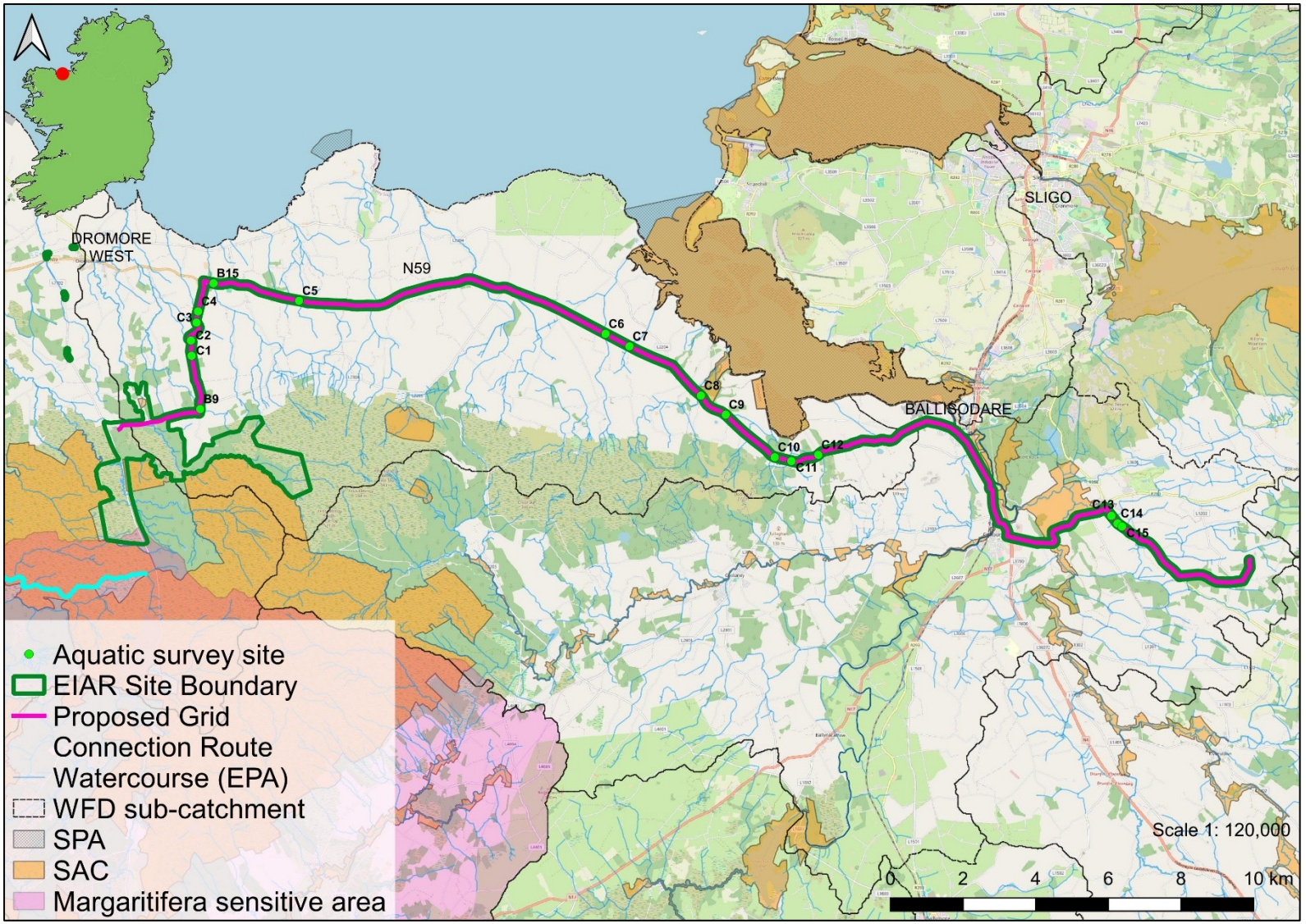

Figure 2.2 Overview of the aquatic survey sites in the vicinity of Proposed Grid Connection Route, September 2024

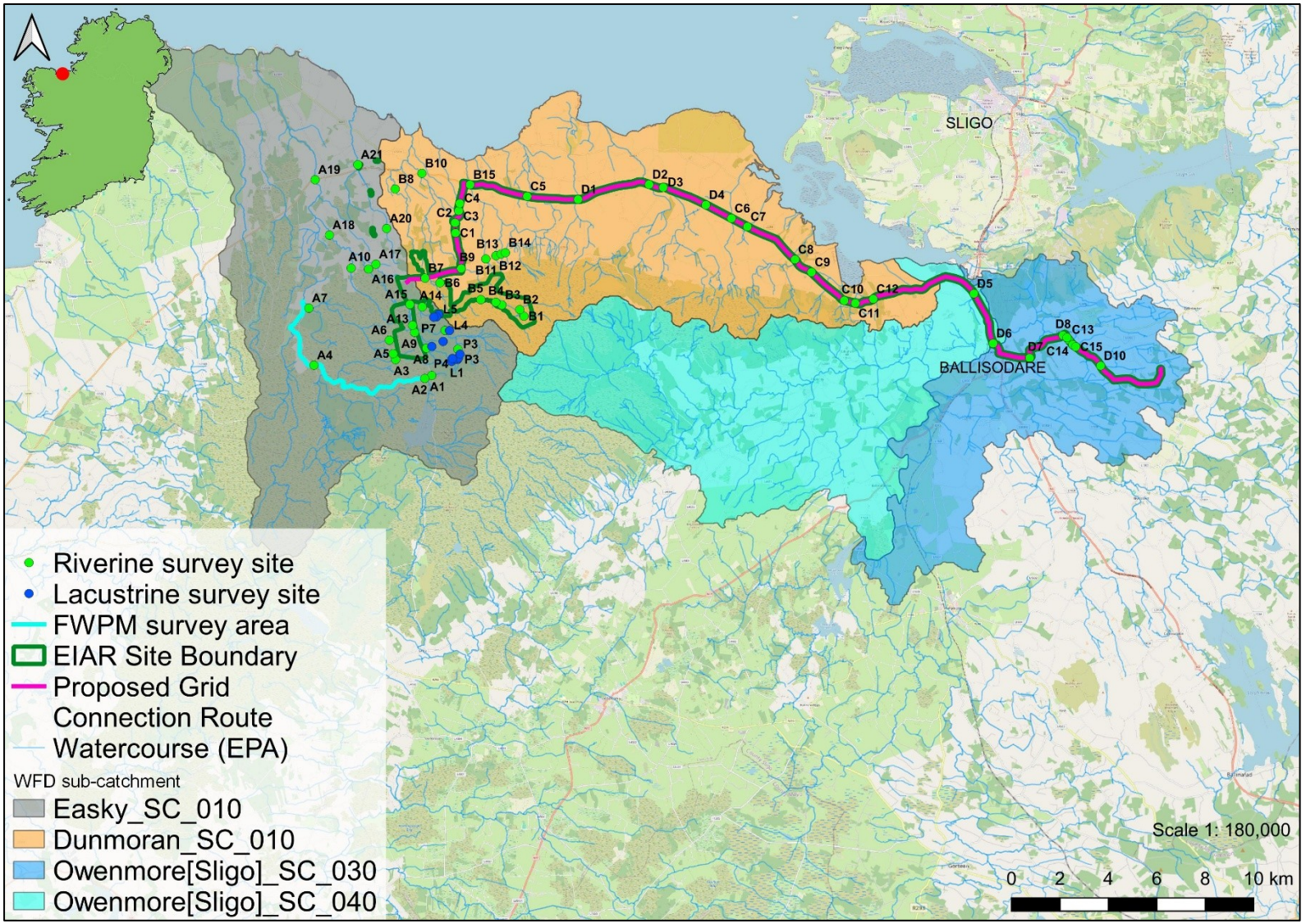

Figure 2.3 Location of the aquatic survey sites within their respective sub-catchments

2.5 Freshwater pearl mussel survey

Given the known presence of freshwater pearl mussel (*Margaritifera margaritifera*) in the Easky River downstream of the Proposed Wind Farm (NPWS data), a Stage 1 pearl mussel survey was undertaken by Triturus on the 23rd, 24th, 25th and 26th May 2024 along 10.0km of the Easky River (**Figure 2.1**). The survey area overlapped with that previously surveyed by Moorkens (2019). The methodology and full survey report is provided in **Appendix D**.

2.6 Biological water quality (Q-sampling)

The 61 no. riverine survey sites were assessed for biological water quality through Q-sampling in July or September 2024 (**Table 2.1**). All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification to species level. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes (**Table 2.2**). Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Nelson et al., 2011; Byrne et al., 2009).

Table 2.2 Reference categories for EPA Q-ratings (Q1 to Q5)

Q Value	WFD class	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

2.7 Lacustrine macro-invertebrate communities

A total of 5 no. lake sites and 7 no. pond/wetland sites were sampled for macro-invertebrates via sweep netting in September 2024. A standard pond net (250mm width, mesh size 500µm) was used to sweep macrophytes to capture macro-invertebrates. The net was also moved along the bed to collect epibenthic and epiphytic invertebrates from the substratum (as per Cheal et al., 1993). A 3-minute sampling period was employed. To ensure appropriate habitat coverage, the sampling period was also divided amongst the range of meso-habitats present at the survey sites to get a representative sample for sub-habitats.

2.8 Macrophytes and aquatic bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the survey sites, with specimens collected (by hand or via grapnel) for on-site identification.

An assessment of the aquatic vegetation community helped to identify any rare macrophyte species listed under the Flora (Protection) Order, 2022, Irish Red list for vascular plants (Wyse-Jackson et al., 2016) and or aquatic bryophytes (Lockhart et al., 2012), or habitats corresponding to the Annex I habitats such as 'Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses (3260)' (more commonly referred to as 'floating river vegetation').

2.9 Otter signs

The presence of otter (*Lutra lutra*) was determined through the recording of otter signs within 150m radius of each survey site. Notes on the age and location of signs (ITM coordinates) were made, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crustaceans, molluscs etc.).

2.10 Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

2.11 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Particular cognisance was given towards preventing the spread or introduction of highly virulent crayfish plague (*Aphanomyces astaci*). Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

3. Desktop review

3.1 Survey area description

The watercourses and aquatic surveys sites in the vicinity of Crowagh (Easky) wind farm were typically small, upland eroding channels (FW1; Fossitt, 2000) within the Easky_SC_010 and Dunmoran_SC_010 river sub-catchments. The watercourses and aquatic surveys sites along the Proposed Grid Connection Route were also typically small, upland eroding channels (FW1; Fossitt, 2000), mostly crossed by the N59 road, within the Dunmoran_SC_010, Owenmore [Sligo]_SC_040 and Owenmore [Sligo]_SC_030 river sub-catchments.

Land use practices in the wider survey area were peat bogs (CORINE 412), coniferous forests (312) and pastures (231) with urban areas also present along the Proposed Grid Connection Route. Predominantly, the watercourses flowed over areas of Neoproterozoic metasedimentary rocks, Visean limestone and calcareous shale and localised Neoproterozoic schist and gneiss (Geological Survey of Ireland data).

3.2 Fisheries

There was a paucity of fisheries data in the survey area given the upland, high gradient and minor nature of many watercourses. However, the Dunneill River and its tributary the Dunbeakin River are known to support brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*) and three-spined stickleback (*Gasterosteus aculeatus*) (Gordon et al., 2021).

Along the Proposed Grid Connection Route , the Owenmore River, also known as the Ballysadare River in its lower reaches, is a significant salmonid bearing watercourse known to support Atlantic salmon (*Salmo salar*) and brown/sea trout (*Salmo trutta*) in addition to European eel (*Anguilla anguilla*), lamprey (*Lampetra* sp.), minnow (*Phoxinus phoxinus*), three-spined stickleback (*Gasterosteus aculeatus*), pike (*Esox lucius*), roach (*Rutilus rutilus*) and perch (*Perca fluviatilis*) (Kelly et al., 2011a).

The Unshin River, a tributary of the Owenmore/Ballysodare, is known to support Atlantic salmon, brown trout, European eel, pike, perch and minnow (Kelly et al., 2015, 2011b). Gordon et al., 2021

3.3 Protected aquatic species

A comprehensive desktop review of available data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Inland Fisheries Ireland (IFI), Botanical Society of Britain and Ireland (BSBI), National Crayfish Plague Surveillance Programme (NCPSP), Environmental Protection Agency (EPA) and Triturus databases for the 10km grid squares containing and adjoining the project (i.e. G32, G42, G43, G53, G62 & G72) identified a low number of records for rare and or protected aquatic species within the vicinity of the Proposed Project.

Annex II otter (*Lutra lutra*) were widespread in the respective 10km grid squares, although most contemporary records were confined to lowland areas in grid squares G43, G53, G62 and G72. Records were available for several surveyed watercourses including the Buncrowey River, Dunneill River, Dunmoran River, Owenmore River and the Unshin River (**Figure 3.1**). No records overlapped with or

adjoined the proposed EIAR site boundary. The nearest otter record to the proposed site boundary was for Lough Rumduff, c. 1km south of Lough Easky but this was historical only (1981; NPWS data).

A significant population of Annex II freshwater pearl mussel (*Margaritifera margaritifera*) is known from the Easky River in the downstream vicinity of the Proposed Wind Farm (**Figure 3.1**). The bulk of these records were from 2018-2019 period (Moorkens, 2019). Please note that an updated pearl mussel survey was undertaken as part of the current assessment and the associated distribution data is provided in **Appendix D**.

A low number of Annex II white-clawed crayfish (*Austropotamobius pallipes*) records were available for the wider survey area, including on the Owenmore River (**Figure 3.1**). However, no records were available for the Easky_SC_010 or Dunmoran_SC_010 sub-catchments containing the majority of survey sites.

A very limited number of smooth newt (*Lissotriton vulgaris*) records were available in the respective grid squares (square G62 only) and none overlapped or adjoined with the survey area (data not shown).

No NPWS records for macrophytes or aquatic bryophytes protected under the Flora (Protection) Order, 2022 were available for the respective grid squares.

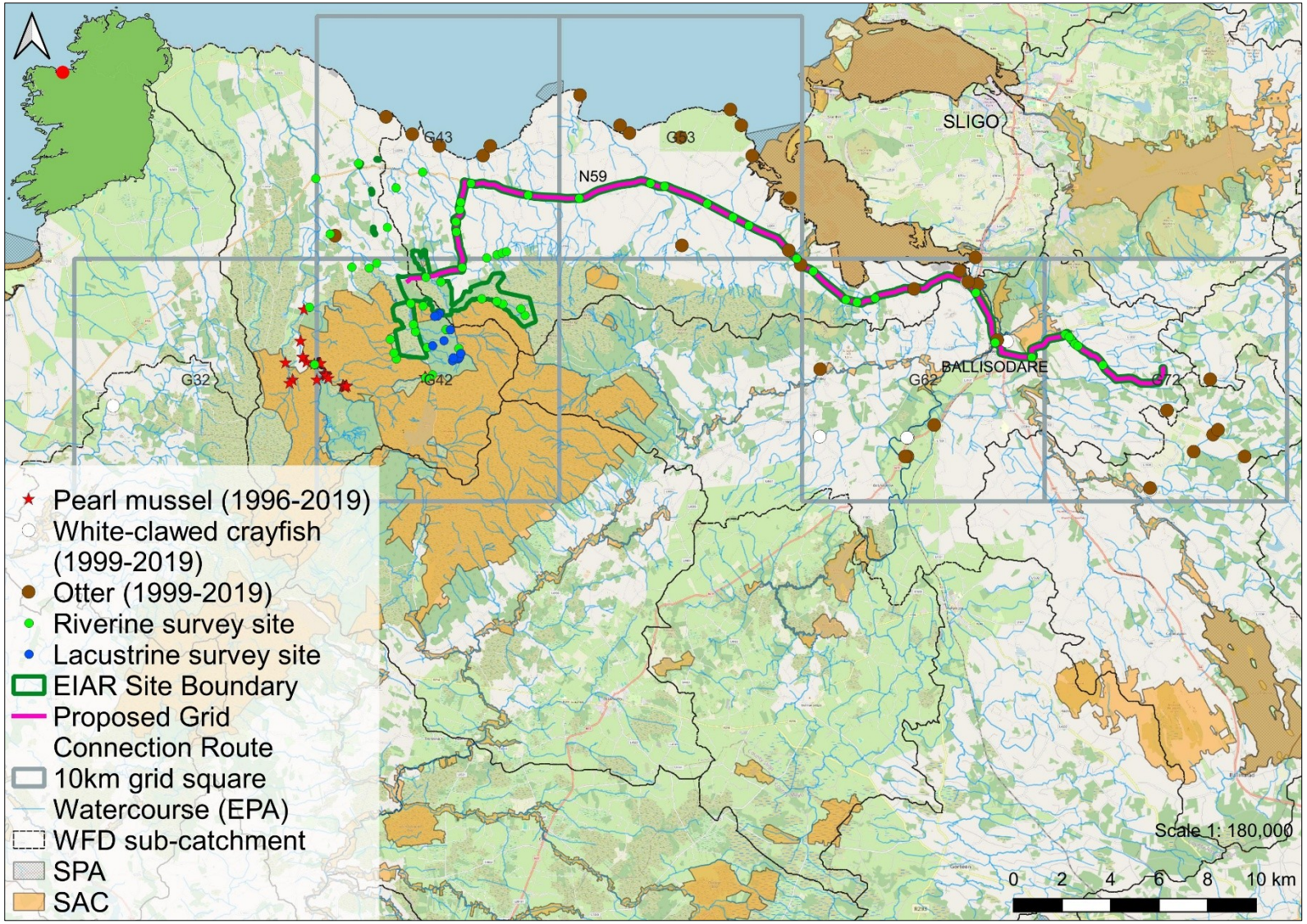

Figure 3.1 Selected protected aquatic species records in the vicinity of the Proposed Project (source: Triturus, NPWS, EPA & NBDC data)

4. Results of aquatic surveys

Appendix A summarises each of the *n*=74 survey sites in terms of aquatic habitats, physical characteristics and overall value for fish and macrophyte/aquatic bryophyte communities, with broad overviews presented below. Please refer to **Appendix B** (fisheries assessment report) for more detailed fisheries results. Biological water quality (Q-sample) results are also summarised for each riverine sampling site and presented in full in **Appendix C**. The results of the freshwater pearl mussel survey on the Easky River are provided in **Appendix D**. A summary of the fish species recorded at each survey site is provided below in **Table 4.1**. A summary of the aquatic species and habitats of high conservation concern recorded during the surveys is provided below in **Table 4.2**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.3**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in July or September 2024.

4.1 Sites within or with connectivity to the site boundary

4.1.1 Easky_SC_010 sub-catchment (33 sites in total)

A total of 21 no. riverine and 12 no. lacustrine survey sites were located within the Easky_SC_010 sub-catchment (**Figure 2.1, 2.3**). Generally, the sites were present on small to medium sized upland eroding/spate watercourses (FW1) with good levels of naturalness. Whilst numerous sites were located near channel headwaters (resulting in low summer flows), all watercourses shared connectivity with the larger Easky River, Owenminna River, Buncrowey River or Carrownrush River. Given higher natural gradients, riverine substrata were typically dominated by cobble and boulder with more localised gravels. Siltation impacts from peat escapement were widespread, with some eutrophication impacts (high filamentous algal cover) also noted locally (e.g. Easky River, Owenminna River). Macrophytes were often restricted to bulbous rush (*Juncus bulbosus*) or alternate milfoil (*Myriophyllum alterniflorum*) with low to medium cover of characteristic upland bryophytes such as *Scapania undulata*, *Racomitrium aciculare* and *Sciuro-hypnum plumosum*. These species are characteristic of upland peatland rivers. Other species such as *Rhynchostegium riparioides*, *Chiloscyphus polyanthos* and *Fontinalis antipyretica* became more common in the lower reaches of the catchment (lower flow velocities and increased nutrients). No riverine examples of Annex I aquatic vegetation habitat (e.g. 3260) were recorded within the Easky_SC_010 sub-catchment. However, Loughs Croan, Anlaba, Nacrowagh, Brickeagh and Nafullow in addition to the 7 no. ponds (i.e. all lacustrine habitats) were representative of natural dystrophic lake Annex I habitat (3160) (**Table 4.2**). In terms of land use, blanket bog (PB2, PB3), wet heath (HH3) and wet grassland (GS4) habitats dominated in the upper reaches of the catchment with extensive coniferous afforestation (WD4) present within the site boundary. The riparian zones of the lower catchment were usually adjoined by semi-improved pasture (GA1), typically used for sheep grazing.

The riverine survey sites within the Easky_SC_010 sub-catchment were of varied fisheries value depending on their location. As expected for such upland environs, the upper reaches of smaller watercourses such as the Owenminna River and numerous unnamed Easky and Buncrowey River tributaries were often unsuitable for resident fish, although some sites with suitable spawning habitats supported small brown trout (*Salmo trutta*) populations. Salmonid populations were recorded at most sites, with higher flow rates and natural gradients resulting in widespread spawning

and nursery habitat. Atlantic salmon (*Salmo salar*) were recorded from 7 no. sites on the Easky River (A2, A4, A19) and unnamed tributary (A7), Owenminna River (A10) and the Buncrowey River (A16, A18). Site A19 on the lower reaches of the Easky River also supported anadromous sea trout. European eel (*Anguilla anguilla*) were recorded in low numbers from the larger watercourses surveyed (**Appendix B**). Whilst the 7 no, pond sites (P1-P7) were typically not of fisheries value due to their small sizes and shallow depths, Loughs Croan, Anlaba, Nacrowagh, Brickeagh and Nafullow were of value for brown trout and European eel. No lamprey or white-clawed crayfish were recorded in the Easky_SC_010 sub-catchment due to an absence of habitat suitability. Otter (*Lutra lutra*) signs were rare and only identified at site A7 on an unnamed Easky River tributary and site A18 on the Buncrowey River. A highly significant and large population of freshwater pearl mussel (*Margaritifera margaritifera*) was recorded and documented on the Easky River (**Appendix D**).

Biological water quality, based on Q-sampling, was typically **Q3-4 (moderate status)** or **Q4 (good status)** within the Easky_SC_010 sub-catchment, with **poor status (Q2-3 or Q3)** sites confined to the upper reaches (**Figure 4.1**). The Red-listed Arctic diver beetle (*Agabus arcticus*) (Foster et al., 2011) was recorded in the sweep sample (**Appendix C**). No other macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling or sweep sampling in the Easky_SC_010 sub-catchment.

The presence of salmonids and or Red-listed European eel resulted in most riverine sites being evaluated as **local importance (higher value)**. All 12 no. lacustrine sites were evaluated as at least **county importance** given the presence of Annex I natural dystrophic lake habitat (3160). Sites A1, A2, A3, A11, A14, A15, L5, P5 and P7 were located within the Ox Mountains Bogs SAC (002006) and therefore of **international importance**. A summary of the ecological evaluation for each survey site is presented in **Table 4.3** below and **Appendix A**.

4.1.2 Dunmoran_SC_010 sub-catchment (excl. Proposed Grid Connection Route crossings, 15 sites in total)

A total of 15 no. riverine survey sites (B1-B15) were located within the Dunmoran_SC_010 sub-catchment (**Figure 2.2, 2.3**). Sites were often present on small, low order tributaries (FW1) draining peatlands with narrow widths, shallow depths and low summer flows. Channels were mostly natural with only local modifications (e.g. near bridges). Riverine substrata (boulder, cobble & gravels) featured low rates of siltation although eutrophication pressures (high filamentous algal cover) were evident, especially in the lower Dunneill River. As per the adjacent Easky-SC_010 sub-catchment, macrophytes were highly restricted due to the high energy, peatland environment with aquatic vegetation communities dominated by aquatic bryophytes including *Scapania undulata*, *Rhynchostegium riparioides*, *Racomitrium aciculare*, *Sciuro-hypnum plumosum* and *Fontinalis* spp. No examples of Annex I aquatic vegetation habitat (e.g. 3260) were recorded within the Dunmoran_SC_010 sub-catchment. Blanket bog (PB2, PB3) and coniferous afforestation (WD4) dominated in the upper catchment with semi-improved pasture (GA1) bordering the survey sites in the lower reaches.

In contrast to the Easky-SC_010 sub-catchment, sites B1-B15 were typically of lower fisheries value although the majority (11 no.) supported small brown trout populations. Siltation impacts were widespread and this coupled with the small channel sizes and lower summer flows often resulted in

poorer quality spawning, nursery and holding habitats. The highest quality salmonid habitats were present on the Dunneill River and Lugdoon Stream. Despite some suitability locally (e.g. Dunneill River), no Atlantic salmon were recorded in the Dunmoran_SC_010 sub-catchment during the survey. Sites were often of lower value for European eel, which were restricted in their distribution (2 sites on the Dunneill and Doonbeakin Rivers only). No lamprey or white-clawed crayfish were recorded in the Dunmoran_SC_010 sub-catchment due to poor habitat suitability. Otter signs were rare and only identified at site B8 on the Dunneill River (B8) and site B15 on the Lugdoon Stream (B16).

Biological water quality, based on Q-sampling, was often **Q4 (good status)** within the Easky_SC_010 sub-catchment, with a low number of sites achieving **Q3-4 (moderate status)** or **poor status (Q2-3 or Q3)** (**Figure 4.1**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling in the Dunmoran_SC_010 sub-catchment (**Appendix C**).

The presence of salmonids and or Red-listed European eel resulted in most riverine sites being evaluated as **local importance (higher value)**. Site B5 on the Ballygreighan Barr River was of **international importance** given it lay contiguous with the Ox Mountains Bogs SAC (002006). A summary of the ecological evaluation for each survey site is presented in **Table 4.3** below and **Appendix A**.

4.2 Proposed Grid Connection Route sites (27 no. watercourse crossings)

A total of 27 no. watercourse crossings were present and surveyed along the Proposed Grid Connection Route option 2 (**Figure 2.2, 2.3**). These were often present on minor channels and low order tributaries although larger watercourses such as the Doonflin River, Dunmoran River, Owenmore River and Unshin River were crossed. Channel types varied from more natural upland spate channels (FW1) (e.g. Doonflin River) to the more frequent heavily modified lowland watercourses (FW2/FW4) (e.g. Doonamurray Stream). Rates of hydromorphological modification (straightening, deepening) generally increased towards the urban centre of Sligo (heading east along the Proposed Grid Connection Route). No examples of Annex I aquatic vegetation habitat (e.g. 3260) were recorded at the Proposed Grid Connection Route crossings. Most crossings were bordered by improved pasture (GA1) with narrow buffers.

Electro-fishing was undertaken at 17 no. Proposed Grid Connection Route crossings (sites B9, B15 & C1-C15), with fisheries appraisal completed at the remaining sites (D1-D10). The crossings were typically of lower fisheries value although many supported or provided suitability for small brown trout and European eel populations (**Appendix B**). Seven sites (C1, C3, C5, C6, C11, C12, C13) supported three-spined stickleback (*Gasterosteus aculeatus*) only. No Atlantic salmon were recorded via electro-fishing on the Proposed Grid Connection Route (i.e. sites B9, B15 & C1-C15). Lamprey ammocoetes (*Lampetra* sp.) were recorded in low densities from site C8 on the Barnabrack River, the only site found to support the species during the survey. However, suitable lamprey nursery habitat was present at fisheries appraisal sites on the Owenmore River (D6), Unshin River (D7) and Ballygrannia River (D10). No white-clawed crayfish were recorded at Proposed Grid Connection Route crossings although the species is known from the Owenmore River (section 3.3). Despite suitability on other survey watercourses, otter signs were recorded on the Barnabrack River (C8), Tanrego Intake (C9), Dunmoran Trib West River (D2), Unshin River (D7) and the Ballygrania River (D10).

Biological water quality, based on Q-sampling, varied along the Proposed Grid Connection Route. A total of 7 no. sites (C1, C2, D1, D2, C10, D6, D7) achieved **Q4 (good status)** with 4 no. (C4, B15, D3, C7) achieving **Q3-4 (moderate status)** (**Figure 4.1**)**.** Many crossings were of **Q2-3 or Q3 (poor status)**, reflecting poor summer flows, siltation and eutrophication pressures. Sites C6 on the Portavaud River and C11 on the Lugawarry River were dry at the time of survey at the proposed crossings. No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling along the Proposed Grid Connection Route (**Appendix C**).

The presence of otter, salmonids and or Red-listed European eel, or habitat capable of supporting these species, resulted in most Proposed Grid Connection Route sites being evaluated as **local importance (higher value)**. Site D6 on the Owenmore River and D7 on the Unshin River were located within the Unshin River SAC (001898) and were thus of **international importance.** Site C8 on the Barnabrack River was also of **international importance** given its location within the Ballysadare Bay SAC (000622). A summary of the ecological evaluation for each survey site is presented in **Table 4.3** below and **Appendix A**.

4.3 White-clawed crayfish

No white-clawed crayfish were recorded via hand-searching or sweep netting of instream refugia at any of the aquatic survey sites in July or September 2024. Furthermore, inspection of mustelid spraint on the Easky River tributary (site A7), the Buncrowey River (A18), Dunneill River (B8), Lugdoon Stream (B16), Barnabrack River (C8), Tanrego Intake (C9), Dunmoran Trib West River (D2), Unshin River (D7) and the Ballygrania River (D10) did not reveal the presence of crayfish remains.

4.4 Freshwater pearl mussel

A highly significant population of freshwater pearl mussel was identified on the Easky River in May 2024 with >15,000 live individuals recorded over the 10km survey area. The full results are presented and discussed in the accompanying freshwater pearl mussel survey report (**Appendix D**).

4.5 Biological water quality & macro-invertebrates

The Red-listed Arctic diver beetle (*Agabus arcticus*) was recorded via sweep sampling at Lough Nafullow (site L5) within the vicinity of the Proposed Wind Farm (**Appendix C**). This species is near threatened in Ireland (Foster et al., 2009).

No other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from a total of 59 no. riverine[1] sites or sweep samples taken at 11 no. other lacustrine sites in July or September 2024 (**Appendix C**). A total of *n*=82 taxa across 58 no. families was recorded from the riverine sites, with *n*=35 taxa across 21 no. families recorded from lacustrine sites.

A total of 24 no. sites on the Easky River (site A2, A4, A19), Owenminna River (A10), Buncrowey River (A12, A18) and unnamed tributary (A14), Carrownrush River (A21), Ballygreighan Barr River (B5) an unnamed tributary (B3), Dunneill River (B7, B8) and unnamed tributary (B6), Doonbeakin River (B10),

[1] Sites C6 and C11 were dry at the time of survey

Cashelboy River (B11), Lugdoon River (B12), Grange More River (B13), Altans Stream (C1) and unnamed tributary (C2), Lugnadeffa River (C10), Doonflin River (D1), Dunmoran Trib West River (D2), Owenmore River (D6) and the Unshin River (D7) achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). This was given the presence of an EPA group A taxa in fair numbers (5% of total abundance), such as the mayflies *Heptagenia sulphurea* and *Ecdyonurus dispar* and or the stoneflies *Nemurella pictetii*, *Protonemura meyeri* or *Dinocras cephalotes* (**Appendix C**).

Eleven sites (i.e. sites A1, A7, A16, A17, B1, B9, B14, B15, C4, C7 & D3) achieved **Q3-4 (moderate status)** water quality. Despite the presence of the EPA group A species *such as Ecdyonurus dispar,* these were only recorded in low numbers (<5% of total sample) and thus did not meet the qualifying criteria for good status as set out by Toner et al. (2005).

A total of 23 no. sites (i.e. A3, A6, A8, A9, A11, A13, A15, A20, B2, B4, C3, C5, C8, C9, C12, C13, C14, C15, D4, D5, D8, D9 & D10) achieved **Q2-3 or Q3 (poor status)** based on an absence of group A species, low numbers of group B species and a dominance of group C and D species, particularly the mayfly *Baetis rhodani* and *Serratella ignita*, caseless caddis (*Hydropsyche* spp.), the freshwater shrimp *Gammarus duebeni*i and blackfly larvae (Simuliidae) (**Appendix C**).

Site A5 (unnamed Easky River tributary), C6 (Portavaud River) and C11 (Lugawarry River) were dry at the time of survey and thus Q-sample collection was not possible.

4.6 Otter signs

Otter signs (comprising spraint sites & latrines) were recorded at 9 no. sites during the current survey. These were identified at sites on an unnamed Easky River tributary (site A7), the Buncrowey River (A18), Dunneill River (B8), Lugdoon Stream (B15), Barnabrack River (C8), Tanrego Intake (C9), Dunmoran Trib West River (D2), Unshin River (D7) and the Ballygrania River (D10).

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in July or September 2024.

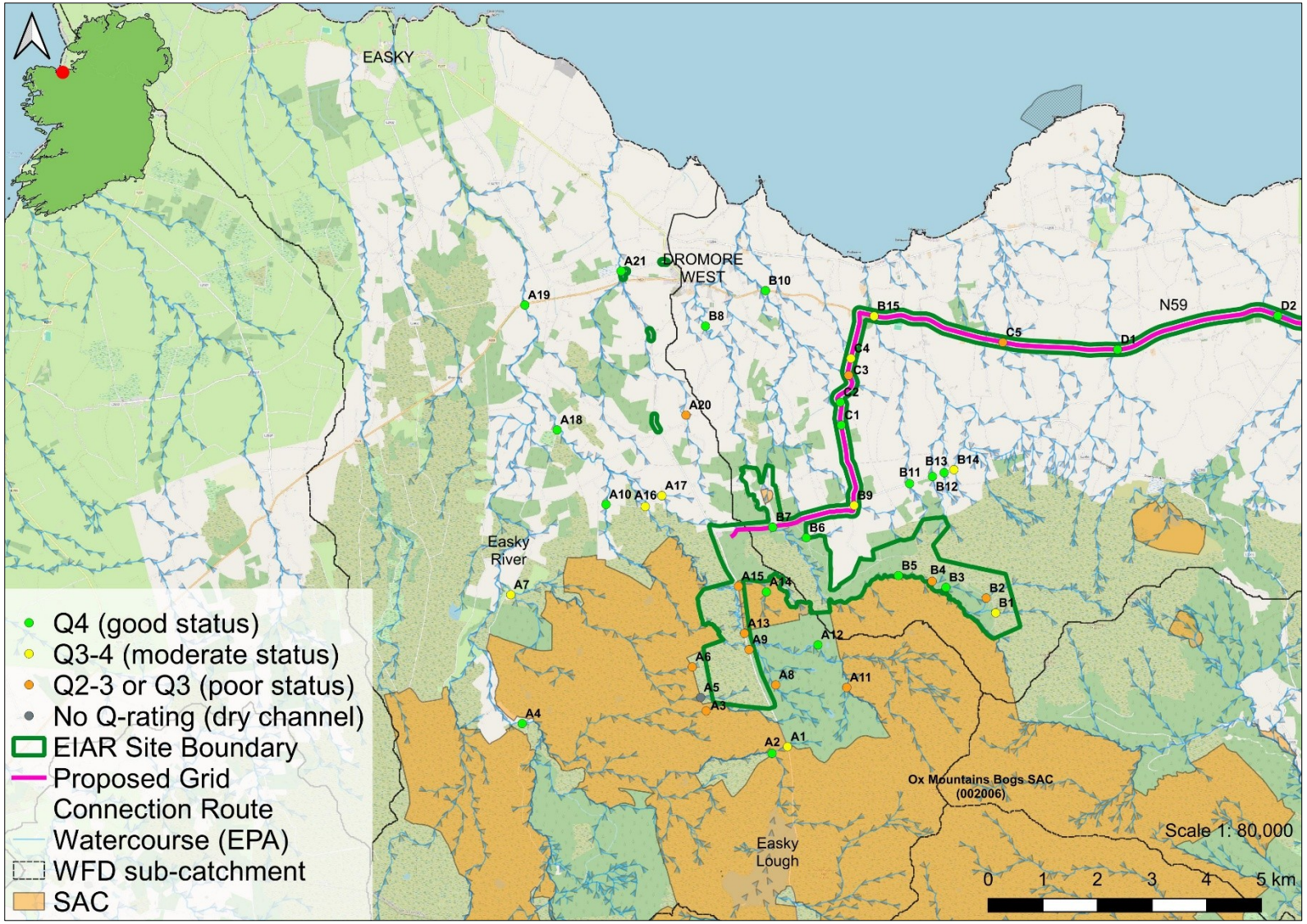

Figure 4.1 Overview of the biological water quality status in the vicinity of the Proposed Wind Farm, July/September 2024

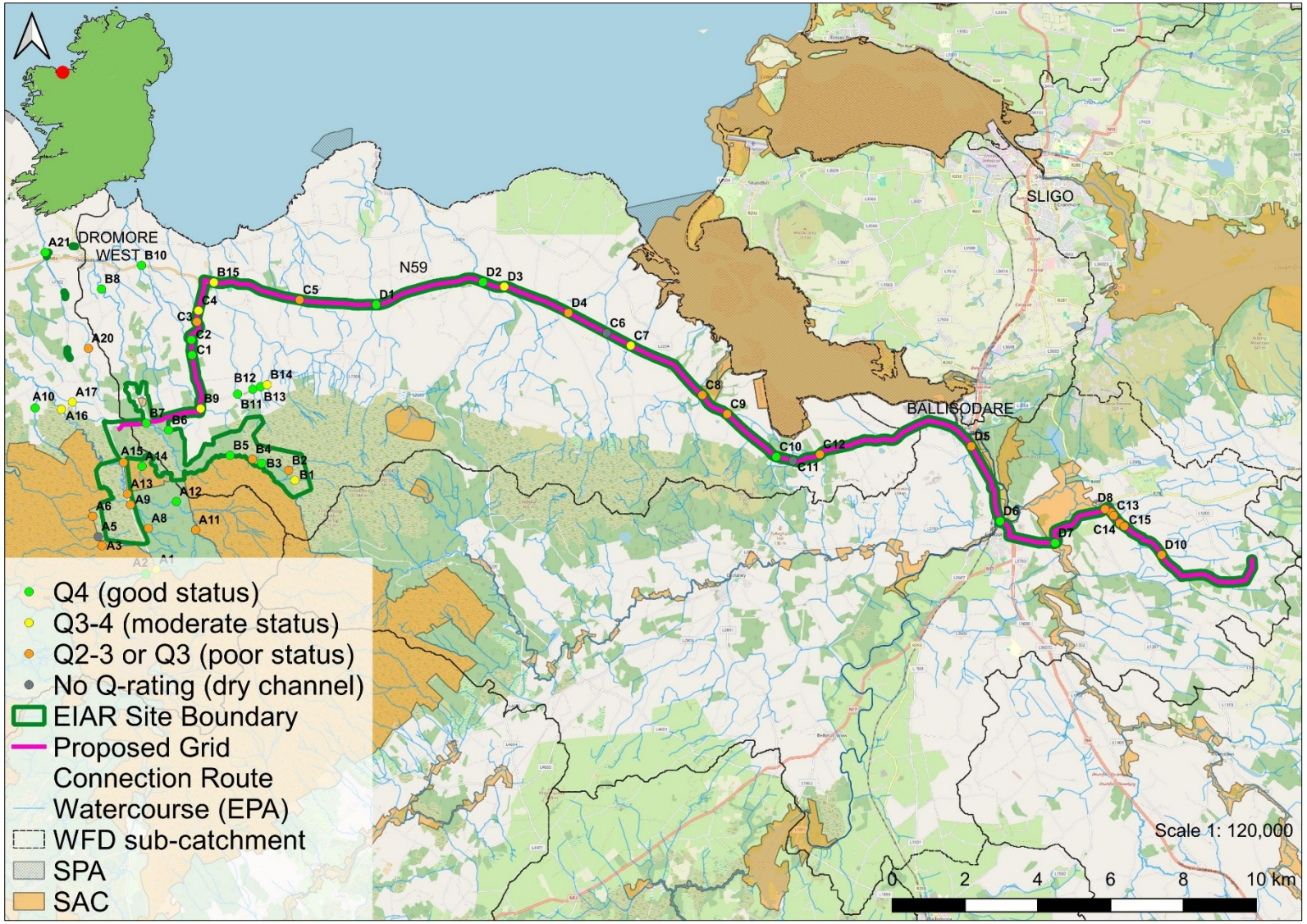

Figure 4.2 Overview of the biological water quality status in the vicinity of the Proposed Grid Connection Route, September 2024

Table 4.1 Relative abundance of fish species of higher conservation value recorded via **electro-fishing** in the vicinity of the Proposed Project, July-September 2024

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
Sites in vicinity of the EIAR site boundary						
A1	Unnamed stream	None	Low	None	None	None
A2	Easky River	Medium	Medium	None	Low	None
A3	Letterunshin River	None	None	None	None	None
A4	Easky River	High	Low	None	None	None
A5	Unnamed stream	None	None	None	None	None
A6	Unnamed stream	None	None	None	None	None
A7	Unnamed river	Medium	Medium	None	Low	None
A8	Owenminna River	None	None	None	None	None
A9	Owenminna River	None	None	None	None	None
A10	Owenminna River	Medium	High	None	None	None
A11	Unnamed river	None	Low	None	None	None
A12	Buncrowey River	None	High	None	None	None
A13	Buncrowey River	None	Medium	None	Low	None
A14	Unnamed river	None	None	None	None	None
A15	Unnamed river	None	Low	None	None	None
A16	Buncrowey River	High	Medium	None	None	None
A17	Rathgoonaun River	None	Low	None	None	None
A18	Buncrowey River	Very high	Medium	None	Low	None
A19	Easky River	High	Low	None	Low	Sea trout
A20	Carrownrush River	None	None	None	None	None
A21	Carrownrush River	None	None	None	None	None
L1	Lough Croane	n/a	n/a	n/a	n/a	Fisheries appraisal only
L2	Lough Anlaba	n/a	n/a	n/a	n/a	Fisheries appraisal only
L3	Lough Nacrowagh	n/a	n/a	n/a	n/a	Fisheries appraisal only
L4	Lough Brickeagh	n/a	n/a	n/a	n/a	Fisheries appraisal only
L5	Lough Nafullow	n/a	n/a	n/a	n/a	Fisheries appraisal only
P1	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P2	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P3	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
P4	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P5	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P6	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P7	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
B1	Grangebeg Barr River	None	Low	None	None	None
B2	Ballygreighan Barr River	None	Medium	None	None	None
B3	Unnamed stream	None	None	None	None	None
B4	Unnamed stream	None	None	None	None	None
B5	Ballygreighan Barr River	None	Medium	None	None	None
B6	Unnamed stream	None	None	None	None	None
B7	Dunneill River	None	Medium	None	None	None
B8	Dunneill River	None	High	None	Low	None
B9	Doonbeakin River	None	None	None	None	None
B10	Doonbeakin River	None	Low	None	Low	None
B11	Cashelboy River	None	Low	None	None	None
B12	Lugdoon River	None	Low	None	None	None
B13	Grange More River	None	Medium	None	None	None
B14	Unnamed stream	None	Low	None	None	None
B15	Lugdoon Stream	None	High	None	None	None
Proposed Grid Connection Route crossings						
C1	Altans Stream	None	None	None	None	Three-spined stickleback
C2	Unmapped stream	None	Low	None	Low	None
C3	Ballyeeskeen River	None	None	None	None	Three-spined stickleback
C4	Ardkill Stream	None	Low	None	None	Three-spined stickleback
C5	Kilrusheighter River	None	None	None	None	Three-spined stickleback
C6	Portavaud River	None	None	None	None	None
C7	Ballinlig River	None	Low	None	Low	None
C8	Barnabrack River	None	Medium	Low	Low	None
C9	Tanrego Intake	None	High	None	Medium	None
C10	Lugnadeffa River	None	Medium	None	Low	Three-spined stickleback
C11	Lugawarry River	None	None	None	None	None
C12	Stonehall River	None	None	None	None	None

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
C13	Carrigeenboy River	None	None	None	None	Three-spined stickleback
C14	Doonamurray Stream	None	Low	None	None	Three-spined stickleback
C15	Doonamurray Stream	None	Low	None	None	Three-spined stickleback
D1	Doonflin River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D2	Dunmoran Trib West River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D3	Dunmoran River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D4	Unmapped stream	n/a	n/a	n/a	n/a	Fisheries appraisal only
D5	Knoxspark River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D6	Owenmore River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D7	Unshin River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D8	Carrigeenboy River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D9	Unmapped stream	n/a	n/a	n/a	n/a	Fisheries appraisal only
D10	Ballygrania River	n/a	n/a	n/a	n/a	Fisheries appraisal only

Table 4.2 Summary of aquatic species and habitats of higher conservation value recorded in the vicinity of the Proposed Wind Farm, September 2024

Site	Watercourse	Freshwater pearl mussel [1]	White-clawed crayfish	Otter signs [2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
Sites within or with connectivity to EIAR site boundary								
A1	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A2	Easky River	**Significant population present downstream**	None recorded	No signs recorded	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
A3	Letterunshin River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A4	Easky River	**Significant population present**	None recorded	No signs recorded	Not present	None recorded	None recorded	**Atlantic salmon**
A5	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A6	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A7	Unnamed river	n/a	None recorded	**Old spraint site**	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
A8	Owenminna River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A9	Owenminna River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A10	Owenminna River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**Atlantic salmon**
A11	Unnamed river	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A12	Buncrowey River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A13	Buncrowey River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**European eel**
A14	Unnamed river	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A15	Unnamed river	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded

Site	Watercourse	Freshwater pearl mussel [1]	White-clawed crayfish	Otter signs [2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
A16	Buncrowey River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**Atlantic salmon**
A17	Rathgoonaun River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A18	Buncrowey River	n/a	None recorded	**Old latrine**	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
A19	Easky River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**Atlantic salmon, sea trout, European eel**
A20	Carrownrush River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
A21	Carrownrush River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
L1	Lough Croane	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
L2	Lough Anlaba	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
L3	Lough Nacrowagh	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
L4	Lough Brickeagh	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
L5	Lough Nafullow	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	**Arctic diver beetle (*Agabus arcticus*) (NT; Foster et al., 2009)**	None recorded
P1	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
P2	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
P3	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded

Site	Watercourse	Freshwater pearl mussel [1]	White-clawed crayfish	Otter signs [2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
P4	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
P5	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
P6	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
P7	Pond	n/a	None recorded	No signs recorded	**Natural dystrophic lake habitat (3160)**	None recorded	None recorded	None recorded
B1	Grangebeg Barr River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B2	Ballygreighan Barr River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B3	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B4	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B5	Ballygreighan Barr River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B6	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B7	Dunneill River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B8	Dunneill River	n/a	None recorded	**2 no. spraint sites**	Not present	None recorded	None recorded	**European eel**
B9	Doonbeakin River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B10	Doonbeakin River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**European eel**
B11	Cashelboy River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B12	Lugdoon River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B13	Grange More River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded

Site	Watercourse	Freshwater pearl mussel [1]	White-clawed crayfish	Otter signs [2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
B14	Unnamed stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
B15	Lugdoon Stream	n/a	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
Proposed Grid Connection Route crossings								
C1	Altans Stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C2	Unmapped stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**European eel**
C3	Ballyeeskeen River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C4	Ardkill Stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C5	Kilrusheighter River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C6	Portavaud River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C7	Ballinlig River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**European eel**
C8	Barnabrack River	n/a	None recorded	**Fresh spraint**	Not present	None recorded	None recorded	**Lamprey (*Lampetra* sp.), European eel**
C9	Tanrego Intake	n/a	None recorded	**2 no. regular spraint sites**	Not present	None recorded	None recorded	**European eel**
C10	Lugnadeffa River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	**European eel**
C11	Lugawarry River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C12	Stonehall River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C13	Carrigeenboy River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C14	Doonamurray Stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
C15	Doonamurray Stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D1	Doonflin River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded

Site	Watercourse	Freshwater pearl mussel [1]	White-clawed crayfish	Otter signs [2]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
D2	Dunmoran Trib West River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D3	Dunmoran River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D4	Unmapped stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D5	Knoxspark River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D6	Owenmore River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D7	Unshin River	n/a	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
D8	Carrigeenboy River	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D9	Unmapped stream	n/a	None recorded	No signs recorded	Not present	None recorded	None recorded	None recorded
D10	Ballygrania River	n/a	None recorded	**Old spraint site**	Not present	None recorded	None recorded	None recorded

Conservation value: Freshwater pearl mussel (*Margaritifera margaritifera*), Atlantic salmon (*Salmo salar*), lamprey (*Lampetra* spp.) and Eurasian otter (*Lutra lutra*) are listed under Annex II of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). Atlantic salmon and otter are both protected under the Irish Wildlife Acts 1976-2023. Atlantic salmon are also protected under the Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations. Freshwater pearl mussel (Moorkens et al., 2017) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). Apart from the Inland Fisheries Acts 1959 to 2017, non-anadromous brown trout have no legal protection in Ireland. The Arctic diver beetle (*Agabus arcticus*) is listed as near threatened in Ireland (Foster et al., 2009).

[1] A stage 1 pearl mussel survey was only undertaken on 10km of the Easky River

[2] Otter signs within 150m of the survey site

Table 4.3 Aquatic ecological evaluation summary of the Proposed Wind Farm survey sites according to NRA (2009) criteria

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
Sites within or with connectivity to the EIAR site boundary				
A1	Unnamed stream	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A2	Easky River	35E01	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A3	Letterunshin River	35L56	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A4	Easky River	35E01	**National importance**	Significant freshwater pearl mussel population
A5	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; dry, ephemeral stream
A6	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
A7	Unnamed river	n/a	**Local importance (higher value)**	Salmonids (including Atlantic salmon), otter & Red-listed European eel recorded
A8	Owenminna River	35O05	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
A9	Owenminna River	35O05	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
A10	Owenminna River	35O05	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded
A11	Unnamed river	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A12	Buncrowey River	35B09	**Local importance (higher value)**	Salmonids recorded
A13	Buncrowey River	35B09	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
A14	Unnamed river	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A15	Unnamed river	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
A16	Buncrowey River	35B09	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded
A17	Rathgoonaun River	35R06	**Local importance (higher value)**	Salmonids recorded

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
A18	Buncrowey River	35B09	**Local importance (higher value)**	Salmonids (including Atlantic salmon), otter & Red-listed European eel recorded
A19	Easky River	35E01	**National importance**	Significant freshwater pearl mussel population
A20	Carrownrush River	35C66	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
A21	Carrownrush River	35C66	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
L1	Lough Croane	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
L2	Lough Anlaba	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
L3	Lough Nacrowagh	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
L4	Lough Brickeagh	35B09	**County importance**	Annex I natural dystrophic lake habitat (3160) present
L5	Lough Nafullow	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
P1	Pond	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
P2	Pond	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
P3	Pond	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
P4	Pond	n/a	**County importance**	Annex I natural dystrophic lake habitat (3160) present
P5	Pond	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
P6	Pond	35O12	**County importance**	Annex I natural dystrophic lake habitat (3160) present
P7	Pond	n/a	**International importance**	Located within the Ox Mountains Bogs SAC (002006)
B1	Grangebeg Barr River	35G64	**Local importance (higher value)**	Salmonids recorded
B2	Ballygreighan Barr River	35B80	**Local importance (higher value)**	Salmonids recorded
B3	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q4 (good status) water quality

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
B4	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative rating)
B5	Ballygreighan Barr River	35B80	**International importance**	Contiguous with Ox Mountains Bogs SAC (002006)
B6	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q4 (good status) water quality
B7	Dunneill River	35D06	**Local importance (higher value)**	Salmonids recorded
B8	Dunneill River	35D06	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
B9	Doonbeakin River	35D09	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3-4 (moderate status) water quality
B10	Doonbeakin River	35D09	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
B11	Cashelboy River	35C83	**Local importance (higher value)**	Salmonids recorded
B12	Lugdoon River	35L27	**Local importance (higher value)**	Salmonids recorded
B13	Grange More River	35G39	**Local importance (higher value)**	Salmonids recorded
B14	Unnamed stream	n/a	**Local importance (higher value)**	Salmonids recorded
B15	Lugdoon Stream	35L01	**Local importance (higher value)**	Salmonids recorded
Proposed Grid Connection Route crossings				
C1	Altans Stream	35A29	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q4 (good status) water quality
C2	Unmapped stream	n/a	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
C3	Ballyeeskeen River	35B40	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
C4	Ardkill Stream	35A61	**Local importance (higher value)**	Salmonids recorded
C5	Kilrusheighter River	35K35	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
C6	Portavaud River	35P02	Local importance (lower value)	No aquatic species or habitats of high conservation value; dry, ephemeral channel

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
C7	Ballinlig River	35B50	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
C8	Barnabrack River	35B30	**International importance**	Located within the Ballysadare Bay SAC (000622)
C9	Tanrego Intake	35T25	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
C10	Lugnadeffa River	35L35	**Local importance (higher value)**	Salmonids & Red-listed European eel recorded
C11	Lugawarry River	35L36	Local importance (lower value)	No aquatic species or habitats of high conservation value; dry, ephemeral channel
C12	Stonehall River	35S25	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q2-3 (poor status) water quality (tentative rating)
C13	Carrigeenboy River	35C19	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative rating)
C14	Doonamurray Stream	35D38	**Local importance (higher value)**	Salmonids recorded
C15	Doonamurray Stream	35D38	**Local importance (higher value)**	Salmonids recorded
D1	Doonflin River	35D10	**Local importance (higher value)**	High suitability for salmonids & Red-listed European eel
D2	Dunmoran Trib West River	35D07	**Local importance (higher value)**	Otter signs recorded
D3	Dunmoran River	35D16	**Local importance (higher value)**	Good suitability for salmonids & Red-listed European eel
D4	Unmapped stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative rating)
D5	Knoxspark River	35K39	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative rating)
D6	Owenmore River	35O06	**International importance**	Located within the Unshin River SAC (001898)
D7	Unshin River	35U01	**International importance**	Located within the Unshin River SAC (001898)
D8	Carrigeenboy River	35C19	**Local importance (higher value)**	Suitability for salmonids, lamprey & Red-listed European eel
D9	Unmapped stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q2-3 (poor status) water quality (tentative rating)
D10	Ballygrania River	35B81	**Local importance (higher value)**	Otter signs recorded

Conservation value: Freshwater pearl mussel (*Margaritifera margaritifera*), Atlantic salmon (*Salmo salar*), lamprey (*Lampetra* spp.) and Eurasian otter (*Lutra lutra*) are listed under Annex II of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). Atlantic salmon and otter are both protected under the Irish Wildlife Acts 1976-2023. Atlantic salmon are also protected under the Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations. Freshwater pearl mussel (Moorkens et al., 2017) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). Apart from the Inland Fisheries Acts 1959 to 2017, non-anadromous brown trout have no legal protection in Ireland. The Arctic diver beetle (*Agabus arcticus*) is listed as near threatened in Ireland (Foster et al., 2009).

5. Discussion

The surveyed watercourses in the vicinity of the Proposed Wind Farm were typically small to medium sized upland eroding/spate channels, with more frequent lower gradient and lowland depositing channels present along the Proposed Grid Connection Route. Many retained high degrees of naturalness although modifications (e.g. historical straightening, deepening) increased in lowland areas adjoining the public road network, more intensive agricultural lands and urban centres. Siltation pressures (mostly from peat escapement) and eutrophication pressures were evident throughout much of the survey area, particularly in the upper Easky and Dunmoran sub-catchments.

The presence of aquatic species of high conservation value including otter, salmonids, lamprey and or European eel resulted in the majority of sites being evaluated as **local importance (higher value)** in terms of their aquatic ecology (**Table 4.3**). A highly significant (yet undesignated) population of freshwater pearl mussel (>15000 live mussels) was recorded in 10km stretch of the Easky River and the watercourse was thus considered to be of **national importance.** All 12 no. lacustrine sites were evaluated as at least **county importance** given the presence of Annex I natural dystrophic lake habitat (3160). Sites A1, A2, A3, A11, A14, A15, L5, P5 and P7 were located within the Ox Mountains Bogs SAC (002006) and therefore of **international importance**. Site B5 on the Ballygreighan Barr River (B5), Barnabrack River (C8), Owenmore River (D6) and Unshin River (D7) were also of **international importance** given their location within European sites.

With the exception of the Red-listed (near threatened) Arctic diver beetle (*Agabus arcticus*) at Lough Nafullow (site L5), no other rare/protected macro-invertebrates were recorded. No white-clawed crayfish, rare/protected macrophytes/aquatic bryophytes or other Annex I aquatic habitats were recorded.

Broadly speaking, in addition to the 12 no. lacustrine sites supporting 3160 habitat, the highest value watercourses in terms of aquatic ecology were the Easky River, Dunneill River, Buncrowey River, Lugdoon Stream, Owenmore River and the Unshin River. These supported and provided better quality habitats for a range of high conservation value aquatic species inclusive of fish populations.

5.1 Fisheries

A low diversity of fish species typical of NW Ireland (Gordon et al., 2021; Kelly et al., 2015, 2011a, 2011b) was recorded during the electro-fishing survey, with Atlantic salmon, brown trout, sea trout, lamprey (*Lampetra* sp.), European eel and three-spined stickleback captured (**Table 4.1**).

Atlantic salmon were recorded from 7 no. sites in the Easky_SC_010 sub-catchment on the Easky River (A2, A4, A19) and unnamed tributary (A7), Owenminna River (A10) and the Buncrowey River (A16, A18). However, none were recorded via electro-fishing in the Dunmoran_SC_010 sub-catchment or along the Proposed Grid Connection Route [2] despite suitability. Brown trout populations were widespread and recorded from 32 no. electro-fishing sites (**Table 4.1**). Trout were also observed (feeding) at Loughs Croane (L1), Nacrowagh (L3), Brickeagh (L4) and Nafullow (L5) during the survey. Lamprey (*Lampetra* sp.)[2] and anadromous sea trout were recorded from single sites on the Barnabrack

[2] However, the Owenmore and Unshin Rivers (fisheries appraisal sites, also crossed by the Proposed Grid Connection Route) are known to support Atlantic salmon and lamprey (*Lampetra* sp.)

River (C8) and the Easky River (A19), respectively. European eel were widespread but recorded in low numbers and typically from the larger watercourses (sites A2, A7, A13, A18, A19, B8, B10, C2, C7, C8, C9, C10; **Appendix B**).

5.2 White-clawed crayfish

Despite some local habitat suitability, no white-clawed crayfish were recorded via hand searching or sweep netting of instream refugia nor inspection of mustelid spraint at any of the sites during the current survey. Whilst crayfish are known from the Owenmore River but there are no records for the species in the Easky-SC_010 or Dunmoran_SC_010 sub-catchments (NPWS data; **Figure 3.1**). This is largely reflective of unsuitable water chemistry as well as geographical isolation (Demers et al., 2005; Lucy & McGarrigle, 1987).

5.3 Macro-invertebrates & biological water quality pressures

The Red-listed Arctic diver beetle (*Agabus arcticus*) was recorded via sweep sampling at Lough Nafullow (site L5) within the vicinity of the Proposed Wind Farm (**Plate 5.1; Appendix C**). This species is near threatened in Ireland due to declines caused by rising summer temperatures and climate change (Foster et al., 2009). It is usually found in pools and small lakes in upland heath and blanket bog above 150m, such as Lough Nafullow. No other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from a total of 59 no. riverine or 11 no. other lacustrine sites in July or September 2024 (**Appendix C**), i.e. none of greater than Least Concern.

Plate 5.1 Stock image of the Arctic diver beetle (*Agabus arcticus*), a near threatened species in Ireland, recorded at Lough Nafullow (site L5) in September 2024

A total of 24 no. sites achieved **Q4 (good status)** water quality. These were located on the Easky River (site A2, A4, A19), Owenminna River (A10), Buncrowey River (A12, A18) and unnamed tributary (A14), Carrownrush River (A21), Ballygreighan Barr River (B5) an unnamed tributary (B3), Dunneill River (B7, B8) and unnamed tributary (B6), Doonbeakin River (B10), Cashelboy River (B11), Lugdoon River (B12), Grange More River (B13), Altans Stream (C1) and unnamed tributary (C2), Lugnadeffa River (C10), Doonflin River (D1), Dunmoran Trib West River (D2), Owenmore River (D6) and the Unshin River (D7) (**Figure 4.1, 4.2**). The remaining 37 no. riverine sites failed to meet the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC).

The biological water quality in the survey area was influenced by several factors, including adjoining and upstream land uses (i.e. pasture, coniferous afforestation, cutover bog). Water quality in the Easky_SC_010 was generally better than elsewhere by virtue of more natural landscapes with fewer modifications and impact sources (e.g. blanket bog). Siltation (mostly from peat escapement) and eutrophication pressures were nevertheless present but were more evident within the Dunmoran_SC_010 sub-catchment and at many Proposed Grid Connection Route crossings. High cover of filamentous algae were especially prevalent in the Owenminna River, Dunneill River and Easky River (particularly impactful to pearl mussel in the latter). Despite field observations, the Easky_010 and Dunneill_010 sub-basins are designated as Blue Dot[3] catchments under the 3rd cycle of the Water Framework Directive and are achieving high ecological status. In support of observations made during the aquatic surveys, coniferous afforestation is a known pressure in the Easky_SC_1010 sub-catchment with agriculture, urban wastewater and anthropogenic pressures the main threats to water quality in the Dunmoran_SC_010, Owenmore (Sligo)_030 and Owenmore (Sligo)_040 sub-catchments (EPA data).

5.4 Otter

Despite suitability at many survey sites in terms of foraging habitat, otter signs (spraint sites or latrines) were only recorded at 9 no. sites during the current survey. These were identified on an unnamed Easky River tributary (site A7, old spraint), the Buncrowey River (A18, old latrine), Dunneill River (B8, 2 no. spraint sites), Lugdoon Stream (B15, regular spraint site), Barnabrack River (C8, fresh spraint), Tanrego Intake (C9, 2 no. regular spraint sites), Dunmoran Trib West River (D2, old spraint), Unshin River (D7, regular spraint site) and the Ballygrania River (D10, old spraint). Otters are known to be present on other watercourses in the vicinity of the Proposed Project (**Figure 3.1**) and are listed as a qualifying interest of the Unshin River SAC (001898) with which a number of survey watercourses share hydrological connectivity. No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in July or September 2024.

Fish are the main component of otter diet (Krawczyk et al., 2016; Reid et al., 2013) and otter signs were typically recorded at sites with more significant fish populations or potential for same. No otter signs were recorded within or adjoining the proposed site boundary, with marking signs located in the lower reaches of the respective catchments (all signs below 98m ASL). Otter occurrence is negatively associated with elevation (Triturus data; Hong et al., 2020) with upland, higher-gradient watercourses

[3] waters in Ireland that should have a high status objective according to the EPA

often providing poor prey resources (Sittenthaler et al., 2019; Scorpio et al., 2016; Remonti et al., 2009).

5.5 Annex I aquatic habitats

All 12 no lacustrine sites (i.e., sites L1-L5 and P1-P7) were located within or in the vicinity of the Proposed Wind Farm and supported examples of Annex I 'Natural dystrophic lakes and ponds (3160)' habitat. This habitat is listed as a qualifying interest of the Ox Mountains Bogs SAC (002006) within which sites Lough Nafullow (site L5) and ponds P5 and P7 are located. These sites had previously been proposed as likely 3160 habitat (NPWS, 2016). The Annex I (3160) habitat is widespread within the Ox Mountains Bog SAC (002006) but nonetheless is of very high importance (NPWS, 2016).

Annex I acid oligotrophic lakes are typically associated with small lakes and ponds in Atlantic and upland blanket bog, and wet heath (Gray et al., 2022; O'Connor, 2015), such as that present within the proposed EIAR boundary. The Annex I (3160) habitats are considered species-poor botanically with a community characterised by bryophytes of the genus *Sphagnum* and sustain the *Utricularietalia* phytosociological order (EC, 2013). In Ireland, this lake habitat has been broadly interpreted as 'species poor lake and pond systems dominated by *Sphagnum* mosses and restricted to blanket bogs and wet heaths' (O'Connor, 2015). Most lacustrine sites surveyed were dominated by *Sphagnum* species such as *S. cuspidatum*, with common associates for 3160 habitat such as floating bur-reed (*Sparganium angustifolium*), bulbous rush (*Juncus bulbosus*) and bladderwort (*Ultricularia* agg.).

6. References

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7. Appendix A – survey site summaries

7.1 Sites within or with connectivity to the EIAR site boundary

7.1.1 Site A1 - Unnamed stream, Trasgarve

Site A1 was located on the upper reaches of an unnamed tributary of the Easky River (to which it joins 150m downstream). The small upland eroding watercourse (FW1) fell over a steep gradient under the local road crossing (large, corrugated pipe culvert) and meandered in a narrow incised channel in a wider V-shaped valley. The stream was 1-1.5m wide (although often 0.5) and 0.1-0.3m deep. Riffle and shallow glide between natural cascade areas dominated with localised small pool. The substrata were dominated by mobile cobble and boulder with interstitial medium-coarse gravels and sand. Siltation was low but peat was present on the bed. Cover of filamentous algae was locally high (indicating enrichment from peat drainage & upstream afforestation). Macrophytes were not present with lesser spearwort (*Ranunculus flammula*) and marsh bedstraw (*Galium palustre*) along the margins. The liverwort *Scapania undulata* was present locally with *Pellia epiphylla* present on sections of peaty bank. The stream was bordered by sloping heath (dominated by heather) and wet grassland with abundant rushes (*Juncus* sp.) and purple moor grass (*Molinia caerulea*).

Brown trout (*Salmo trutta*) was the only fish species recorded via electro-fishing at site A1 (**Appendix C**). The site was of moderate value for salmonids, supporting a low density of mixed cohort trout. Whilst the site was of some value as a nursery and spawning, the holding opportunities were poor due to the shallow, upland/cascading nature high energy site was unsuitable for lamprey and white-clawed crayfish. There was no suitability for freshwater pearl mussel although the species is known in the downstream connecting Easky River. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A1 was of **international importance** (**Table 4.3**).

Plate 7.1.1 Representative image of site A1 on an unnamed Easky River tributary, July 2024

7.1.2 Site A2 - Easky River, Trasgarve

Site A2 was located on the upper reaches of the Easky River (35E01) at a local farm access crossing approximately 1km downstream of Lough Easky. The upland eroding river (FW1) was natural in character and meandered in a typically incised channel with 1-2m high banks. The river was 3-6m wide and 0.2-0.4m deep with locally deeper pool to 1m. Riffle and fast glide predominated with occasional pool. The substrata were dominated by mobile rounded cobble and boulder with localised patches of sands and mixed gravels. Cover of floc and filamentous algae was locally high. Given high flow rates, macrophytes were limited to characteristic bulbous rush (*Juncus bulbosus*) and occasional alternate milfoil (*Myriophyllum alterniflorum*). Aquatic bryophyte coverage was low with occasional *Sciuro-hypnum plumosum* and *Scapania undulata*. The low lying banks were exposed to low-level sheep grazing and were dominated by abundant soft rush (*Juncus effusus*) and purple moor grass with localised heather (*Calluna vulgaris*), foxglove (*Digitalis purpurea*) and ferns. The site was bordered by mosaics of upland blanket bog (PB2), wet heath (HH3) and wet grassland (GS4).

Atlantic salmon (*Salmo salar*), brown trout and European eel (*Anguilla anguilla*) were recorded via electro-fishing at site A2 (**Appendix B**). The site was of high value for salmonids, with moderate numbers of juvenile salmon and trout. Abundant instream cobble refugia provided good quality salmonid nursery and good quality eel habitat. Good quality spawning habitat was also present with some limited holding habitat for adult salmonids on meanders and under the bridge. The spate channel was unsuitable for lamprey or white-clawed crayfish. However, the upper reaches support a high density of freshwater pearl mussel albeit these were mostly located downstream of the survey site (nearest population c.350m downstream) (**Appendix D**). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national

red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A2 was of **international importance** (**Table 4.3).**

Plate 7.1.2 Representative image of site A2 on the Easky River, July 2024

7.1.3 Site A3 - Letterunshin River, Crowagh or Dunneill

Site A3 was located on the upper reaches of the Letterunshin River (35L56) at a bog access track crossing. The small upland eroding stream (FW1) flowed in a very narrow, deeply incised channel through blanket bog and was often <1m in width and <0.2m in depth. The profile comprised riffle and deep glide between natural cascades and peat impoundments. This resulted in localised pooling of near stagnant water. The substrata were dominated by cobble and mixed gravels with localised sands and scattered small boulder. These were heavily silted. The bridge apron was rendered but degrading and not a barrier to fish at low flows (inherently low summer flows more of an issue than apron). Cover of floc and filamentous algae were locally high in rare open areas of channel. Macrophytes were absent with occasional lesser spearwort along peaty margins. *Scapania undulata* and *Pellia* sp. were occasional instream. The channel was heavily shaded by purple moor grass, soft rush and ferns. The site was bordered by cutover bog (PB4) and degraded blanket bog (PB2).

Despite some physical suitability for salmonids, no fish were recorded via electro-fishing at site A3 (**Appendix B**). The river at this location was shallow and very narrow and may dry up seasonally, possibly precluding resident fish in the summer months. Siltation pressures, natural blockages to flow and poor summer flows further reduced the fisheries value. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A3 was of **international importance** (**Table 4.3).**

Plate 7.1.3 Representative image of site A3 on the Letterunshin River, September 2024

7.1.4 Site A4 - Easky River, Tawnamore

Site A4 was located on the upper reaches of the Easky River (35E01) at a local road crossing. The large upland eroding spate channel was 6-8m wide and 0.1-0.3m deep with a profile comprising riffle, shallow glide and frequent pool. Peat staining was moderate at the time of survey The substrata of the high energy site were dominated by small mostly mobile cobble and mixed gravels with scattered boulder (mostly upstream). Sand was abundant along depositing margins with soft sediment accumulations (humic) also present. The site was heavily vegetated with abundant alternate leaved milfoil and frequent bog pondweed (*Potamogeton polygonifolius*). Bulbous rush was also present but sparse. Aquatic bryophyte coverage was moderate with *Sciuro-hypnum plumosum* in addition to *Batrachospermum* sp. A stand of invasive Japanese knotweed (*Reynoutria japonica*) adjoined the bridge abutment (downstream, west bank). Whilst historically modified, the banks supported intermittent treelines of ash (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*) and willow species (*Salix* spp.) with bramble scrub. The site was bordered by rough low intensity pasture (GS2) with areas of wet grassland (GS4).

Atlantic salmon and brown trout were the only fish species recorded via electro-fishing at site A4 (**Appendix B**). The site was an excellent quality salmonid nursery with abundant macrophyte beds and mixed substrata providing high quality refugia. Good quality spawning habitat was also widespread

with the substrata mostly mobile. More stable areas of cobble in faster flowing glide supported abundant freshwater pearl mussel with a high density present downstream of the bridge (see **Appendix D**). There was no suitability for white-clawed crayfish. Despite high suitability, no European eel were recorded. No otter signs were recorded in vicinity of the site with only a low number of marking opportunities present.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of freshwater pearl mussel, the aquatic ecological evaluation of site A4 was of **national importance** (**Table 4.3**).

Plate 7.1.4 Representative image of site A4 on the Easky River, July 2024

7.1.5 Site A5 - Unnamed stream, Crowagh or Dunneill

Site A5 was located on the uppermost reaches of an unnamed Easky River tributary at a bog access track crossing adjacent to the EIAR site boundary. The channel had been historically straightened and deepened as part of land drainage resulting in a deep U-shaped channel with slumping, peaty banks. The stream was dry at this location at the time of survey with an absence of aquatic habitats. Some bog pondweed grew on damp muddy areas of the bed, implying occasional water flows. The site was bordered by cutover bog (PB4) and degraded blanket bog (PB2).

No fish were recorded via electro-fishing at site A5 (**Appendix B**). The ephemeral stream was dry at the time of survey and thus not of fisheries value. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

It was not possible to collect a biological water quality sample given the dry nature of the stream at this location.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A5 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.5 Representative image of site B5 on an unnamed Easky River tributary, July 2024 (dry, ephemeral channel)

7.1.6 Site A6 - Unnamed stream, Crowagh or Dunneill

Site A6 was located on an unnamed stream at a bog access crossing. The small upland eroding stream (FW1) had been extensively straightened and deepened historically as part of peatland drainage. The stream was 1-1.5m wide and <0.1m deep, suffering from low summer flows at the time of survey. Shallow riffle and glide were interspersed with shallow stagnant pool over a moderate gradient. The stream had been excavated to the clay layer and as a result was alkaline with calcification of the bed evident. The substrata were dominated by mixed gravels and sand with frequent cobble and small boulder. Slumping of the often vertical peat banks was widespread with peat/silt accumulations along channel margins. The fall of 0.3m downstream of the rendered bridge apron was a barrier to fish at low flows. The narrow channel did not support macrophytes although the liverwort species *Scapania undulata* and *Pellia* sp. were locally frequent. The red alga *Batrachospermum* sp. was present. Cover of floc and filamentous algae was moderate. The stream flowed through cutover bog (PB4) and degraded lowland blanket bog (PB2), with low levels of sheep grazing.

No fish were recorded via electro-fishing at site A6 (**Appendix B**). The stream at this location suffered from regular low flows and this coupled with extensive modifications and location in the upper reaches of the watercourse precluded the presence of resident fish during the survey period. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A6 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.6 Representative image of site A6 on an unnamed stream, July 2024

7.1.7 Site A7 - Unnamed River, Tawnatruffaun

Site A7 was located on an unnamed Easky River tributary at a local road crossing. The small upland eroding spate channel (FW1) was largely natural in character although some local historical bank modifications had occurred in vicinity of the bridge (old retaining walls). The sinuous river channel was 3-5m wide and varied from 0.1-0.4m deep with locally deeper pool to 1m. The river flowed over a moderate gradient with characteristic boulder cascades. The substrata were dominated by boulder and cobble with localised small areas of coarse gravels and interstitial sands. Siltation was low but present nonetheless, with peat staining at the time of survey. Whilst high flow rates and large substrata precluded the presence of macrophytes, aquatic bryophyte coverage was very high with abundant *Rhynchostegium riparioides* in addition to occasional *Racomitrium aciculare* and *Chiloscyphus polyanthos*. The liverworts *Marchantia polymorpha* and *Pellia* sp. were present on the rocky banks. The site was shaded by mature treeline (south bank) of sycamore (*Acer psuedoplatanus*), hazel, holly (*Ilex aquifolium*) and oak (*Quercus petraea*). The site was bordered by meadows (GS2).

Atlantic salmon, brown trout and European eel were recorded via electro-fishing at site A7 (**Appendix B**). The site was a high quality salmonid nursery, supporting relatively high densities of juvenile brown trout and, less so, Atlantic salmon. The site featured a high frequency of large boulder and cobble and provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent and better represented upstream in lower gradient areas. Small plunge pools

provided some good quality holding areas for migratory adults. The site was of high suitability for European eel although only a low density were recorded. The site was unsuitable for lamprey or white-clawed crayfish. A single old otter spraint was recorded on the broken apron under the bridge (ITM 539665, 828009).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and Red-listed European eel, the aquatic ecological evaluation of site A7 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.7 Representative image of site A7 on an unnamed Easky River tributary, July 2024

7.1.8 Site A8 - Owenminna River, Crowagh or Dunneill

Site A8 was located on the upper reaches of the Owenminna River (30O05) with the proposed EIAR site boundary. The narrow U-shaped upland stream (FW1) meandered through mature coniferous plantations (WD4) and was 0.5m wide and 0.2-0.3m deep with 1m high banks. The flow profile was of shallow glide and localised pool. The bed comprised boulder, cobbles and gravels bedded in peat. Macrophytes were not present. However, instream boulder tops supported the liverwort species *Scapania undulata* with *Pellia* sp. on the muddy banks.

No fish were recorded via electro-fishing at site A8 (**Appendix B**). The channel was considered a poor quality salmonid nursery given an absence of riparian buffers from the adjoining conifer plantations. These evidently caused acidification of the stream with very high pine needle deposition on the bed. The small size of the stream (0.5m width), acidification pressures and the location in the uppermost

reaches of the catchment created conditions inimical for salmonids, European eel or lamprey. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A8 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.8 Representative image of site A8 on the upper reaches of the Owenminna River, September 2024

7.1.9 Site A9 - Owenminna River, Crowagh or Dunneill

Site A9 was located on the Owenminna River (30O05) at a local road crossing c. 1km downstream of site A8. The small upland stream (FW1) was 1m wide and flowed in an incised channel through blanket bog with steep banks of 1-2m. Shallow glide and riffle of 0.1-0.3m predominated with only very localised pool to 0.4m present. The substrata were dominated by heavily silted boulder and cobble with frequent small areas of sand and mixed gravels. Peat accumulations due to slumping banks were also frequent. Macrophytes were limited to occasional bulbous rush. However, aquatic bryophyte coverage was high with abundant *Scapania undulata* and *Batrachospermum* sp., with occasional *Pellia* sp. Encroachment of *Sphagnum cuspidatum* along margins was high. Cover of filamentous algae and floc was very high, indicating significant enrichment. The open banks supported purple moor grass, heather and soft rush. The site was bordered by upland blanket bog (PB2) and areas of wet heath (HH3).

No fish were recorded via electro-fishing at site A9 (**Appendix B**). Despite some low physical suitability

for a small salmonid (trout) population, the site was of poor fisheries value given the location in the uppermost reaches of the catchment and significant siltation pressures. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A9 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.9 Representative image site A9 on the Owenminna River, July 2024

7.1.10 Site A10 - Owenminna River, Rathgoonaun

Site A10 was located on the Owenminna River (30O05), a tributary of the Buncrowey River, at a local road crossing c.5km downstream of site A9. The small upland eroding channel had been modified historically (bed removal) and was 2.5-3m wide and 0.1-0.3m deep, with very localised deeper pool to 0.75m. The river flowed over a moderate gradient and featured a series of riffle-glide sequences over small boulder cascades and instream woody debris. The substrata comprised abundant boulder and cobble with frequent mixed gravels and sands. However, these were heavily silted with widespread livestock poaching along both unfenced banks. Peat staining was present at the time of survey. Given this and the high energy nature of the site, macrophytes were not present. Aquatic bryophyte coverage was low with occasional *Rhynchostegium riparioides* and *Chiloscyphus polyanthos* on more stable cobble and boulder. Floc and filamentous algae were present, indicating enrichment. The largely open banks supported scattered grey willow (*Salix cinerea*) and ash, some of which had fallen instream and contributed to habitat heterogeneity. The site was bordered by low intensity pasture (GA1).

Atlantic salmon and brown trout were the only fish species recorded via electro-fishing at site A10 (**Appendix B**). The site was a high quality salmonid nursery, with abundant refugia supporting a relatively high density of juveniles. The quality of spawning habitat was compromised by siltation and naturally reduced given high flow rates (albeit suitable areas were still present). The shallow nature of the site also provided limited holding areas for adult salmonids. Despite some good suitability, no European eel were recorded. The high energy site was unsuitable for lamprey or white-clawed crayfish No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), the aquatic ecological evaluation of site A10 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.10 Representative image site A10 on the Owenminna River, July 2024

7.1.11 Site A11 - Unnamed River, Dunowla

Site A11 was located on an unnamed Buncrowey River tributary approximately 100m downstream of Lough Anlaba, within the proposed EIAR site boundary. The small upland eroding river (FW1) meandered in a naturally incised peat channel and was 1-2m wide and 0.2-0.6m deep. The profile comprised deep glide and pool with occasional shallow cascade areas over peat. The substrata were dominated by mobile sands and fine gravels with scattered bedded cobble and boulder. Slumping and scouring of the peat banks was widespread. The narrow channel was heavily shaded and macrophytes were limited to rare bulbous rush in faster glide. The steep banks (above and below the water) supported abundant *Pellia* sp. liverwort. *Sphagnum* sp. mosses encroached the channel littorals. The river often flowed under collapsed bridges of peat. The open banks were dominated by purple moor

grass and rushes (*Juncus* sp.) with bog myrtle (*Myrica gale*), heather and tormentil (*Potentilla erecta*). The river flowed between blocks of pre-thicket coniferous plantation (WD4) supporting lodgepole pine (*Pinus contorta*) and sitka spruce (*Picea sitchensis*) in a wider landscape of upland blanket bog (PB2).

Brown trout was the only fish species recorded via electro-fishing at site A11 (**Appendix B**). The site was of good suitability for salmonids, with abundant spawning habitat present. However, nursery conditions were suboptimal and the poor invertebrate prey resource restricted the trout population - only a low density were recorded. Despite some suitability for European eel, none were recorded and this reflected the location of the site in the upper reaches of the watercourse. There was no suitability for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A11 was of **international importance** (**Table 4.3).**

Plate 7.1.11 Representative image of site A11 on an unnamed Buncrowey River tributary, September 2024

7.1.12 Site A12 - Buncrowey River, Tawnadremira

Site A12 was situated on the upper on the upper reaches of the Buncrowey River (35B09) within the proposed EIAR site boundary. The high energy upland eroding watercourse (FW1) had a sinuous profile through the peatland valley and was 2-2.5m wide and between 0.1-0.5m deep. The flow profile was of cascading glide over small, exposed boulders with more localised riffle and pool. The bed comprised mixed small boulder, cobble and gravels (coarse, medium & fine). Macrophytes were

absent given the high energy conditions. However, instream boulders supported the liverwort *Marsupella emarginata* with *Pellia* sp. on incised peaty sandy banks. The largely open banks supported scattered areas of bracken (*Pteridium aquilinum*) scrub (HD1) and wet grassland (GS4) habitat.

Brown trout was the only fish species recorded via electro-fishing at site A12 (**Appendix B**). The site was of high value for salmonids. The mixed boulders, cobble and gravels (coarse substrata) provided good flow heterogeneity and refugia for mixed cohort brown trout, including relatively high numbers of juveniles. Furthermore, accumulations of well sorted mixed rounded gravels (with low siltation) provided very good quality spawning habitat. There was also ample holding pool habitat below boulder cascade areas for adult trout. While the channel had some suitability for European eel (good refugia) the location of the site in the upper catchment reduced accessibility and none were recorded. The high energy site was unsuitable for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site A12 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.12 Representative image of site A12 on the upper reaches of the Buncrowey River, September 2024

7.1.13 Site A13 - Buncrowey River, Cooper's Lodge

Site A13 was located on the Buncrowey River (35B09) at a local road crossing c. 1.8km downstream of site A12. The upland eroding spate channel was largely natural in character and flowed over a

moderate gradient. The river was 3-5m wide in a channel up to 10m wide. The fast-flowing site was 0.2-0.4m deep with localised deeper pool to 1m. The profile was of swift glide and riffle with localised pool. The substrata were dominated by mobile rounded cobble and boulder with only very localised gravels. Siltation was low although some flocculent peat was present. Macrophytes were limited to rare bulbous rush although coverage of aquatic bryophytes was moderate with widespread *Scapania undulata* on more stable cobble and boulder. *Racomitrium aciculare* and *Sciuro-hypnum plumosum* were present on the tops of boulders. The open riparian zones were grazed by sheep with resulting low diversity and cover of vegetation, although localised bracken (HH3) was present. The site was bordered by semi-improved (GA1) and wet grassland (GS4) in a wider landscape of degraded blanket bog (PB2). Coniferous afforestation (WD4) was present upstream.

Brown trout and European eel was the only fish species recorded via electro-fishing at site A13 (**Appendix B**). The site was a good quality salmonid habitat although the mobile bed and large size of substrata reduced its value as a spawning habitat (no juveniles recorded). Bank scours and pools provided some good quality holding areas for brown trout, and also European eel habitat. The absence of Atlantic salmon, despite suitability, was indicative of (natural) instream barriers downstream. The high energy spate channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site A13 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.13 Representative image of site A13 on the Buncrowey River at Cooper's Lodge, July 2024

7.1.14 Site A14 - Unnamed River, Crowagh or Dunneill

Site A14 was located on the upper reaches of an unnamed Buncrowey River tributary within the vicinity of the EIAR site boundary. The narrow upland stream (FW1) flowed over a moderate gradient in a deeply incised channel and was <0.5m wide and 0.1-0.2m deep. The stream suffered from low flows at the time of survey with frequent ponding of water between natural (peat) impoundments and slumping banks. The profile comprised shallow glide and cascades over peat. The substrata were dominated by sands and gravels with scattered cobble and small boulder. Peat agglomerations were present with frequent blockage of the channel. Given high shading of the narrow channel, macrophytes were absent. *Pellia* sp. and *Scapania undulata* were occasional instream. The riparian zone supported abundant purple moor grass, bracken, heather and soft rush. The site was bordered by wet heath (HH3) and blanket bog (PB2), with coniferous afforestation (WD4) upstream.

No fish were recorded via electro-fishing at site A14 (**Appendix B**). The very narrow, moderate gradient stream was unsuitable for resident fish given poor summer flows (frequent ponding of water between blockages/cascades), intermittent fluvial connectivity and the location in the upper reaches of the catchment. There was no suitability for white-clawed crayfish No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A14 was of **international importance** (**Table 4.3).**

Plate 7.1.14 Representative image of site A14 on the upper reaches of an unnamed Buncrowey River tributary, September 2024

7.1.15 Site A15 - Unnamed River, Crowagh or Dunneill

Site A15 was located on the lower reaches of an unnamed Buncrowey River tributary within the EIAR site boundary, approximately 0.7km downstream of site A14. The upland eroding spate channel (FW1) flowed over a moderate gradient in a naturally incised channel. The river was 1.5-2m wide and 0.1-0.2m deep with only very localised pool to 0.3m. The profile comprised riffle and shallow glide over natural boulder cascades, with only localised pool. The substrata were dominated by large cobble and boulder with very limited gravels and sands. Siltation was low. The small spate channel did not support macrophytes at this location. However, cover of aquatic bryophytes was high with abundant *Scapania undulata* on larger substrata. The steep peaty banks supported bracken, purple moor grass, soft rush and heather with fuchsia (*Fuchsia magellanica*) and nettle (*Urtica dioica*). The site was bordered by blanket bog (PB2) and grazed heath with coniferous afforestation (WD4) present upstream.

Brown trout was the only fish species recorded via electro-fishing at site A15 (**Appendix B**). The site was of relatively low value for salmonids, supporting only a low density of small adult brown trout. This reflected the location in the upper reaches of the catchment in addition to the narrow, shallow nature of the stream. Salmonid spawning habitat was largely absent (predominance of larger substrata) although there was some moderate value as a salmonid nursery. Despite some low suitability, no European eel were recorded. The high energy spate channel was unsuitable for lamprey and white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site A15 was of **international importance** (**Table 4.3).**

Plate 7.1.15 Representative image of site A15 on the lower reaches of an unnamed Buncrowey River tributary, July 2024

7.1.16 Site A16 – Buncrowey River, Crowagh or Dunneill

Site A16 was located on the Buncrowey River (35B09) at a ford crossing approximately 3km downstream of site A15. The large upland spate channel was 3-4m wide (in a channel of 8m) and 0.1-0.3m deep. The generally shallow site comprised riffle and shallow glide with very limited pool. The substrata were dominated by mobile cobble and boulder with limited mixed gravels or sands. As a result, macrophyte cover was low with only alternate leaved milfoil and localised smooth stonewort (*Nitella flexilis* agg.) along depositing margins. Aquatic bryophyte coverage was also low with occasional *Rhynchostegium riparioides* and *Racomitrium aciculare*. Filamentous algae was present but coverage was low. The riparian zones supported willow treeline along the west bank (valuable shading) with gorse-dominated scrub along the east. The site was bordered by scrub (WS1), wet grassland (GS4) and semi-improved pasture (GA1), adjoined to the south by cutover bog (PB4)

Atlantic salmon and brown trout were the only fish species recorded via electro-fishing at site A16 (**Appendix B**). The high energy site was a high quality salmonid nursery, with abundant cobble and boulder refugia supporting a relatively high density of juveniles. Although limited in extent, good quality spawning habitat was present locally - this was better suited to Atlantic salmon given the size of substrata. The paucity of pool reduced the holding habitat for adults although willow treelines provided valuable flow refugia and thermal shading along the west bank. Despite some good suitability, no European eel were recorded. The site was unsuitable for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), the aquatic ecological evaluation of site A16 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.16 Representative image of site A16 on the Buncrowey River, July 2024

7.1.17 Site A17 - Rathgoonaun River, Crowagh or Dunneill

Site A17 was located on the Rathgoonaun River (35R06), a tributary of the Buncrowey River, downstream of a local road crossing. The small upland eroding stream (FW1) had been historically straightened through a forestry plantation (but not deepened) in vicinity of the road crossing but retained some natural features. The swift flowing stream was 1.5m wide and 0.1-0.2m deep with a profile comprising shallow glide and riffle. Pool was almost entirely lacking. The substrata were dominated by angular cobble and boulder which were heavily compacted and silted. Mixed gravels and sands were present locally. Given very high shading and local tunnelling, macrophytes were limited to water mint (*Mentha aquatica*) along channel margins. The moss *Rhynchostegium riparioides* was abundant instream. Filamentous algae was present but coverage was low given shading. The stream was heavily tunnelled and flowed through gorse and willow scrub amongst a sitka spruce plantation (WD4) with frequent alder (*Alnus glutinosa*) buffers.

Brown trout was the only fish species recorded via electro-fishing at site A17 (**Appendix B**). The river at this location was of relatively low fisheries value given historical modifications, shallow profile and siltation pressures. However, a small population of mixed cohort brown trout were present. The site was of poor value as a spawning or holding habitat. Despite some suitability, no European eel were recorded. The site was unsuitable for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site A17 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.17 Representative image of site A17 on the Rathgoonaun River, July 2024

7.1.18 Site A18 - Buncrowey River, Crowagh or Dunneill

Site A18 was located on the Buncrowey River at a local road crossing c. 2.8km downstream of site A16. The large upland eroding spate channel (FW1) was natural in character with the exception of some local bank strengthening works in the vicinity of the bridge (which featured an old disintegrating rendered apron). The river was 6-8m wide and 0.2-0.4m deep with a profile comprising shallow glide and riffle. Pool was present but limited in extent and shallow (<0.75m). Given high flow rates and the dominance of large substrata, macrophytes were not present. However, coverage of aquatic bryophytes was high with abundant *Rhynchostegium riparioides*. *Fontinalis antipyretica* was occasional. The banks, although historically modified near the bridge, supported a high diversity of riparian species including figwort (*Scrophularia nodosa*), meadowsweet (*Filipendula ulmaria*), gorse (*Ulex europaeus*), willow, ash, sycamore, hazel, bramble, fuchsia and rank grasses. The site was bordered by semi-improved pasture (GA1) and dry meadows (GS2) with scrub (WS1).

Atlantic salmon, brown trout and European eel were recorded via electro-fishing at site A18 (**Appendix B**). The site was a high quality salmonid nursery, supporting relatively high densities of juvenile (mostly 1+) Atlantic salmon and, less so, brown trout. The site featured a high frequency of large bryophyte-rich boulder and cobble and provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent (and better suited to salmon). Small pools

and bank scours provided some good quality holding areas for migratory adults albeit mostly at higher water levels. The site was of high suitability for European eel although only a low density were recorded. The site was unsuitable for lamprey or white-clawed crayfish. An old otter latrine was recorded on mud under the dry northernmost bridge arch (ITM 540520, 831024).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and Red-listed European eel, the aquatic ecological evaluation of site A18 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.18 Representative image of site A18 on the Buncrowey River, July 2024

7.1.19 Site A19 – Easky River, Camcuill

Site A19 was located on the lower reaches of the Easky River (35E01) at the N59 road crossing. The large upland spate river (FW1) was 18-20m wide and ranged from 0.1-0.3 deep with frequent deeper pool to 1m. Deeper scour pool to >1.8m was present under the road bridge. The high energy river flowed over a series of boulder/bedrock cascades upstream of the bridge before grading into deep glide and pool downstream. The substrata were dominated by bedrock and boulder with abundant cobble. Mixed gravels were present locally but were typically mobile, with more present downstream. Given the hard bed and high flow rates, macrophytes were absent. However, aquatic bryophyte coverage was high with abundant *Rhynchostegium riparioides* and more occasional *Fontinalis antipyretica*, *Cinclidotus fontinaloides* and *Chiloscyphus polyanthos*. The river was lined by mature treelines of ash, alder, sycamore, grey willow and hawthorn which provided valuable shading to the channel margins. The site was bordered by rough pasture (GA1/GS2).

Atlantic salmon, sea trout, brown trout and European eel were recorded via electro-fishing at site A19 (**Appendix B**). The site was a high quality salmonid nursery, supporting relatively high densities of juvenile Atlantic salmon. The site featured a high frequency of large bryophyte-rich boulder and cobble and provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent and better suited to salmon given the dominance of larger substrata. Small pools associated with bank scours (upstream of bridge) and large deep pool (downstream of bridge) provided high quality holding areas for migratory adults, including anadromous sea trout which were recorded in low numbers. The site was of high suitability for European eel although only a low density were recorded. The site was unsuitable for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site, despite evident foraging suitability.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of a significant freshwater pearl mussel population within the watercourse (and healthy populations of mussel host fish species), the aquatic ecological evaluation of site A19 was of **national importance** (**Table 4.3**).

Plate 7.1.19 Representative image of site A19 on the lower reaches of the Easky River at the N59 road crossing, July 2024

7.1.20 Site A20 - Carrownrush River, Farranmacfarrell

Site A20 was located on the upper reaches of the Carrownrush River (35C66) at a local road crossing (small box culvert). The small upland eroding watercourse (FW1) had been straightened and deepened historically resulting in a shallow, homogenous channel with an often trapezoidal channel (1-2m bank heights). The river suffered from low summer flows at the time of survey and was a homogenous 2m

wide and <0.1m deep. Shallow glide and riffle dominated with occasional small shallow near stagnant pool to 0.3m maximum. The substrata comprised compacted angular boulder and cobble, much of which was exposed at the time of survey. Flocculent peat was widespread on the bed. Mixed gravels and sands were present locally along channel margins. Given high shading (mature trees), macrophytes were absent with only very occasional *Rhynchostegium riparioides*. *Pellia* sp. was frequent on muddy sections of steep bank. The river flowed through a small block of mature pine with sycamore, ash and fuchsia. The site was bordered by a residential property (BL3/GS2) and improved pasture (GA1).

Despite some physical suitability for salmonids and European eel, no fish were recorded via electro-fishing at site A20 (**Appendix B**). The narrow river suffered from low summer flows and this coupled with historical modifications and water quality pressures (siltation) precluded the presence of fish during the survey. The site was unsuitable for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A20 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.20 Representative image of site A20 on the Carrownrush River, July 2024

7.1.21 Site A21 - Carrownrush River, Knockacullen

Site A21 was located on the lower reaches of the Carrownrush River (35C66) approximately 3km downstream of site A20. The small lowland depositing alkaline river (FW2) had been extensively

straightened and deepened in the recent past, resulting in a homogenous with poor hydromorphology. The trapezoidal profile river was 2m wide and <0.1m deep with an almost complete absence of pool (due to deepening). The river suffered from low summer flows at the time of survey. The substrata were dominated by compacted, silted and calcified mixed gravels and cobble with scattered boulder. Silt deposits were present in association with bank slumping and macrophyte beds. Macrophyte cover was locally high with abundant fool's watercress (*Helosciadium nodiflorum*), watercress (*Nasturtium officinale*) and blue water speedwell (*Veonica anagallis-aquatica*). The calcicolous liverwort *Pellia endiviifolia* was occasional on instream cobble. Filamentous algal cover was high indicating significant enrichment. The narrow channel was often heavily encroached by herbaceous vegetation dominated by great willowherb (*Epilobium hirsutum*) with frequent grey willow. The site was bordered by wet grassland (GS4), semi-improved pasture (GA1) and scrub (WS1).

Despite some good physical suitability for salmonids and European eel, no fish were recorded via electro-fishing at site A21 (**Appendix B**). This was likely reflective of the low summer flows and historical modifications which had removed habitat heterogeneity including deeper holding areas for fish. Similarly, despite some physical suitability for white-clawed crayfish, none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A21 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.21 Representative image of site A21 on the Carrownrush River, July 2024

7.1.22 Site L1 - Lough Croane, Tawnadremira

Site L1 was located at Lough Croane, a twin basin lake of c.1ha situated within the vicinity of the Proposed Wind Farm. The lake featured deep margins of >1m and quickly shelved to 1.5->2m depth although shallower areas were present along the western shore. The bed was dominated by boulder and cobble with localised gravels and sands along windward margins. Peat staining was high with abundant flocculent peat on the substrata. In light of this, macrophyte growth was sparse with occasional bottle sedge (*Carex rostrata*), floating bur-reed (*Sparganium angustifolium*), bulbous rush and rare bladderwort (*Utricularia* sp.) along the margins. However, the moss *Sphagnum cuspidatum* was abundant around the margins and littoral areas. The filamentous rhodophyte *Batrachospermum* sp. was frequent. Filamentous algae were also abundant. The lake was representative of natural dystrophic lake Annex I habitat (3160). The open banks were dominated by rushes, sedges, purple moor grass, bilberry (*Vaccinium myrtillus*), cross-leaved heath (*Erica tetralix*) and heather with scattered bog myrtle. The lake was surrounded by pre-thicket sitka spruce (WD4) with localised lodgepole pine in a wider landscape of blanket bog (PB2).

The lake had good potential for brown trout (observed surface feeding during the site visit) with some limited littoral spawning habitat present along windward shores. Likewise, there was also suitability for European eel although the location in the upper reaches of the catchment and poor fluvial connectivity with downstream habitats reduced the likelihood of their presence. There was some suitability for smooth newt (none recorded via sweep sampling). No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The sample was dominated by Dipteran larvae, Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic lake habitat (3160), the aquatic ecological evaluation of site L1 was of **county importance** (**Table 4.3**).

Plate 7.1.22 Representative image of site L1 at Lough Croane, September 2024

7.1.23 Site L2 - Lough Anlaba, Tawnadremira

Site L2 was located at Lough Anlaba within the vicinity of the Proposed Wind Farm. Lough Anlaba was a loosely triangular shaped upland lake covering 0.5ha surface area. The very shallow (<0.5m) and homogenous lake featured a bed of compacted gravel and cobble with frequent boulder. There was a high cover of floc and flocculant peat throughout, with areas along the southern shore featuring deep soft sediment accumulations (>0.3m in depth). The lake was heavily vegetated with dominant bulbous rush, frequent bladderwort (*Utricularia* sp.) and occasional bog pondweed. The moss *Sphagnum cuspidatum* was abundant in littoral areas with some bottle sedge locally along SW margins adjoining quaking margins (PF3). Floating bur-reed was present but rare. The lake was representative of natural dystrophic lake Annex I habitat (3160). Lake margins also supported abundant purple moor grass, compact rush (*Juncus conglomeratus*) and sedges. The site was bordered by areas of wet heath (HH3) and coniferous afforestation (WD4) in a landscape of upland blanket bog (PB2).

Lough Anlaba was of relatively low value for salmonids (none observed) with the heavily vegetated, silted lake providing poor fisheries habitat. Some salmonid spawning habitat was present at the lake outflow and also along windward shores given the dominance of hard substrata, locally. Brown trout were recorded from the outflow channel via electro-fishing at site A11, downstream of the lake, in July 2024 (**Appendix B**). The lake was of some suitability for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The sample was dominated by Dipteran larvae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic lake habitat (3160), the aquatic ecological evaluation of site L2 was of **county importance** (**Table 4.3**).

Plate 7.1.23 Representative image of site L2 at Lough Anlaba, September 2024

7.1.24 Site L3 - Lough Nacrowagh, Tawnadremira

Site L3 was located at Lough Nacrowagh within the vicinity of the Proposed Wind Farm. The small, sheltered upland lake covered 0.5ha and was 1-4m deep with a bed of humic soft sediment. Peat staining as high and macrophyte growth was resultingly low, although bulbous rush was frequent locally. *Sphagnum* spp. mosses were abundant in littoral areas. The lake was representative of natural dystrophic lake Annex I habitat (3160). The outflow, leading to the Owenminna River, had been modified historically and represented a drainage channel. The lake was bordered by extensive areas of coniferous afforestation (WD4).

The lake (and outflowing channel) was of low value for salmonids although the lake likely supported a small population of brown trout. The lake was of some suitability for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The sample was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic lake habitat (3160), the aquatic ecological evaluation of site L3 was of **county importance** (**Table 4.3**).

Plate 7.1.24 Representative image of site L3 at Lough Nacrowagh, September 2024

7.1.25 Site L4 - Lough Brickeagh, Tawnadremira

Site L4 was located at Lough Brickeagh within the vicinity of the Proposed Wind Farm. The small, sheltered upland oligotrophic lake of 0.4ha was typically 1-2m deep with low water turbidity and low levels of peat staining. The bed comprised areas of cobble, gravels and sands with scattered bedded boulder and areas of humic soft sediment. The oligotrophic lake supported a low diversity of macrophyte plants. These included frequent submerged bulbosus rush and floating bur-reed. *Sphagnum cuspidatum* was frequent in the littorals. The lake was representative of natural dystrophic lake Annex I habitat (3160). The site was bordered by upland blanket bog (PB2) and extensive areas of coniferous afforestation (WD4).

The lake was of some value for salmonids, with brown trout observed (feeding) during the site visit. Littoral areas of hard substrata provided some suitability for lacustrine spawning salmonids. The lake was of some value for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment and limited connectivity with the adjacent Buncrowey River. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The sample was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic lake habitat (3160), the aquatic ecological evaluation of site L4 was of **county importance** (**Table 4.3**).

Plate 7.1.25 Representative image of site L4 at Lough Brickeagh, September 2024

7.1.26 Site L5 - Lough Nafullow, Tawnadremira

Site L5 was located at Lough Nafullow within the vicinity of the Proposed Wind Farm. The 4ha upland oligotrophic lake was 1-4m deep with a bed of humic soft sediment and high levels of peat staining. The lake had eroded peat margins that graded into the adjoining peatland and numerous small peninsulas and bays with an outflowing river in the northwestern corner. The oligotrophic lake supported a low diversity of macrophytes. These included beds of floating bur-reed and frequent submerged bulbosus rush. Bog bean (*Menyanthes trifoliata*) and bladderwort (*Ultricularia* agg.) were recorded as rare. *Sphagnum* cuspidatum was present very locally in the littorals. The lake was representative of natural dystrophic lake Annex I habitat (3160). The adjoining blanket bog habitat supported cross-leaved heath, purple moor grass, bog asphodel (*Narthecium ossifragum*) and *Cladonia* lichen. The site was bordered by upland blanket bog (PB2) and extensive areas of coniferous afforestation (WD4) to the south.

The site was of some moderate suitability for salmonids, with brown trout observed feeding during the site visit. The lake was also of moderate suitability for European eel with good connectivity to the downstream Easky River. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

The Red-listed Arctic diver beetle (*Agabus arcticus*) (Foster et al., 2011) was recorded in the sweep sample. No other macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The sample was dominated by Dipteran larvae and water beetles (Gyrinidae, Dytiscidae).

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site L5 was of **international importance** (**Table 4.3).**

Plate 7.1.26 Representative image of site L5 at Lough Nafullow, September 2024

7.1.27 Site P1 - Pond, Tawnadremira

Site P1 was a small 0.5ha pond within the vicinity of the Proposed Wind Farm, adjacent to Lough Anlaba. The pond was 0.5-1m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in depth. The shallow pond featured near total cover of *Sphagnum cuspidatum* with some localised bladderwort (*Utricularia* agg.). The site was representative of natural dystrophic pond Annex I habitat (3160). Littoral areas supported purple moor grass, heather, compact rush, cottongrass (*Eriophorum angustifolium*.) and cross-leaved heath. The site was bordered by upland blanket bog (PB2) and coniferous afforestation (WD4).

The small pond was not of fisheries value given its shallow depths, very high vegetation cover and lack of connectivity from superior fisheries habitats. Suitability for smooth newt was poor given the very high vegetation cover (none recorded). There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community comprised low numbers of Dytiscidae, dragonfly and damselfly larvae.

Given the presence of Annex I natural dystrophic pond habitat (3160), the aquatic ecological evaluation of site P1 was of **county importance** (**Table 4.3**).

Plate 7.1.27 Representative image of site P1, September 2024

7.1.28 Site P2 - Pond, Tawnadremira

Site P2 was a small pond complex within the vicinity of the Proposed Wind Farm adjacent to Lough Anlaba. The site comprised a main irregular basin of 0.02ha with several smaller and very shallow (0.05-0.1m) connected satellite ponds/scrapes. The main basin was <0.2m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in depth. Vegetation cover was relatively high with frequent bog pondweed and bog bean with encroachment from *Sphagnum* sp. mosses. The site was representative of natural dystrophic pond Annex I habitat (3160). Littoral areas supported purple moor grass, heather, bog myrtle and stunted lodgepole pine. The site was bordered by upland blanket bog (PB2) and coniferous afforestation (WD4).

The small pond was not of fisheries value given its very shallow depths, high vegetation cover and lack of connectivity from superior fisheries habitats. There was some suitability for smooth newt although none were recorded via sweep sampling. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic pond habitat (3160), the aquatic ecological evaluation of site P2 was of **county importance** (**Table 4.3**).

Plate 7.1.28 Representative image of site P2, September 2024

7.1.29 Site P3 - Pond, Tawnadremira

Site P3 was located at a small pond complex within the vicinity of the Proposed Wind Farm. The site comprised a main irregular basin of 0.02ha with several smaller and very shallow connected satellite ponds/scrapes. The main basin was just 0.05-0.25m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in depth. Vegetation cover was relatively high with frequent bog pondweed and bog bean with encroachment from *Sphagnum* sp. mosses. Bladderwort (*Utricularia* agg.) was present but rare. The site was representative of natural dystrophic pond Annex I habitat (3160). Littoral areas supported purple moor grass, *Cladonia* sp. lichen, heather, bog myrtle and stunted lodgepole pine. The site was bordered by upland blanket bog (PB2) and coniferous afforestation (WD4).

The small pond was not of fisheries value given its very shallow depths, high vegetation cover and lack of connectivity from superior fisheries habitats. There was some suitability for smooth newt although none were recorded via sweep sampling. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic pond habitat (3160), the aquatic ecological evaluation of site P3 was of **county importance** (**Table 4.3**).

Plate 7.1.29 Representative image of site P3, September 2024

7.1.30 Site P4 - Pond, Tawnadremira

Site P4 was located at a small pond within the vicinity of the Proposed Wind Farm, adjacent to Lough Croane (no surface water connectivity). The small pond complex featured a main basin of 100m^2 with several small very shallow satellite scrapes of <0.1m. The main basin was 0.2-0.3m deep with a bed composed entirely of flocculent peat/soft sediment of >1.5m in depth. The shallow, clear water pond supported sparse vegetation with scattered bog bean and bulbous rush with abundant encroaching *Sphagnum cuspidatum* and cottongrass. Bladderwort (*Utricularia* agg.) and bog pondweed were present but rare. The site was representative of natural dystrophic pond Annex I habitat (3160). The littorals featured quaking bog habitat which supported abundant *Sphagnum* spp. mosses with cottongrass, heather, cross-leaved heath, bog asphodel, tormentil, bilberry and abundant *Cladonia* sp. lichen. The pond was surrounded by pre-thicket (stunted) sitka spruce in a wider landscape of blanket bog (PB2).

The very small pond was not of fisheries value given its very shallow depths, high vegetation cover and lack of connectivity from superior fisheries habitats. There was some suitability for smooth newt although none were recorded via sweep sampling. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the presence of Annex I natural dystrophic pond habitat (3160), the aquatic ecological evaluation of site P4 was of **county importance** (**Table 4.3**).

Plate 7.1.30 Representative image of site P4, September 2024

7.1.31 Site P5 - Pond, Crowagh or Dunneill

Site P5 was located at a small oligotrophic pond of 0.025ha within the vicinity of the Proposed Wind Farm, adjacent to Lough Nafullow (no surface water connectivity). The small circular pond was 1-1.5m deep with a soft peat base with some localised pockets of *Sphagnum cuspidatum* in the margins with *Sphagnum magellanicum* and *Sphagnum papillosum* as edge species in the adjoining blanket bog. Macrophyte growth was limited with occasional bog bean and submerged bulbous rush. The site was representative of natural dystrophic pond Annex I habitat (3160). The site was bordered by blanket bog (PB2) with extensive areas of coniferous afforestation (WD4) to the south.

Site P5 was of poor fisheries value given its small size, siltation and isolation from superior fisheries habitats. The site was a poor quality salmonid habitat (none observed). However, given the close proximity to Lough Nafullow, there was some suitability for European eel. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community was dominated by damselfly larvae (Coenagrionidae).

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site P5 was of **international importance** (**Table 4.3).**

Plate 7.1.31 Representative image of site P5, September 2024

7.1.32 Site P6 - Pond, Crowagh or Dunneill

Site P6 was a large oligotrophic wetland and pond complex of 0.3ha in size within the vicinity of the Proposed Wind Farm. The shallow peatland basin supported pools of water 0.1-0.2m deep with near total cover of *Sphagnum* spp. mosses. *Sphagnum magellanicum* and *Sphagnum papillosum* were also present in littoral areas. The wetland basin supported abundant emergent cottongrass with occasional bottle sedge and bogbean. The site was representative of natural dystrophic pond Annex I habitat (3160). The adjoining blanket bog habitat supported heather, purple moor grass, bog asphodel, *Cladonia* lichen. The site was bordered by blanket bog (PB2) and extensive areas of coniferous afforestation (WD4).

Site P6 was not of fisheries value given its small size, shallow depths, high vegetation cover and poor connectivity with superior fisheries habitats. There was some suitability for smooth newt although none were recorded via sweep sampling. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community supported low numbers of Dytiscidae and Corixidae.

Given the presence of Annex I natural dystrophic pond habitat (3160), the aquatic ecological evaluation of site P6 was of **county importance** (**Table 4.3**).

Plate 7.1.32 Representative image of site P6, September 2024

7.1.33 Site P7 - Pond, Crowagh or Dunneill

Site P7 was a small pond and wetland complex located in banket bog adjacent to sites P5 and L5, within the vicinity of the Proposed Wind Farm. The main basin was an oval pond of 0.02ha and 1-2.5m in depth with a soft peat base. The pond had an irregular margin that was at gradient with the adjoining peatland a soft peat base. Cover of *Sphagnum cuspidatum* was high with *Sphagnum magellanicum* and *Sphagnum papillosum* in the littorals. Bog bean was locally frequent in the margins. The site was representative of natural dystrophic pond Annex I habitat (3160). It was bordered by blanket bog (PB2) with extensive areas of coniferous afforestation (WD4) to the south.

Site P7 was of poor fisheries value given its small size and isolation from superior fisheries habitats. However, there was some low suitability for brown trout and European eel given the proximity to Lough Nafullow. There was some suitability for smooth newt although none were recorded via sweep sampling. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The poorly developed macroinvertebrate community was dominated by Corixidae and damselfly larvae (Coenagrionidae).

Given the location of the site within the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site P7 was of **international importance** (**Table 4.3).**

Plate 7.1.33 Representative image of site P7, September 2024

7.1.34 Site B1 - Grangebeg Barr River, Ballygreighan Barr

Site B1 was located on the uppermost reaches of the Grangebeg Barr River (35G64) at an access track crossing with the existing Kingsmountain wind farm. The small upland eroding channel (FW1) flowed over a steep gradient and under the access track via a corrugated pipe culvert. The high energy river was characterised by boulder cascades with associated plunge pools. The substrata were dominated by angular mobile cobble and boulder with localised coarse gravels. The river was heavily peat stained with abundant flocculent peat deposits instream. The high energy site was unsuitable for macrophytes. However, larger boulder and cobble supported frequent *Scapania undulata*. Filamentous algal cover was present but low. The river drained upland blanket bog (PB2) and wet heath (HH3) with the riparian zones supporting typical vegetation dominated by heather, soft rush and *Sphagnum* sp. mosses. The site was bordered downstream by coniferous afforestation (WD4).

Brown trout was the only fish species recorded via electro-fishing at site B1 (**Appendix B**). Despite its location in the upper reaches of the watercourse, the high gradient site supported a surprisingly high density of fish, with mixed cohort brown trout present both upstream and downstream of the track culvert. Small plunge pools between high gradient cascades provided valuable holding areas for all age classes. The spawning value of the site was low (given predominance of large substrata) but evidently sufficient to support a recruiting population. Abundant cobble and boulder provided suitable refugia and nursery areas. Despite some physical suitability, no European eel were recorded, likely reflecting the location of the site in the uppermost reaches of the catchment. The upland spate channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B1 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.34 Representative image of site B1 on the on the upper reaches of the Grangebeg Barr River, July 2024

7.1.35 Site B2 - Ballygreighan Barr River, Kingsmountain

Site B2 was located on the uppermost reaches of the Ballygreighan Barr River (35B80) at an access track crossing within the existing Kingsmountain wind farm. The upland eroding spate channel (FW1) flowed over a steep gradient upstream of the track before grading to moderate below. Despite historical bank strengthening works in vicinity of the pipe culvert, the rive retained a good degree of naturalness. The river was 3-4m wide and 0.1-0.5m deep. The profile comprised fast glide and riffle with frequent boulder cascades and associated plunge pools. The substrata were dominated by angular cobble and boulder with localised bedrock. Pools supported mixed gravels and smaller cobble. Peat staining was moderate with some flocculent peat in depositional slacks. The high energy site was unsuitable for macrophytes. However, larger boulder and cobble supported frequent *Scapania undulata* and *Racomitrium aciculare*. Filamentous algal cover was present but low. The river drained upland blanket bog and wet heath with the riparian zones supporting typical vegetation dominated by heather, soft rush and *Sphagnum* sp. and *Polytrichum* sp. mosses. The site was adjoined downstream by coniferous afforestation (WD4) (larch and spruce).

Brown trout was the only fish species recorded via electro-fishing at site B2 (**Appendix B**). Despite its location in the upper reaches of the watercourse, the site supported a surprisingly high density of fish,

with mixed cohort brown trout present both upstream and downstream of the track culvert. Small plunge pools between cascades provided valuable holding areas for all age classes, with large pool at the culvert providing particularly valuable holding habitat. Localised mixed, uncompacted gravels in pools provided good quality spawning habitat. Abundant cobble and boulder provided suitable refugia and nursery areas. Despite some physical suitability, no European eel were recorded, likely reflecting the location of the site in the uppermost reaches of the catchment. The upland spate channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B2 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.35 Representative image of site B2 on the on the upper reaches of the Ballygreighan Barr River, July 2024

7.1.36 Site B3 - Unnamed stream, Kingsmountain

Site B3 was located on an unnamed stream tributary of the Ballygreighan Barr River. The small upland eroding peat channel flowed in a deeply incised channel (up to 1.5m banks) through peat adjacent to turbine T10 of Kingsmountain wind farm, between forestry blocks. The narrow channel suffered from low flows at the time of survey with most of the flow volume deriving from groundwater seepage areas. The channel was <1m wide and <0.1m deep with very heavy peat staining. The profile was of very slow-flowing glide and near stagnant pool. The substrata comprised cobble and mixed gravels which were heavily bedded in peat. Scouring and slumping of the banks was widespread and created

frequent obstruction to flow. Poaching from sheep grazing was also evident. Whilst macrophytes were absent (some lesser spearwort along margins), the stream supported occasional *Scapania undulata* and *Racomitrium aquaticum* with *Pellia* sp. along muddy banks. The channel was heavily encroached by typical wet heath and wet grassland vegetation such as soft rush, purple moor grass, heather and bilberry. The site was bordered by coniferous afforestation (WD4).

No fish were recorded via electro-fishing at site B3 (**Appendix B**). The narrow peat-stained channel was not of fisheries value given high rates of siltation, shallow depths, narrow widths and poor connectivity with downstream habitats. However, the adjoining Ballygreighan Barr River was of high value for salmonids with abundant spawning, nursery and holding habitat in the meandering channel. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site B3 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.36 Representative image of site B3 on an unnamed Ballygreighan Barr River tributary, July 2024

7.1.37 Site B4 - Unnamed stream, Kingsmountain

Site B4 was located on an unnamed stream tributary of the Ballygreighan Barr River. The small upland eroding peat channel flowed in a deeply incised channel (up to 1.5m banks) through peat. The narrow channel suffered from low flows at the time of survey with most of the flow volume deriving from groundwater seepage areas. The channel was <0.5m wide and <0.2m deep with very heavy peat

staining and ponding of stagnant water between peat dams. The substrata comprised humic soft sediment with no hard substrata. Poaching from sheep grazing was also evident. Macrophytes were absent. The channel was heavily encroached by *Sphagnum* sp. mosses and other typical wet heath and wet grassland vegetation such as rushes, purple moor grass, heather and bilberry. The site was bordered by upland blanket bog (PB2) and coniferous afforestation (WD4).

No fish were recorded via electro-fishing at site B4 (**Appendix B**). The narrow peat-stained channel conveyed minimal, intermittent water flows and was more of a seepage area through blanket bog rather than a flowing watercourse. The channel was not of fisheries value given high rates of siltation, shallow depths, narrow widths, poor flows and poor connectivity with downstream habitats. However, the adjoining Ballygreighan Barr River was of high value for salmonids with abundant spawning, nursery and holding habitat in the meandering channel. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site B3 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.37 Representative image of site B4 on an unnamed Ballygreighan Barr River tributary, July 2024

7.1.38 Site B5 - Ballygreighan Barr River, Dunowla

Site B5 was located on the upper reaches of the Ballygreighan Barr River (35B80) approximately 2.5km downstream of site B2, within the Easky Bog Nature Reserve. The upland eroding spate river flowed over a moderate gradient and was characterised by boulder and bedrock cascades with associated plunge pools and bank scours. The strongly meandering river was 3-5m wide and 0.2-0.5m deep, with locally deeper pool to 1m. The substrata were dominated by bedrock and boulder with abundant cobble. Mixed gravels were present but highly localised and mostly coarse. Siltation was low overall although peat staining was high. Whilst the high energy site was unsuitable for macrophytes, aquatic bryophyte coverage was high with abundant *Fontinalis squamosa* and *Scapania undulata*. *Jungermannia* sp. was present locally. The moss *Racomitrium aciculare* was frequent on boulder tops. The open banks were exposed to low intensity sheep grazing. The site was bordered by degraded upland blanket bog (PB2) and coniferous afforestation (WD4).

Brown trout was the only fish species recorded via electro-fishing at site B3 (**Appendix B**). The site was of high value for salmonids, supporting a relatively high density of mixed cohort trout (albeit mostly adults). The site provided good quality holding and nursery habitat. Whist present, spawning habitat (gravels & smaller cobble) was highly localised with some peat (siltation) impacts evident. Despite good suitability for European eel, none were recorded. Similarly, the absence of Atlantic salmon would indicate downstream barriers to fish migration. The upland spate channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the river formed a boundary with the Ox Mountains Bogs SAC (002006), the aquatic ecological evaluation of site B5 was of **international importance** (**Table 4.3**).

Plate 7.1.38 Representative image of site B5 on the Ballygreighan Barr River, July 2024

7.1.39 Site B6 - Unnamed stream, Ballyglass

Site B6 was located on a small minor tributary of the Dunneill River at an access track crossing adjacent to the Dunneill 220kV sub-station. The narrow upland eroding stream (FW1) flowed over a moderate gradient in a deeply incised channel and had been historically and more recently modified (deepened, straightened). The stream also suffered from low summer flows at the time of survey, resulting in poor fluvial connectivity and ponding of water. The stream was <1m wide and <0.2m deep. The substrata comprised boulder and cobble which were heavily silted. Mixed gravels were present locally, with very significant siltation downstream adjoining recent clear-fell. The heavily shaded/encroached site did not support macrophytes although *Fontinalis antipyretica*, *F. squamosa*, *Jungermannia* sp. and *Scapania undulata* were present locally. The riparian zone supported wet grassland vegetation dominated by soft rush, bracken and bramble with scattered grey willow. The site was bordered by upland blanket bog (PB2), coniferous afforestation (WD4) and clear-fell (WS5).

Despite some low physical suitability for salmonids and European eel in light of connectivity with the downstream Dunneill River, no fish were recorded via electro-fishing at site B6 (**Appendix B**). The narrow stream suffered from low summer flows and this coupled with historical modifications and water quality pressures (including recent clear-fell downstream of the culvert) precluded the presence of fish during the survey. The upland channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site B6 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.39 Representative image of site B6 on an unnamed Dunneill River tributary, July 2024

7.1.40 Site B7 - Dunneill River, Crowagh or Dunneill

Site B7 was located on the Dunneill River (35D06) at a local road crossing adjacent to the existing Dunneill wind farm. The upland eroding spate river (FW1) flowed over a moderate gradient and was characterised by boulder cascades with associated small and shallow plunge pools. The river had been historically modified in vicinity of the bridge (bank strengthening/embankments) although good natural recovery had occurred. The river was 4-6m wide and 0.2-0.4m deep, with locally deeper pool to 0.7m. The substrata were dominated by often large boulder and bedded cobble. Smaller substrata (i.e. gravels) were rare given high flow rates and natural gradients. Siltation was low overall. Macrophytes were restricted to very occasional bog pondweed and water horsetail (*Equisetum fluviatile*) along channel margins. Aquatic bryophyte coverage was moderate with locally frequent *Fontinalis squamosa*, some *Fissidens* sp., *Sciuro-hypnum plumosum* and *Scapania undulata*. *Racomitrium aciculare* was frequent on boulder tops. Cover of filamentous algae was significantly higher than upstream sites, reflecting enrichment sources such as coniferous forestry. The banks were typically open with some localised gorse scrub and were exposed to low intensity sheep grazing. The site was bordered by scrub (WS1), wet grassland (GS4) semi-improved pasture (GA1) and coniferous afforestation (WD4).

Brown trout was the only fish species recorded via electro-fishing at site B7 (**Appendix B**). The site was of high value for salmonids, supporting a moderate density of mixed cohort trout (albeit mostly adults). The site provided good quality nursery habitat given an abundance of instream refugia (boulders & cobble). The site was of moderate value only as a spawning habitat given the predominance of larger substrata (i.e. paucity of gravels). Small pools between boulder cascade

reaches offered some good quality holding areas for adult salmonids. Despite good suitability for European eel, none were recorded. Similarly, the absence of Atlantic salmon in spite of habitat suitability would indicate downstream barriers to fish migration. The upland spate channel was unsuitable for lamprey or white-clawed crayfish at this location. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B7 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.40 Representative image of site B7 on the Dunneill River, July 2024

7.1.41 Site B8 - Dunneill River, Dunneill

Site B8 was located on the lower reaches of the Dunneill River (35D06) at a local road crossing, c. 5km downstream of site B7. The upland eroding spate river (FW1) had been historically modified in vicinity of the bridge but retained a good degree of naturalness elsewhere. At the bridge, a historical weir and retaining walls were present. The profile comprised shallow glide and riffle with frequent pool and deep glide near the bridge. The substrata were dominated by bedrock near the bridge but this graded into boulder and cobble elsewhere with localised mixed gravels. Siltation was low overall. Some flocculent and transient accumulations were present in deep glide over bedrock. Given high flow rates and a mostly compacted bed, macrophytes were limited to very occasional fool's watercress and water mint along margins. Aquatic bryophyte coverage was high with abundant *Rhynchostegium riparioides*. Filamentous algal cover was locally high, indicating significant enrichment. The river was well shaded by narrow but mature riparian treelines of alder and sycamore with bramble, gorse,

montbretia (*Crocosmia* × *crocosmiiflora*) and fuchsia (more open banks present downstream where clearance had occurred). The site was bordered by improved pasture (GA1) and a residential property.

Brown trout and European eel were the only fish species recorded via electro-fishing at site B8 (**Appendix B**). The site was of good value for salmonids supporting a relatively high density of mixed cohort fish. Deep glide and pool below the historical weir and bedrock steps provided valuable holding habitat, with bryophyte-rich cobble riffle areas providing good quality nursery habitat. The site was of relatively poor value as a salmonid spawning area given the paucity of smaller substrata. Bank scours, boulders and submerged tree root systems offered high quality eel refugia and supported a low density of fish. Flocculent soft sediment accumulations were not suitable for lamprey ammocoete burial, with no lamprey spawning habitat present. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site B8 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.41 Representative image of site B8 on the Dunneill River, July 2024

7.1.42 Site B9 - Doonbeakin River, Dunowla

Site B9 was located on the Doonbeakin River (35D09) at a local road crossing (single masonry arch) on the Proposed Grid Connection Route. The small channel had been modified historically (locally deepened) and suffered from low summer flows at the time of survey. The river was 1-1.5m wide and 0.1-0.2m deep, with up to half of the channel bed exposed. The profile comprised slow-flowing glide

and riffle with very localised pool. The substrata comprised mobile mixed gravels and coble with scattered boulder. Siltation was high with livestock poaching throughout. Soft sediment and sand accumulations were present along channel margins and in pool slacks. The narrow shallow channel supported few macrophytes although water starwort (*Callitriche* sp.) and brooklime (*Veronica beccabunga*) were present locally. The mosses *Fontinalis antipyretica* and *F. squamosa* were frequent. Cover of floc and filamentous algae were relatively high, indicating significant enrichment. The site was bordered by sloping wet grassland (GS4) and semi-improved pasture (GA1) with scrub (WS1). Coniferous afforestation (WD4) and blanket bog (PB2) were present upstream.

Despite some low physical suitability for salmonids and European eel, no fish were recorded via electro-fishing at site B9 (**Appendix B**). The poor fisheries value at the time of survey reflected low summer flows, poor fluvial connectivity with downstream habitats and significant siltation. There was limited suitability for white-clawed crayfish and none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site B9 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.1.42 Representative image of site B9 on the Doonbeakin River, July 2024

7.1.43 Site B10 - Doonbeakin River, Carrowcor Bridge

Site B10 was located on the Doonbeakin River (35D09) at Carrowcor Bridge (N59). The upland eroding alkaline river (FW1) flowed over a moderate to locally steep gradient with frequent sheets of bedrock.

occasional pool. The substrata were dominated by bedrock with frequent calcified cobble and scattered boulder. Gravels were present but highly localised and exposed to significant siltation. Sand accumulation was present in pools. Given high shading and a compacted bed, macrophytes were absent. However, cover of the moss *Rhynchostegium riparioides* was locally high, with occasional *Pellia endiviifolia*. Filamentous algal cover was locally high, indicating enrichment. The river was heavily shaded by mature treelines comprising osier (*Salix viminalis*), grey willow, ash, fuchsia and sycamore. The site was bordered by improved pasture (GA1).

Brown trout and European eel were the only fish species recorded at site B10 (**Appendix B**). The site was of moderate value for salmonids only, supporting a low density of adult brown trout with only a single juvenile recorded. This reflected the paucity of suitable spawning habitat (compacted, calcified, silted gravels). Deep pool between bedrock sheets provided some moderate quality holding areas. European eel habitat was moderate at best given a paucity of instream refugia with a low density recorded. Despite some suitability for lamprey ammocoetes in localised sand accumulations, none were recorded via targeted electro-fishing. There was some suitability for white-clawed crayfish although none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site B10 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.43 Representative image of site B10 on the Doonbeakin River, July 2024

7.1.44 Site B11 - Cashelboy River, Kingsmountain

Site B11 was located on the Cashelboy River (35C83) at a local road Proposed Grid Connection Route crossing. The small upland channel (FW1) meandered through lowland pasture in an incised, low gradient channel of 0.5-1.5m wide and 0.1-0.3m deep. The flow profile comprised riffle and shallow glide with localised small pool, typically between cobble /boulder area and on meanders. The substrata were dominated by cobble and small boulders with localised mixed gravels and sands locally. These were moderately silted with slumping of the peaty banks widespread. Livestock poaching (sheep) was evident. Peat staining was present at the time of survey. Given the narrow channel width and subsequent riparian shading, macrophytes were not present with scattered lesser spearwort along margins. Stable substrata supported *Scapania undulata* with some *Rhynchostegium riparioides*. The banks were typically open with scattered gorse scrub. The site was bordered by low intensity, semi-improved pasture (GA1) and wet grassland fringes locally (GS4).

Brown trout was the only fish species recorded at site B11 (**Appendix B**). The narrow channel at this location (0.5-1m wide) was of relatively low fisheries value although supported a low density of juvenile trout. Salmonid spawning habitat by way of finer gravels and smaller cobble was present although impacted by siltation (including from sheep poaching). Riffle and shallow glide with cobble and small boulder refugia provided some moderate quality nursery habitat although the channel was too small and shallow at this point to support a more significant fish population. The paucity of deeper pool reduced the value for adult salmonids although some (relatively) deeper areas and bank scours on meanders offered valuable refugia in the narrow typically open channel. European eel habitat was of poor quality and none were recorded. The small upland river was not of value for lamprey at this location with an absence if nursery habitat.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B11 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.44 Representative image of site B11 on the Cashelboy River, July 2024

7.1.45 Site B12 - Lugdoon River, Kingsmountain

Site B12 was located on the Lugdoon River (35C83) at a local road crossing. The small upland spate channel (FW1) flowed over a moderate gradient upstream before meandering through low intensity pasture downstream. The channel as 1-2m wide and 0.1-0.2m deep with localised plunge pools to 0.3m. Riffle and shallow glide predominated with only localised pool associated with natural falls in gradient. The substrata were dominated by often mobile cobble and boulder with interstitial gravels and localised sand beds. Siltation was low with only flocculent (peat) accumulations present locally. Given the high energy conditions, macrophytes were absent with frequent *Racomitrium aciculare* and *Scapania undulata* on stable substrata. Filamentous algal cover was moderate, indicating enrichment sources (e.g. upstream afforestation). The open, sloping grassy banks provided very little shading to the narrow channel. The site was bordered by semi-improved pasture (GA1) and wet grassland fringes (GS4) used for sheep grazing.

Brown trout was the only fish species recorded at site B12 (**Appendix B**). The site was of moderate value for salmonids, with a small mixed cohort population present. Although of some value as a salmonid nursery with a lack of riparian shading, shallow depths and siltation pressures reducing the quality of habitat. However, abundant bryophyte-rich cobble and boulder offered valuable instream refugia. Salmonid spawning habitat was present but highly localised and limited in extent (predominance of larger substrata). Frequent small pools were often shallow (<0.2m) but provided valuable holding areas for low densities of adult salmonids. Despite some suitability for European eel, none were recorded. The upland spate channel was not suitable for lamprey at this location with an absence of nursery areas. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No

macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B11 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.45 Representative image of site B12 on the Lugdoon River, July 2024

7.1.46 Site B13 - Grange More River, Lugdoon

Site B13 was located on the Grange More River (35G39) at a local road crossing. The small upland spate channel (FW1) flowed over a slight gradient downstream of the road crossing in an incised, meandering channel. Bank erosion and scouring was frequent with slumping in many areas. The channel was 1-2m wide and 0.1-0.2m deep with often undercut banks (1-1.5m high) and a flow profile of riffle and glide. Small pool areas were occasional but shallow where present. The river suffered from low summer flows at the time of survey. The substrata were dominated by mostly mobile cobble and small boulder with interstitial gravels and localised sands. Siltation was low with no accumulations present although some flocculent peat was observed on the bed. The presence of filamentous algae indicated enrichment pressures. Given the high energy conditions, bed mobility and shading, macrophytes were absent. *Scapania undulata* was present locally on stable substrata with *Pellia* sp. on muddy sections of bank. The riparian areas featured frequent areas of gorse scrub. The site was bordered by low intensity semi-improved pasture (GA1).

Brown trout was the only fish species recorded at site B13 (**Appendix B**). The site was of moderate value for salmonids, with a small mixed cohort population present. The Lugdoon River tributary suffered from low summer flows at the time of survey and this likely influenced the numbers of resident fish. The site was of moderate value as a salmonid nursery with the shallow depths and siltation and enrichment pressures reducing the quality of habitat. Some good quality spawning

habitat by way of mixed gravels and small cobble was present locally. The paucity of deeper pool areas reduced the value for adult salmonids considerably. Despite some moderate suitability for European eel, none were recorded. Soft sediment accumulations in the upland spate channel were shallow and sand dominated where present and thus unsuitable for lamprey ammocoetes. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B13 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.46 Representative image of site B13 on the Grange More River, July 2024

7.1.47 Site B14 - Unnamed stream, Lugdoon

Site B14 was located on an unnamed Lugdoon Stream tributary at a local road and Proposed Grid Connection Route crossing. The small upland spate stream (FW1) flowed over a moderate gradient in an incised channel alongside a local road and had been modified historically with several crossings and fords present in vicinity of the survey site. The channel was 1-1.5m wide and 0.05-0.2m deep with a flow profile of shallow glide and riffle. Small pools associated with gradient drops and culverts were present locally. The substrata comprised cobble and small boulder with frequent mixed gravels. However, these were moderately silted (heavy locally). Livestock poaching was evident along the channel, with natural erosion and slumping also observed. Macrophytes were limited to highly localised watercress and fool's watercress. Aquatic bryophyte coverage was low but some *Racomitrium aciculare* and *Scapania undulata* were preset on stable substrata. The stream was heavily shaded by riparian scrub comprising grey willow, gorse and bramble locally although the banks had

been cleared historically downstream. The site was bordered by improved pasture (GA1).

Brown trout was the only fish species recorded at site B14 on an unnamed Lugdoon Stream tributary (**Appendix B**). The site was of moderate value for salmonids, with a small mixed cohort population present. The Lugdoon Stream tributary was of moderate value as a salmonid nursery with the shallow depths and siltation pressures reducing the quality of habitat. Furthermore, local culverting and livestock poaching (leading to erosion & siltation) likely restricted fish passage under low flows. Some moderate quality spawning habitat for salmonids and lamprey by way of mixed gravels was present locally. Small pool areas and natural bank scours provided some valuable areas for adult salmonids but such features were limited. Instream refugia offered some moderate quality nursery habitat but this was also limited. Suitability for European eel was poor (limited refugia) and none were recorded. Soft sediment accumulations in the upland spate channel were shallow and flocculent where present and thus unsuitable for lamprey ammocoetes. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B14 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.47 Representative image of site B14 on an unnamed Lugdoon Stream tributary, July 2024

7.1.48 Site B15 - Lugdoon Stream, Ballyeeskeen

Site B16 was located on the Lugdoon Stream (35L01) at the N59 road crossing. The high energy, alkaline spate channel had been modified historically in vicinity of the single arch bridge (retaining

walls & small weir) but retained a high degree of naturalness elsewhere. The stream was 4-6m wide and 0.1-0.3m deep, with locally deeper pool to 1m. The substrata were dominated by mobile boulder and cobble with localised mixed gravels at the tailings of pools and in slacks. Siltation was low (almost absent). Calcification of the bed was evident locally. Filamentous algae cover was low but nonetheless present. Given high flow rates and shading, macrophytes were not present. Aquatic bryophyte coverage was moderate with locally frequent *Rhynchostegium riparioides* in addition to occasional *Fontinalis antipyretica* and *Pellia endiviifolia*. *Conocephalum conicum* and *Marchantia polymorpha* were occasional along muddy banks. The stream flowed through a small block of broadleaved woodland (WD1, beech, alder, sycamore, ash, willow) downstream of the bridge with historical clear-fell (WS5) and pasture (GA1) upstream.

Brown trout were the only fish species recorded via electro-fishing at site B15 (**Appendix B**). The site was of high value for salmonids supporting a relatively high density of fish, albeit mostly adult age classes. The clear-water alkaline site provided a combination of good quality spawning, nursery and holding habitat, with abundant instream refugia, localised spawning substrata and occasional deeper pool (including at a small weir). The compaction/calcification of the bed in many areas reduced the spawning value of the site. Despite high suitability for both Atlantic salmon and European eel, neither were recorded, thus indicating the presence of downstream barriers to migration. The weir at the bridge (0.75m fall) and associated apron was considered a barrier to fish migration at low flows. The high energy site was unsuitable for lamprey or white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site B15 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.1.48 Representative image of site B15 on the Lugdoon Stream, July 2024

7.2 Proposed Grid Connection Route sites (watercourse crossings)

7.2.1 Site C1 - Altans Stream, Dunowla

Site C1 was located on the Altans Stream (35A29) at a local road and Proposed Grid Connection Route crossing. The diminutive stream flowed under the road via a twin box culvert (slight gradient) and had been extensively deepened and straightened historically downstream. The stream was <0.75m wide and 0.05-0.15m deep in an incised channel with frequent land bridges. The profile comprised riffle and very shallow glide with only occasional small pool. The substrata were dominated by fine and medium gravels with occasional bedded cobble and small boulder. Siltation was moderate with a high cover of floc. Livestock poaching and natural bank scouring contributed to silt loads. Given high shading caused by the narrow channel, macrophytes were limited to open areas where some watercress and water mint were present. Aquatic bryophytes were limited to occasional *Rhynchostegium riparioides* on larger instream substrata. The very narrow channel was bordered by low intensity sheep grazing (GA1) with an absence of trees or riparian vegetation (except grasses).

Three-spined stickleback (*Gasterosteus aculeatus*) was the only fish species recorded via electro-fishing at site C1 (**Appendix B**). With the exception of low densities of this species, the site was not of fisheries value given its very small size, location in the upper reaches of the watercourse and poor fluvial connectivity with downstream habitats. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C1 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.1 Representative image of site C1 on the Altans Stream, September 2024

7.2.2 Site C2 - Unmapped stream, Dunowla

Site C2 was located on an unmapped Altans Stream tributary at a local road and Proposed Grid Connection Route crossing. The small upland eroding stream (FW1) had been straightened and deepened downstream of the single arch bridge resulting a trapezoidal channel flowing over a slight gradient. However, a semi-natural profile was retained. The stream was 1.5m wide and 0.05-0.15m deep in a profile of riffle and shallow glide. Small poor was present occasionally (to 0.25m). The substrata were dominated by relatively clean cobble with frequent small boulder and interstitial mixed gravels. Areas of exposed clay from previous excavations were frequent. Siltation was low. Given modifications and high energy conditions, macrophyte growth was sparse with occasional water mint, fool's watercress and brooklime (*Veronica beccabunga*). Aquatic bryophyte coverage was also low with occasional *Rhynchostegium riparioides* and rare *Leptodictyum riparium* on larger, stable substrata. The historically cleared banks supported low lying and recolonising scrub vegetation and rushes (*Juncus* sp.). The site was bordered by improved pasture (GA1) with very narrow riparian buffers.

Brown trout and European eel were the only fish species recorded via electro-fishing at site C2 (**Appendix B**). The site was of some value as a salmonid nursery supporting a low density of juveniles with no adults. This reflected the paucity of deeper holding habitat. Good quality spawning habitat was present locally (where smaller substrata dominated) with the site considered a moderate value nursery overall. European eel suitability was moderate with a single individual recorded from a pool area underneath the bridge. The small stream was not of value for lamprey at this location with an

absence of nursery areas. There was low suitability for white-clawed crayfish and none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.2 Representative image of site C2 on an unmapped Altans Stream tributary, September 2024

7.2.3 Site C3 - Ballyeeskeen River, Dunowla

Site C3 was located on the Ballyeeskeen River (35B40) at a local road and Proposed Grid Connection Route crossing. The highly calcareous river (FW1) had been historically deepened and likely realigned along the road resulting in a very narrow (one-sided trapezoidal) channel of <1m wide and 0.1-0.3m deep. The profile comprised slow-flowing glide and pool with localised riffle. The substrata were heavily calcified (cyanobacterial crusts) resulting in cementation of the cobble and gravel bed. Sands were present locally. Siltation was moderate, reflecting upstream livestock poaching pressures (sheep). Given high shading and tunnelling, macrophyte growth was limited to occasional watercress and water mint in rare open areas. The moss *Rhynchostegium riparioides* was frequent with occasional *Pellia endiviifolia* liverwort on submerged substrata. The narrow channel was heavily shaded by abundant scrub vegetation supporting bramble, dog rose (*Rosa canina*) and butterbur (*Petasites hybridus*) with hawthorn and scattered ash. The site was bordered by low-intensity pasture (GA1) with narrow fenced buffers.

Three-spined stickleback was the only fish species recorded via electro-fishing at site C3 (**Appendix B**). With the exception of low densities of this species, the highly calcareous channel at this location was not of fisheries value given its very small size, bed compaction/calcification, low summer flows, location in the upper reaches of the watercourse and poor fluvial connectivity with downstream habitats (inclusive of instream barriers). Despite some suitability for white-clawed crayfish, none were recorded with few accessible refugia present. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C3 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.3 Representative image of site C3 on the Ballyeeskeen River, September 2024

7.2.4 Site C4 - Ardkill Stream, Dunowla

Site C4 was located on the Ardkill Stream (35A61) at a local road and Proposed Grid Connection Route crossing. The small stream (FW1) had been historically straightened and deepened but demonstrated some good recovery downstream of the road crossing (pipe culvert). The stream suffered from low summer flows at the time of survey and was 1-2m wide and 0.05-0.15m deep. The profile comprised riffle and very shallow glide with only occasional small pool (to 0.25m). The substrata were dominated by mobile mixed gravels, sands and cobble, with scattered small boulder. These were moderately silted with naturally high rates of calcification causing compaction. Due to high shading and bed compaction, macrophytes were sparse with localised fool's watercress in rare open areas of channel. Iris (*Iris psuedacorus*) was present along wet riparian fringes. The bryophytes *Rhynchostegium riparioides* and *Pellia endiviifolia* were occasional. Apart from a cleared section in vicinity of the

culvert, the stream was heavily shaded by mature treelines of sycamore and ash with scrubby understories. The site was bordered by improved pasture (GA1).

Brown trout and three-spined stickleback were the only fish species recorded via electro-fishing at site C4 (**Appendix B**). Despite some good physical suitability, the site only supported a very low density of juvenile trout. This likely reflected low summer flows and siltation pressures which reduced the quality of nursery and spawning habitat, respectively (but present, nonetheless). The shallow site was of poor holding value for adult salmonids. Although lamprey spawning habitat was present (finer gravels), the absence of soft sediment nursery areas precluded the presence of the species. Suitability for European eel and white-clawed crayfish was low given the shallow depths of the stream at this location and paucity of suitable refugia. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C4 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.4 Representative image of site C4 on the Ardkill Stream, September 2024

7.2.5 Site C5 - Kilrusheighter River, N59 road crossing

Site C5 was located on the Kilrusheighter River (35K35) at the N59 road and Proposed Grid Connection Route crossing. The highly alkaline river (FW1) had been historically modified in vicinity of the road (pipe) culvert but some instream recovery had occurred, with landform formation and meanders present. The river was 1-2m wide in a channel of up 6m in width - much of the bed was exposed at the time of survey or colonised by abundant macrophytes. The shallow site ranged from 0.05 to 0.3m.

The profile comprised shallow glide and riffle with only very localised pool. The bed was heavily calcified (cyanobacterial crusts) resulting in cementation/compaction of the gravel and cobble bed. Scattered boulders and sand accumulations were also present. Siltation was moderate although no deep deposits were present (i.e. flocculent/transitory deposits). The site was very heavily vegetated with abundant fool's watercress often covering the channel width. Water mint and spearmint (*Mentha spicata*) were frequent with occasional brooklime and iris along the littorals. Coverage of aquatic bryophytes was high with abundant *Pellia endiviifolia* and *Riccardia chamedryfolia*. The moss *Rhynchostegium riparioides* and the submerged form of *Marchantia polymorpha* were occasional. Encroachment of the over-widened channel from terrestrial and herbaceous vegetation was high with abundant great willowherb, water figwort and reed canary grass (*Phalaris arundinacea*). The site was bordered by improved pasture (GA1) with historically cleared buffers.

Three-spined stickleback was the only fish species recorded via electro-fishing at site C5 (**Appendix B**). Despite some physical suitability in the heavily vegetated, swift flowing alkaline channel, the site did not support salmonids and this reflected low summer water levels and naturally high rates of bed compaction (calcification) which reduced the availability of spawning habitat. The shallow site was not of value as a holding habitat for adult salmonids, with the exception of the culvert (fish passable). Although lamprey spawning habitat was present (finer gravels), the absence of soft sediment nursery areas precluded the presence of the species. Suitability for European eel and white-clawed crayfish was low given the shallow depths of the stream at this location and paucity of suitable refugia. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C5 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.5 Representative image of site C5 on the Kilrusheighter River, September 2024

7.2.6 Site C6 - Portavaud River, N59 road crossing

Site C6 was located on the Portavaud River (35P02) at the N59 road and Proposed Grid Connection Route crossing. The watercourse was dry at this location at the time of survey, with the bed of the <1m wide channel supporting no standing or flowing water. The channel had been historically straightened and deepened and passed under the road via a pipe culvert. The substrata were dominated by mixed gravels with scattered small boulder and sands. Cover of macrophytes was high with abundant fool's watercress with localised water mint, brooklime and water pepper (*Persicaria hydropiper*). The presence of the moss *Rhynchostegium riparioides* further indicated occasional water flows. Low lying banks supported a nitrophilous community dominated by nettle, dock (*Rumex* spp.) and buttercups (*Ranunculus* spp.). The channel was shaded by mature treeline of ash, alder and hawthorn with dense bramble scrub along the west bank (east bank cleared & largely open). The site was bordered by improved pasture (GA1) with narrow buffers.

No fish were recorded via electro-fishing at site C6 (**Appendix B**). The ephemeral stream was dry at the time of survey and thus not of fisheries value. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

It was not possible to collect a biological water quality sample given the dry nature of the river at this location.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C6 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.6 Representative image of site C6 on the Portavaud River, September 2024 (dry, ephemeral channel)

7.2.7 Site C7 - Ballinlig River, N59 road crossing

Site C7 was located on the Ballinlig River (35B50) at the N59 road and Proposed Grid Connection Route crossing. The alkaline river (FW2) flowed under the road via a box culvert with bank modifications (retaining walls) in vicinity of the road crossing. The river had also been historically straightened downstream (but not deepened). The river was 2-2.5m wide and 0.1-0.2m deep in a profile of swift, shallow glide and riffle with localised pool. The substrata were dominated by mixed gravels and cobble, with scattered small boulder. These were moderately silted with calcification of the bed also evident. Sands were present along depositing margins with shallow silt accumulations in association with instream macrophyte beds. These were dominated by fool's watercress with some localised encroachment of iris and water mint. Given high shading (very high locally), coverage was low. Aquatic bryophyte coverage was also low with some localised *Pellia endiviifolia*, *Rhynchostegium riparioides* and rare *Leptodictyum riparium*. The narrow channel was shaded by dense scrub and hedgerows supporting bramble and grey willow. The site was bordered by species-poor wet grassland (GS4) adjoined by sloping pasture (GA1) on higher ground.

Brown trout and European eel were the only fish species recorded via electro-fishing at site C7 (**Appendix B**). The alkaline site was of value for salmonids although supported a relatively low density of small adults and juveniles. Although widespread, the quality of spawning habitat was moderate being compromised by siltation and natural bed calcification. Faster glide and riffle areas with macrophyte cover provided some good quality nursery habitat. The shallow site was of relatively poor value as a holding habitat for adult salmonids given the paucity of pool. Although some suitable lamprey spawning habitat was present (finer gravels), the shallow nature of soft sediment reduced the value for lamprey ammocoetes - none were recorded. Suitability for European eel was moderate (paucity of refugia) with a low density of fish recorded. Despite some suitability for white-clawed

crayfish, none were recorded (relatively few accessible refugia apart from macrophytes). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site C7 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.7 Representative image of site C7 on the Ballinlig River, September 2024

7.2.8 Site C8 - Barnabrack River, N59 road crossing

Site C8 was located on the Barnabrack River (35B30) at the N59 road and Proposed Grid Connection Route crossing c. 0.7km downstream of Lough Doo. The lowland river (FW2) flowed under the road via a twin pipe culvert, having passed under a derelict single arch bridge. Despite historical modification in vicinity of the culvert (local straightening and deepening, the river retained some good natural features. The river was 3-4m wide and 0.3-0.6m deep in a profile of deeper glide and pool with isolated riffle. The substrata were dominated by silted mixed gravels and sands with frequent cobble. Small boulder were scattered throughout. Silt accumulations were abundant along depositing margins. Siltation was higher upstream of the culvert/bridge. Given very high shading, macrophytes were limited to rare fool's watercress. Aquatic bryophyte coverage was low with rare *Pellia* sp. The river flowed through dense mixed woodland (WD1) supporting abundant grey willow which encroached the narrow channel but provided good degree of thermal refugia and instream refugia for fish (e.g. submerged root systems). The site was bordered by mature broadleaved woodland (WD1).

Brown trout, lamprey (*Lampetra* sp.) and European eel were recorded via electro-fishing at site C8 (**Appendix B**). The site was of good value for salmonids, supporting a mixed cohort population of trout. Good quality salmonid and lamprey spawning habitat was present in vicinity of the culvert although siltation pressures were evident. The site was also a good quality nursery although densities of juveniles was low with limited habitat. Deep glide and pool, in addition to banks scours/undercuts, provided high quality holding habitat for adult salmonids, as well as European eel (present in low densities). Abundant soft sediment deposits downstream of the culvert supported a low density of ammocoetes only (2 per m^2). There was some low suitability for white-clawed crayfish although none were recorded. A single fresh otter spraint was recorded on a marginal boulder adjoining the derelict bridge abutment upstream of the road culvert (ITM 559722, 830026).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the Ballysadare Bay SAC (000622), the aquatic ecological evaluation of site C9 was of **international importance** (**Table 4.3**).

Plate 7.2.8 Representative image of site C8 on the Barnabrack River, September 2024

7.2.9 Site C9 - Tanrego Intake, N59 road crossing

Site C9 was located on the Tanrego Intake[4], (35T25), the outflow from Folleesh Lough, at the N59 road and Proposed Grid Connection Route crossing. The lowland river (FW2) flowed under the road via a (fish passable) pipe culvert and had been historically straightened and deepened throughout. This resulted in a trapezoidal channel with steep banks and a deep glide and pool dominated profile. The

[4] The Tanrego Intake channel was completed in 1861 as part of a major embankment and slob land reclamation project in this part of Ballysodare Bay (McTernan, 1995)

substrata comprised heavily silted cobble and mixed gravels with scattered boulder. Deep silt accumulations were frequent throughout, particularly along depositing margins. Some mixed gravels were present locally. Given high riparian shading, macrophyte growth was sparse with only rare fool's watercress and branched bur-reed (*Sparganium erectum*). Aquatic bryophytes were limited to rare *Rhynchostegium riparioides* and *Pellia* sp. The river was well-shaded by mature treelines of sycamore, alder and elder (*Sambucus nigra*). The site was bordered by improved pasture (GA1) with narrow buffers and some livestock poaching.

Brown trout and European eel were the only fish species recorded via electro-fishing at site C9 (**Appendix B**). Despite evident siltation and hydromorphological pressures (established but artificial channel), the site was of good value for salmonids, supporting a relatively high density of mixed cohort trout. The site was of highest value as a holding area for adult salmonids with frequent deeper glide and pool, including natural scours and tree root undercuts. Spawning habitat was present but highly localised and impacted by siltation pressures - the quality improved upstream of the road crossing. The site was a moderate quality salmonid nursery only. Whilst soft sediment accumulations were abundant, these did not support lamprey ammocoetes but they did support a low density of European eel elvers (which were buried in the silt). Suitability for white-clawed crayfish was low and none were recorded. Two regular otter spraint sites (including fresh with fish remains) were recorded on boulders immediately downstream of the bridge (ITM 560433, 829494).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site C9 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.9 Representative image of site C9 on the Tanrego Intake, September 2024

7.2.10 Site C10 - Lugnadeffa River, N59 road crossing

Site C10 was located on the Lugnadeffa River (35L35) at the N59 road and Proposed Grid Connection Route crossing. The upland river (FW1) flowed under the road via a culvert and had been realigned historically. However, the river retained some good natural characteristics. The river flowed over a slight gradient and was 2-2.5m wide and 0.1-0.2m deep in a profile of shallow glide and riffle with occasional small pool (often at instream debris dams). The substrata comprised sands, mixed gravels and cobble with bedded boulder. Siltation was moderate with frequent silt accumulations in depositing areas. Given high shading, macrophytes were limited to localised fool's watercress, with frequent iris encroachment of the channel from adjoining wet grassland areas. Aquatic bryophyte coverage was high with frequent *Chiloscyphus polyanthos* and *Pellia* sp. and rarer *Marchantia polymorpha*. *Hyocomium armoricum* was frequent on the tops of larger boulders. The red alga *Hildenbrandia* sp. was occasional on larger boulder. The river was heavily scrubbed and shaded by dense treelines of alder, grey willow, osier and hawthorn with abundant bramble. The site was bordered by wet grassland (GS4) and improved pasture (GA1) with mature buffers.

Brown trout, European eel and three-spined stickleback were recorded via electro-fishing at site C10 (**Appendix B**). Despite evident siltation pressures, the site was of good value for salmonids, supporting a low density of juvenile trout. This reflected the good quality nursery and spawning habitat present. The shallow river section was not of value for adult salmonids (no holding habitat). Bryophyte-rich boulder and cobble areas provided good quality European eel habitat and a low density was recorded. Whilst suitable spawning and nursery (soft sediment/sand) habitat was present, no lamprey ammocoetes were recorded. There was some low physical suitability for white-clawed crayfish although none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and Red-listed European eel, the aquatic ecological evaluation of site C10 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.10 Representative image of site C10 on the Lugnadeffa River, September 2024

7.2.11 Site C11 - Lugawarry River, N59 road crossing

Site C11 was located on the Lugawarry River (35L36) at the N59 road and Proposed Grid Connection Route crossing. The watercourse was dry at this location at the time of survey, with the bed of the 1-2m wide channel supporting no standing or flowing water. The damp mud bed of the historical channel supported some scattered brooklime, iris and terrestrial species, with livestock (cattle) poaching widespread. The channel was shaded by a mature treeline of alder, hawthorn and grey willow. The site was bordered by wet grassland (GS4) and semi-improved pasture (GA1).

No fish were recorded via electro-fishing at site C11 (**Appendix B**). The ephemeral stream was dry at the time of survey and thus not of fisheries value. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

It was not possible to collect a biological water quality sample given the dry nature of the river at this location.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C11 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.11 Representative image of site C11 on the Lugawarry River, September 2024 (dry, ephemeral channel)

7.2.12 Site C12 - Stonehall River, N59 road crossing

Site C11 was located on the Lugawarry River (35L36) at the N59 road and Proposed Grid Connection Route crossing. The narrow river channel had been historically straightened (but not deepened) and was semi-dry at this location at the time of survey. Isolated standing water pools of water were present near the road culvert only, with the bed composed of damp mud elsewhere. Submerged substrata at the culvert comprised bedded boulder and cobble with abundant soft sediment. Macrophytes were absent given high riparian shading, although some iris and fool's watercress were present in the dry bed upstream of the culvert. Aquatic bryophytes were not recorded. The intermittent channel was heavily shaded by mature broadleaved woodland dominated by grey willow and alder.

No fish were recorded via electro-fishing at site C12 (**Appendix B**). The site was not of fisheries value given its ephemeral nature, significant siltation and poor connectivity to downstream habitats. There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C12 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.12 Representative image of site C12 on the Stonehall River, September 2024

7.2.13 Site C13 - Carrigeenboy River, R284 road crossing

Site C13 was located on the Carrigeenboy River (35C19) at the R284 road and Proposed Grid Connection Route crossing, c. 0.3km upstream of site D8. The lowland river (FW2) had been extensively straightened and deepened both upstream and downstream of the road crossing. Contrary to EPA mapping, the main flows of the watercourse flowed alongside the road in a south-east to north-west direction (to site D9), with the channel flowing under the road representing a drainage channel with very low flows. An artisanal hydroelectric turbine was present immediately adjacent to the crossing but this was not a major barrier to fish passage at higher water levels. The channel was a homogenous 2-2.5m wide and 0.4-0.6m deep, with a profile of very slow-flowing glide and pool. The substrata comprised deep silt with a high clay content. The site was heavily vegetated with near total cover of macrophytes. Fool's watercress dominated (<80% cover) with frequent branch bur-reed. Water mint was occasional. The historically cleared banks supported only low lying grass and herbaceous vegetation with isolated grey willow. The site was bordered by wet grassland (GS4) and wet improved pasture (GA1).

Three-spined stickleback was the only fish recorded via electro-fishing at site C13 (**Appendix B**). With the exception of this ubiquitous species, the site was not of fisheries value given very poor flows, poor hydromorphology and near total cover of macrophytes. However, some low suitability for brown trout existed downstream (site D8) and immediately adjacent in an unmapped branch of the channel (site D9). Suitability for white-clawed crayfish was poor and none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation

value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C13 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.13 Representative image of site C13 on the Carrigeenboy River, September 2024

7.2.14 Site C14 - Doonamurray Stream, R284 road crossing

Site C14 was located on the Carrigeenboy River (35C19) at the R284 road and Proposed Grid Connection Route crossing, c. 0.3km upstream of site C13. The lowland river (FW2) had been extensively straightened and deepened resulting in a trapezoidal channel with steep banks. Contrary to EPA mapping, the main flows of the watercourse flowed alongside the road in a north-south direction (to site C13), with the channel the other side of the road representing a stagnant drainage channel with high macrophyte cover. The river upstream of the road crossing was 2-2.5m wide and 0.3-0.6m deep with a profile of slow-flowing glide. This was restricted by heavy macrophyte cover. A short section of riffle and fast glide was located downstream of a pipe culvert on the west side of the road. The substrata were dominated by cobble and mixed gravels with scattered small boulder. Silt accumulations were frequent and siltation was high, exacerbated by abundant instream macrophytes. These were dominated by fool's watercress with occasional branch bur-reed. The moss *Rhynchostegium riparioides* was occasional on larger substrata. The steep-sided channel was shaded by abundant bramble and nitrophilous species. Mature narrow treelines of ash and hawthorn were present upstream. The site was bordered by low intensity, often wet, pasture (GA1) and wet grassland (GS4).

Brown trout and three-spined stickleback were the only fish recorded via electro-fishing at site C14 (**Appendix B**). The heavily modified channel at this location was of low value for salmonids, with suitable habitat highly localised (e.g. culvert). However, a low density of trout were recorded in

isolated fast glide habitat. Here, some low quality spawning and nursery habitat persisted. Despite some suitability for lamprey, the paucity of spawning habitat likely precluded the species from the site. Suitability for European eel and white-clawed crayfish was low with a paucity of instream refugia (except macrophytes). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C14 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.14 Representative image of site C14 on the Doonamurray Stream, September 2024

7.2.15 Site C15 - Doonamurray Stream, R284 road crossing

Site C15 was located on the Carrigeenboy River (35C19) at the R284 road and Proposed Grid Connection Route crossing, c. 0.15km upstream of site C14. The small stream (FW1) had been straightened and deepened both upstream and downstream of the crossing. The river flowed under the road via a twin perched box culvert and featured a steep trapezoidal profile. The river was 1-1.5m wide and 0.2-0.3m deep in swift-flowing glide and riffle habitat. Pool was rare. The alkaline river featured a heavily calcified bed with compacted cobble and mixed gravels. Siltation was moderate despite flow rates. Boulder was scattered throughout. The narrow channel was heavily shaded by scrub and macrophyte growth was sparse with some localised fool's watercress in rare open areas of channel. Common reed (*Phragmites australis*) was present upstream of the crossing. The liverwort *Pellia endiviifolia* was occasional on larger substrata with the moss *Rhynchostegium riparioides* present but rare. The steep banks supported abundant scrub dominated by bramble with frequent hawthorn and willow. The site was bordered by improved pasture (GA1).

Brown trout and three-spined stickleback were the only fish recorded via electro-fishing at site C15 (**Appendix B**). The highly alkaline site was of low value for salmonids, supporting only a very low density of juvenile trout. This reflected significant modifications, siltation pressures and naturally high bed compaction. Calcification also reduced the availability of habitat for European eel and white-clawed crayfish, neither of which were recorded. The site was unsuitable for lamprey with an absence of suitable spawning or nursery habitat. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C15 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.15 Representative image of site C15 on the Doonamurray River, September 2024

7.2.16 Site D1 - Doonflin River, N59 road crossing

Site D1 was located on the Doonflin River (35D10) at the N59 road and Proposed Grid Connection Route crossing. The large upland eroding river (FW1) had been modified in the vicinity of the culvert (retaining walls, gabion baskets) but retained many natural features. The river flowed over a moderate gradient and was 4-8m wide and 0.2-0.5m deep. The profile comprised riffle and fast-flowing glide with localised bedrock cascades downstream of the bridge. The substrata were dominated by compacted/stable cobble and boulder with frequent small areas of mixed gravels and coarse sands (often in pools). Calcareous bedrock was present locally. Siltation was low given high flow rates. Whilst macrophyte cover was low given high energy conditions (marginal fool's watercress and water mint only), bryophyte coverage was high. The moss *Rhynchostegium riparioides* was abundant on large substrata with *Hygroamblystegium* sp. also present. *Fontinalis antipyretica* was locally frequent. The river was well-shaded by mature treelines dominated by ash, alder and sycamore. The site was

bordered by improved pasture (GA1) with mature buffers.

Electro-fishing was not undertaken at site D1 (**Appendix B**). The site was of high value for salmonids, with widespread suitability as a spawning and nursery habitat for both Atlantic almon and brown trout. The site was of highest value as a nursery given a high frequency of bryophyte-rich instream refugia. Some localised holding habitat by way of deeper pools was also present for adult salmonids, particularly downstream of the culvert where a series of bedrock steps/falls created plunge pools (falls fish passable at higher water levels). The site also had high suitability for European eel with abundant instream refugia present. Despite some localised spawning habitat for lamprey, the absence of suitable nursery areas (soft sediment accumulations) likely precluded the species at this high energy site. There was no suitability for white-clawed crayfish (none recorded). Despite marking suitability, no otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the high suitability for salmonids and Red-listed European eel, the aquatic ecological evaluation of site D1 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.16 Representative image of site D1 on the Doonflin River, September 2024

7.2.17 Site D2 – Dunmoran Trib West River, N59 road crossing

Site D2 was located on the Dunmoran Trib West River (35D07) at the N59 road and Proposed Grid Connection Route crossing. The upland eroding river (FW1) had been modified in the vicinity of the culvert (retaining walls) but retained many natural features. The high energy watercourse was 5-7m wide and 0.2-0.5m deep with occasional deeper areas to 1m. The profile comprised glide and riffle

with occasional pool areas. The substrata were dominated by boulder and cobble although sands and mixed gravels predominated in pool areas. The bed was typically compacted given high flow rates. Siltation was low but nonetheless present. Some peat staining was present. Given bed compaction and high riparian shading, macrophytes were typically absent. However, aquatic bryophyte coverage was high with abundant *Rhynchostegium riparioides* and occasional *Fissidens* sp. mosses. The liverwort *Conocephalum conicum* was abundant on the banks and waterline, with occasional *Pellia* sp. and *Chiloscyphus polyanthos*. Filamentous algal cover was low. The river was well-shaded by mature treelines dominated by sycamore, ash and hawthorn. The site was bordered by improved pasture (GA1) with narrow buffers.

Electro-fishing was not undertaken at site D2 (**Appendix B**). However, the site was of high value for salmonids, with widespread suitability as a nursery and holding habitat for both Atlantic salmon and brown trout. The site was of highest value as a nursery given a high frequency of bryophyte-rich instream refugia. Some localised holding habitat by way of deeper pools was also present for adult salmonids (e.g. under bridge). Good quality salmonid spawning habitat was present but more localised. The site had high suitability for European eel with abundant instream refugia present. The high energy site was unsuitable for lamprey with no suitable nursery areas. The high energy site was unsuitable for white-clawed crayfish. An old otter spraint was recorded on a marginal boulder immediately upstream of the bridge (ITM 553709, 833111).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the utilisation by otter, the aquatic ecological evaluation of site D2 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.17 Representative image of site D2 on the Dunmoran Trib West River, September 2024

7.2.18 Site D3 – Dunmoran River, N59 road crossing

Site D3 was located on the Dunmoran River (35D16) at the N59 road and Proposed Grid Connection Route crossing. The upland eroding river (FW1) had been historically straightened (but not deepened) in the downstream vicinity of the road crossing. Retaining walls/rocky embankments were evident. The alkaline river was 4-5m wide and 0.1-0.3m deep with a profile comprising shallow glide and riffle with localised bedrock cascades downstream. Small pool areas were present but rare overall. The substrata were dominated by compacted and locally calcified cobble and boulder. Mixed gravels were localised, with occasional sand accumulations in depositing areas. Siltation was moderate (higher than expected for river type). Given high shading and bed compaction, macrophyte cover was limited to rare heterophyllus fool's watercress in open areas near the bridge. Cover of aquatic bryophytes was high with abundant *Rhynchostegium riparioides*. *Pellia endiviifolia* was present but rare. The waterline and lower banks supported abundant *Conocephalum conicum*. The river was shaded by mature treelines dominated by sycamore, hawthorn and ash. The site was bordered by improved pasture (GA1) with narrow buffers.

Electro-fishing was not undertaken at site D3 (**Appendix B**). The site was of moderate value for salmonids only given bed compaction and calcification which reduced the availability of suitable spawning habitat. However, the site was of better value as a salmonid nursery with abundant instream refugia throughout. Localised plunge pools associated with cascades provided some valuable holding habitat for adult salmonids although this was highly localised. The site had some good suitability for European eel with abundant instream refugia present. The high energy site was unsuitable for lamprey and white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the good suitability for salmonids and Red-listed European eel, the aquatic ecological evaluation of site D3 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.18 Representative image of site D3 on the Dunmoran River, September 2024

7.2.19 Site D4 – Unmapped stream, N59 road crossing

Site D4 was located on an unmapped stream at the N59 road and Proposed Grid Connection Route crossing. The 1-2m wide channel (FW4) was semi-dry at the time of survey with only localised, shallow (<0.05m) standing water in vicinity of the single arch bridge. The bed comprised deep silt with scattered superficial cobble and gravel. The macrophyte community supported occasional water mint, fool's watercress and watercress with rare brooklime. Iris and common reed were present locally in rare open areas. Aquatic bryophytes were limited to localised *Rhynchostegium riparioides* and *Pellia* sp. Iron oxidising bacterial films were abundant in vicinity of the bridge. The channel was typically heavily shaded (tunnelled) by dense scrub vegetation and mature sycamore-dominated treelines. The site was bordered by low intensity pasture (GA1), scrub (WS1) and residential properties.

Electro-fishing was not undertaken at site D4 (**Appendix B**). The 1-2m wide channel was semi-dry at the time of survey with only localised, shallow (<0.05m) standing water in vicinity of the single arch bridge. The site was not of fisheries value given its ephemeral nature in addition to siltation/water quality pressures. There was no suitability for white-clawed crayfish. No otter sings were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value and poor suitability for same, the aquatic ecological evaluation of site D4 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.19 Representative image of site D4 on an unmapped stream, September 2024

7.2.20 Site D5 – Knoxspark River, R290 road crossing

Site D5 was located on the Knoxspark River (35K39) at the R290 road and Proposed Grid Connection Route crossing. The lowland depositing river (FW2) had been extensively straightened and deepened in vicinity of the road crossing, resulting in a homogenous channel with no perceptible flow (pool habitat). The river was 3m wide and >1m deep with a bed comprised of deep silt with a high clay content. The river at this location was very heavily vegetated with near total cover of macrophytes. Fool's watercress and water horsetail were abundant with locally frequent common duckweed (*Lemna minor*), water forget-me-not (*Myosotis scorpioides*) and occasional water plantain (*Alisma plantago-aquatica*) and water mint. Various-leaved water starwort (*Callitriche platycarpa*) was present locally. Aquatic bryophytes were not present. Encroachment of the channel by terrestrial reed canary grass was high. This also dominated the sloping, wet banks with a nitrophilous community of nettle, hedge bindweed (*Calystegia sepium*), meadowsweet and occasional purple loosestrife (*Lythrum salicaria*) in addition to grey willow. The site was bordered by wet grassland (GS4) with improved pasture (GA1) upstream.

Electro-fishing was not undertaken at site D5 (**Appendix B**). The site was of very poor fisheries value and not of value for salmonids given extensive modifications, poor flows, high macrophyte cover, poor hydromorphology and siltation pressures. However, there was some low value for European eel, and three-spined stickleback (the latter of which were recorded via macro-invertebrate sweep sampling). There was some low physical suitability for white-clawed crayfish although none were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value and poor suitability for same, the aquatic ecological evaluation of site D5 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.20 Representative image of site D5 on the Knoxspark River, September 2024

7.2.21 Site D6 – Owenmore River, R290 road crossing

Site D6 was located on the Owenmore River (35O06) at the R290 road and Proposed Grid Connection Route crossing. The large upland spate river (FW1) was largely natural in character with only local bank modifications (retaining walls, embankments) in vicinity of the bridge. The river was 30-40m wide and varied from 0.3m to 1.8m in depth, with some localised braiding of the channel downstream of the bridge. The profile comprised swift shallow glide and pool with localised riffle. The substrata were dominated by partially bedded cobble and boulder with frequent mixed gravels locally. Sands were present along channel margins and in slacks. Siltation was low. Given high flow rates, macrophyte cover was low although water crowfoot (*Ranunculus* sp.) was locally frequent in shallower glide. Branched bur-reed was occasional along channel margins with some reed canary grass. Larger substrata supported frequent *Rhynchostegium riparioides* and *Cinclidotus fontinaloides* mosses. *Fontinalis antipyretica* was present but rare. The river was lined by mature treelines of sycamore, wych elm (*Ulmus glabra*) and ash with grey willow and osier (some of which was growing instream). Invasive giant hogweed (*Heracleum mantegazzianum*) was scattered along the south bank. The site was bordered by peri-urban and residential areas (BL3).

Electro-fishing was not undertaken at site D6 (**Appendix B**). The large spate river at this location was of very high value for salmonids, including Atlantic salmon, with combinations of very good quality spawning, nursery and holding habitat present. Localised areas of boulder and larger cobble provided good quality European eel habitat. Suitability for lamprey was low given high flow rates although some localised spawning habitat was present. Access for anadromous sea and river lamprey is blocked by

Ballysodare Falls located c. 4.5km downstream. The Owenmore River is known to support Atlantic salmon, brown/sea trout, European eel, lamprey (*Lampetra* sp.), minnow (*Phoxinus phoxinus*), three-spined stickleback, pike (*Esox lucius*), roach (*Rutilus rutilus*) and perch (*Perca fluviatilis*) (Kelly et al., 2011a). Although some physical suitability for white-clawed crayfish existed, the species is not known from the catchment (unsuitable water chemistry). Despite good suitability for otter, no signs were recorded in vicinity of the site with few marking opportunities present.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location within the Unshin River SAC (001898), the aquatic ecological evaluation of site D6 was of **international importance** (**Table 4.3**).

Plate 7.2.21 Representative image of site D6 on the Owenmore River, September 2024

7.2.22 Site D7 – Unshin River, R290 road crossing

Site D7 was located on the Unshin River (35U01) at the R290 road and Proposed Grid Connection Route crossing, located within the Unshin River SAC (001898). The high energy lowland alkaline river (FW2) was 25-30m wide 1-1.8m deep in vicinity of the bridge, with a profile of deep glide and pool. Deeper glide and pool to >2m was present upstream. The substrata were dominated by bedded boulder and cobble with localised mixed gravels. Sands and soft sediment accumulations were locally frequent, particularly in vicinity of macrophyte beds and along channel margins. The site was heavily vegetated with abundant heterophyllus common clubrush (*Schoenoplectus lacustris*), fool's watercress and bright leaved pondweed (*Potamogeton nitens*). Soft sediment accumulations and littorals supported small stands of branched bur-reed. Water starwort (*Callitriche* spp.) and the invasive Canadian pondweed (*Elodea canadensis*) were rare. Cover of aquatic bryophytes was high

with larger substrata supporting abundant *Fontinalis antipyretica* and *Chiloscyphus polyanthos*, in addition to *Cinclidotus fontinaloides* and *Rhynchostegium riparioides*. Given the presence of multiple indicator species, the aquatic vegetation community was representative of Annex I habitat floating river vegetation (3260) (a pondweed dominated example). The riparian areas supported abundant reed canary grass with intermittent mature treelines of sycamore, horse chestnut (*Aesculus hippocastanum*), hawthorn and willow species. Invasive giant hogweed was present on the banks near the bridge. The site was bordered by improved pasture (GA1).

Electro-fishing was not undertaken at site D7 (**Appendix B**). The site was of high value for salmonids, including Atlantic salmon. Although the heavily vegetated site, with siltation pressures, was not of significant spawning value, good quality holding opportunities (for adult salmonids) and nursery habitat were widespread. The site was also of high suitability for European eel. Whilst spawning habitat was largely absent, abundant soft sediment areas were suitable for lamprey ammocoetes (likely present in low densities). Access for anadromous sea and river lamprey is blocked by Ballysodare Falls located c.7.5km downstream. The Unshin River, a tributary of the Owenmore/Ballysodare, is known to support Atlantic salmon, brown trout, European eel, pike, perch and minnow (Kelly et al., 2015, 2011b). Although some physical suitability for white-clawed crayfish existed, the species is not known from the catchment (unsuitable water chemistry). A regular otter spraint site was recorded on the ledge under the westernmost arch - this contained fish and mollusc remains (ITM 569422, 825944).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location within the Unshin River SAC (001898), the aquatic ecological evaluation of site D6 was of **international importance** (**Table 4.3**).

Plate 7.2.22 Representative image of site D7 on the Unshin River, September 2024

7.2.23 Site D8 – Carrigeenboy River, R290 road crossing

Site D8 was located on the Carrigeenboy River (35C19) at the R290 road and Proposed Grid Connection Route crossing. The lowland river (FW2) had been extensively straightened and deepened, resulting in a homogenous channel with steep (although low lying) banks and poor hydromorphology. The alkaline river suffered from low summer flows at the time of survey with a profile of slow-flowing glide and pool (no riffle). Shallower glide predominated upstream of the culvert, with the river adjoined by a heavily vegetated channel (historical course of the river before realignment). The substrata comprised sand and silt with only superficial gravels present. Small boulders were scattered. Bank scouring and slumping, often caused by livestock poaching, was frequent upstream, with the channel very heavily tunnelled downstream of the culvert. In open areas, macrophyte cover was high with abundant fool's watercress and localised branched bur-reed although many areas did not support macrophytes due to shading. Water mint, common duckweed, lesser water parsnip (*Berula erecta*) and water starwort (*Callitriche* sp.) were present locally. Reed canary grass dominated much of the steep banks. The river was lined by treelines of grey willow with abundant dogwood (*Cornus* sp.) near the road crossing. The site was bordered by residential properties and improved pasture (GA1).

Electro-fishing was not undertaken at site D8 (**Appendix B**). The heavily modified site was not of significant salmonid value given poor hydromorphology and siltation pressures. However, some low holding suitability was present and the river likely supports brown trout in low densities (known to be present upstream at site C14). Likewise, European eel were also likely present given abundant instream refugia. Whilst lamprey nursery habitat was abundant, the absence of spawning habitat likely restricted the species' distribution at the site. Despite some suitability, no white-clawed crayfish were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the suitability for salmonids, lamprey and European eel (albeit low), the aquatic ecological evaluation of site D8 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.23 Representative image of site D8 on the Carrigeenboy River, September 2024

7.2.24 Site D9 – Unmapped stream, R284 road crossing

Site D9 was located on an unmapped channel the R284 road and Proposed Grid Connection Route crossing. The channel had been straightened and deepened both along the roadside (upstream of box culvert) and downstream of the crossing, resulting in a channel with very poor hydromorphology and low flows. The channel likely represented the original path of the Carrigeenboy River before historical realignment. The channel was 2.5-3m wide and >1m deep with a profile of very slow-flowing glide and pool (no riffle). The substrata were dominated by deep silt with some superficial gravels and boulder near the culvert only (exposed by livestock poaching). The channel featured near total coverage of macrophytes with abundant fool's watercress and branched bur-reed. Water starwort (*Callitriche* sp.) and water mint were present locally. The banks of the channel had been cleared historically with only isolated grey willow and grasses (such as reed canary grass). The site was bordered by wet improved pasture (GA1).

Electro-fishing was not undertaken at site D9 (**Appendix B**). The channel had been straightened and deepened both along the roadside (upstream of box culvert) and downstream of the crossing, resulting in a channel with very poor hydromorphology, low flows, high siltation and very high macrophyte coverage. Suitability for salmonids and lamprey was very low although there was some low suitability for European eel. Three-spined stickleback were recorded during macro-invertebrate sweep sampling. Despite some suitability, no white-clawed crayfish were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix C**). However, it should be noted that this was a tentative rating given poor flows and an absence of suitable riffle areas for sampling (Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of higher conservation value and poor suitability for same, the aquatic ecological evaluation of site D4 was of **local importance (lower value)** (**Table 4.3**).

Plate 7.2.24 Representative image of site D9 on an unmapped Carrigeenboy River tributary, September 2024

7.2.25 Site D10 – Ballygrania River, R284 road crossing

Site D10 was located on the Ballygrania River (35B81) at the R284 road and Proposed Grid Connection Route crossing. The lowland river (FW2) had been extensively deepened and locally straightened in vicinity of the single arch bridge crossing. This resulted in a narrow trapezoidal channel with steep banks. The river was 2-2.5m wide and >1m deep in a profile dominated by very deep glide and pool (no riffles). Deeper scour pool to 1.6m was present locally. The substrata comprised deep silt with a high clay content. Bedded cobble and superficial mixed gravels and sands were present near the bridge. Bank slumping was frequent and was contributing to siltation. Given deep water conditions, macrophyte growth was limited with only occasional fool's watercress. The liverworts *Conocephalum conicum* and *Pellia* sp. were present along the waterline. Reed canary grass dominated the narrow riparian zones and encroached the channel. The banktop also supported grey willow, some of which grew instream adding to habitat heterogeneity. The site was bordered by low intensity pasture (GA1) and wet grassland (GS4).

Electro-fishing was not undertaken at site D10 (**Appendix B**). The site was of moderate fisheries value only given historical modifications and siltation pressures. However, the deep glide habitat (>1m) with frequent bank scours likely supported adult brown trout and European eel. Salmonid and lamprey spawning habitat was largely absent from the narrow, silted channel. Soft sediment accumulations had some potential to support juvenile lamprey but the high clay content would reduce the quality of the bed for ammocoete burial. Three-spined stickleback were recorded during sweep/kick sampling.

Despite some suitability, no white-clawed crayfish were recorded. An old otter spraint was recorded on the ledge under the road bridge (ITM 572362, 825621).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix C**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the utilisation by otter, the aquatic ecological evaluation of site D10 was of **local importance (higher value)** (**Table 4.3**).

Plate 7.2.25 Representative image of site D10 on the Ballygrania River, September 2024

8. Appendix B – fisheries assessment report

Fisheries assessment for the proposed Crumhach Wind Farm, Co. Sligo

Prepared by Triturus Environmental Ltd. for MKO

February 2025

Please cite as:

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Table of contents

1. Introduction **3**

1.1 Background 3

1.2 Fisheries (desktop review) 3

2. Methodology **4**

2.1 Fish stock assessment (electro-fishing) 4

2.2 Fisheries habitat 5

2.3 Biosecurity 5

3. Results **12**

3.1 Sites within or with connectivity to the site boundary 12

3.2 Sites crossed by the Proposed Grid Connection Route 62

4. Discussion **97**

4.1 Salmonids 97

4.2 Lamprey 98

4.3 European eel 98

5. References **99**

1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by MKO to undertake a baseline fisheries assessment of numerous watercourses in the vicinity of the Proposed Crumhach Wind Farm (hereafter referred to as the Proposed Project), inclusive of the Proposed Wind Farm and Proposed Grid Connection Route. The Proposed Project is located approximately 4.5km south of Dromore West, Co. Sligo (**Figure 2.1**).

The survey was undertaken to establish baseline fisheries data used in the preparation of the EIAR for the Proposed Project. In order to gain an accurate overview of the existing and potential fisheries value of the watercourses within the vicinity of the proposed project, inclusive of the Proposed Grid Connection Route, a catchment-wide electro-fishing survey across *n*=61 riverine sites was undertaken (**Table 2.1; Figure 2.1**). A fisheries appraisal of 12 no. lake/pond sites within the EIAR site boundary was also undertaken. Electro-fishing helped to identify the importance of the watercourses as nurseries and habitats for salmonids, lamprey (*Lampetra* sp.) and European eel (*Anguilla anguilla*). Other species of lower conservation value were also recorded. The presence and or absence of fish populations and or associated supporting habitat would help inform impact assessment and any subsequent mitigation for the project.

Triturus Environmental Ltd. made an application under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962, to undertake a catchment-wide electro-fishing survey in the vicinity of the proposed Crumhach wind farm. The surveys were undertaken in July (site boundary) and September Proposed Grid Connection Route 2024.

1.2 Fisheries (desktop review)

There was a paucity of fisheries data in the survey area given the upland, high gradient and minor nature of many watercourses. However, the Dunneill River and its tributary the Dunbeakin River are known to support brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*) and three-spined stickleback (*Gasterosteus aculeatus*) (Gordon et al., 2021).

Along the Proposed Grid Connection Route , the Owenmore River, also known as the Ballysodare River in its lower reaches, is a significant salmonid bearing watercourse known to support Atlantic salmon (*Salmo salar*) and brown/sea trout (*Salmo trutta*) in addition to European eel (*Anguilla anguilla*), lamprey (*Lampetra* sp.), minnow (*Phoxinus phoxinus*), three-spined stickleback (*Gasterosteus aculeatus*), pike (*Esox lucius*), roach (*Rutilus rutilus*) and perch (*Perca fluviatilis*) (Kelly et al., 2011a).

The Unshin River, a tributary of the Owenmore/Ballysodare, is known to support Atlantic salmon, brown trout, European eel, pike, perch and minnow (Kelly et al., 2015, 2011b).

2. Methodology

2.1 Fish stock assessment (electro-fishing)

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on watercourses in the vicinity of the proposed project on the 2nd-7th July and 11th-14th September 2024 following notification to Inland Fisheries Ireland and under the conditions of Department of the Environment, Climate and Communications (DECC) licences. The electro-fishing survey was undertaken across 61 no. riverine sites (see **Table 2.1, Figure 2.1**).

Both river and holding tank water temperature was monitored continually throughout the survey to ensure temperatures of 20°C were not exceeded, thus minimising stress to the captured fish due to low dissolved oxygen levels. A portable battery-powered aerator was also used to further reduce stress to any captured fish contained in the holding tank. Salmonids, European eel and other captured fish species were transferred to a holding container with oxygenated fresh river water following capture. To reduce fish stress levels, anaesthesia was not applied to captured fish. All fish were measured to the nearest millimetre and released in-situ following a suitable recovery period.

As three primary species groups were targeted during the survey, i.e., salmonids, lamprey, and eel, the electro-fishing settings were tailored for each species. By undertaking electro-fishing using the rapid electro-fishing technique (see methodology below), the broad characterisation of the fish community at each sampling reach could be determined as a longer representative length of channel was surveyed. Electro-fishing methodology followed accepted European standards (CEN, 2003) and adhered to best practice (e.g., CFB, 2008).

2.1.1 Salmonids and European eel

For salmonid species and European eel, as well as all other incidental species, electro-fishing was carried out in an upstream direction for a 10-minute CPUE, an increasingly common standard approach for wadable streams (Matson et al., 2018). A total of approximately 30-75m channel length was surveyed at each site, where feasible, in order to gain a better representation of fish stock assemblages.

Relative conductivity of the water at each site was checked in-situ with a conductivity meter and the electro-fishing backpack was energised with the appropriate voltage and frequency to provide enough draw to attract salmonids and European eel to the anode without harm. For the low to moderate conductivity waters of the sites a voltage of 220-300v, frequency of 35-45Hz and pulse duration of 3.5-4ms was utilised to draw fish to the anode without causing physical damage.

2.1.2 Lamprey

Electro-fishing for lamprey ammocoetes was conducted using targeted quadrat-based electro-fishing (as per Harvey & Cowx, 2003) in objectively suitable areas of sand/silt, where encountered. As lamprey take longer to emerge from silts and require a more persistent approach, they were targeted at a lower frequency (30Hz) burst DC pulse setting which also allowed detection of European eel in sediment, if present. Settings for lamprey followed those recommended and used by Harvey & Cowx (2003), APEM (2004) and Niven & McAuley (2013). Using this approach, the anode was placed under

the water's surface, approximately 10-15cm above the sediment, to prevent immobilising lamprey ammocoetes within the sediment. The anode was energised with 100V of pulsed DC for 15-20 seconds and then turned off for approximately five seconds to allow ammocoetes to emerge from their burrows. The anode was switched on and off in this way for approximately two minutes. Immobilised ammocoetes were collected by a second operator using a fine-mesh hand net as they emerged.

Lamprey species were identified to species level, where possible, with the assistance of a hand lens, through external pigmentation patterns and trunk myomere counts as described by Potter & Osborne (1975) and Gardiner (2003).

2.2 Fisheries habitat

A fisheries habitat appraisal of all 73 no. riverine and lacustrine sites was undertaken to establish the importance of the supporting habitats as nursery, spawning and or holding habitats. The appraisal surveys focused on evaluating the spawning, nursery and or holding habitat for salmonids and lamprey species but also considered European eel and other fish species. The appraisals of salmonids and lamprey were cognisant of species-specific habitat requirements and preferences as outlined in O'Grady (2006), Hendry et al. (2003), Armstrong et al. (2003), Harvey & Cowx (2003), Maitland (2003) and Hendry & Cragg-Hine (1997). 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) to broadly characterise the riverine sites (i.e., channel profiles, substrata etc.).

2.3 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Particular cognisance was given towards preventing the spread or introduction of highly virulent crayfish plague (*Aphanomyces astaci*). Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

Table 2.1 Location of *n*=73 electro-fishing & fisheries appraisal survey sites in the vicinity of the Proposed Project

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
Sites within or with downstream connectivity to the site boundary						
A1	Unnamed stream	n/a	Trasgarve	Easky_SC_010	544732	825222
A2	Easky River	35E01	Trasgarve	Easky_SC_010	544448	825098
A3	Letterunshin River	35L56	Crowagh or Dunneill	Easky_SC_010	543241	825878
A4	Easky River	35E01	Tawnamore	Easky_SC_010	539871	825646
A5	Unnamed stream	n/a	Crowagh or Dunneill	Easky_SC_010	543140	826123
A6	Unnamed stream	n/a	Crowagh or Dunneill	Easky_SC_010	542987	826683
A7	Unnamed river	n/a	Tawnatruffaun	Easky_SC_010	539662	828004
A8	Owenminna River	35O05	Crowagh or Dunneill	Easky_SC_010	544516	826353
A9	Owenminna River	35O05	Crowagh or Dunneill	Easky_SC_010	544027	827000
A10	Owenminna River	35O05	Rathgoonaun	Easky_SC_010	541407	829658
A11	Unnamed river	n/a	Dunowla	Easky_SC_010	545816	826307
A12	Buncrowey River	35B09	Tawnadremira	Easky_SC_010	545288	827086
A13	Buncrowey River	35B09	Crowagh or Dunneill	Easky_SC_010	543942	827297
A14	Unnamed river	n/a	Crowagh or Dunneill	Easky_SC_010	544344	828056
A15	Unnamed river	n/a	Crowagh or Dunneill	Easky_SC_010	543832	828160
A16	Buncrowey River	35B09	Crowagh or Dunneill	Easky_SC_010	542125	829620
A17	Rathgoonaun River	35R06	Crowagh or Dunneill	Easky_SC_010	542429	829819
A18	Buncrowey River	35B09	Buncrowey	Easky_SC_010	540511	831023
A19	Easky River	35 E01	Camcuill	Easky_SC_010	539919	833311
A20	Carrownrush River	35C66	Farranmacfarrell	Easky_SC_010	542871	831296
A21	Carrownrush River	35C66	Knockacullen	Easky_SC_010	541682	833933
L1	Lough Croane	n/a	Tawnadremira	Easky_SC_010	545555	825804
L2	Lough Anlaba	n/a	Tawnadremira	Easky_SC_010	545801	825886
L3	Lough Nacrowagh	n/a	Tawnadremira	Easky_SC_010	545205	826628

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
L4	Lough Brickeagh	35B09	Tawnadremira	Easky_SC_010	545465	827079
L5	Lough Nafullow	n/a	Tawnadremira	Easky_SC_010	545023	827744
P1	Pond	n/a	Tawnadremira	Easky_SC_010	545707	825897
P2	Pond	n/a	Tawnadremira	Easky_SC_010	545842	825950
P3	Pond	n/a	Tawnadremira	Easky_SC_010	545901	826104
P4	Pond	n/a	Tawnadremira	Easky_SC_010	545589	825923
P5	Pond	n/a	Crowagh or Dunneill	Easky_SC_010	544927	827641
P6	Pond	35O12	Crowagh or Dunneill	Easky_SC_010	544737	826420
P7	Pond	n/a	Crowagh or Dunneill	Easky_SC_010	544818	827634
B1	Grangebeg Barr River	35G64	Ballygreighan Barr	Dunmoran_SC_010	548545	827673
B2	Ballygreighan Barr River	35B80	Kingsmountain	Dunmoran_SC_010	548372	827942
B3	Unnamed stream	n/a	Kingsmountain	Dunmoran_SC_010	547634	828139
B4	Unnamed stream	n/a	Kingsmountain	Dunmoran_SC_010	547380	828251
B5	Ballygreighan Barr River	35B80	Dunowla	Dunmoran_SC_010	546762	828355
B6	Unnamed stream	n/a	Ballyglass	Dunmoran_SC_010	545075	829049
B7	Dunneill River	35D06	Crowagh or Dunneill	Dunmoran_SC_010	544460	829243
B8	Dunneill River	35D06	Dunneill	Dunmoran_SC_010	543228	832926
B9	Doonbeakin River	35D09	Dunowla	Dunmoran_SC_010	545953	829641
B10	Doonbeakin River	35D09	Carrowcor Bridge	Dunmoran_SC_010	544328	833575
B11	Cashelboy River	35C83	Kingsmountain	Dunmoran_SC_010	546968	830039
B12	Lugdoon River	35L27	Kingsmountain	Dunmoran_SC_010	547388	830171
B13	Grange More River	35G39	Lugdoon	Dunmoran_SC_010	547601	830241
B14	Unnamed stream	n/a	Lugdoon	Dunmoran_SC_010	547780	830295
B15	Lugdoon Stream	35L01	Ballyeeskeen	Dunmoran_SC_010	546318	833107
Proposed Grid Connection Route watercourse crossings						
C1	Altans Stream	35A29	Dunowla	Dunmoran_SC_010	545716	831111

Site no.	Watercourse	EPA code	Location	WFD sub-catchment	X (ITM)	Y (ITM)
C2	Unmapped stream	n/a	Dunowla	Dunmoran_SC_010	545698	831531
C3	Ballyeeskeen River	35B40	Dunowla	Dunmoran_SC_010	545852	832024
C4	Ardkill Stream	35A61	Dunowla	Dunmoran_SC_010	545893	832334
C5	Kilrusheighter River	35K35	N59 road crossing	Dunmoran_SC_010	548676	832626
C6	Portavaud River	35P02	N59 road crossing	Dunmoran_SC_010	557113	831714
C7	Ballinlig River	35B50	N59 road crossing	Dunmoran_SC_010	557773	831371
C8	Barnabrack River	35B30	N59 road crossing	Dunmoran_SC_010	559740	830013
C9	Tanrego Intake	35T25	N59 road crossing	Dunmoran_SC_010	560423	829490
C10	Lugnadeffa River	35L35	N59 road crossing	Dunmoran_SC_010	561772	828316
C11	Lugawarry River	35L36	N59 road crossing	Dunmoran_SC_010	562230	828209
C12	Stonehall River	35S25	N59 road crossing	Dunmoran_SC_010	562971	828382
C13	Carrigeenboy River	35C19	R284 road crossing	Owenmore (Sligo)_SC_030	571042	826702
C14	Doonamurray Stream	35D38	R284 road crossing	Owenmore (Sligo)_SC_030	571212	826493
C15	Doonamurray Stream	35D38	R284 road crossing	Owenmore (Sligo)_SC_030	571335	826408
D1	Doonflin River	35D10	N59 road crossing	Dunmoran_SC_010	550778	832495
D2	Dunmoran Trib West River	35D07	N59 road crossing	Dunmoran_SC_010	553713	833114
D3	Dunmoran River	35D16	N59 road crossing	Dunmoran_SC_010	554297	832993
D4	Unmapped stream	n/a	N59 road crossing	Dunmoran_SC_010	556058	832270
D5	Knoxspark River	35K39	R290 road crossing	Owenmore (Sligo)_SC_010	567129	828604
D6	Owenmore River	35O06	R290 road crossing	Owenmore (Sligo)_SC_010	567923	826548
D7	Unshin River	35U01	R290 road crossing	Owenmore (Sligo)_SC_030	569431	825946
D8	Carrigeenboy River	35C19	R290 road crossing	Owenmore (Sligo)_SC_030	570805	826879
D9	Unmapped stream	n/a	R284 road crossing	Owenmore (Sligo)_SC_030	570974	826787
D10	Ballygrania River	35B81	R284 road crossing	Owenmore (Sligo)_SC_030	572362	825624

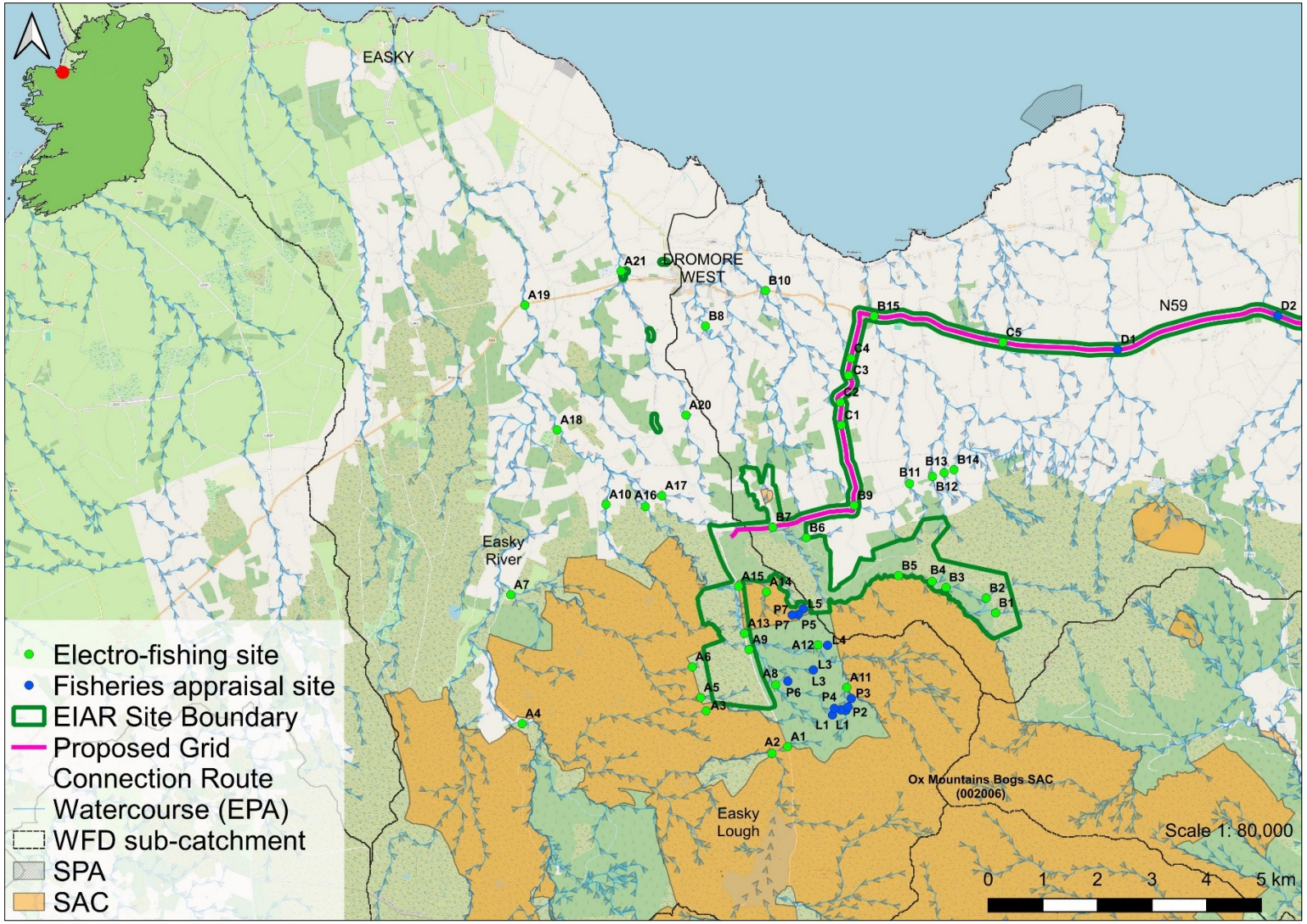

Figure 2.1 Overview of the electro-fishing & fisheries appraisal survey site locations in vicinity of the proposed EIAR site boundary

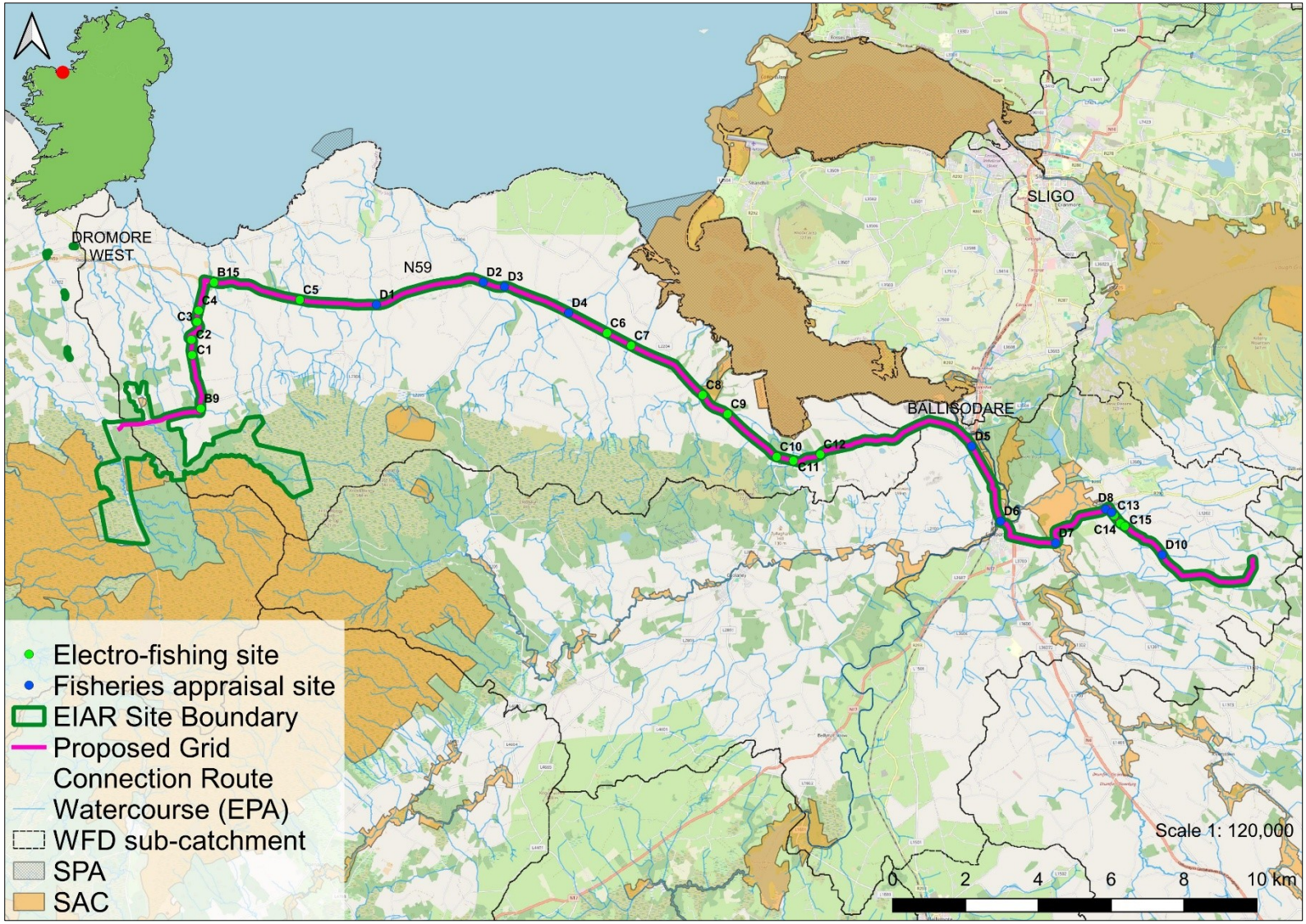

Figure 2.2 Overview of the electro-fishing & fisheries appraisal survey site locations crossed by the Proposed Grid Connection Route

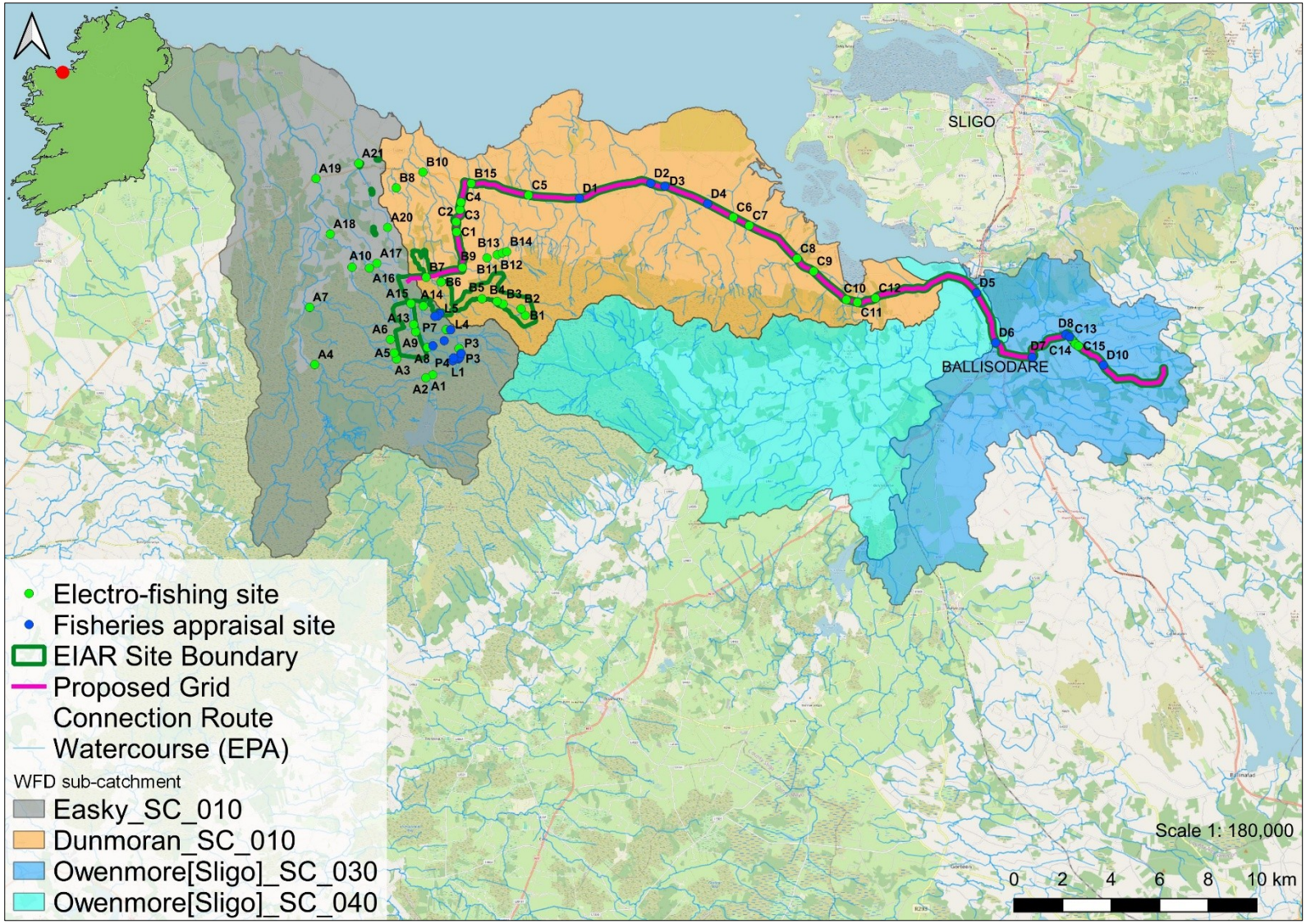

Figure 2.3 Overview of the electro-fishing & fisheries appraisal survey site locations crossed by the Proposed Grid Connection Route

3. Results

A catchment-wide fisheries survey of 61 no. riverine and 12 no. lake/pond sites in the vicinity of the Proposed Project was conducted on the on the 2nd to 7th July and 11th to 14th September 2024 following notification to Inland Fisheries Ireland. The results of the survey are discussed below in terms of fish population structure, population size and the suitability and value of the surveyed areas as nursery and spawning habitat for salmonids, European eel and lamprey species. Scientific names are provided at first mention only.

For clarity, the results are grouped into 'Sites within or with connectivity to the EIAR site boundary' (**section 3.1)** and 'Proposed Grid Connection Route crossings' (**section 3.2**).

3.1 Sites within or with connectivity to the site boundary

3.1.1 Site A1 – Unnamed stream, Trasgarve

Brown trout (*Salmo trutta*) (*n*=12) was the only fish species recorded via electro-fishing at site A1 on the lower reaches of an unnamed Easky River tributary (**Figure 3.1**).

The high gradient site was of moderate value for salmonids, supporting a low density of mixed cohort trout. Whilst the site was of some value as a salmonid nursery and spawning area, the holding opportunities were poor due to the shallow, upland/cascading nature high energy nature. These characteristics made the site unsuitable for lamprey and the species was not recorded present. The site was a poor quality habitat for European eel (too upland, shallow and with limited large refugia). This was supported by an absence of eel recorded during the survey.

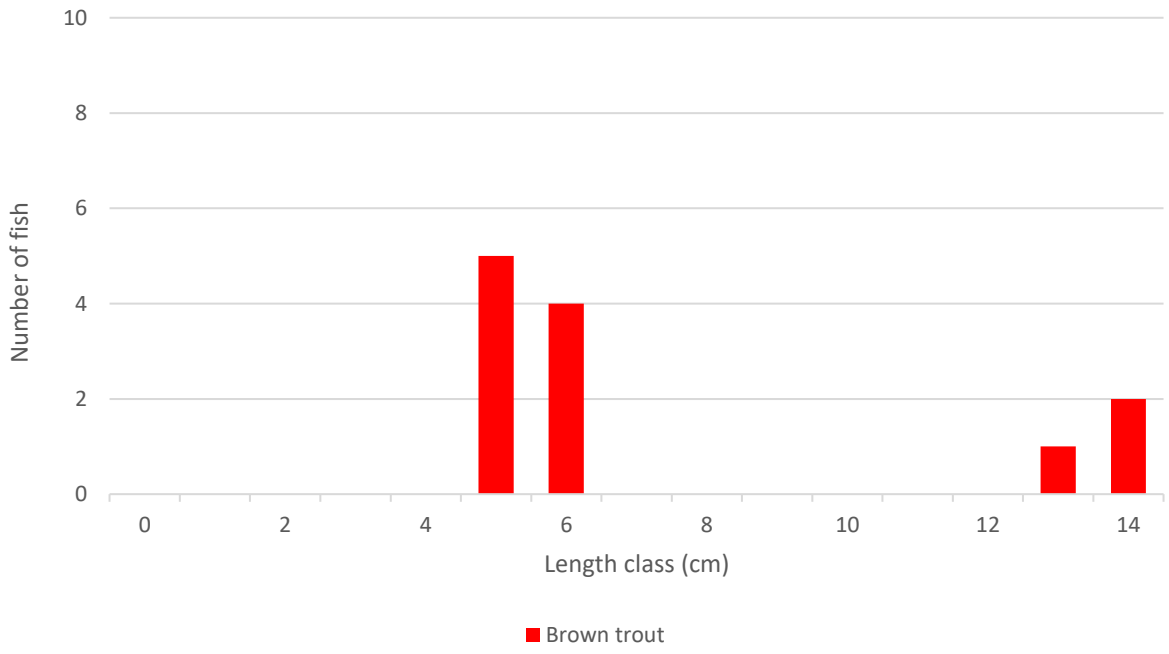

Figure 3.1.1 Length frequency distribution recorded via electro-fishing at site A1, September 2024

Plate 3.1.1 Mixed cohort brown trout recorded at site A1 on an unnamed Easky River tributary, July 2024

3.1.2 Site A2 – Easky River, Trasgarve

Atlantic salmon (*Salmo salar*) (*n*=30), brown trout (*n*=17) and European eel (*Anguilla anguilla*) (*n*=1) were recorded via electro-fishing at site A2 on the upper reaches of the Easky River (**Figure 3.1.2**).

The site was of high value for salmonids, with moderate numbers of juvenile salmon and trout. The site was of highest value as a salmonid nursery with abundant instream cobble refugia. These areas also provided good quality European eel habitat, supporting a low density of fish. Good quality spawning habitat was also present with some limited holding habitat on meanders and under the bridge. The spate channel was unsuitable for lamprey at this location (none recorded).

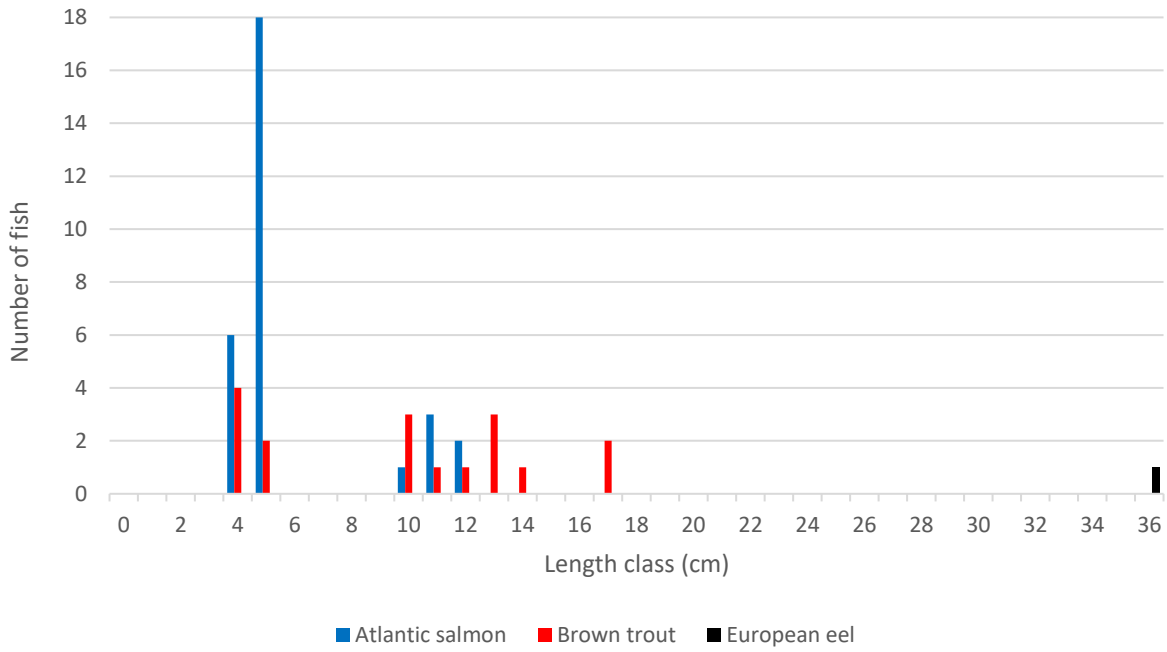

Figure 3.1.2 Length frequency distribution recorded via electro-fishing at site A2, September 2024

Plate 3.1.2 Atlantic salmon (top) & brown trout recorded at site A2 on the Easky River, July 2024

3.1.3 Site A3 – Letterunshin River, Crowagh

Despite some physical suitability for salmonids and European eel, no fish were recorded via electro-fishing at site A3 on the upper reaches of the Letterunshin River. The channel at this location was shallow and very narrow. It evidently suffered from poor flows in summer. Siltation pressures, natural blockages to flow and poor summer flows indicated the channel was not of fisheries value. No fish were recorded during the survey.

Plate 3.1.3 Representative image of site A3 on the Letterunshin River, July 2024

3.1.4 Site A4 – Easky River, Tawnamore

Atlantic salmon (*n*=48) and brown trout (*n*=7) were the only fish species recorded via electro-fishing at site A4 on the Easky River (**Figure 3.1.3**).

The site was an excellent quality salmonid nursery with abundant macrophytes and mixed substrata providing high quality refugia. Good quality spawning habitat was also widespread with the substrata mostly mobile. More stable areas of cobble in faster flowing glide supported abundant freshwater pearl mussel with a high density present downstream of the bridge. Deeper glide and bank scours/pools provided some localised holding opportunities for adult salmonids. Despite high suitability, no European eel were recorded. The upland spate channel was unsuitable for lamprey at this location and none were recorded present.

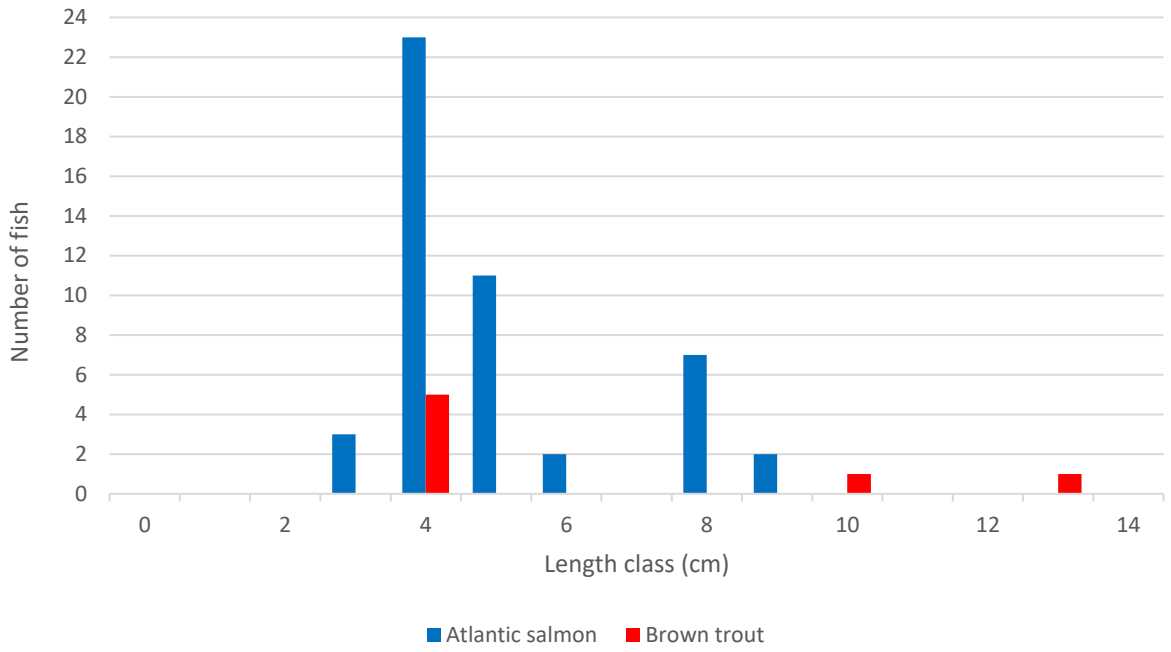

Figure 3.1.3 Length frequency distribution recorded via electro-fishing at site A4, September 2024

Plate 3.1.4 Atlantic salmon parr recorded at site A4 on the Easky River, July 2024

3.1.5 Site A5 – Unnamed stream, Crowagh

No fish were recorded via electro-fishing at site A5 on upper reaches of an unnamed stream adjacent to the EIAR site boundary. The ephemeral stream was dry at the time of survey and thus not of fisheries value (Plate 3.1.5).

Plate 3.1.5 Representative image of an unnamed stream at site A5, July 2024 (dry, ephemeral channel)

3.1.6 Site A6 – Unnamed stream, Crowagh or Dunneill

No fish were recorded via electro-fishing at site A6 on the upper reaches of an unnamed stream adjacent to the EIAR site boundary. Despite some physical habitat suitability for salmonids and European eel, the stream at this location was likely ephemeral during to very poor summer flows and shallow water. The poor flows were exacerbated by extensive straightening & deepening (Plate 3.1.6).

Plate 3.1.6 Representative image of an unnamed stream at site A6, July 2024

3.1.7 Site A7 – Unnamed River[1], Tawnatruffaun

Atlantic salmon (*n*=15), brown trout (*n*=34) and European eel (*n*=1) were recorded via electro-fishing at site A7 on the lower reaches of an unnamed Easky River tributary.

The site was a high quality salmonid nursery, supporting relatively high densities of juvenile brown trout and lower numbers of Atlantic salmon. The site featured a high frequency of large boulder and cobble that provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent and better represented upstream. Small plunge pools provided some good quality holding areas for migratory adults. The site was of high suitability for European eel although only a single eel was recorded. The high energy site was unsuitable for lamprey and the species was not recorded present.

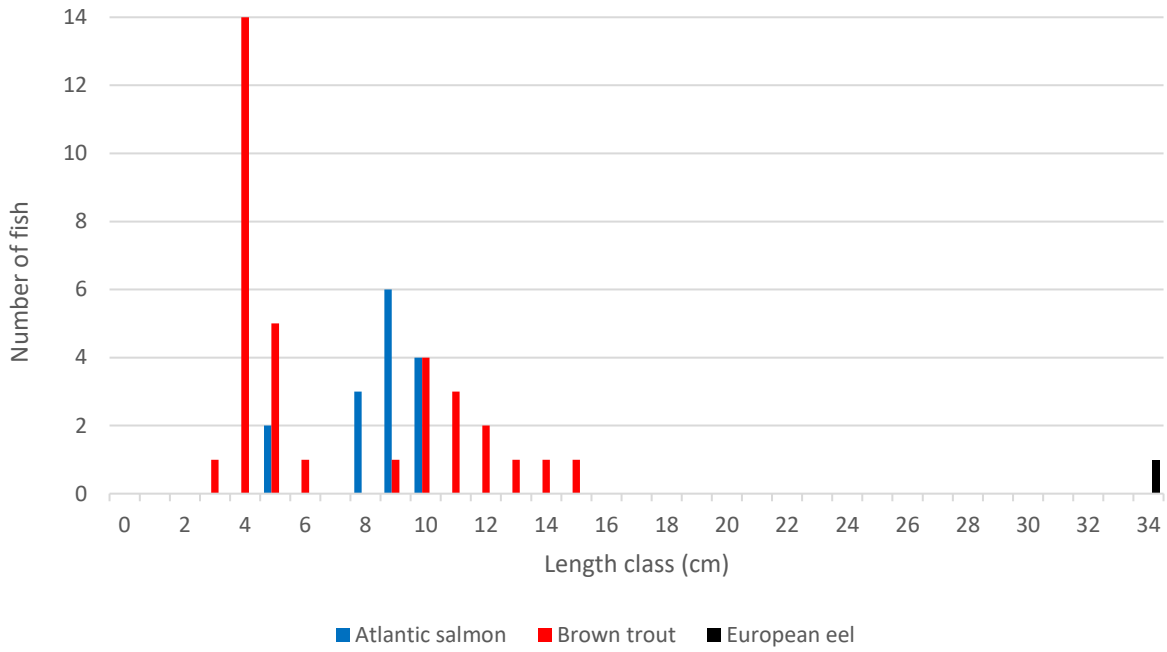

Figure 3.1.4 Length frequency distribution recorded via electro-fishing at site A7, September 2024

[1] Known locally as the Fiddangarrode River

Plate 3.1.7 Representative image of site A7 on an unnamed Easky River tributary, July 2024

3.1.8 Site A8 – Owenminna River, Crowagh

No fish were recorded via electro-fishing at site A8 on the upper reaches of the Owenminna River. The channel was considered a poor quality salmonid nursery given an absence of riparian buffers from the adjoining conifer plantations. These evidently caused acidification of the stream with very high pine needle deposition on the bed. The small size of the stream (0.5m width), acidification pressures and the location in the uppermost reaches of the catchment created conditions inimical for salmonids, European eel or lamprey. No fish were recorded during the survey.

Plate 3.1.8 Representative image of site A8 on the of the Owenminna River, September 2024

3.1.9 Site A9 – Owenminna River, Crowagh or Dunneill

No fish were recorded via electro-fishing at site A9 on the upper reaches of the Owenminna River c.1km downstream of site A8. Despite some low physical suitability for a small salmonid (trout) population, the site was of poor fisheries value given the location in the uppermost reaches of the catchment and significant siltation pressures.

Plate 3.1.9 Representative image site A9 on the Owenminna River, July 2024

3.1.10 Site A10 – Owenminna River, Rathgoonaun

Atlantic salmon (*n*=22) and brown trout (*n*=59) were the only fish species recorded via electro-fishing at site A10 on the Owenminna River (**Figure 3.1.5**).

The site was a high quality salmonid nursery, with abundant refugia supporting a relatively high density of juveniles. The quality of spawning habitat was compromised by siltation and naturally reduced given high flow rates (albeit suitable areas were still present). The shallow nature of the site also provided limited holding areas for adult salmonids. Despite some good suitability, no European eel were recorded. The high energy site was unsuitable for lamprey and no lamprey were recorded present.

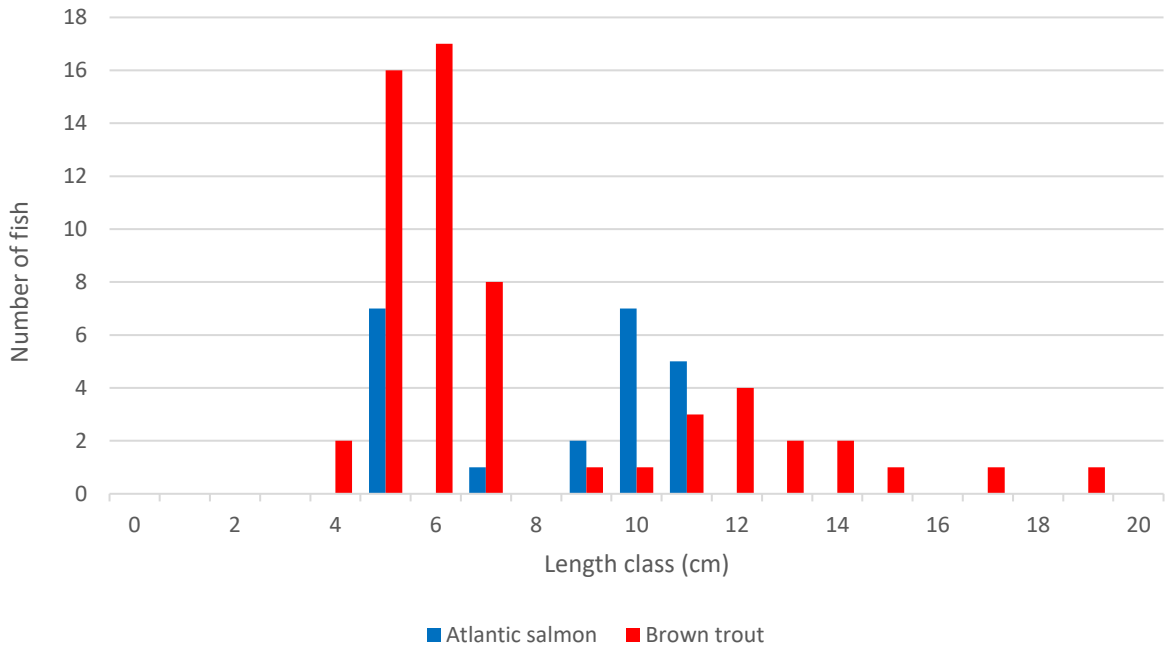

Figure 3.1.5 Length frequency distribution recorded via electro-fishing at site A10, September 2024

Plate 3.1.10 Adult brown trout recorded at site A10 on the Owenminna River, July 2024

3.1.11 Site A11 – Unnamed River, Dunowla

Brown trout (*n*=4) was the only fish species recorded via electro-fishing at site A11 on an unnamed Buncrowey River tributary within the proposed EIAR site boundary (**Figure 3.1.6**).

The site was of good suitability for salmonids, with abundant spawning habitat present. However, nursery conditions were suboptimal due to the small size and compacted peaty bed with only a low

density of trout recorded. Despite some low suitability for European eel, none were recorded. The upland site with peat sediment deposits was unsuitable for lamprey (none were recorded).

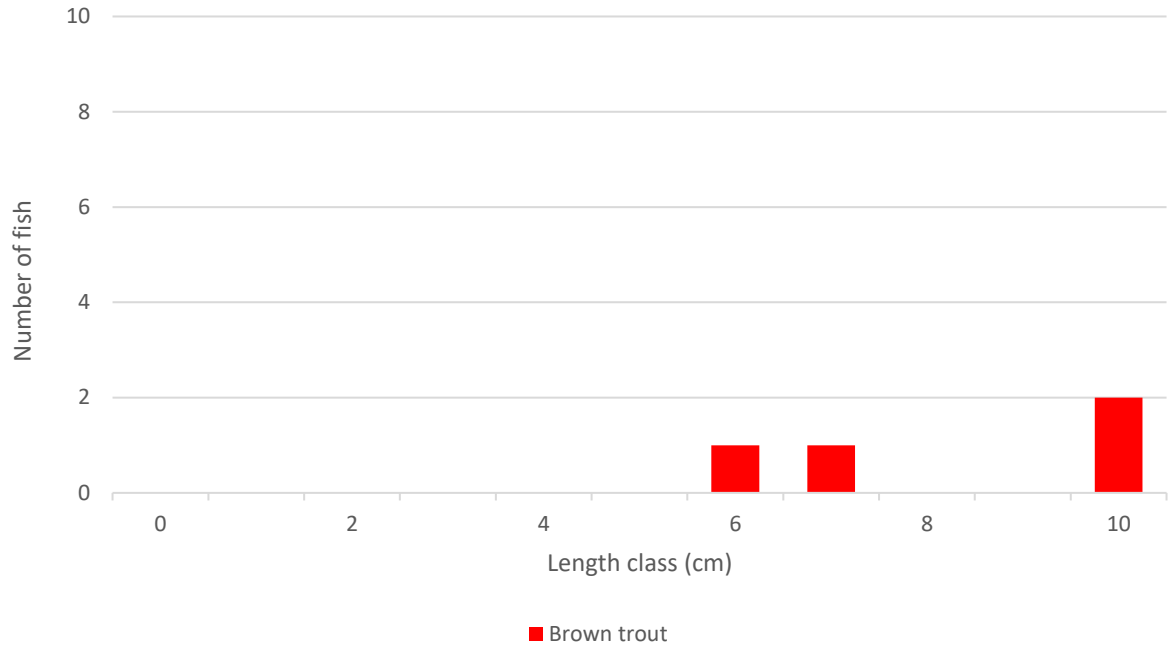

Figure 3.1.6 Length frequency distribution recorded via electro-fishing at site A11, September 2024

Plate 3.1.11 Representative image of site A11 on an unnamed Buncrowey River tributary, September 2024

3.1.12 Site A12 – Buncrowey River, Tawnadremira

Brown trout (*n*=39) was the only fish species recorded via electro-fishing at site A12 on the upper reaches of the Buncrowey River within the proposed site boundary (**Figure 3.1.7**).

The river at this location was of high value for salmonids. The mixed boulders, cobble and gravels (coarse substrata) provided good flow heterogeneity and refugia for mixed cohort brown trout. Furthermore, accumulations of well sorted mixed rounded gravels (with low siltation) provided very good quality spawning habitat. There was also ample holding pool habitat below boulder cascade areas for adult trout. While the channel had some suitability for European eel (good refugia) the location of the site in the upper catchment reduced accessibility and none were recorded. The high energy site was unsuitable for lamprey (none recorded).

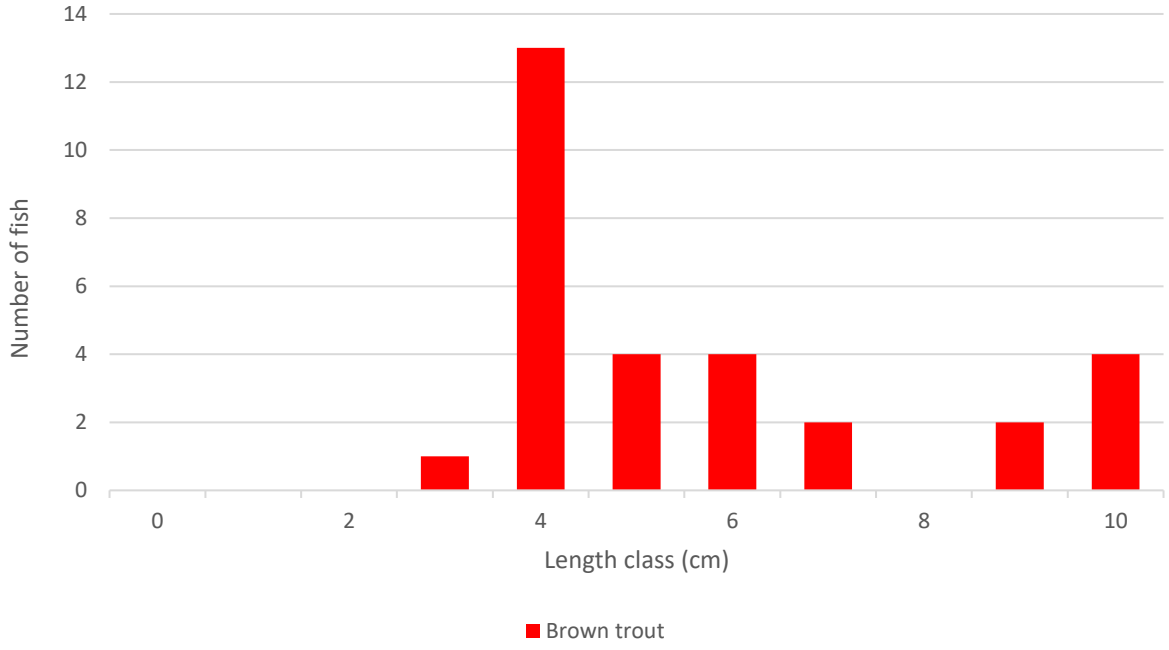

Figure 3.1.7 Length frequency distribution recorded via electro-fishing at site A12, September 2024

Plate 3.1.12 Representative image of site A12 on the of the upper reaches of the Buncrowey River, September 2024

3.1.13 Site A13 – Buncrowey River, Cooper's Lodge

Brown trout (*n*=20) and European eel (*n*=3) was the only fish species recorded via electro-fishing at site A13 on the upper reaches of the Buncrowey River at a local road crossing (within the proposed EIAR site boundary) (**Figure 3.1.7**).

The site was a good quality salmonid habitat although the mobile bed and large size of substrata reduced its value as a spawning habitat (no juveniles recorded). Bank scours and pools provided some good quality holding areas for brown trout, and also European eel habitat. The absence of Atlantic salmon, despite suitability, was indicative of natural barriers downstream. The high energy spate channel was unsuitable for lamprey at this location and none were recorded present.

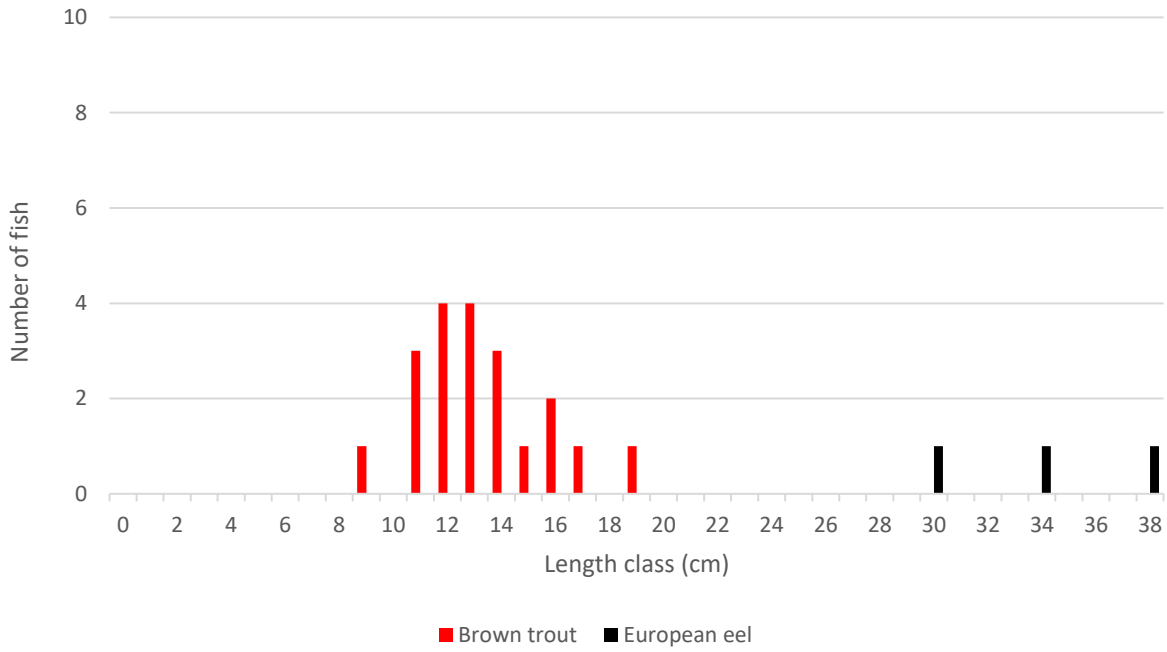

Figure 3.1.8 Length frequency distribution recorded via electro-fishing at site A13, July 2024

Plate 3.1.13 Representative image of site A13 on the Buncrowey River, July 2024

3.1.14 Site A14 – Unnamed River, Crowagh or Dunneill

No fish were recorded via electro-fishing at site A14 on the upper reaches of an unnamed Buncrowey River tributary within the vicinity of the EIAR site boundary. The very narrow, moderate gradient stream was unsuitable for resident fish given poor summer flows (frequent ponding of water between blockages/cascades) and its location in the upper reaches of the catchment.

Plate 3.1.14 Representative image of site A14 on the upper reaches of an unnamed Buncrowey River tributary, September 2024

3.1.15 Site A15 – Unnamed River, Crowagh or Dunneill

Brown trout (*n*=3) was the only fish species recorded via electro-fishing at site A15 on the lower reaches of an unnamed Buncrowey River tributary at a local road crossing (**Figure 3.1.9**).

The site was of relatively low value for salmonids, supporting only a low density of small adult brown trout. This reflected the location in the upper reaches of the catchment in addition to the narrow, shallow nature of the stream. Salmonid spawning habitat was largely absent (predominance of larger substrata) although there was some moderate value as a salmonid nursery. Despite some low suitability, no European eel were recorded. The high energy spate channel was unsuitable for lamprey at this location (none recorded).

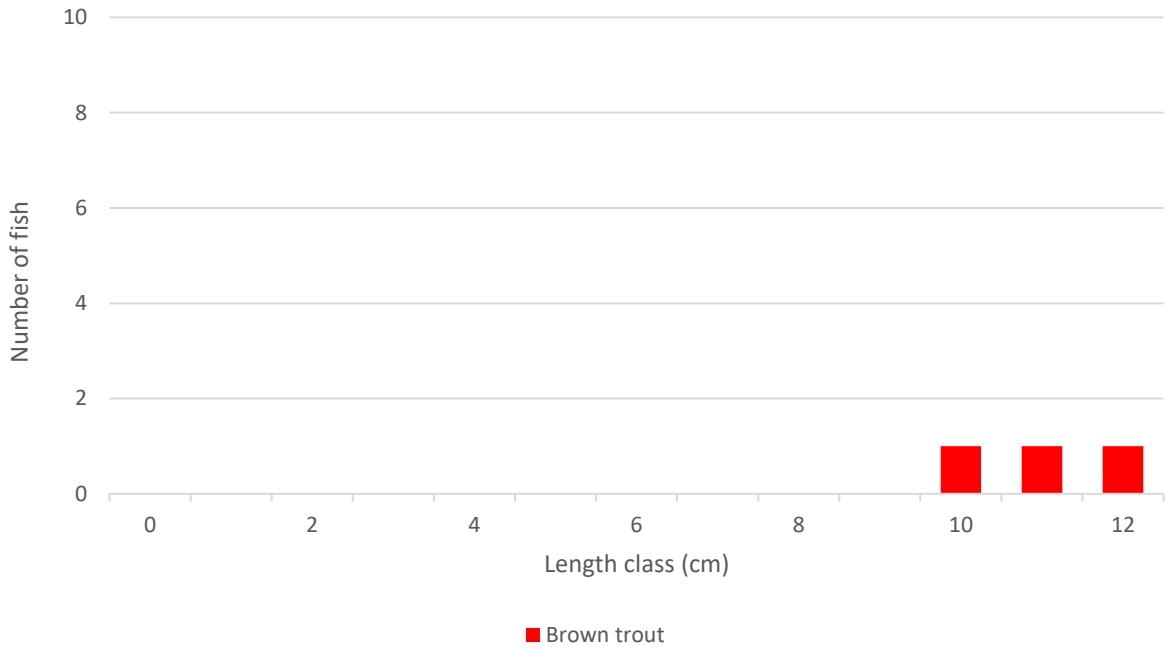

Figure 3.1.9 Length frequency distribution recorded via electro-fishing at site A15, July 2024

Plate 3.1.15 Representative image of site A15 on the lower reaches of an unnamed Buncrowey River tributary, July 2024

3.1.16 Site A16 – Buncrowey River, Crowagh or Dunneill

Atlantic salmon (*n*=45) and brown trout (*n*=20) were the only fish species recorded via electro-fishing at site A16 on the Buncrowey River at a ford crossing near Crowagh (**Figure 3.1.10**).

The site was a high quality salmonid nursery, with abundant cobble and boulder refugia supporting a

relatively high density of juvenile salmon and trout. Although limited in extent, good quality spawning habitat was present locally. This was better suited to Atlantic salmon given the lager substrata sizes present at the high energy site. The paucity of pool reduced the holding habitat for adults although overhanging willow treelines provided valuable flow refugia and thermal shading along the west bank. Despite some good suitability, no European eel were recorded. The high energy spate channel was unsuitable for lamprey at this location (none were recorded present).

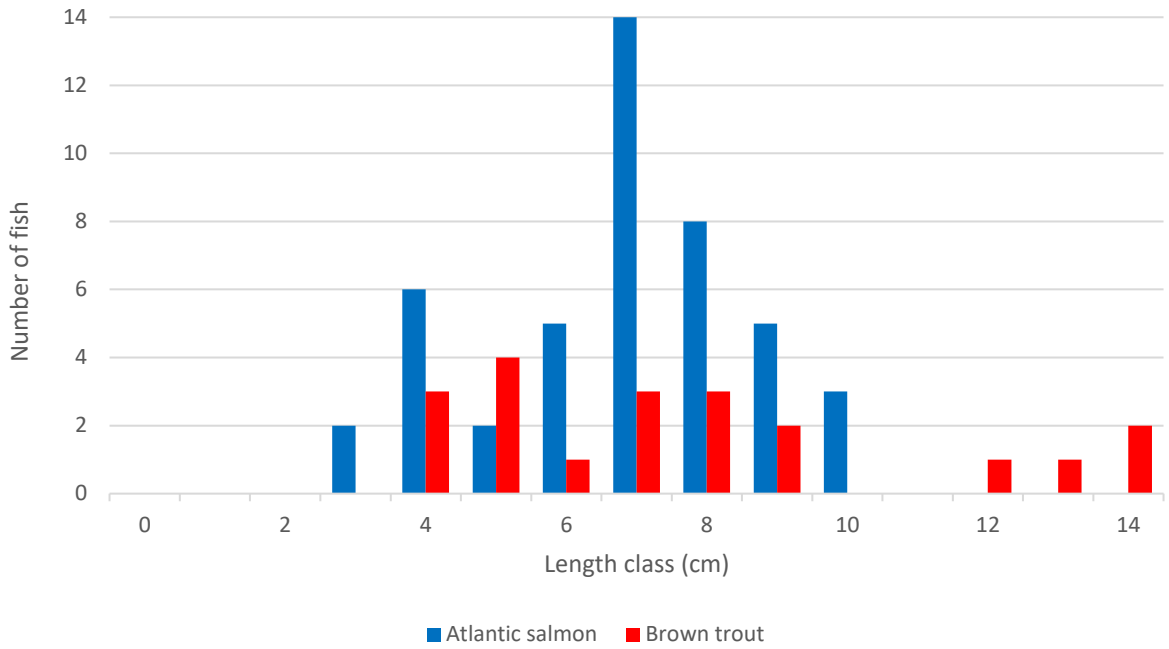

Figure 3.1.10 Length frequency distribution recorded via electro-fishing at site A16, July 2024

Plate 3.1.16 Representative image of site A16 on the Buncrowey River, July 2024

3.1.17 Site A17 – Rathgoonaun River, Crowagh or Dunneill

Brown trout (*n*=5) was the only fish species recorded via electro-fishing at site A17 on the Rathgooaun River at a local road crossing (**Figure 3.1.11**).

The Buncrowey River tributary at this location was of relatively low fisheries value given historical modifications (straightening), the shallow profile, riparian tunnelling, bed compaction and siltation pressures. However, a small population of mixed cohort brown trout were present. The site was of poor value as a spawning or holding habitat. Despite some suitability, no European eel were recorded. The swift flowing stream was unsuitable for lamprey at this location (none recorded).

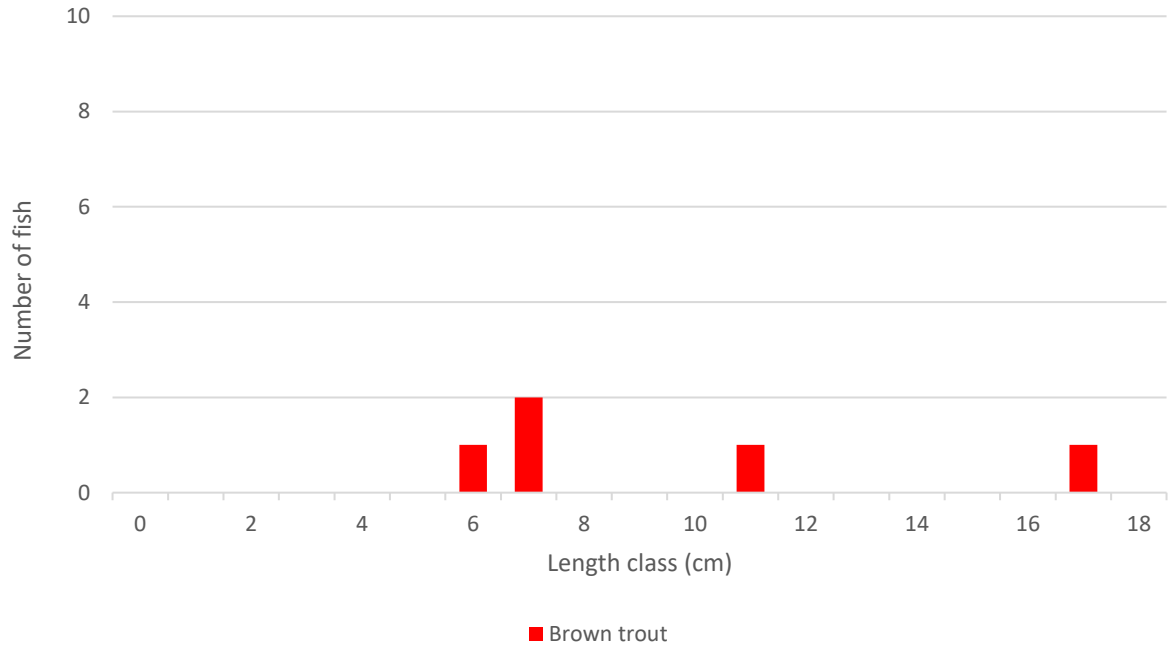

Figure 3.1.11 Length frequency distribution recorded via electro-fishing at site A17, September 2024

Plate 3.1.17 Representative image of site A17 on the Rathgooaun River, July 2024

3.1.18 Site A18 – Buncrowey River, Buncrowey

Atlantic salmon (*n*=87), brown trout (*n*=17) and European eel (*n*=1) were recorded via electro-fishing at site A18 on the Buncrowey River at a local road crossing (**Figure 3.1.12**).

The site was a very high quality salmonid nursery, supporting relatively high densities of juvenile (mostly 1+) Atlantic salmon and, less so, brown trout. The site featured a high frequency of large bryophyte-rich boulder and cobble which provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent (and better suited to salmon). Small pools and bank scours provided some good quality holding areas for migratory adults albeit mostly at higher water levels. The site was of high suitability for European eel although only a low density were recorded. The high energy spate channel was unsuitable for lamprey at this location (none recorded).

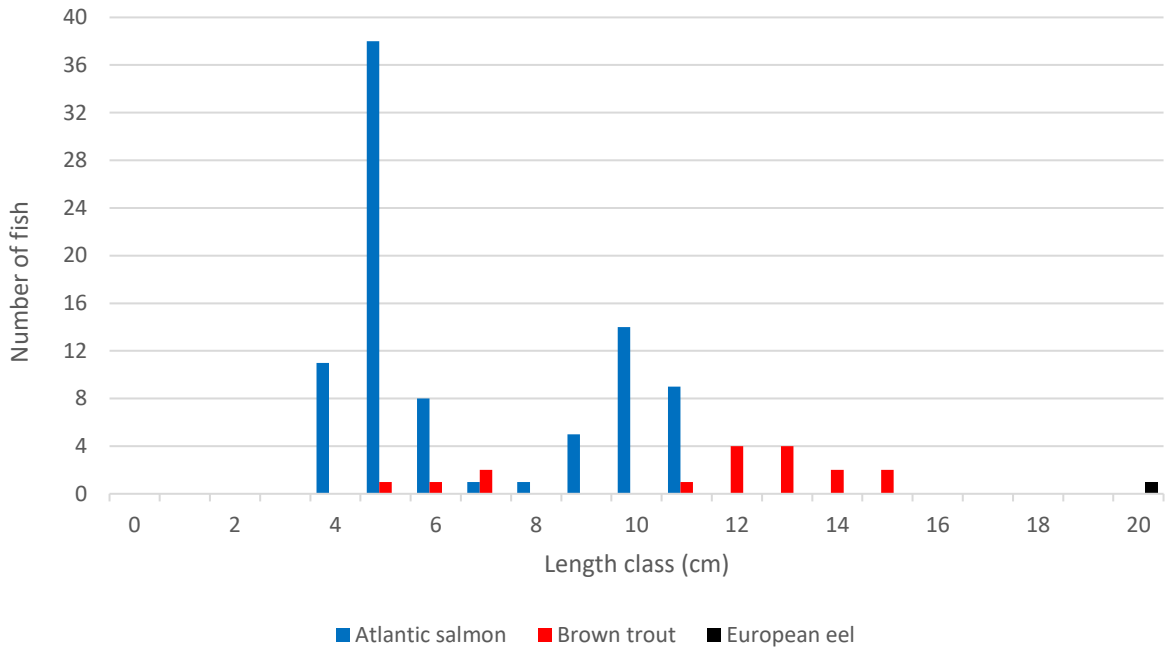

Figure 3.1.12 Length frequency distribution recorded via electro-fishing at site A18, September 2024

Plate 3.1.19 Juvenile Atlantic salmon & brown trout recorded at site A18 on the Buncrowey River, July 2024

3.1.19 Site A19 – Easky River, N59 road crossing

Atlantic salmon (*n*=65), sea trout (*n*=2), brown trout (*n*=11) and European eel (*n*=1) were recorded via electro-fishing at site A19 on the lower reaches of the Easky River at the N59 road crossing (**Figure 3.1.13**).

The site was a high quality salmonid nursery, supporting relatively high densities of juvenile Atlantic salmon. The site featured a high frequency of large bryophyte-rich boulder and cobble and provided abundant refugia for juvenile salmonids. Although some spawning substrata was present this was limited in extent (and better suited to salmon). Small pools associated with bank scours (upstream of bridge) and large deep pool (downstream of bridge) provided high quality holding areas for migratory adults, including anadromous sea trout (present in low densities). The site was of high suitability for European eel although only a low density were recorded. The high energy spate channel, with several natural barriers (cascades), was unsuitable for lamprey (none recorded).

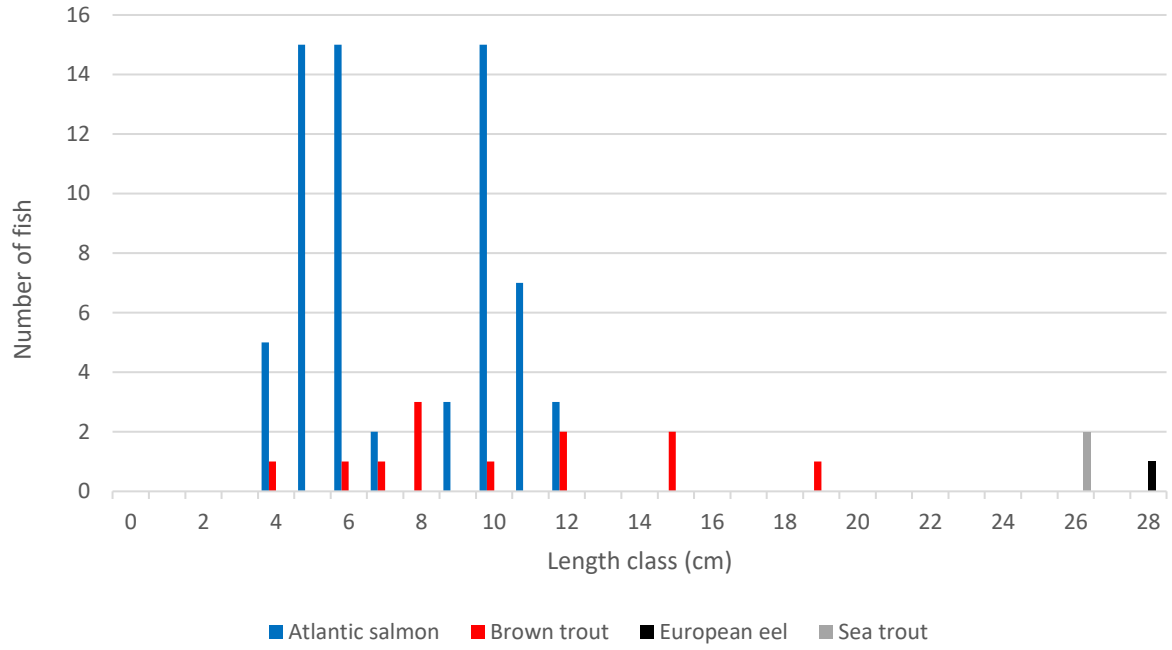

Figure 3.1.13 Length frequency distribution recorded via electro-fishing at site A19, September 2024

Plate 3.1.19 Anadromous Sea trout recorded site A19 on the Easky River, July 2024

3.1.20 Site A20 – Carrownrush River, Farranmacfarrell

Despite some suitability for salmonids and European eel, no fish were recorded via electro-fishing at site A20 on the Carrownrush River (36G76) at a local road crossing. The narrow river suffered from low summer flows and this coupled with historical modifications (straightening & deepening) and water quality pressures (i.e. siltation, including peat) precluded the presence of fish during the survey.

Plate 3.1.20 Representative image of site A20 on the Carrownrush River, July 2024

3.1.21 Site A21 – Carrownrush River, Knockacullen

Despite some good suitability for salmonids and European eel, no fish were recorded via electro-fishing at site A21 on the lower reaches of the Carrownrush River at a local road crossing. The historically straightened and deepened alkaline channel suffered from low summer flows at the time of survey. This precluded the presence of viable, nursery, spawning and holding habitat for salmonids and other fish (Plate 3.1.21). No fish were recorded during the survey.

Plate 3.1.21 Representative image of site A21 on the Carrownrush River, July 2024

3.1.22 Site L1 – Lough Croane

Lough Croane was a twin basin upland lake covering 1ha surface area within the site boundary. The lake had good potential for brown trout (observed surface feeding during the site visit) with some limited littoral spawning habitat present along windward shores. Likewise, there was also suitability for European eel although the location in the upper reaches of the catchment and poor fluvial connectivity with downstream habitats reduced the likelihood of their presence.

Plate 3.1.22 Representative image of site L1 at Lough Croane, September 2024

3.1.23 Site L2 – Lough Anlaba

Lough Anlaba was a loosely triangular shaped upland lake covering 0.5ha surface area within the vicinity of the EIAR site boundary. The very shallow (<0.5m) and homogenous lake featured a bed of compacted gravel and cobble with frequent boulder. There was a high cover of floc and flocculant peat, with high vegetation cover (mostly bulbous rush, *Juncus bulbosus*). Thus, the lake was of relatively low value for salmonids (none observed). Some salmonid spawning habitat was present at the lake outflow and also along windward shores given dominance of hard substrata, locally. Brown trout were recorded from the outflow channel via electro-fishing at site A11, downstream of the lake, in July 2024. The lake was of some suitability for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment.

Plate 3.1.23 Representative image of site L2 at Lough Anlaba, September 2024

3.1.24 Site L3 – Lough Nacrowagh

Lough Nacrowagh was a small upland oligotrophic lake of 0.5ha bordered by coniferous afforestation within the vicinity of the EIAR site boundary. The sheltered lake was 1-4m deep with a bed of humic soft sediment and frequent growth of bulbous rush. The outflow had been modified historically and represented a drainage channel. The lake (and outflowing channel) was of low value for salmonids although the lake likely supported a small population of brown trout. The lake was of some suitability for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment.

Plate 3.1.24 Representative image of site L3 at Lough Anlaba, September 2024

3.1.25 Site L4 – Lough Brickeagh

Lough Brickeagh was a small, sheltered upland oligotrophic lake of 0.4ha bordered by coniferous afforestation within the vicinity of the EIAR site boundary. The shallow lake was typically 1-2m deep with low water turbidity and low levels of peat staining. The presence of large boulder, cobbles, gravels and sand throughout the lake littorals meant that peat erosion was low. These areas provided some suitability for lacustrine spawning brown trout which were observed feeding during the site visit. The lake was of some suitability for European eel although the likelihood of their presence would be reduced given the location of the lake in the upper reaches of the catchment and limited connectivity with the adjacent Buncrowey River.

Plate 3.1.25 Representative image of site L4 at Lough Brickeagh, September 2024

3.1.26 Site L5 – Lough Nafullow

Lough Nafullow was a 4ha upland oligotrophic lake bordered by blanket bog within the vicinity of the EIAR site boundary. The lake was 1-4m deep with a bed of humic soft sediment and high levels of peat staining. The lake had eroded peat margins that graded into the adjoining peatland and numerous small peninsulas and bays with an outflowing river in the northwestern corner. The was some moderate suitability for salmonids, with brown trout observed feeding during the site visit. The lake also had moderate suitability for European eel as it had connectivity with the downstream Easky River.

Plate 3.1.26 Representative image of site L5 at Lough Nafullow, September 2024

3.1.27 Site P1 – Pond, Tawnadremira

Site P1 was a small 0.5ha pond within the vicinity of the EIAR the site boundary, adjacent to Lough Anlaba. The pond was 0.5-1m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in depth. The pond featured near total cover of *Sphagnum cuspidatum*. The site was not of fisheries value given its shallow depths, very high vegetation cover and lack of connectivity from superior fisheries habitats.

Plate 3.1.27 Representative image of site P1, September 2024

3.1.28 Site P2 – Pond, Tawnadremira

Site P2 was a part of a small pond complex within the vicinity of the EIAR site boundary adjacent to Lough Anlaba. The site comprised a main irregular basin of 0.02ha with several smaller and very shallow connected satellite ponds/scrapes. The main basin was <0.2m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in depth. Vegetation cover was high with frequent bog pondweed. The site was not of fisheries value given its very shallow depths and isolation from downstream riverine habitats.

Plate 3.1.28 Representative image of site P2, September 2024

3.1.29 Site P3 – Pond, Tawnadremira

Site P3 was located at a small pond complex within the vicinity of the EIAR site boundary. The site comprised a main irregular basin of 0.02ha with several smaller and very shallow connected satellite ponds/scrapes. The main basin was just 0.05-0.25m deep with a bed composed entirely of flocculent peat/soft sediment of up to 0.5m in thickness. Site P3 was not of fisheries value given its very shallow depths and isolation from downstream riverine habitats.

Plate 3.1.29 Representative image of site P3, September 2024

3.1.30 Site P4 – Pond, Tawnadremira

Site P4 was located at a small pond within the vicinity of the EIAR site boundary, adjacent to Lough Croane (no surface water connectivity). The small pond complex featured a main basin of 100m^2 with several small very shallow satellite scrapes. The main basin was 0.2-0.3m deep with a bed composed entirely of flocculent peat/soft sediment of >1.5m in depth. The shallow, clear water pond supported sparse vegetation. Site P4 was not of fisheries value given its small size, shallow depths and isolation from downstream riverine habitats.

Plate 3.1.30 Representative image of site P4, September 2024

3.1.31 Site P5 – Pond, Crowagh or Dunneill

Site P5 was located at a small oligotrophic pond of 0.025ha within the vicinity of the EIAR site boundary, adjacent to Lough Nafullow (no connectivity). The small circular pond was 1-1.5m deep with a soft peat base with some localised pockets of *Sphagnum cuspidatum* in the margins which graded into upland blanket bog (PB2). Macrophyte growth was limited. Site P4 was of poor fisheries value given its small size, siltation and isolation from downstream riverine habitats. The site was a poor quality salmonid habitat (none observed). However, given the close proximity to Lough Nafullow, there was some suitability for European eel.

Plate 3.1.31 Representative image of site P5, September 2024

3.1.32 Site P6 – Pond, Crowagh or Dunneill

Site P6 was a large oligotrophic wetland and pond complex of 0.3ha in size within the vicinity of the EIAR site boundary. The shallow peatland basin supported pools of water 0.1-0.2m deep with near total cover of *Sphagnum* spp. mosses. Site P6 was not of fisheries value given its small size, shallow depths, high vegetation cover (late successional basin) and the absence of connectivity to riverine watercourses.

Plate 3.1.32 Representative image of site P6, September 2024

3.1.33 Site P7 – Pond, Crowagh or Dunneill

Site P7 was a small pond and wetland complex located in banket bog adjacent to sites P5 and L5, within the vicinity of the EIAR site boundary. The main basin was an oval pond of 0.02ha and 1-2.5m in depth. The pond had an irregular margin that was at grade with the adjoining peatland a soft peat base. Site P7 was of poor fisheries value given its small size and isolation from downstream riverine habitats. However, there was some low suitability for brown trout and European eel given the proximity to Lough Nafullow.

Plate 3.1.33 Representative image of site P7, September 2024

3.1.34 Site B1 – Grangebeg Barr River, Ballygreighan Barr

Brown trout (*n*=10) was the only fish species recorded via electro-fishing at site B1 on the upper reaches of the Grangebeg Barr River at an access track crossing with the existing Kingsmountain wind farm (**Figure 3.1.14**).

Despite its location in the upper reaches of the watercourse, the high gradient site supported a surprisingly high density of fish, with a mixed cohort brown trout present both upstream and downstream of the track culvert. Small plunge pools between high gradient cascades provided valuable holding areas for all age classes. The spawning value of the site was low (given predominance of large substrata) but evidently sufficient to support a recruiting population. Abundant cobble and boulder provided suitable refugia and nursery areas. Despite some physical suitability, no European eel were recorded, likely reflecting the location of the site in the uppermost reaches of the catchment. The upland spate channel was unsuitable for lamprey at this location (none recorded).

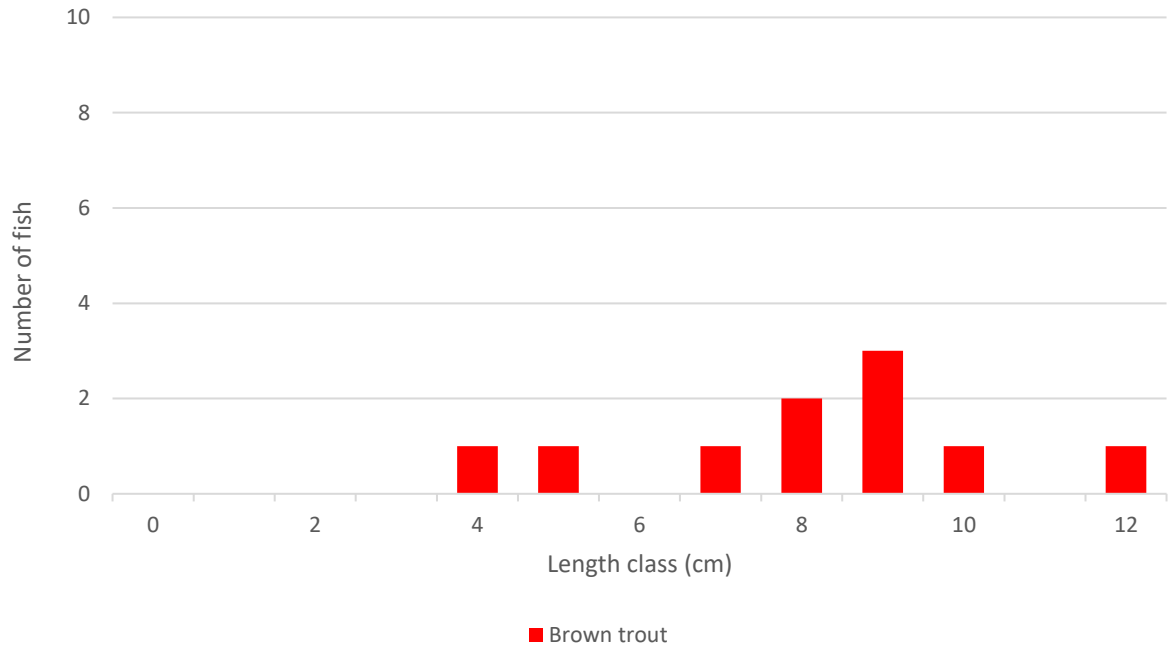

Figure 3.1.14 Length frequency distribution recorded via electro-fishing at site B1, July 2024

Plate 3.1.34 Mixed cohort brown trout recorded on the upper reaches of the Grangebeg Barr River, July 2024

3.1.35 Site B2 – Ballygreighan Barr River, Kingsmountain

Brown trout (*n*=32) was the only fish species recorded via electro-fishing at site B2 on the upper reaches of the Ballygreighan Barr River at an access track crossing within the existing Kingsmountain wind farm (**Figure 3.1.15**).

Despite its location in the upper reaches of the watercourse, the site supported a surprisingly high density of fish, with mixed cohort brown trout present both upstream and downstream of the track culvert. Small plunge pools between cascades provided valuable holding areas for all age classes, with large pool at the culvert providing particularly valuable holding habitat. Localised mixed, uncompacted gravels in pools provided good quality spawning habitat. Abundant cobble and boulder provided suitable refugia and nursery areas. Despite some physical suitability, no European eel were recorded, likely reflecting the location of the site in the uppermost reaches of the catchment. The upland spate channel was unsuitable for lamprey at this location (none recorded).

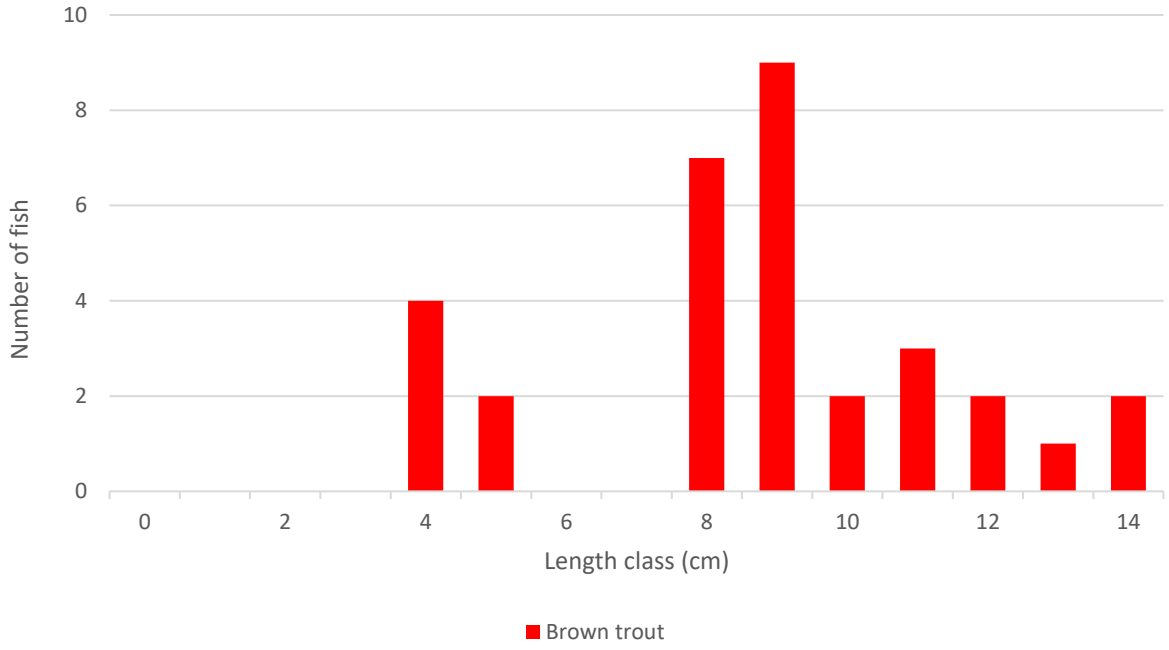

Figure 3.1.15 Length frequency distribution recorded via electro-fishing at site B2, July 2024

Plate 3.1.35 Representative image of site B2 on the Ballygreighan Barr River, July 2024

3.1.36 Site B3 – Unnamed stream, Kingsmountain

No fish were recorded via electro-fishing at site B3 on an unnamed stream tributary of the Ballygreighan Barr River. The narrow peat-stained channel was not of fisheries value given high rates of siltation, shallow depths, narrow widths and poor connectivity with downstream habitats. However, the downstream connecting Ballygreighan Barr River was of high value for salmonids with abundant spawning, nursery and holding habitat in the meandering channel.

Plate 3.1.36 Representative image of site B3 on an unnamed Ballygreighan Barr River tributary, July 2024

3.1.37 Site B4 – Unnamed stream, Kingsmountain

No fish were recorded via electro-fishing at site B4 on an unnamed stream tributary of the Ballygreighan Barr River. The narrow peat-stained channel conveyed minimal, intermittent water flows and was more of a seepage area through blanket bog rather than a flowing watercourse. The channel was not of fisheries value given high rates of siltation, shallow depths, narrow widths, poor flows and poor connectivity with downstream habitats. However, the adjoining Ballygreighan Barr River was of high value for salmonids with abundant spawning, nursery and holding habitat in the meandering channel.

Plate 3.1.37 Representative image of site B4 on an unnamed Ballygreighan Barr River tributary, July 2024

3.1.38 Site B5 – Ballygreighan Barr River, Dunowla

Brown trout (*n*=33) was the only fish species recorded via electro-fishing at site B3 on the upper reaches of the Ballygreighan Barr River approximately 2.5km downstream of site B2 (**Figure 3.1.16**).

The site was of high value for salmonids, supporting a relatively high density of mixed cohort trout (albeit mostly adults). The site provided good quality holding and nursery habitat. Whist present, spawning habitat (gravels & smaller cobble) was highly localised with some peat (siltation) impacts evident. Despite good suitability for European eel, none were recorded. Similarly, the absence of Atlantic salmon would indicate downstream barriers to fish migration. The upland spate channel was unsuitable for lamprey at this location (none recorded).

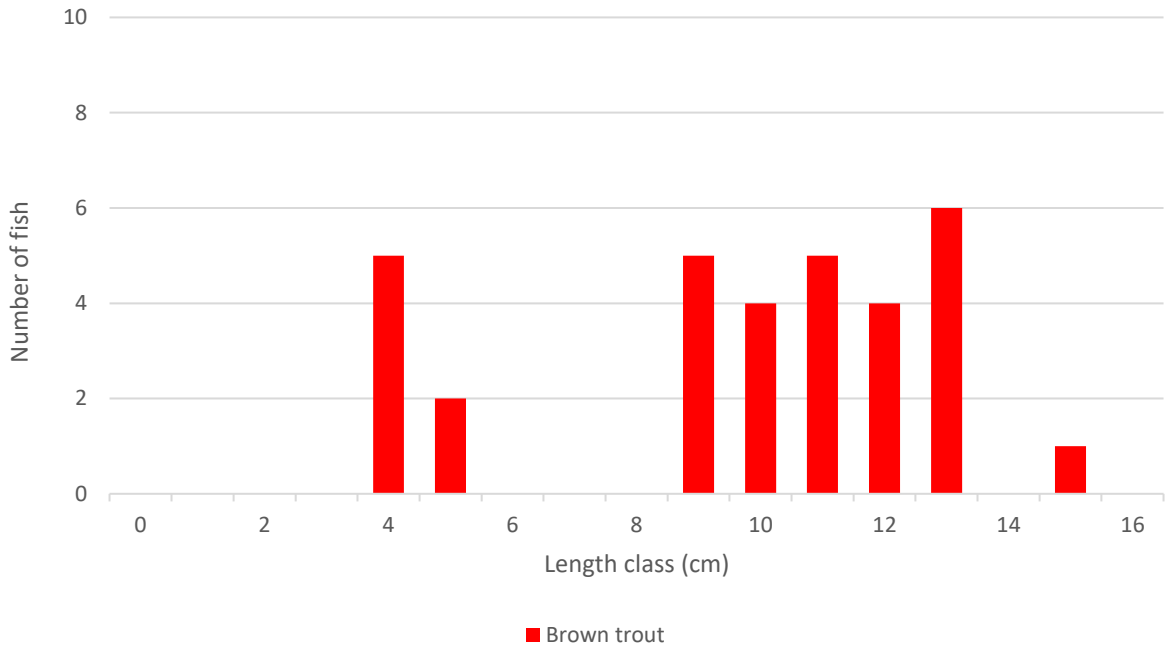

Figure 3.1.16 Length frequency distribution recorded via electro-fishing at site B5, July 2024

Plate 3.1.38 Mixed cohort brown trout recorded at site B5 on the Ballygreighan Barr River, July 2024

3.1.39 Site B6 – Unnamed stream, Ballyglass

No fish were recorded via electro-fishing at site B6 on a small tributary of the Dunneill River at an access track crossing adjacent to the Dunneill 220kV sub-station. The narrow stream suffered from low summer flows and this coupled with historical modifications and water quality pressures (including recent clear-fell downstream of the culvert) precluded the presence of fish during the survey.

Plate 3.1.39 Representative image of site B6 on an unnamed Dunneill River tributary, July 2024

3.1.40 Site B7 – Dunneill River, Crowagh or Dunneill

Brown trout (*n*=27) was the only fish species recorded via electro-fishing at site B7 on the Dunneill River at a local road crossing (**Figure 3.1.17**).

The site overall was of high value for salmonids, supporting a moderate density of mixed cohort trout (albeit mostly adults). The site provided good quality nursery habitat given an abundance of instream refugia (boulders & cobble). The site was of moderate value only as a spawning habitat given the predominance of larger substrata (i.e. paucity of gravels). Small pools between boulder cascade reaches offered some good quality holding areas for adult salmonids. Despite good suitability for European eel, none were recorded. Similarly, the absence of Atlantic salmon in spite of habitat suitability would indicate downstream barriers to fish migration. The upland spate channel was unsuitable for lamprey at this location (none recorded).

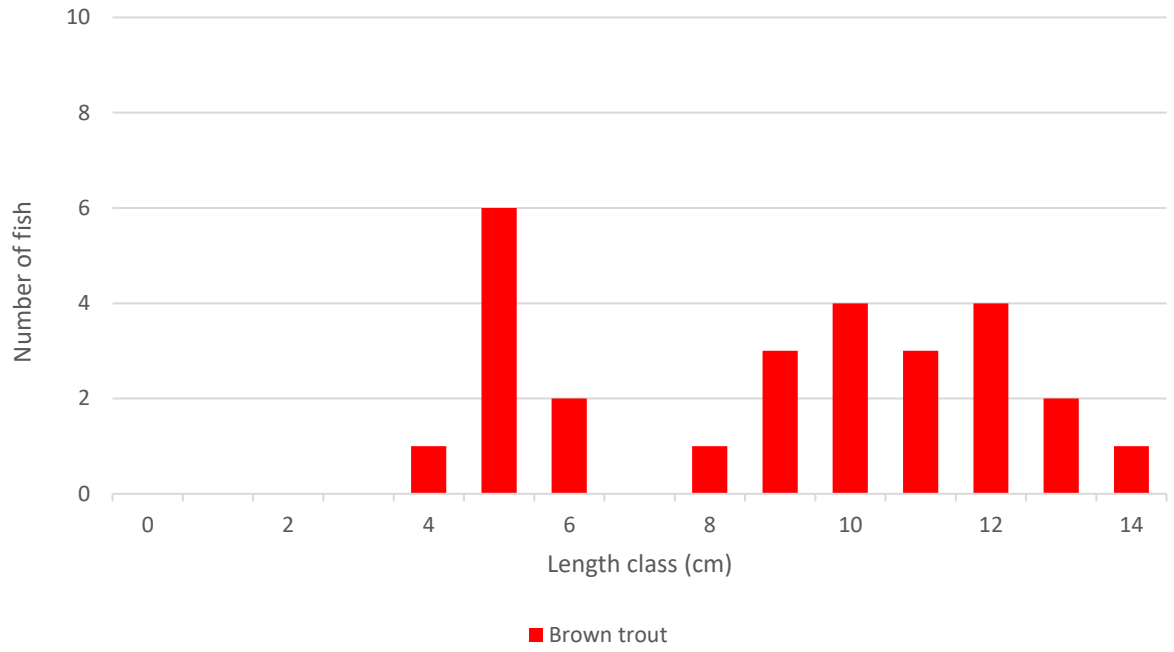

Figure 3.1.17 Length frequency distribution recorded via electro-fishing at site B7, July 2024

Plate 3.1.40 Representative image of site B7 on the Dunneill River, July 2024

3.1.41 Site B8 – Dunneill River, Dunneill

Brown trout (*n*=59) and European eel (*n*=2) were the only fish species recorded via electro-fishing at site B8 on the lower reaches of the Dunneill River at a local road crossing, approximately 5km downstream of site B7 (**Figure 3.1.18**).

The site was of good value for salmonids supporting a relatively high density of mixed cohort fish.

Deep glide and pool below the historical weir and bedrock steps provided valuable holding habitat, with bryophyte-rich cobble riffle areas providing good quality nursery habitat. The site was of relatively poor value as a salmonid spawning area given the paucity of smaller substrata. Bank scours, boulders and submerged tree root systems offered high quality eel refugia and supported a low density of fish. Flocculent soft sediment accumulations were not suitable for lamprey ammocoete burial, with no lamprey spawning habitat present. No lamprey were recorded during the survey.

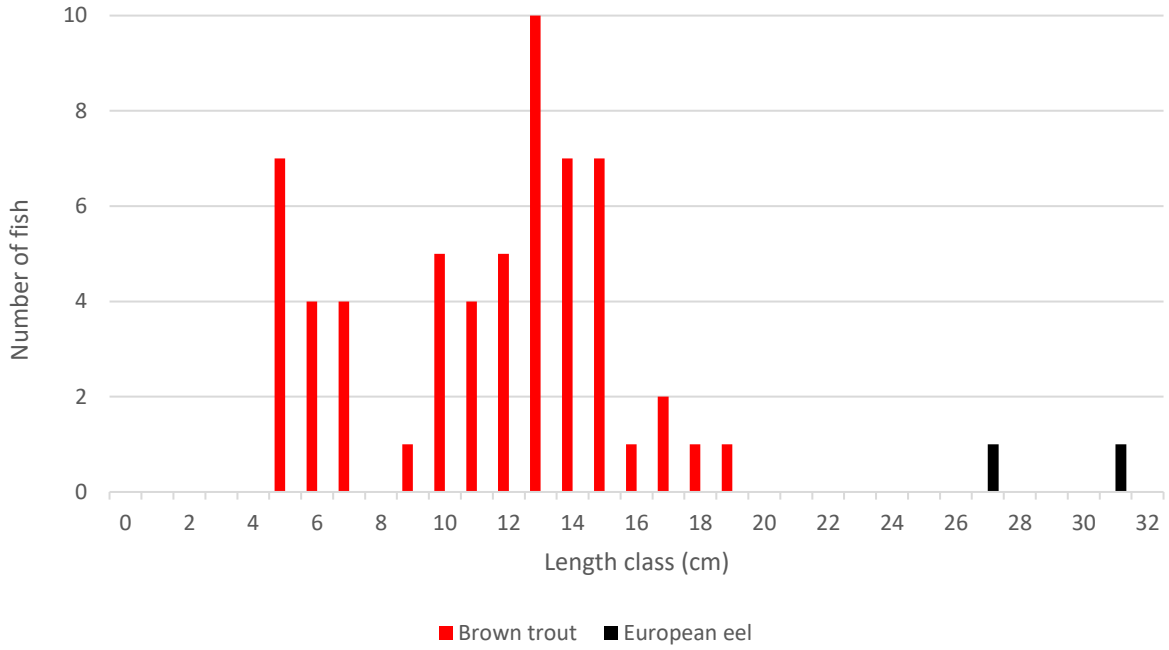

Figure 3.1.18 Length frequency distribution recorded via electro-fishing at site B8, July 2024

Plate 3.1.41 European eel and brown trout recorded at site B8 on the Dunneill River, July 2024

3.1.42 Site B9 – Doonbeakin River, Dunowla

No fish were recorded via electro-fishing at site B9on the upper reaches of the Doonbeakin River at a local road crossing (single masonry arch) on the Proposed Grid Connection Route. The narrow upland stream was not of fisheries value at the time of survey given low summer flows, poor fluvial connectivity with downstream habitats and significant siltation.

Plate 3.1.42 Representative image of site B9 on the Doonbeakin River, July 2024

3.1.43 Site B10 – Doonbeakin River, Carrowcor Bridge

Brown trout (*n*=10) and European eel (*n*=1) were the only fish species recorded at site B10 on the Doonbeakin River at Carrowcor Bridge (N59).

The site was of moderate value for salmonids only, supporting a low density of adult brown trout with only a single juvenile recorded. This reflected the paucity of suitable spawning habitat (compacted, calcified, silted gravels). Deep pool between bedrock sheets provided some moderate quality holding areas. European eel habitat was moderate at best given a paucity of instream refugia with a low density recorded. Despite some suitability for lamprey ammocoetes in localised sand accumulations, none were recorded via targeted electro-fishing.

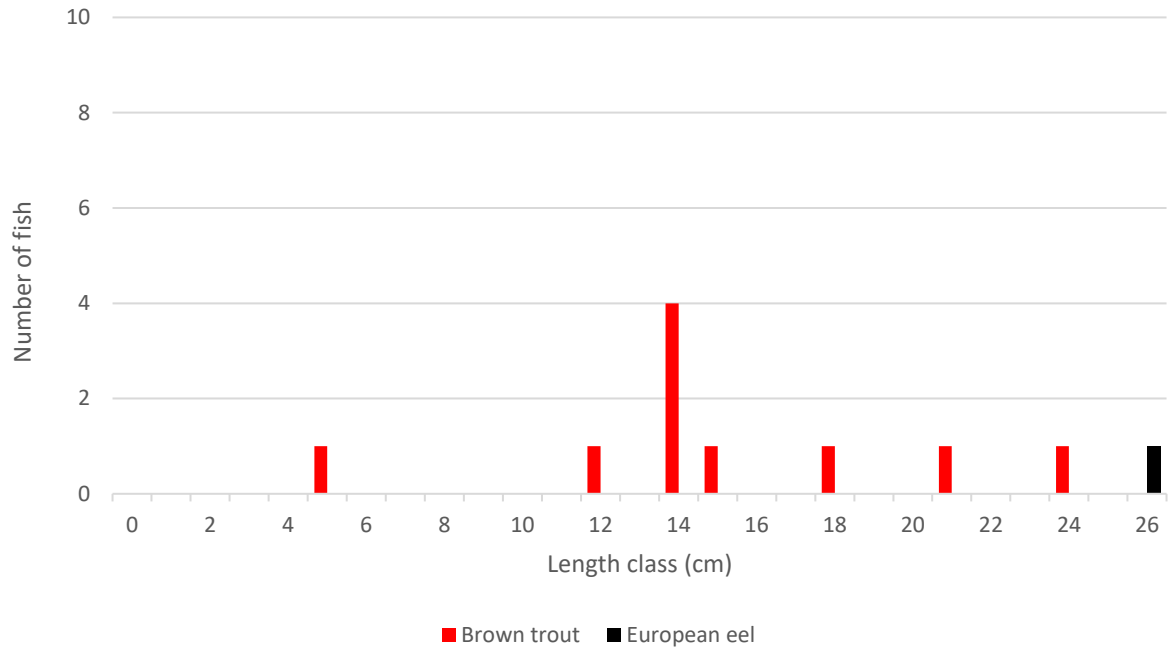

Figure 3.1.19 Length frequency distribution recorded via electro-fishing at site B10, July 2024

Plate 3.1.43 Adult brown trout recorded at site B10 on the Doonbeakin River, July 2024

3.1.44 Site B11 – Cashelboy River, Kingsmountain

Brown trout (*n*=2) was the only fish species recorded at site B11 on the Cashelboy River at a local road crossing (**Figure 3.1.20**).

The narrow channel at this location (0.5-1m wide) was of relatively low fisheries value although supported a low density of juvenile trout. Salmonid spawning habitat by way of finer gravels and

smaller cobble was present although impacted by siltation (including from bank poaching by sheep). Riffle and shallow glide with cobble and small boulder refugia provided some moderate quality nursery habitat although the channel was too small and shallow at this point to support a more significant fish population. The paucity of deeper pool reduced the value for adult salmonids although some deeper areas and bank scours on meanders offered valuable refugia in the narrow typically open channel. European eel habitat was of poor quality and none were recorded. The small upland river was not of value for lamprey at this location with an absence if nursery habitat (none recorded).

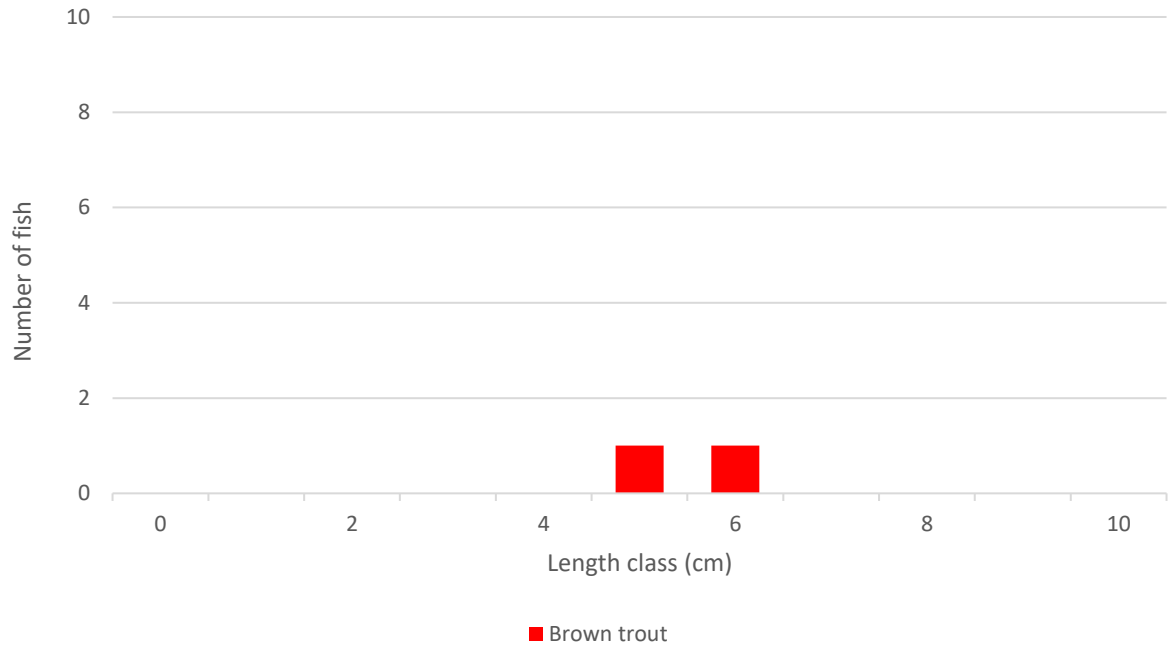

Figure 3.1.20 Length frequency distribution recorded via electro-fishing at site B11, July 2024

Plate 3.1.44 Representative image of site B11 on the Cashelboy River, July 2024

3.1.45 Site B12 – Lugdoon River, Kingsmountain

Brown trout (*n*=13) was the only fish species recorded at site B12 on the upper reaches of the Lugdoon River at a local road crossing (**Figure 3.1.21**).

The site was of moderate value for salmonids, with a small mixed cohort population present. The site was of moderate value as a salmonid nursery with a lack of riparian shading, shallow depths and siltation pressures reducing the quality of habitat. However, abundant bryophyte-rich cobble and boulder offered valuable instream refugia. Salmonid spawning habitat was present but highly localised and limited in extent (predominance of larger substrata). Frequent small pools were often shallow (<0.2m) but provided valuable holding areas for low densities of adult salmonids. Despite some suitability for European eel, none were recorded. The upland spate channel was not suitable for lamprey at this location with an absence of nursery areas (none recorded during the surveys).

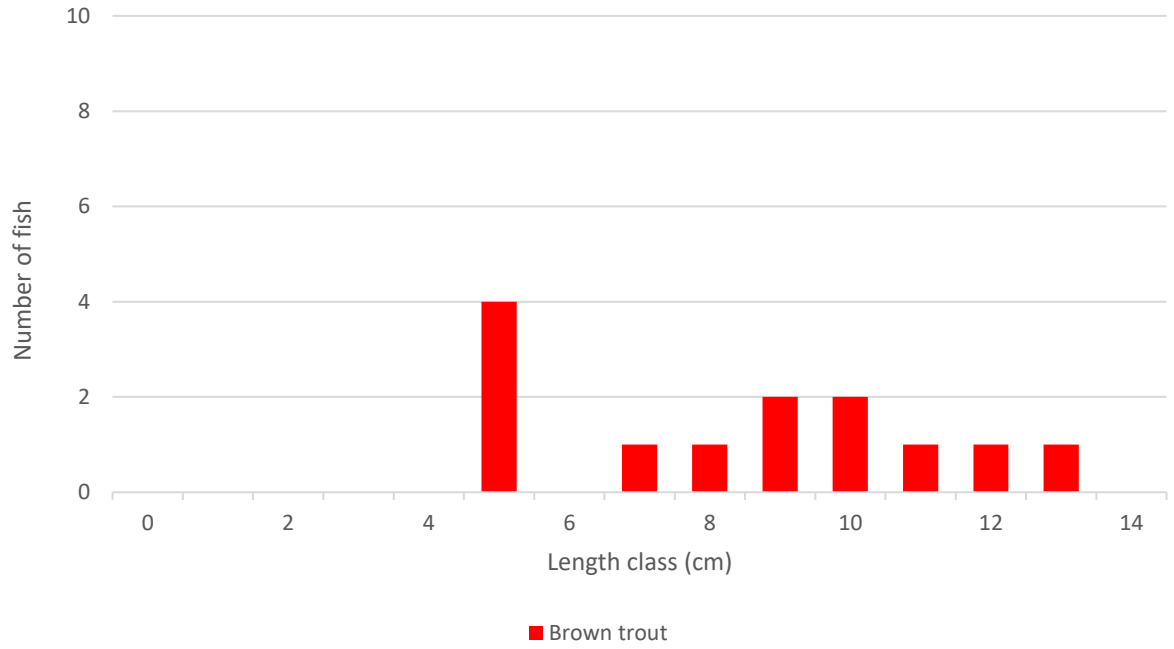

Figure 3.1.21 Length frequency distribution recorded via electro-fishing at site B12, July 2024

Plate 3.1.45 Mixed cohort brown trout recorded at site B12 on the upper reaches of the Lugdoon River, July 2024

3.1.46 Site B13 – Grange More River, Lugdoon

Brown trout (*n*=4) was the only fish species recorded at site B13 on the Grange More River at a local road crossing (**Figure 3.1.21**).

The site was of moderate value for salmonids, with a small mixed cohort population present. The Lugdoon River tributary suffered from low summer flows at the time of survey and this likely influenced the numbers of resident fish. The site was of moderate value as a salmonid nursery with the shallow depths and siltation and enrichment pressures reducing the quality of habitat. Some good quality spawning habitat by way of finer gravels and small cobble was present locally. The paucity of deeper pool areas reduced the value for adult salmonids considerably. Despite some moderate suitability for European eel, none were recorded. Soft sediment accumulations in the upland spate channel were shallow and sand dominated where present and thus unsuitable for lamprey ammocoetes (none recorded).

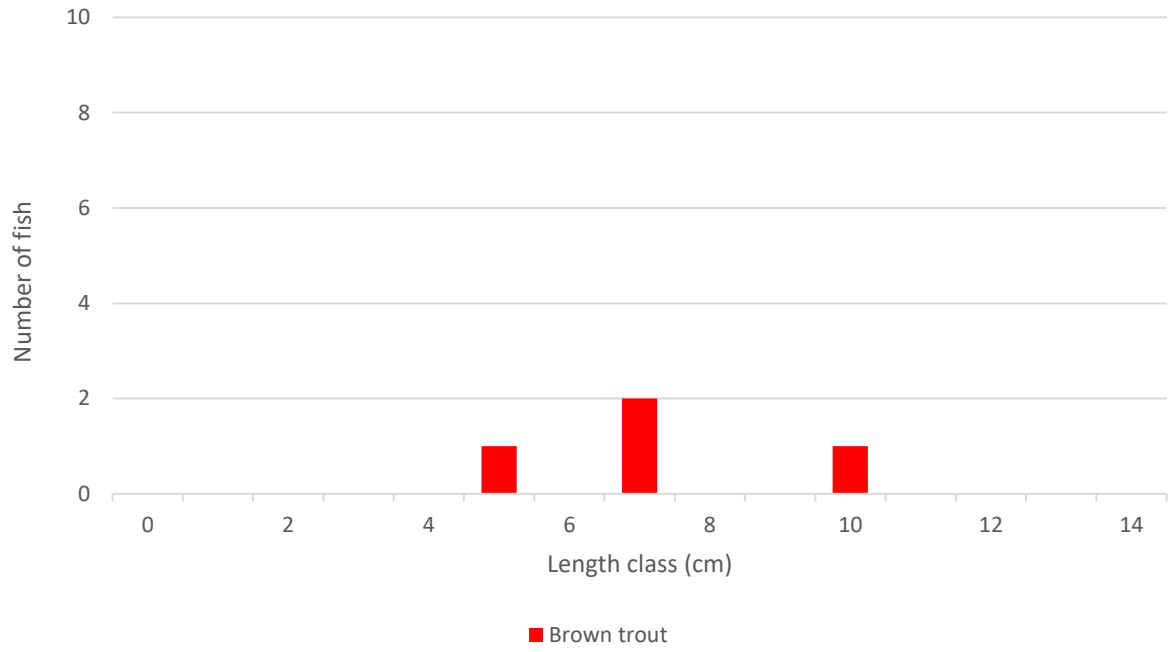

Figure 3.1.22 Length frequency distribution recorded via electro-fishing at site B13, July 2024

Plate 3.1.46 Juvenile brown trout (with *Piscicola geometra* leech) recorded at site B13 on the Grange More River, July 2024

3.1.47 Site B14 – Unnamed stream, Lugdoon

Brown trout (*n*=7) was the only fish species recorded at site B14 on an unnamed Lugdoon Stream tributary (**Figure 3.1.23**).

The site was of moderate value for salmonids, with a small mixed cohort population present. The

Lugdoon Stream tributary was of moderate value as a salmonid nursery with the shallow depths and siltation pressures reducing the quality of habitat. Furthermore, local culverting and livestock poaching (leading to erosion & siltation) likely restricted fish passage under low flows. Some moderate quality spawning habitat for salmonids and lamprey by way of mixed gravels was present locally. Small pool areas and natural bank scours provided some valuable areas for adult salmonids but such features were limited. Instream refugia offered some moderate quality nursery habitat but this was also limited. Suitability for European eel was poor (limited refugia) and none were recorded. Soft sediment accumulations in the upland spate channel were shallow and flocculent where present and thus unsuitable for lamprey ammocoetes (none recorded).

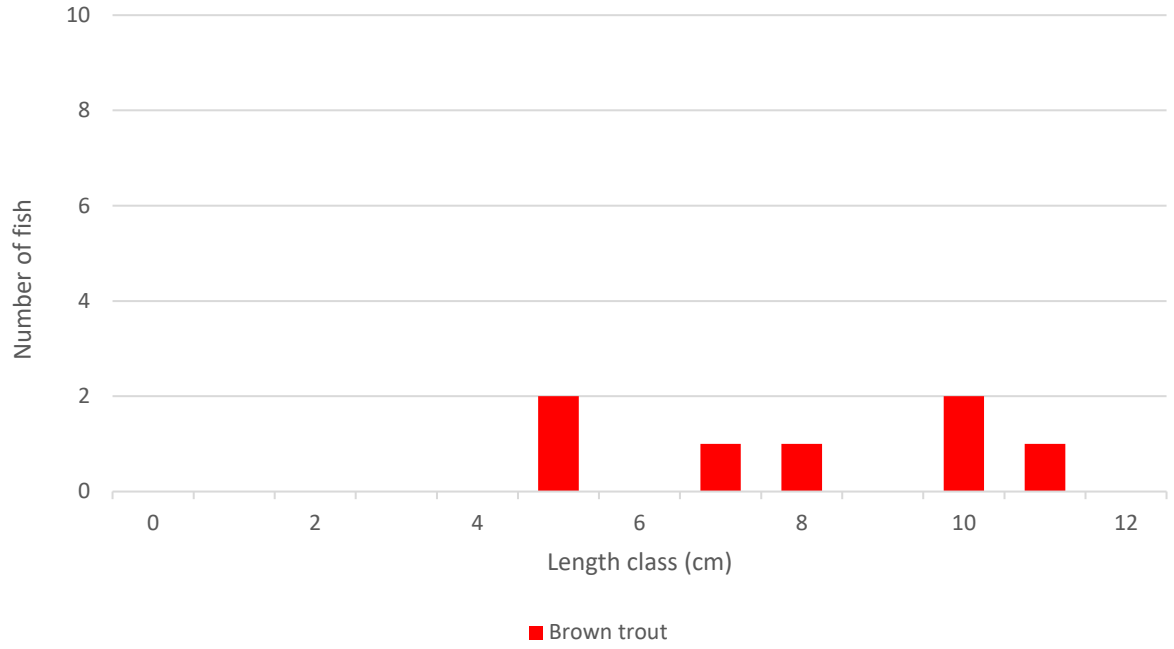

Figure 3.1.23 Length frequency distribution recorded via electro-fishing at site B14, July 2024

Plate 3.1.47 Brown trout recorded at site B14 on an unnamed Lugdoon Stream tributary, July 2024

3.1.48 Site B15 – Lugdoon Stream, Ballyeeskeen

Brown trout (*n*=47) were the only fish species recorded via electro-fishing at site B15 on the Lugdoon Stream at the N59 road crossing (**Figure 3.1.20**).

The site was of high value for salmonids supporting a relatively high density of fish, albeit mostly adult age classes. The clear-water alkaline site provided a combination of good quality spawning, nursery and holding habitat, with abundant instream refugia, localised spawning substrata and occasional deeper pool (including at a small weir). The compaction/calcification of the bed in many areas reduced the spawning value of the site. Despite high suitability for both Atlantic salmon and European eel, neither were recorded, thus indicating the presence of downstream barriers to migration. The weir at the bridge (0.75m fall) and associated apron was considered a barrier to fish migration at low flows. The high energy site was unsuitable for lamprey (none recorded).

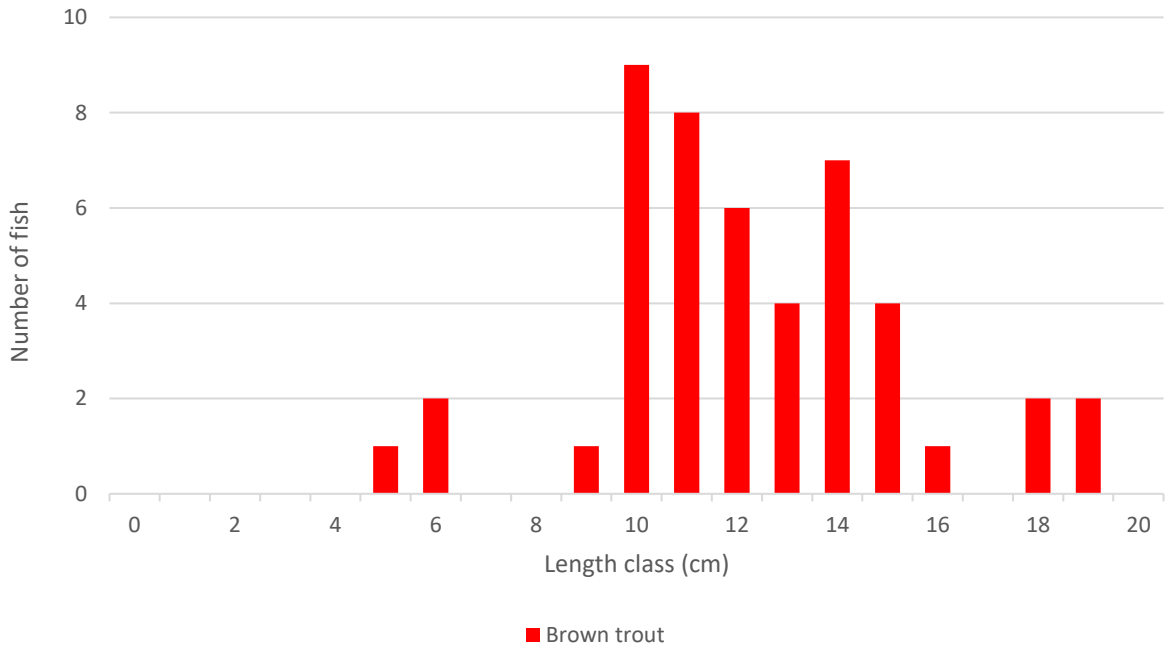

Figure 3.1.24 Length frequency distribution recorded via electro-fishing at site B15, July 2024

Plate 3.1.48 Representative image of site B15 on the Lugdoon Stream, July 2024

3.2 Sites crossed by the Proposed Grid Connection Route

3.2.1 Site C1 – Altans Stream, Dunowla

Three-spined stickleback (*Gasterosteus aculeatus*) (*n*=2) was the only fish species recorded via electro-fishing at site C1 on the Altans Stream at a local road crossing of the Proposed Grid Connection Route (**Figure 3.2.1**).

With the exception of low densities of this species, the site was not of fisheries value given its very small size, location in the upper reaches of the watercourse and poor fluvial connectivity with downstream habitats.

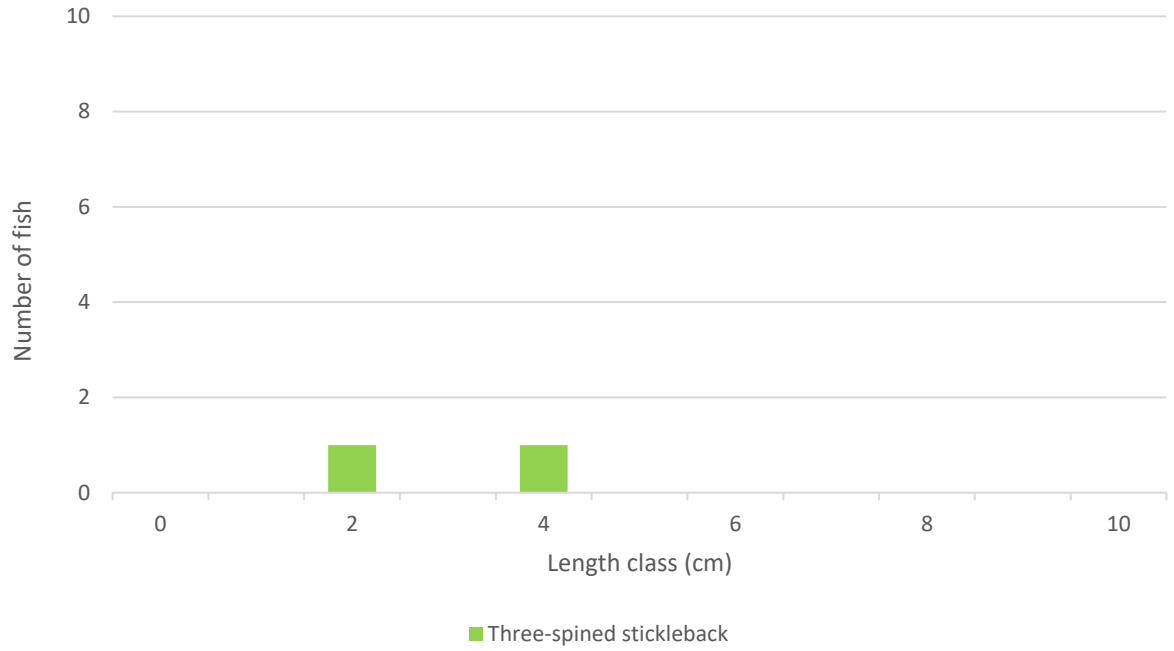

Figure 3.2.1 Length frequency distribution recorded via electro-fishing at site C1, September 2024

Plate 3.2.1 Representative image of site C1 on the Altans Stream, September 2024

3.2.2 Site C2 – Unmapped stream, Dunowla

Brown trout (*n*=11) and European eel (*n*=1) were the only fish species recorded via electro-fishing at site C2 on an unmapped stream at a local road crossing of the Proposed Grid Connection Route (**Figure 3.2.2**).

The site was of some value as a salmonid nursery supporting a low density of juveniles with no adults. This reflected the paucity of deeper holding habitat. Good quality spawning habitat was present locally (where smaller substrata dominated) with the site considered a moderate value nursery overall. European eel suitability was moderate with a single individual recorded from a pool area underneath the bridge. The small stream was not of value for lamprey at this location with an absence of nursery areas (none recorded).

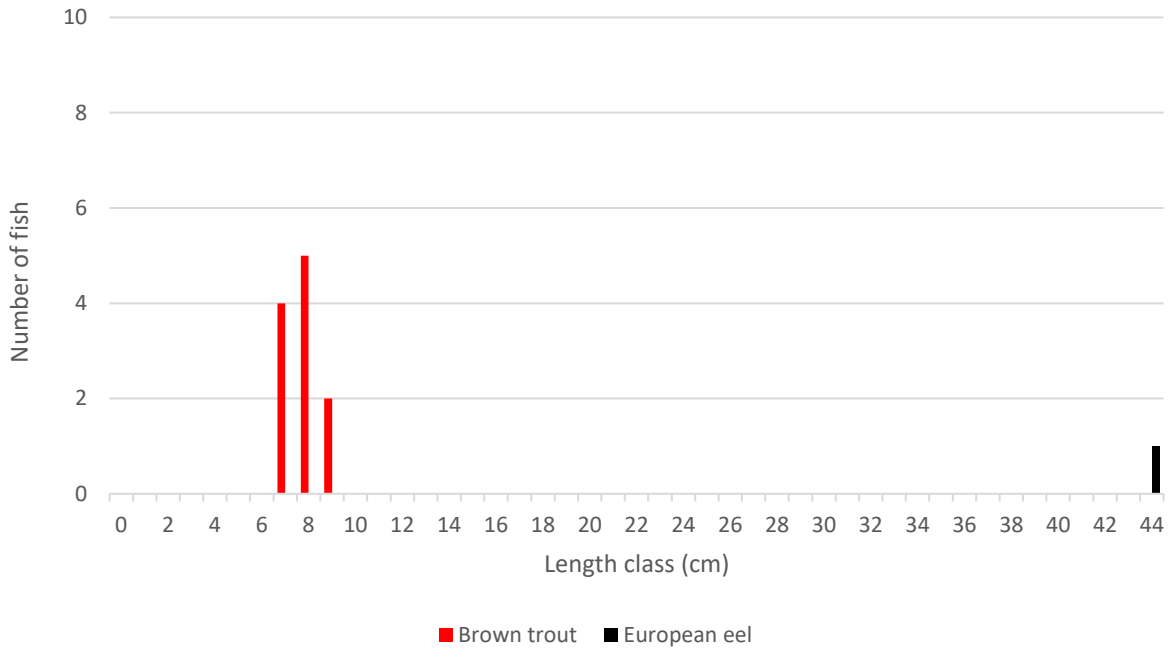

Figure 3.2.2 Length frequency distribution recorded via electro-fishing at site C2, September 2024

Plate 3.2.2 Juvenile cohort brown trout recorded at site C2 on an unnamed Altans Stream tributary, September 2024

3.2.3 Site C3 – Ballyeeskeen River, Dunowla

Three-spined stickleback (*n*=4) was the only fish species recorded via electro-fishing at site C3 on the Ballyeeskeen River (35B40) at a local road and Proposed Grid Connection Route crossing (**Figure 3.2.3**).

With the exception of low densities of this species, the highly calcareous channel at this location was not of fisheries value given its very small size, bed compaction/calcification, low summer flows, location in the upper reaches of the watercourse and poor fluvial connectivity with downstream habitats (inclusive of instream barriers).

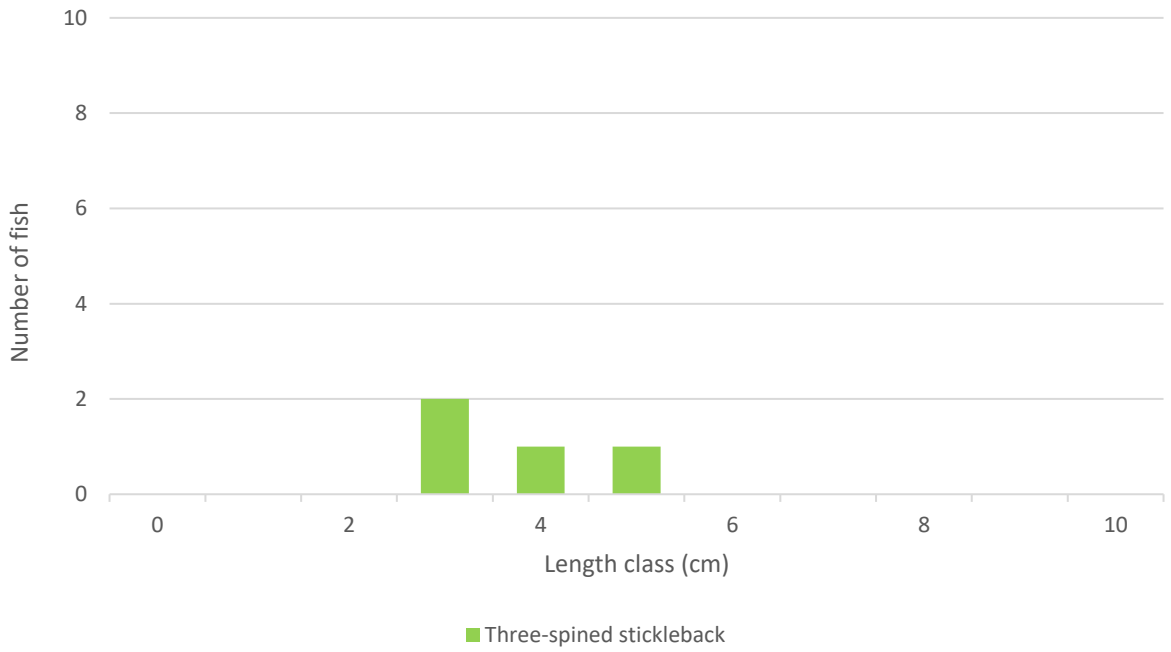

Figure 3.2.3 Length frequency distribution recorded via electro-fishing at site C3, September 2024

Plate 3.2.3 Representative image of site C3 on the Ballyeeskeen River, September 2024

3.2.4 Site C4 – Ardkill Stream, Dunowla

Brown trout (*n*=2) and three-spined stickleback (*n*=2) were the only fish species recorded via electro-fishing at site C4 on the Ardkill Stream at a local road crossing of the Proposed Grid Connection Route (**Figure 3.2.4**).

Despite some good physical suitability, the site only supported a very low density of juvenile trout. This likely reflected low summer flows and siltation pressures which reduced the quality of nursery and spawning habitat, respectively. The shallow site was of poor holding value for adult salmonids. Although lamprey spawning habitat was present (finer gravels), the absence of soft sediment nursery areas precluded the presence of the species. Suitability for European eel was low given the shallow depths of the stream at this location and paucity of suitable refugia (none recorded).

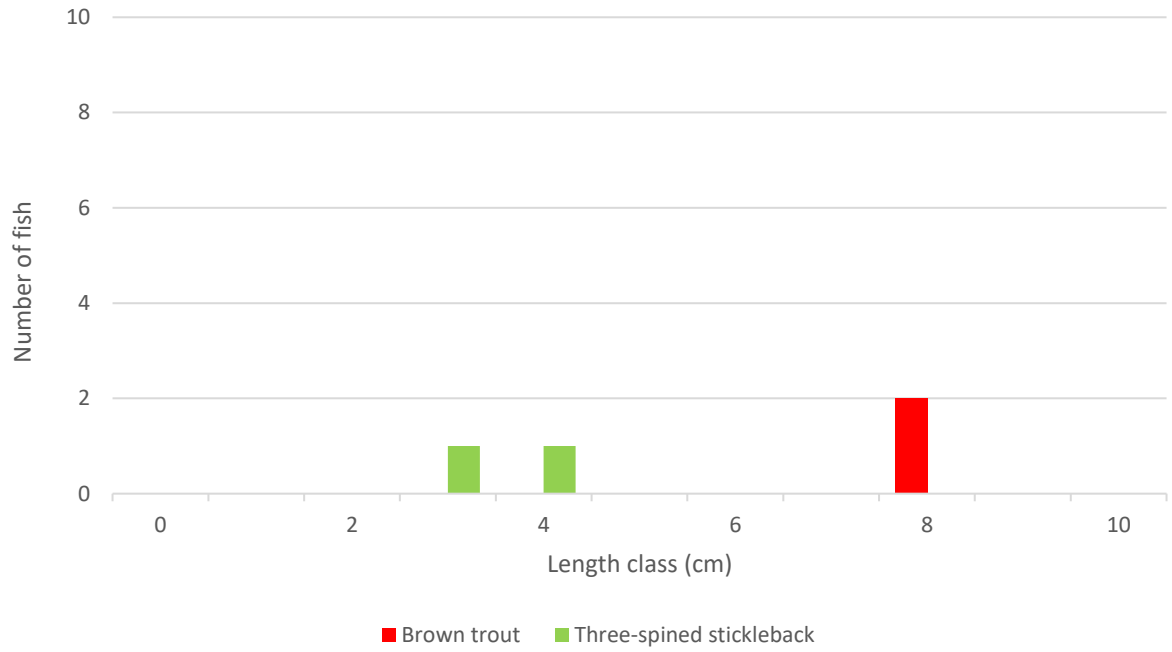

Figure 3.2.4 Length frequency distribution recorded via electro-fishing at site C4, September 2024

Plate 3.2.4 Representative image of site C4 on the Ardkill Stream, September 2024

3.2.5 Site C5 – Kilrusheighter River, N59 road crossing

Three-spined stickleback (*n*=8) was the only fish species recorded via electro-fishing at site C5 on the Kilrusheighter River at the N59 road and Proposed Grid Connection Route crossing (**Figure 3.2.5).**

Despite some physical suitability in the heavily vegetated, swift flowing alkaline channel, the site did not support salmonids and this reflected low summer water levels and naturally high rates of bed compaction (calcification) which reduced the availability of spawning habitat. Although lamprey spawning habitat was present (finer gravels), the absence of soft sediment nursery areas precluded the presence of the species. Suitability for European eel was low given the shallow depths of the stream at this location and paucity of suitable refugia (none recorded).

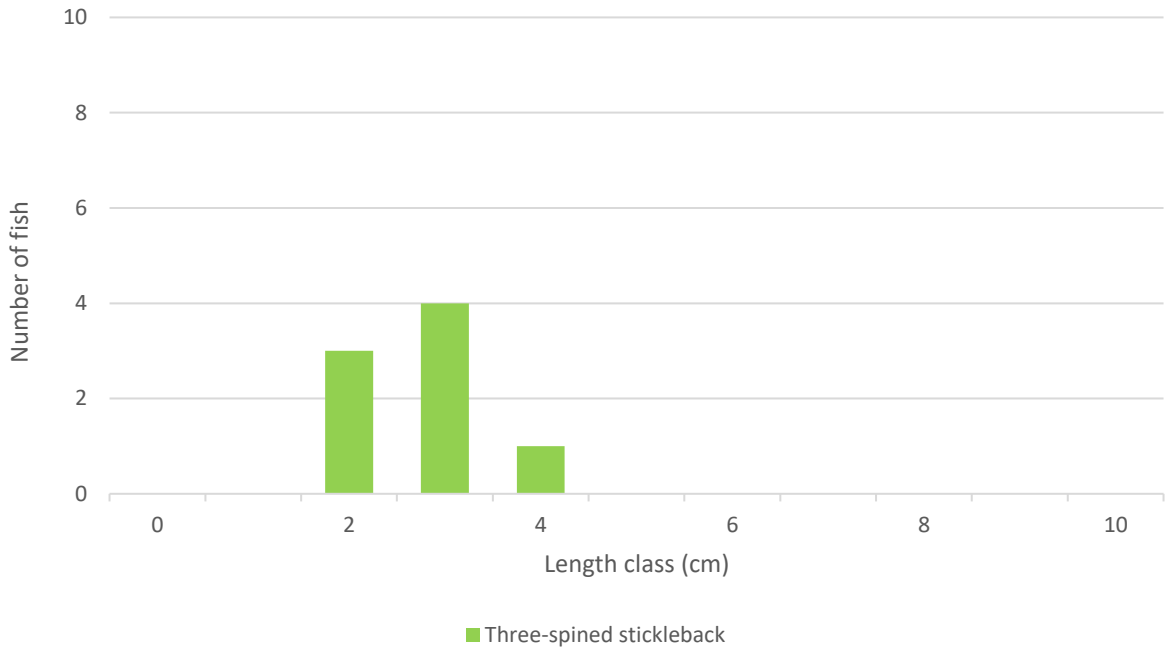

Figure 3.2.5 Length frequency distribution recorded via electro-fishing at site C5, September 2024

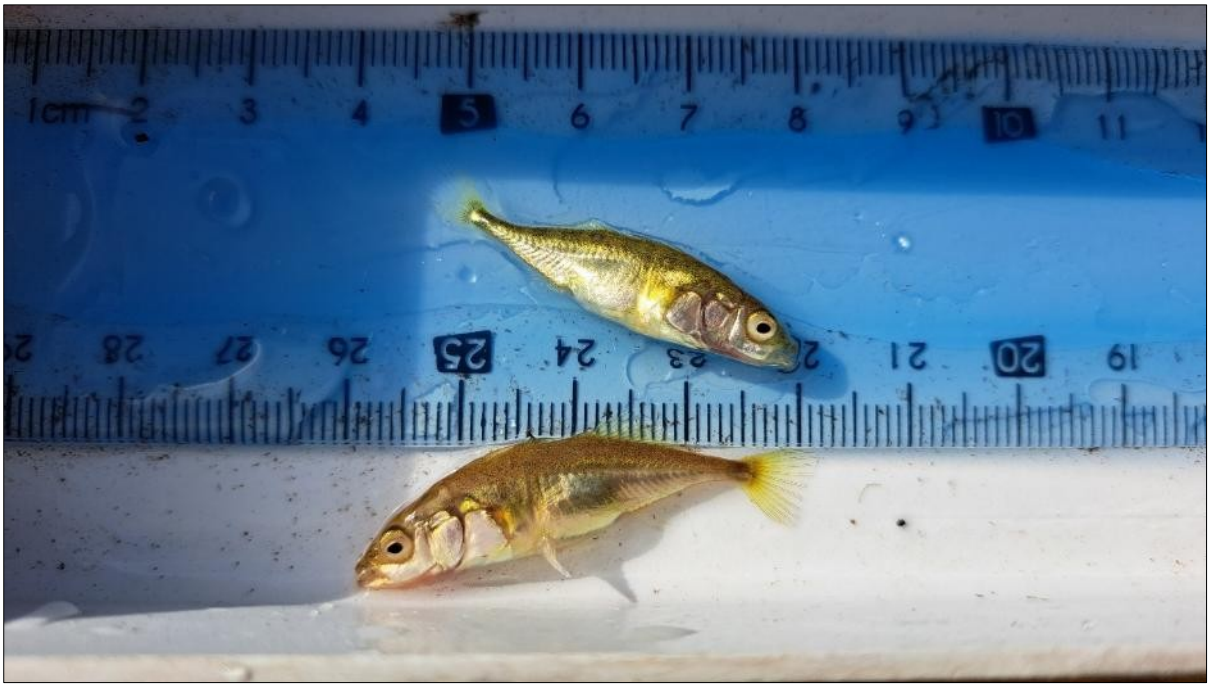

Plate 3.2.5 Three-spined stickleback recorded at site C4 on the Ardkill Stream, September 2024

3.2.6 Site C6 – Portavaud River, N59 road crossing

Site C6 was located on the Portavaud River at the N59 road and Proposed Grid Connection Route crossing. The narrow (1m wide) watercourse was dry at this location at the time of survey and was thus not of fisheries value given its ephemeral nature.

Plate 3.2.6 Representative image of site C6 on the Portavaud River, September 2024 (dry, ephemeral channel)

3.2.7 Site C7 – Ballinlig River, N59 road crossing

Brown trout (*n*=11) and European eel (*n*=1) were the only fish species recorded via electro-fishing at site C7 on the Ballinlig River at the N59 road and Proposed Grid Connection Route crossing (**Figure 3.2.6**).

The alkaline site was of value for salmonids although supported a relatively low density of small adults and juveniles. Although widespread, the quality of spawning habitat was moderate being compromised by siltation and natural bed calcification. Faster glide and riffle areas with macrophyte cover provided some good quality nursery habitat. The shallow site was of relatively poor value as a holding habitat for adult salmonids given the paucity of pool. Although some suitable lamprey spawning habitat was present (finer gravels), the shallow nature of soft sediment reduced the value for lamprey ammocoetes - none were recorded. Suitability for European eel was moderate given a paucity of coarse substrata refugia with only a single eel recorded.

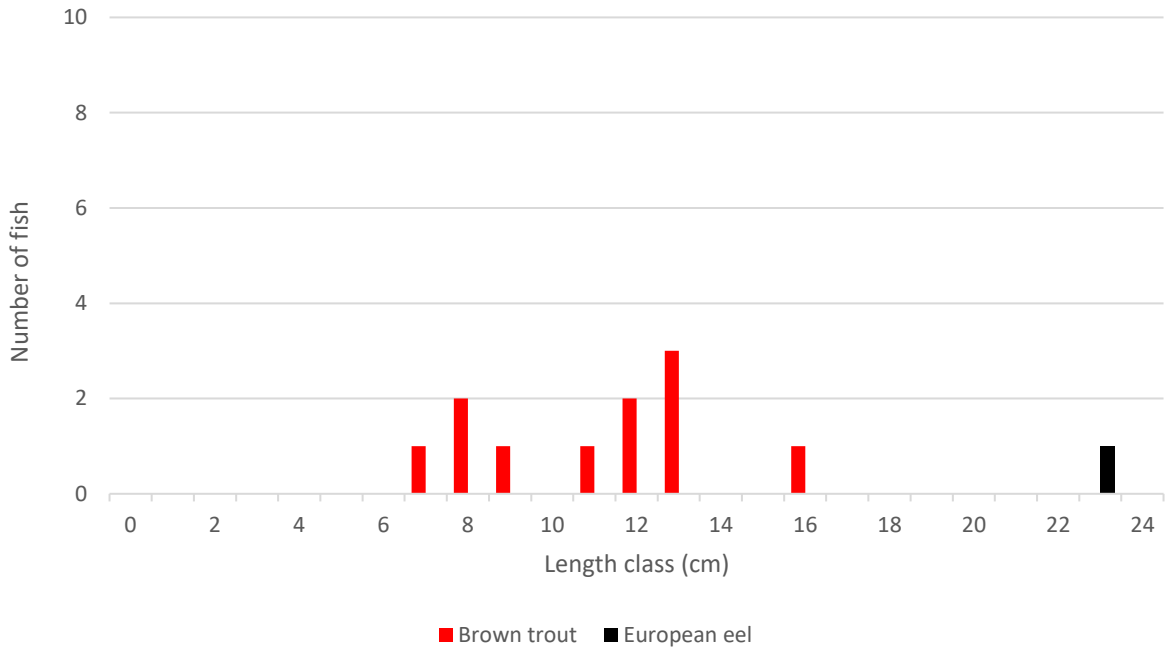

Figure 3.2.6 Length frequency distribution recorded via electro-fishing at site C7, September 2024

Plate 3.2.7 Brown trout recorded at site C7 on the Ballinlig River, September 2024

3.2.8 Site C8 – Barnabrack River, N59 road crossing

Brown trout (*n*=33), lamprey (*Lampetra* sp.) (*n*=4) and European eel (*n*=1) were recorded via electro-fishing at site C8 on the Barnabrack River at the N59 road and Proposed Grid Connection Route crossing (**Figure 3.2.7).**

The site was of good value for salmonids, supporting a mixed cohort population of trout. Good quality salmonid and lamprey spawning habitat was present in vicinity of the culvert although siltation pressures were evident. The site was also a good quality nursery although densities of juveniles was low with limited habitat. Deep glide and pool, in addition to banks scours/undercuts, provided high quality holding habitat for adult salmonids, as well as European eel (present in low densities). Abundant soft sediment deposits downstream of the culvert supported a low density of ammocoetes with a density of 2 per m^2 recorded.

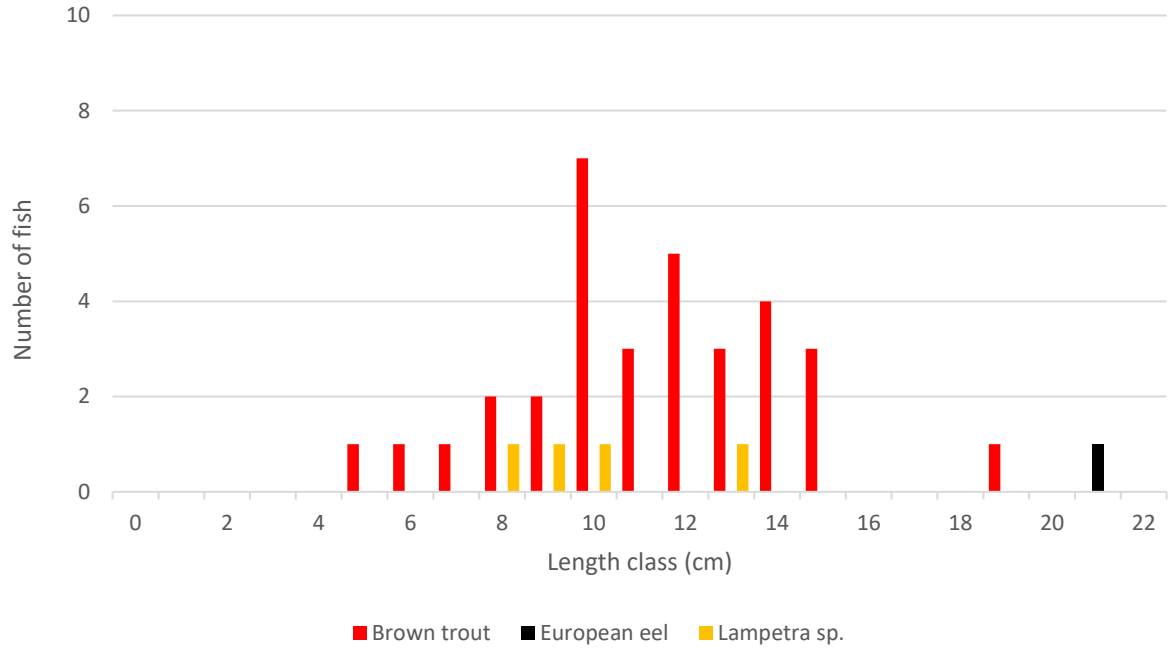

Figure 3.2.7 Length frequency distribution recorded via electro-fishing at site C8, September 2024

Plate 3.2.8 *Lampetra* sp. ammocoetes recorded at site C8 on the Barnabrack River, September 2024

3.2.9 Site C9 – Tanrego Intake, N59 road crossing

Brown trout (*n*=41) and European eel (*n*=6) were the only fish species recorded via electro-fishing at site C9 on the Tanrego Intake[2], the outflow from Folleesh Lough, at the N59 road and Proposed Grid Connection Route crossing (**Figure 3.2.8**).

Despite evident siltation and hydromorphological pressures (established but artificial channel), the site was of good value for salmonids, supporting a relatively high density of mixed cohort trout. The site was of highest value as a holding area for adult salmonids with frequent deeper glide and pool, including natural scours and tree root undercuts. Spawning habitat was present but highly localised and impacted by siltation pressures. However, the fisheries habitat quality improved upstream of the road crossing. The site was a moderate quality salmonid nursery only. Whilst soft sediment accumulations were abundant, these did not support lamprey ammocoetes but they did support a low density of European eel elvers (which were buried in the silt).

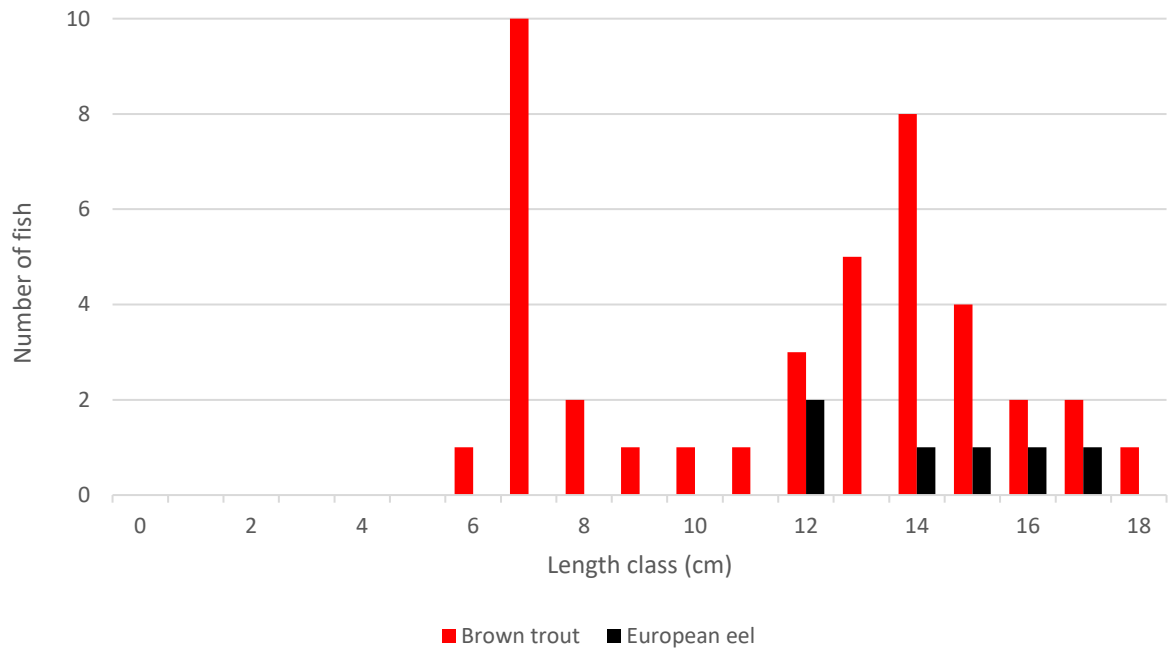

Figure 3.2.8 Length frequency distribution recorded via electro-fishing at site C9, September 2024

[2] The Tanrego Intake channel was completed in 1861 as part of a major embankment and slob land reclamation project in this part of Ballysodare Bay (McTernan, 1995)

Plate 3.2.9 Juvenile European eel recorded from soft sediment habitat at site C9 on the Tanrego Intake, September 2024

3.2.10 Site C10 – Lugnadeffa River, N59 road crossing

Brown trout (*n*=13), European eel (*n*=1) and three-spined stickleback (*n*=1) were recorded via electro-fishing at site C10 on the Lugnadeffa River at the N59 road and Proposed Grid Connection Route crossing (**Figure 3.2.9**).

Despite evident siltation pressures, the site was of good value for salmonids, supporting a low density of juvenile trout. This reflected the good quality nursery and spawning habitat present. The shallow river section was not of value for adult salmonids (no holding habitat). Bryophyte-rich boulder and cobble areas provided good quality European eel habitat and a low density was recorded. Whilst suitable spawning and nursery (soft sediment/sand) habitat was present, no lamprey ammocoetes were recorded.

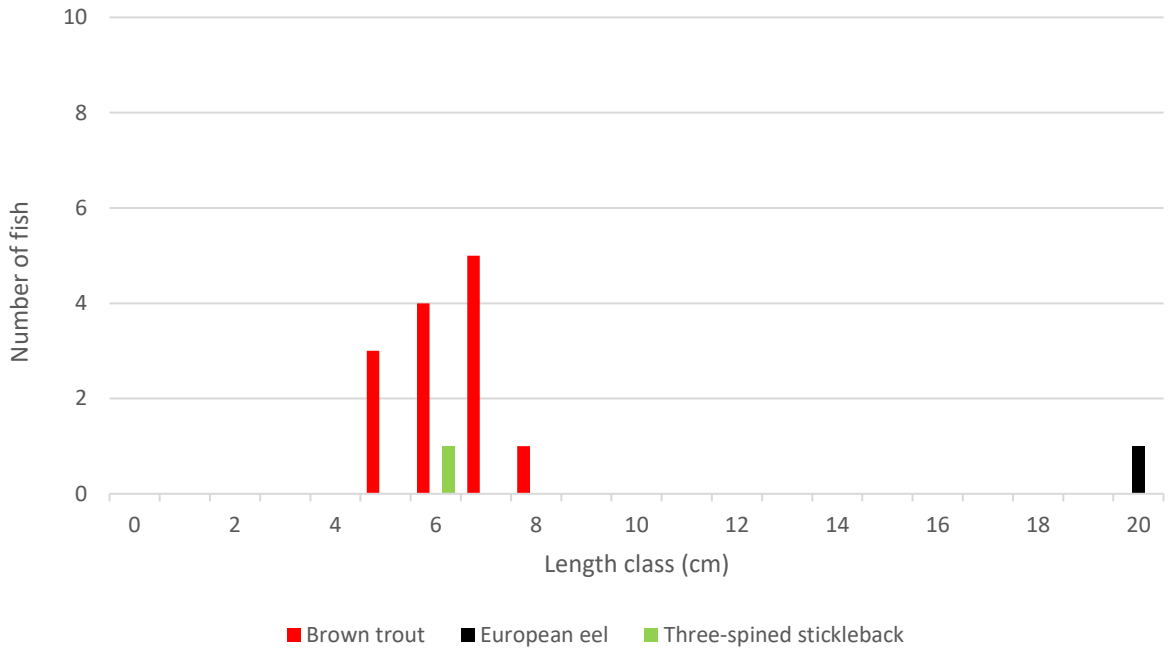

Figure 3.2.9 Length frequency distribution recorded via electro-fishing at site C10, September 2024

Plate 3.2.10 Representative image of site C10 on the Lugnadeffa River, September 2024

3.2.11 Site C11 – Lugawarry River, N59 road crossing

Site C11 was located on the Lugawarry River at the N59 road and Proposed Grid Connection Route crossing. The narrow channel was dry at this location at the time of survey with no standing water and was thus not of fisheries value given its ephemeral nature.

Plate 3.2.11 Representative image of site C11 on the Lugawarry River, September 2024 (dry, ephemeral channel)

3.2.12 Site C12 – Stonehall River, N59 road crossing

No fish were recorded via electro-fishing at site C12 was located on the Stonehall River at the N59 road and Proposed Grid Connection Route crossing. The narrow channel was semi-dry at this location at the time of survey with isolated standing water pools of water near the road culvert only. The site was not of fisheries value given its ephemeral nature and poor connectivity to downstream habitats.

Plate 3.2.12 Representative image of site C12 on the Stonehall River, September 2024

3.2.13 Site C13 – Carrigeenboy River, R284 road crossing

Three-spined stickleback (*n*=8) was the only fish recorded via electro-fishing at site C13 on the Carrigeenboy River (35C19) at the R284 road and Proposed Grid Connection Route crossing (**Figure 3.2.10**) approximately 300m upstream of site D8. Contrary to EPA mapping, the main flows of the watercourse flowed alongside the road in a north-south direction (to site D9), with the channel flowing under the road representing a drainage channel with very low flows.

With the exception of this ubiquitous species, the site was not of fisheries value given very poor flows, poor hydromorphology and near total cover of macrophytes. However, some low suitability for brown trout existed downstream (site D8) and immediately adjacent in an unmapped channel (site D9).

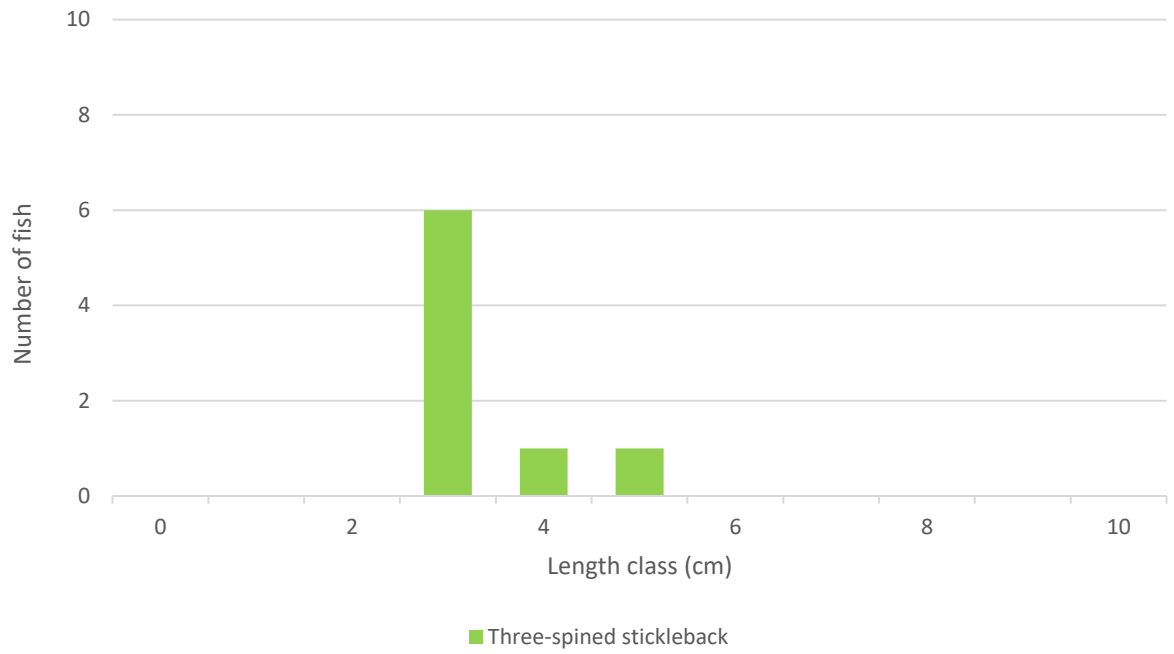

Figure 3.2.10 Length frequency distribution recorded via electro-fishing at site C13, September 2024

Plate 3.2.13 Representative image of site C13 on the Carrigeenboy River, September 2024

3.2.14 Site C14 – Doonamurray Stream, R284 road crossing

Brown trout (*n*=3) and three-spined stickleback (*n*=5) were the only fish recorded via electro-fishing at site C14 on the Doonamurray River at the R284 road and Proposed Grid Connection Route crossing, approximately 300m upstream of site C13 (**Figure 3.2.11**).

The heavily modified channel at this location was of low value for salmonids, with suitable habitat highly localised (e.g. culvert). However, a low density of trout were recorded in isolated fast glide habitat. Here, some low quality spawning and nursery habitat persisted. Despite some suitability for lamprey, the paucity of spawning habitat likely precluded the species from the site. Suitability for European eel habitat was low with a paucity of instream refugia and no eel were recorded present.

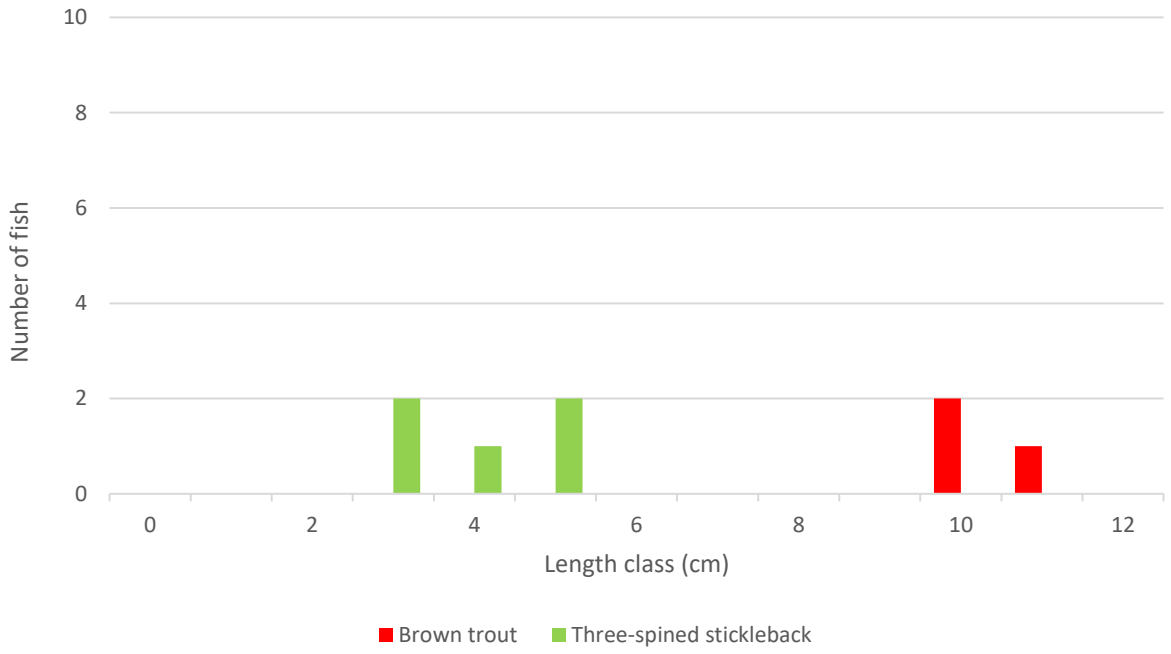

Figure 3.2.11 Length frequency distribution recorded via electro-fishing at site C14, September 2024

Plate 3.2.14 Brown trout and three-spined stickleback recorded at site C14 on the Carrigeenboy River, September 2024

3.2.15 Site C15 – Doonamurray Stream, R284 road crossing

Brown trout (*n*=2) and three-spined stickleback (*n*=4) were the only fish recorded via electro-fishing at site C15 on the Doonamurray River at the R284 road and Proposed Grid Connection Route crossing, approximately 150m upstream of site C14 (**Figure 3.2.12**).

The highly alkaline site was of low value for salmonids, supporting only a very low density of juvenile trout. This reflected significant modifications, siltation pressures and naturally high bed compaction. Calcification also reduced the availability of habitat for European eel which were not recorded. The site was unsuitable for lamprey with an absence of suitable spawning or nursery habitat (none recorded).

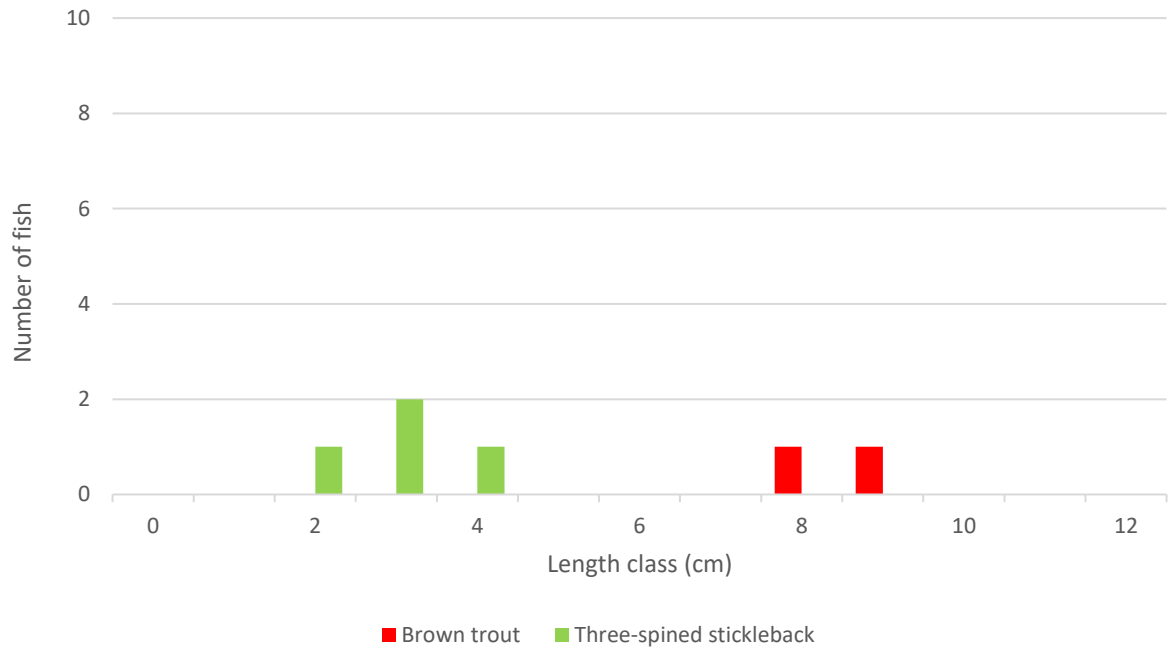

Figure 3.2.12 Length frequency distribution recorded via electro-fishing at site C15, September 2024

Plate 3.2.15 Representative image of site C15 on the Doonamurray River, September 2024

3.2.16 Site D1 – Doonflin River, N59 road crossing

Electro-fishing was not undertaken at site D1 on the Doonflin River at the N59 road and Proposed Grid Connection Route crossing. The site was of high value for salmonids, with widespread suitability as a spawning and nursery habitat for both Atlantic almon and brown trout. The site was of highest value as a nursery given a high frequency of bryophyte-rich instream refugia. Some localised holding habitat by way of deeper pools was also present for adult salmonids, particularly downstream of the culvert where a series of bedrock steps/falls created plunge pools (falls fish passable at higher water levels). The site also had high suitability for European eel with abundant instream refugia present. Despite some localised spawning habitat for lamprey, the absence of suitable nursery areas (soft sediment accumulations) likely precluded the species at this high energy site.

Plate 3.2.16 Representative image of site D1 on the Doonflin River, September 2024

3.2.17 Site D2 – Dunmoran Trib West River, N59 road crossing

Electro-fishing was not undertaken at site D2 on the Dunmoran Trib West River at the N59 road and Proposed Grid Connection Route crossing. However, the site was of high value for salmonids, with widespread suitability as a nursery and holding habitat for both Atlantic salmon and brown trout. The site was of highest value as a nursery given a high frequency of bryophyte-rich instream refugia. Some localised holding habitat by way of deeper pools was also present for adult salmonids (e.g. under bridge). Good quality salmonid spawning habitat was present but more localised. The site had high suitability for European eel with abundant instream refugia present. The high energy site was unsuitable for lamprey with no suitable nursery areas.

Plate 3.2.17 Representative image of site D2 on the Dunmoran Trib West River, September 2024

3.2.18 Site D3 – Dunmoran River, N59 road crossing

Electro-fishing was not undertaken at site D3 on the Dunmoran River at the N59 road and Proposed Grid Connection Route crossing. The site was of moderate value for salmonids only given bed compaction and calcification which reduced the availability of suitable spawning habitat. However, the site was of better value as a salmonid nursery with abundant instream refugia throughout. Localised plunge pools associated with cascades provided some valuable holding habitat for adult salmonids although this was highly localised. The site had some good suitability for European eel with abundant instream refugia present. The high energy site was unsuitable for lamprey with no suitable nursery areas.

Plate 3.2.18 Representative image of site D3 on the Dunmoran River, September 2024

3.2.19 Site D4 – Unmapped stream, N59 road crossing

Electro-fishing was not undertaken at site D4 on an unmapped stream at the N59 road and Proposed Grid Connection Route crossing. The 1-2m wide channel was semi-dry at the time of survey with only localised, shallow (<0.05m) standing water in vicinity of the single arch bridge. The site was not of fisheries value given its ephemeral nature in addition to siltation/water quality pressures.

Plate 3.2.19 Representative image of site D4 on an unmapped stream, September 2024

3.2.20 Site D5 – Knoxspark River, R290 road crossing

Electro-fishing was not undertaken at site D5 on the Knoxspark River at the R290 road and Proposed Grid Connection Route crossing. The site was of very poor fisheries value and not of value for salmonids given extensive modifications, poor flows, high macrophyte cover, poor hydromorphology and siltation pressures. However, there was some low value for European eel, and three-spined stickleback (the latter of which were recorded via macro-invertebrate sweep sampling).

Plate 3.2.20 Representative image of site D5 on the Knoxspark River, September 2024

3.2.21 Site D6 – Owenmore River, R290 road crossing

Electro-fishing was not undertaken at site D6 on the Owenmore River at the R290 road and Proposed Grid Connection Route crossing, located within the Unshin River SAC (001898). The large spate river at this location was of very high value for salmonids, including Atlantic salmon, with combinations of very good quality spawning, nursery and holding habitat present. Localised areas of boulder and larger cobble provided good quality European eel habitat. Suitability for lamprey was low given high flow rates although some localised spawning habitat was present. Access for anadromous sea and river lamprey is blocked by Ballysodare Falls located c. 4.5km downstream. The Owenmore River is known to support Atlantic salmon, brown/sea trout, European eel, lamprey (*Lampetra* sp.), minnow (*Phoxinus phoxinus*), three-spined stickleback, pike (*Esox lucius*), roach (*Rutilus rutilus*) and perch (*Perca fluviatilis*) (Kelly et al., 2011a).

Plate 3.2.21 Representative image of site D6 on the Owenmore River, September 2024

3.2.22 Site D7 – Unshin River, R290 road crossing

Electro-fishing was not undertaken at site D7 on the Unshin River at the R290 road and Proposed Grid Connection Route crossing, located within the Unshin River SAC (001898). The site was of high value for salmonids, including Atlantic salmon. Although the heavily vegetated site, with siltation pressures, was not of significant spawning value, good quality holding opportunities (for adult salmonids) and nursery habitat were widespread. The site was also of high suitability for European eel. Whilst spawning habitat was largely absent, abundant soft sediment areas were suitable for lamprey ammocoetes (likely present in low densities). Access for anadromous sea and river lamprey is blocked by Ballysodare Falls located c. 7.5km downstream. The Unshin River, a tributary of the Owenmore/Ballysodare, is known to support Atlantic salmon, brown trout, European eel, pike, perch and minnow (Kelly et al., 2015, 2011b).

Plate 3.2.22 Representative image of site D7 on the Unshin River, September 2024

3.2.23 Site D8 – Carrigeenboy River, R290 road crossing

Electro-fishing was not undertaken at site D8 on the Carrigeenboy River at the R290 road and Proposed Grid Connection Route crossing. The heavily modified site was not of significant salmonid value given poor hydromorphology and siltation pressures. However, some low holding suitability was present and the river likely supports brown trout in low densities. Likewise, European eel were also likely present given abundant instream refugia. Whilst lamprey nursery habitat was abundant, the absence of spawning habitat likely restricted the species' distribution at the site.

Plate 3.2.23 Representative image of site D8 on the Carrigeenboy River, September 2024

3.2.24 Site D9 – Unmapped stream, R284 road crossing

Electro-fishing was not undertaken at site D9 on an unmapped Carrigeenboy River tributary at the R284 road and Proposed Grid Connection Route crossing. The channel had been straightened and deepened both along the roadside (upstream of box culvert) and downstream of the crossing, resulting in a channel with very poor hydromorphology, low flows, high siltation and very high macrophyte coverage. Suitability for salmonids and lamprey was very low although there was some low suitability for European eel. Three-spined stickleback were recorded during macro-invertebrate sweep sampling.

Plate 3.2.24 Representative image of site D9 on an unmapped Carrigeenboy River tributary, September 2024

3.2.25 Site D10 – Ballygrania River, R284 road crossing

Electro-fishing was not undertaken at site D10 on the Ballygrania River at the R284 road and Proposed Grid Connection Route crossing. The site was of moderate fisheries value only given historical modifications and siltation pressures. However, the deep glide habitat (>1m) with frequent bank scours likely supported adult brown trout and European eel. Salmonid and lamprey spawning habitat was largely absent from the narrow channel. Soft sediment accumulations had some potential to support juvenile lamprey but the high clay content would reduce the quality of the bed for ammocoete burial. Three-spined stickleback were recorded during sweep/kick sampling.

Plate 3.2.25 Representative image of site D10 on the Ballygrania River, September 2024

Table 3.1 Fish species densities per m^2 recorded at sites in the vicinity of the Proposed Crumhach Wind Farm via electro-fishing in July & September 2024 (values in **bold** represent the highest densities recorded for each species, respectively)

Site	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Atlantic salmon	Brown trout	Sea trout	*Lampetra* sp.	European eel	Three-spined stickleback
Sites within or in the vicinity of the EIAR site boundary									
A1	Unnamed stream	10	85	0.000	0.141	0.000	0.000	0.000	0.000
A2	Easky River	10	250	0.120	0.068	0.000	0.000	0.004	0.000
A3	Letterunshin River	5	45	0.000	0.000	0.000	0.000	0.000	0.000
A4	Easky River	10	320	0.150	0.022	0.000	0.000	0.000	0.000
A5	Unnamed stream	n/a	Dry channel	n/a	n/a	n/a	n/a	n/a	n/a
A6	Unnamed stream	5	75	0.000	0.000	0.000	0.000	0.000	0.000
A7	Unnamed river	10	245	0.061	0.139	0.000	0.000	0.004	0.000
A8	Owenminna River	5	60	0.000	0.000	0.000	0.000	0.000	0.000
A9	Owenminna River	5	65	0.000	0.000	0.000	0.000	0.000	0.000
A10	Owenminna River	10	150	0.147	0.393	0.000	0.000	0.000	0.000
A11	Unnamed river	10	180	0.000	0.022	0.000	0.000	0.000	0.000
A12	Buncrowey River	10	250	0.000	0.156	0.000	0.000	0.000	0.000
A13	Buncrowey River	10	275	0.000	0.073	0.000	0.000	0.011	0.000
A14	Unnamed river	5	40	0.000	0.000	0.000	0.000	0.000	0.000
A15	Unnamed river	5	90	0.000	0.033	0.000	0.000	0.000	0.000
A16	Buncrowey River	10	200	0.225	0.100	0.000	0.000	0.000	0.000

Site	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Atlantic salmon	Brown trout	Sea trout	*Lampetra* sp.	European eel	Three-spined stickleback
A17	Rathgoonaun River	5	75	0.000	0.067	0.000	0.000	0.000	0.000
A18	Buncrowey River	10	245	0.355	0.069	0.000	0.000	0.004	0.000
A19	Easky River	10	270	0.241	0.041	**0.007**	0.000	0.004	0.000
A20	Carrownrush River	10	190	0.000	0.000	0.000	0.000	0.000	0.000
A21	Carrownrush River	10	270	0.000	0.000	0.000	0.000	0.000	0.000
L1	Lough Croane	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
L2	Lough Anlaba	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
L3	Lough Nacrowagh	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
L4	Lough Brickeagh	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
L5	Lough Nafullow	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P1	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P2	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P3	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P4	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P5	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P6	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
P7	Pond	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
B1	Grangebeg Barr River	10	150	0.000	0.067	0.000	0.000	0.000	0.000
B2	Ballygreighan Barr River	10	210	0.000	0.152	0.000	0.000	0.000	0.000

Site	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Atlantic salmon	Brown trout	Sea trout	*Lampetra* sp.	European eel	Three-spined stickleback
B3	Unnamed stream	5	40	0.000	0.000	0.000	0.000	0.000	0.000
B4	Unnamed stream	0	0	0.000	0.000	0.000	0.000	0.000	0.000
B5	Ballygreighan Barr River	10	260	0.000	0.127	0.000	0.000	0.000	0.000
B6	Unnamed stream	5	80	0.000	0.000	0.000	0.000	0.000	0.000
B7	Dunneill River	10	250	0.000	0.108	0.000	0.000	0.000	0.000
B8	Dunneill River	10	280	0.000	0.211	0.000	0.000	0.007	0.000
B9	Doonbeakin River	5	60	0.000	0.000	0.000	0.000	0.000	0.000
B10	Doonbeakin River	10	255	0.000	0.039	0.000	0.000	0.004	0.000
B11	Cashelboy River	5	50	0.000	0.040	0.000	0.000	0.000	0.000
B12	Lugdoon River	10	150	0.000	0.087	0.000	0.000	0.000	0.000
B13	Grange More River	5	75	0.000	0.053	0.000	0.000	0.000	0.000
B14	Unnamed stream	5	80	0.000	0.088	0.000	0.000	0.000	0.000
B15	Lugdoon Stream	10	275	0.000	0.171	0.000	0.000	0.000	0.000
Proposed Grid Connection Route crossings									
C1	Altans Stream	5	40	0.000	0.000	0.000	0.000	0.000	0.050
C2	Unmapped stream	10	130	0.000	0.085	0.000	0.000	0.008	0.000
C3	Ballyeeskeen River	5	50	0.000	0.000	0.000	0.000	0.000	0.060
C4	Ardkill Stream	5	100	0.000	0.020	0.000	0.000	0.000	0.020
C5	Kilrusheighter River	5	100	0.000	0.000	0.000	0.000	0.000	0.080
C6	Portavaud River	n/a	Dry channel	n/a	n/a	n/a	n/a	n/a	n/a

Site	Watercourse	CPUE (elapsed time)	Approx. area fished (m^2)	Atlantic salmon	Brown trout	Sea trout	*Lampetra* sp.	European eel	Three-spined stickleback
C7	Ballinlig River	5	100	0.000	0.110	0.000	0.000	0.010	0.000
C8	Barnabrack River	10	175	0.000	0.189	0.000	**2 per m^2**	0.006	0.000
C9	Tanrego Intake	10	150	0.000	0.273	0.000	0.000	0.040	0.000
C10	Lugnadeffa River	5	90	0.000	0.144	0.000	0.000	0.011	0.011
C11	Lugawarry River	5	90	0.000	0.000	0.000	0.000	0.000	0.000
C12	Stonehall River	5	90	0.000	0.000	0.000	0.000	0.000	0.000
C13	Carrigeenboy River	5	140	0.000	0.000	0.000	0.000	0.000	0.057
C14	Doonamurray Stream	5	120	0.000	0.025	0.000	0.000	0.000	0.042
C15	Doonamurray Stream	5	90	0.000	0.022	0.000	0.000	0.000	0.044
D1	Doonflin River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D2	Dunmoran Trib West River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D3	Dunmoran River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D4	Unmapped stream	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D5	Knoxspark River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D6	Owenmore River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D7	Unshin River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D8	Carrigeenboy River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D9	Unmapped stream	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a
D10	Ballygrania River	n/a	Fisheries appraisal only	n/a	n/a	n/a	n/a	n/a	n/a

Table 3.2 Relative abundance of fish species of higher conservation value recorded via **electro-fishing** in the vicinity of the Proposed Project, July-September 2024

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
Sites within or in the vicinity of the EIAR site boundary						
A1	Unnamed stream	None	Low	None	None	None
A2	Easky River	Medium	Medium	None	Low	None
A3	Letterunshin River	None	None	None	None	None
A4	Easky River	High	Low	None	None	None
A5	Unnamed stream	None	None	None	None	None
A6	Unnamed stream	None	None	None	None	None
A7	Unnamed river	Medium	Medium	None	Low	None
A8	Owenminna River	None	None	None	None	None
A9	Owenminna River	None	None	None	None	None
A10	Owenminna River	Medium	High	None	None	None
A11	Unnamed river	None	Low	None	None	None
A12	Buncrowey River	None	High	None	None	None
A13	Buncrowey River	None	Medium	None	Low	None
A14	Unnamed river	None	None	None	None	None
A15	Unnamed river	None	Low	None	None	None
A16	Buncrowey River	High	Medium	None	None	None
A17	Rathgoonaun River	None	Low	None	None	None
A18	Buncrowey River	Very high	Medium	None	Low	None
A19	Easky River	High	Low	None	Low	Sea trout
A20	Carrownrush River	None	None	None	None	None
A21	Carrownrush River	None	None	None	None	None
L1	Lough Croane	n/a	n/a	n/a	n/a	Fisheries appraisal only
L2	Lough Anlaba	n/a	n/a	n/a	n/a	Fisheries appraisal only
L3	Lough Nacrowagh	n/a	n/a	n/a	n/a	Fisheries appraisal only
L4	Lough Brickeagh	n/a	n/a	n/a	n/a	Fisheries appraisal only
L5	Lough Nafullow	n/a	n/a	n/a	n/a	Fisheries appraisal only
P1	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P2	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P3	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
P4	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P5	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P6	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
P7	Pond	n/a	n/a	n/a	n/a	Fisheries appraisal only
B1	Grangebeg Barr River	None	Low	None	None	None
B2	Ballygreighan Barr River	None	Medium	None	None	None
B3	Unnamed stream	None	None	None	None	None
B4	Unnamed stream	None	None	None	None	None
B5	Ballygreighan Barr River	None	Medium	None	None	None
B6	Unnamed stream	None	None	None	None	None
B7	Dunneill River	None	Medium	None	None	None
B8	Dunneill River	None	High	None	Low	None
B9	Doonbeakin River	None	None	None	None	None
B10	Doonbeakin River	None	Low	None	Low	None
B11	Cashelboy River	None	Low	None	None	None
B12	Lugdoon River	None	Medium	None	None	None
B13	Grange More River	None	Low	None	None	None
B14	Unnamed stream	None	Low	None	None	None
B15	Lugdoon Stream	None	High	None	None	None
Proposed Grid Connection Route crossings						
C1	None	None	None	None	None	Three-spined stickleback
C2	Unmapped stream	None	Low	None	Low	None
C3	Ballyeeskeen River	None	None	None	None	Three-spined stickleback
C4	Ardkill Stream	None	Low	None	None	Three-spined stickleback
C5	Kilrusheighter River	None	None	None	None	Three-spined stickleback
C6	Portavaud River	None	None	None	None	None
C7	Ballinlig River	None	Low	None	Low	None
C8	Barnabrack River	None	Medium	Low	Low	None
C9	Tanrego Intake	None	High	None	Medium	None
C10	Lugnadeffa River	None	Medium	None	Low	Three-spined stickleback
C11	Lugawarry River	None	None	None	None	None
C12	Stonehall River	None	None	None	None	None

Site	Watercourse	Atlantic salmon	Brown trout	Lamprey (*Lampetra* sp.)	European eel	Other species
C13	Carrigeenboy River	None	None	None	None	Three-spined stickleback
C14	Doonamurray Stream	None	Low	None	None	Three-spined stickleback
C15	Doonamurray Stream	None	Low	None	None	Three-spined stickleback
D1	Doonflin River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D2	Dunmoran Trib West River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D3	Dunmoran River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D4	Unmapped stream	n/a	n/a	n/a	n/a	Fisheries appraisal only
D5	Knoxspark River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D6	Owenmore River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D7	Unshin River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D8	Carrigeenboy River	n/a	n/a	n/a	n/a	Fisheries appraisal only
D9	Unmapped stream	n/a	n/a	n/a	n/a	Fisheries appraisal only
D10	Ballygrania River	n/a	n/a	n/a	n/a	Fisheries appraisal only

Conservation value: Atlantic salmon (*Salmo salar*) & lamprey (*Lampetra* spp.) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). Atlantic salmon and sea trout are protected under the Wild Salmon and Sea Trout Tagging Scheme (Amendment) Regulations. With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011).

4. Discussion

The surveyed watercourses in the vicinity of the EIAR site boundary were typically small to medium sized upland eroding/spate channels, with more frequent lower gradient and lowland depositing channels present along the Proposed Grid Connection Route. Many retained high degrees of naturalness although modifications (e.g. historical straightening, deepening) increased in lowland areas adjoining the public road network, more intensive agricultural lands and urban centres. Siltation pressures (mostly from peat escapement) and eutrophication pressures were evident throughout much of the survey area, particularly in the upper Easky and Dunmoran sub-catchments. However, although natural gradients and channel hydromorphologies restricted fish populations in the upper catchments, salmonids and to a lesser extent European eel were widespread in the survey area. Sea trout and lamprey (*Lampetra* sp.) were recorded from single sites only (A19 & C8 respectively).

A low diversity of fish species typical of the Easky, Dunmoran and Owenmore sub-catchments (Gordon et al., 2021; Kelly et al., 2015, 2011a, 2011b) was recorded during the electro-fishing survey, with Atlantic salmon, brown trout, sea trout, lamprey (*Lampetra* sp.), European eel and three-spined stickleback captured (**Table 3.1, 3.2**). No fish were recorded from a total of 15 no. electro-fishing sites (A3, A5, A6, A8, A9, A14, A20, A21, B3, B4, B6, B9, C6, C11 & C12) during the survey and these were mostly located in the upper reaches of the respective catchments where fisheries value is inherently lower due to small channel sizes, shallow depths, low flows, low riparian shading and or instream barriers (O'Briain et al., 2020, 2017; Wood & Budy, 2009; O'Grady, 2006; Amiro, 1993). Sites C1, C3, C5 and C13 along the Proposed Grid Connection Route were found to support ubiquitous three-spined stickleback only.

4.1 Salmonids

Salmonid populations were widespread in the vicinity of the proposed project, with brown trout recorded from 32 no. electro-fishing sites (**Table 3.1, 3.2**). Trout were observed feeding at Loughs Croane, Nacrowagh, Brickeagh and Nafullow during the survey. Their presence in Lough Anlaba is likely given their confirmed presence in the outflow channel (recorded at site A11). While typical spawning habitat was sparse or even absent from the lake sites surveyed (L1-L5), brown trout can support self-sustaining lacustrine populations in oligotrophic peatland lakes provided wind action sufficiently oxygenates the littorals (Arostegui & Quinn, 2019).

Atlantic salmon were recorded from 7 no. sites on the Easky River (A2, A4, A19) and unnamed tributary (A7), Owenminna River (A10) and the Buncrowey River (A16, A18). Site A19 on the lower reaches of the Easky River also supported anadromous sea trout. The Easky River and Buncrowey River were particularly valuable salmon nurseries and spawning habitats. Despite some suitability locally (e.g. Dunneill River), no Atlantic salmon were recorded in the Dunmoran_SC_010 sub-catchment during the survey, in keeping with previous surveys (e.g. Gordon et al., 2021). Atlantic salmon were also absent from electro-fishing surveys undertaken at Proposed Grid Connection Route crossing sites C1-C15, although the Owenmore and Unshin Rivers (fisheries appraisal sites, also crossed by the Proposed Grid Connection Route) are known to support the species.

4.2 Lamprey

Lamprey ammocoetes (*Lampetra* sp.) were recorded via electro-fishing from a single site during the electro-fishing survey, namely site C8 on the Barnabrack River (a Proposed Grid Connection Route crossing). Low densities of ammocoetes (2 per m^2) were recorded from soft sediment accumulations downstream of the N59 road crossing. However, much of the survey area was unsuitable for lamprey given the high energy/spate nature of many of the surveyed watercourses which reduces the extent of fine gravels required for spawning (Dawson et al., 2015; Rooney et al., 2013; Lasne et al., 2010) and discourages the deposition of fine, organic-rich sediment ≥5cm in depth generally required by larval *Lampetra* spp. (Aronsuu & Virkkala, 2014; Goodwin et al., 2008; Gardiner, 2003). Suitable habitat was sparse and often absent entirely from the survey sites. However, local potential for *Lampetra* sp. ammocoetes (given the presence of soft sediment areas) was noted during fisheries appraisals of Proposed Grid Connection Route crossings at sites D7 (Unshin River), D8 (Carrigeenboy River) and D10 (Ballygrania River). Lamprey (*Lampetra* sp.) are also known from the Owenmore River, also crossed by the Proposed Grid Connection Route.

4.3 European eel

European eel are Red-listed in Ireland (King et al., 2011) and are classed as 'critically endangered' on a global scale (Pike et al., 2020). Despite widespread suitability, eel were recorded from a total of 12 no. sites during the electro-fishing surveys, typically in low numbers. This distribution reflected the high energy/spate nature of many watercourses in addition to other natural characteristics including high gradients and small channel width/depth. Eel penetration into the upper reaches of catchments is often low, especially where higher natural gradients result in higher flow velocities, reduced accessibility and sub-optimal eel habitats (Matondo et al., 2021; Laffaille et al., 2003). Abundance naturally decreases with gradient and distance from marine habitats (Degerman et al., 2019), with a greater frequency of eel typically found in the lower reaches of watercourses (Moriarty, 2003).

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9. Appendix C – Biological water quality & macro-invertebrates

Table 9.1 Macro-invertebrate Q-sampling results for riverine sites A1-A21, July/September 2024

Group	Family	Species	A1	A2	A3	A4	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*				1		1			16						1	1	4	6		15	**A**
Ephemeroptera	Heptageniidae	*Heptagenia sulphurea*		5		9																	**A**
Ephemeroptera	Heptageniidae	*Rhithrogena semicolorata*																		1		1	**A**
Plecoptera	Chloroperlidae	*Siphonoperla torrentium*	1																				**A**
Plecoptera	Nemouridae	*Protonemura meyeri*											7		3								**A**
Plecoptera	Perlidae	*Perla bipunctata*															1		2	5			**A**
Ephemeroptera	Baetidae	*Alainites muticus*	1			2		1												1		1	**B**
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia cincta*			2						2	1							1				**B**
Plecoptera	Leuctridae	*Leuctra fusca*	2	1		3			2	3	20		10	8		2	7	1	1	4			**B**
Plecoptera	Leuctridae	*Leuctra hippopus*										1											**B**
Trichoptera	Cased caddis pupa	sp. indet.				3				1					5	2		8					**B**
Trichoptera	Glossosomatidae	*Glossosoma boltoni*																		12			**B**
Trichoptera	Goeridae	*Silo pallipes*														1						2	**B**
Trichoptera	Limnephilidae	*Halesus radiatus*								2													**B**
Trichoptera	Limnephilidae	*Micropterna* sp.			1					2													**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*				1	2			4		2								3		10	**B**
Trichoptera	Limnephilidae	sp. indet.	3			1																	**B**
Trichoptera	Odontoceridae	*Odontocerum albicorne*									1												**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*				5													1			11	**B**
Odonata	Coenagrionidae	sp. indet.										5											**B**
Ephemeroptera	Baetidae	*Baetis rhodani*	17	15	11	28		12			34			4			3	29	27	11	35		**C**
Ephemeroptera	Caenidae	*Caenis rivulorum*																	1				**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*		8		6	1	9			21						21	6	23	28	4	11	**C**
Trichoptera	Hydropsychidae	*Hydropsyche siltalai*		26		21	5	11									5	7	12	39			**C**

Group	Family	Species	A1	A2	A3	A4	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	EPA group
Trichoptera	Philopotamidae	*Wormaldia occipitalis*																	5			4	**C**
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	1		5		3			3		1	1	5	5					1		1	**C**
Trichoptera	Polycentropodidae	*Plectrocnemia geniculata*							5														**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*		3			3				4		4	2			1			1			**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*	1	5	2	3							3	4						2	2	1	**C**
Arachnida	Hydrachnidiae	sp. indet.							1					1		4							**C**
Coleoptera	Elmidae	*Elmis aenea*									14						1	1		1		9	**C**
Coleoptera	Elmidae	*Limnius volckmari*	5	5	28	17	2					3	7	3		3			1			3	**C**
Coleoptera	Gyrinidae	*Gyrinus substriatus*				1																	**C**
Coleoptera	Hydraenidae	*Hydraena gracilis*													3								**C**
Coleoptera	Hydrophilidae	*Anacaena globulus*								3													**C**
Coleoptera	Scirtidae	sp. indet.								1							1						**C**
Crustacea	Gammaridae	*Gammarus duebeni*						41			15							23	16	10	85	5	**C**
Diptera	Chironomidae	Non-*Chironomus* spp.	4	3	1	1	1					2		4				1	5			1	**C**
Diptera	Culicidae	sp. indet.															2						**C**
Diptera	Pediciidae	*Dicranota* sp.		1						2				2			2	1				1	**C**
Diptera	Simuliidae	sp. indet.	10	20	10	18	3			9		26	5	16			18		14	8	10	21	**C**
Gastropoda	Tateidae	*Potamopyrgus antipodarum*															12	14				51	**C**
Hemiptera	Corixidae	*Hesperocorixa castanea*										6											**C**
Hemiptera	Gerridae	*Gerris* sp.				1	1														8		**C**
Hemiptera	Veliidae	*Velia caprai*	1						3			1											**C**
Crustacea	Crangonyctidae	*Crangonyx* sp.						8			3												**D**
Hirudinidae	Glossiphoniidae	sp. indet.	1			1																	**D**
Diptera	Chironomidae	*Chironomus* spp.		2			2			1		5		2					9	2			**E**
Annelidae	Oligochaeta	sp. indet.		3		1						1				4		3	2		3	9	**n/a**
Nematomorpha	Gordiidae	sp. indet.																				1	**n/a**

Group	Family	Species	A1	A2	A3	A4	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	EPA group
Abundance			**47**	**97**	**60**	**123**	**23**	**83**	**11**	**31**	**130**	**54**	**37**	**51**	**16**	**16**	**75**	**95**	**124**	**135**	**147**	**158**	
Q-rating			Q3-4	Q4	Q3	Q4	Q3	Q3-4	Q3	Q3	Q4	Q3	Q4	Q3	Q4	Q3	Q3-4	Q3-4	Q4	Q4	Q3	Q4	
WFD status			Mod	Good	Poor	Good	Poor	Mod	Poor	Poor	Good	Poor	Good	Poor	Good	Poor	Mod	Mod	Good	Good	Poor	Good	

Note: site A5 was dry at the time of survey

Table 9.2 Macro-invertebrate Q-sampling results for riverine sites B1-B15, July/September 2024

Group	Family	Species	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*							6	9	1	1		4			1	**A**
Ephemeroptera	Heptageniidae	*Ecdyonurus* sp.										37	6	1	5			**A**
Ephemeroptera	Heptageniidae	*Ecdyonurus insignis*										1						**A**
Ephemeroptera	Heptageniidae	*Heptagenia sulphurea*											1		2	1		**A**
Ephemeroptera	Heptageniidae	*Rhithrogena semicolorata*													1			**A**
Plecoptera	Chloroperlidae	*Siphonoperla torrentium*					1											**A**
Plecoptera	Nemouridae	*Protonemura meyeri*	2		3									1	1			**A**
Plecoptera	Perlidae	*Dinocras cephalotes*							8	3								**A**
Plecoptera	Perlidae	*Perla bipunctata*						3		3								**A**
Ephemeroptera	Baetidae	*Alainites muticus*						1	1	2		1		2	3			**B**
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia cincta*													1			**B**
Plecoptera	Leuctridae	*Leuctra fusca*	22	6			1	2	2	5		1	2	1		1		**B**
Plecoptera	Leuctridae	*Leuctra hippopus*											3		4			**B**
Trichoptera	Cased caddis pupa	sp. indet.								42		1	5	3	8		2	**B**
Trichoptera	Glossosomatidae	*Glossosoma boltoni*														9		**B**
Trichoptera	Goeridae	*Silo pallipes*													1	2		**B**
Trichoptera	Leptoceridae	*Athripsodes aterrimus*						1										**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*												1	6	4	1	**B**

Group	Family	Species	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	EPA group
Trichoptera	Odontoceridae	*Odontocerum albicorne*						1						1				**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*							6	2								**B**
Odonata	Calopterygidae	*Calopteryx splendens*				1												**B**
Ephemeroptera	Baetidae	*Baetis rhodani*	17	3	4			4	21	59	19	17	12	29	14	16	101	**C**
Ephemeroptera	Caenidae	*Caenis rivulorum*						6										**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*	1				1	5	25	16	2	8		4	9	2	11	**C**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*										1			2	1		**C**
Trichoptera	Hydropsychidae	*Hydropsyche siltalai*						10	18	22		2	4	2	2	1		**C**
Trichoptera	Philopotamidae	*Wormaldia occipitalis*		1						3		2			1	1		**C**
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	4				5				2						1	**C**
Trichoptera	Polycentropodidae	*Plectrocnemia geniculata*													3	1		**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*	1							1								**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*							1	6		7		5	1		7	**C**
Trichoptera	Rhyacophilidae	*Rhyacophila munda*	2										1					**C**
Arachnida	Hydrachnidiae	sp. indet.				4												**C**
Coleoptera	Dytiscidae	Dytiscidae larva					2								1			**C**
Coleoptera	Dytiscidae	*Ilybius ater*									1							**C**
Coleoptera	Elmidae	*Elmis aenea*								1	9	10	3	6	2		2	**C**
Coleoptera	Elmidae	*Limnius volckmari*						1		6		1	4		2			**C**
Coleoptera	Gyrinidae	*Orectochilus villosus*								1								**C**
Coleoptera	Halipliidae	*Haliplus ruficollis* group													1			**C**
Coleoptera	Hydraenidae	*Hydraena gracilis*							2	1								**C**
Coleoptera	Hydrophilidae	*Helophorus grandis*									1							**C**
Coleoptera	Scirtidae	sp. indet.		1				2	1	8	1							**C**
Crustacea	Gammaridae	*Gammarus duebeni*	16					10	1	43	84	49	6		2	24	153	**C**
Diptera	Ceratopogonidae	sp. indet.														2		**C**

Group	Family	Species	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	EPA group
Diptera	Chironomidae	Non-*Chironomus* spp.	5		9	4			1	3		2		2			3	**C**
Diptera	Pediciidae	*Dicranota* sp.	1					1		2					1		1	**C**
Diptera	Simuliidae	sp. indet.	8	2		3	1		2	4		5		6		15	15	**C**
Diptera	Tipuliidae	sp. indet.												1	1			**C**
Gastropoda	Tateidae	*Potamopyrgus antipodarum*						1	3			1						**C**
Hemiptera	Veliidae	*Velia caprai*									1				1			**C**
Diptera	Chironomidae	*Chironomus* spp.	3		4	2				1		6				2		**E**
Annelidae	Oligochaeta	sp. indet.			2	4	8						3	1	2	2		**n/a**
Abundance			**82**	**13**	**22**	**18**	**19**	**48**	**98**	**243**	**121**	**153**	**50**	**70**	**77**	**84**	**298**	
Q-rating			Q3-4	Q3	Q4	Q3*	Q4	Q4	Q4	Q4	Q3-4	Q4	Q4	Q4	Q4	Q3-4	Q3-4	
WFD class			Mod	Poor	Good	Poor	Good	Good	Good	Good	Mod	Good	Good	Good	Good	Mod	Mod	

* Tentative Q-rating given lack of suitable riffle areas for sampling and or poor flows (Toner et al., 2005)

Table 9.3 Macro-invertebrate Q-sampling results for riverine Proposed Grid Connection Route sites C1-C15, September 2024

Group	Family	Species	C1	C2	C3	C4	C5	C7	C8	C9	C10	C12	C13	C14	C15	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*	4	12												**A**
Ephemeroptera	Heptageniidae	*Ecdyonurus* sp.				2		1								**A**
Ephemeroptera	Heptageniidae	*Rhithrogena semicolorata*		3							1					**A**
Ephemeroptera	Heptageniidae	sp. indet.	3													**A**
Plecoptera	Nemouridae	*Nemurella pictetii*	3													**A**
Plecoptera	Nemouridae	*Protonemura meyeri*									6					**A**
Ephemeroptera	Baetidae	*Alainites muticus*	6				10				2					**B**
Plecoptera	Leuctridae	*Leuctra fusca*									4				1	**B**
Plecoptera	Leuctridae	*Leuctra hippopus*						1	1	5						**B**
Trichoptera	Cased caddis pupa	sp. indet.	1			10				3	5					**B**

Group	Family	Species	C1	C2	C3	C4	C5	C7	C8	C9	C10	C12	C13	C14	C15	EPA group
Trichoptera	Goeridae	*Silo pallipes*	4	2												B
Trichoptera	Hydroptilidae	*Oxyethira* sp.	1													B
Trichoptera	Limnephilidae	*Limnephilus marmoratus*							1							B
Trichoptera	Limnephilidae	*Potamophylax cingulatus*		2		4			8					1		B
Trichoptera	Odontoceridae	*Odontocerum albicorne*				1		1		7						B
Trichoptera	Sericostomatidae	*Sericostoma personatum*				4	31	10	3	1				2	14	B
Odonata	Coenagrionidae	sp. indet.	2										1			B
Ephemeroptera	Baetidae	*Baetis rhodani*	68	83	7	26	110	52	15	2	14			8	22	C
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*		2						1						C
Trichoptera	Philopotamidae	*Philopotamus montanus*	10	10	3						15					C
Trichoptera	Philopotamidae	*Wormaldia occipitalis*	5													C
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	2	2		3				1						C
Trichoptera	Polycentropodidae	*Polycentropus kingi*		6	1											C
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*		6							1					C
Arachnida	Hydrachnidiae	sp. indet.													1	C
Coleoptera	Dytiscidae	Dytiscidae larva											1			C
Coleoptera	Elmidae	*Elmis aenea*	4	18			12		2	5	2			1	6	C
Coleoptera	Elmidae	*Limnius volckmari*				3		10	4	3						C
Coleoptera	Hydraenidae	*Hydraena gracilis*											1			C
Coleoptera	Scirtidae	sp. indet.		1							1					C
Crustacea	Gammaridae	*Gammarus duebeni*	56	62	21		109	36	15	36	16	49	6	11	6	C
Diptera	Ceratopogonidae	sp. indet.	1													C
Diptera	Chironomidae	Non-*Chironomus* spp.		1			5			1					2	C
Diptera	Dixidae	sp. indet.			5		8					11	1			C
Diptera	Pediciidae	*Dicranota* sp.		6										3	1	C
Diptera	Simuliidae	sp. indet.	14	3	10	5	1	41	6	1	11				6	C
Diptera	Tipuliidae	sp. indet.					1									C

Group	Family	Species	C1	C2	C3	C4	C5	C7	C8	C9	C10	C12	C13	C14	C15	EPA group
Gastropoda	Bithnyiidae	*Bithynia tentaculata*						2								C
Gastropoda	Tateidae	*Potamopyrgus antipodarum*	1		8	22		18	4	4	2	9	12			C
Platyhelminthes		sp. indet.						7					2		1	C
Hemiptera	Gerridae	*Gerris* sp.										3				C
Hemiptera	Veliidae	*Velia caprai*	1													C
Crustacea	Asellidae	*Asellus aquaticus*				4	5					14	13			D
Mollusca	Sphaeridae	sp. indet.								2						D
Hirudinidae	Piscicolidae	*Piscicola* sp.							1							D
Hirudinidae	Glossiphoniidae	sp. indet.	2							12		2	2			D
Diptera	Chironomidae	*Chironomus* spp.	1	2			6			3		6	3	3		E
Annelidae	Oligochaeta	sp. indet.								13		3	2	1	3	n/a
Nematomorpha	Gordiidae	sp. indet.		3					1	1			1		1	n/a
Abundance			**189**	**224**	**55**	**84**	**298**	**179**	**61**	**101**	**80**	**97**	**45**	**30**	**64**	
Q-rating			Q4	Q4	Q3	Q3-4	Q3	Q3-4	Q3	Q3	Q4	Q2-3*	Q3	Q3	Q3	
WFD class			Good	Good	Poor	Mod	Poor	Mod	Poor	Poor	Good	Poor	Poor	Poor	Poor	

* Tentative Q-rating given lack of suitable riffle areas for sampling and or poor flows (Toner et al., 2005)

Note: sites C6 and C11 were dry at the time of survey

Table 9.4 Macro-invertebrate Q-sampling results for riverine Proposed Grid Connection Route sites D1-D10, September 2024

Group	Family	Species	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	EPA group
Ephemeroptera	Ephemeridae	*Ephemera danica*						9	14				A
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*	8	7									A
Ephemeroptera	Heptageniidae	*Ecdyonurus* sp.			2								A
Ephemeroptera	Heptageniidae	*Heptagenia sulphurea*	1					1	2				A
Ephemeroptera	Heptageniidae	*Rhithrogena semicolorata*	2										A

Group	Family	Species	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	EPA group
Plecoptera	Nemouridae	*Protonemura meyeri*	8	3									**A**
Plecoptera	Perlidae	*Perla bipunctata*		1									**A**
Ephemeroptera	Baetidae	*Alainites muticus*	4	4	3			1	2	1			**B**
Plecoptera	Leuctridae	*Leuctra fusca*	6	4				6					**B**
Trichoptera	Cased caddis pupa	sp. indet.	11	15	3						2		**B**
Trichoptera	Goeridae	*Silo pallipes*	5										**B**
Trichoptera	Lepidostomatidae	*Lepidostoma hirtum*						14					**B**
Trichoptera	Leptoceridae	*Athripsodes aterrimus*						1					**B**
Trichoptera	Limnephilidae	*Limnephilus marmoratus*					10		10				**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*			2						1	3	**B**
Trichoptera	Odontoceridae	*Odontocerum albicorne*			4								**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*	1	6			1	13			3		**B**
Odonata	Calopterygidae	*Calopteryx splendens*							1				**B**
Odonata	Coenagrionidae	sp. indet.					2						**B**
Ephemeroptera	Baetidae	*Baetis rhodani*	73	49	15		1	23	52	12		8	**C**
Ephemeroptera	Caenidae	*Caenis rivulorum*					5						**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*	14	7					22				**C**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*	13					1					**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*							1				**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*	5	1	1								**C**
Coleoptera	Dytiscidae	Dytiscidae larva					5			3			**C**
Coleoptera	Dytiscidae	*Oreodytes sanmarkii*		2									**C**
Coleoptera	Elmidae	*Elmis aenea*	16	5	12				1	1			**C**
Coleoptera	Elmidae	*Limnius volckmari*	4	5				3	1	7			**C**
Coleoptera	Gyrinidae	*Gyrinus substriatus*					7						**C**
Coleoptera	Halipliidae	*Haliplus ruficollis* group		1			3						**C**
Coleoptera	Hydraenidae	*Hydraena gracilis*	1										**C**

Group	Family	Species	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	EPA group
Crustacea	Gammaridae	*Gammarus duebeni*	44	33	35		2	67	34	41	42	46	**C**
Diptera	Chironomidae	Non-*Chironomus* spp.	3	1			7			4	4		**C**
Diptera	Dixidae	sp. indet.				3					6		**C**
Diptera	Pediciidae	*Dicranota* sp.			7	4							**C**
Diptera	Simuliidae	sp. indet.	8	10	51				53				**C**
Gastropoda	Bithnyiidae	*Bithynia tentaculata*					69			3	6		**C**
Gastropoda	Lymnaeidae	*Lymnaea stagnalis*					21		5	3	2		**C**
Gastropoda	Planorbidae	*Ancylus fluviatilis*						3	11				**C**
Gastropoda	Neritidae	*Theodoxus fluviatilis*						5	4				**C**
Gastropoda	Tateidae	*Potamopyrgus antipodarum*	13	5	8			33		6		4	**C**
Platyhelminthes		sp. indet.			3		7						**C**
Hemiptera	Gerridae	*Gerris* sp.		3			2						**C**
Hemiptera	Veliidae	*Velia caprai*				3	6						**C**
Crustacea	Asellidae	*Asellus aquaticus*					24		9	5	31		**D**
Crustacea	Crangonyctidae	*Crangonyx* sp.							5		2		**D**
Gastropoda	Physidae	*Physa fontinalis*					28						**D**
Mollusca	Sphaeridae	sp. indet.					6			16	8	3	**D**
Hirudinidae	Glossiphoniidae	sp. indet.	3				2	2			2	3	**D**
Diptera	Chironomidae	*Chironomus* spp.				4	5				6	4	**E**
Annelidae	Oligochaeta	sp. indet.	1	4	1	5	4	1				6	**n/a**
Abundance			**244**	**166**	**147**	**19**	**217**	**183**	**227**	**102**	**115**	**77**	
Q-rating			Q4	Q4	Q3-4	Q3*	Q3*	Q4	Q4	Q3	Q2-3	Q3	
WFD class			Good	Good	Mod	Poor	Poor	Good	Good	Poor	Poor	Poor	

* Tentative Q-rating given lack of suitable riffle areas for sampling and or poor flows (Toner et al., 2005)

Table 9.4 Macro-invertebrate results for lacustrine sites L1-L5 & P1-P7, September 2024

Group	Family	Species	L1	L2	L3	L4	L5	P1	P2	P3	P4	P5	P6	P7
Ephemeroptera	Baetidae	*Baetis rhodani*												
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia cincta*	10				2							
Trichoptera	Phryganeidae	*Agrypnia obsoleta*	1											
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*			1						7			
Trichoptera	Polycentropodidae	*Plectrocnemia geniculata*	1											
Trichoptera	Polycentropodidae	*Polycentropus kingi*					2							
Trichoptera	Limnephilidae	sp. indet.	3			3								
Odonata	Coenagrionidae	sp. indet.	125	18	8	68	2	1	9		13	14		
Odonata	Aeshnidae	*Anax imperator*						2						6
Odonata	Aeshnidae	*Aeshna sp.*				1				6				
Odonata	Lestidae	*Lestes sponsa*	2			1					1			
Odonata	Libellulidae	*Sympetrum* sp.		8		4		1	3		3			
Coleoptera	Dytiscidae	*Agabus arcticus*					3							
Coleoptera	Dytiscidae	Dytiscidae larva				2						1	3	
Coleoptera	Dytiscidae	*Hydroporus* sp.						1					1	
Coleoptera	Dytiscidae	*Ilybius ater*						1						
Coleoptera	Dytiscidae	*Rhantus exsoletus*				1	2							
Coleoptera	Gyrinidae	*Gyrinus minutus*										1		
Coleoptera	Gyrinidae	*Gyrinus substriatus*				1	6							
Coleoptera	Hydrophilidae	*Anacaena globulus*					1							
Coleoptera	Hydrophilidae	*Enochrus* sp.											1	
Diptera	Ceratopogonidae	sp. indet.											1	
Diptera	Chaoboridae	sp. indet.	38		1	3								
Diptera	Chironomidae	*Chironomus* spp.	1	11		6	3							
Diptera	Chironomidae	Non-*Chironomus* spp.			1	2	1			1				

Group	Family	Species	L1	L2	L3	L4	L5	P1	P2	P3	P4	P5	P6	P7
Diptera	Culicidae	sp. indet.		6			1					1		
Diptera	Dixidae	sp. indet.							8	11				
Hemiptera	Corixidae	*Corixa punctata*			2	9	1							
Hemiptera	Corixidae	*Corixa* sp.	11		2	6	1		6	2				3
Hemiptera	Corixidae	*Hesperocorixa moesta*		9	1					51	54			2
Hemiptera	Corixidae	*Sigara sp.*								1				
Hemiptera	Gerridae	*Gerris* sp.							5	2			1	
Hemiptera	Notonectidae	*Notonecta obliqua*								1	4			
Hemiptera	Notonectidae	*Notonecta viridis*	1		1	5								
Arachnida	Hydrachnidiae	sp. indet.	1	3		12				3		2		2
Abundance			**194**	**55**	**17**	**124**	**25**	**6**	**31**	**78**	**82**	**19**	**7**	**13**
Taxon richness			**11**	**6**	**8**	**15**	**12**	**5**	**5**	**9**	**6**	**5**	**5**	**4**

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10. Appendix D – freshwater pearl mussel report

Freshwater pearl mussel (*Margaritifera margaritifera*) survey of the Easky River, Co. Sligo

Prepared by Triturus Environmental Ltd. for MKO

February 2025

Please cite as:

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Note: Given the content of highly sensitive species location data, this report may not be made available to the public without the prior consent of the NPWS

Table of contents

1. Introduction **3**

1.1 Background 3

1.2 Conservation status of freshwater pearl mussel in Ireland 3

2. Methodology **5**

2.1 Stage 1 & 2 surveys 5

2.2 Biosecurity 5

3. Results **8**

4. Discussion **22**

4.1 Significant water quality pressures 22

4.2 Riparian shading 23

4.3 Summary 24

5. References **25**

6. Appendix A – freshwater pearl mussel database (May 2024) **27**

7. Appendix B – survey section characteristics **35**

8. Appendix C – representative survey images **40**

1. Introduction

1.1 Background

Triturus Environmental Ltd. were contracted by MKO to undertake a baseline freshwater pearl mussel (*Margaritifera margaritifera*) survey of the Easky River in the vicinity of the Proposed Crumhach Wind Farm located approximately 4.5km south of the village of Dromore West, Co. Sligo.

A significant population of Annex II freshwater pearl mussel (*Margaritifera margaritifera*) is known from the Easky River in the downstream vicinity of the proposed EIAR site boundary (**Figure 1.1**). The majority of these records were from 2018-2019 period (Moorkens, 2019). Recent (2018) mussel records are also available for the adjacent Gowlan River (a tributary of the Easky River) although there is no hydrological connectivity between this watercourse and the proposed project.

Considering the above, a Stage 1 and 2 pearl mussel survey was undertaken in May 2024 to establish population status and contemporary mussel distribution downstream of the proposed project, thus informing impact assessment and mitigation. The 2024 survey area encompassed 10km of contiguous sections of the Easky River and aligned with that surveyed by Moorkens (2019) to facilitate comparison of data (**Figure 2.1**).

1.2 Conservation status of freshwater pearl mussel in Ireland

The freshwater pearl mussel (*Margaritifera margaritifera*) is listed as critically endangered in Ireland (Byrne et al., 2009) and across Europe (Moorkens et al., 2017). It is also protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). Pearl mussel are protected in Ireland under the Wildlife Acts 1976 to 2018 (S.I. 112, 1990) and the species is listed on Annex II and Annex V of the EU Habitats Directive (92/43/EEC).

Three Article 17 reports have been prepared for pearl mussel (to report on national status as part of the requirements of the Habitats Directive) with the overall conservation status being considered as 'Bad' on all three occasions (NPWS, 2019, 2013, 2008). During 2009, The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations S.I. No. 296/2009 were created to establish environmental quality objectives for SAC pearl mussel populations, including the preparation of sub-basin management plans.

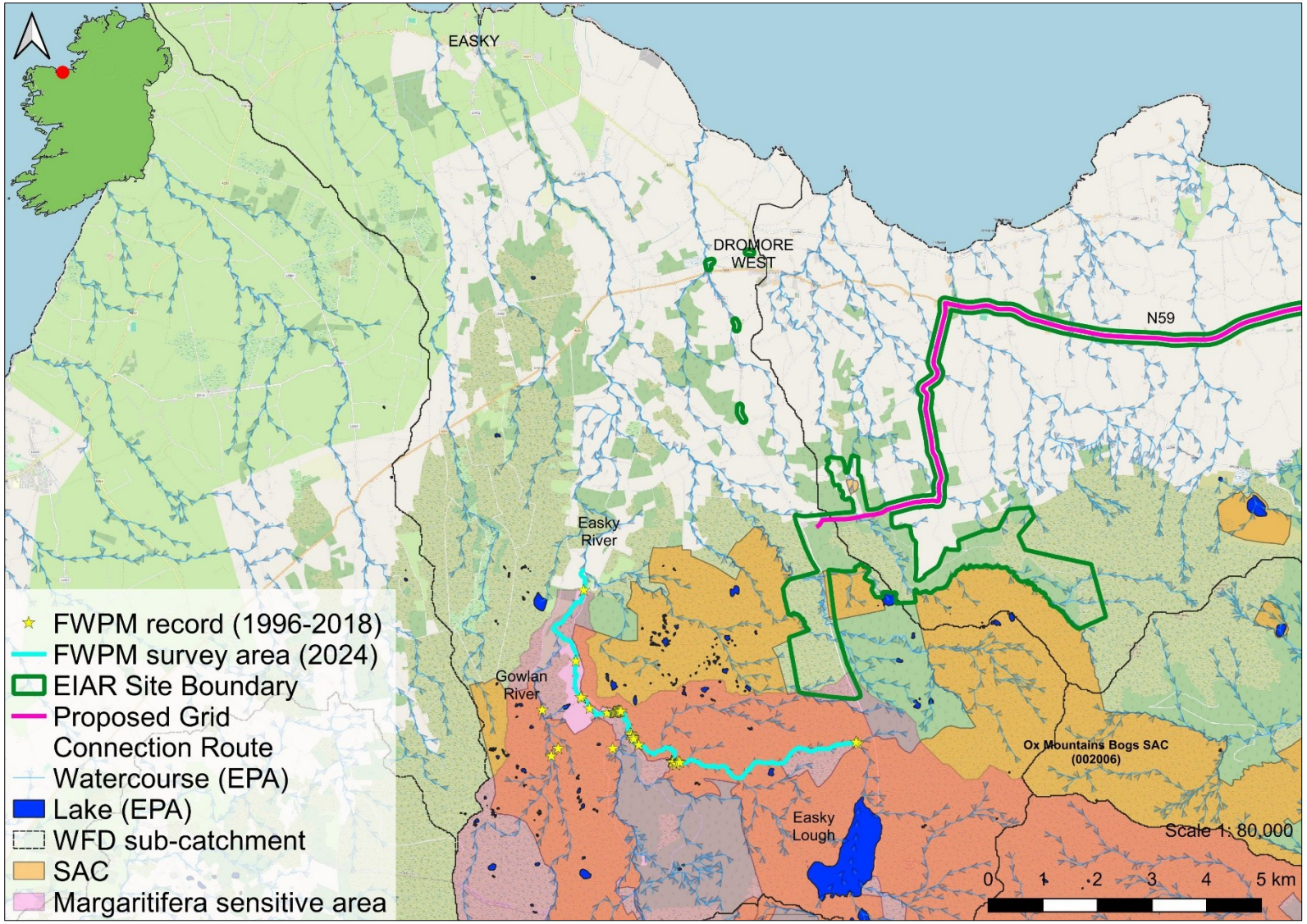

Figure 1.1 Historical freshwater pearl mussel records in vicinity of the Proposed Wind Farm (source: NPWS data)

2. Methodology

2.1 Stage 1 & 2 surveys

Stage 1 and 2 freshwater pearl mussel surveys were undertaken (licence C21/2024) on the 23rd, 24th, 25th and 26th May 2024 in bright weather with good underwater visibility and under base flow conditions. This helped to maximise visibility of pearl mussel against dark substrata and also helped to increase the chances of detection when mussels are actively filtering. The survey methodology used was in accordance with the Stage 1 and 2 guidelines provided by the NPWS (Anon., 2004) (guidelines currently being updated but unpublished at the time of survey). The surveys were also cognisant of the latest European-wide guidance for freshwater pearl mussel survey methodology (e.g. Boon et al., 2019; CEN, 2017).

Stage 1 and 2 surveys were undertaken along a total of 10.0km of the Easky River (**Table 2.1, Figure 2.1**). As per best practice guidelines, the survey area was delineated into ≤500m survey sections, with surveys carried out in an upstream direction in order to maximise visibility and minimise potential damage to mussels. In contrast to the traditional Stage 1 and 2 approach which recommends surveying 1 no. 500m section per kilometre, a total channel survey effort was applied, i.e. all 500m sections along 10km survey area. A total of 20 no. ≤500m contiguous sections were surveyed with total counts made for each ≤500m section. This total cover approach would facilitate more accurate mussel counts throughout the survey area, thus better informing impact assessment and mitigation. Surveys incorporated a combination of bathyscope and snorkelling methodologies, dependant on local water depths and flow regimes.

To highlight the most important areas for pearl mussel, survey sections were classified according to relative mussel abundance based on Moorkens & Killeen (2020), i.e. absent (no evidence), dead shells only, occasional (1-40 per 100m), frequent (41-300 per 100m), common (301-1500 per 100m) or abundant (>1500 per 100m) (counts adjusted for 500m sections). Notes were also taken on the aquatic habitat conditions and suitability for freshwater pearl mussels, based on the criteria of Moorkens & Killeen (2020), Skinner et al. (2003) and Hastie et al. (2000).

Table 2.1 Summary of the freshwater pearl mussel Stage 1 and 2 survey area, May 2024

Watercourse (EPA code)	Approx. survey length (km)	No. ≤500m survey sections	Upstream extent (ITM)	Downstream extent (ITM)
Easky River (35E01)	10.0	20	544443, 825099	539414, 828272
Total	**10.0km**	**20**		

2.2 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was undertaken to prevent the transfer of pathogens or invasive propagules between survey sites. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

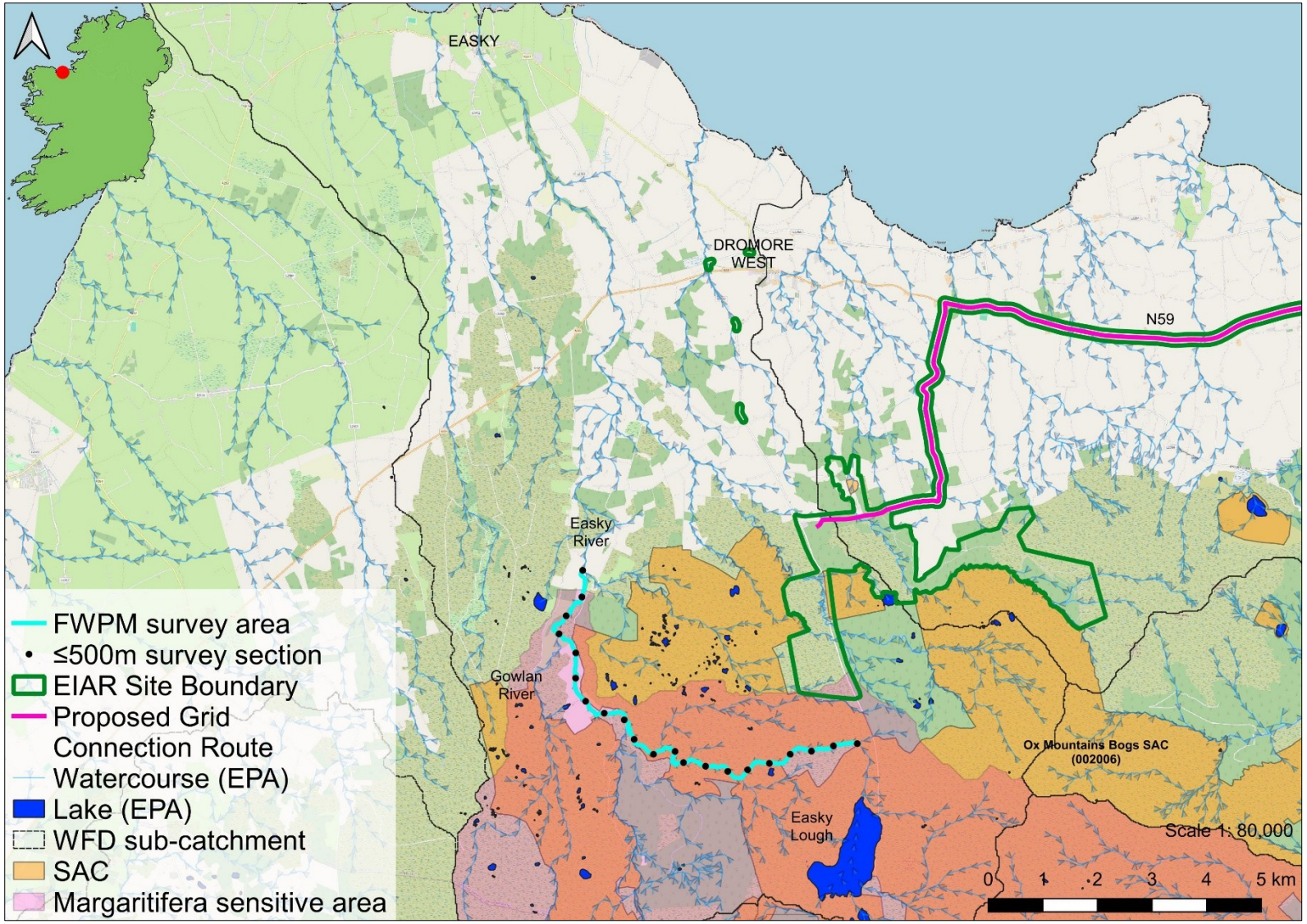

Figure 2.1 Overview of the 2024 freshwater pearl mussel survey area in the vicinity of the Proposed Wind Farm

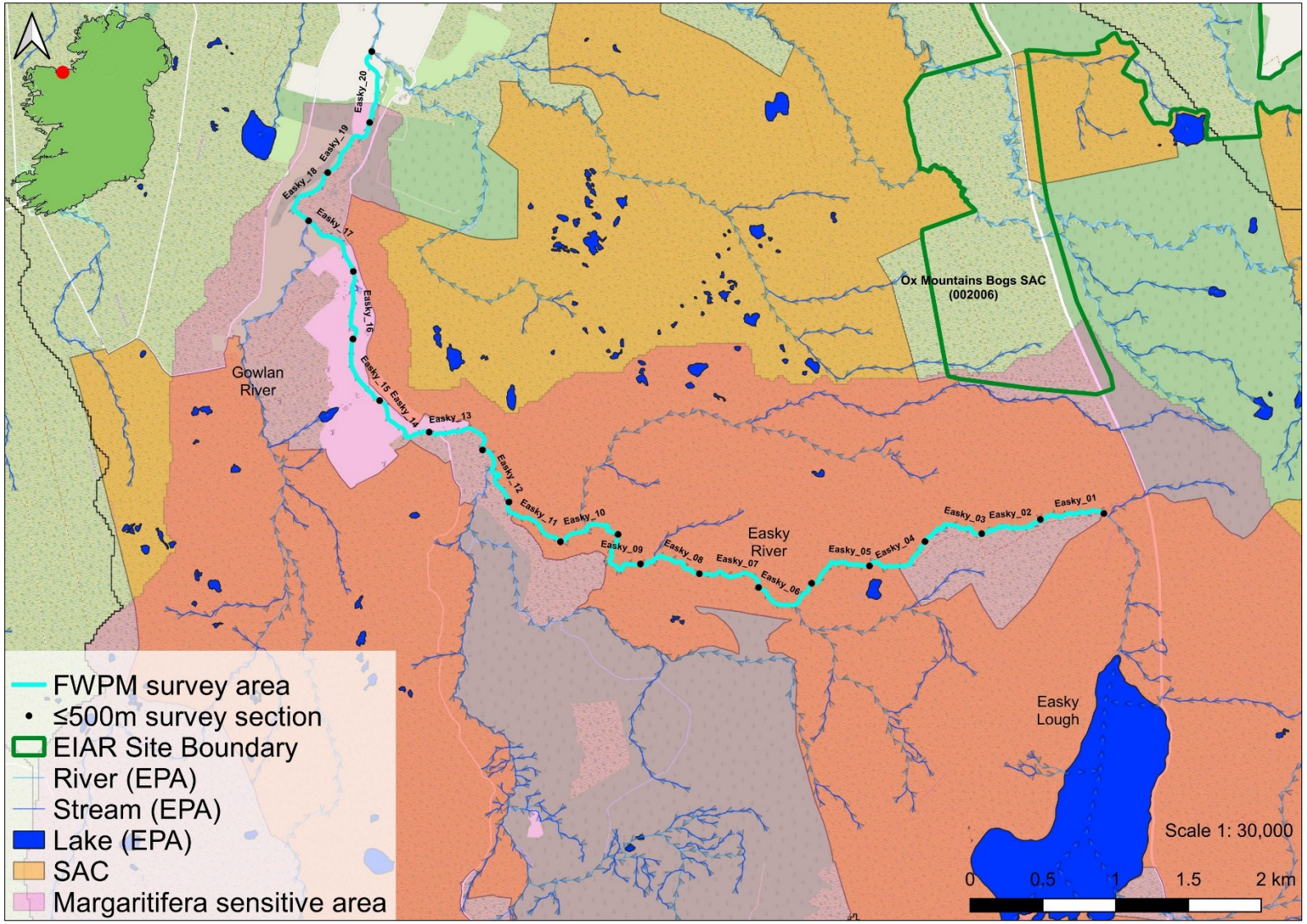

Figure 2.2 Twenty no. 0.5km river sections surveyed for freshwater pearl mussel survey in the vicinity of the Proposed Wind Farm, May 2024

3. Results

In support of previous surveys (i.e. Moorkens, 2019), a highly significant population of freshwater pearl mussel was identified in the survey area in May 2024 with >15,068 live individuals recorded along 10km of the Easky River (**Table 3.1; Figures 3.1-3.5**). All 20 no. survey sections supported live mussels, with sections Easky_02, Easky_03, Easky_04, Easky_05, Easky_06, Easky_09 and Easky_15 supporting particularly high numbers of mussels, respectively. Over 160 discreet clusters (agglomerations) of mussels were recorded during the survey, with most supporting 5-100 individual mussels (**Appendix A**). Section Easky_09 featured a very high density of mussels (abundant) with >2000 in a 50m section of mixed substrata glide and bank scours.

There was widespread footing suitability in the survey area, with often abundant mixed and stable substrata suitable for mussel footing present between boulders and in bank scours/undercuts. Numerous areas of river with higher gradients and flow velocities provided little or no suitability for mussels (e.g. sections Easky_12, Easky_13, Easky_18).

Significant water quality pressures, resulting in extremely high filamentous algae and floc cover, were evident in section Easky_07 downstream of the Meenamaddo River (EPA code: 35M44) confluence (ITM 542306, 824466).

A summary of the physical habitats and suitability for freshwater pearl mussel for each ≤500m survey section is provided in **Appendix A**.

Table 3.1 Counts of freshwater pearl mussel per ≤500m survey section

Survey section	No. live mussels	Relative abundance category[1]
Easky_01	23	Occasional
Easky_02	464	Frequent
Easky_03	1360	Frequent
Easky_04	1308	Frequent
Easky_05	3253	Common
Easky_06	1152	Common
Easky_07	82	Occasional
Easky_08	829	Frequent
Easky_09	2235	Common
Easky_10	1340	Frequent
Easky_11	122	Occasional
Easky_12	35	Occasional
Easky_13	23	Occasional
Easky_14	251	Frequent
Easky_15	1529	Common
Easky_16	263	Frequent
Easky_17	81	Occasional

[1] based on counts per 100m as per Moorkens & Killeen (2020), adjusted here for 500m sections

Survey section	No. live mussels	Relative abundance category[1]
Easky_18	39	Occasional
Easky_19	445	Frequent
Easky_20	234	Frequent
Total	**>15,068**	

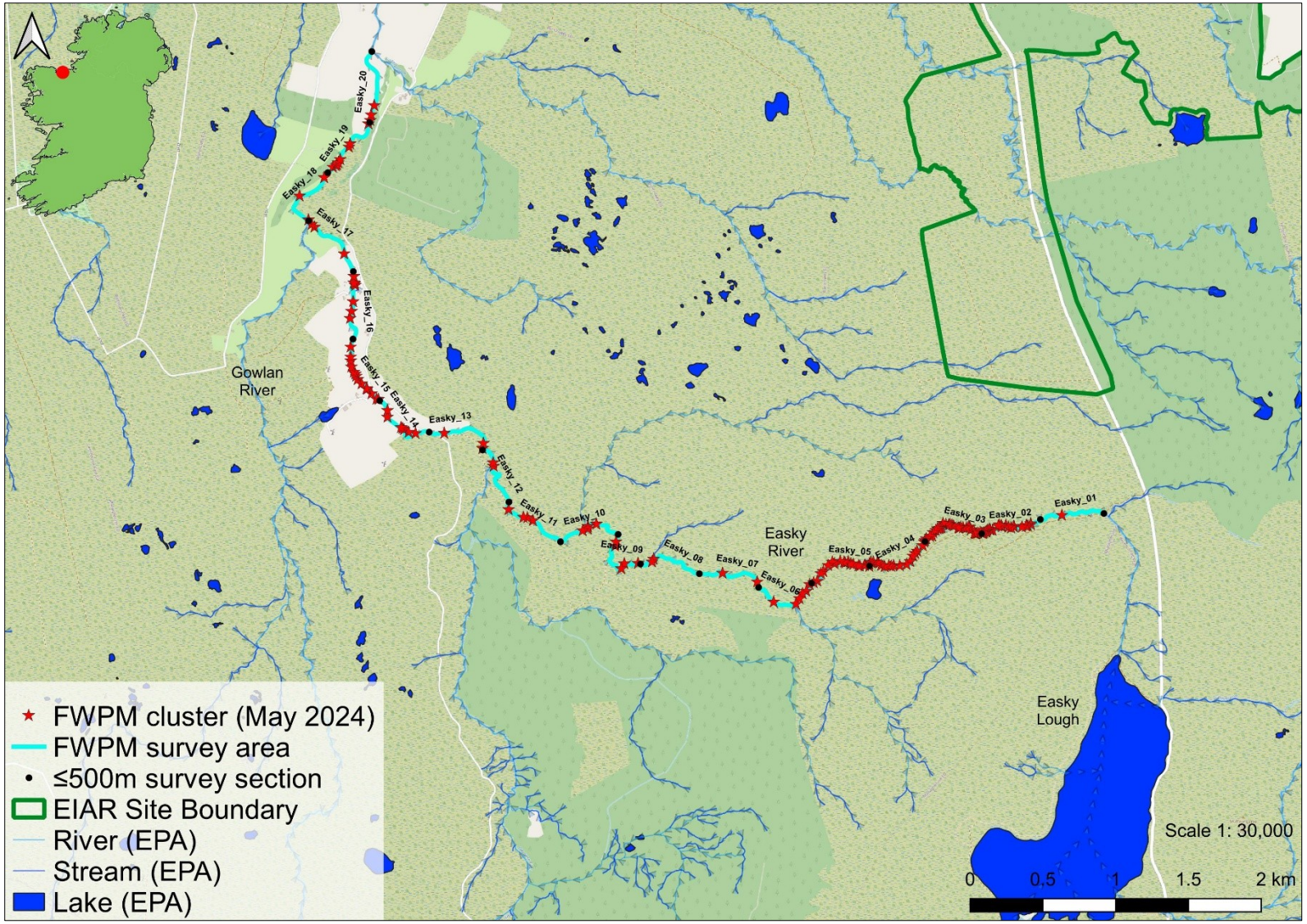

Figure 3.1 Overview of freshwater pearl mussel clusters in the Easky River, May 2024

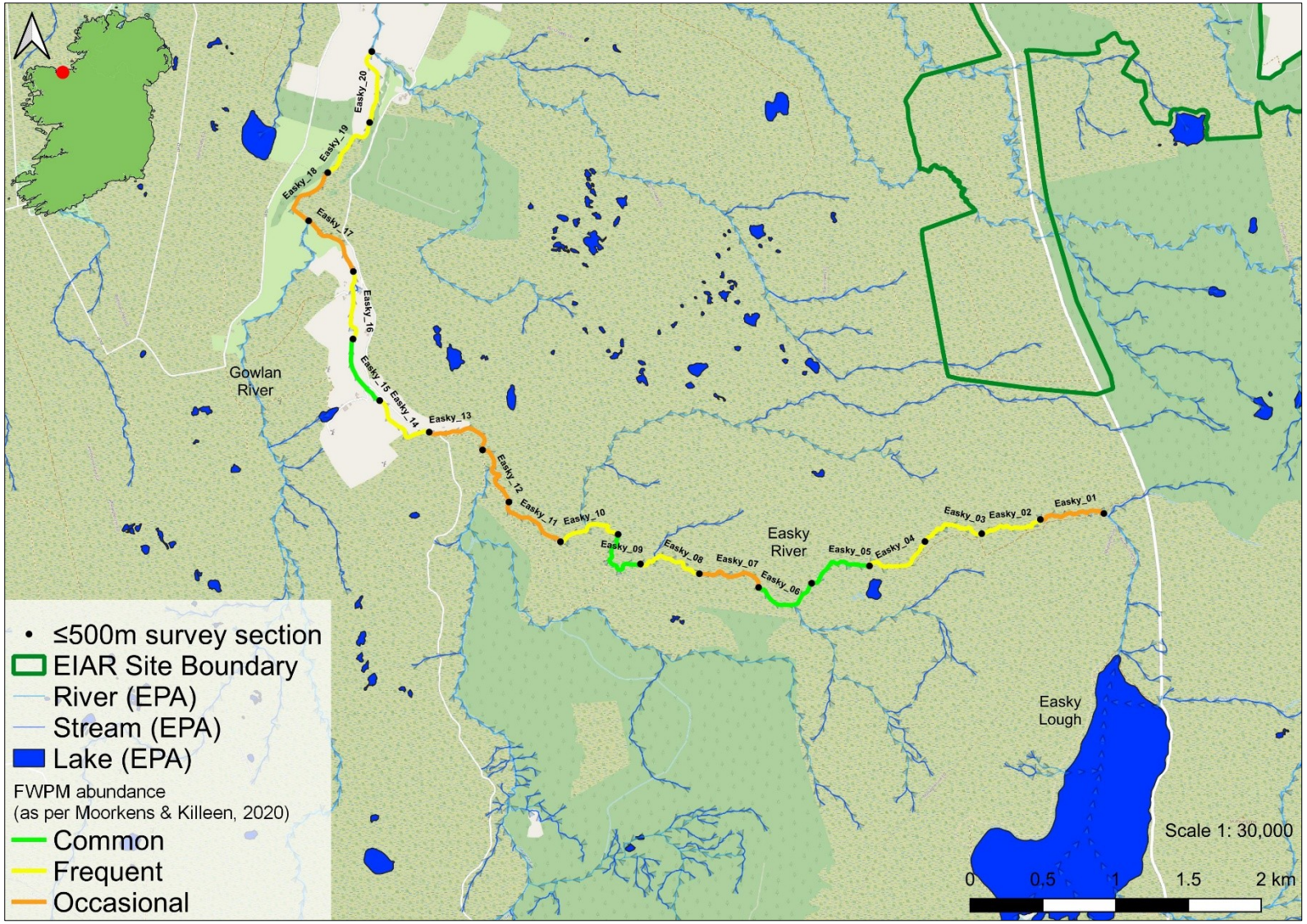

Figure 3.2 Freshwater pearl mussel abundance per 500m survey section in the Easky River, May 2024

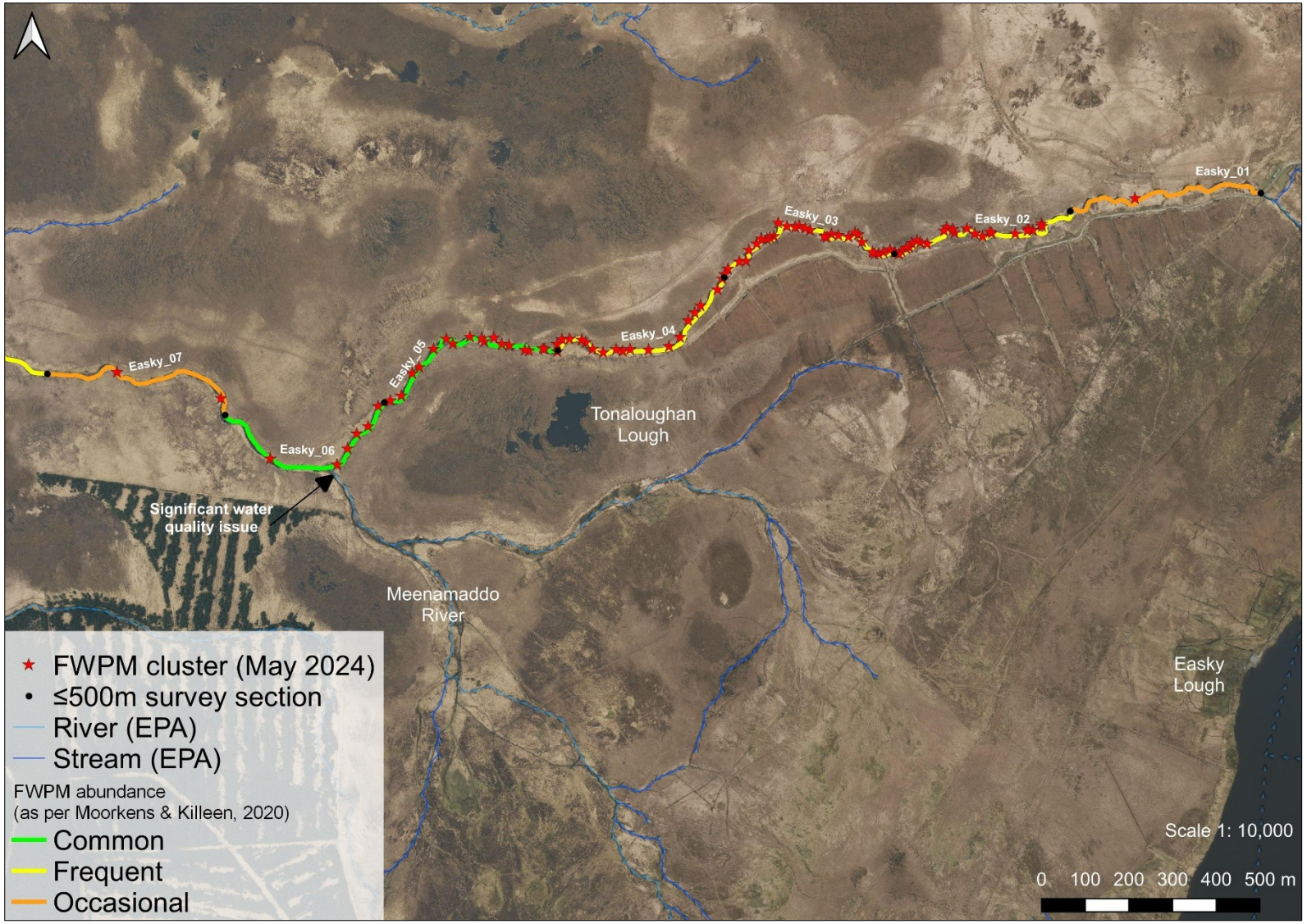

Figure 3.3 Freshwater pearl mussel distribution and abundance in sections 1-7, May 2024

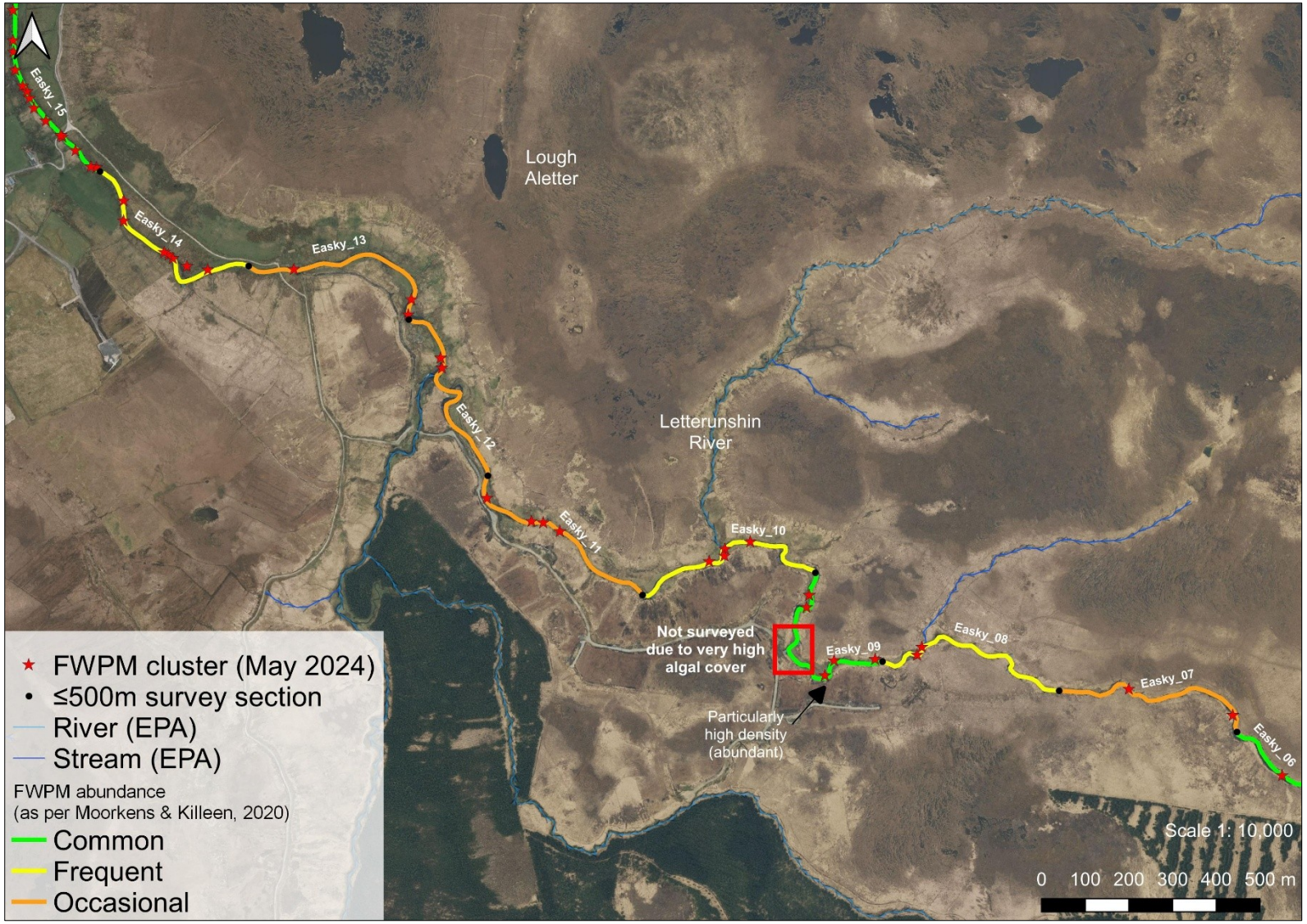

Figure 3.4 Freshwater pearl mussel distribution and abundance in sections 7-14, May 2024

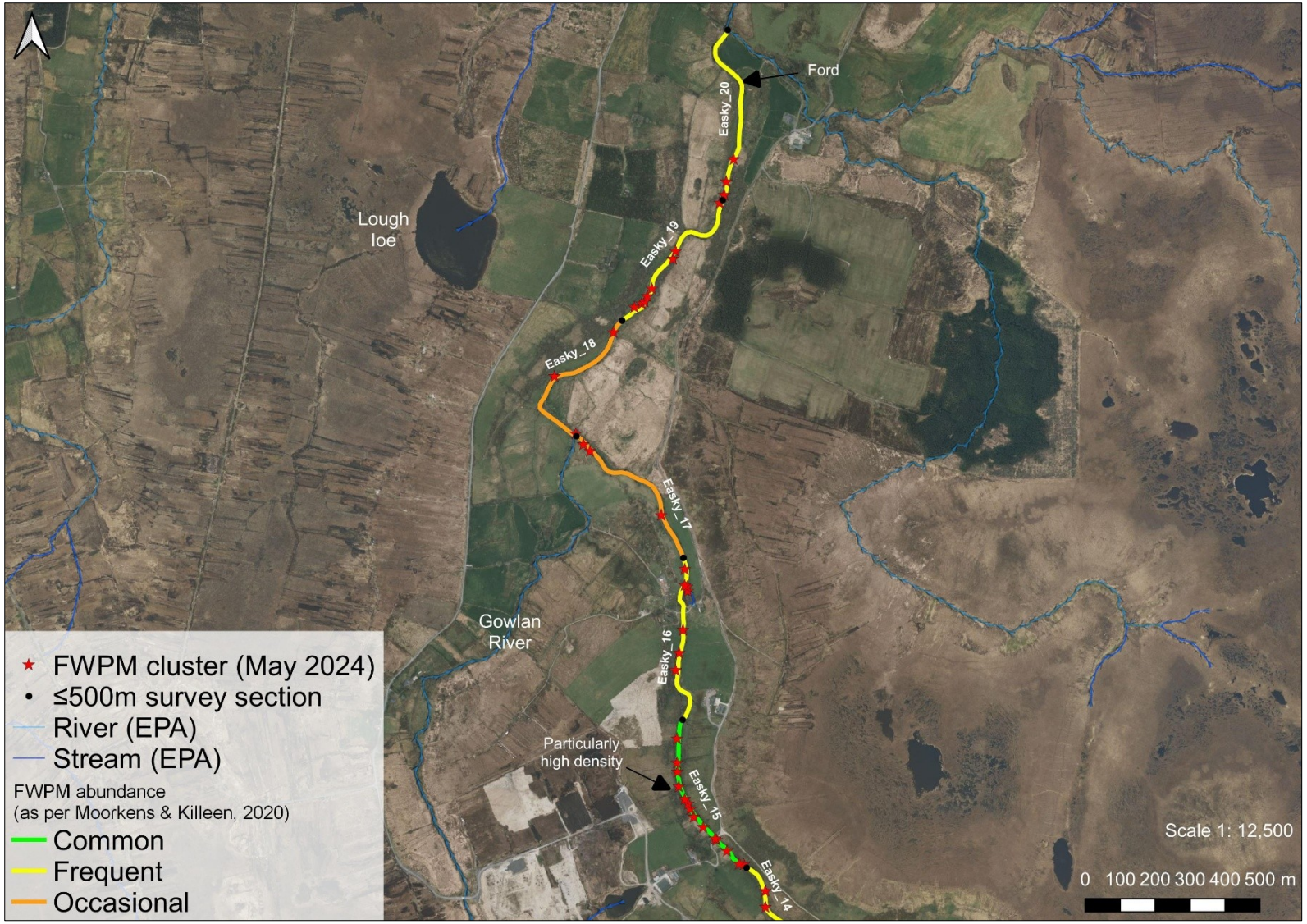

Figure 3.5 Freshwater pearl mussel distribution and abundance in sections 15-20, May 2024

Plate 3.1 Filtering adult mussels on the upper reaches of the Easky River (section Easky_02) with high cover of filamentous algae, May 2024

Plate 3.2 Example of the upper survey area with stable mixed substrata supporting high densities of pearl mussel

Plate 3.3 Different size (age) classes of mussel in the upper survey area

Plate 3.4 Moribund adult mussel were common in the upper reaches of the Easky River (section Easky_10)

Plate 3.5 Very high cover of filamentous algae indicating significant eutrophication in the upper reaches of the Easky River (Easky_07)

Plate 3.6 Extremely high cover of filamentous algae in section Easky_09 made it impossible to safely record pearl mussels (present in high numbers)

Plate 3.7 Dead shells were abundant in section Easky_09

Plate 3.8 Localised bank works in section Easky_14

Plate 3.9 Adult mussels with very high cover of floc and filamentous algae (significant eutrophication)

Plate 3.10 High densities of pearl mussel were typically found in the shade of bank scours / undercuts (e.g. section Easky_15)

Plate 3.11 Small cluster of mussels in mixed gravel flow refuge between large boulders in high energy cascade area (section Easky_17)

Plate 3.12 Land use pressures increased in the lower survey reaches (e.g. semi-improved pasture with bank clearance & some localised instream works)

Plate 3.13 Mussel suitability decreased moving downstream in the survey area (high energy cascade/boulder reaches with poor footing opportunities). Easky River near the end of the survey area (section Easky_20)

4. Discussion

The current study has provided contemporary data on the status and distribution of pearl mussel populations of the upper reaches of the Easky River updating the results of previous surveys (Moorkens, 2019). The survey effort covering c.10km of channel recorded over 15,000 live mussels in May 2024. While juvenile mussels can be buried under adults, a very low number (<20) of smaller size classes (estimated <50mm) were encountered as the population was dominated by old mussel. The shortest potential hydrological pathway from the Proposed Wind Farm to known pearl mussels on the Easky River was c. 650m instream distance (**Figures 3.1 & 3.3**). Eutrophication, and to a lesser degree siltation, was evidently impacting mussel habitat throughout the survey area and gross filamentous algal cover on the riverbed made it impossible to safely survey for mussels in much of section Easky_09.

The upper survey reaches of the Easky River featured a greater frequency of lower gradient riffle and glide areas supporting less mobile mixed gravel and cobble substrata that provided more optimal conditions for mussel footing (Hastie et al., 2000). Such areas were often located between boulder zones/cascades and also along bank scours. However, mussels were well distributed throughout the survey area, with over 160 discreet clusters (agglomeration) of mussels recorded in addition to scattered mussels (**Appendix A**). Sections Easky_02, Easky_03, Easky_04, Easky_05, Easky_06, Easky_09 and Easky_15 supported particularly high numbers of mussels, respectively (**Table 3.1; Figures 3.3-3.5**).

Alongside bed stability, the presence of flow refugia during high flows is vital for mussel bed formation (Denic et al., 2023; Moorkens & Killeen, 2014) and to minimise drifting of mussels (Eissenhauer et al., 2023). The occurrence of such refugia in many higher velocities (boulder cascade) reaches allowed colonisation and persistence of mussels (e.g. **Plate 3.10**), albeit at lower densities than upstream areas. A smaller number of river sections were of higher gradient with a paucity of flow refugia and provided very limited suitability for mussels (i.e. sections Easky_12, Easky_13, Easky_18).

4.1 Significant water quality pressures

Very high concentrations of mussels were present in sections Easky_03 to Easky _06 (**Figure 3.3**). However, very significant water quality pressures, resulting in very high filamentous algae and floc[2] cover (eutrophication), high iron-oxidising bacterial cover and increased turbidity, were evident in section Easky_07 downstream of the Meenamaddo River (EPA code: 35M44) confluence (ITM 542306, 824466). Pearl mussel abundance dropped noticeably at this point with a sudden increase in the number of dead shells and moribund mussels indicating a toxic effect from the adjoining tributary (a channel draining blanket bog and coniferous afforestation). High rates of eutrophication were also evidently originating from the unnamed tributary at ITM 540218, 825404 in section Easky_12 (a channel again draining coniferous afforestation).

Eutrophication pressures were present throughout the survey area, with coverage of filamentous algae often very high in the open channel. Algal cover was so extremely high in section Easky_09 (**Plate**

[2] floc is defined as an aggregation of (mostly dead) organic material, mainly from algae and diatoms, but also with potential origins from decaying macrophytes and associated decomposers (bacteria and fungi). The floc can form a layer at the surface of the substrate, or infiltrate the substrate (Moorkens & Killeen, 2020)

3.6) that it was not possible to safely identify mussels throughout much of the section, despite their presence in very high numbers (e.g. >2000 in a short 50m section of mixed substrata glide). Both juvenile and adult life stages of freshwater pearl mussel are highly sensitive to eutrophication (Boon et al., 2019; Moorkens, 2000). Eutrophication, resulting in higher rates of algal growth and decay, increases biological oxygen demand and thus limits oxygen supply, particularly in juvenile mussels buried in substrata (Geist & Auerswald, 2007). The Easky River drains blanket bog with areas of cutover bog and coniferous afforestation, with much of the middle and lower reaches bordered by semi-improved pasture with frequent adjoining land drainage channels (i.e. nutrient pathways). Such land use practices significantly increase the escapement of nutrients to surface waters.

Whilst not as pronounced as eutrophication, siltation pressures were also observed during the survey. These appeared to mostly originate from bank erosion and peat escapement in the upper catchment with widespread flocculent peat on substrata in lower flow areas. The high energy characteristics of the spate channel likely reduce the severity of such impacts on mussels and their salmonid hosts. Siltation is the critical factor determining successful *Margaritifera* recruitment (Tamario et al., 2022; Hyvärinen et al., 2021; Moorkens & Killeen, 2014; Denic & Geist, 2015; Geist & Auerswald, 2007). Siltation also impacts the filter feeding ability of adult mussels and can lead to mortality (Goldsmith et al., 2021; Österling et al., 2010; Moorkens, 1999).

The Easky River is designated as a 'Blue Dot' catchment with a high status water quality objective and is currently achieving high ecological status according to the EPA. However, eutrophication pressures and, to a lesser degree, silt inputs are evidently compromising this status. Coniferous afforestation is listed as a primary threat in the Easky catchment (EPA data) and this was corroborated during the field surveys based on evident eutrophication pressures downstream of afforested areas.

4.2 Riparian shading

Much of the upper Easky River featured open banks exposed to low-intensity sheep grazing with historical riverbank clearance (for agriculture) that was more common in the lower reached of the survey area. Consequentially, riparian and littoral shading was often low due. Tree removal alters sediment dynamics, river hydromorphology, thermal regimes, substratum oxygenation thereby impacting the survival of pearl mussel and host salmonid populations (Wagner et al., 2024; Wacker et al., 2024; Quinlan et al. 2015). Allochthonous inputs from intact riparian zones contribute particulate organic matter (POM) and provide surprisingly important food resources for pearl mussels (Brauns et al., 2021). Mussel densities are strongly correlated with riparian shading (Reid et al., 2013; Gittings et al., 1998; Triturus pers. obs.) although in an Irish context this is thought to only apply to damaged habitats. A clear association between mussel density and riparian shading (often undercut banks/bank scours but also trees) was observed in the current survey (e.g. section Easky_15). Most mussels were found in shaded areas, inclusive of macrophyte (*Myriophyllum*) beds rather than open areas of channel this would further imply impacts from water quality pressures. Mussels in open, unshaded and undamaged habitats filter more efficiently, grow larger, and reproduce more frequently and successfully (Moorkens, 2018).

4.3 Summary

Despite the high number of adult mussels present, the Easky River pearl mussel population would appear to be in unfavourable condition based on the significant eutrophication pressures observed in addition to a (very) low number of smaller size classes present (suggesting poor or failing recruitment).

Irrespective the presence of a significant population, the Easky River is not a designated freshwater pearl mussel catchment. Nonetheless, the upper Easky River catchment (i.e. within the current survey area) is considered a *Margaritifera* sensitive area given the presence of extant populations. It is therefore essential to incorporate strict mitigation measures in the EIAR for the Project to ensure no deterioration in habitat quality for pearl mussel.

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6. Appendix A – freshwater pearl mussel database (May 2024)

Table 6.1 Easky River freshwater pearl mussel database, May 2024

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_01	1	23	Group of 23 mussels in glide with stable cobble and gravel on south under shade of bank	544155	825087
Easky_02	2	33	Group of 33 mussels on meander and pool head in mixture of sand and cobble	543941	825029
Easky_02	3	10	Group of 10 mussels in pool in stable large cobble with high algae and flock cover at head of pool	543942	825023
Easky_02	4	5	Cluster of 5 mussels along north bank in stable cobble	543921	825014
Easky_02	5	34	Cluster of 34 mussels in large cobble and sand in glide along south bank	543911	825017
Easky_02	6	16	Cluster of 16 mussels in large cobble and mixed glide on meander	543909	825013
Easky_02	7	36	Scattered mussels 36 in section of glide in stable cobble	543881	825006
Easky_02	8	5	Small group of 5 mussels in stable cobble	543827	825007
Easky_02	9	26	Group of 26 mussels in large stable cobble and sand	543823	825010
Easky_02	10	29	Group of 29 mussels in glide between boulder cascade area and pool	543806	825000
Easky_02	11	4	Small group of 4 mussel in large cobble in small pool	543788	825006
Easky_02	12	3	Small group of 3 mussel in large cobble at head of deep pool	543770	825018
Easky_02	13	7	Small group of 7 mussel in large cobble between boulder glide	543742	825008
Easky_02	14	6	Small group of 6 mussel in stable large cobble and boulder in glide	543738	825016
Easky_02	15	26	Group of 26 mussels along south bank	543724	825020
Easky_02	16	24	Group of 24 mussels in pool with stable cobble and sand	543718	825013
Easky_02	17	17	Group of 17 mussels in glide with stable cobble and sand	543679	824983
Easky_02	18	19	Group of 19 mussels in glide with stable cobble, gravels and sand	543663	824986
Easky_02	19	24	Group of 24 mussels in glide with stable cobble and boulder	543656	824990
Easky_02	20	42	Scattered clusters of 42 mussel (total) in shallow glide in mixed cobble and sand	543644	824984
Easky_02	21	13	Small group 13 mussel in shallow glide	543638	824975
Easky_02	22	6	Group of 22 mussels between boulders in cobble	543631	824973
Easky_02	23	22	Group of 22 mussels between cobble and gravels in riffle adjoining undercut bank	543620	824966
Easky_02	24	29	Group of 29 mussels between boulders and gravels in glide adjoining undercut bank	543614	824960
Easky_02	25	28	Scattered clusters of 28 (total) mussels in glide between boulders	543605	824964

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_03	26	55	Group of 55 (total) mussels in glide between boulders	543594	824969
Easky_03	27	18	Group of 39 mussels in cobble and gravels	543579	824964
Easky_03	28	12	Group of 12 mussels in cobble and gravels between boulders	543568	824960
Easky_03	29	42	Clusters of mussels 42 total in cobble and gravels between boulders	543558	824960
Easky_03	30	32	Clusters of mussels 32 total in cobble and gravels between boulders	543554	824964
Easky_03	31	188	Large bed of mussels in long pool below glide reach in gravels and sand	543530	824987
Easky_03	32	55	Clusters of mussels 55 no. in riffle amongst gravels and cobbles	543521	825004
Easky_03	33	23	Group of 23 mussels in depositional sand and gravels	543514	825008
Easky_03	34	30	Group of 30 mussels in glide downstream of pool in boulder and cobble	543499	824999
Easky_03	35	53	Scattered clusters of 53 mussels in glide run	543476	825002
Easky_03	36	102	Scattered clusters of 102 mussels in glide between cobbles and boulder	543460	825005
Easky_03	37	48	Group of 48 mussels in pool with sand, gravels and cobbles	543449	824998
Easky_03	38	26	Group of 26 mussels in pool with sand, gravels and cobbles	543444	825000
Easky_03	39	18	Scattered clusters 18 no. in boulder glide runs between boulders and cobble	543411	825014
Easky_03	40	54	Scattered clusters 39 no. in glide run between cobbles and gravels	543400	825019
Easky_03	41	95	Scattered clusters 95 no. in glide run between cobbles and gravels	543386	825024
Easky_03	42	34	Clusters of mussels 34 no. in pool at meander within bedded cobbles with silt	543377	825021
Easky_03	43	7	Small group of 7 mussels in pool tail	543358	825023
Easky_03	44	11	Group of 11 mussels at head of pool on meander situated in mobile sand and cobbles (heavy siltation)	543338	825031
Easky_03	45	10	Group of 10 mussels in deep glide between sand and cobbles (heavy siltation)	543328	825000
Easky_03	46	8	Cluster of 8 mussels in undercut bank	543319	824997
Easky_03	47	47	Clusters of mussels 47 in pool along north bank in large gravels	543312	824994
Easky_03	48	128	Large group of mussels 128 no. at head of pool between boulder and cobble	543300	824994
Easky_03	49	39	Scattered clusters 39 no. in deep glide	543289	824983
Easky_03	50	52	Scattered clusters 52 no. mussels in shallow glide between gravels and boulder	543271	824968
Easky_03	51	10	Scattered clusters 10 no. mussels in pool between boulders	543264	824944

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_03	52	45	Scattered clusters 45 no. mussels in glide between boulders and mixed gravels. increased algae cover.	543249	824942
Easky_03	53	11	Scattered clusters 11 no. mussels in glide between boulders and mixed gravels. increased algae cover.	543223	824925
Easky_03	54	38	Scattered clusters 38 no. mussels in glide between sand and mixed gravels.	543215	824913
Easky_03	55	60	Scattered clusters 60 no. mussels in glide between boulders. Situated in gravels and sand.	543210	824903
Easky_03	56	9	Small number scattered mussels between boulders in glide	543199	824878
Easky_04	57	13	Small number scattered mussels 13 no. between boulders in glide	543160	824841
Easky_04	58	21	Small clusters of scattered mussels 21 no. between exposed boulders in glide	543147	824825
Easky_04	59	57	Group of 57 mussels between boulders in cobble and gravels in glide habitat	543132	824807
Easky_04	60	196	Larger clusters of mussels in pool below extensive boulder cascade glide reach. Approximately 196 mussels in cobbles and gravels.	543113	824769
Easky_04	61	201	Large groups of mussels total 118no. in long glide-pool habitat area. Mussels situated mainly near head of pool.	543088	824748
Easky_04	62	34	Group of 34 mussel between boulders in gravel in undercut bank	543041	824740
Easky_04	63	79	Group of 79 mussels between boulders in mixed gravels-cobbles in shallow glide	542999	824741
Easky_04	64	207	Large group of 207 mussels at head of deep glide-pool area in cobbles and gravels	542982	824737
Easky_04	65	57	Group of 57 mussels in pool between mixed gravels	542967	824741
Easky_04	66	97	Clusters of mussels 97 no. at pool tailing in glide	542937	824734
Easky_04	67	123	Frequent clusters of mussels 123 in shallow glide with clean gravels between boulders	542913	824742
Easky_04	68	111	Clusters of mussels 111 in gravels between boulders throughout glide habitat	542897	824757
Easky_04	69	81	Clusters of mussels at end of glide to pool	542888	824763
Easky_04	70	11	Small mussel clusters in glide reaches below pool	542687	824768
Easky_04	71	20	Groups of mussels in glide habitat in gravels	542860	824765
Easky_05	72	38	Mussel clusters 48 no. in gravels in deeper glide	542843	824764
Easky_05	73	16	Small numbers 16 no. of mussel between boulders in pool	542832	824753
Easky_05	74	86	Group of mussel no. 86 at head of pool in gravels and sand	542832	824736
Easky_05	75	137	Large group of mussels 137 no.in gravels and cobbles under bank	542803	824742
Easky_05	76	159	Large group of mussels 159 no.in gravels and cobbles under bank	542799	824743

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_05	77	21	Small clusters 21 no. between boulders	542767	824738
Easky_05	78	33	Group of mussels 33no. at head of glide in mixed gravels and sand between cobble	542758	824740
Easky_05	79	22	Small clusters of mussels in gravels between boulders	542722	824750
Easky_05	80	26	Clusters of mussels in glide between boulders at top of glide	542705	824753
Easky_05	81	350	Cluster in riffle gravels and cobbles, high density all across channel	542665	824759
Easky_05	82	400	Very high density cluster in gravelly and cobble shallow glide at head of deep pool	542659	824766
Easky_05	83	150	High density at end of glide,	542632	824770
Easky_05	84	60	Small clusters in localised areas of mixed substrata between large boulder	542593	824754
Easky_05	85	220	High density in short riffle between pool,	542578	824765
Easky_05	86	180	High density in glide and slope of pool, all substrata supporting mussels	542549	824742
Easky_05	87	460	Very high density in short glide section	542516	824700
Easky_05	88	475	Very high density in short glide section, cobble and boulder, lots of *Myriophyllum alterniflorum*	542500	824686
Easky_05	89	260	High density in small pool area, sand and gravel between boulder,	542475	824635
Easky_05	90	160	High density in shallow cobble boulder glide with some localised gravels downstream of pool on meander, some in very shallow water.	542450	824624
Easky_06	91	120	Cobble and boulder glide	542422	824611
Easky_06	92	121	Cobble and boulder glide	542399	824565
Easky_06	93	239	Glide to pool	542373	824548
Easky_06	94	76	Glide with abundant *Myriophyllum*	542352	824514
Easky_06	95	43	Boulder glide with abundant *Myriophyllum* & algae	542328	824477
Easky_06	96	118	In mixed sub between boulder cascades. Very high cover of floc. Almost no mussels (10 maybe) between 542175, 824491 and 542062, 824629	542175	824491
Easky_06	97	435	In short glide mixed substrata below boulder cascade pool sequence	542062	824629
Easky_07	98	82	In boulder glide between meanders. Very heavy algal cover	541824	824689
Easky_08	99	75	Cluster at head of glide in algae covered boulder and cobble	541350	824785
Easky_08	100	300	Cluster on cobble and gravel at head of pool on meander	541339	824767
Easky_08	101	454	Large high density cluster on fast glide, most covered by algae	541243	824757

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_09	102	2000	Very high density in 50m of glide and undercut bank. Cobble and mixed gravels, most mussels buried under algae. Abundant (hundreds) dead shells in area also	541149	824754
Easky_09	103	200	Large cluster in pool and deep glide, very high algal cover	541128	824720
Easky_09	104	20	Cluster at head of pool on meander	541086	824876
Easky_09	105	15	Small cluster in fast glide alongside milfoil bed along undercut bank, including a moribund adult	541092	824904
Easky_10	106	250	High density in short glide between cascades, covered by algae mostly. Low density downstream including lots of moribund adults who were clearly trying to avoid BOD/toxic effects	540957	825026
Easky_10	107	400	Large cluster in deep glide and margins at river confluence, some moribund	540899	825010
Easky_10	108	90	Cluster in side channel at island	540898	824994
Easky_10	109	600	High density in glide below meander, most along extreme littorals, many moribund	540863	824981
Easky_11	110	12	Cluster scattered in cobble glide, sub-optimal habitat	540521	825050
Easky_11	111	11	In glide adjoining milfoil beds in pool downstream of riffle	540483	825070
Easky_11	112	24	Cluster in glide under bank. Scattered mussels only in adjoining boulder glide	540456	825073
Easky_11	113	75	In short section of boulder cobble glide	540354	825126
Easky_12	114	10	Small cluster in shallow small cobble glide downstream confluence. Only very low density, less than 15 in first 250m, dead shells also. All boulder and cobble. Couple of mussels were moribund.	540251	825424
Easky_12	115	25	Scattered mussels in boulder cobble glide	540248	825447
Easky_13	116	11	Cluster at head of pool on meander in cobble. High floc cover	540174	825546
Easky_13	117	6	Mussels in shallow glide, mixed substrata under milfoil	540181	825581
Easky_13	118	6	Low density upstream of footbridge mid channel, despite better suitability in mixed gravels	539912	825650
Easky_14	119	3	In mixed boulder cobble under ash tree in section with historical bank works	539715	825649
Easky_14	120	63	Large cluster at head of pool with mixed cobble and gravels	539667	825657
Easky_14	121	23	Cluster at small tributary confluence along left bank, small cobble	539635	825675
Easky_14	122	21	Small cluster at head of pool, mixed substrate, lower algal cover then upstream but still present. Most under milfoil beds	539625	825683
Easky_14	123	113	Mussels in 50m of glide, mostly along shade left bank, mixed substrata, high algal cover	539615	825689
Easky_14	124	24	Mussels in glide (same glide as above really). Heavy algal cover. Most along margins	539522	825761
Easky_14	125	4	Small cluster in glide	539522	825807
Easky_15	126	13	Cluster of 13 x mussels in small bed of sand and mixed sub in fast flowing glide, heavy algal cover	539460	825883

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_15	127	21	Cluster of 21 mussels in mixed cobble along west bank, fast glide	539447	825885
Easky_15	128	85	85+ mussels in slow glide with mixed cobble and gravels under heavy *Myriophyllum* cover. Hard to identify all due to weed. Scattered mussels elsewhere	539412	825922
Easky_15	129	15	15 mussels in under cover of bridge in mixed cobble. Scattered.	539382	825953
Easky_15	130	85	Scattered line of 85+ mussels along west bank under cover of ash and willow, tight to bank only. Stable cobble.	539378	825957
Easky_15	131	95	Linear deep glide with 95 mussels, mostly along west bank where higher flows are, mixed substrata, very high floc cover.	539344	825990
Easky_15	132	302	High density in 30m run along west bank, mostly in bank scour under ash, mixed gravels and cobble, 302 mussels. As far as large boulders.	539317	826019
Easky_15	133	56	56 mussels in mixed cobble and gravels in riffle at head of deep glide and pool area, both banks.	539307	826042
Easky_15	134	82	82 mussels in clean cobble under oak hazel	539301	826057
Easky_15	135	102	102 mussels in clean cobble and gravels, mostly along left bank under shade, scattered only in mid channel and right bank. Far more suitable footing substrata than upstream, all glide is cobble and mixed gravels although some areas too mobile for footing. Shading clearly improving mussel habitat.	539291	826070
Easky_15	136	310	310 mussels in glide along left bank, mostly gravels and cobble, some mid channel.	539274	826106
Easky_15	137	50	Slow glide with mixed bed supported 50+ scattered mussels.	539270	826148
Easky_15	138	168	168 mussels cluster in cobble under large holly tree, west bank.	539269	826174
Easky_15	139	145	145 mussels scattered in deep glide to large boulders. Changes to cascade reaches below this point, with significant bank works present.	539269	826243
Easky_16	140	64	64 mussels in head of deep pool section at cascade, mixed gravels and sands mostly, some deep down 1.5m. Too deep to survey in pool.	539265	826439
Easky_16	141	71	71 mussels in boulder glide with sand, mostly along left under tree shade	539275	826488
Easky_16	142	25	Scattered mussels only elsewhere in slow boulder glide as far as bridge. 25 mussels in C 60m of glide. None under bridge or ford.	539286	826554
Easky_16	143	42	42 mussels in side channel at island, clean stable cobble, along west bank scours.	539300	826666
Easky_16	144	6	Cluster of 6 in main channel in mixed gravels at head of pool	539298	826678
Easky_16	145	20	Cluster 20 mussels in cobbles at tail for same pool above cascade	539291	826682
Easky_16	146	35	Scattered 35 mussels on suitable sands gravel in fast boulder glide between last point and end of section, mostly under shade.	539291	826728
Easky_17	147	5	All boulder glide with poor suitability, some localised sand and gravels support low density of mussels only, like 5 in 10m section etc. Usually too high a gradient.	539224	826883
Easky_17	148	12	Cluster of 12 mussels under rowan tree, mixed substrata between boulder	539020	827066

Survey section	Cluster ID	No. live mussels	Notes	ITM x	ITM y
Easky_17	149	64	Cluster of 64 mussels under ash and hawthorn, cobble, tight to bank and in scours, west bank, only suitable footing under bank. Other trees with sufficient depth (rare) had low densities also, 4 to 6 mussels etc.	539001	827085
Easky_18	150	36	Begins as cascade area with very deep glide and pool. Small side flow channel rh bank under ash scour, mussels in stable cobble.	538979	827116
Easky_18	151	1	Single large adult in gravels under willow, west bank	538918	827280
Easky_18	152	2	2 x adult mussels in small patch of sand gravels below weir	539087	827406
Easky_19	153	6	Small cluster 6 mussels, in cobble in bank scour at riffle downstream large deep glide	539147	827478
Easky_19	154	14	14 mussels under dead sycamore, mixed gravels tight to bank	539168	827488
Easky_19	155	5	Very occasional mussel, clearly washed out from upstream areas. Some dead shells but not many.	539176	827494
Easky_19	156	5	Cluster 5 mussels in sand amongst cobble in side flow under hawthorn	539184	827509
Easky_19	157	47	Large cluster 47 mussels in sand and cobble amongst boulder along rh bank under hazel immediately above stepping stone weir.	539197	827531
Easky_19	158	61	Large cluster in small stable cobbles along rh bank in shallow glide under shade of hazel woodland	539257	827616
Easky_19	159	32	32 mussels in small patch mixed gravels between boulder, rh bank	539265	827638
Easky_19	160	275	At end of section, large density 275 mussels in glide, mostly under ash and hazel in cobble but some mid channel, 250+ were along west bank.	539391	827776
Easky_20	161	92	Large cluster 92 mussels under hazel, rh bank, mixed gravels sand cobble	539404	827799
Easky_20	162	22	Cluster of 22 mussels on cobble sand downstream of boulder along west bank	539410	827837
Easky_20	163	120	High density 120 mussels under hazel trees, mixed stable bed along west bank immediately downstream stepping stone weir.	539431	827901
	Total	**15,068**			

7. Appendix B – survey section characteristics

Table 7.1 Summary characteristics of contiguous freshwater pearl mussel survey sections on the Easky River, May 2024

Section	Pearl mussel habitat	Substrata	Bed condition & siltation	Macrophytes & bryophytes	Pearl mussel recorded	Threats & pressures	Start (ITM)	Stop (ITM)
Easky_01	Poor suitability due to high bed mobility. Frequent bank erosion contributing to siltation. High energy meandering section with abundant boulder cascades. Low riparian shading. Bordered by degraded blanket bog & wet grassland (grazed)	Mobile cobble & boulder with localised bedrock & exposed peat. Very limited gravels.	Very high cover of floc & filamentous algae (often near 100%) with flocculent peat throughout	Frequent *Myriophyllum alterniflorum* with low bryophyte coverage due to bed mobility	23	Eutrophication, siltation	544443, 825099	544007, 825058
Easky_02	Good suitability with abundant mussels in stable cobble (often in small pools). Many mussels wedged between large cobble also. Frequent bank erosion. High energy meandering section with riffle, glide & pool series. Low riparian shading. Bordered by degraded blanket bog & wet grassland (grazed)	Abundant stable cobble with very limited gravels or sands. Scattered boulder.	High cover of filamentous algae & floc but less than upstream. Moderate siltation but mostly in depositional areas.	Occasional *Myriophyllum aeriform* & *Juncus bulbosus* with low bryophyte coverage	464	Eutrophication, siltation	544007, 825058	543604, 824960
Easky_03	Very high suitability. As above, with near continuous distribution of mussels in abundant flow refugia along low gradient	As above with increasing boulder	As above	As above	1360	Eutrophication, siltation	543604, 824960	543214, 824906
Easky_04	Very high suitability with abundant flow refugia (pools). High energy meandering low gradient section with more frequent deep glide & pool. Low riparian shading. Bordered by degraded blanket bog & wet grassland (grazed)	Abundant boulder with more scattered area of stable cobble. Limited gravels.	Moderate cover of filamentous algae & floc with more silt compared with upstream	Frequent *Myriophyllum lageniform* with occasional *Juncus bulbosus* & low bryophyte coverage	1308	Eutrophication, siltation	543214, 824906	542833, 824739
Easky_05	As above, very high suitability with near continuous distribution of abundant mussels (even in sub-optimal areas, including very shallow water). Only areas without mussels were deep depositional silty pools.	Abundant boulder & stable cobble with more frequent mixed substrata	Reduced cover of filamentous algae & floc, silt largely confined to depositional pools	Frequent *Juncus bulbosus* with occasional *Myriophyllum alterniflorum* with low bryophyte coverage	3253	Eutrophication, siltation	542833, 824739	542436, 824620
Easky_06	Very high suitability with frequent areas of mixed substrata. **Significant decline in water quality** downstream of tributary confluence (ITM 542300, 824469) = far fewer mussels but habitat suitability also reduced due to higher gradients (poor footing). Low riparian shading. Bordered	Dominated by boulder with frequent small areas of mixed substrata. Bedrock & boulder dominated downstream of tributary confluence	Bed condition improved until tributary confluence – significant increase in floc, filamentous algal cover & turbidity downstream	Frequent *Juncus bulbosus* & *Myriophyllum alterniflorum* with low bryophyte coverage	1152	**Very significant eutrophication & siltation**	542436, 824620	542072, 824591

Section	Pearl mussel habitat	Substrata	Bed condition & siltation	Macrophytes & bryophytes	Pearl mussel recorded	Threats & pressures	Start (ITM)	Stop (ITM)
	by degraded blanket bog & wet grassland (grazed) with coniferous afforestation to south							
Easky_07	Extensive higher gradient boulder cascade reaches with little to no footing suitability in addition to very high cover of filamentous algae & floc. Mussels confined to one area between meanders. Low riparian shading. Bordered by degraded blanket bog & wet grassland (grazed) with coniferous afforestation to south.	Dominated by boulder with very localised mixed substrata	Poor: very high cover of filamentous algae & floc despite high flow rates, moderate to high siltation locally	Occasional *Juncus bulbosus* & *Myriophyllum alterniflorum* with low bryophyte coverage	82	Eutrophication, siltation	542072, 824591	541665, 824685
Easky_08	Limited suitability due to high gradients, boulder cascades & poor footing suitability (improved at lower extent of section). Mussels largely confined to fastest flowing areas only (presumably due to water quality issues). High number of dead shells with moribund mussels also present. Bordered by semi-improved pasture & wet grassland with more frequent trees	Dominated by boulder with localised areas of cobble and mixed substrata	As above	As above	829	**Very significant eutrophication** & siltation	541665, 824685	541260, 824752
Easky_09	Very high physical suitability with abundant mussels, including >2000 in 50m section of mixed substrata glide. Much of section could not be surveyed due to **extremely high filamentous algal cover** (despite abundant mussels under algae). Abundant dead shells present. Bordered by semi-improved pasture & wet grassland with more frequent trees	Abundant cobble with more frequent mixed substrata, scattered boulder	**Extremely high cover of filamentous algae** with very abundant floc, moderate siltation	Frequent *Myriophyllum alterniflorum* with occasional *Juncus bulbosus* & low bryophyte coverage	2235	**Very significant eutrophication,** siltation, historical & recent bank works	541260, 824752	541106, 824956
Easky_10	Good suitability but localised due to higher gradients & boulder cascades (e.g. undercut banks). Many moribund adults observed, with many live adults in very shallow water. Bordered by semi-improved pasture & wet grassland with scattered trees.	Abundant boulder with localised areas of stable cobble & mixed substrata	As above	As above	1340	**Significant eutrophication,** siltation, historical & recent bank works (including instream bed removal)	541106, 824956	540711, 824905

Section	Pearl mussel habitat	Substrata	Bed condition & siltation	Macrophytes & bryophytes	Pearl mussel recorded	Threats & pressures	Start (ITM)	Stop (ITM)
Easky_11	Good suitability locally but extensive reaches largely unsuitable due to high velocities & boulder bed. Small clusters of mussels only. Bordered by semi-improved pasture & wet grassland with scattered trees.	Frequent boulder with more frequent areas of cobble & mixed substrata	**Very high cover of filamentous algae** with abundant floc, moderate siltation	As above	122	**Significant eutrophication,** siltation, historical bank works	540711, 824905	540356, 825178
Easky_12	Low suitability in shallow, high energy section dominated by boulder cascades. Some suitable footing areas (e.g. tributary confluence) did not support mussels. Eutrophication again an issue. Bordered by semi-improved pasture & wet grassland with scattered trees & upstream coniferous afforestation (via tributary).	Abundant boulder with very localised areas of stable cobble & mixed substrata	As above	Locally abundant *Myriophyllum alterniflorum* with occasional *Juncus bulbosus* & low bryophyte coverage	35	**Significant eutrophication,** siltation, historical bank works	540356, 825178	540175, 825535
Easky_13	As above, limited & localised suitability only supporting small clusters of mussels.	As above	As above	As above with rare *Potamogeton polygonifolius*	23	**Significant eutrophication,** siltation, historical bank works	540175, 825535	539809, 825658
Easky_14	Improved suitability but again localised, with increased bed mobility in many areas. Several areas with good footing suitability did not support mussels (in contrast to upper reaches). Lower energy section with deep modified glide locally. Eutrophication again an issue. Bordered by semi-improved pasture & wet grassland with more frequent trees.	Abundant cobble and boulder with more frequent areas of mixed substrata	**High cover of filamentous algae** with abundant floc, moderate siltation	Frequent *Myriophyllum alterniflorum* with occasional *Juncus bulbosus* & Potamogeton polygonifolius with low bryophyte coverage	251	**Significant eutrophication,** siltation, historical & recent bank works (including instream bed removal)	539809, 825658	539468, 825874
Easky_15	Very high suitability, especially downstream of road bridge, with far more suitable footing substrata than upstream. Mussels scattered throughout entire section with some higher density areas. Abundant mixed substrata in glide (often under bank scours) although some areas too mobile for footing. Riparian shading (west bank) clearly improving mussel habitat. Low energy section	Abundant stable cobble & mixed gravels/sands with scattered boulder	**High cover of filamentous algae** & floc in open areas, siltation largely confined to depositional areas	Locally abundant *Myriophyllum alterniflorum* & Potamogeton polygonifolius low bryophyte coverage	1529	**Significant eutrophication,** siltation, livestock poaching, riparian clearance	539468, 825874	539285, 826297

Section	Pearl mussel habitat	Substrata	Bed condition & siltation	Macrophytes & bryophytes	Pearl mussel recorded	Threats & pressures	Start (ITM)	Stop (ITM)
	bordered by semi-improved pasture & wet grassland with frequent trees.							
Easky_16	Often low suitability in higher gradient boulder cascade section but some mussel clusters in stable mixed substrata & localised flow refugia. More frequent deeper glide than upstream areas. Much higher riparian shading (disjunct treelines). Bordered by semi-improved pasture & scrub with frequent trees.	Frequent but small areas of stable cobble & mixed gravels/sands with more frequent boulder with increasing gradient moving downstream	Reduced cover of filamentous algae & floc (still locally high) due to higher shading, siltation largely confined to depositional areas	Rare *Myriophyllum alterniflorum* with increased (but still low) bryophyte coverage	263	**Significant eutrophication,** siltation, historical & recent bank works, riparian clearance	539285, 826297	539287, 826761
Easky_17	As above, increasing gradient. Mussels typically confined to bank overhangs. Bordered by semi-improved pasture & scrub with more continuous mature treelines providing valuable shading & nutrient buffers.	Abundant boulder with localised areas of stable cobble & mixed substrata	As above	As above	81	Eutrophication, siltation, historical bank works, riparian clearance	539287, 826761	538981, 827109
Easky_18	As above, very limited & localised footing opportunities only (mostly under treelines).	As above	As above	As above	39	Eutrophication, siltation	538981, 827109	539112, 827440
Easky_19	Localised suitability only due to high flow rates & bed compaction. Mixed substrata often mobile with few flow refugia. Some mussel clusters present locally though (mostly under treelines). Mussel wash-out from upstream areas evident (i.e. wedged in unsuitable areas).	As above, bed mobility increased	As above	As above	445	Eutrophication, siltation	539112, 827440	539400, 827785
Easky_20	Localised suitability but poor overall with deeper slower-flowing glide & compacted bed with reduced shading & higher floc cover. Mussel densities high where present. Bordered by Bordered by improved pasture with narrower buffers	Abundant more compacted cobble & boulder with very localised areas of stable mixed substrata	Increased filamentous algal & floc cover due to reduced shading, siltation largely confined to depositional areas	As above	234	Eutrophication, siltation, livestock poaching, riparian clearance	539400, 827785	539414, 828272

8. Appendix C – representative survey images

Plate 8.1 Representative image of survey section **Easky_01**

Plate 8.2 Representative image of survey section **Easky_02**

Plate 8.3 Pearl mussel with high cover oof floc & filamentous algae in **Easky_02**

Plate 8.4 Representative image of survey section **Easky_03**

Plate 8.5 Clean mixed substrata along river margins supporting pearl mussel in **Easky_03**

Plate 8.6 Mussels in stable mixed substrata adjoining *Myriophyllum* bed in **Easky_03**

Plate 8.7 Representative image of survey section **Easky_04**

Plate 8.8 Observing mussels in deeper glide habitat in **Easky_05**

Plate 8.9 Representative image of survey section **Easky_05**

Plate 8.10 Representative image of survey section **Easky_06**

Plate 8.11 Pearl mussel with high cover of floc & filamentous algae in **Easky_06**

Plate 8.12 The Meenamaddo River tributary (right) was causing very significant water quality declines (**Easky_06**)

Plate 8.13 Representative image of survey section **Easky_07**

Plate 8.14 Mussels barely visible under very high cover of floc & filamentous algae downstream of the Meenamaddo River confluence (**Easky_07**)

Plate 8.15 Representative image of survey section **Easky_08**

Plate 8.16 Representative image of survey section **Easky_09**

Plate 8.17 Representative image of survey section **Easky_10**

Plate 8.18 Dead shells in **Easky_10**

Plate 8.19 Representative image of survey section **Easky_111**

Plate 8.20 Iron-oxidising bacterial deposits were abundant in section **Easky_11** (indicative of pH changes)

Plate 8.21 Representative image of survey section **Easky_12**

Plate 8.22 Representative image of survey section **Easky_13**

Plate 8.23 Representative image of survey section **Easky_14** with undercut banks supporting pearl mussel (right of image)

Plate 8.24 Representative image of survey section **Easky_15** with valuable riparian shading (left of image, west bank) supporting highly abundant pearl mussel

Plate 8.25 Dead and live pearl mussel in **Easky_15**

Plate 8.26 Evidence of historical instream boulder/bed removal works in **Easky_15**

Plate 8.27 Representative image of survey section **Easky_16** (higher gradient cascading reach with limited mussel suitability)

Plate 8.28 Pearl mussels in very shallow littoral under cover of riparian treeline in **Easky_16**

Plate 8.29 Representative image of survey section **Easky_17** (more continuous riparian treelines)

Plate 8.30 Representative image of survey section **Easky_18** (high energy reach with limited mussel suitability)

Plate 8.31 Representative image of survey section **Easky_19**

Plate 8.32 High bed mobility precluded mussels from many areas in **Easky_19**

Plate 8.33 Location of large mussel cluster under cover of riparian treeline in **Easky_19**

Plate 8.34 Representative image of survey section **Easky_20** (at ford crossing)

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