# APPENDIX 3

## *AQUATIC BASELINE REPORT*

# Aquatic baseline report for the proposed Cunlaghfadda Green Energy Project, Co. Mayo (2025)


Prepared by Triturus Environmental Ltd. for MKO

**November 2025**



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# 1. Introduction

## 1.1 Background



Triturus Environmental Ltd. were commissioned by MKO to conduct baseline aquatic surveys to inform EIAR preparation for the proposed Cunlaghfadda Green Energy Project approximately 5km north-west of Claremorris, Co. Mayo (**Figure 2.1**). The baseline surveys undertaken in July 2025 update and expand upon those previously completed in July and October 2023 (Triturus, 2023).

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 development, inclusive of the proposed turbine array.

## 1.2 Development description

A full description of the Proposed Project is provided in Chapter 4 Description of the Proposed Development. As detailed in Chapter 1, Section 1.1.1, for the purposes of this EIAR, the various project components are described and assessed using the following terminology: 'Proposed Wind Farm', 'Proposed Grid Connection', 'Proposed Project' and 'Site' which are defined as follows:

- Where the 'Proposed Wind Farm' is referred to, this refers to turbines and associated foundations and hardstanding areas, including access tracks, underground cabling, permanent meteorological mast, temporary construction compound, peat and spoil management, biodiversity enhancement, tree felling, site drainage, operational stage signage, turbine delivery route and junction accommodation works, and all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Chapter 4, Section 4.4.1 of this EIAR.

- Where the 'Proposed Grid Connection' is referred to, this refers to the proposed 110kV onsite substation, underground 110kV cabling and end masts connecting the proposed 110kV substation to the 110kV Castlebar to Cloon overhead line, access tracks and all ancillary works and apparatus. The Proposed Grid Connection Route is described in detail in Chapter 4, Section 4.4.2 of this EIAR.

- Where the 'Proposed Project' is referred to, this encompasses the entirety of the project (Proposed Wind Farm and Proposed Grid Connection) for the purposes of this EIA in accordance with the EIA Directive.

- Where 'the Site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown in Chapter 1, Figure 1-2 of the EIAR and encompasses an area of approximately 165 hectares.

The EIAR Site Boundary encompasses an area of approximately 165 hectares (ha). The permanent footprint of the Proposed Project measures approximately 5ha, which represents approximately 3% of the Site.

# 2. Methodology

## 2.1 Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the Proposed Project were considered as part of the current assessment. This included watercourses in vicinity of the Site. Thus, a total of 8 no. sites were selected for detailed aquatic assessment (see **Table 2.1, Figure 2.1**). The courses and nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Aquatic survey sites were present on the Meander River (EPA code: 34M05) and an unnamed tributary of the River Robe, in addition to Drumady Lough (north and south lake) and a small pond within the Site (**Table 2.1**). The aquatic survey sites were located in the Robe_SC_010 and Castlebar_SC_020 river sub-catchments within hydrometric area 34 (Moy & Kilalla Bay). The Proposed Project is not located within, adjacent to or immediately upstream of a designated European site although the Proposed Project has potential hydrological connectivity (via the River Robe downstream ) with the Lough Carra/Mask Complex SAC (001774) and the Lough Mask SPA (004062).

Please note this aquatic report should be read in conjunction with Chapter 6 Biodiversity and Chapter 9 Hydrology and Hydrogeology prepared for the Proposed Project.

## 2.2 Aquatic site surveys

Aquatic surveys were conducted on the 3rd and 4th July 2025. Survey effort focused on both instream and riparian habitats at each aquatic sampling location. A fisheries assessment (electro-fishing and or fisheries habitat appraisal), white-clawed crayfish survey, macrophyte and aquatic bryophyte survey and biological water quality (Q-sampling) / macro-invertebrate sweep sampling (**Figure 2.1**). Environmental DNA samples were also collected from 2 no. riverine sites. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed development 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. All 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

**Table 2.1** Location of 8 no. aquatic survey sites in the vicinity of the proposed Cunlaghfadda Green Energy Project

| Site no. | Watercourse | EPA code | Location | X (ITM) | Y (ITM) |
|---|---|---|---|---|---|
| A1 | Meander River | 34M05 | Cappagh North | 528928 | 777233 |
| A2 | Meander River | 34M05 | Maltpool | 528240 | 775653 |
| **A3*** | Meander River | 34M05 | Oory | 526087 | 775116 |
| B1 | Unnamed stream | n/a | Clogher Beg | 529745 | 776187 |
| **B2*** | Unnamed stream | n/a | Garravlagh | 530452 | 773056 |
| P1 | Pond | n/a | Cunlaghfadda | 529145 | 777734 |
| L1 | Drumady Lough (north basin) | n/a | Drumady | 529572 | 777795 |
| L2 | Drumady Lough (south basin) | n/a | Drumady | 529752 | 777224 |

*eDNA sampling for lamprey (*Lampetra* sp.), European eel, freshwater pearl mussel & crayfish plague

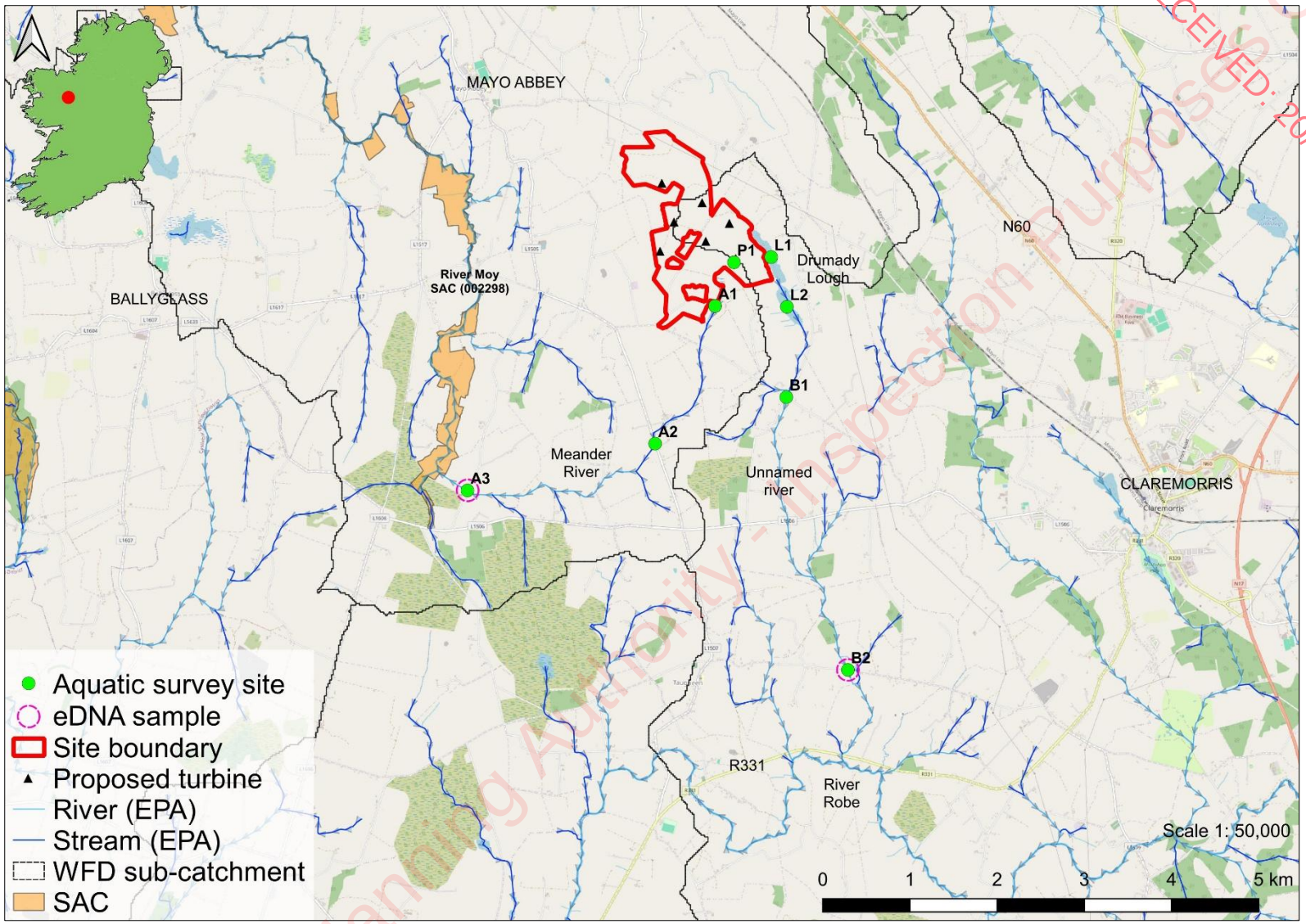


**Figure 2.1** Overview of the aquatic survey sites, July 2025

## 2.3 Fisheries assessment (electro-fishing)

To collate a more accurate baseline, a catchment-wide approach was adopted and the electro-fishing survey was undertaken across 5 no. riverine sites (**Table 2.1, Figure 2.1**). A single anode Smith-Root LR24 backpack (12V DC input; 300v, 100W DC output) was used to electro-fish riverine sites on Thursday 3rd and Friday 4th July 2025 following notification to Inland Fisheries Ireland and under the conditions of a Department of Climate, Energy and the Environment (DCEE) licence. 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 was undertaken to establish their importance for salmonid, lamprey, European eel (*Anguilla anguilla*) and other fish species. The baseline assessment also considered the quality of fisheries habitats 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 2025 under a National Parks and Wildlife (NPWS) open national licence (C164/2025) 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 each catchment or sub-catchment in the survey area to minimise the risk of transfer of 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.

## 2.5 eDNA analysis

To further validate site surveys and to detect potentially cryptically low populations of high conservation value aquatic species within the survey area, a composite water sample was collected from the Meander River (site A3) and an unnamed River Robe tributary (B2) on the 4th July 2025 (**Figure 2.1; Table 2.1**). This was analysed for lamprey (*Lampetra* sp.), European eel, freshwater pearl mussel (*Margaritifera margaritifera*) and crayfish plague (*Aphanomyces astaci*) eDNA, with the sites strategically chosen to maximise longitudinal (instream) coverage within the catchment (i.e. facilitating a greater likelihood of species detection).

In accordance with laboratory guidance, a composite (500ml) water sample was collected from the sampling point, maximising the geographic spread at the site (20 x 25ml samples at each site), thus increasing the chance of detecting the target species' DNA. The composite sample was filtered and fixed on site using a sterile proprietary eDNA sampling kit. The sample was stored at room temperature and sent to the laboratory for analysis with 48 hours of collection. A total of *n*=12 qPCR

replicates were analysed for the site. Given the high sensitivity of eDNA analysis, a single positive qPCR replicate is considered as proof of the species' presence (termed qPCR No Threshold, or qPCR NT). Whilst an eDNA approach is not currently quantitative, the detection of the target species' DNA indicates the presence of the species at and or upstream of the sampling point. Please refer to **Appendix A** for full eDNA laboratory analysis methodology.



## 2.6 Biological water quality (Q-sampling)

The 5 no. riverine survey sites were assessed for biological water quality through Q-sampling in July 2023 (**Figure 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. Byrne et al., 2009; Nelson et al., 2011).

**Table 2.2** Reference categories for EPA Q-ratings (Q1 to Q5) (Toner et al., 2005)

| Q value | WFD status 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

Lake sites L1 and L2 and pond site P1 were sampled for macro-invertebrates via sweep netting in July 2025. A standard pond net (250mm width, mesh size 500µm) was used to sweep macrophytes and submerged vegetation to capture macro-invertebrates. The net was also moved along the lake/pond 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 Annex I habitats, such as floating river vegetation (3260) or hydrophilous tall herb (6430).

## 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 given the known presence of white-clawed crayfish in the survey area. 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 Site is located in a lowland area c. 5km north-west of Claremorris, Co. Mayo within the Western River Basin District and hydrometric area 34 (Moy & Killala Bay) (**Figure 2.1**). Whilst not located within the Site boundary, the Meander River and an unnamed River Robe tributary adjoins the Site to the south and south-east, respectively. These watercourses were historically modified (drained) lowland depositing rivers (FW2; Fossitt; 2000) present in a landscape dominated by cutover bog (CORINE 412) and agricultural pasture (CORINE 231). The survey area is underlain by Visean limestone & calcareous shale (Geological Survey of Ireland data).

## 3.2 Fisheries

There was a paucity of fisheries data for the wider survey area with much of the data available stemming from the previous surveys undertaken for the development in 2023 (Triturus, 2023).

The Meander River, a tributary of the Manulla River, is known to support brown trout (*Salmo trutta*), lamprey (*Lampetra* sp.) and three-spined stickleback (*Gasterosteus aculeatus*) (Triturus, 2023).

The unnamed River Robe tributary also supports brown trout in addition to pike (*Esox lucius*), perch (*Perca fluviatilis*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and three-spined stickleback (Triturus, 2023).

Drumady Lough (north and south basins) is known locally to support pike, perch and European eel (pers. obs.). There was no fisheries data available for pond site P1 (not surveyed previously).

## 3.3 Protected & rare 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 development (i.e. M27 & M37) identified several records for a low number of rare and or protected aquatic species within the vicinity of the Proposed Project.

A moderate number of contemporary records for Annex II white-clawed crayfish (*Austropotamobius pallipes*) were available for the respective 10km grid squares, including the unnamed River Robe tributary (included in the current survey) and the downstream-connecting River Robe (2000-2015; NPWS & EPA data; **Figure 3.1**). Moderate to high densities of white-clawed crayfish were also recorded from both the unnamed Robe tributary and the Meander River during the previous 2023 survey (Triturus, 2023).

A low number of Annex II otter (*Lutra lutra*) records were available for the respective grid squares, with more contemporary records (2005-2017) available for the River Robe which shares downstream hydrological connectivity with the survey area (NPWS, EPA & NBDC data; **Figure 3.1**). Otter signs were

recorded at sites A2 on the Meander River and B1 and B2 on the unnamed Robe tributary during July 2023 (Triturus, 2023).

A single 2015 record for smooth newt (*Lissotriton vulgaris*) was available for grid square M27 at a location c. 2.5km south-west of the proposed site boundary (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.

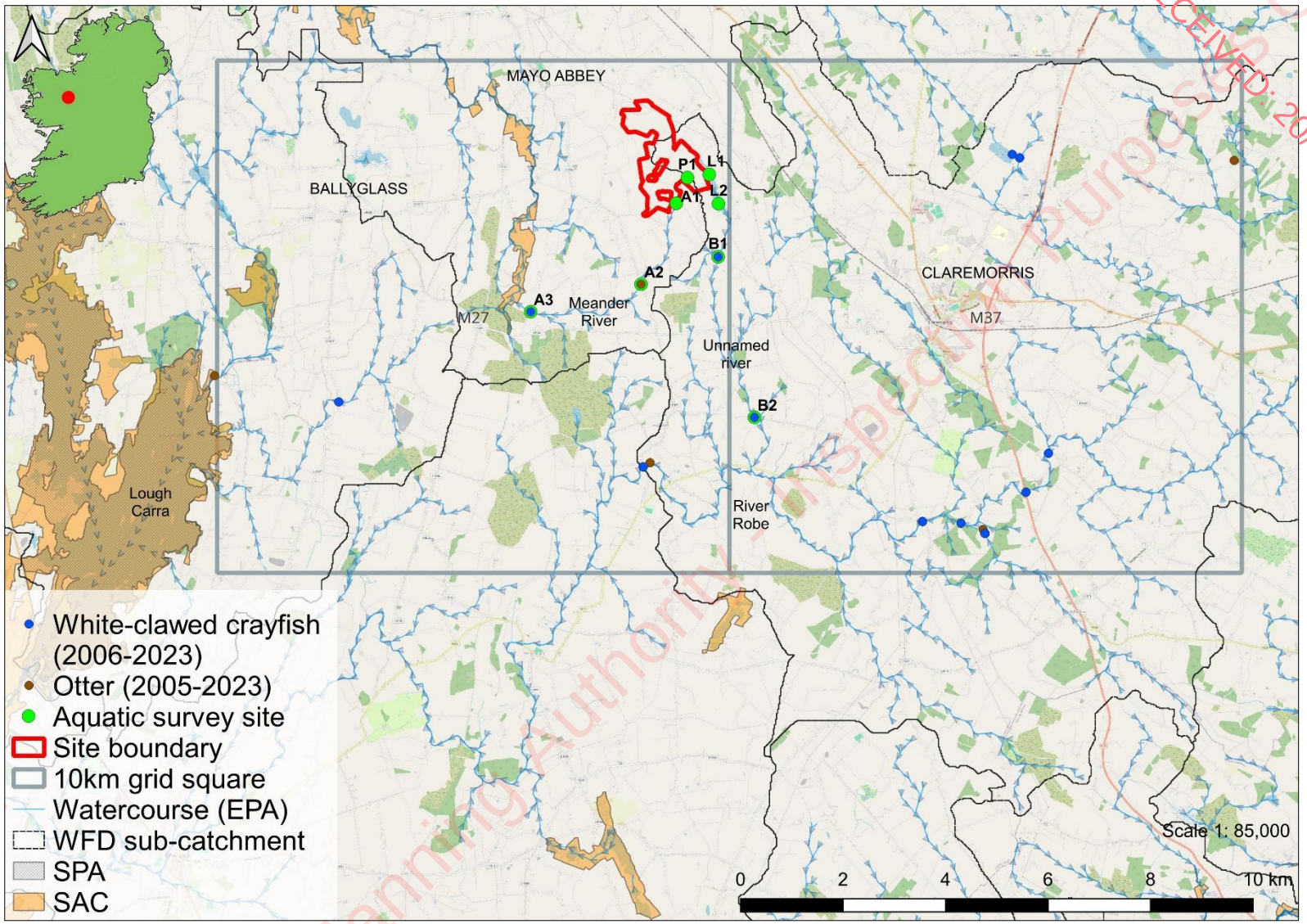


**Figure 3.1** Selected protected aquatic species records in the vicinity of the Site (source: NPWS, NBDC, EPA, NCPSP & Triturus data)

# 4. Results of aquatic surveys



The following section summarises each of the 8 no. survey sites (5 riverine, two lake sites and one pond site) in terms of aquatic habitats, physical characteristics and overall value for fish, white-clawed crayfish and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) results are summarised for each riverine sampling site and presented in full in **Appendix C**. A summary of the fish species recorded at each survey site is provided in **Table 4.3**. A summary of the aquatic species and habitats of high conservation value recorded during the surveys is provided in **Table 4.4**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.5**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in July 2025.

## 4.1 Aquatic survey sites

### 4.1.1 Site A1 – Meander River, Cappagh North

Site A1 was located on the uppermost reaches of the Meander River (EPA code: 34M05) c.300m downstream of Lough Nambrackkeagh, an undesignated wetland in cutover bog. The lowland river (FW2; Fossitt, 2000) had been extensively straightened and deepened, resulting in a trapezoidal channel with very poor hydromorphology and no observable flows at the time of survey. The stagnant channel was 1.5-2m wide and 0.05-0.1m deep. Widespread bank slumping resulting in abundant instream peat accumulations causing frequent impoundments. The substrata were comprised exclusively of deep anoxic peat (often >0.5m in depth). The site was heavily vegetated with abundant bulrush (*Typha latifolia*) and common duckweed (*Lemna minor*). Branched bur reed (*Sparganium erectum*) and bottle sedge (*Carex rostrata*) were locally frequent. Aquatic bryophytes were not present. *Leptothrix* sp. bacterial films were present on the water's surface. Encroachment of terrestrial vegetation was high with frequent willowherb (*Epilobium* spp.), floating sweet grass (*Glyceria fluitans*), meadowsweet (Filipendula ulmaria), rushes (*Juncus* spp.) and willow (*Salix* sp.) along the littorals and instream. The site was bordered by cutover bog (PB4) and reclaimed wet pasture (GA1/GS4), with coniferous afforestation (WD4) to the south.

Three-spined stickleback (*Gasterosteus aculeatus*) was the only fish species recorded via electro-fishing at site A1 (**Appendix A**). With the exception of low densities of this species, the river was not of fisheries value at this location given historical modifications, poor hydromorphology and heavy siltation. 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 B**). However, it should be noted that this was a tentative rating given 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 A1 was of **local importance (lower value)** (**Table 4.5**).


**Plate 4.1** Representative image of site A1 on the uppermost reaches of the Meander River, July 2025

### 4.1.2 Site A2 – Meander River, Maltpool

Site A2 was located on the Meander River (34M05) at a local road crossing c.1.8km downstream of riverine sampling site A1. The lowland depositing river (FW2) had been extensively straightened and deepened resulting in a homogenous trapezoidal channel with steep banks of up to 2.5m in height. Modified banks (revetment) were present in vicinity of the road box culvert. The river was 2-2.5m wide and 0.1-0.2m deep. The profile comprised slow-flowing glide with occasional riffle and very limited pool. The substrata were dominated by mixed gravels which were partially bedded and often heavily silted (exacerbated by low flows). Some calcification was evident. Cobble and small boulder were frequent in faster-flowing areas. Soft sediment accumulations were present locally in association with macrophyte stands but were typically flocculent and or shallow (<5cm depth). Given the narrow nature of the channel and low flows, the site was heavily vegetated with abundant branched bur-reed and fool's watercress (*Helosciadium nodiflorum*). Common water starwort (*Callitriche stagnalis*) and watercress (*Nasturtium officinale*) was occasional with rare blue water speedwell (*Veronica anagallis-aquatica*). Common duckweed was locally frequent. Aquatic bryophytes were limited to occasional *Rhynchostegium riparioides* and *Leptodictyum riparium* on boulder and larger cobble. Filamentous algae was also present (5%), indicating enrichment. The open banks supported abundant great willowherb (*Epilobium hirsutum*), meadowsweet, nettle (*Urtica dioica*), thistles (*Cirsium* spp.), bramble (*Rubus fruticosus* agg.) and rank grasses with only isolated sycamore (*Acer psuedoplatanus*) and alder (*Alnus glutinosa*) saplings. The site was bordered by low intensity agricultural grassland (GA1) and dry meadow habitat (GS2) with a residential lawn (GA2) upstream of the culvert.

Brown trout (*Salmo trutta*), lamprey (*Lampetra* sp.) and three-spined stickleback were recorded via electro-fishing at riverine sample site A2 (**Appendix A**). The site was only of moderate value for salmonids, with a low density of juvenile brown trout recorded. The nursery value was reduced given the shallow nature of the stream and poor summer flows. Whilst some spawning habitat for salmonids

and lamprey was present, this was invariably silted and sub-optimal. The site was of poor value for adult salmonids given a near absence of deeper pool areas. Soft sediment accumulations were shallow and flocculent where present and supported only a low density of ammocoetes. Suitability for European eel was poor and none were recorded. Suitability for white-clawed crayfish was moderate given a paucity of suitable accessible refugia and the shallow nature of the river at this location. However, a moderate density of crayfish (following the scale of Peay, 2003) were recorded near the bridge (more frequent boulders) and numerous otter spraint sites located under the road crossing contained abundant crayfish remains. A total of 4 no. spraint sites were present under the bridge on exposed boulders (ITM 528240, 775658).

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 lamprey (*Lampetra* sp.) in addition to utilisation by otter, the aquatic ecological evaluation of site A2 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.2** Representative image of site A2 on the Meander River, July 2025

### 4.1.3 Site A3 – Meander River, Oory

Riverine Site A3 was located on the Meander River (34M05) at a local road crossing (box culvert), c. 2.5km downstream of river site A2. The lowland depositing river (FW2) had been straightened and deepened historically but showed some instream recovery. The river was 2.5-3m wide and 0.2-0.3m deep with steep banks of 2-3m in height. The profile was of swift-flowing shallow glide and riffle with occasional small pool to a maximum depth of 0.6m. The substrata were dominated by cobble and small boulder with localised areas of mixed gravels. These were moderately silted but mobile in nature. Flocculent soft sediment areas were present locally. Macrophyte growth was locally abundant, with extensive stands of branched bur-reed, lesser water parsnip (*Berula erecta*) and fool's watercress

present upstream of the road crossing. Watercress, water mint (*Mentha aquatica*) and common water starwort were occasional, with localised common duckweed in marginal slacks and pool areas. The aquatic bryophytes *Rhynchostegium riparioides* and *Leptodictyum riparium* were frequent on larger substrata. Filamentous algae cover was high in open areas of channel, indicating enrichment. The site was heavily tunnelled downstream of the bridge with dense scrub of hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), willow and bramble whilst upstream of the banks were largely open with only scattered scrub and hawthorn. The site was bordered by improved pasture (GA1) and dry meadows (GS2) with narrow riparian buffers.

Brown trout, lamprey (*Lampetra* sp.) and three-spined stickleback were recorded via electro-fishing at site A3 (**Appendix A**). In contrast to upstream areas, the site was a good quality salmonid nursery, supporting relatively high densities of juvenile brown trout. Cobble and boulder-dominated glide provided valuable instream refugia. However, the generally shallow nature of the river at this location reduced the value for adult salmonids (a consequence of historical straightening). Whilst some salmonid and lamprey spawning habitat was present in localised mixed gravels, the quality of the habitat was reduced given evident siltation and enrichment pressures. Soft sediment areas were flocculent where present (i.e. macrophyte beds) and supported only a low density of larger ammocoetes. Despite some good suitability, no European eel were recorded although the species was detected via eDNA sampling (**Table 4.1; Appendix B**). The site supported a moderate density (after Peay, 2003) of white-clawed crayfish (9 per 30 refugia; 10-36mm carapace length), with good quality habitat present (plentiful refugia, macrophyte beds etc.). Despite suitability, no otter spraint site was recorded in vicinity of the site (limited marking opportunities).

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, lamprey (*Lampetra* sp.) and white-clawed crayfish, the aquatic ecological evaluation of site A3 was of **local importance (higher value)** (**Table 4.5**).


**Plate 4.3** Representative image of site A3 on the Meander River, July 2025

### 4.1.4 Site B1 – unnamed river, Clogher Beg

Site B1 was located on an unnamed River Robe tributary at a local road crossing, c.0.8km downstream of Drumady Lough (site L2). The lowland depositing stream (FW2) had been extensively historically straightened and deepened with a trapezoidal profile and banks of up to 3m in height. The stream suffered from low summer flows at the time of survey and was 2-2.5m wide and 0.1-0.4m deep. The profile was dominated by slow-flowing glide with localised pool and very occasional riffle. The bed comprised heavily silted mixed gravels and cobble with occasional small boulder. Whilst siltation was moderate to heavy locally, soft sediment deposits were not present (flocculent only) with a generally compacted bed. Some more mobile gravels were present upstream of the bridge. Fool's watercress, watercress and common duckweed was locally frequent with occasional blunt-fruited water starwort (*Callitriche obtusangula*) and branched bur-reed. Branched bur-reed was abundant downstream of the bridge. Ivy-leaved duckweed (*Lemna trisulca*) was abundant and indicative of enrichment. Both shining pondweed (*Potamogeton lucens*) and the invasive Canadian pondweed (*Elodea canadensis*) were present but rare. The aquatic moss *Cinclidotus fontinaloides* was also rare. The banks had been historically cleared with rank grasses and great willowherb dominating the steeply sloping banks, with scattered bramble, ash (*Fraxinus excelsior*) and willow causing tunnelling locally. The site was bordered by semi-improved pasture (GA1) and dry meadows (GS2).

Perch (*Perca fluviatilis*) and three-spined stickleback were the only fish species recorded via electrofishing at site B1 (**Appendix A**). Despite some good suitability locally for salmonids upstream of the bridge, none were recorded, in keeping with previous surveys. Overall, historical modifications, low summer flows and poor hydromorphology reduced the fisheries value of the site. Salmonid habitat was poor given a paucity of faster-flowing riffle areas and cleaner substrata although there was some suitability (but none recorded). Whilst there was some suitability for lamprey in terms of sub-optimal spawning substrata, no suitable ammocoete areas were present (flocculent only). The shallow nature

of the site with limited refugia (apart from macrophyte beds) provided poor conditions for European eel (none recorded). White-clawed crayfish were present in low densities (after Reay, 2003), with both adults and juveniles present (*n*=5, 11-30mm carapace length). Accessible hard refugia were limited. No otter signs were recorded in vicinity of the site although the species is known from the site (Triturus, 2023).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). With the exception of Annex II white-clawed crayfish (single hatchling), 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 white-clawed crayfish, the aquatic ecological evaluation of site B1 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.4** Representative image of site B1 on an unnamed River Robe tributary, July 2025

### 4.1.5 Site B2 – unnamed river, Garravlagh

Site B2 was located on an unnamed River Robe tributary at a local road crossing c. 3.5km downstream of site B1 and 1.2km upstream of the River Robe confluence. The river had been historically straightened but not deepened. Unlike upstream, the channel demonstrated some good instream recovery with a semi-natural profile. The swift-flowing lowland alkaline watercourse (FW2) was 2-2.5m wide and 0.1-0.3m deep with a paucity of deeper areas. The shallow profile was dominated by riffle and glide with only occasional small, shallow pool. The substrata comprised compacted bryophyte-rich boulder and cobble with evident calcification. Mixed gravels were present locally although these were moderately silted. Soft sediment deposits were flocculent where present. Fool's watercress was frequent along channel margins with occasional watercress and water mint. Blue water speedwell was present but rare. The site was dominated by aquatic bryophytes with locally abundant *Fontinalis antipyretica*, *Leptodictyum riparium* and *Rhynchostegium riparoides*. Common

duckweed and ivy-leaved duckweed were present in marginal slacks. Cover of filamentous algae was very high, indicating significant enrichment. This was exacerbated by a recently installed land drain discharging to the river upstream of the bridge. The margins supported abundant reed canary grass (*Phalaris arundinacea*) and great willowherb, with rank grasses, meadowsweet, purple loosestrife (*Lythrum salicaria*), cleavers (*Galium aparine*), bindweed (*Calystegia sepium*) and nettle, with scattered mature sycamore, hawthorn, ash and willow. The site was bordered by improved pasture (GA1) with narrow riparian buffers.

Brown trout, minnow (*Phoxinus phoxinus*) and stone loach (*Barbatula barbatula*) were recorded via electro-fishing at site B2 (**Appendix A**). Despite evident enrichment pressures, the site was of good value for salmonids, supporting a mixed cohort population of brown trout (dominated by juveniles). The site was of most value as a nursery with a general paucity of deeper holding pools or undercut banks for adults. The compacted/calcified, bryophyte-rich bed provided poor spawning opportunities. Despite some good suitability for European eel (abundant instream refugia), none were recorded. However, the species was detected from the site via eDNA sampling (**Table 4.1; Appendix B**). Suitability for lamprey was poor with limited suitable spawning areas and an absence of suitable soft sediment areas for ammocoetes – none were detected in eDNA sampling. Although known from the site (Triturus, 2023), no pike (*Esox lucius*) were recorded in the current survey. As per previous surveys, the site supported abundant white-clawed crayfish (after Peay, 2003) with a healthy mixed population present (52 crayfish recorded from 40 refugia, 5-32mm carapace length). Juvenile crayfish (*n*=9) were also recorded in kick sampling . A regular otter spraint site was recorded on a mossy wall/revetment approximately 30m upstream of the road bridge (containing abundant crayfish remains; ITM 530567, 773053 – a known marking site from 2023). A second spraint site (also with abundant crayfish remains) was located on the cutwater/bridge abutment located immediately downstream of the bridge (ITM 530454, 773053).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix B**). With the exception of Annex II white-clawed crayfish (*n*=9 juveniles), 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 white-clawed crayfish, and utilisation by otter, the aquatic ecological evaluation of site B2 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.5** Representative image of site B2 on an unnamed River Robe tributary, July 2025

**Plate 4.6** Recently installed land drain at site B2 on an unnamed River Robe tributary, July 2025

### 4.1.6 Site P1 – pond, Cunlaghfadda

Site P1 was a small, very shallow, heavily enriched pond of 0.2ha surface area located within the proposed Site boundary and adjacent to turbine T5. The landlocked, likely spring fed pond was a homogeneous 0.1-0.2m deep with a bed comprised exclusively of organic rich soft sediment overlaying compacted gravels. The margins were heavily grazed and poached by cattle. Water turbidity was very high at the time of survey given livestock access and a very significant cyanobacterial

bloom. This had resulted in a near absence of macrophytes, with only common duckweed and floating sweet grass in the sheltered littorals. The southern and eastern part of the small basin was colonised by dense soft rush (*Juncus effusus*) and likely flooded seasonally (i.e. an inundation area). The pond was located in improved grassland with grazed margins supporting marsh cudweed (*Gnaphalium uliginosum*), dock (*Rumex* spp.) and common agricultural species like white clover (*Trifolium repens*). Nearby areas (30m from pond) supported scrub dominated by bramble and hawthorn with scattered ash.

Electro-fishing was not undertaken at site P1 given the lacustrine conditions (fisheries appraisal only). The small, very shallow, heavily enriched pond was not of fisheries value. However, the pond supported a low density of early stage smooth newt efts (*Lissotriton vulgaris*) (**Plate 4.7**) which appeared to be confined to areas of littoral soft rush stands. The pond was bordered to the west by a field boundary featuring an old stone wall (BL1) which likely served as a winter hibernacula for adult newts.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**).

Given the presence of a smooth newt population, the aquatic ecological evaluation of site P1 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.7** Representative image of pond site P1, July 2025

**Plate 4.8** Example of juvenile smooth newt recorded at pond site P1, July 2025

### 4.1.7 Site L1 – Drumady Lough (north)

Site L1 was located at the north basin of Drumady Lough, an interconnected pair of shallow, narrow alkaline lakes. The 5.2ha mixed geology lake was very shallow, averaging 1-1.5m deep with a maximum depth of 1.6m towards the northern shore. The substrata comprised deep, soft organic-rich soft sediment. The lake was very heavily vegetated with near 100% cover of macrophytes. Yellow water lily (*Nuphar lutea*) was abundant with extensive areas of the stoneworts *Chara rudis* and *Chara globularis* in areas along the eastern shore. White water lily (*Nymphaea alba*) was locally frequent in the northern basin (where there was a greater peat influence). The invasive Canadian pondweed was also locally abundant and typically interspersed with lily beds. The eastern littoral supported extensive stands of common clubrush (*Schoenoplectus lacustris*) and scattered common reed (*Phragmites australis*) whilst the shallower western shore featured a mix of common reed, bulrush, bottle sedge (*Carex rostrata*) and abundant water horsetail (*Equisetum fluviatile*). Ivy-leaved duckweed was abundant on the lakebed. Mare's-tail (*Hippuris vulgaris*) and fine-leaved water dropwort (*Oenanthe aquatica*) was present but very rare overall. The lacustrine form of greater water moss (*Fontinalis antipyretica* var. *cymbifolia*) was locally frequent semi-aquatic mosses such as *Calliergonella cuspidata* along littoral areas. Water mint and common herbaceous species associated with inundation zones of lake littorals were present in the margins, such as purple loosestrife, bog bean (*Menyanthes trifoliata*), marsh bedstraw (*Galium aparine*), marsh pennywort (*Hydrocotyle vulgaris*), marsh marigold (*Caltha palustris*), water plantain (*Alisma plantago-aquatica*), fool's watercress, marsh cinquefoil (*Comarum palustre*), meadowsweet, abundant bottle sedge and other terrestrial sedge species. Patches of grey willow (*Salix cinerea* subsp. *oleifolia*) and downy birch (*Betula pubescens*) were present although the banks were typically open. The lake was bordered by low-diversity wet grassland (GS4) and peat soils, much of which had been reclaimed for agriculture (low-intensity pasture).

Site L1 was of very high value for coarse fish species in addition to European eel. This was given the abundance of spawning and nursery habitat (coarse fish) and abundant refuge and a diverse prey resource for eel. Pike and perch are known from the site (pers. obs.). Despite some good suitability, no white-clawed crayfish were recorded via hand searching or sweep netting. The lake also had high suitability for otter and a regular spraint site was recorded on a marginal tussock along the (ITM 529548, 777711).

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The macro-invertebrate community was dominated by abundant gastropod molluscs, Leptocerid cased caddis and freshwater hoglouse (*Asellus aquaticus*).

Given utilisation by otter, the aquatic ecological evaluation of site L1 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.9** Representative image of site L1 in the northern basin of Drumady Lough, July 2025



**Plate 4.10** *Chara* spp. stoneworts were abundant in the shallow littorals of site L1

### 4.1.8 Site L2 – Drumady Lough (south)

Site L2 was located at the southern basin of Drumady Lough, a 5.3ha shallow, narrow alkaline lake. The lake was shallow and homogenous, averaging 1.4-1.7m with some areas exceeding 2m. The substrata were dominated by deep soft organic-rich sediment with scattered calcareous boulder around the lakeshore. The lake was very heavily vegetated with near 100% cover of macrophytes. Yellow lily and Canadian pondweed were abundant throughout the lake (both littorals and open water) with scattered small stands of shining pondweed primarily confined to the southern end of the lake. The lake was fringed by abundant common reed with a narrow belts of water horsetail, bottle sedge and scattered bulrush. Common clubrush and bladderwort (*Utricularia* sp.) were present but rare. The moss *Fontinalis antipyretica* var. *cymbifolia* was present locally. Ivy-leaved duckweed was abundant on the lakebed. Water mint and bottle sedge were locally abundant. *Chara hispida* was locally abundant on exposed peat littorals. The littorals also supported common emergent wet ground species including such as purple loosestrife, marsh bedstraw, marsh pennywort, marsh marigold and meadowsweet. Patches of grey willow and downy birch were present although the banks were typically open with high wind exposure. The lake was bordered by low-diversity wet grassland (GS4), much of which had been reclaimed for agriculture (low-intensity pasture).

As per site L1, site L2 was of very high value for coarse fish species in addition to European eel. This was given the abundance of spawning and nursery habitat (coarse fish) and abundant refugia and a diverse prey resource for eel. Pike and perch are known from the site (pers. obs.). Despite some good suitability, no white-clawed crayfish were recorded via hand searching or sweep netting. The lake also had high suitability for otter although no signs were recorded during the survey. A low density of juvenile smooth newt were recorded from the shallow littorals along the eastern shore (**Plate 4.11**).

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep sampling (**Appendix C**). The macro-invertebrate community was dominated by abundant gastropod molluscs, cased caddis and freshwater shrimp (*Gammarus duebeni*).

Given the presence of smooth newt, the aquatic ecological evaluation of site L2 was of **local importance (higher value)** (**Table 4.5**).

**Plate 4.11** Representative image of site L2 in the southern basin of Drumady Lough, July 2025

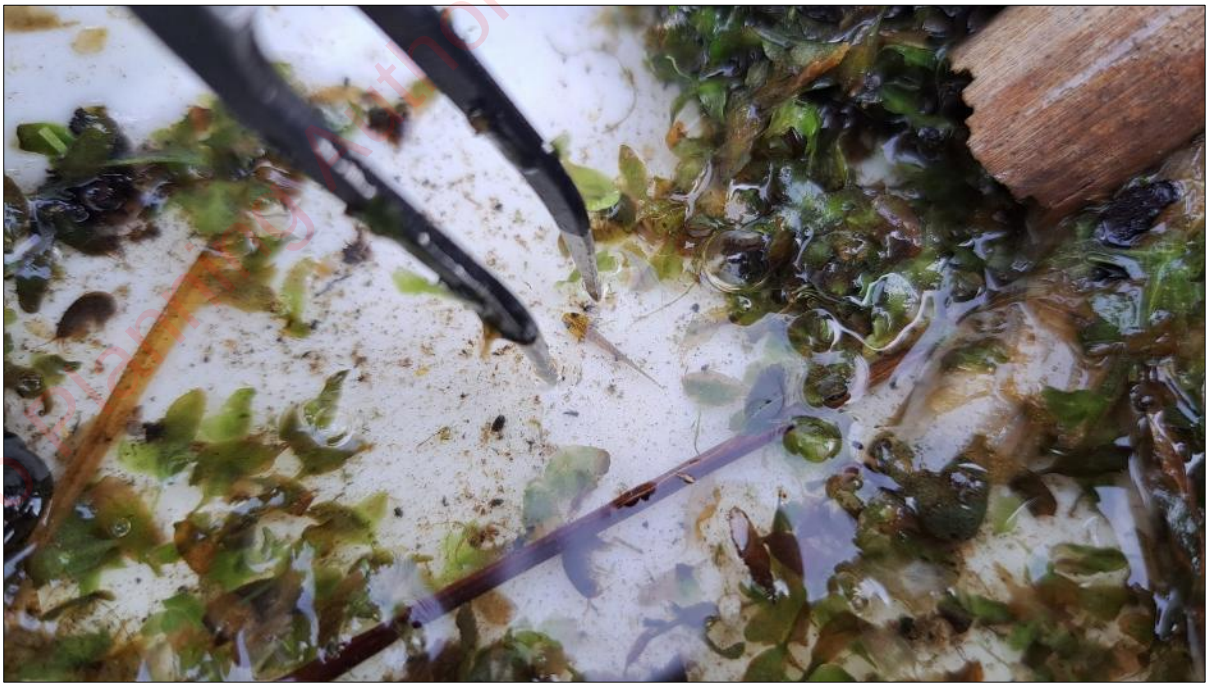

**Plate 4.12** Smooth newt larvae recorded at site L2, July 2025

## 4.2 White-clawed crayfish

White-clawed crayfish were recorded from sites A2 and A3 on the Meander River (moderate density; Peay, 2003) and sites B1 and B2 on an unnamed River Robe tributary at low and very high densities respectively. Crayfish remains were also recorded in otter spraint at site A2 on the Meander River. The same distribution of crayfish was recorded in the previous surveys (Triturus, 2023).

**Plate 4.13** Live white-clawed crayfish & crayfish remains in otter spraint recorded at site A2, July 202

**Plate 4.14** Mixed cohort white-clawed crayfish recorded at site B2 on an unnamed River Robe tributary, July 2025

## 4.3 eDNA sampling

In support of electro-fishing findings, lamprey (*Lampetra* sp.) eDNA was detected at site A3 on the Meander River (11 positive qPCR replicates out of 12; **Table 4.1; Appendix B**). Whilst not recorded during electro-fishing, European eel eDNA was detected at both sites A3 and B2 (11 & 8 positive qPCR replicates out of 12, respectively) (**Table 4.1; Appendix B**). These results were considered as evidence of the species' presence at and or upstream of the sampling locations.

As per 2023, no crayfish plague or freshwater pearl mussel eDNA was detected at the two riverine sampling sites (**Table 4.1**). These results were considered as evidence of the species' absence at and or upstream of the sampling locations.

**Table 4.1** 2025 eDNA results in the vicinity of the Proposed Project Cunlaghfadda Green Energy Project(positive qPCR replicates out of 12 in parentheses)

| Site | Watercourse | Lamprey (*Lampetra* sp.) | European eel | Crayfish plague | Freshwater pearl mussel |
|---|---|---|---|---|---|
| A3 | Meander River | **Positive (11/12)** | **Positive (11/12)** | Negative (0/12) | Negative (0/12) |
| B2 | Unnamed river | Negative (0/12) | **Positive (8/12)** | Negative (0/12) | Negative (0/12) |

## 4.4 Biological water quality (macro-invertebrates)

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 5 no. riverine sites or sweep samples collected at 3 no. lacustrine sites in July 2025 (**Appendix C**).

Site A2 on the Meander River and B2 on the unnamed Robe tributary achieved Q4 (good status) water quality in July 2025 (**Table 4.1; Figure 4.1**). This was given the presence of EPA group A (most pollution sensitive) taxa in at least fair numbers (≥5% of total sample abundance), namely the flattened mayflies *Ecdyonurus dispar* or *Heptagenia sulphurea* (**Appendix C**). Whilst both of these group A species were also present at site B1, the site achieved **Q3-4 (moderate status)** given they were only recorded in low numbers (<5% of total sample). Thus, this site did not meet the qualifying criteria for good status as set out by Toner et al. (2005).

Sites A1 and A3 on the Meander River achieved **Q3 (poor status)** based on a dominance of pollution tolerant EPA group C and D species such as freshwater shrimp (*Gammarus duebeni*) and freshwater hoglouse (*Asellus aquaticus*) (**Appendix C**).

It should be noted that the rating for site A1 was tentative due to poor flows and an absence of riffle areas for sampling at the time of survey (as per Toner et al., 2005).

**Table 4.2** Comparison of 2023 and 2025 biological water quality (Q-ratings) at riverine sites in vicinity of the Proposed Project

| Site no. | Watercourse | EPA code | July 2023 | | July 2025 | |
|---|---|---|---|---|---|---|
| | | | Q-rating | WFD status | Q-rating | WFD status |
| A1 | Meander River | 34M05 | Q2-3* | Poor | Q3* | Poor |
| A2 | Meander River | 34M05 | Q4 | Good | Q4 | Good |
| A3 | Meander River | 34M05 | Q3-4 | Mod. | Q3 | Poor |
| B1 | Unnamed stream | n/a | Q3-4 | Mod. | Q3-4 | Mod. |
| B2 | Unnamed stream | n/a | Q3-4 | Mod. | Q4 | Good |

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

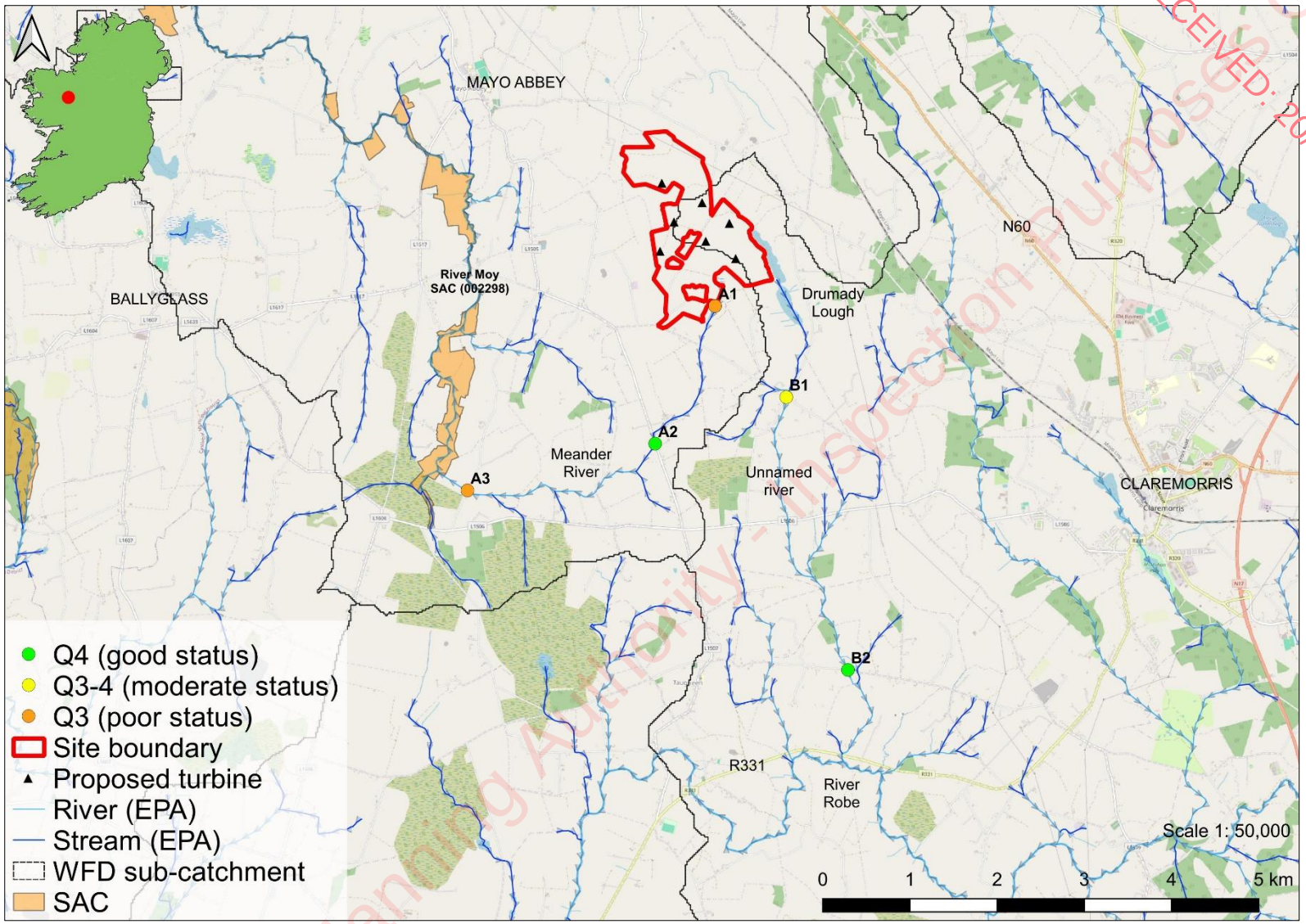


**Figure 4.1** Overview of the biological water quality status in the vicinity of the Proposed Project, July 2025

## 4.5 Lake macro-invertebrate communities

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the composite sweep samples collected from lakes sites L1 and L2 or pond site P1 in July 2025 (**Appendix C**).

The Drumady Lough samples were dominated by a high abundance of common invertebrate species such as freshwater hoglouse, freshwater shrimp (*Gammarus duebeni*), Leptocerid caddis such as *Triaenodes bicolor*, pea mussel (Sphaeriidae) and gastropod molluscs including *Bithynia tentaculata* and *Planorbis planorbis* (**Appendix C**). The lake olive mayfly *Cloeon simile* was the only mayfly species recorded. Taxon richness was 26 and 24 taxa respectively for sites L1 and L2 which was slightly higher than the previous 2023 surveys (18 & 20), likely due to the July vs. October sampling period.

The pond site P1 sample was dominated by a low diversity of species (taxon richness = 13) highly tolerant of heavily enriched, silted conditions such as the water boatman species *Hesperocorixa sahlbergi* and *Corixa punctata*, non-biting midge larvae (*Chironomus* sp.) and diving beetle (Dytiscidae) larvae (**Appendix C**).

## 4.6 Otter signs

Otter signs were recorded within a 150m radius of the survey sites in July 2025. As per the previous 2023 surveys, otter spraint sites were recorded at sites A2 on the Meander River and site B2 on the unnamed River Robe tributary. At these locations, crayfish remains were abundant in spraint. Additionally, a spraint site was identified along the western shores of the northern basin of Drumady Lough (site L1). No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in July 2025 or July-October 2023.

**Plate 4.15** Example of otter spraint containing abundant white-clawed crayfish remains at site A2 on the Meander River, July 2025



**Plate 4.16** Characteristic very fresh 'red' otter spraint containing abundant white-clawed crayfish remains at site B2 on the unnamed River Robe tributary, July 2025

**Plate 4.17** White-clawed crayfish remains recently predated (and abandoned) by otter at site B2 on the unnamed River Robe tributary, July 2025

**Table 4.3** Relative abundance of fish species of higher conservation value recorded via **electro-fishing** in the vicinity of the Proposed Project, July 2025 (blank cell = none recorded)

| Site | Watercourse | Brown trout | *Lampetra* sp. | Other species |
|---|---|---|---|---|
| A1 | Meander River | | | Three-spined stickleback |
| A2 | Meander River | Low | Low | Three-spined stickleback |
| A3 | Meander River | High | Low | Three-spined stickleback |
| B1 | Unnamed stream | | | Perch, three-spined stickleback |
| B2 | Unnamed stream | Medium | | Minnow, stone loach |
| P1 | Pond | Fisheries appraisal only | | |
| L1 | Drumady Lough (north basin) | Fisheries appraisal only | | |
| L2 | Drumady Lough (south basin) | Fisheries appraisal only | | |

**Table 4.4** Summary of aquatic species and habitats of higher conservation value recorded in the vicinity of the Proposed Project, July 2025

| Site | Watercourse | White-clawed crayfish | Otter signs within 150m | Annex I aquatic habitats | Rare or protected macrophytes/ aquatic bryophytes | Rare or protected macro-invertebrates | Other species/habitats of high conservation value |
|---|---|---|---|---|---|---|---|
| A1 | Meander River | None recorded | No signs | Not present | None recorded | None recorded | None recorded |
| A2 | Meander River | **Moderate density (Peay, 2003)** | **4 no. spraint sites** | Not present | None recorded | None recorded | **Lamprey (*Lampetra* sp.)** |
| A3 | Meander River | **Moderate density (Peay, 2003)** | No signs | Not present | None recorded | None recorded | **Lamprey (*Lampetra* sp.) recorded, European eel detected via eDNA** |
| B1 | Unnamed stream | **Low density (Peay, 2003)** | No signs | Not present | None recorded | None recorded | None recorded |
| B2 | Unnamed stream | **Very high density (Peay, 2003)** | **2 no. spraint sites** | Not present | None recorded | None recorded | **European eel detected via eDNA** |
| P1 | Pond | None recorded | No signs | Not present | None recorded | None recorded | **Smooth newt** |
| L1 | Drumady Lough (north basin) | None recorded | **Regular spraint site** | Not present | None recorded | None recorded | None recorded |
| L2 | Drumady Lough (south basin) | None recorded | No signs | Not present | None recorded | None recorded | **Smooth newt** |

**Conservation value:** White-clawed crayfish (*Austropotamobius pallipes*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) 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') and all are protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. Smooth newt (*Lissotriton vulgaris*) are protected under the Irish Wildlife Acts 1976-2023.

**Table 4.5** Aquatic ecological evaluation summary of the Proposed Project sites according to NRA (2009) criteria

| Site no. | Watercourse | EPA code | Evaluation of importance | Rationale summary |
|---|---|---|---|---|
| A1 | Meander River | 34M05 | Local importance (lower value) | No aquatic species or habitats of high conservation value |
| A2 | Meander River | 34M05 | **Local importance (higher value)** | Brown trout, lamprey (*Lampetra* sp.), white-clawed crayfish & otter signs recorded |
| A3 | Meander River | 34M05 | **Local importance (higher value)** | Brown trout, lamprey (*Lampetra* sp.), white-clawed crayfish & otter signs recorded; European eel detected via eDNA |
| B1 | Unnamed stream | n/a | **Local importance (higher value)** | White-clawed crayfish recorded |
| B2 | Unnamed stream | n/a | **Local importance (higher value)** | Otter signs, brown trout & white-clawed crayfish recorded; European eel detected via eDNA |
| P1 | Pond | n/a | **Local importance (higher value)** | Smooth newt recorded |
| L1 | Drumady Lough (north basin) | n/a | **Local importance (higher value)** | Otter signs recorded |
| L2 | Drumady Lough (south basin) | n/a | **Local importance (higher value)** | Smooth newt recorded |

**Conservation value:** White-clawed crayfish (*Austropotamobius pallipes*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) 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') and all are protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. Smooth newt (*Lissotriton vulgaris*) are protected under the Irish Wildlife Acts 1976-2023. Apart from the Inland Fisheries Acts 1959 to 2017, non-anadromous brown trout have no legal protection in Ireland although sites capable of supporting salmonid populations can be considered of at least higher local value.

# 5. Discussion

The two riverine survey watercourses downstream of the Proposed Project were lowland, alkaline channels that had been historically modified (straightened and or deepened) and had suffered from evident water quality pressures (siltation & eutrophication).

However, in keeping with the previous 2023 surveys, a number of high conservation value aquatic species were recorded. Both watercourses supported Annex II white-clawed crayfish, Annex II otter, salmonid and European eel populations, with lamprey (*Lampetra* sp.) recorded from the Meander River. Both lake sites L1 and L2 (Drumady Lough), adjacent to the EIAR site boundary, were of high suitability for otter and Red-listed European eel. Lake site L2 and pond site P1 supported smooth newt populations (not detected during 2023 surveys). The presence of one or more of these species resulted in most sites being evaluated as **local importance (higher value)** in terms of their aquatic ecology (**Table 4.5**).

In support of previous surveys no rare or protected macrophytes/aquatic bryophytes, rare or protected macro-invertebrates or otter breeding/resting areas were recorded during the current survey. Again, the only aquatic invasive species recorded was the widespread Canadian pondweed (*Elodea canadensis*) at sites B2, L1 and L2, a species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. 477/2011).

## 5.1 Fisheries

A typically low diversity of fish for the surveyed sub-catchments was recorded during the electro-fishing survey, with brown trout, lamprey (*Lampetra* sp.), perch, minnow, stone loach and three-spined stickleback captured in July 2025 (**Appendix A**). With the exception of pike (not recorded in 2025), the same species assemblage was recorded during the previous survey (Triturus, 2023).

Both the Meander River and unnamed Robe tributary were found to support brown trout populations. Fish abundances and distributions were also similar to 2023, with greater numbers of brown trout recorded at sites A3 and B2 in 2025 where superior nursery and spawning habitats were located. No Atlantic salmon were recorded, in keeping with data for the wider survey area. Lamprey (*Lampetra* sp.) were recorded in low densities at sites A2 and A3 on the Meander River only (**Table 3.1**), where sub-optimal and limited nursery habitat was present. Suitability for lamprey was typically poor given a paucity of spawning habitat (clean gravels) and organic-rich soft sediment >5cm in depth required for healthy populations (**Appendix A**). Despite widespread suitability, no European eel were recorded during the current (2025) or previous (2023) electro-fishing survey. However, eel were detected in eDNA samples from both the Meander River (A3) and the Robe tributary (B2) (**Appendix B**). Drumady Lough north and south basins (sites L1 & L2) were also of high suitability for eel and the species is said to be present anecdotally.

## 5.2 Otter

As per the previous 2023 surveys, regular otter marking sites (spraints) were recorded on the Meander River at site A1 and an unnamed River Robe tributary at site B2 (but not B1). These depositions were found to contain abundant white-clawed crayfish remains, based on the presence of identifiable carapace/shell fragments (e.g. **Plate 4.15, 4.16**). Where their ranges overlap, white-clawed crayfish

are a highly important seasonal dietary component for otters in Irish rivers (Triturus data; O'Connor et al., 2022; Smiddy & Saich, 2015; Reid et al., 2013; Preston et al., 2006; Breathnach & Fairley, 1993; Kyne et al., 1989). This is especially the case on watercourses with otherwise limited prey resources (e.g. where fish populations are impacted by hydromorphological modifications) and crayfish can evidently sustain a healthy otter population in such habitats. Drumady Lough (sites L1 & L2) were of high suitability for otter, with a regular spraint site recorded on the western shore of the northern basin (site L1). No breeding (holt) or couch (resting) areas were identified in the vicinity of the survey sites in July 2025 or the previous 2023 surveys.



## 5.3 White-clawed crayfish

Despite historical modifications (straightening & deepening) and water quality pressures (siltation, eutrophication), healthy populations of white-clawed crayfish were again recorded in both the Meander River and an unnamed River Robe tributary (as per 2023 surveys). Particularly high densities were present at site B2 where abundant bryophyte-rich boulder and cobble provided highly suitable instream refugia (52 mixed cohort crayfish recorded from 40 refugia). Whilst crayfish were already known from the Meander River (**Figure 3.1**), records were not available for the unnamed River Robe tributary[1] prior to the 2023 survey and the current survey. Annex II white-clawed crayfish are a qualifying interest of the downstream connecting River Moy SAC (002298) and the Meander River likely contributes strongly to this population given the close proximity to the European site.

## 5.4 Water quality & macro-invertebrates

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the samples taken from 5 no. riverine, 2 no. lake sites or 1 no. pond site (**Appendix C**), i.e. none greater than 'Least Concern'. Species assemblages were similar to the previous 2023 survey.

Although site A2 on the Meander River and B2 on the unnamed Robe tributary achieved **Q4 (good status**), the other 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) (**Figure 4.1; Table 4.2**). Siltation and eutrophication of riverine watercourses was noted during the surveys and is known to be a primary threat to water quality in the survey area, in addition to hydromorphological modifications (EPA data). Recent land drainage along the unnamed Robe tributary was also evident and was clearly adding to nutrient loads of the river (**Plate 4.6**).



[1] While no records available for the River Robe tributary records were available for the downstream-connecting River Robe (NPWS & EPA data)

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# Fisheries assessment for the proposed Cunlaghfadda Green Energy Project, Co. Mayo (2025)

Triturus

Prepared by Triturus Environmental Ltd. for MKO

**November 2025**



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# Table of contents

# 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 Cunlaghfadda Green Energy Project located near Claremorris, Co. Mayo. The baseline surveys would update and expand upon those previously completed by Triturus in July and October 2023.

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 Site, a catchment-wide electro-fishing survey across 5 no. riverine sites was undertaken (**Table 2.1; Figure 2.1**). A fisheries appraisal of 2 no. lake sites and 1 no. pond site 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 Proposed 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 Site. The surveys were undertaken in July 2025.

## 1.2 Fisheries (desktop review)

The Meander River, a tributary of the Manulla River, is known to support brown trout (*Salmo trutta*), lamprey (*Lampetra* sp.) and three-spined stickleback (*Gasterosteus aculeatus*) (Triturus, 2023).

The unnamed River Robe tributary also supports brown trout in addition to pike (*Esox lucius*), perch (*Perca fluviatilis*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and three-spined stickleback (Triturus, 2023).

Drumady Lough (north and south basins) is known locally to support pike, perch and European eel (pers. obs.). There was no fisheries data available for pond site P1 (not surveyed previously).

# 2. Methodology

## 2.1 Fisheries assessment (electro-fishing)

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish riverine sites on Thursday 3rd and Friday 4th July 2025 following notification to Inland Fisheries Ireland and under the conditions of a Department of Climate, Energy and the Environment (DCEE) licence. To collate a more accurate baseline of the proposed receiving watercourse, the electro-fishing survey was undertaken across 5 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 high conductivity waters of the sites a voltage of 200-240v, frequency of 35-40Hz 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 8 no. riverine and lacustrine sites was undertaken to establish their importance for salmonid, lamprey, 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 profile, 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 8 no. electro-fishing & fisheries appraisal survey sites in the vicinity of the Proposed Project

| Site no. | Watercourse | EPA code | Location | X (ITM) | Y (ITM) |
|---|---|---|---|---|---|
| A1 | Meander River | 34M05 | Cappagh North | 528928 | 777233 |
| A2 | Meander River | 34M05 | Maltpool | 528240 | 775653 |
| A3 | Meander River | 34M05 | Oory | 526087 | 775116 |
| B1 | Unnamed stream | n/a | Clogher Beg | 529745 | 776187 |
| B2 | Unnamed stream | n/a | Garravlagh | 530452 | 773056 |
| P1* | Pond | n/a | Cunlaghfadda | 529145 | 777734 |
| L1* | Drumady Lough (north basin) | n/a | Drumady | 529572 | 777795 |
| L2* | Drumady Lough (south basin) | n/a | Drumady | 529752 | 777224 |

* fisheries appraisal only

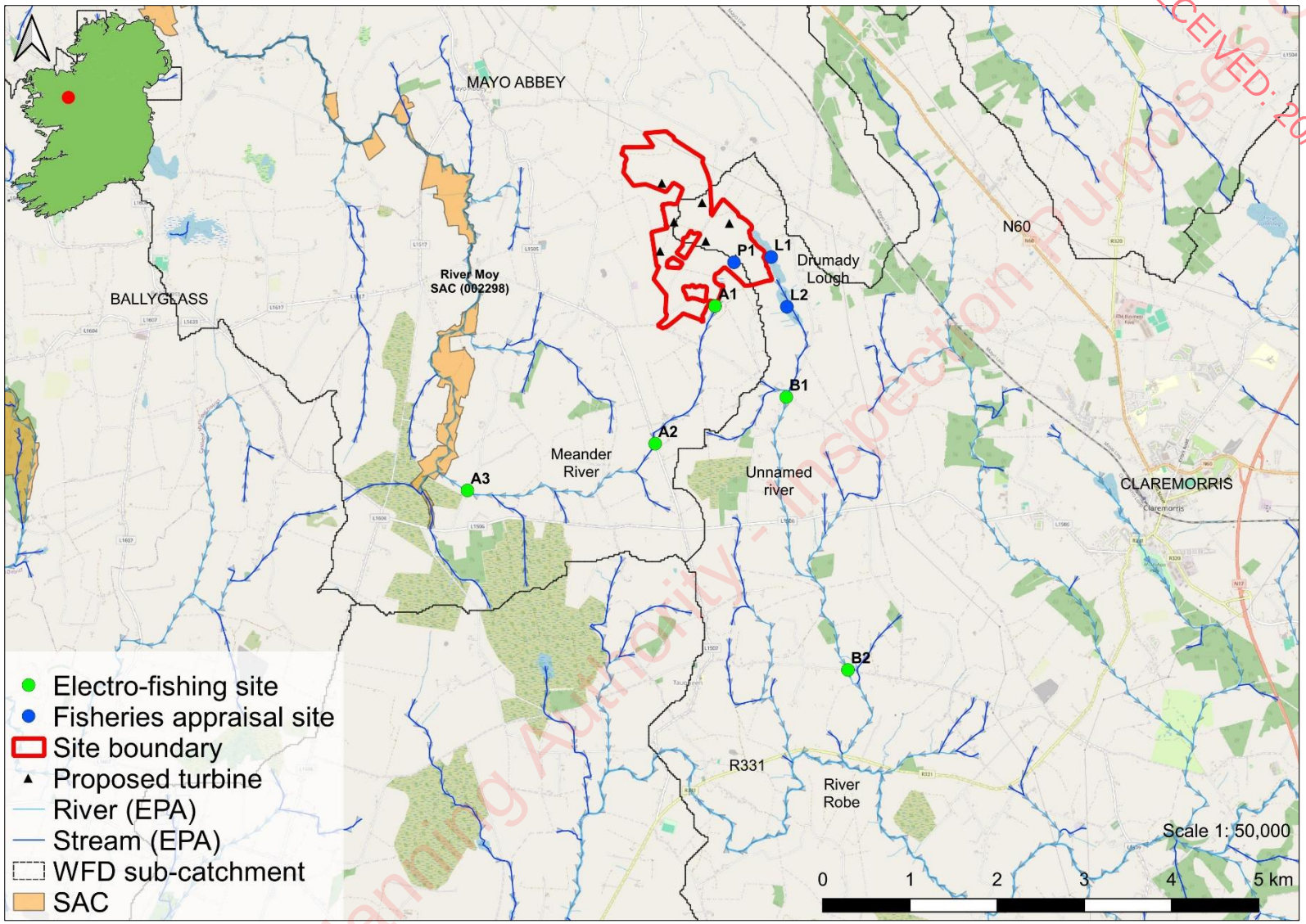


**Figure 2.1** Overview of the electro-fishing & fisheries appraisal survey site locations for the Proposed Project

# 3. Results



A catchment-wide fisheries survey of 5 no. riverine and 3 no. lacustrine sites in the vicinity of the Proposed Project was conducted on Thursday 3rd and Friday 4th July 2025 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.

## 3.1 Fisheries assessment & appraisal

### 3.1.1 Site A1 – Meander River, Cappagh North

Three-spined stickleback (*Gasterosteus aculeatus*) (*n*=9) was the only fish species recorded via electro-fishing at site A1 on the uppermost reaches of the Meander River (EPA code: 34M05) (**Figure 3.1**). With the exception of low densities of this species, the river was not of fisheries value at this location given historical modifications, poor hydromorphology, heavy siltation and no observable flows at the time of survey.

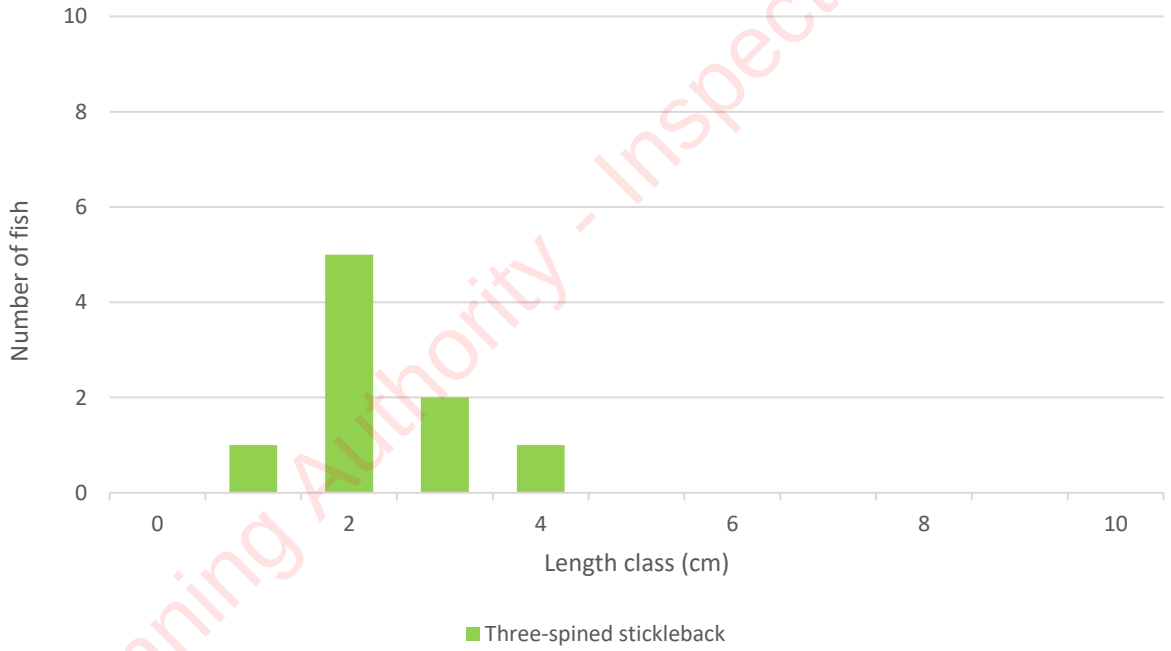


**Figure 3.1** Length frequency distribution recorded via electro-fishing at site A1, July 2025




**Plate 3.1** Male and female three-spined stickleback recorded at site A1 on the uppermost reaches of the Meander River, July 2025

### 3.1.2 Site A2 – Meander River, Maltpool

Three-spined stickleback (*n*=14), brown trout (*Salmo trutta*) (*n*=2) and lamprey (*Lampetra* sp.) (*n*=2) were recorded via electro-fishing at site A2 on the Meander River (34M05) at a local road crossing c.1.8km downstream of site A1 (**Figure 3.2**).

The site was only of moderate value for salmonids, with a low density of juvenile brown trout recorded. The nursery value was reduced given the shallow nature of the stream and poor summer flows. Whilst some spawning habitat for salmonids and lamprey was present, this was invariably silted and sub-optimal. The site was of poor value for adult salmonids given a near absence of deeper pool areas. Soft sediment accumulations were shallow and flocculent where present and supported only a low density of ammocoetes . Suitability for European eel was poor and none were recorded.

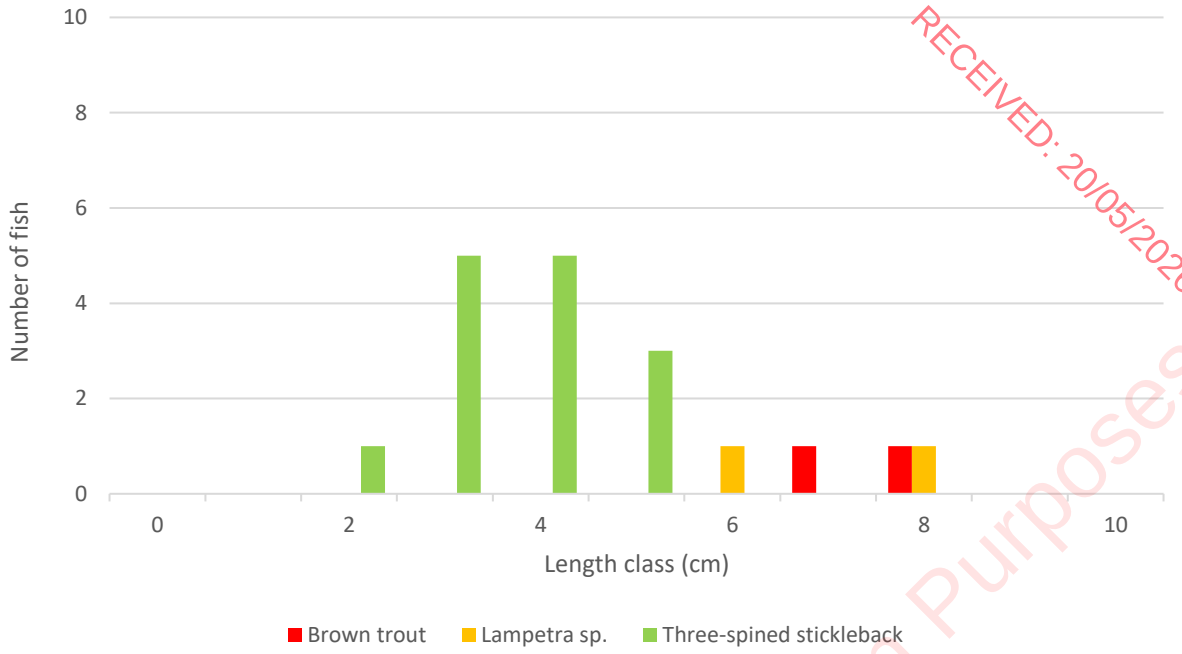


**Figure 3.2** Length frequency distribution recorded via electro-fishing at site A2, July 2025


**Plate 3.2** Juvenile brown trout recorded at site A2 on the Meander River, July 2025

### 3.1.3 Site A3 – Meander River, Oory

Brown trout (*n*=50), three-spined stickleback (*n*=4) and lamprey (*Lampetra* sp.) (*n*=2) were recorded via electro-fishing at site A3 on the Meander River (34M05) at a local road crossing c. 2.5km downstream of site A2 (**Figure 3.3**).

In contrast to upstream areas, the site was a good quality salmonid nursery, supporting relatively high

densities of juvenile brown trout. Cobble and boulder-dominated glide provided valuable instream refugia. However, the generally shallow nature of the river at this location reduced the value for adult salmonids (a consequence of historical straightening). Whilst some salmonid and lamprey spawning habitat was present in localised mixed gravels, the quality of the habitat was reduced given evident siltation and enrichment pressures. Soft sediment areas were flocculent where present (i.e. macrophyte beds) and supported only a low density of ammocoetes. Despite some good suitability, no European eel were recorded although the species was detected via eDNA sampling (**Appendix B**).



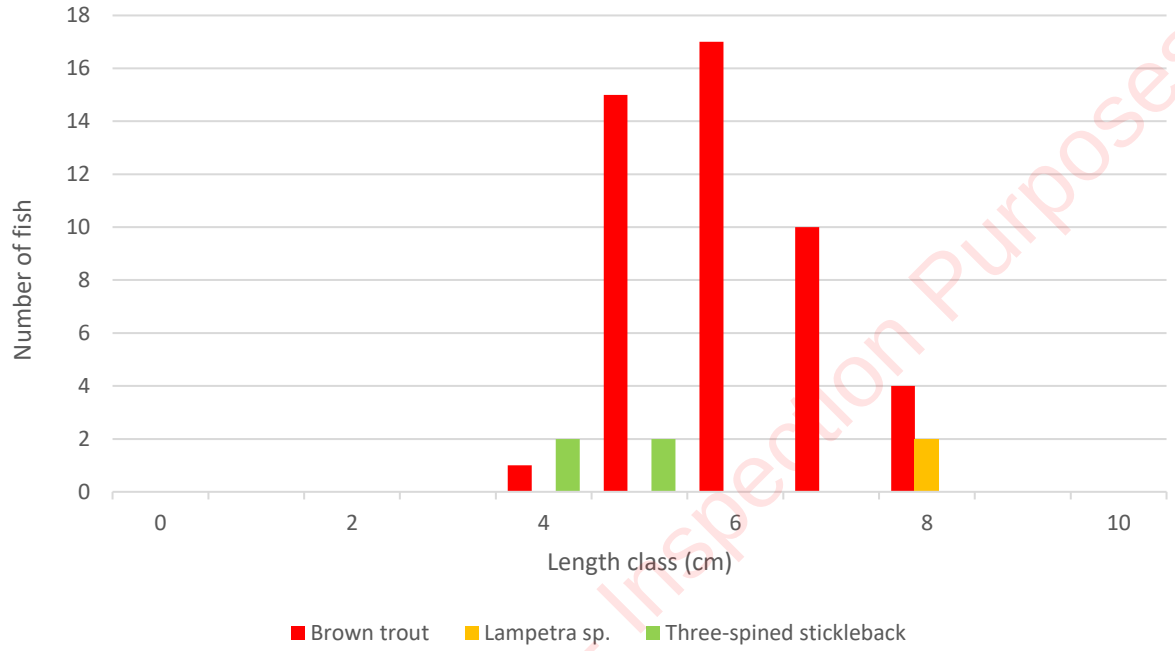


**Figure 3.3** Length frequency distribution recorded via electro-fishing at site A3, July 2025

**Plate 3.3** Juvenile brown trout recorded at site A3 on the Meander River, July 2025

### 3.1.4 Site B1 – unnamed river, Clogher Beg

Three-spined stickleback (*n*=9) and perch (*Perca fluviatilis*) (*n*=5) were the only fish species recorded via electrofishing at site B1 on an unnamed River Robe tributary at a local road crossing downstream of Drumady Lough (**Figure 3.4**).

Despite some good suitability locally for salmonids upstream of the bridge, none were recorded, in keeping with previous surveys. Overall, historical modifications, low summer flows and poor hydromorphology reduced the fisheries value of the site. Salmonid habitat was poor given a paucity of faster-flowing riffle areas and cleaner substrata although there was some suitability (but none recorded). Whilst there was some suitability for lamprey in terms of sub-optimal spawning substrata, no suitable ammocoete areas were present (flocculent only). The shallow nature of the site with limited refugia (apart from macrophyte beds) provided poor conditions for European eel (none recorded).

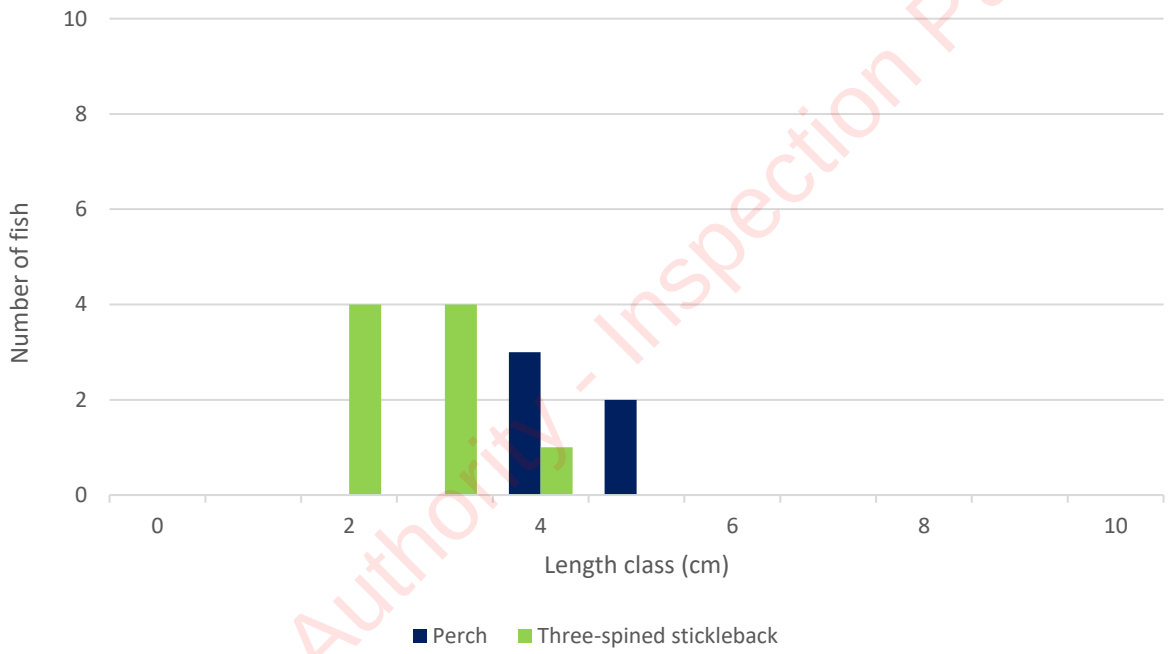


**Figure 3.4** Length frequency distribution recorded via electro-fishing at site B1, July 2025




**Plate 3.4** Juvenile perch and three-spined stickleback recorded at site B1 on an unnamed River Robe tributary, July 2025

### 3.1.5 Site B2 – unnamed river, Garravlagh

Minnow (*Phoxinus phoxinus*) (*n*=26), brown trout (*n*=24) and stone loach (*Barbatula barbatula*) (*n*=1) were recorded via electro-fishing at site B2 on an unnamed River Robe tributary c. 3.5km downstream of site B1 (**Figure 3.5**).

Despite evident enrichment pressures, the site was of good value for salmonids, supporting a mixed cohort population of brown trout (dominated by juveniles). The site was of most value as a nursery with a general paucity of deeper holding pools or undercut banks for adults. The compacted/calcified, bryophyte-rich bed provided poor spawning opportunities. Despite some good suitability for European eel (abundant instream refugia), none were recorded. However, the species was detected from the site via eDNA sampling (**Appendix B**). Suitability for lamprey was poor with limited suitable spawning areas and an absence of suitable soft sediment areas for ammocoetes – none were detected in eDNA sampling. Although known from the site (Triturus, 2023), no pike (*Esox lucius*) were recorded in the current survey.

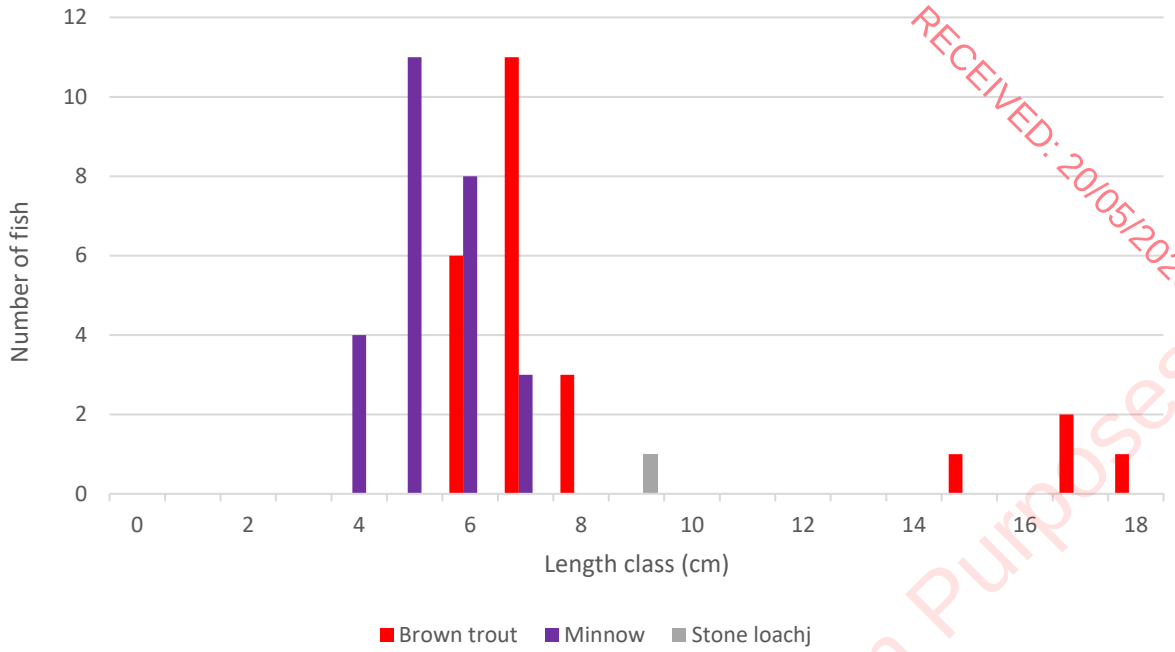




**Figure 3.5** Length frequency distribution recorded via electro-fishing at site B2, July 2025

**Plate 3.5** Adult brown trout recorded at site B2 on an unnamed River Robe tributary, July 2025

**Plate 3.6** Minnow and juvenile brown trout recorded at site B2 on an unnamed River Robe tributary, July 2025

### 3.1.6 Site P1 – pond, Cunlaghfadda

Electro-fishing was not undertaken at site P1 given the lacustrine conditions (fisheries appraisal only). The small 0.2ha heavily enriched pond was not of fisheries value given poor water quality, very shallow depths and isolation from other fisheries habitats.

**Plate 3.7** Representative image of pond site P1, July 2025

### 3.1.7 Site L1 – Drumady Lough (north)

Site L1 was located at the north basin of Drumady Lough, an interconnected pair of shallow, narrow alkaline lakes. The 5.2ha mixed geology lake was of very high value for coarse fish species in addition to European eel. This was given the abundance of spawning and nursery habitat (coarse fish) and abundant refugia and a diverse prey resource for eel. Pike and perch are known from the site (pers. obs.).

**Plate 3.8** Representative image of site L1 in the northern basin of Drumady Lough, July 2025

### 3.1.8 Site L2 – Drumady Lough (south)

Site L2 was located at the southern basin of Drumady Lough, a 5.3ha shallow, narrow alkaline lake. As per site L1, site L2 was of very high value for coarse fish species in addition to European eel. This was given the abundance of spawning and nursery habitat (coarse fish) and abundant refugia and a diverse prey resource for eel. Pike and perch are known from the site (pers. obs.).

**Plate 3.9** Representative image of site L2 in the southern basin of Drumady Lough, July 2025

**Table 3.1** Fish species densities per $m^2$ recorded at sites in the vicinity of the Proposed Project via electro-fishing in July 2025 (values in **bold** represent the highest densities recorded for each species, respectively)

| Site | Watercourse | CPUE (elapsed time) | Approx. area fished ($m^2$) | Brown trout | *Lampetra* sp. | Three-spined stickleback | Minnow | Stone loach | Perch |
|---|---|---|---|---|---|---|---|---|---|
| A1 | Meander River | 5 | 75 | 0.000 | 0.000 | **0.120** | 0.000 | 0.000 | 0.000 |
| A2 | Meander River | 10 | 200 | 0.010 | 0.5 per $m^2$ | 0.070 | 0.000 | 0.000 | 0.000 |
| A3 | Meander River | 10 | 195 | **0.256** | **2 per $m^2$** | 0.021 | 0.000 | 0.000 | 0.000 |
| B1 | Unnamed stream | 10 | 150 | 0.000 | 0.000 | 0.060 | 0.000 | 0.000 | **0.033** |
| B2 | Unnamed stream | 10 | 160 | 0.150 | 0.000 | 0.000 | **0.163** | **0.006** | 0.000 |
| P1 | Pond | n/a | Fisheries appraisal only | n/a | n/a | n/a | n/a | n/a | n/a |
| L1 | Drumady Lough (north basin) | n/a | Fisheries appraisal only | n/a | n/a | n/a | n/a | n/a | n/a |
| L2 | Drumady Lough (south basin) | 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 2025 (blank cell = none recorded)

| Site | Watercourse | Brown trout | *Lampetra* sp. | Other species |
|---|---|---|---|---|
| A1 | Meander River | | | Three-spined stickleback |
| A2 | Meander River | Low | Low | Three-spined stickleback |
| A3 | Meander River | High | Low | Three-spined stickleback |
| B1 | Unnamed stream | | | Perch, three-spined stickleback |
| B2 | Unnamed stream | Medium | | Minnow, stone loach |
| P1 | Pond | Fisheries appraisal only | | |
| L1 | Drumady Lough (north basin) | Fisheries appraisal only | | |
| L2 | Drumady Lough (south basin) | Fisheries appraisal only | | |

Table 3.3 Comparison of fish recorded via electro-fishing in 2023 and 2025 at sites in vicinity of the Proposed Project

| | | | Fish species recorded | |
|---|---|---|---|---|
| Site no. | Watercourse | EPA code | July 2023 | July 2025 |
| A1 | Meander River | 34M05 | Three-spined stickleback | Three-spined stickleback |
| A2 | Meander River | 34M05 | Brown trout, *Lampetra* sp., three-spined stickleback | Brown trout, *Lampetra* sp., three-spined stickleback |
| A3 | Meander River | 34M05 | Brown trout, *Lampetra* sp., three-spined stickleback | Brown trout, *Lampetra* sp., three-spined stickleback |
| B1 | Unnamed stream | n/a | Perch, three-spined stickleback | Perch, three-spined stickleback |
| B2 | Unnamed stream | n/a | Brown trout, pike, minnow, stone loach | Brown trout, minnow, stone loach |
| P1 | Pond | n/a | Not previously surveyed | Fisheries appraisal only |
| L1 | Drumady Lough (north basin) | n/a | Fisheries appraisal only | Fisheries appraisal only |
| L2 | Drumady Lough (south basin) | n/a | Fisheries appraisal only | Fisheries appraisal only |

# 4. Discussion



The watercourses surveyed in the vicinity of the Proposed Project were small lowland alkaline channels which had been historically straightened and or deepened. Historical straightening and deepening of watercourses (e.g. Meander River) removes habitat and hydromorphological heterogeneity, encourages siltation of substrata and invariably results in an irreparable reduction in fisheries potential, particularly for salmonids but also lamprey and European eel (O'Grady et al., 2017; Blanc et al., 2009; O'Grady, 2006). Furthermore, eutrophication pressures were again evident in 2025 and had impacted the quality of fisheries habitat, particularly on the unnamed Robe River tributary (sites B1 & B2). Nevertheless, both survey rivers were of value for salmonids and Red-listed European eel, with lamprey also recorded (again) from the Meander River. Drumady Lough (north & south basins) were of high value for coarse fish species and eel, whilst the small shallow pond at site P1 did not provide fisheries habitat.

A typically low diversity of fish for the surveyed sub-catchments was recorded during the electro-fishing survey, with brown trout, lamprey (*Lampetra* sp.), perch, minnow, stone loach and three-spined stickleback captured in July 2025 (**Table 3.1, 3.2**). With the exception of pike (not recorded in 2025), the same species assemblage was recorded during the previous survey (Triturus, 2023; **Table 3.3**).

Siltation of salmonid spawning habitat and hydromorphological impacts reducing habitat heterogeneity and the quality of available nursery areas was evident throughout the survey area. However, as per previous surveys, both the Meander River and unnamed Robe tributary were found to support brown trout populations. Fish abundances and distributions were also similar to 2023, with greater numbers of brown trout recorded at sites A3 and B2 in 2025 where superior nursery and spawning habitats were located. No Atlantic salmon were recorded, in keeping with data for the wider survey area. Salmonid migration through the Lough Mask catchment to the Robe sub-catchment is restricted by numerous natural and artificial barriers (Gargan et al., 2021). The Meander River survey area is also situated in the upper reaches of the River Moy catchment and this also presents access issues to Atlantic salmon from downstream habitats.

As per the previous surveys results, lamprey (*Lampetra* sp.) ammocoetes were only recorded in low densities at sites A2 and A3 on the Meander River (0.5 to 2 per $m^2$; **Table 3.1**), where sub-optimal and limited nursery habitat was present. Suitability for lamprey was typically poor given a paucity of spawning habitat (clean gravels) and organic-rich soft sediment >5cm in depth required for healthy populations (Dawson et al., 2015; Aronsuu & Virkkala, 2014; Rooney et al., 2013; Goodwin et al., 2008; Gardiner, 2003; Kelly & King, 2001). Most sediment accumulations encountered were flocculent and too shallow for ammocoete burial, particularly on the unnamed River Robe tributary where, despite the presence of sub-optimal spawning areas, no lamprey were recorded via electro-fishing or eDNA sampling.

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, no European eel were recorded during the current (2025) or previous (2023) electro-fishing survey. However, eel were detected in eDNA samples from both the Meander River (A3) and the Robe tributary (B2) (**Appendix B**), indicating the presence of a (likely) small population in both watercourses. Drumady Lough north and south basins

(sites L1 & L2) were also of high suitability for eel and the species is said to be present anecdotally. The paucity of eel in the electro-fishing surveys primarily reflected the typically sub-optimal habitat and poor connectivity with marine habitats (>70km instream distance; Degerman et al., 2019; Chadwick et al., 2007), which leads to limited freshwater penetration and lower eel densities.

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# 8. Appendix B – eDNA lab report



| | |
|---|---|
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| **Purchase Order:** | eDNA25_Cunlaghfadda |
| **Contact:** | Triturus Environmental Ltd |
| **Issue Date:** | 12.08.2025 |
| **Received Date:** | 29.07.2025 |

## eDNA Report

Technical Report

SureScreen Scientifics

Triturus

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SureScreen Scientifics



# eDNA Analysis

## Summary

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

## Results

| Lab ID | Site Name | OS Reference | Target Species | Sample Integrity Check | Result | Positive Replicates |
|---|---|---|---|---|---|---|
| FK2908 | Cunlaghfadda Wind Farm - A3 Meander River | | Brook/River lamprey (Lampetra planeri/ Lampetra fluviatilis) | Pass | Positive | 11 |
| | | | Crayfish plague (Aphanomyces astaci) | Pass | Negative | 0 |
| | | | European eel (Anguilla anguilla) | Pass | Positive | 11 |
| | | | Freshwater pearl mussel (Margaritifera margaritifera) | Pass | Negative | 0 |
| FK2917 | Cunlaghfadda Wind Farm - B2 Unnamed River | | Brook/River lamprey (Lampetra planeri/ Lampetra fluviatilis) | Pass | Negative | 0 |
| | | | Crayfish plague (Aphanomyces astaci) | Pass | Negative | 0 |

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| | | | |
|---|---|---|---|
| European eel (Anguilla anguilla) | Pass | Positive | 8 |
| Freshwater pearl mussel (Margaritifera margaritifera) | Pass | Negative | 0 |

Matters affecting result: none

Reported by:Consuela Sopronyi

Aporoved by: Lauryn Jewkes

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# Methodology

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

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

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

# Interpretation of Results

**Sample Integrity Check:**

**Laboratory Arrival:**

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

**Degradation and Inhibition check:**

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

**Result:**

**Presence of eDNA (Positive/Negative/Inconclusive)**

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

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

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

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

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# 9. Appendix C – biological water quality & lacustrine macro-invertebrate communities

**Table 8.1** Macro-invertebrate Q-sampling results for riverine sites, July 2025

| Group | Family | Species | A1 | A2 | A3 | B1 | B2 | EPA class |
|---|---|---|---|---|---|---|---|---|
| Ephemeroptera | Heptageniidae | *Ecdyonurus dispar* | | 13 | | 6 | | **A** |
| Ephemeroptera | Heptageniidae | *Heptagenia sulphurea* | | | | 1 | 6 | **A** |
| Ephemeroptera | Baetidae | *Alainites muticus* | | | | | 1 | **B** |
| Ephemeroptera | Leptophlebiidae | *Paraleptophlebia cincta* | | | | | 12 | **B** |
| Plecoptera | Leuctridae | *Leuctra fusca* | | | | | 3 | **B** |
| Trichoptera | Glossomatidae | sp. indet. | 27 | 24 | | 21 | 15 | **B** |
| Trichoptera | Leptoceridae | *Athripsodes aterrimus* | | | | 2 | | **B** |
| Trichoptera | Leptoceridae | sp. indet. | 1 | | | 1 | | **B** |
| Trichoptera | Limnephilidae | *Limnephilus lunatus* | 2 | | | 1 | | **B** |
| Odonata | Calopterygidae | *Calopteryx splendens* | 1 | 3 | | 2 | | **B** |
| Odonata | Coenagrionidae | sp. indet. | | | | 6 | | **B** |
| Ephemeroptera | Baetidae | *Baetis rhodani* | | 8 | 5 | 31 | 1 | **C** |
| Ephemeroptera | Ephemerellidae | *Serratella ignita* | | 1 | 6 | 16 | | **C** |
| Trichoptera | Hydropsychidae | *Hydropsyche instabilis* | | | | 41 | 1 | **C** |
| Trichoptera | Polycentropodidae | *Polycentropus kingi* | | 1 | | | | **C** |
| Trichoptera | Rhyacophilidae | *Rhyacophila dorsalis* | | 2 | | | | **C** |
| Coleoptera | Dytiscidae | Dytiscidae larva | 1 | | 1 | 1 | | **C** |
| Coleoptera | Haliplidae | *Haliplus ruficollis* group | 2 | | | | | **C** |
| Coleoptera | Elmidae | *Elmis aenea* | | | | 22 | | **C** |
| Coleoptera | Elmidae | *Limnius volckmari* | | | | 1 | | **C** |
| Coleoptera | Haliplidae | *Brychius elevatus* | | 3 | 1 | 3 | | **C** |
| Crustacea | Gammaridae | *Gammarus duebeni* | 12 | 26 | 33 | 69 | 38 | **C** |
| Diptera | Pediciidae | *Dicranota sp.* | | | | 1 | | **C** |
| Diptera | Simuliidae | sp. indet. | | | | 31 | | **C** |
| Crustacea | Astacidae | *Austropotamobius pallipes* | | | | 1 | 9 | **C** |
| Gastropoda | Tateidae | *Potamopyrgus antipodarum* | | 2 | 13 | 197 | 15 | **C** |
| Gastropoda | Bithnyiidae | *Bithynia tentaculata* | 2 | | | 1 | | **C** |
| Hemiptera | Nepidae | *Nepa cinerea* | 2 | 1 | | | | **C** |
| Hemiptera | Veliidae | *Velia caprai* | 1 | | 1 | | | **C** |
| Crustacea | Asellidae | *Asellus aquaticus* | 12 | | | 2 | | **D** |
| Gastropoda | Lymnaeidae | *Ampullacaena balthica* | 4 | | | | | **D** |
| Mollusca | Sphaeriidae | sp. indet. | 6 | | | 6 | | **D** |
| Diptera | Chironomidae | *Chironomus* spp. | 2 | | | 6 | | **E** |
| Annelidae | Oligochaeta | sp. indet. | | | | | 2 | **n/a** |
| **Abundance** | | | **75** | **84** | **60** | **469** | **103** | |
| **Q-rating** | | | Q3* | Q4 | Q3 | Q3-4 | Q4 | |
| **WFD status** | | | Poor | Good | Poor | Mod. | Good | |

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

**Table 9.2** Macro-invertebrate communities recorded at lacustrine sites P1, L1 & L2, July 2025

| Group | Family | Species | P1 | L1 | L2 |
|---|---|---|---|---|---|
| Hemiptera | Corixidae | *Hesperocorixa sahlbergi* | 86 | | 16 |
| Diptera | Chironomidae | *Chironomus* spp. | 32 | 1 | 2 |
| Hemiptera | Corixidae | *Corixa punctata* | 19 | | 5 |
| Coleoptera | Dytiscidae | Dytiscidae larva | 13 | 7 | 1 |
| Diptera | Cuculidae | sp. indet. | 10 | | |
| Mollusca | Sphaeriidae | sp. indet. | 6 | 22 | 5 |
| Hemiptera | Hydrometridae | *Hydrometra stagnorum* | 4 | | |
| Gastropoda | Lymnaeidae | *Lymnaea stagnalis* | 3 | | |
| Hemiptera | Corixidae | Corixidae nymph | 3 | 1 | |
| Coleoptera | Dytiscidae | *Acilius sulcatus* | 2 | | |
| Hemiptera | Notonectidae | Notonectidae nymph | 2 | 1 | 2 |
| Diptera | Chironomidae | Non-*Chironomus* spp. | 1 | | 1 |
| Hemiptera | Notonectidae | *Notonecta viridis* | 1 | | |
| Arachnida | Hydrachnidiae | sp. indet. | | 2 | 22 |
| Arachnida | Argyronetidae | *Argyroneta aquatica* | | 2 | 4 |
| Coleoptera | Dytiscidae | *Hygrotus inaequalis* | | 1 | |
| Coleoptera | Dytiscidae | *Hyphydrus ovatus* | | | 4 |
| Coleoptera | Haliplidae | Haliplidae larva | | 1 | |
| Crustacea | Asellidae | *Asellus aquaticus* | | 109 | 3 |
| Crustacea | Gammaridae | *Gammarus duebeni* | | 3 | 59 |
| Gastropoda | Bithnyiidae | *Bithynia tentaculata* | | 105 | 86 |
| Gastropoda | Physidae | *Physa fontinalis* | | 6 | 2 |
| Gastropoda | Planorbidae | *Gyraulus albus* | | 1 | |
| Gastropoda | Planorbidae | *Planorbis planorbis* | | 42 | |
| Gastropoda | Tateidae | *Potamopyrgus antipodarum* | | 4 | 14 |
| Hemiptera | Corixidae | sp. indet. | | | 3 |
| Hemiptera | Gerridae | Gerridae nymph | | 2 | 6 |
| Odonata | Aeshnidae | sp. indet. | | 2 | 2 |
| Odonata | Coenagrionidae | sp. indet. | | 16 | 1 |
| Odonata | Lestidae | *Lestes sponsa* | | 4 | |
| Trichoptera | Beraeidae | *Beraeodes minutus* | | 6 | |
| Trichoptera | Leptoceridae | *Triaenodes bicolor* | | 51 | 2 |
| Trichoptera | Leptoceridae | *Athripsodes aterrimus* | | 6 | 4 |
| Trichoptera | Phryganeidae | *Agrypnia obsoleta* | | 13 | 5 |
| Trichoptera | Polycentropodidae | *Plectrocnemia conspersa* | | 1 | 1 |
| Ephemeroptera | Baetidae | *Cloeon simile* | | 6 | 10 |
| **Abundance** | | | **182** | **415** | **260** |
| **Taxon richness** | | | 13 | 26 | 24 |


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