Breezy Hill Energy Project

Fisheries Report

Technical Appendix 6.4

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Ayrshire Rivers Trust

Breezy Hill Energy Project Surveys

Electrofishing Survey

2024

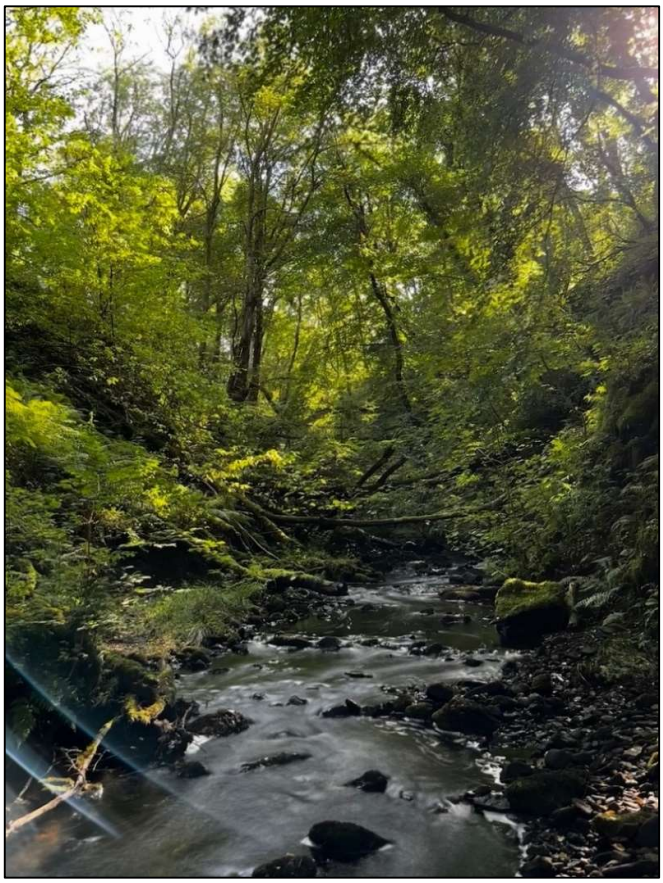

Figure 1: the Hawford Burn (Water of Coyle Tributary)

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Revision	Purpose Description	Originated	Checked	Approved for submission
0.1	Draft	C.Watson	C.Bryce	S.Candlish

1. Summary

Ayrshire Rivers Trust (ART) undertook electrofishing surveys on eight sites (**Figure 4**) in the vicinity of the proposed Breezy Hill Energy Project. These watercourses are all situated within the Ayr catchment and flow to the Water of Coyle, Burnock Water and the Lugar Water. These sites are situated within or downstream of the Proposed Development area. No Atlantic salmon (*Salmo salar*) were recorded at any of the eight sites; this is due to natural and manmade obstacles preventing upstream migration. The data gathered will form the basis of Ecological Impact Assessment Report (EIAR).

- Atlantic salmon were absent from all survey sites.
- Brown trout (*S. trutta*) were recorded at five of the eight survey sites, with the exceptions being the furthest upstream site on the Water of Coyle, the Shield Burn and the Watson Burn.
- European eels (*Anguilla anguilla*) were not recorded at any of the survey sites but have been recorded by ART further downstream in the Water of Coyle and Lugar Water.

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1. Introduction

Ayrshire Rivers Trust (ART) was commissioned by MacArthur Green (now SLR Consulting Limited[1]) to survey watercourses for freshwater fish and habitat across eight sites (**Figure 4**): two on the upper reaches of the Water of Coyle, the Hawford Burn, one unnamed burn that runs to the Water of Coyle, the Shield burn, the Drumbowie Burn, the Watson burn and one unnamed watercourse that runs to the Burnock Water.

The purpose of these surveys is to support an Environmental Impact Assessment Report (EIAR) of the Proposed Development and establish an ecological baseline to assess risks and potential impacts of the Proposed Development. These surveys also follow guidance by the Scottish Government in relation to monitoring watercourses for onshore wind farm developments (Marine Scotland, 2021) where possible.

The construction of the Proposed Development has the potential to impact on the water environment due to its proximity to several watercourses that drain the construction area flowing into the River Ayr and Lugar Water. These river systems and their tributaries are known to support several aquatic UK Biodiversity Action Plan (BAP) species including all three UK lamprey species, Atlantic salmon (*Salmo salar*), brown trout (*S. trutta*), European eel (*Anguilla anguilla*), otter (*Lutra lutra*) and water vole (*Arvicola amphibious*).

The River Ayr and Lugar salmon populations fall under the management and control of the River Ayr District Salmon Fishery Board (RADSFB) who have statutory powers in relation to all matters and activities surrounding and affecting salmon within the catchment.

The RADSFB grant permission to ART to perform electrofishing surveys within the River Ayr catchment. ART provide professional management and ecological advice to the boards in relation to all matters affecting the catchment and the fishery.

These surveys will assess both the fish habitat and species present by calculating the number of fish present per unit area in the watercourses surrounding the proposed development area. The survey design was based on eight electrofishing surveys (**Figure 4**); two sites on the Water of Coyle and single sites on the Hawford Burn, Drumbowie Burn, Watson Burn, Shield Burn and two unnamed burns draining the hillside to the south of Drongan and Ochiltree.

Electrofishing surveys were completed to assess both the fish habitat and species present by calculating the number of fish present per 100 m^2.

1.1 Salmonid fish and fisheries

Migratory salmonids; Atlantic salmon and brown/sea trout and other native fish populations use freshwater habitats for breeding and development of early life-stages. Typically, juvenile salmon spend between one and three years in freshwater before migrating to sea as smolts. Salmon may spend between one and three years in the Atlantic Ocean before returning as mature fish to spawn within their natal river, at or close to their original hatching site. Sea trout (*S. trutta*) differ from salmon in that they are part of a resident brown trout population and may spend less time at sea and, unlike salmon, remain in nearby inshore marine waters to feed. The use of both marine and freshwater habitats during their life-cycle makes migratory salmonids vulnerable to deterioration or loss of accessibility across a wide range of habitats.

[1] Following acquisition, MacArthur Green became part of SLR Consulting Limited on 1 September 2025.

Isolated resident brown trout populations are potentially present upstream of waterfall barriers that prevent access from the sea. Although an important part of biodiversity, it is likely such isolated brown trout populations are present in most catchments and may contribute to downstream populations through downstream migration.

1.2 Biodiversity

Other than Atlantic salmon and brown trout, native fish such as lamprey (*Lampetra* spp.), three-spined stickleback (*Gasterosteus aculeatus*) and European eel and others may also utilise freshwater habitats. Non-native fish species such as stone loach (*Barbatula barbatula*) and grayling (*Thymallus thymallus*) are also known to be present in the Ayr catchment. Fish and freshwater habitats also support a range of other native flora and fauna and consequently mitigation to protect water resources for such species is likely to benefit a range of biodiversity and conservation objectives.

2. Methods

2.1 Background

ART is a full member of the Scottish Fisheries Coordination Centre (SFCC), which is an association of Scottish fisheries management organisations including Fisheries Management Scotland (FMS), The Marine Directorate (formerly Marine Science Scotland (MSS)), and the local District Salmon Fishery Boards. The electrofishing surveys carried out for this report were completed following SFCC protocols for this technique using SFCC accredited surveyors. The SFCC also provides electrofishing training to its members, and ART staff are qualified to lead and design electrofishing surveys to SFCC protocols. Wherever possible, ART surveys are therefore carried out to the standards required by the SFCC and data are recorded using the agreed format. ART are licenced by The Marine Directorate to undertake electrofishing throughout Ayrshire.

2.2 Techniques

Fish populations at each site were assessed using electrofishing. This is a widely used technique to examine freshwater fish communities. The method uses electricity to stun fish, which allows operators to remove them from the water. The fish are transferred to a holding container until they have recovered and then anaesthetised using a mild solution of MS222 (Tricaine Methane Sulphonate). Individuals are then identified, measured and returned unharmed to the area from where they were captured.

Battery powered backpack equipment (Hans Grassl model # IG600) was used to carry out each survey. Smooth DC was used at all sites, to maximise catch efficiency, while minimising potential damage to fish and other wildlife. A minimum voltage of 150 V was used, to ensure efficient fish capture.

In small watercourses, it is possible to cover the entire survey area accurately, and the number of fish captured can therefore be related to the wetted area of the site. All survey protocols were followed to SFCC standards.

2.3 Quantitative sites

All the sites surveyed were subject to density surveys; the survey sweep began at the downstream end of the identified survey section with surveyors moving upstream, back and forth across the channel so that every part of the bed was covered. Salmon and trout were separated into year classes based on length frequency histograms. As fish grow at very different rates between sites, this was repeated for each site individually. Age classifications were also checked by examining the number of annual rings on scales taken from fish of a range of sizes, where deemed necessary. Fish densities were then separated into fry and parr for the presentation of results. Other fish species were counted and recorded. Throughout this report the following notation has been used to distinguish fish year classes: salmonid fish less than one year old are recorded as 0+ year class or fry, whilst fish one year or older are recorded as 1++ or parr.

Sites were sampled using an area-delimited survey, thus allowing fish densities to be calculated. A fully quantitative 3-run depletion technique was used at all sites. If there were sufficient fish present, absolute fish densities were calculated, together with a measure of statistical confidence, otherwise a minimum density estimate is given.

3. Results

3.1 Results classification

The results from surveys where fish densities are obtained are now classified according to the SFCC Scottish national classification scheme which was derived using data from over 1600 Scottish sites covering the period 1997-2002, Godfrey (2005). This allows ART and the reader to interpret local fish populations in a Scotland-wide context. The national classes should be periodically revised as fish populations will inevitably change over time, even on a national scale.

Table 1: SFCC classification salmon fry and parr breakpoints

Salmon fry (no/100 m^2)	Classification	Salmon parr (no/100 m^2)
0.0	Absent	0.0
<4.7	E – Very poor	<2.6
4.7 -<10.3	D - Poor	2.6 -<5.1
10.3 - <20.3	C - Moderate	5.1 - <9.1
20.3 - <42.1	B - Good	9.1 - <15.8
>42.1	A - Excellent	>15.8

Table 2: SFCC classification trout fry and parr density breakpoints

Trout fry (no/100 m^2)	Classification	Trout parr (no/100 m^2)
0.0	Absent	0.0
<2.5	E – Very poor	<1.6
2.5 -<5.3	D - Poor	1.6 -<3.1
5.3 - <12.4	C - Moderate	3.1 - <5.6
12.4 - <30.3	B - Good	5.6 - <10.4
>30.3	A - Excellent	>10.4

3.2 Electrofishing survey limitations

Electrofishing is a common means of obtaining data on fish populations (SEERAD, 2007). The electrofishing techniques used by ART are specifically designed for assessing juvenile salmonid populations therefore fish from other groups may not be quantified effectively.

The survey sites chosen were selected to be representative of the general habitat type present within each sub-catchment and to include a range of flow and substrate types. If the site selected is representative of the local habitat the survey should provide a robust estimate of local fish populations. However, it is possible that if fish populations are low or have a clumped distribution, the survey data may not sample the full fish population in that area.

It is considered impossible to prove the absence of a fish species by electrofishing, therefore, whilst the failure to capture fish at a site may indicate that the population is absent, it cannot be assumed that they are not present elsewhere in the watercourse. For the purposes of this report and the classifications **Tables 1** and **2**, where a fish species has not been recorded at an electrofishing site, they will be classified as absent.

Depletion sampling, where fish are removed from a site in a series of successive electrofishing runs, are used to provide an estimate of the total fish population present. The rate of decline in each run and the total number of fish captured are used to estimate fish stocks. However, if fish numbers are low (less than 40 per site) the confidence limits will be wide and the depletion estimates will be unreliable (Schnute, 1983). In instances where absolute densities cannot be calculated, the 1-run minimum density will be provided.

3.3 Fish survey

Survey sites were based on the layout of the proposed site infrastructure.

These surveys are designed to assess the likely effects of any potential pollution, either point source or diffuse, which may occur during the construction of infrastructure. This baseline data confirms which species are present and the density per unit area of those species. Should densities remain at a similar level to the previous year at the control site but reduce at those sites that could be potentially impacted by the construction and remedial works when surveys are repeated, then this may indicate that the works had a negative impact on the watercourses present within the construction works area. Details of the 2024 electrofishing sites are shown in **Table 3** below, and indicated on **Figure 4**.

Table 3: Details of the electrofishing survey sites selected

Site code	Purpose	Location	Survey Date	Grid ref (Easting)	Grid ref (Northing)
ACW20	Baseline monitoring	Water of Coyle	02/09/24	248016	611086
ACW19	Baseline monitoring	Water of Coyle	02/09/24	2481178	612284
ACWUNB4	Baseline monitoring	Shield Burn	02/09/24	247341	612224
ACWHF2	Baseline monitoring	Hawford Burn	06/09/24	246587	612568
ACWUNB3	Baseline monitoring	Unnamed Burn	14/10/24	246457	614325
ACWD2	Baseline monitoring	Drumbowie Burn	14/10/24	248377	615182
ABWUNB1	Baseline monitoring	Unnamed tributary of Burnock Water	09/09/24	251625	615742
ABWUNB2	Baseline monitoring	Watson Burn (outwith Proposed Development boundary)	25/10/24	252699	617468

The Water of Coyle is the first major tributary of the River Ayr and enters the mainstem 500 m upstream of Tarholm Bridge near Annbank. The lower reaches of the Water of Coyle are accessible to migratory trout and salmon. At Sundrum there is a large waterfall that prevents upstream migration for trout and salmon although there is anecdotal evidence of juveniles having been caught by anglers upstream of the falls, indicating that occasional salmon and trout may ascend the falls and migrate upstream. The falls at Sundrum are natural but have had concrete poured over them to raise the height; this was part of a lade system in previous years. Nowadays this modification is redundant and is due to be removed.

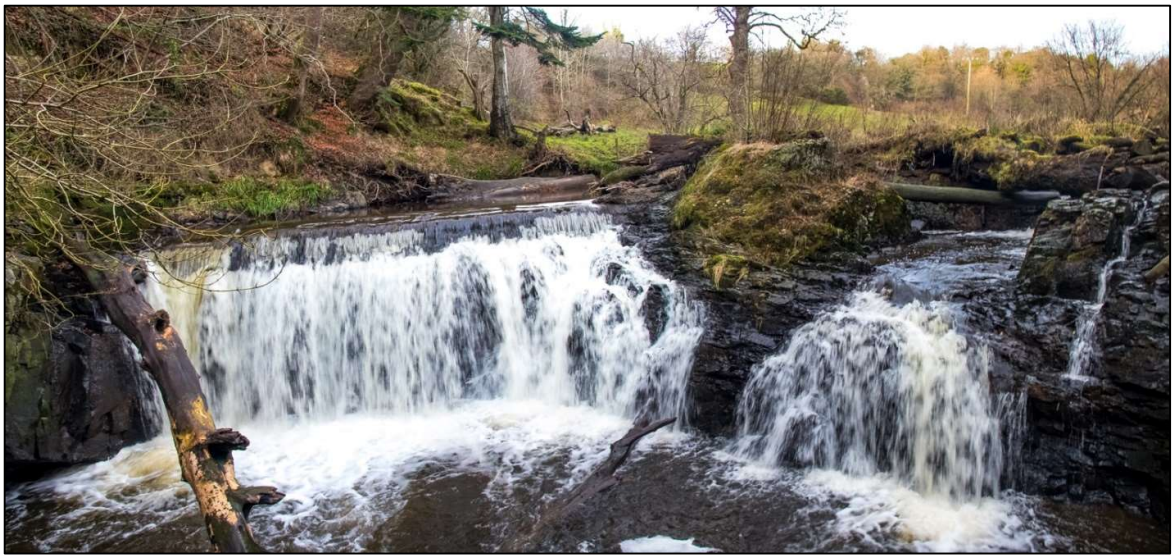

Figure 2: Ness Linn on the Water of Coyle.

The Burnock Water is the first major tributary of the Lugar Water. The Lugar Water joins the River Ayr near Mauchline. The lower reaches of the Burnock are accessible to migratory trout and salmon. There is a large rock weir that prevents most upstream migration although there are occasional anecdotal reports of salmon parr upstream of the weir and ART biologists have recorded a single salmon parr upstream of the weir. The weir isn't natural and was built to feed a lade system at Burnock Mill. As the Mill is now defunct there is no requirement for the weir and there are plans for this to be removed which will allow migratory trout and salmon to access the upper reaches of the burn and the tributaries that feed the catchment.

All surveys were completed in low-medium water level conditions during daylight hours.

Figure 3: Burnock Mill Weir in a high flow.

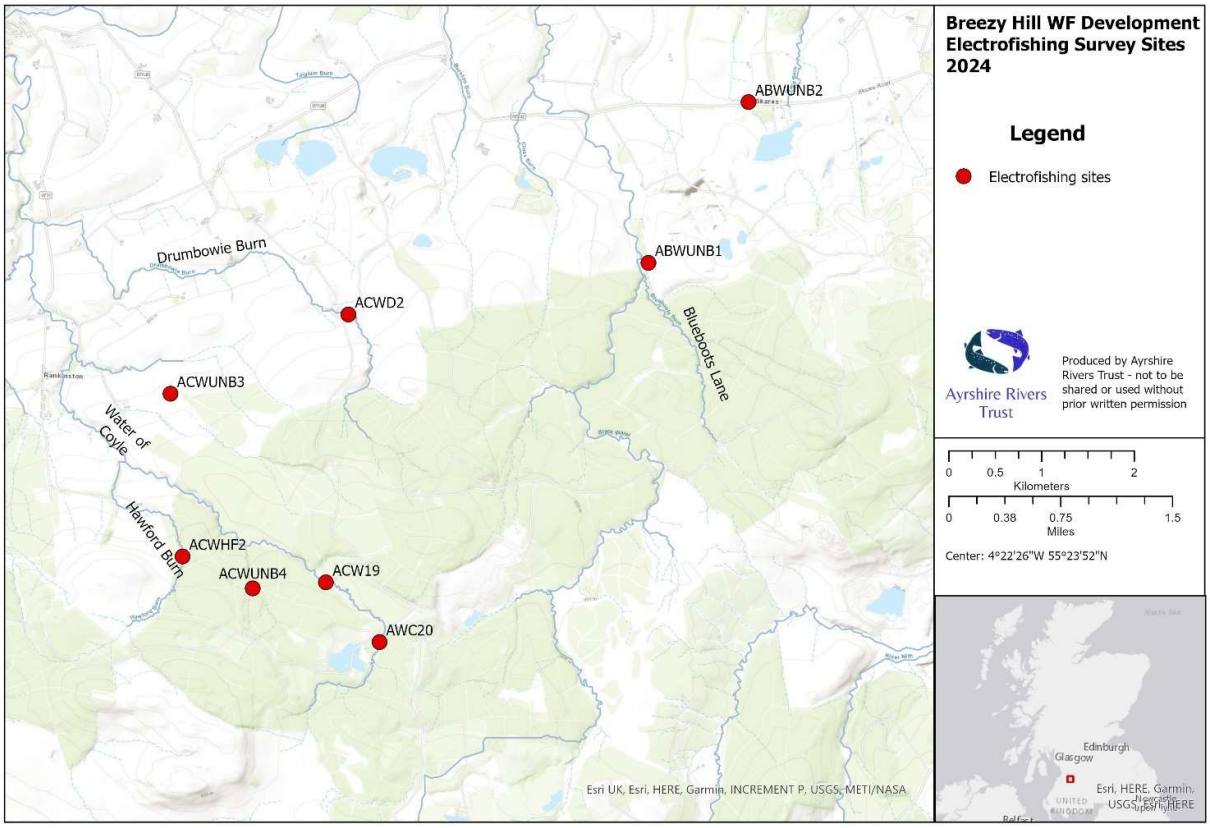

Figure 4: Catchment overview with the electrofishing sites shown.

Table 4: Results from the 2024 electrofishing survey. Where available, calculations of absolute densities are given, along with confidence limits, otherwise minimum densities are supplied.

*Codes for salmon and trout 0+ = fry (less than one year old), 1++ = parr (one-year older fish and older)

**Codes for other species are, E = Eels, M = Minnow, SL=Stoneloach, SB = 3 spined stickleback numbers in brackets indicate number category for each species. # *Minimum density (per 100 m^2) estimates*

Site code	Watercourse	Date	Fish densities (Number/100 m^2)				Other fish species**
			Salmon*		Trout*		
			0+	1++	0+	1++	
ACW20	Water of Coyle	02/09/2024	0	0	0	0	None
ACW19	Water of Coyle	02/09/2024	0	0	6.4#	1.1#	None
ACWUNB4	Shield Burn	02/09/2024	0	0	0	0	None
ACWHF2	Hawford Burn	06/09/2024	0	0	4.78#	1.2#	None
ACWUNB3	Unnamed Burn	14/10/2024	0	0	44.2 (+/-0.4)	0	None
ACWD2	Drumbowie Burn	14/10/2024	0	0	12.9#	0	SL (1-10), M(1-10)
ABWUNB1	Unnamed Burn	05/09/2024	0	0	4.1#	0	None
ABWUNB2	Watson Burn	25/10/2024	0	0	0	0	None

Site ACW20 is the furthest upstream (closest to the Proposed Development) sampling site on the Water of Coyle. There were no salmon or trout recorded during the survey.

Site ACW19 is located further downstream on the Water of Coyle. No salmon were recorded at this site, but trout were present with a moderate number of fry and a very poor number of parr being recorded.

Site ACWUNB4 is located on the Shield Burn, a small tributary of the Water of Coyle. There were no fish recorded here.

Site ACWHF2 is located on the Hawford Burn, a small tributary of the Water of Coyle. There were no salmon recorded but trout were found to be present in low numbers, with a poor density of fry and a very poor density of parr recorded.

Site ACWUNB3 is an unnamed burn feeding into the Water of Coyle. No salmon were recorded and there were no trout parr found, however there were excellent numbers of trout fry recorded.

Site ACWD2 is located on the Drumbowie Burn, which goes on to feed the Water of Coyle. There were no salmon recorded and no trout parr, however there was a good density of trout fry recorded during the survey.

Site ABWUNB1 is a small tributary which ultimately flows to the Burnock Water and then to the Lugar Water. No salmon fry or parr and no trout parr were recorded, however a low number (poor density) of trout fry were recorded.

Site ABWUNB2 is on the Watson Burn and located at the Skares Bridge. It flows into the Lugar Water. No fish were recorded and the site was heavily silted due to cattle having access to the burn.

4. Discussion

These surveys highlight the importance of small burns (many of which are under two meters in width) for the recruitment of juvenile fish and will help serve as baseline data against which future monitoring studies can be compared, however, we do suggest that two years of baseline surveys are preferable as fish populations naturally fluctuate and can make the interpretation of a single years data difficult.

Despite the absence of Atlantic salmon in these surveys, we would like to highlight that salmon are listed as a European species of importance under the EC Habitats & Species Directive, in addition to the extensive UK legislation intended to protect the species (Hendry and Cragg-Hine, 2003). The IUCN red list of threatened species reclassified Atlantic salmon as endangered in Great Britain (December 2023), previously salmon were designated as being 'least concern'. Given the conservation status of these fish and the historical and current potential of these watercourses as productive juvenile salmon areas of the River Ayr, it is important to monitor the impact that this development may have on the habitats utilised by this species. All the watercourses within this study feed salmon spawning and juvenile development areas that are susceptible to impacts from diffuse and point source pollution, and every effort must be taken to ensure that there is no impact on water quality or habitat.

The upper reaches of the Water of Coyle showed no trout at the furthest upstream site (ACW20) but did show low numbers of both trout fry and trout parr further downstream (ACW19). Both sites on the Water of Coyle had suitable habitat for fry, with predominantly pebble and cobble substrates and relatively shallow water. With the future removal of the barrier at Sundrum in mind, this should therefore be viewed as potential spawning territory, despite the low – moderate recordings made at the survey sites.

ACW19 had no fish at all despite being relatively close to ACW20, which had both trout fry and parr. One possible reason for this is the culvert located in between the sites. This culvert is very long and dark which may discourage adult fish from moving up it.

The Water of Coyle is also heavily influenced by historic mining in the area. As seen on the site map (**Figure 4**), sites ACW20 and ACW19 are extremely close to a man-made pond that was created within the last 20 years. Historic satellite imagery shows this current pond previously being an area of forestry and then an open cast mine. It is therefore possible that mining water is leaching into the Water of Coyle from this source and affecting the watercourse. Conductivity readings at site ACW20 were 200 µS/cm which is unnaturally high for the headwaters of a watercourse.

The Shield Burn feeds into the upper reaches of the Water of Coyle. Despite recording no fish at the survey site (ACWUNB4), the fish habitat was good, with ample cover provided by the undercut and draped banks and a substrate predominantly composed of pebble and cobble that is ideally suited for salmon and trout fry.

The Hawford Burn also feeds into the Water of Coyle. At this burn there were low numbers of both trout fry and trout parr recorded, though as only two of the eight sites recorded trout parr presence, this is comparatively good. There is excellent tree cover and shading at this site, with an approximately 30 m buffer of broadleaf woodland surrounding the glen and fencing to keep livestock and animals out.

The unnamed burn that flows into Water of Coyle was surveyed at site ACWUNB3. The site is located outside of the current forestry area and is surrounded by rough pasture farmland. This was the most productive site in terms of trout fry numbers, with an 'excellent' number of fry recorded. Despite a lack of tree cover, the predominantly cobble and pebble substrate combined with the varied water flow type creates 'excellent' fry habitat.

The Drumbowie Burn is a tributary of the Water of Coyle. The survey site (ACWD2) is located outside of the forestry site in an area of rough pasture farmland. A good population of trout fry were recorded here, despite a lack of tree

cover and slight silting from a culvert. Fry were comparatively small when compared to neighbouring catchments. This would suggest that this watercourse is resource poor and overwinter survival may be impacted as a result.

The two remaining survey sites both flow into the Lugar Water. Site ABWUNB1 had to be moved due to access issues and is located on a tributary of the Burnock Water. This burn has been previously moved due to open cast mining and forestry and this was evident on arrival as the burn flows through an artificially straightened and deeply incised channel. There were high levels of erosion at this site and parts of the riverbank had collapsed into the burn. However, the substrate provided good fry habitat for the size of the burn and willow trees further upstream provide shade and shelter for adult fish. Therefore, and despite the historic modification of the burn, there were trout fry present, though the numbers were poor.

The final survey site was on the Watson Burn, a tributary of the Lugar, and located outside of the development boundary. This burn has been historically straightened and the survey site (ABWUNB2) was in a livestock grazing field with a resulting high organic and silt content in the watercourse. The watercourse also had lots of rubble in it and the surrounding area only had a few trees in it, so cover was very poor. No fish were recorded at this site.

While the Blueboots Burn itself was not surveyed for this report, historic electrofishing data from previous ART surveys shows both trout fry and parr as present in the burn. Furthermore, the downstream Burnock Water not only shows previous records of trout but also of European eel, which are a protected species. As the Blueboots Burn feeds into the Burnock Water, any works conducted that affect this watercourse should be done with caution.

While parr numbers were mostly absent from the eight survey sites, this is likely due to the width and overall size of the watercourses. Typically, the habitat within the survey sites favoured fry which was reflected in the results. Parr will be present elsewhere in the catchment area utilising deeper water and areas with better instream cover.

Fish populations are naturally variable over time and local populations such as the brown trout in these study watercourses are susceptible to natural environmental events. This can be due to factors such as barriers downstream which can constrain upstream migration creating a genetic bottleneck. For example, extreme flows may cause redd washout and it therefore can take a population several years to fully recover due to a lack of fish immigrating into the inaccessible section of the watercourse.

Electrofishing surveys have demonstrated that although these watercourses are small and are in areas predominately forested with commercial conifer plantations, they are nevertheless important juvenile trout nursery areas for the River Ayr and its tributaries. Furthermore, the presence of juvenile trout in those watercourses that drain the proposed development construction area indicate water quality and habitat is capable of supporting trout and should be protected. As previously noted, seven survey sites were also all upstream of barriers to upstream salmon migration (the Ness Linn Falls and the Burnock Mill Weir) and therefore should be viewed as being potential salmon spawning areas once the barrier is removed. This is discussed further in **Chapter 6** (**EIA Report, Volume 3**)

5. Recommendations

Without appropriate mitigation and pollution control measures, the development has the potential to adversely affect the fish habitat and fish populations within and downstream of the proposed development. It is recommended that good practice guidelines are strictly adhered to for each component of the development (forestry felling, infrastructure construction, new water crossings, water management, post construction restoration). The recommendations provided below are not exhaustive and it is the responsibility of the developer and contractor to ensure that they comply with legislation (Appendix C) and conditions provided by the planning authority, SEPA, NatureScot and any other statutory consultee.

- All instream work must be scheduled to avoid the migration, spawning, egg incubation and emergence period of salmonids. The exclusion period is October to May (SEPA).
- Forestry operations should follow 'UKFS Guidelines on Forests and Water' which describe how to comply with the requirements to protect the water environment.
- Detailed supplementary guidance can be found in Forestry and Land Scotland's (formerly Forestry Commission) 'Managing Forest operations to protect the water environment' (2019) document.
- Following approval by the planning authority, an ecological baseline should be established which includes aquatic fish, macroinvertebrate and water quality sampling to comply with Marine Directorate (formerly Marine Scotland) (2021) 'Monitoring watercourses in relation to onshore wind farm development: generic monitoring programme'.
- Immediately prior to any new water crossings being installed or upgraded, fish rescues should be scheduled in and conducted regardless of the size of watercourse.
- New or upgraded water crossings should follow SEPA's 'Engineering in the water environment: good practice guide. River Crossings' guidance and ensure that new water crossings do not become an obstacle to fish migration. Perched outfalls, insufficient water depth and/or high-water velocities through culverts are common problems that can cause habitat fragmentation. This is of particular importance for resident brown trout who carry out local migrations to access different habitats for refuge and as part of their life cycle.
- Visual assessments of the watercourses (downstream of onsite works) should be carried out daily to ensure pollution is not entering watercourse. Silt protection measures should be regularly checked for their effectiveness, especially following periods of heavy rain. Recent pollution incidents in Ayrshire have been caused due to irregular checks and failed silt protection following heavy rain.
- Water management plans should consider all potential avenues for pollution to enter watercourses and have appropriate pollution controls and silt mitigation measures in place prior to commencement of works. This should include measures to address run-off from new road surfaces.
- Any biodiversity offsetting should consider riparian tree planting in the River Ayr catchment. Ayrshire Rivers Trust can provide recommendations on appropriate locations.
- Biosecurity protocols should be established to ensure that Invasive non-native species (INNS) are not introduced. Monthly checks during the growing season of Japanese knotweed, giant hogweed, Himalayan balsam and American skunk cabbage should be carried out within the development.
- Ecological monitoring needs take into consideration the cumulative impact of this development with any nearby developments (e.g. North Kyle Windfarm). The Blueboots Burn, Burnock Water and Water of Coyle all drain both development sites and could be adversely affected should either or both developments fail to adequately protect these watercourses.

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7. Appendix

7.1 Appendix A – Site Photographs

Figure 5: Site ACW20 – Looking downstream

Figure 6: Long culvert located between sites AWC20 and AWC19

Figure 7: Site ACW20 – Example of typical substrate deposits

Figure 8: Site ACW19 – Looking upstream

Figure 9: Site ACW19 – Looking upstream towards the top limit of the survey site

Figure 10: Site ACW19 – Resident trout 'parr'


Figure 11: Site ACWUNB4 – Looking downstream to the downstream end of the site


Figure 12: Site ACWUNB4 – Looking downstream from the upstream end of the site


Figure 13: Site ACWHF2 – Looking upstream from the downstream end of the site

Figure 14: Site IASB4 – Trout 'fry' (top) and 'parr' (bottom) recorded during survey

Figure 15: Site ACWUNB3 – Looking downstream towards a small livestock bridge crossing the watercourse

Figure 16: Site ACWUNB3 – Trout 'fry' and 'parr' recorded during survey


Figure 17: Site ACWUNB3 – Looking upstream – Coarse substrate typical of the site


Figure 18: Site ACWD2 – Looking upstream from downstream end of site


Figure 19: Site ACWD2 – Small tributary enters the Drumbowie burn just below the survey site

Figure 20: Site ACWD2 – Immediately downstream of site, two culverts under a road crossing

Figure 21: Site ACWD2 – Trout fry recorded during survey. Under sized fry for time of year

Figure 22: Site ABWUNB1 – Small unnamed tributary of the Burnock Water – Looking upstream


Figure 23: Site ABWUNB1 – Historic straightening of channel likely due to forestry activities


Figure 24: Site ABWUNB1 – Single trout recorded during survey


Figure 25: Site ABWUNB1 – Substrate present within unnamed burn

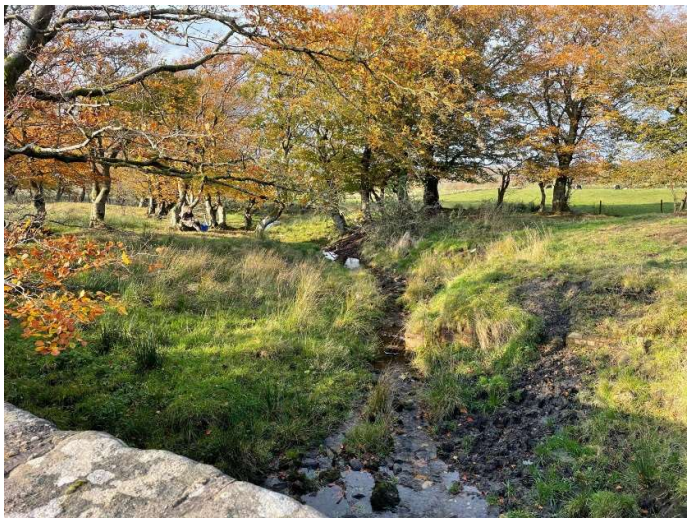

Figure 26: ABWUNB2 – Looking downstream from the upstream end of the site

Figure 27: Site ABWUNB2 – Cattle poaching adversely affecting quality and condition of the site

Figure 28: Site ABWUNB2 - Looking upstream of survey site - Watson burn significantly reduces in size

Figure 29: Site ABWUNB2 - Upstream limit of site - Bridge apron likely acts as a barrier under low and medium flow conditions

7.2 Appendix B – Obstacles to Fish Migration

Details relating to the known obstacles to fish migration within the relevant sub-catchments are presented within Table 5. This information has been sourced from the Scottish Environment Protection Agency (SEPA) 'Obstacles to Fish migration' database and ART's barrier database). Photos provided are owned by ART and not to be used, shared, replicated or sold without prior written permission from ART. (https://marine.gov.scot/maps/1746#:~:text=Obstacles%20to%20Fish%20Passage%20(SEPA%20WMS)%20contains%20information%20on%20the,to%20fish%20under%20certain%20conditions.)

Table 5: Known obstacles to fish migration within the Annick Water sub-catchment area

Barrier Type	Location	Grid ref (Easting)	Grid ref (Northing)	Permeability	Notes
Bridge apron	Watson burn - B7046 Road bridge	252714	617445	Passable under certain conditions. No fish pass is present.	Immediately upstream of survey site ABWUNB2
Rock weir (Burnock weir)	Burnock Water	250539	617485	Upstream migration of adult salmon and trout is significantly impacted. No fish pass present.	Has been identified as a high priority for easement by SEPA
Culvert	Water of Coyle	248770	611759	Length of culvert may act as a barrier to trout migration	
Natural waterfall with concrete cap (Ness Linn)	Water of Coyle	241085	621441	A complete barrier to upstream fish migration. No fish pass is present. Salmon, trout, eels and lamprey affected.	Natural waterfall with modifications that has increased the vertical height of the falls. Has been identified as a high priority for easement/removal by SEPA
Natural waterfall	Water of Coyle	246748	613144	Passability unknown	
Natural waterfall	Water of Coyle	245810	613756	Passability unknown	
Natural waterfall	Hawford burn	245831	613224	A complete barrier to upstream fish migration. Salmon, trout, eels and lamprey affected.	

7.3 Appendix C – Freshwater Species Information and Distribution

ART conducted a desk-based review of the known presence/absence and distribution of the following fish species within the relevant sub-catchments: Atlantic salmon, Brown/Sea trout, European eel, Brook lamprey, River Lamprey and Sea Lamprey.

This data has been drawn from ART's electrofishing database, and pre-existing habitat and fisheries reports. **Data provided here is for the Breezy Hill development only and not to be used, shared, replicated or sold without prior written permission from Ayrshire Rivers Trust.**

3. *Atlantic salmon*

Salmon populations in Great Britain have declined between 30-50 % since 2005 and are expected to fall 50-80 % between 2010-2015 (IUCN Red List, 2023). As such Atlantic salmon in Great Britian were reassessed by the IUCN Red List of Threatened Species in December 2023 and reclassified from 'Least Concern' to 'Endangered'.
The management of existing and emerging pressures to improve the conservation status of wild salmon has been identified as a priority action under Objective 4 of the Scottish Biodiversity Delivery Plan 2024-2030. Encompassed within this plan is the Scottish Wild Salmon Strategy which sets out the vision, objectives and priority themes for action to protect and support the recovery of wild Atlantic salmon populations in Scotland (Marine Directorate, 2022). Atlantic salmon is protected under Annex II (animal and plant species of community interest whose conservation requires the designation of special areas of conservation) and Annex V (animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures) of the Habitats Directive.
Atlantic salmon is protected under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.
Under section 23, sub-section 1, Paragraph (a) it is an offence to:

- Knowingly take, injure or destroy young salmon (alevin, fry, parr or smolt) and spawning beds

Under section 23, sub-section 2, paragraph (a) and (b) it is an offence to:

- Knowingly injure or disturb any salmon spawn; or
- Disturb any spawning bed or any bank or shallow in which the spawn of salmon may be.

Under section 23, sub-section 3 it is an offence to:

- Obstruct or impede salmon in their passage to any such bed, bank or shallow during the annual close time

The salmon and sea trout populations of the River Ayr fall under the management and control of the River Ayr District Salmon Fishery Board (RADSFB), who have statutory powers in relation to all matters and activities surrounding and affecting salmonids within their catchment. Their powers and responsibilities as a District Salmon Fishery Board are provided within the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.

4. *Brown/Sea trout*

While Brown trout and Sea trout are the same species, they differ in their life history strategies. Brown trout complete their entire life cycle in freshwater whereas sea trout are anadromous and migrate to sea to mature. Due to this difference, the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 applies to each form differently. The sea trout populations across Scotland have declined dramatically, with rod catches in 2023 being the fifth lowest since 1952 (Marine Directorate, 2024). Trout is a UK Biodiversity Action Plan priority fish species.

5. *European eel*

European eels are classified as 'Critically endangered' by the IUCN Red List of Threatened Species following significant declines since the early 1980s. In the North Sea, the recruitment index series for glass eels (a life stage

of European eels) fell to 0.5 % in 2023 and 1.1 % in 2024 of the recruitment between 1960-1979 (ICES, 2024). Similarly, the data series for yellow eels (a life stage of European eels) showed a recruitment level of just 11.4 % in 2023.

In European Union waters, European eel stocks, fisheries and pressures are regulated under Council Regulation (EC) No 1100/2007, which sets out measures for the recovery of European eels (ICES, 2024). In Scotland, fishing for eels is prohibited without license under the Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008. European eels are a UK Biodiversity Action Plan priority fish species.

6. *Lamprey Species – Brook Lamprey, River Lamprey & Sea Lamprey*

All three species of Lamprey native to the UK are protected under Annex II of the EU Habitats Directive, Appendix III of the Bern Convention and are a UK Biodiversity Action Plan priority fish species. Brook Lamprey are afforded further protection under Annex V of the EU Habitats Directive. All three species migrate within the freshwater environment however Brook Lamprey are the only species to complete their lifecycle entirely in freshwater. Both River lamprey and Sea Lamprey spend a portion of their lifecycle at sea before returning to freshwater to spawn. All three species spawn in spring to early summer.

Table 6: Fish species presence and distribution information

Watercourse reach	Fish Species Presence / Absence					
	Atlantic salmon	Brown trout	European eel	Brook Lamprey	River Lamprey	Lamprey spp (undefined)
Water of Coyle (downstream of Ness Linn barrier)	Present	Present	Present	Absent	Absent	Absent
Water of Coyle (upstream of Ness Linn barrier)	Absent	Present	Absent	Present (Littlemill)	Absent	Absent
Water of Coyle (within development boundary)	Absent	Present	Absent	Absent	Absent	Absent
Shield burn	Absent	Absent	Absent	Absent	Absent	Absent
Hawford burn (upstream of natural waterfall)	Absent	Present	Absent	Absent	Absent	Absent
Drumbowie burn	Absent	Present	Absent	Absent	Absent	Absent
Watson burn	Absent	Absent	Absent	Absent	Absent	Absent

There are no historic records held by ART for the Sheild burn or Watson burn and therefore the results are based on surveys conducted as part of this EIA.

It is considered impossible to capture all fish present within a site therefore, whilst the failure to capture fish at a site may indicate that the population is absent, it cannot be assumed that they are not present elsewhere in the watercourse or catchment. For the purposes of this section of the report 'absent' means that ART have no records of this fish species within the specified section. The potential for future populations should be considered when developing an environmental management plan as the removal or easement of the Ness Linn barrier and the Burnock weir may allow Atlantic salmon, trout, European eels and lampreys to migration upstream.

7. Freshwater pearl mussel (*Margaritifera margaritifera*)

Freshwater pearl mussels are categorised as 'Critically Endangered' on the IUCN Red List of Threatened Species in Europe. No country in Europe has a 'favourable conservation' status for Freshwater pearl mussel.
Freshwater pearl mussels are protected under Schedule 5 of the Wildlife & Countryside Acy 1981 (as amended). It is an offence to intentionally or recklessly:

- kill, injure or take any wild animal included in Schedule 5 - Freshwater Pearl Mussels
- possess or control, sell, offer for sale or transport for the purpose of sale any live or dead animal included in Schedule 5 or any part of, or anything derived from, such an animal
- damage or destroy any structure or place which any wild animal specified in Schedule 5 uses for shelter or protection
- disturbs any such animal while it is occupying a structure or place which it uses for shelter or protection.

There is no evidence of Freshwater pearl mussels being present within the River Ayr catchment.

7.4 Appendix D – Invasive Non-Native Species Distribution

Table 7: INNS Distribution

Species	Location	Grid ref (Easting)	Grid ref (Northing)	Notes
Himalayan balsam	Broomhill Fishery	243460	614809	The Himalayan balsam on the Water of Coyle was brought into the catchment during the construction of Broomhill Fishery (between Drongan and Patna). The Kerse Burn is a tributary of the Water of Coyle and the balsam is present down the Kerse Burn and Water of Coyle. The River Ayr also has balsam which comes down the Lugar Valley from Dumfries House. There is no active control strategy currently in place on the Water of Coyle.
Giant hogweed	Drongan, East Ayrshire	244485	618257	Giant hogweed (GHW) is present on the Water of Coyle and emanates from the Taiglum Burn and enters the Coyle at Drongan. ART control the GHW across the entire Ayr catchment annually.
Japanese knotweed	Drongan, East Ayrshire	243722	617851	Japanese knotweed is present on the Water of Coyle across the catchment at a low density. There is no active control strategy currently in place.

INNS are considered one of the biggest threats to biodiversity worldwide after habitat destruction. INNS are species that have been introduced and can cause harm or damage to local biodiversity, natural environments, our health, the economy or the way we live. Invasive non-native plant species commonly found in Scotland are Japanese knotweed (*Fallopoa japonica*), Giant hogweed (*Heracleum mantegazzianum*), Himalayan balsam (*Impatiens glandulifer*) and American skunk cabbage (*Lysichiton americanus*).

Under the Wildlife and Countryside Act 1981, section 14 it is an offence to:

- plant, or otherwise causes to grown, any plant in the wild at a place out with its native range.

Under the Wildlife and Countryside Act native range is defined as 'the locality to which the animal or plant of that type is indigenous and does not refer to any locality to which that type of animal or plant has been imported (whether intentionally or otherwise) by any person'.

ART carry out INNS control and management of all four species and as such are experienced in identifying and surveying for these species. During the electrofishing and fish habitat surveys, our staff made additional notes on the presence/absence of INNS.

Within the development boundary, no INNS were recorded along the riparian zone of the any surveyed watercourse, nor were any recorded on the access tracks used within the development boundary.

7.5 Appendix E – General Habitat Survey Definitions

Habitat and site data collection follows the SFCC team leader electrofishing general method guidelines. Relevant components and definitions from the Electrofishing Team Leader manual have been provided below.
Left and Right bank are determined when facing downstream.

Instream Cover

Instream cover for salmonids aged one year or older:
None – No over – Stream bed composed entirely of fine uniform particles (silt, sand, gravel, pebbles) or continuous hard surfaces (bedrock or concrete).
Poor – Little cover - Stream bed composed predominantly of fine to medium particles (gravel, pebbles and cobbles), little or no cover from aquatic vegetation.
Moderate – Moderate cover - Stream composed of a mix of particle sizes (gravel to boulders) and/or with some areas of Good cover substrate (pebbles, cobbles and boulders), which may or may not have some aquatic vegetation cover.
Good – Good cover - Stream composed mainly of medium to large size substrate (pebbles, cobbles and boulders) and/or with some aquatic vegetation cover.
Excellent – Excellent cover - Stream composed predominantly of large size substrate (cobbles and boulders) and/or with extensive aquatic vegetation cover.

Substrate type

Table 8: SFCC Substrate type definitions

High Organic	Very fine organic matter, include peat substrate and thick leaf cover on stream bed in this category.
Silt	Fine, sticky, mostly inorganic material, individual particles invisible.
Sand	Fine, inorganic particles, <2mm diameter, individual particles visible
Gravel	2-16mm diameter
Pebble	16-64mm diameter
Cobble	64-256mm diameter
Boulder	>256mm diameter
Bedrock	Continuous rock surface
Obscured	Anything that can obscure the riverbed and cannot be moved for inspection. Include areas that cannot be seen because of water depth or colour

Compacted substrates

Compaction of the substrate is evaluated by digging into the riverbed using your foot. If it freely moves, it is considered uncompacted. A compacted substrate is when the riverbed is cemented by fine particles and very difficult or impossible to move with your foot.

Flow types

Table 9: SFCC Flow type definitions

SM	Still marginal	<10cm deep, water still or eddying, no waves form behind a 2-3 cm wide rule placed in the current, smooth surface appearance, water flow is silent.
DP	Deep pool	≥30 cm deep, water flow slow, eddying, no waves form behind a 2-3 cm wide rule placed in the current, smooth surface appearance, water flow is silent.
SP	Shallow pool	<30cm deep, water flow slow, eddying, no waves form behind a 2-3 cm wide rule placed in the current, smooth surface appearance, water flow is silent
DG	Deep glide	≥30 cm deep, water flow moderate/fast; waves form behind a 2-3 cm wide rule placed in the current, smooth surface appearance, water flow is silent.
SG	Shallow glide	<30 cm deep, water flow moderate/fast; waves form behind a 2-3 cm wide rule is placed in the current, smooth surface appearance, water flow is silent.
RU	Run	Water flow fast, unbroken standing waves at surface; water flow is silent.
RI	Riffle	Water flow fast, broken standing waves at surface; water flow is audible.
TO	Torrent	White water, water flow noisy, difficult to distinguish substrate, associated with steep gradient.

Scottish Fisheries Coordination Centre (2024). Training Manual, Team Leader Electrofishing

Table 10: Walkover fish habitat survey definitions (Hendry & Cragg-Hine, 1997)

Habitat type	Characteristics and definition
Salmonid spawning habitat including silted spawning habitat	Stable gravel up to 30 cm in depth that is not compacted or contains excessive silts. Substrate size of 80 mm to 100 mm is optimal. Silted spawning habitats are compacted and contain excess silt preventing easy movement of substrate.
Fry (0+) habitat	Shallow (<20 cm) fast flowing water associated with riffle-run habitats with substrates dominated by gravel (16-64 mm) and cobble (64-256 mm).
Parr (1+) habitat	Deeper (20-40 cm) fast flowing water associated with riffle-run habitats with substrates composed of gravel (16-64 mm), cobble (64-256 mm) and boulder (>256 mm).
Mixed juvenile salmonid habitat	A mix of fry and parr habitat, suited to both age classes in combination. Deeper, faster, larger substrate areas used by parr, and the shallower, slower, smaller substrate areas used by fry.
Glides	Smooth laminar flow with little surface turbulence and generally greater than 30 cm in depth.
Pools	No perceptible flow and usually greater than 1 m deep.
Flow constriction	Where physical features provide a narrowing of the channel resulting in increased velocity and depth (often combined with a localised increase in gradient and bedrock substrates).
Obstacles to fish migration	A structure or item identified as a potential obstruction to fish passage at certain water heights (e.g. waterfalls, weirs, bridge aprons, shallow braided river sections preventing upstream migration during low flows, culverts).
Lamprey spawning habitat	Stable gravel up to 30 cm deep that is not compacted or contains excessive silt. Moderate to fast flowing water.
Ammocoete habitat	Areas of stable silt and sand (>20 cm depth), shallow with low velocity and organic detritus (twigs, leaf litter) present. SFCC (2007).