Dalradian Gold Limited

Ecological Monitoring Report 2025

River and Fish Habitat Assessment of the Owenkillew River, Owenreagh River and Tributaries for the Curraghinalt Gold Project, County Tyrone, Northern Ireland

2488365

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RSK GENERAL NOTES

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EXECUTIVE SUMMARY

1. RSK Biocensus was appointed by Dalradian Gold Limited (DGL) to carry out a river habitat and fish habitat assessment on the Owenkillew River, Owenreagh River and associated tributaries for the Curraghinalt Gold Project, County Tyrone, Northern Ireland.

2. In relation to the Attagh Burn, Glenealy Burn and Unnamed Burn then the river habitat and fish habitat assessment was carried out during 2024 and details of which are available within the RSK Biocensus 'small burn surveys' report[8].

3. This report provides an update to the previous river habitat and fish habitat assessments carried out by SLR Consulting in 2015 and 2020.

4. The 2025 fish and river habitat assessment was carried out during September and October and follows the River Habitat Survey (RHS) and Life Cycle Unit Method (LCUM) survey methodology.

5. The RHS and LCUM surveys were carried out during suitable weather and river flow conditions during September and October 2025, and observations were made in channel.

6. Localised changes in relation to depth and width from previous surveys were observed but these are most likely due to the seasonal changes in river flow conditions at the time of survey.

7. The survey results from the 2025 survey indicate that the river and fish habitat has not changed significantly in respect to the sites surveyed within the Owenkillew and Owenreagh catchments.

1 INTRODUCTION

1.1 Purpose of this report

1.1.1 RSK Biocensus was appointed by Dalradian Gold Limited to carry out a fish and river habitat assessment of the Owenkillew River, Owenreagh River and tributaries for the Curraghinalt Gold Project.

1.1.2 The aim of this report is to update the previous SLR survey carried out in 2020 and updated in 2021[1] in order to provide a more recent assessment of river habitat and fish habitat status for both the Owenkillew and Owenreagh Rivers.

1.1.3 The 2025 survey was also to ensure that baseline conditions established via previous river habitat and fish habitat surveys remain valid, and that the survey will provide up to date information until such time planning permission is granted and where applications for wildlife licences may be necessary to support the gold mine development.

1.1.4 Furthermore, the Chartered Institute of Ecology and Environmental Management (CIEEM) has provided detailed advice in relation to the time taken between commencing the scoping or design and submitting a planning application (which can be several years) along with the age of ecological data[2].

1.2 Proposed development

1.2.1 Dalradian Gold Limited (DGL) is proposing to develop and operate an underground gold mine as part of the Curraghinalt Project in County Tyrone.

1.3 Landscape context

1.3.1 The application site is situated on the southern edge of the Sperrin Mountains. The local landscape is dominated by the river valleys of the Owenkillew and Owenreagh catchments which are separated by the broad ridge of Crocknamoghil that rises to a height of 335m above sea level. The valley slopes are deeply undulated and dissected by numerous tributary burns, typically with stony substrates and lined with trees.

[1] SLR Consulting (2021). River and Fish Habitat Assessment of the Owenkillew River, Owenreagh River and Tributaries for the Curraghinalt Gold Project, County Tyrone, Northern Ireland.

[2] https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf

2 METHODOLOGY

2.1 Introduction

2.1.1 The fish and river habitat assessment of the Owenkillew River, Owenreagh River and Tributaries was carried out during September and October 2025 and baseline environmental data were collated through field surveys in accordance with current standard methodologies and published good practice[3].

2.1.2 The location of the Owenkillew River, Owenreagh River is shown within Figure 1.

2.1.3 All equipment and PPE used as part of the field surveys were disinfected prior to use with Virkon™ to prevent the spread of Non-Native Species (NNS), fish diseases and/or parasites[4].

2.1.4 This report draws upon previously collated survey data carried out by SLR in 2020[5] and 2015[6] along with a previous fisheries assessment (commissioned by SLR) carried out by Paul Johnston Associates[7]. Further habitat surveys were carried out on three previously un-surveyed small burns in 2024[8] and these are shown in Table 1 along with the previous studies.

2.1.5 The 2015 and 2012 surveys formed part of the Environmental Baseline Study (EBS) to inform DGL's exploratory works on the Curraghinalt gold deposits and was supplemented through further field surveys along sections of river not previously surveyed.

Table 1 Summary of Previous Fish and River Habitat Studies

Assessment / Survey	Owenkillew catchment	Owenreagh catchment
Fish Habitat Assessment carried out in 2012 by Paul Johnston Associates	13 km length of river from Glenhull Bridge to Gortin	9.9 km length of river from Greencastle to the confluence with the Owenkillew
River Habitat Survey and Fish Habitat Assessment carried out in 2015 by SLR Consulting	9.5 km length of river from Glenhull Bridge to the confluence of the Owenreagh	7.8 km length of river from Cashel Bridge to the confluence with the Owenkillew
River Habitat Survey and Fish Habitat Assessment carried out in 2020 by SLR Consulting	17.2 km length of river from Carnaransy Road to B48 Culvacullion Road Bridge	3.9km downstream of Cashel Bridge to the confluence with the Owenkillew.
River Habitat Survey and Fish Habitat Assessment carried out in 2024 by RSK Biocensus	280m of the Attagh Burn upstream of the confluence with the Owenkillew River. 230m of the Glenealy Burn upstream of the confluence with the Owenkillew River	250m of the Unnamed burn above the Owenreagh confluence.

[3] CIEEM (2024). Guidelines for ecological impact assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine

[4] https://www.nonnativespecies.org/biosecurity/

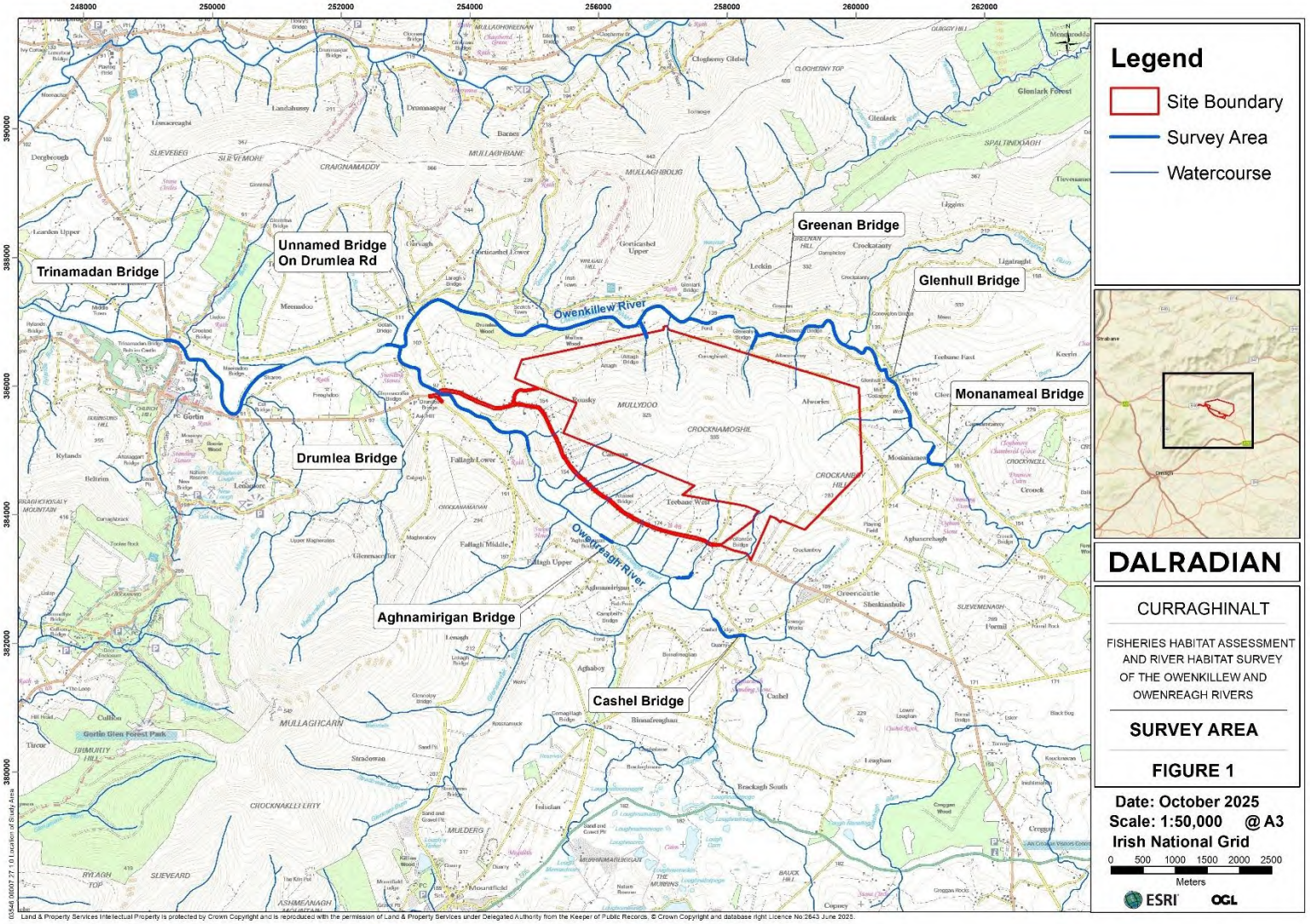
[5] SLR Consulting (2021). River and Fish Habitat Assessment of the Owenkillew River, Owenreagh River and Tributaries for the Curraghinalt Gold Project, County Tyrone, Northern Ireland.

[6] SLR Consulting (2016). Fisheries Habitat Assessment for the Owenkillew and Owenreagh Rivers

[7] Paul Johnson Associates (2014). DGL Curraghinalt Gold Project: Fisheries Baseline Assessment.

[8] RSK Biocensus (2024). Fish Habitat and River Habitat Assessment of the Attagh Burn, Glenealy Burn and Unnamed Burn

Figure 1 Map showing the extent of the watercourses surveyed in the study area



2.2 Fish Habitat Field Survey Methodology

2.2.1 The survey uses the Life Cycle Unit Method (LCUM) which was developed in Northern Ireland by the Department of Agriculture in Northern Ireland (now the Department of Agriculture, Environment and Rural Affairs (DAERA)) to assess the river habitat requirements of salmonid fish (salmon and trout)[9]. LCUM surveys are undertaken by identifying suitable reaches of river which are then sub-divided into 100 m sections. Each LCUM section is walked by a surveyor (either upstream or downstream), from either the left or right bank though this is dependent upon safe/suitable access.

2.2.2 The LCUM assessment is used for all salmonid fish life stages (including spawning) and the fish habitat assessment is graded in relation to substrate size/type, flow and water depth. LCUM also provides a broad habitat type map which can cover large areas of rivers. This methodology is currently used by the Loughs Agency and the optimal field survey period is during low river flow conditions which enables visual habitat observation[10].

2.2.3 The LCUM assessment requires that the surveyor identifies a selected number of categorised salmonid requirements. These include:

- holding areas for adults;
- nursery areas for juvenile fish; and
- spawning locations.

2.2.4 A summary of the habitat requirements for salmonid used in the assessment is summarised in Table 2 and the criteria used in the classification of salmonid habitat in Table 3.

Table 2 Habitats for Different Life Stages of Salmon and Trout

Life Stage	Salmon Requirements	Trout Requirements
Eggs / Alevins	Golf ball to tennis ball sized substrate.	Dependent upon fish size: Golf-ball to tennis-ball substrate for large brown trout. Pea to golf-ball sized material for smaller trout
Fry (<1 year old)	Golf ball to tennis ball sized substrate, fast flowing, shallow broken water.	Golf ball to tennis ball sized substrate, slow to medium flowing water, often concentrated in stream margins
Parr (≥1 year old)	Tennis ball to football sized substrate, fast flowing broken water, often slightly deeper than fry	Variety of substrate, undercut banks, tree roots, big rocks, deeper slower water.
Smolts	Unknown	Unknown
Adults	Deep pools	Deeper areas sustained by flow but not too fast, undercut banks, tree roots, instream vegetation and large rocks

[9] Kennedy GJA (1984). E*valuation of Techniques for Classifying Habitats for Juvenile Salmon* (*Salmo salar* L.). Proceedings of the Atlantic Salmon Trust Workshop on Stock Enhancement.
[10] Department of Agriculture Northern Ireland (2005). *The Evaluation of Habitat for Salmon and Trout*. Advisory Leaflet No. 1. Fisheries Division, Stormont, Belfast.

Table 3 Criteria for Salmonid Habitat Classification

Habitat	Grade	Criteria
Nursery	1	Water depth 50-250mm. 0.5 – 8% gradient. Stable cobble/boulder substrate with at least 70% coverage of riverbed.
	2	Marginally outside Grade1 in a single criterion.
	3	Well outside Grade1 in one or more criteria.
Spawning	1	Flow 300-600 mm/sec. Water depth 150-700mm. Gravel size 30-80mm with at least 70% coverage of riverbed. Gravel depth 50-150mm. Near holding area. Nursery area downstream.
	2 - 3	Failing as for spawning habitat above.
Holding	1	Minimum depth 1m. Adequate instream/bankside cover. Stable banks and substrate. Spawning area nearby.
	2 - 3	Failing as for holding habitat above;
Unclassified		Unsuitable for fish – not classifiable as any of the 3 habitat types Typically, shallow, silty substrate or 100% bedrock, channelized section or other engineered channel of low morphological status.

2.3 River Habitat Survey (RHS)

2.3.1 Standard RHS methodology was used to undertake and complete the field work[11]. A RHS requires that each length of river is divided into 500m sections of river channel. Each RHS section is walked by a surveyor (either upstream or downstream), from either the left or right bank though this is dependent upon safe/suitable access.

2.3.2 For every 500m section a comprehensive range of physical information and other data is gathered covering the following:

- Bank - composition (material), artificial modifications and other (natural) features (such as side and point bars and eroding cliffs);
- Channel - composition of substrate (if visible), modifications and other features (including exposed boulders, mid-channel bars, islands etc.);
- Flow types – including number of riffles and pools per 500m section;
- Land use - extending to 50m distance of bank top;
- Presence of specific artificial features (culverts, weirs, dams, bridges and fords etc.);

[11] Environment Agency (2003). River Habitat Survey in Britain and Ireland – Field Survey Guidance Manual: 2003 version. Environment Agency, Scottish Environmental Protection Agency (SEPA) & Environment and Heritage Service (NI).

- Presence and extent of alders (diseased or otherwise);
- Presence and degree of shading;
- Presence and extent of woody debris;
- Vegetation – banktop / bankface and in-channel vegetation types;
- Vegetation – invasive species e.g. Himalayan balsam (*Impatiens glandulifera*);
- Channel dimensions;
- Evidence of recent management; and
- Observations of riverine birds, mammals and other associated species.

2.3.3 It should be noted that the RHS methodology records many of the features that support fish species within a river and RHS notes features that may displace fish from a section or reach of river and even features that may influence fish spawning. However, the RHS methodology does not record the level of detail required in order to describe the suitability of a section of river for a particular fish species or family of fish and their particular habitat requirements e.g. salmonid (salmon and trout), lamprey species, coarse fish, European eel and minor fish species.

2.3.4 Both the fish habitat assessment and the river habitat survey was undertaken by [redacted] who is an Associate Director of ecology at RSK Biocensus. He has over 30 years' experience in carrying out aquatic surveys and monitoring and is highly skilled in carrying out fish habitat and river habitat surveys. He is a member of:

- The Chartered Institute of Water and Environmental Management (CIWEM) - Chartered Water Environment Manager (C.WEM);
- The Royal Society of Biology (MRSB) - Chartered Biologist (C. Biol);
- Freshwater Biological Association (FBA); and
- The Institute of Fisheries Management (IFM).

2.4 Survey limitations

2.4.1 The LCUM and RHS site visits were planned to be carried out during suitable weather conditions i.e. when water levels are sufficiently low to allow full access to the channels and banks of the watercourses surveyed.

2.4.2 RSK Biocensus had access to the riverbanks and channel where DGL had agreed access with landowners. This meant that some access restrictions applied to both the Owenkillew and Owenreagh River along with the Pollanroe Burn.

2.4.3 Due to site access restrictions at some locations then it was not possible to complete full 500m sections of river channel for the RHS survey.

3 RESULTS

3.1 Owenkillew River

3.1.1 The fisheries habitat assessment is shown in Figure 2, Figure 3 and Figure 4.

3.1.2 The baseline 2015 RHS sites are presented in Table 4 and the 2020 survey sites are presented in Table 5.

3.1.3 Access to some of the 2015 RHS sections was restricted during 2025 and it was not possible to survey sites OK RHS3 and the start of site OK RHS4 due to landowner permissions.

3.1.4 Access to some of the 2020 RHS sections was also restricted during 2025 and it was not possible to survey sites WP 60 and WP 61 due to landowner permissions.

3.1.5 Additional site access was obtained in 2025 which included two new RHS waypoint locations (WP 112 and WP Juvenile Fish Site 1). This has resulted in having a connecting reach between the upstream extent of the 2020 survey (WP 76) and the 2015 baseline site of OK RHS1.

Figure 2 Owenkillew LCUM fish habitat assessment (Part 1)

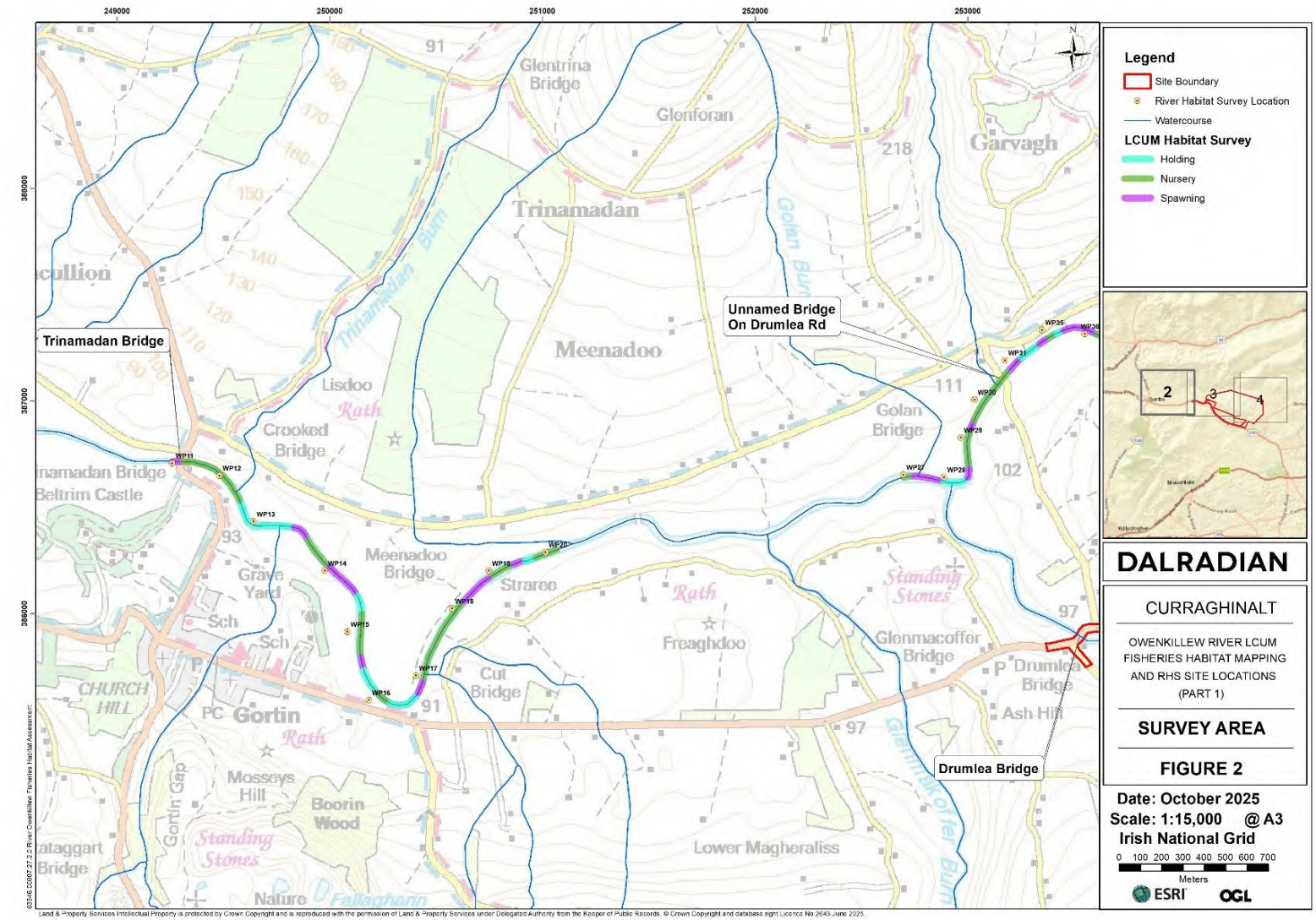


Figure 3 Owenkillew LCUM fish habitat assessment (Part 2)

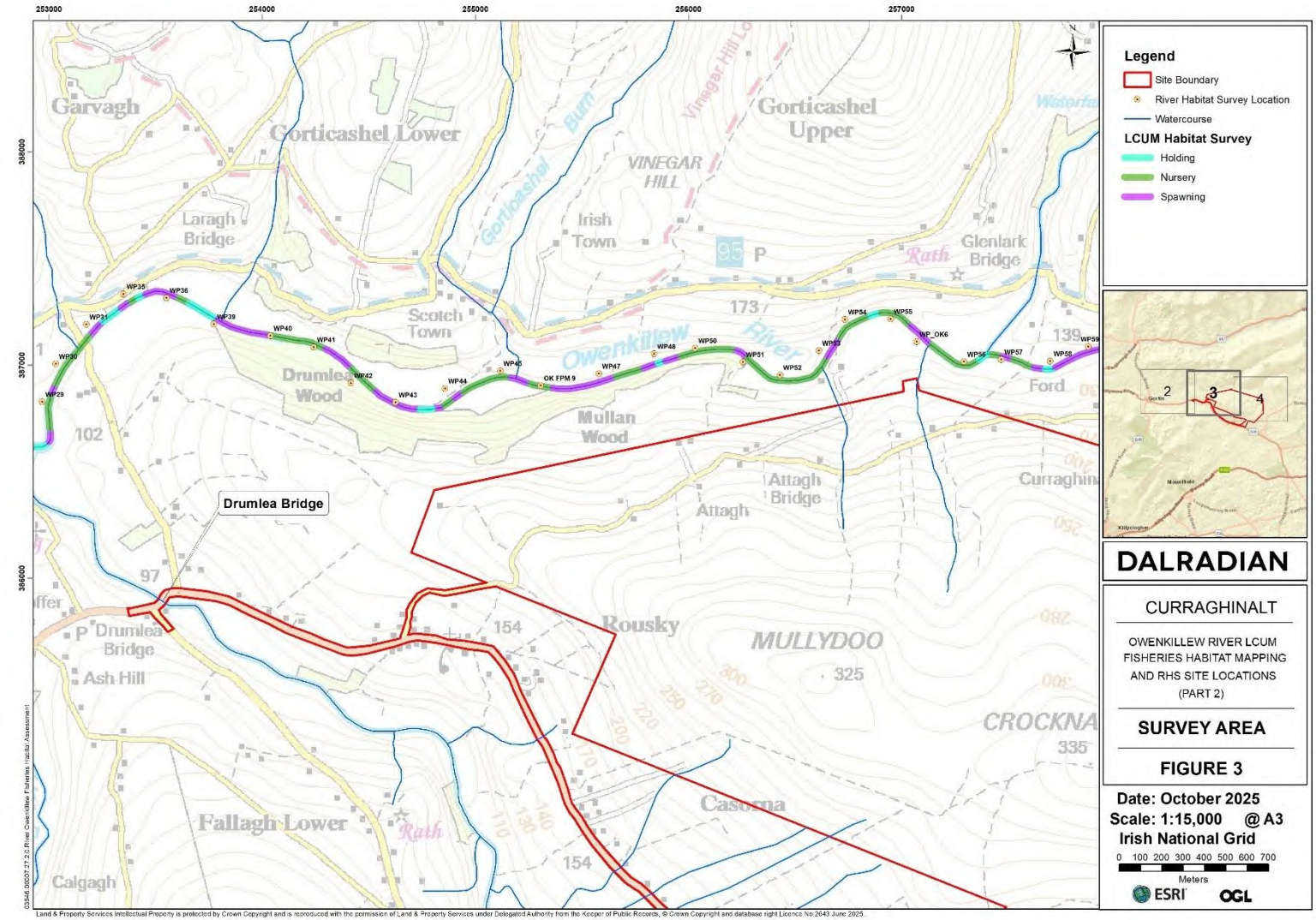


Figure 4 Owenkillew LCUM fish habitat assessment (Part 3)

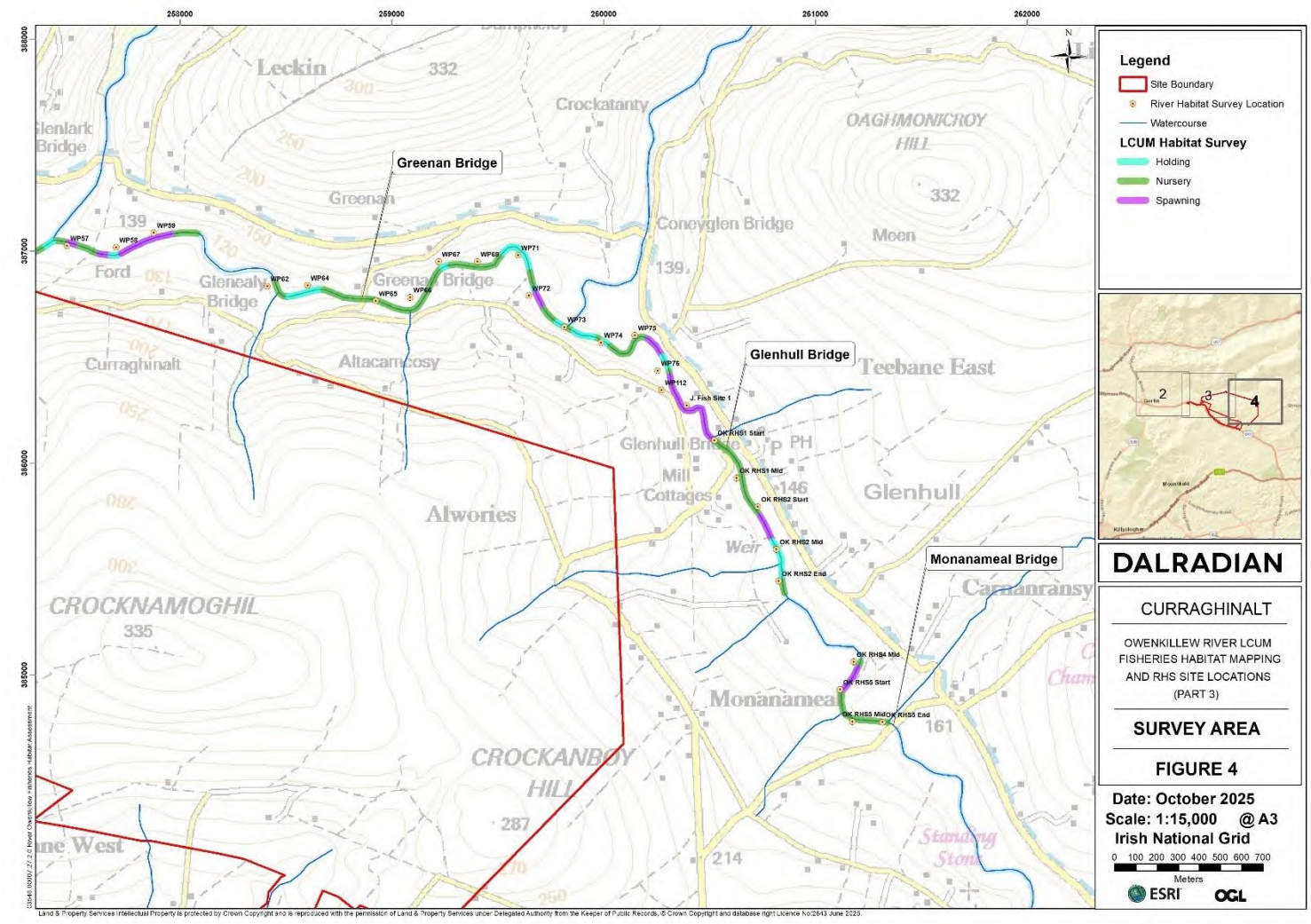


Table 4 Update of '2015 baseline RHS sites' and fish habitat descriptions

Owenkillew Survey Waypoints, Site Photographs and Site Description	
OK RHS1 Start Looking Upstream 	**OK RHS1 Start** Looking Downstream 
Glenhull Bridge: average channel width at time of survey was 7.2 m, dominant flow-type was rippled and the average depth was 45cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland with some broad-leafed woodland. Glenhull bridge is not single span and that the central buttress has a major impact upon the river channel. A large gravel mid channel bar has developed upstream of the bridge since 2020 and the overall fisheries assessment was that this site is a nursery, with areas of good spawning habitat observed along with suitable holding areas for adult fish.	
OK RHS1 Middle Looking Upstream 	**OK RHS1** Middle Looking Downstream 
OK RHS1 Middle: average channel width at time of survey was 7.2 m, dominant flow-type was rippled and the average depth was 20cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site was a nursery though areas of good spawning habitat was also observed within this section.	

Owenkillew Survey Waypoints, Site Photographs and Site Description

OK RHS1 End Looking Upstream

OK RHS1 End Looking Downstream

OK RHS2 Start: average channel width at time of survey was 7.1 m, dominant flow-type was 'rippled' and the average depth was 20cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site was a nursery area though good spawning habitat was also observed.

OK RHS2 Start Looking Upstream

OK RHS2 Start Looking Downstream

OK RHS2 Start: average channel width at time of survey was 7.1 m, dominant flow-type was 'rippled' and the average depth was 20cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site was a nursery area though good spawning habitat was also observed.

Owenkillew Survey Waypoints, Site Photographs and Site Description

OK RHS2 Mid Looking Upstream

OK RHS2 Mid Looking Downstream

OK RHS2 Mid: average channel width at time of survey was 13 m, dominant flow-type was smooth flow and the average depth was 100cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site was a glide proving 100% holding habitat within this section.

OK RHS2 End Looking Upstream

OK RHS2 End Looking Downstream

OK RHS2 End: average channel width at time of survey was 10.1 m, dominant flow-type was smooth and the average depth was 30cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site was a nursery area with spawning gravels noted within this reach.

Owenkillew Survey Waypoints, Site Photographs and Site Description

OK RHS4 Mid Looking Upstream

OK RHS4 Mid Looking Downstream

OK RHS4 Mid: average channel width at time of survey was 4.8m, dominant flow-type was unbroken wave and the average depth was 30cm. The banks were cobble/boulder/bare earth; vertical or undercut with a toe. A marginal cobble side-bar was present on the left-hand bank and the dominant channel substrate was cobble. The land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site is a nursery area area, though spawning substrate was noted and the deeper areas offered some holding habitat.

OK RHS4 End Looking Upstream

OK RHS4 End Looking Downstream

OK RHS4 End: average channel width at time of survey was 8.3 m, dominant flow-type was smooth and the average depth was 45cm. The banks were bare earth; vertical or undercut with a toe. Marginal cobble side-bar present.The dominant channel substrate was cobble along with areas of gravel and pebbles and the land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site is a spawning area, with deeper areas offering holding habitat.

Owenkillew Survey Waypoints, Site Photographs and Site Description

OK RHS5 Start Looking Upstream

OK RHS5 Start Looking Downstream

OK RHS5 Start: average channel width at time of survey was 8.3 m, dominant flow-type was smooth and the average depth was 45cm. The banks were bare earth; vertical or undercut with a toe. Marginal cobble side-bar present.The dominant channel substrate was cobble along with areas of gravel and pebbles and the land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site is a spawning area, with deeper areas offering holding habitat.

OK RHS5 Mid Looking Upstream

OK RHS5 Mid Looking Downstream

OK RHS5 Mid: average channel width at time of survey was 8.3 m, dominant flow-type was 'unbroken wave' and the average depth was 30cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland with some broad-leafed woodland. The overall fisheries assessment was that this site is a nursery area, with deeper areas offering holding habitat.

Owenkillew Survey Waypoints, Site Photographs and Site Description	
OK RHS5 End Looking Upstream 	**OK RHS5 End** Looking Downstream 
Monanmeal Bridge: average channel width at time of survey was 12.5 m, dominant flow-type was smooth flow and the average depth was 40cm. The banks were bare earth; vertical or undercut with a toe. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland with some broad-leafed woodland. Note that the bridge is not single span and that the central supports has an impact upon the channel. The overall fisheries assessment was that this site is a nursery area, though shallower spawning areas downstream of the bridge were observed along with deeper holding areas under the bridge.	

The following pages of this section of the report provide an assessment of the remaining sections of the Owenkillew River (where access was possible) extending downstream of the Glenhull Bridge to below the confluence with the Owenreagh River near Gortin (Table 5). These sites were previously surveyed via RHS and LCUM techniques in 2020.

Table 5 Owenkillew River RHS sites and fish habitat descriptions

Owenkillew Survey Waypoints, Site Photographs and Site Description	
WP11 Looking Upstream	**WP11** Looking Downstream
	
B48 Culvacullion Road Bridge: average channel width at time of survey was 19.4m, dominant flow-type was smooth flow. The average depth was 60cm, the banks were predominatly boulder/cobble and vertical or undercut with a toe and marginal side bars were noted within this section. The dominant channel substrate was boulder at the bridge though large areas of cobble/gravel/pebble mix were noted upstream. The land-use associated with the river was broad-leafed woodland. Note that the bridge is not single span and that the central buttress has a major impact upon the river channel. The overall fisheries assessment was that this site is a spawning area, though an area of good nursery habitat was observed along with suitable holding areas for adult fish.	
WP12 Looking Upstream	**WP12** Looking Downstream
	
WP12: average channel width at time of survey was 18.4m, dominant flow-type was broken standing wave. The average depth was 35cm and the banks were predominatly cobble and vertical or undercut. The dominant channel substrate was a cobble/gravel/pebble mix and the land-use associated with the river was broad-leafed woodland and improved grassland. The overall fisheries assessment was that this site is a nursery area, though areas of spawning and holding habitat were also noted.	

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP13 Looking Upstream

WP13 Looking Downstream

WP13: average channel width at time of survey was 15.1m, dominant flow-type was unbroken standing wave. The average depth was 50cm and the banks were predominatly cobble/gravel/sand and steep/vertical or undercut. The dominant channel substrate was a cobble though areas of gravel/pebble mix were noted. The land-use associated with the river was broad-leafed woodland and improved grassland. The overall fisheries assessment was that this site is a holding area, though the channel offered good nursery habitat and spawning areas for adult fish.

WP14 Looking Upstream

WP14 Looking Downstream

WP14: average channel width at time of survey was 20m, dominant flow-type was rippled and the average depth was 40cm. The banks were a mix of boulder/gravel/sand/earth and steep, vertical or undercut. The dominant channel substrate was a cobble and areas of gravel/pebble mix were noted. The land-use associated with the river was broad-leafed woodland and improved grassland. The overall fisheries assessment was that this site is a spawning area, though the channel also supported excellent nursery areas and limited holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP15 Looking Upstream

WP15 Looking Downstream

WP15: average channel width at time of survey was 18.5m, dominant flow-type was broken standing wave and the average depth was 25cm. The banks were predominatly boulder and steep/vertical or undercut and sidebars were noted within this section. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursey area, though small areas of spawning habitat were noted.

WP16 Looking Upstream

WP16 Looking Downstream

WP16: average channel width at time of survey was 14.5m, dominant flow-type was rippled. The average depth was 50cm and the banks were predominatly boulder or gravel/sand and vertical or undercut. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was broad-leafed woodland and improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported some spawning habitat and limited holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP17 Looking Upstream

WP17 Looking Downstream

WP17: average channel width at time of survey was 25.2m, dominant flow-type was unbroken standing wave. The average depth was 30cm and the banks were predominatly earth, boulder or cobble and steep, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported some spawning habitat and limited holding areas for adult fish.

WP18 Looking Upstream

WP18 Looking Downstream

WP18: average channel width at time of survey was 18.8m, dominant flow-type was unbroken standing wave. The average depth was 45cm and the banks were a boulder/gravel/sand mix and vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported good spawning habitat and provided limited holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP19 Looking Upstream

WP19 Looking Downstream

WP19: average channel width at time of survey was 19.1m, dominant flow-type was smooth. The average depth was 35cm and the banks were boulder or a gravel/sand mix and vertical or undercut. A marginal sidebar was present on the left bank and the dominant channel substrate was cobble. The land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported good spawning habitat and provided limited holding areas for adult fish.

WP20 Looking Upstream

WP20 Looking Downstream

WP20: average channel width at time of survey was 21.4m and the dominant flow-type was smooth. The average depth was 25cm and the banks were a gravel/sand/earth mix and steep, vertical or undercut. A marginal sidebar was present on the left and right banks and the dominant channel substrate was gravel/pebble. The land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported good spawning habitat and provided limited holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP27 Looking Upstream

WP27 Looking Downstream

WP27: average channel width at time of survey was 18.1m, dominant flow-type was rippled. The average depth was 60cm and the banks were a cobble/gravel/sand mix and vertical or undercut. A marginal sidebar was present on the left bank and a large mid-channel bar was present at the time of survey. The dominant channel substrate was cobble/gravel/pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported good spawning habitat and also holding areas for adult fish.

WP28 Looking Upstream

WP28 Looking Downstream

WP28 Upstream of the confluence with the Owenreagh: average channel width at time of survey was 9.6m. Dominant flow-type was rippled and the average depth was 65cm and the banks were boulder and cobble, vertical or undercut. An extensive marginal sidebar was present on the right bank and and the dominant channel substrate was cobble. The land-use associated with the river was improved grassland and the overall fisheries assessment was that this site is a nursery area, though the channel also supported some spawning habitat and provided holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP29 Looking Upstream

WP29 Looking Downstream

WP29: average channel width at time of survey was 16.1m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder and cobble, vertical or undercut. A marginal sidebar was present on the left bank and and the dominant channel substrate was cobble. The land-use associated with the river was improved grassland and the overall fisheries assessment was that this site is a nursery area, though the channel also supported spawning habitat and some limited holding areas for adult fish.

WP30 Looking Upstream

WP30 Looking Downstream

WP30: average channel width at time of survey was 17.3m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder/cobble, vertical or undercut. A marginal sidebar was present on the right bank and and the dominant channel substrate was cobble. The land-use associated with the river was improved grassland and the overall fisheries assessment was that this site is a nursery area, though the channel also supported spawning habitat and the site also supported holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP31 Looking Upstream

WP31 Looking Downstream

WP31: average channel width at time of survey was 16.2m and dominant flow-type was unbroken standing wave. The average depth was 35cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is predominantly a spawning area though the channel also supported good nursery habitat. A minor ford was also present at this location.

WP35 Looking Upstream

WP35 Looking Downstream

WP35: average channel width at time of survey was 13.9m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were cobble/boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is predominantly a nursery area though the channel also supported good spawning habitat.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP36 Looking Upstream

WP36 Looking Downstream

WP36: average channel width at time of survey was 13.8m and dominant flow-type was unbroken standing wave. The average depth was 60cm and the banks were cobble/boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery and spawning area, and the site also supported holding areas for adult fish.

WP39 Looking Upstream

WP39 Looking Downstream

WP39: average channel width at time of survey was 14.2m and dominant flow-type was unbroken standing wave. The average depth was 40cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a nursery and spawning area, and the site also supported holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP40 Looking Upstream

WP40 Looking Downstream

WP40: average channel width at time of survey was 15.2m and dominant flow-type was unbroken standing wave. The average depth was 45cm and the banks were cobble/boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a nursery area, though spawning habitat was observed along with some holding areas for adult fish.

WP41 Looking Upstream

WP41 Looking Downstream

WP41: average channel width at time of survey was 12.5m and dominant flow-type was unbroken standing wave. The average depth was 60cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery/spawning area, though holding habitat was observed for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP42 Looking Upstream

WP42 Looking Downstream

WP42: Average channel width at time of survey was 16.2m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a nursery area, though excellent spawning habitat was observed.

WP43 Looking Upstream

WP43 Looking Downstream

WP43: Average channel width at time of survey was 10.5m and dominant flow-type was unbroken standing wave. The average depth was 45cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a spawning area, and excellent nursery habitat was also observed. An area of lamprey ammoceote habitat was also noted on the right hand bank upsream of this location.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP44 Looking Upstream

WP44 Looking Downstream

WP44: Average channel width at time of survey was 13.4m and dominant flow-type was unbroken standing wave. The average depth was 35cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area, though some localised spawning and holding habitat was also observed.

WP45 Looking Upstream

WP45 Looking Downstream

WP45: Average channel width at time of survey was 13.5m and dominant flow-type was unbroken standing wave. The average depth was 15cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a nursery area, though spawning and holding habitat was observed.

Owenkillew Survey Waypoints, Site Photographs and Site Description

OKFPM 9 Looking Upstream

OKFPM 9 Looking Downstream

OKFPM 9: This was identified as a potential FWPM area. Average channel width at time of survey was 12.3m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and broadleaf woodland. The overall fisheries assessment was that this site is a nursery area, though some spawning substrate was observed.

WP47 Looking Upstream

WP47 Looking Downstream

WP47: Average channel width at time of survey was 11.2m and dominant flow-type was unbroken standing wave. The average depth was 35cm and the banks were cobble/boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a spawning area and nursery habitat and holding habitat was observed on site.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP48 Looking Upstream

WP48 Looking Downstream

WP48: Average channel width at time of survey was 12.1m and dominant flow-type was unbroken standing wave. The average depth was 50cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture. The overall fisheries assessment was that this site is a holding area, though nursery and lamprey habitat was observed on site.

WP 50 Looking Upstream

WP 50 Looking Downstream

WP50: Average channel width at time of survey was 13.3m and dominant flow-type was unbroken standing wave. The average depth was 30cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and semi-natural coniferous woodland. The overall fisheries assessment was that this site is a nursery area, though spawning and holding habitat was observed on site. A minor ford was also noted upstream of the site.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 51 Looking Upstream

WP 51 Looking Downstream

WP51: Average channel width at time of survey was 12.1m and dominant flow-type was unbroken standing wave. The average depth was 40cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area, though excellent spawning was observed on site and futher downstream.

WP 52 Looking Upstream

WP 52 Looking Downstream

WP52: Average channel width at time of survey was 14.2m and dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a spawning and nursery area.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 53 Looking Upstream

WP 53 Looking Downstream

WP53: Average channel width at time of survey was 15.2m and dominant flow-type was broken standing wave. The average depth was 25cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a spawning area, and good nursery habitat was observed on site.

WP 54 Looking Upstream

WP 54 Looking Downstream

WP54: Average channel width at time of survey was 13m and dominant flow-type was broken standing wave. The average depth was 70cm and the banks were boulder/ cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area, though a significant proportion of the site was considered to be suitable as holding areas for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 55 Looking Upstream

WP 55 Looking Downstream

WP55: Average channel width at time of survey was 14.8m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a nursery area, though a proportion of the site was considered to be suitable spawning habitat.

WP OK6 Looking Upstream

WP OK6 Looking Downstream

WP OK6: This waypoint is the location of where the Curraghinalt Burn flows into the Owenkillew River and is the river invertebrate sample station as described within the Biolological Water Quality Monitoring Report. Average channel width at time of survey was 10.5m and dominant flow-type was unbroken standing wave. The average depth was 40cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a spawning area, though a significant proportion of the site was considered to be nursery area.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 56 Looking Upstream

WP 56 Looking Downstream

WP56: Average channel width at time of survey was 11.9m and dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area though a proportion of the site was considered to be suitable for spawning and as a holding area for adult fish.

WP 57 Looking Upstream

WP 57 Looking Downstream

WP57: Average channel width at time of survey was 11.7m and dominant flow-type was rippled. The average depth was 50cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area though a proportion of the site was considered to be suitable for spawning and as a holding area for adult fish.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 58 Looking Upstream

WP 58 Looking Downstream

WP58: Average channel width at time of survey was 11.2m and dominant flow-type was rippled. The average depth was 25cm and the bank material was cobble/gravel/pebble and the bank profile was vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area though a proportion of the site was considered to be suitable for spawning and good spawning habitat was noted circa 50m downstream.

WP 59 Looking Upstream

WP 59 Looking Downstream

WP59: Average channel width at time of survey was 12.1m and dominant flow-type was unbroken wave. The average depth was 35cm and the banks were cobble/earth, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area though a proportion of the site was considered to be suitable as a holding area. Suitable lamprey ammoceote habitat was noted on the left-hand bank at this site.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 62 Looking Upstream

WP 62 Looking Downstream

WP62: Average channel width at time of survey was 15.5m and dominant flow-type was unbroken wave. The average depth was 20cm and the banks were cobble/earth, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and rough pasture. The overall fisheries assessment was that this site is a nursery area, though a proportion of the site was considered to be suitable as a holding area. Suitable lamprey ammoceote habitat was noted on the left-hand bank at this site.

WP 64 Looking Upstream

WP 64 Looking Downstream

WP64: Average channel width at time of survey was 10.5m and dominant flow-type was smooth. The average depth was 60cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a holding area.

Owenkillew Survey Waypoints, Site Photographs and Site Description

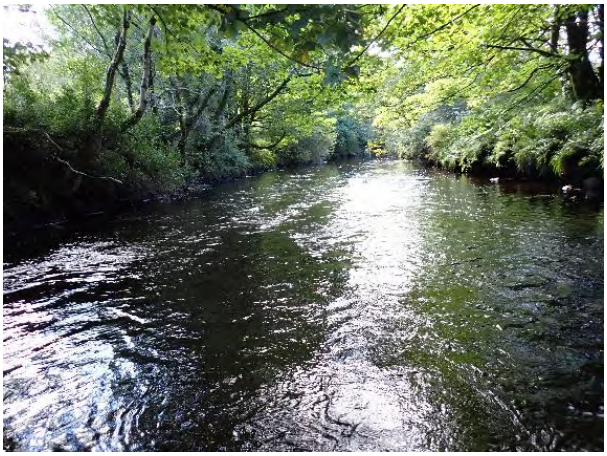
WP 65 Looking Upstream

WP 65 Looking Downstream

WP65: Average channel width at time of survey was 12.5m and dominant flow-type was was unbroken standing wave. The average depth was 20cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a nursery area.

WP 66 Looking Upstream

WP 66 Looking Downstream



WP66: Average channel width at time of survey was 10.5m and dominant flow-type was rippled. The average depth was 25cm and the banks were boulder/earth, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area though a third of the site was considered to be suitable as an adult holding area and areas of spawning gravels were present.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 67 Looking Upstream

WP 67 Looking Downstream

WP67: Average channel width at time of survey was 9.7m and dominant flow-type was smooth flow. The average depth was 55cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland and broadleaved woodland. The overall fisheries assessment was that this site is a holding area though at least a third of the site was considered to be suitable as a nursery area.

WP 68 Looking Upstream

WP 68 Looking Downstream

WP68: Average channel width at time of survey was 9.2m and dominant flow-type was unbroken wave. The average depth was 35cm and the banks were boulder/cobble, steep/vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery and spawning area.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 71 Looking Upstream

WP 71 Looking Downstream

WP71: Average channel width at time of survey was 11.8m and dominant flow-type was smooth flow. The average depth was 40cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a holding area, though at least a third of the channel was considered to be a nursery area.

WP 72 Looking Upstream

WP 72 Looking Downstream

WP72: Average channel width at time of survey was 8.5m and dominant flow-type was unbroken standing wave. The average depth was 50cm and the banks were cobble/boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a spawning area with a significant proportion of the site offering nursery habitat. It should be noted that 50m upstream of this site that a boulder weir spanned the channel.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 73 Looking Upstream

WP 73 Looking Downstream

WP73: Average channel width at time of survey was 7.6m and dominant flow-type was smooth. The average depth was 35cm and the banks were cobble/boulder, steep/vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though it should be noted that spawning substrate was also observed.

WP 74 Looking Upstream

WP 74 Looking Downstream

WP74: Average channel width at time of survey was 8.2m and dominant flow-type was smooth flow. The average depth was 80cm and the banks were earth, steep/vertical or undercut. The dominant channel substrate was gravel/pebble and the land-use associated with the river was improved grassland and broad leafed woodland. The overall fisheries assessment was that this site is a holding area though nursery habitat was present within the margins of the river. Circa 100m upstream of this site marginal silt beds were observed which could provide suitable habitat for lamprey ammocetes.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 75 Looking Upstream

WP 75 Looking Downstream

WP75: Average channel width at time of survey was 6.1m and dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were cobble/earth, steep/vertical or undercut. The dominant channel substrate was gravel pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery and spawning area and an excellent stand of water-crowfoot was present (see above right photo).

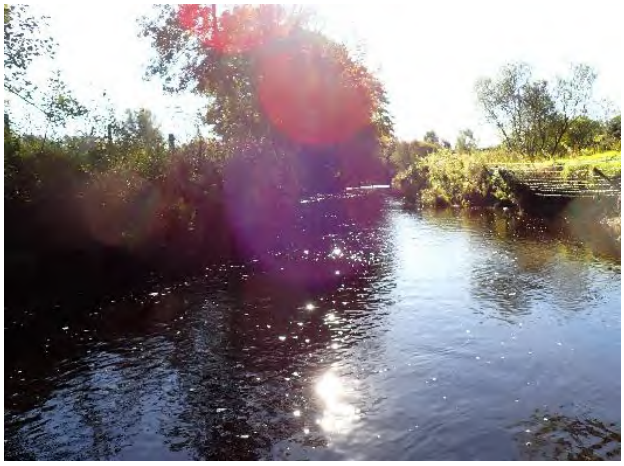
WP 76 Looking Upstream

WP 76 Looking Downstream

WP76: Average channel width at time of survey was 10.2m and dominant flow-type was smooth flow. The average depth was 80cm and the banks were cobble, steep/vertical or undercut. The dominant channel substrate was gravel/pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a holding area and some suitable spawning and nursery areas were also noted.

Owenkillew Survey Waypoints, Site Photographs and Site Description

WP 112 Looking Upstream



WP 112 Looking Downstream

WP112: Average channel width at time of survey was 8.4m and dominant flow-type was smooth flow. The average depth was 35cm and the banks were cobble, steep or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area though small areas of spawning gravels were noted within this section of river.

Juvenile Fish Site 1 Looking Upstream

Juvenile Fish Site 1 Looking Downstream

Juvenile Fish Site 1: Average channel width at time of survey was 10.2m and dominant flow-type was smooth flow. The average depth was 25cm and the banks were cobble, steep or undercut. The dominant channel substrate was gravel/pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a spawning area and suitable nursery area.

Owenkillew Survey Waypoints, Site Photographs and Site Description	
OK RHS1 Looking Upstream	**OK RHS 1** Looking Downstream
	
Glenhull Bridge: average channel width at time of survey was 16.5m, dominant flow-type was rippled and the average depth was 15cm. The banks were reinforced at the bridgebut downstream they were earth; vertical or undercut with a toe. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland with some broad-leafed woodland. Note that the bridge is not single span and that the central buttress has a major impact upon the river channel. The overall fisheries assessment was that this site is a nursery area, however an area of good spawning habitat was also observed.	

3.2 Owenkillew River: Minor Watercourses and Unnamed Burns

3.2.1 The following section provides an assessment of the small burns and watercourses encountered during the Owenkillew RHS and LCUM survey. The majority of these watercourses are perched above the water level of the Owenkillew River and offer limited habitat for salmonid fish species (Table 6).

Table 6 Owenkillew River: Minor Watercourses and Unnamed Burns

Watercourse Name, Site Photographs and Site Description	
Trinamaden Burn	**Trinamaden Burn**
	
Trinamaden Burn: Site downstream of Curraghinalt Burn (circa 300m upstream of B48 Culvacullion Road Bridge). Small watercourse which offers modest juvenile salmonid fish habitat. At confluence with the Owenkillew the bed substrate is mobile and consists of small gravel and fine sand. Upstream a small pool was observed which would be suitable for small brown trout. No suitable salmonid spawning areas observed and unsuitable for FWPM.	
Gortin Burn	**Gortin Burn**
	
Site downstream of Curraghinalt Burn and this small watercourse which offers modest juvenile salmonid fish habitat. At confluence with the Owenkillew the bed substrate is mobile and consists of small gravel and fine sand. Upstream small bolders were present which would be suitable refuge for small brown trout. No suitable salmonid spawning areas observed and unsuitable for FWPM.	

Watercourse Name, Site Photographs and Site Description	
Attagh Burn	**Attagh Burn**
	
Site downstream of Curraghinalt Burn. Small watercourse which offererd limited habitat for fish at time of survey. At confluence with the Owenkillew the bed of the unnamed burn is 'perched' above the Owenkillew, resulting in no open access to fish at time of survey. Substrate consists of bolder, cobble, gravel, and fine sand. Due to the linear nature of the channel and lack of upstream connectivity from the Owenkillew River then it is also considered to be unsuitable for fish during higher flow conditions. No suitable salmonid spawning areas observed and unsuitable for FWPM.	
Curraghinalt Burn	**Curraghinalt Burn**
	
Site at confluence with the Owenkillew. Small watercourse which offers no suitable habitat for fish due to steep gradient and the bed of the Curraghinalt Burn is 'perched' above the Owenkillew. Substrate and consists of boulders and cobbles. Due to the linear nature of the channel, gradient of the Curraghinalt Burn and lack of upstream connectivity from the Owenkillew River then it is unsuitable for fish during higher flow conditions. No suitable salmonid spawning areas observed and unsuitable for FWPM.	

Watercourse Name, Site Photographs and Site Description	
Glenlark River (confluence)	**Glenlark River (confluence)**
	
Site upstream of Curraghinalt Burn and average channel width at time of survey was 8m and dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were boulder/cobble, vertical or undercut. The channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a spawning area.	
Coneyglen Burn Confluence with Owenkillew	**Coneyglen Burn Upstream View**
	
Site upstream of Curraghinalt Burn. Important tributary of the Owenkillew River which offers good habitat for salmonid fish e.g. brown trout. At confluence with the Owenkillew the bed substrate is mobile and consists of gravel and cobbles. Upstream, the channel was somewhat linear but potential salmonid spawning areas were observed. Given the distance upstream and site access restrictions the Coneyglen Burn was not surveyed further but the channel may offer suitable habitat for FWPM.	

3.3 Owenreagh River

3.3.1 The fisheries habitat assessment is shown in Figure 5 and Figure 6. Within the Owenreagh catchment it was not possible to repeat the 2015 RHS sites.

3.3.2 In relation to the 2020 RHS survey locations it was not possible to survey sites WP 86 to WP 90 due to landowner permissions and the remaining 2020 RHS sites are shown in Table 7.

Figure 5 Owenreagh LCUM fish habitat assessment (Part 1)

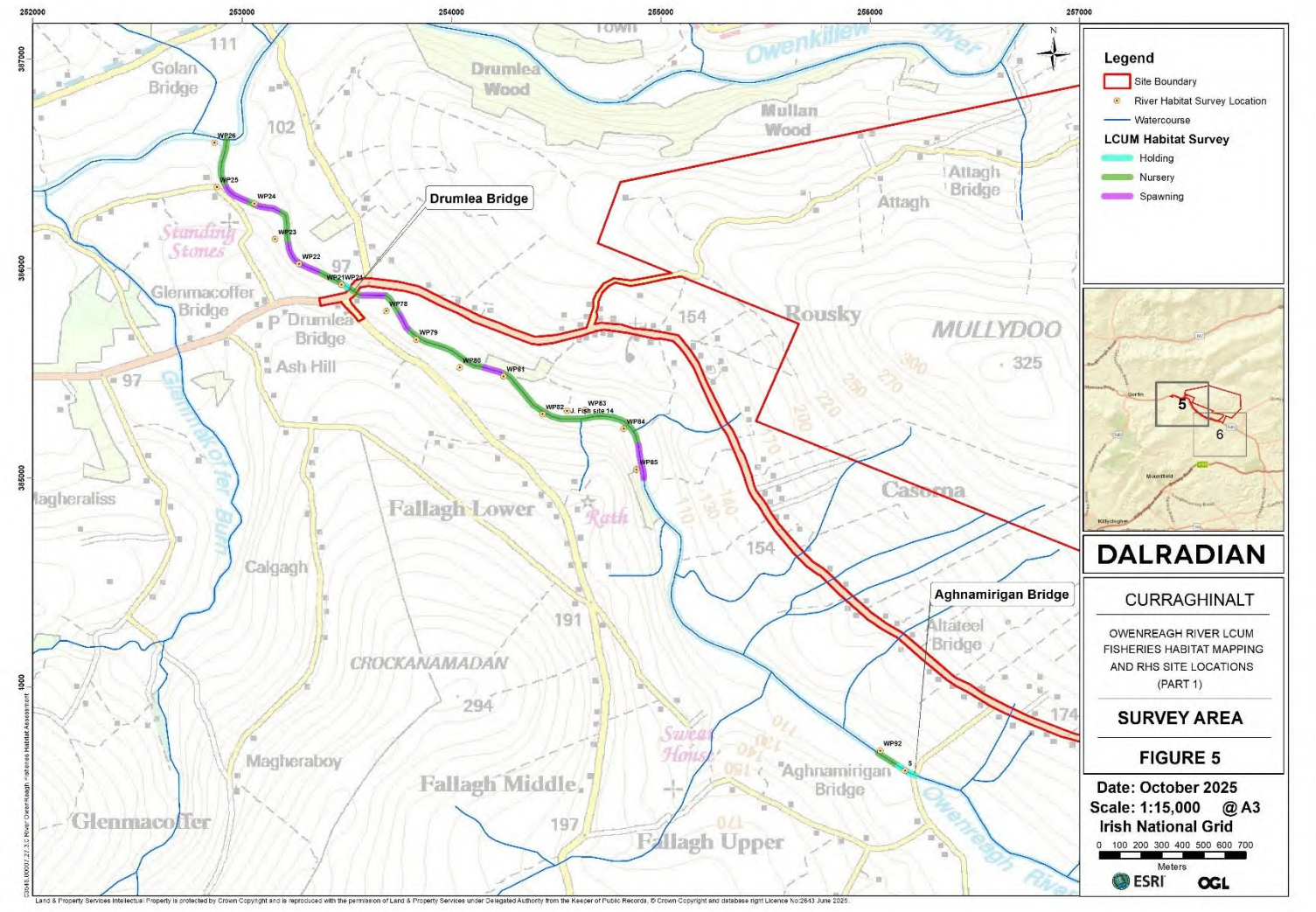


Figure 6 Owenreagh LCUM fish habitat assessment (Part 2)

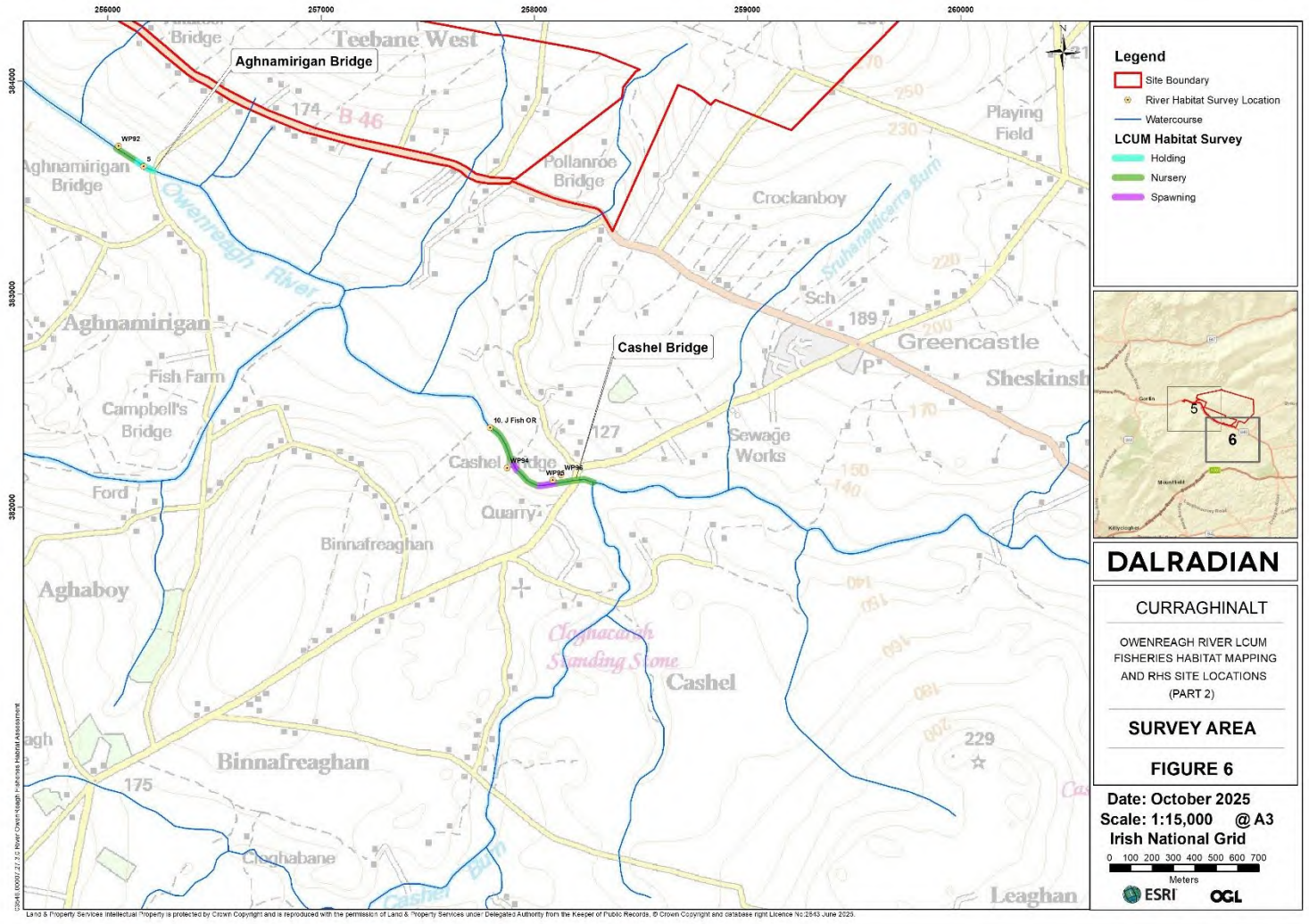


Table 7 Owenreagh RHS sites and fish habitat descriptions

Owenreagh Survey Waypoints, Site Photographs and Site Description	
WP21 Looking Upstream	**WP21** Looking Downstream
	
WP21 Crockanboy Road bridge: this waypoint is downstream of the road bridge and the average channel width at time of survey was 17.6m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area.	
WP22 Looking Upstream	**WP22** Looking Downstream
	
WP22: average channel width at time of survey was 11.4m and the dominant flow-type was rippled. The average depth was 20cm and the banks were boulder/earth, vertical in profile and undercut. The dominant channel substrate was a mix of gravel/pebble/cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a spawning area, though the channel also provided nursery habitat.	

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP23 Looking Upstream

WP23 Looking Downstream

WP23: average channel width at time of survey was 15.5m and the dominant flow-type was smooth. The average depth was 35cm and the banks were earth, vertical in profile and undercut. The dominant channel substrate was a gravel/pebble mix and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported spawning habitat and provided limited holding areas for adult fish. Evidence of wood piling in the form of bank protection was noted on the LHB and suitable lamprey habitat was noted 50m upstream of this section on the RHB.

WP24 Looking Upstream

WP24 Looking Downstream

WP24: average channel width at time of survey was 12.5m and the dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were cobble/earth, vertical in profile and undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also provided spawning habitat.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP25 Looking Upstream

WP25 Looking Downstream

WP25: average channel width at time of survey was 8.6m and the dominant flow-type was rippled. The average depth was 50cm and the banks were earth/cobble/boulder, steep/vertical in profile and undercut. The dominant channel substrate was gravel/pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though the channel also supported holding areas for adult fish and limited spawning habitat. A minor ford was present upstream of this site.

WP26 Looking Upstream

WP26 Looking Downstream

WP26 Confluence with the Owenkillew: average channel width at time of survey was 15.2m and the dominant flow-type was smooth flow. The average depth was 25cm but downstream was a deep large pool and the banks were gravel/sand, vertical in profile and undercut. The dominant channel substrate was gravel/pebble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a holding area, though the channel also supported some nursery areas and spawning habitat. A minor ford was present at this location.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP OR6 Looking Upstream

WP OR6 Looking Downstream

WP OR6: This waypoint is upstream of Crockanboy Road bridge and the location of a river invertebrate sample station as described within the Biolological Water Quality Monitoring Report. Average channel width at time of survey was 17.6m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area.

WP78 Looking Upstream

WP78 Looking Downstream

WP78: Average channel width at time of survey was 8.4m and dominant flow-type was unbroken standing wave. The average depth was 35cm and the banks were cobble/boulder, steep/vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area, though a significant propotion of the area was considered to be suitable as spawning habitat.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP79 Looking Upstream

WP79 Looking Downstream

WP79: Average channel width at time of survey was 8.4m and dominant flow-type was rippled. The average depth was 35cm and the banks were earth, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries assessment was that this site is a nursery area, though a significant proportion of the area was considered to be suitable as spawning habitat.

WP80 Looking Upstream

WP80 Looking Downstream

WP80: Average channel width at time of survey was 8.1m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder/earth, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was improved grassland. The overall fisheries assessment was that this site is a nursery area, though a significant propotion of the area was considered to be suitable as spawning habitat.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP81 Looking Upstream

WP81 Looking Downstream

WP81: Average channel width at time of survey was 9.4m and dominant flow-type was unbroken standing wave. The average depth was 20cm and the banks were cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a nursery area, though circa a third of the channel was considered to be suitable as spawning habitat. A minor ford was noted within the vicinity of the site and evidence of cattle poaching was noted on-site. Also an area of good spawning habitat was noted circa 50m downstream of this site.

WP82 Looking Upstream

WP82 Looking Downstream

WP82: Average channel width at time of survey was 9.3m and dominant flow-type was unbroken standing wave. The average depth was 25cm and the banks were boulder/cobble, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a nursery area, though areas of spawning substate were noted within this reach.

Owenreagh Survey Waypoints, Site Photographs and Site Description	
WP83 Looking Upstream	**WP83** Looking Downstream
	
WP83: Average channel width at time of survey was 11.9m and dominant flow-type was unbroken standing wave. The average depth was 10cm and the banks were earth/boulder, vertical or undercut. The dominant dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a spawning and nursery area.	
WP84 Looking Upstream	**WP84** Looking Downstream
	
WP84: Average channel width at time of survey was 10.3m and flow-type was unbroken standing wave. The average depth was 25cm and the banks were earth/boulder, vertical or undercut. The dominant dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a nursery area and araes of spawning substrate were noted.	

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP85 Looking Upstream

WP85 Looking Downstream

WP85: Average channel width at time of survey was 12.3m and flow-type was unbroken standing wave. The average depth was 15cm and the banks were cobble, steep/vertical or undercut. The dominant dominant channel substrate was grave/pebble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a nursery area, though a good proportion of the channel was considered to offer spawning habitat. A minor bridge with a buttress within the river and significant area of riverbank erosion was noted on the right bank of the site.

WP90 Looking Upstream

WP90 Looking Downstream

WP90: Average channel width at time of survey was 9.9 m and flow-type was unbroken standing wave. The average depth was 15 cm and the banks were boulder/earth, steep or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture. The overall fisheries assessment was that this site is a nursery area and evidence of erosion control and bank-works was noted on the right bank of the river.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP92 Looking Upstream

WP92 Looking Downstream

WP92: Average channel width at time of survey was 65 cm and flow-type was unbroken standing wave. The average depth was 35cm and the banks were boulder/cobble, steep or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a nursery area though the channel offered good holding habitat. Note that the bridge is not single span and that the central buttress has a major impact upon the river channel. This is further compounded by the presence of a crump weir across the channel directly dowwnstream of the bridge.

Juvenile fish Site 10 Looking Upstream

Juvenile fish Site 10 Looking Downstream

Juvenile fish Site 10: Average channel width at time of survey was 7.3 m and flow-type was unbroken standing wave. The average depth was 20 cm and the banks were earth, steep or undercut. The dominant channel substrate was cobble and the land-use associated with the river was broadleaf woodland and rough pasture. The overall fisheries assessment was that this site is a nursery area and a noticabe area of iron ochre was observed on the left-hand bank.

Owenreagh Survey Waypoints, Site Photographs and Site Description

WP94 Looking Upstream

WP94 Looking Downstream

WP94: Average channel width at time of survey was 8.9m and flow-type was upwelling. The average depth was 50cm and the banks were boulder, vertical or undercut. The dominant channel substrate was cobble and the land-use associated with the river was rough pasture and improved grassland. The overall fisheries [assessment was that this site is a spawning area though the channel offered good nursery habitat. Evidence of erosion control and bank-works was noted on the right bank of the river and an intermediate ford was observed downstream.

WP95 Looking Upstream

WP95 Looking Downstream

WP95: Average channel width at time of survey was 15.8 m and flow-type was broken standing wave. The average depth was 15cm and the banks were boulder. The dominant channel substrate was gravel/pebble and the land-use associated with the river was broadleaf woodland and improved grassland. The overall fisheries assessment was that this site is a spawning area though the channel offered good nursery habitat. Evidence of erosion control and bank-works was noted on the right bank of the river and an intermediate ford was observed downstream.

3.4 Owenreagh River: Minor watercourses and unnamed burns

3.4.1 The following section provides an assessment of the small burns and watercourses encountered during the Owenreagh RHS and LCUM survey. Many of these watercourses are 'perched' above the water level of the Owenkillew River and offer minimal habitat for salmonid fish species (Table 8).

3.4.2 Due to site access permissions then it was not possible to survey the unnamed burn (Site upstream of WP87) and the Pollanroe Burn (Sites WP198 and WP 202).

3.4.3 Two new sites were assessed on the Pollanroe Burn above Site WP OR4 and these are also shown in Table 8 (Site WP 119 and Site WP 119).

Table 8 Owenreagh River minor watercourses and unnamed burns

Watercourse Name, Location and Site Description	
Unamed Burn 	**Unamed Burn** 
<u>Site upstream of Drumlea Bridge</u>. Small watercourse which is the boundary between two fields. Channel offers no suitable habitat for juvenile salmonid fish at time of survey due to depth and being choked with vegetaion. At confluence with the Owenreagh River the bed substrate is mobile and consists of small gravel and fine sand. Upstream it is considered that the habitat is only suitable for minor fish species such as minnow or stickleback. Due to the linear nature of this unnamed burn then it is also considered to be unsuitable for salmonid fish during higher flow conditions. No suitable salmonid spawning areas and unsuitable for FWPM.	
Unamed Burn 	**Unamed Burn** 
<u>Site upstream of Drumlea Bridge:</u> Channel offers no suitable habitat for juvenile salmonid fish at time of survey due to water depth and channel being mostly dry. At confluence with the Owenreagh River the bed substrate is mobile and consists of gravels and fine sand. Upstream it is considered that the habitat is only suitable for minor fish species such as minnow or stickleback. Due to the linear nature of this unnamed burn then it is also considered to be unsuitable for salmonid fish during higher flow conditions. No suitable salmonid spawning areas and unsuitable for FWPM.	

Watercourse Name, Location and Site Description	
WP OR4 Pollanroe Burn looking downstream	**WP OR4 Pollanroe Burn** looking upstream
	
WP117: Average channel width at time of survey was 1.4 m and the dominant flow-type was unbroken standing wave. The average depth was 10cm and the banks were cobble. The dominant dominant channel substrate was gravel/pebble and the land-use associated with the burn was improved grassland. The overall fisheries assessment was that this site is a spawning area though due to the linear nature of the channel, steep gradient and lack of upstream connectivity from the Owenreagh River then the Pollanroe Burn is considered unsuitable for salmonid fish.	
WP 118 Pollanroe Burn looking downstream	**WP 118 Pollanroe Burn** looking upstream
	
WP118: Average channel width at time of survey was 1.1 m and the dominant flow-type was unbroken standing wave. The average depth was 5cm and the banks were earth. The dominant dominant channel substrate was gravel/pebble and the land-use associated with the burn was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a spawning area though due to the linear nature of the channel, steep gradient and lack of upstream connectivity from the Owenreagh River then the Pollanroe Burn is considered unsuitable for salmonid fish. A signicant area of iron ochre deposition was noted on the LHB upstream of this location.	

Watercourse Name, Location and Site Description	
WP 119 Pollanroe Burn looking downstream 	**WP 119 Pollanroe Burn** looking upstream 
WP119: Average channel width at time of survey was 1.4 m and the dominant flow-type was unbroken standing wave. The average depth was 5cm and the banks were earth. The dominant dominant channel substrate was gravel/pebble and the land-use associated with the burn was improved grassland and broadleaf woodland. The overall fisheries assessment was that this site is a spawning area though due to the linear nature of the channel, steep gradient and lack of upstream connectivity from the Owenreagh River then the Pollanroe Burn is considered unsuitable for salmonid fish.	

4 DISCUSSION

4.1 Owenkillew River

Reach 1: Owenkillew River downstream of the Owenreagh confluence.

4.1.1 This lower survey reach of the Owenkillew River between the B48 Culvacullion Road Bridge and the Owenreagh confluence is a predominantly fast-flowing high energy watercourse. The channel width is between 14-25m and the average depth ranges between 25cm to 60cm.

4.1.2 The Owenkillew River flows through extensive broadleaved woodland, and vertical undercut banks are the dominant bank profile. The bed of the river is predominantly cobble and boulder (some >1m in size) though in lower energy areas excellent spawning gravels are present.

4.1.3 The dominant flow type is unbroken standing wave, and vegetated boulders, unvegetated side bars and discrete unvegetated sand deposits are present. At the confluence of the Owenkillew and Owenreagh rivers a large pool is present which provides suitable habitat for adult salmonid fish. Directly downstream of the confluence is a substantial unvegetated mid-channel bar which is over 50m in length.

4.1.4 The fisheries habitat exhibited within Reach 1 is varied and a mix of nursery, holding and spawning habitats are present. Other river features such as glides and pools can also be found and overall, the cross-section of the channel provides a range of suitable habitats for the various life stages of European eel (*Anguilla anguilla*), salmonid, lamprey, and minor fish species.

4.1.5 Evidence of channel modification in the form of bridges, erosion control measures (laid stone) and fords was observed but it is considered that these areas of channel modification have a limited effect upon the channel structure. Overall, the bed of the river was consolidated, and the riverbed was stable, though localised changes in riverbed and bank structure were noted since the 2020 survey.

Reach 2: Owenkillew River upstream of the Owenreagh to the Curraghinalt Burn.

4.1.6 This middle survey reach of the Owenkillew River is a fast-flowing shallow watercourse. The channel width is between 9-18m and the average depth ranges between 25cm to 70cm.

4.1.7 The Owenkillew River flows through extensive improved grassland, and vertical undercut banks are the dominant bank profile. The bed of the river is predominantly cobble and in lower energy areas excellent spawning gravels are found. The predominant flow type is unbroken standing wave, and vegetated boulders, unvegetated side bars and discrete unvegetated sand deposits are present.

4.1.8 This reach of the Owenkillew River appears to have been historically straightened and large blocks of stone have been laid at the toe of the bank to stabilise both banks of the river. This has led to a somewhat homogeneous instream channel form and there is a lack of meanders within this reach. This historic channel modification may in turn be impacting upon the fisheries potential for the reach.

4.1.9 The fisheries habitat exhibited within Reach 2 is varied with a good mix of nursery, holding and spawning habitats. Other river features such as glides and pools are present and overall, the cross-section of the channel provides a range of suitable habitats for the various life stages of European eel, salmonid, lamprey, and minor fish species.

4.1.10 Overall, the bed of the river was unconsolidated, and localised changes in riverbed and bank structure were noted since the 2020 survey.

Reach 3: Owenkillew River upstream of the Curraghinalt Burn.

4.1.11 This upper survey reach of the Owenkillew River is a fast-flowing shallow watercourse, though deeper glides and pools become more common further upstream.

4.1.12 The channel width is narrower than Reach 1 and Reach 2 (between 8m to 16m) and the average depth ranges between 20cm to 80cm.

4.1.13 The Owenkillew flows through extensive improved grassland, and vertical undercut banks are the dominant bank profile. The bed of the river is predominantly cobble and in lower energy areas gravels, sands and silts are to be found. These silts are considered to offer good habitat for lamprey ammocetes.

4.1.14 The predominant flow type is unbroken standing wave, and unvegetated side bars and discrete sand deposits are present.

4.1.15 This upper reach of the Owenkillew River again appears to have been historically straightened and large blocks of stone have been laid at the toe of the bank to stabilise both banks of the river. This has led to a homogeneous instream channel form and there is a lack of meanders within this reach. This historic channel modification may in turn be impacting upon the fisheries potential for the reach.

4.1.16 The fisheries habitat exhibited within Reach 3 is varied with a good mix of nursery, holding and spawning habitats. Other river features such as glides and pools are present and overall, the cross-section of the channel provides a range of suitable habitats for the various life stages of salmonid fish and lamprey. In particular the confluences with the Glenlark Burn and the Coneyglen Burn offer some excellent and varied fisheries habitat.

4.1.17 Within the upper survey sections of this reach (above the Coneyglen Burn) it is noticeable that the gradient of the river reduces and the Owenkillew becomes slow flowing and meanders across the valley floor. Within this upper section of the Owenkillew River provides some excellent deep holding pools for adult salmonid fish.

4.1.18 Overall, the bed of the river was again unconsolidated, and the survey team were able to turn over large boulders with ease during the survey, which indicates the loose nature of the riverbed.

4.2 Owenreagh River

Reach 4: Owenreagh above the Owenkillew confluence to below the Pollanroe Burn.

4.2.1 This lower reach of the Owenreagh is a relatively fast-flowing shallow watercourse and the channel width was between 11-17m and average depth ranges between 20cm to 50cm.

4.2.2 At the confluence with the Owenkillew a large pool was noted which provides excellent holding habitat for adult salmonid fish.

4.2.3 The Owenreagh flows through extensive improved grassland, and vertical undercut banks are the dominant bank profile. An eroding cliff was observed within the lower section of this reach and an area of river bank stabilisation was also noted (downstream of the eroding cliff) which was in the form of timber piles and logs.

4.2.4 The bed of the river is predominantly cobble with the occasional boulder and in lower energy areas excellent gravels and sand found. The predominant flow type is unbroken standing wave, and unvegetated side bars and discrete unvegetated sand/silt deposits are present.

4.2.5 This reach of the Owenreagh River appears to have been historically straightened and large blocks of stone have been laid at the toe of the bank to stabilise both banks of the river. This historic channel modification may in turn be impacting upon the fisheries potential for the reach.

4.2.6 The fisheries habitat exhibited within Reach 4 is varied with a good mix of nursery, holding and spawning habitats. Other river features such as glides and pools are present and overall, the cross-section of the channel provides the range of suitable habitats for the various life stages of European eel, salmonid, lamprey and minor fish species.

4.2.7 The survey team could not access all of the Owenreagh River within this reach, and it was not possible to survey the confluence with the Unnamed Burn and the Pollanroe Burn.

4.2.8 Overall, the bed of the river was unconsolidated, and the survey team were able to turn over large boulders with ease during the survey, which indicates the loose nature of the riverbed.

Reach 4: Owenreagh above the Owenkillew confluence to below the Pollanroe Burn.

4.2.9 Due to site access restrictions then only a short section of the Owenreagh River upstream of the Pollanroe Burn could be surveyed.

4.2.10 Within this reach the Owenreagh was a relatively fast-flowing shallow river, and the channel width varied between 7m to 15m (though it was circa 16m wide at Cashel Bridge).

4.2.11 The river depth ranged between 10cm to 65cm the river flows through extensive improved grassland, and vertical undercut banks are the dominant bank profile. The bed of the river is predominantly cobble with the occasional boulder and in lower energy areas excellent gravels and sand found.

4.2.12 The predominant flow type was unbroken standing wave, and unvegetated side bars and discrete unvegetated sand/silt deposits are present.

4.2.13 This reach of the Owenreagh River appears to have been historically straightened and large blocks of stone have been laid at the toe of the bank to stabilise both banks of the river. This historic channel modification may in turn be impacting upon the fisheries potential for the reach.

4.2.14 The fisheries habitat exhibited within Reach 5 is varied with a good mix of nursery, holding and spawning habitats. Other river features such as glides and pools are present and overall, the cross-section of the channel provides the range of suitable habitats for the various life stages of salmonid fish and lamprey.

4.2.15 Overall, the bed of the river was unconsolidated, and the survey team were able to turn over large boulders with ease during the survey, which indicates the loose nature of the riverbed.

5 CONCLUSIONS

5.1.1 The results of the 2025 fish and river habitat monitoring survey indicate that the baseline conditions (as recorded via previous surveys during 2015 and 2020) have not changed significantly in respect to the river and fish habitat observed within the Owenkillew and Owenreagh catchments.

5.1.2 The 2025 river and fish habitat surveys were carried out during suitable weather and river flow conditions and during a similar season to the previous 2015 and 2020 river and fish habitat surveys i.e. September/October.

5.1.3 Localised changes in relation to depth and width were noted from previous surveys at several locations within the Owenkillew and Owenreagh catchments and these changes are most likely due to the river flow conditions at the time of survey.

5.1.4 Changes in relation to bank structure, bank profile and river width and depth due were also noted within the Owenkillew and Owenreagh catchments but these can be attributed to river bank erosion and deposition e.g. marginal cobble bars and areas of silt deposition.

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Dalradian Gold Limited

Fish Habitat Assessment

Assessment of the value of the Attagh Burn, Curraghinalt Burn, Glenealy Burn, Pollanroe Burn and Unnamed Burn for Atlantic salmon (*Salmo salar*)

2488365

NOVEMBER 2025

RSK GENERAL NOTES

Project No: 2488365

Title: Fish Habitat Assessment

Client: Dalradian Gold Limited

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Status: Final

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Contents

1 INTRODUCTION

1.1.1 This technical report provides a detailed assessment of the value of these small watercourses to Atlantic salmon and addresses comments made by Loughs Agency (LA) in their 'Transboundary Consultation TB25.01: Curraghinalt Project', dated 23rd April 2025, considering points specifically related to the small watercourses close to the Curraghinalt Project.

1.1.2 The LA raise a number of points related to the small watercourses and the impact of the mine project on stream flows, sediment movement and channel hydraulics, and how these processes impact on fish habitat, with particular reference to Atlantic salmon. The watercourses in question are: Attagh Burn, Curraghinalt Burn, Glenealy Burn, Pollanroe Burn and Unnamed Burn. The LA indicate that changes to these burns have the potential to have downstream impacts that will affect the Owenkillew SAC and rivers in the Republic of Ireland, namely, the River Finn SAC.

1.1.3 The impacts on these small watercourses were discussed in detail in the project Surface Water Impact Assessment (Second Addendum to the ES, Appendix C4), however, given the specific nature of the points raised by LA, we have undertaken some additional analyses to address their concerns. We summarise the conclusions of the SWIA in Section 2 and the rest of the report outlines our recent analyses and provides direct responses to the points raised by LA.

2 DATA SETS AND ANALYSIS

2.1 Key Data Sets

2.1.1 The report is based on information provided in the SWIA and recent survey data collected on site during summer and autumn 2025. In addition to this report there are further additional reports which provide more information on LiDAR and aerial photographic data, channel cross-sections measurements, river habitat and fish habitat surveys, hydomorphology surveys and electrofishing surveys. The key reports to support this assessment are:

- Surface Water Technical Report by Kaya Consulting[1];
- River and Fish Habitat Assessments by RSK Biocensus[2,3] ;
- Owenreagh and Owenkillew catchment electric fishing surveys by Aztec Management Consultants[4]; and
- Hydromorphology Assessment by SLR Consulting[5].

2.1.2 The SWIA describes the impact of the project on flows in the watercourses adjacent to the Curraghinalt mine and these impacts are summarized below.

2.1.3 The recent survey data considered in this report includes:

- LiDAR and aerial photographic data collected by Six West survey contractors (Six West - Home);
- Channel cross-sections measured by land survey by Six West for each watercourse taken at accessible locations on the burns
- River Habitat Survey (RHS) details measured every 50m and fish habitat assessments made via the NI Life Cycle Unit Method (LCUM) for each watercourse taken at accessible locations on the burns
- Electrofishing data collected at accessible locations on the burns
- Hydromorphology field survey data collated and recorded for each burn.

2.2 Summary of Impacts of Mine on Stream flows from SWIA

2.2.1 The impacts of the mine on stream flows were discussed in detail in the SWIA and then outlined in the mine Statement of Case TR6. The key points are summarized again below in brief.

2.2.2 For the Pollanroe Burn average and low flows will be increased over baseline conditions due to the diversion of a small part of the Unnamed Watercourse (5%) to the Pollanroe Burn and due to pumping of groundwater inflow from the underground mine. Average flow rates are predicted to be around 15L/s higher when compared to baseline conditions. Flood flows will be reduced with runoff within the Proposed Infrastructure Site retained within water management ponds.

[1] Kaya Consulting (2025). Technical Report – Surface Water. Report for Dalradian Gold Limited, September 2025.

[2] RSK Biocensus (2025). River and Fish Habitat Assessment of the Owenkillew River, Owenreagh River and Tributaries, October 2025.

[3] RSK Biocensus (2024). Small Burn Surveys - Fish Habitat and River Habitat Assessment of the Attagh Burn, Glenealy Burn and Unnamed Burn, November 2024.

[4] Aztec Management Consultants (2025). Owenreagh and Owenkillew catchment electric fishing surveys on Saturday 6 September 2025, November 2025.

[5] SLR Consulting (2025). Hydromorphology Assessment of the Pollanroe Burn, Unnamed Burn, Glenealy Burn, Curraghinalt Burn and Attagh Burn, Co. Tyrone, September 2025

2.2.3 For the Unnamed Watercourse flows will be slightly reduced with 5% of the catchment diverted to the Pollanroe Burn.

2.2.4 For the Curraghinalt Burn there will be a slight reduction in flows during operations mainly due to cessation of flow from the old/existing adit with mine water pumped to the Pollanroe catchment, with a slight reduction in flow due to the lowering of the local groundwater table.

2.2.5 For the Attagh and Glenealy Burns flows are also slightly reduced due to the lowering of the local groundwater table.

2.2.6 Table 1 summarises the key changes in flow for each watercourse.

Table 1 Summary of small burns and impact on flows during the operational phase of the mine

Watercourse	Catchment Area (km^2)	Baseline Annual Average Flow (L/s)	Impact of Mine under Average Flows (L/s)
Pollanroe Burn at its mouth	2	58	+15
Unnamed Burn at its mouth	1.4	40	-1.98
Curraghinalt Burn at its mouth	1	28	-1.85
Attagh Burn at its mouth	0.6	17	-0.94
Glenealy Burn at its mouth	1.1	31	-0.66

3 ASSESSMENT OF FISHERIES HABITAT

The following section of the report highlights the findings of the key data sets and reports with a view to providing an assessment of the fisheries habitat.

3.1 Attagh Burn

3.1.1 The Attagh Burn is assessed in detail within the 2025 Kaya Consulting report[1] via aerial survey and in-situ site measurements. The watercourse flows though agricultural land with good vegetation cover on both sides of the channel, though the channel is impacted by man-made structures (notably a farm ford crossing, and two road crossings.

3.1.2 The channel down-valley gradient was calculated for the surveyed cross-sections, with the LiDAR unable to penetrate through the tree cover over much of the reach. The channel gradient is 6.5% within the area surveyed and from visual survey the gradient was seen to increase upstream of the surveyed reach. Furthermore, Natura 2000 guidance[6] states that the gradient threshold for spawning Atlantic salmon (*Salmo salar*) should be <3% and the gradient threshold brown/Sea trout (*Salmo trutta*) spawning <4%.

3.1.3 As outlined within the 2025 Kaya Consulting report the mine will reduce flows in the Attagh Burn by around 1 L/s. The impacts of the change in flow on average velocity, flow area and maximum water depth show negligible impacts on any of these parameters, for example, under average flow conditions the change in flow due to the mine is predicted to result in 2mm (0.002m) change in flow depth and a 0.003m^2 change in flow area and a 0.01m/s change in flow velocity. All of which are considered to be unmeasurable changes. Furthermore, the Natura 2000 guidance[6] presents habitat characteristics for juvenile Atlantic salmon which include preferenda in relation to depth (≤ 20cm for fry and underyearling parr and 20-40cm for yearling and older parr) and velocity (50-65cm/s for fry and underyearling parr and 60-75 cm/s for yearling and older parr). As the predicted changes in flow and depth within the Attagh Burn are considered to be unmeasurable then the current habitat will still be available to any juvenile Atlantic salmon that enters the burn when the Owenkillew River is in flood

3.1.4 It is clear from the 2025 Kaya Consulting report that the Attagh Burn is a steep, rocky channel with shallow water depths over most flow conditions. Under high flow conditions there would be a risk of higher velocities locally in the channel and changes in flow due to the mine are negligible, with almost no noticeable change in depths, flow area and velocity. It should also be noted from Figure 6-4 within the 2025 Kaya Consulting report that current flood flow and low flow conditions within the Attagh Burn are such as to provide unfavourable conditions for juvenile salmonids.

3.1.5 In 2024 the lower section of the Attagh Burn was surveyed using RHS and LCUM survey techniques by RSK Biocensus[3] . The lower section of the watercourse from the confluence with the Owenkillew River to c. 280m upstream was on average 1-2 m wide, shallow (5 cm deep), and the bed substrate was predominantly cobble. Furthermore, no spawning gravels were identified within the survey area and the Attagh Burn offered limited habitat for juvenile salmonid fish. The LCUM Annex 1 Habitat Classification states that Grade 1 Atlantic salmon habitat should have 70% of the substrate 30-80mm in diameter with a gravel depth of 200-500mm (50-150mm for trout). The RSK Biocensus did not identify any suitable salmonid spawning areas and no spawning redds were observed.

[6] Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough

3.1.6 The 2024 RSK Biocensus survey also identified four barriers to fish migration and these were associated with:

- The 'perched' nature of the Attagh Burn at the confluence of the Owenreagh River at site resulting in no free access for fish between the river and the burn
- A major ford c. 70m upstream of the confluence with the Owenkillew River
- An intermediate ford c. 160m upstream of the confluence with the Owenkillew River
- A road culvert c. 280m upstream of the confluence with the Owenkillew River.

3.1.7 The hydromorphology of the Attagh Burn was assessed by SLR Consulting during 2025 via walkover surveys[5]. The hydromorphology attributes of the watercourse was assessed via the River Hydromorphology Assessment Technique (RHAT)[7] within two reaches of the Attagh Burn. As part of the RHAT assessment both reaches (AB Reach 1 and AB Reach 2) were classified as being moderate under the Water Framework Directive (WFD) hydromorphology classification scheme due to the following modifications:

- Channel morphology and flow types
- Channel vegetation
- Barriers to continuity
- Bank structure and stability
- Bank vegetation
- Riparian land use
- Floodplain connectivity.

3.2 Curraghinalt Burn

3.2.1 The Curraghinalt Burn is assessed in detail within the 2025 Kaya Consulting report[1] via aerial survey and in-situ site measurements. The watercourse flows though agricultural land with good vegetation cover on both banks of the channel. The channel is impacted by the road crossing close to the Existing Infrastructure Area with no other crossing points along the reach.

3.2.2 The channel down-valley gradient was calculated for the surveyed cross-sections, with the LiDAR unable to penetrate through the tree cover over much of the reach. The channel is around 15% in this area and from visual survey the gradient appears lower upstream of the surveyed reach, however, it is still steeper than 5-7% along its length. Natura 2000 guidance[8] states that the gradient threshold for spawning Atlantic salmon should be <3% and the gradient threshold brown/Sea trout spawning <4%.

3.2.3 As outlined within the 2025 Kaya Consulting report the mine will reduce flows in the Curraghinalt Burn during operations due to the ending of flow from the existing adit (mine water is routed to Pollanroe Burn during operations) and a lowering of the regional groundwater table. The impacts of the change in flow on average velocity, flow area and maximum water depth show very small to negligible impacts on any of these parameters, and under average flow conditions the change in flow due to the mine is predicted to result in 5mm (0.005m) change in flow depth and a 0.007m^2 change in flow area and a 0.02m/s change in flow velocity. Again these very small changes would be

[7] River Hydromorphology Assessment Technique (RHAT) Training Manual - Version 2 (September, 2014). Accessed from DAERA website https://www.daera-ni.gov.uk/publications/river-hydromorphology-assessment-technique-training-manual .

[8] Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough

unmeasurable in the field, and considering the Natura 2000 guidance[6] habitat characteristics for juvenile Atlantic salmon preferenda in relation to depth (≤ 20cm for fry and underyearling parr and 20-40cm for yearling and older parr) and velocity (50-65cm/s for fry and underyearling parr and 60-75 cm/s for yearling and older parr), then there are no perceived changes in relation to available habitat if any juvenile salmonid fish enter the burn when the Owenkillew River is in flood.

3.2.4 It is clear from the 2025 Kaya Consulting report that the Curraghinalt Burn is very steep, with a bedrock section close to the confluence of the Owenkillew River, which would be expected to prevent fish access to upper reaches and providing a topographical divide between sections of the burn upstream and downstream of this steep reach. Under high flow conditions there would be a risk of higher velocities locally in the channel and changes in flow due to the mine are negligible, with almost no noticeable change in depths, flow area and velocity. It should also be noted from Figure 5-4 within the 2025 Kaya Consulting report that current flood flow and low flow conditions within the Curraghinalt Burn are such as to provide unfavourable conditions for juvenile salmonid fish which again would support the October 2024 Statement of Case that the Curraghinalt Burn is a low sensitivity watercourse.

3.2.5 In 2025 the lower section of the Curraghinalt Burn was surveyed using RHS and LCUM survey techniques by RSK Biocensus[2] . The section of watercourse surveyed from the Crockanboy Road to the confluence with the Owenkillew River was on average 1-2 m wide, shallow (5-10cm cm deep), and the bed substrate was predominantly cobble and bedrock. No spawning gravels were identified within the survey area and the Curraghinalt Burn survey offered limited habitat for juvenile salmonid fish. In relation to LCUM Annex 1 Habitat Classification no Grade 1 Atlantic salmon spawning habitat was observed (70% of the substrate should be 30-80mm in diameter and a gravel depth of 200-500mm or 50-150mm for trout). The RSK Biocensus survey did not identify any suitable salmonid spawning areas.

3.2.6 The hydromorphology of the Curraghinalt Burn was assessed by SLR Consulting during 2025 via walkover surveys[5]. The hydromorphology attributes of the watercourse was assessed via the River Hydromorphology Assessment Technique (RHAT)[7] within two reaches of the Curraghinalt Burn. As part of the RHAT assessment both reaches (CB Reach 1 and CB Reach 2) were classified as being Good under the WFD hydromorphology classification scheme due to the following modifications:

- Channel morphology and flow types
- Bank structure and stability
- Riparian land use
- Floodplain connectivity

3.2.7 In 2021 the LA electrofished one site on the Curraghinalt Burn, with the site fished upstream of the Owenkillew River confluence (site CURR_001)[13] which was 40m in length. The LA captured two brown trout (*Salmo trutta*) and one 3-spined stickleback (*Gasterosteus aculeatus*) during their electrofishing survey. The LA also graded site CURR_001 via the LCUM Annex 1 Habitat Classification and for all three components of the LCUM assessment (nursery area, spawning area and holding area) the LA gave a score of 3 for each component (noting that a score of 1 is the best and a score of 4 is the worst within the assessment).

3.2.8 In 2022 Ricardo electrofished Site CURR_001 using a different survey methodology in order to derive an estimate of the fish population within the middle reach[9]. Ricardo also carried out a single

[9] Ricardo (2022). Unpublished data submitted to the Loughs Agency as part of the conditions of the electrofishing authorisation issued by the LA on 23 June 2022.

electrofishing run above CURR_001 over c. 800m in order to ascertain the upstream population of fish within the Curraghinalt Burn. Over three electrofishing runs (three times the LA sampling effort) Ricardo captured three brown trout and one European eel (*Anguilla anguilla*) at site CURR_001. The upstream single run recorded just one brown trout. Ricardo also graded site CURR_001 via the LCUM Annex 1 Habitat Classification and for all three components of the LCUM assessment (nursery area, spawning area and holding area) and gave a score of 3 for each component. The upstream survey section was also graded as a 3 for each component by Ricardo.

3.3 Glenealy Burn

3.3.1 The Glenealy Burn is assessed in detail within the 2025 Kaya Consulting report[1] via aerial survey and in-situ site measurements. The watercourse flows though agricultural land with some vegetation cover for the channel, but with much of the channel exposed. The channel is impacted by man-made structures (notably a fence, animal crossing (gate) and one road crossing).

3.3.2 The channel down-valley gradient was calculated from the LiDAR and the channel is very steep, being almost 14% at its mouth and 7.5% over the rest of the measured reach. From field observations there is an even steeper, near vertical bedrock section, just downstream of the road bridge, which was not picked up by the LiDAR due to vegetation cover. Following Natura 2000 guidance[10] the gradient threshold for spawning Atlantic salmon should be <3% and the gradient threshold for brown/Sea trout spawning <4%.

3.3.3 As outlined within the 2025 Kaya Consulting report the mine will reduce flows in the Glenealy Burn by around 0.7 L/s. The impacts of the change in flow on average velocity, flow area and maximum water depth are shown to result in negligible impacts on any of these parameters. Under average flow conditions the change in flow due to the mine is predicted to result in 1mm (0.001m) change in flow depth and a 0.002m^2 change in flow area and no change in flow velocity – all unmeasurable changes. Considering the Natura 2000 guidance[6] habitat characteristics for juvenile Atlantic salmon preferenda in relation to depth (≤ 20cm for fry and underyearling parr and 20-40cm for yearling and older parr) and velocity (50-65cm/s for fry and underyearling parr and 60-75 cm/s for yearling and older parr), there are no perceived changes in relation to available habitat if any juvenile salmonid fish enter the burn when the Owenkillew River is in flood.

3.3.4 It is clear from the 2025 Kaya Consulting report that the Glenealy Burn is very steep, with a large fan/bar deposit (steep gravel/cobble feature) at the mouth of the burn where it joins the Owenkillew River. The Glenealy Burn channel is perched some 1.5m above the level of the river which in normal river flow conditions is a topographical barrier for entry of fish to the burn. Under average and low flow the water depths in the channel would be expected to be extremely low and would restrict the ability of the channel to support large fish, with or without the mine. This can be seen in the photographs associated with the figures in the 2025 Kaya Consulting report which are indicative of low flow conditions. It should also be noted from Figure 7-7 within this report that current flood flow and low flow conditions within the Glenealy Burn are such as to provide unfavourable conditions for juvenile salmonid fish.

3.3.5 In 2024 the lower section of the Glenealy Burn was surveyed using RHS and LCUM survey techniques by RSK Biocensus[3] . The lower section of the watercourse from the confluence with the Owenkillew River to c. 230m upstream was on average 1.2 to 2.4m wide, shallow (5-10 cm deep), and the bed substrate was predominantly cobble. Furthermore, no spawning gravels were identified within the survey area and the Glenealy Burn offered limited habitat for juvenile salmonid fish. The LCUM Annex

[10] Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough

1 Habitat Classification states that Grade 1 Atlantic salmon habitat should comprise substrate where 70% is between 30-80mm in diameter with a gravel depth of 200-500mm (50-150mm for trout). The RSK Biocensus survey did not identify any suitable salmonid spawning areas and no spawning redds and were observed.

3.3.6 The 2024 RSK Biocensus survey also identified three barriers to fish migration and these were associated with:

- The Camcosy Road bridge where there was a >1m waterfall downstream of the bridge which is circa 230m upstream of the confluence of the Owenkillew River
- A 'chute' feature circa 200m upstream of the confluence of the Owenkillew River
- The 'perched' nature of the Glenealy Burn at the confluence of the Owenreagh River, which meant that there was no free access for fish between the river and the burn.

3.3.7 The hydromorphology of the Glenealy Burn was assessed by SLR Consulting during 2025 via walkover surveys[5]. The hydromorphology attributes of the watercourse were assessed via the River Hydromorphology Assessment Technique (RHAT)[7] within two reaches of the Glenealy Burn. As part of the RHAT assessment both reaches (AB Reach 1 and AB Reach 2) were classified as being moderate under the WFD hydromorphology classification scheme due to the following modifications:

- Channel morphology and flow types
- Channel vegetation
- Barriers to continuity
- Bank structure and stability
- Bank vegetation
- Riparian land use
- Floodplain connectivity.

3.4 Pollanroe Burn

3.4.1 The reach of the Pollanroe Burn from Crockanboy Road to the Owenreagh River is shown in detail within the 2025 Kaya Consulting report[1]. Within this report the mine will increase average and low flows in the Pollanroe Burn and reduce flood flows.

3.4.2 The watercourse flows though agricultural land with good vegetation cover on stretches of the channel but with a number of exposed sections. The channel is impacted by man-made structures, notably a water gate (fence across channel), ford and the Crockanboy Road culvert.

3.4.3 The channel down valley gradient indicates a lower gradient section for the first 500-600m of the channel upstream of Owenreagh River, then a channel with sections varying from 3.5% (near the confluence with the Owenreagh) to 10.6% further upstream. Following Natura 2000 guidance[11] the gradient threshold for spawning Atlantic salmon should be <3% and the gradient threshold brown/Sea trout spawning <4%. As such, the gradients present within the watercourse would support the October 2024 Statement of Case that adult Atlantic salmon do not spawn in the Pollanroe Burn.

[11] Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough

3.4.4 As outlined within the 2025 Kaya Consulting report the impacts of the change in flow on average velocity, flow area and maximum water depth show very small impacts on any of these parameters. For example, under average flow conditions the change in flow due to the mine is predicted to result in 0.013m change in flow depth and a 0.022m^2 change in flow area and a 0.02m/s change in flow velocity. Considering the Natura 2000 guidance[6] habitat characteristics for juvenile Atlantic salmon preferenda in relation to depth (≤ 20cm for fry and underyearling parr and 20-40cm for yearling and older parr) and velocity (50-65cm/s for fry and underyearling parr and 60-75 cm/s for yearling and older parr), then there are no perceived changes in relation to available habitat if any juvenile Atlantic salmon enter the burn when the Owenreagh River is in flood.

3.4.5 Furthermore, the changes under average flow conditions are all positive, meaning an increase in depth and flow area, which would be expected to increase available channel habitat under low flow conditions; this should be viewed as a positive in terms of habitat. At the same time the change in velocity is very small and would not cause any change in acceptable conditions for fish, if they were in the burn (i.e., under average conditions average velocity is predicted to change from 0.64m/s to 0.66m/s only).

3.4.6 In 2020 a section of the Pollanroe Burn was surveyed within the middle reach (including the area around the ford) using RHS and LCUM survey techniques by SLR Consulting[12]. This section of the burn at the time of survey was between 1-2m wide and had a mean depth of 2cm and was considered to be unsuitable for salmonid fish.

3.4.7 In 2021 the LA electrofished three sites on the Pollanroe Burn, with the lower site a short distance upstream of the Owenreagh River confluence (site POLL_001), a middle site within the middle section surveyed by SLR in 2020 (site POLL_002) and a third site downstream of the Crockanboy Road culvert (site POLL_003)[13]. At the closest site to the Owenreagh River (POLL_001) the LA caught 12 juvenile Atlantic salmon, 34 juvenile brown trout and 24 minnow (*Phoxinus phoxinus*). At site POLL_002 the LA caught 39 juvenile brown trout and 40 minnow, whilst at POLL_003 (furthest site from the Owenreagh River) no fish were recorded on site.

3.4.8 In 2022 Ricardo electrofished Site POLL_002 using a different survey methodology (3-catch depletion) in order to derive an estimate of the fish population within the middle reach. Over the three electrofishing runs Ricardo caught 76 juvenile brown trout and 15 juvenile Atlantic salmon. The estimated population of brown trout within the Pollanroe Burn at Site POLL_002 was estimated to be 90 fish but due to the low numbers of Atlantic salmon captured it was not possible to calculate a population estimate.

3.5 Unnamed Burn.

3.5.1 The Unnamed Burn is assessed in detail within the 2025 Kaya Consulting report[1] via aerial survey and in-situ site measurements. The watercourse flows though agricultural land with good vegetation cover on stretches of the channel but with a number of exposed sections. The channel is impacted by man-made structures (notably a farm crossing culvert, long culvert under a farm building and the Crockanboy Road culvert, as well as areas of bank erosion caused by animals accessing the channel to cross or to drink water.

3.5.2 The channel down valley gradient indicates a lower gradient of 3.7% for the first 250-300m of the channel upstream of Owenreagh River, then high gradient sections upstream of 6% and then 7.8% that are consistent with a Step-Pool geomorphology, which are high velocity channels (steps can be

[12] SLR Consulting (2021). River and Fish Habitat Assessment of the Owenkillew River, Owenreagh River and Tributaries for the Curraghinalt Gold Project, County Tyrone, Northern Ireland.
[13] Loughs Agency (2021). Investigative Electro-fishing Surveys on the Curraghinalt Burn Pollanroe Burn. Loughs Agency Report

seen in the aerial photography within the 2025 Kaya report). Following Natura 2000 guidance[14] the gradient threshold for spawning Atlantic salmon should be <3% and the gradient threshold brown/Sea trout spawning <4%. As such, the gradients present within the watercourse would support the October 2024 Statement of Case that adult Atlantic salmon do not spawn in the Unnamed Burn.

3.5.3 As outlined within the 2025 Kaya Consulting report the mine will reduce flows in the Unnamed Burn from between 0-5% and as a precautionary measure the impact upon flow is calculated using 5% (a reduction of c. 2 L/s). The impacts of the change in flow on average velocity, flow area and maximum water depth show negligible impacts on any of these parameters, and under average flow conditions the change in flow due to the mine is predicted to result in 2mm (0.002m) change in flow depth and a 0.003m^2 change in flow area and a 0.01m/s change in flow velocity – all unmeasurable changes. Considering the Natura 2000 guidance[6] habitat characteristics for juvenile Atlantic salmon preferenda in relation to depth (≤ 20cm for fry and underyearling parr and 20-40cm for yearling and older parr) and velocity (50-65cm/s for fry and underyearling parr and 60-75 cm/s for yearling and older parr), there are no perceived changes in relation to available habitat if any juvenile Atlantic salmon enter the burn when the Owenreagh River is in flood.

3.5.4 It is clear from the 2025 Kaya Consulting report that the Unnamed Burn becomes steep after the first 300m and aerial images show a gravel bar at the mouth of the watercourse, with the burn channel perched above the main river level, separating the two channels and spreading flow from the burn across the bar where it enters the Owenreagh River. Under average and low flow the water depths in the channel would be expected to be extremely low and would restrict the ability of the channel to support large fish, with or without the mine. This can be seen in the photographs associated with the figures in the 2025 Kaya Consulting report which are indicative of low flow conditions. It should also be noted from Figure 4-6 within this report that current flood flow and low flow conditions within the Unnamed Burn provide unfavourable conditions for juvenile Atlantic salmon.

3.5.5 In 2024 the middle section of the Unnamed Burn was surveyed (c. 100m upstream of the Owenreagh) using RHS and LCUM survey techniques by RSK Biocensus[3]. This section of watercourse was between 1.2-2m wide, shallow (5-10 cm deep), and the bed substrate was predominantly cobble. No suitable spawning sites were identified within the survey area and the Glenealy Burn offered limited habitat for juvenile Atlantic salmon. The LCUM Annex 1 Habitat Classification states that Grade 1 Atlantic salmon habitat should have 70% of the substrate in the 30-80mm diameter range with a gravel depth of 200-500mm (50-150mm for trout). The RSK Biocensus did not find any spawning redds within this section of the Unnamed Burn, and a major barrier to fish migration was observed, which was in the form of a pipe culvert which is situated circa 300m upstream of the Owenreagh confluence.

3.5.6 The hydromorphology of the Unnamed Burn was assessed by SLR Consulting during 2025 via walkover surveys[5]. The hydromorphology attributes of the watercourse was assessed via the River Hydromorphology Assessment Technique (RHAT)[7] within one reach of the Unnamed Burn. As part of the RHAT assessment the UB Reach 1 was classified as being poor under the WFD hydromorphology classification scheme due to the following modifications:

- Channel morphology and flow types
- Channel vegetation
- Barriers to continuity
- Bank structure and stability

[14] Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough

- Bank vegetation
- Riparian land use
- Floodplain connectivity.

4 DISCUSSION AND CONCLUSIONS

4.1 Flow and fish habitat

4.1.1 The overall impact of the proposed project in relation to flow is shown in Table 1, and in relation to the impact under average flows for the Pollanroe Burn it will be to add 15 litres per second (L/s) to the flow and to reduce the flow in the Curraghinalt Burn by 1.85 L/s. For the Attagh Burn there is a reduction in flow of 1.85 L/s, for the Glenealy a reduction in flow of 0.66 L/s and the Unnamed Burn a reduction in flow of 1.98 L/s under average flow.

4.1.2 Thus, the proposed project will have a barely measurable impact on the overall hydrology of the burns and the proposed project will have no impact on the physical status of the burns and accordingly will have no impact on the ability of the burns to function as habitat for various fish species.

4.1.3 It is therefore irrelevant to the project proposal how the competent authority in Northern Ireland, in this case the Loughs Agency, regard the burns in terms of their ability to provide suitable habitat for salmonids, and particularly suitable Atlantic salmon spawning and nursery habitat.

4.1.4 However, given that the competent authority, The Loughs Agency, has argued its case and put so much effort into arguing its case that the Curraghinalt and Pollanroe burns are of vital importance to the well-being of Atlantic salmon in the Foyle system, the project proposal consultant team has deemed it necessary to rebut the unreasonable and inaccurate claims made by the competent authority, The Loughs Agency, with regard to the fish and fish habitat status of the Curraghinalt and Pollanroe burns.

4.1.5 With regard to the physical habitat surveys of the Curraghinalt and Pollanroe burns carried out by the project proposal consultant team, it must be pointed out that the fisheries consultant team never had access to the lower reaches of the Pollanroe Burn and that survey results for this reach of the burn are based on aerial work. Therefore, it has not been possible for the consultant team to categorically state that the lower reaches of the Pollanroe Burn have, or do not have, suitable spawning habitat for adult Atlantic salmon.

4.1.6 The documentation relating to the status of the Pollanroe and Curraghinalt burns, tributaries of the Owenreagh and Owenkillew rivers, respectively, with regard to salmonid habitat, has been extensive and controversial.

4.1.7 In various documents The Loughs Agency has set out an opinion that these burns are very important to the overall status of Atlantic salmon in the Foyle River system. They point to the occurrence of juvenile salmon in the lower reaches of the Pollanroe Burn and emphasise that this occurrence proves that the Pollanroe Burn provides suitable spawning habit for adult Atlantic salmon and suitable nursery habitat for juvenile Atlantic salmon.

4.2 Electrofishing data

4.2.1 The project proposal consultant team has based its argument on the evidence resulting from electric fishing surveys and detailed habitat surveys of the burns. The project proposal consultant team is also basing its argument on some of the evidence and views previously presented by the competent authority, The Loughs Agency, before the Loughs Agency clearly changed its opinion on the proposed project.

4.2.2 However, based on the results of electric fishing surveys carried out by the project proposal consultant team at other sites on the Pollanroe Burn and on the results of electric fishing survey work carried out by the competent authority, on the lower reaches of the Pollanroe Burn, it is possible to present a considered view on the occurrence of juvenile salmon in the lower reaches of the Pollanroe Burn and their likely origin – in terms of where they were spawned and how they came to occupy the lower reaches of the Pollanroe Burn.

4.2.3 There is no question that juvenile Atlantic salmon have been recorded in the lower reaches of the Pollanroe Burn. The question is – how did they get there? In this document, the biology and ecology of Atlantic salmon and brown trout is reviewed with particular reference to:

- recent electrofishing surveys of the main rivers (Owenkillew and Owenreagh) and tributary burns (Pollanroe, Curraghinalt and Attagh)
- spawning habitat requirements of salmon and trout
- salmon redd counts in this part of the Foyle river system

4.2.4 The analysis below confirms that the Owenkillew and Owenreagh tributary burns are home to mainly brown trout while the Owenkillew and Owenreagh rivers are home to mainly Atlantic salmon. Juvenile salmon have been recorded in the lower reaches of the Pollanroe and Attagh burns. The following analysis reviews the evidence of their presence in these burns and rebuts claims made by the competent authority regarding the importance of these burns to salmon in the Foyle river system.

4.2.5 The results of the following electrofishing surveys are included in this assessment:

- The Loughs Agency June 2021 / Sept 2021 / Sept 2022 / Sept 2023 / Sept 2024
- Ricardo June 2022
- Aztec Management Consultants September 2025

Curraghinalt Burn (Owenkillew River tributary)

4.2.6 Within the Curraghinalt Burn only brown trout, European eel and 3-spined stickleback have been recorded.

4.2.7 The electrofishing survey of September 2025 recorded a total of 10 brown trout at a site on the burn which commenced at the Owenkillew River confluence and extended for about 71m upstream from this confluence. The average width of the site was 2.25m over a length of 71m (160m^2). Of the 10 brown trout recorded seven were 0+ fish (less than 1 year old) and three >0+ (older than one year old) fish.

4.2.8 The habitat in this section of the Curraghinalt Burn comprised small pools, bedrock and patches of shallow gravel. In no stretch of the imagination could this section of the Curraghinalt be categorised as suitable salmon spawning habitat.

4.2.9 Two sections of the Curraghinalt Burn were surveyed by Ricardo[9] on 27 June 2022 as follows:

- A lower section from the confluence upstream for a distance of 45m during which three brown trout (all >0+ (9.8 / 17 /22.5cm long) and a single European eel were recorded
- An upstream section (c. 800m long) during which a single brown trout (>0+ and 10.5cm long) was recorded.

4.2.10 A 40m long section of the Curraghinalt immediately upstream of the Curraghinalt-Owenkillew confluence was electrofished by The Loughs Agency on 10 June 2021 and a total of 2 >0+ brown trout were recorded.

4.2.11 Thus, after a total of three electrofishing surveys of the Curraghinalt Burn carried out in June 2021, June 2022 and September 2025 only brown trout, European eel and 3-spined stickleback were recorded. No juvenile Atlantic salmon were recorded. The Loughs Agency also collected a total of 24 water samples from the Curraghinalt which they claim resulted in 2 of these samples proving positive for the presence of Atlantic salmon.

4.2.12 There are several ways in which Atlantic salmon eDNA might be present in the Curraghinalt Burn as follows:

- The presence of juvenile Atlantic salmon
- The presence of Atlantic salmon DNA associated with predators e.g. spraints of otter
- False positives resulting from the eDNA analysis process.

4.2.13 We suggest that the results of a total of three electrofishing surveys of the Curraghinalt Burn trump the results of water samples purporting to demonstrate the presence of juvenile Atlantic salmon in the Curraghinalt Burn and that the Curraghinalt Burn is devoid of juvenile Atlantic salmon and of no relevance to the well-being of Atlantic salmon in the Foyle River system.

Attagh Burn (Owenkillew River tributary)

4.2.14 The electrofishing survey of September 2025 recorded a total of 19 brown trout (fifteen 0+ fish and four >0+ fish) at two sites on the burn. The survey commenced at the Owenkillew River confluence and extended for about 110m upstream from this confluence (total are fished at the two sites was estimated at 165m^2). No salmon were recorded at the upstream site while a solitary 0+ salmon parr was recorded at the confluence of the burn and river in a pool which was separated from the river by a gravel / cobble mound which had presumably been deposited at this location as a result of sediment movement in the Attagh Burn which resulted in the deposition of this mound at the confluence. The Attagh Burn cannot be considered as a burn which is of any relevance to the well-being of Atlantic salmon in the Foyle River system.

Pollanroe Burn (Owenreagh River tributary)

4.2.15 The electrofishing survey of September 2025 recorded no fish at a site on the burn which was located upstream of the road bridge and accordingly upstream of the site coded POLL_003 in other surveys. Table 2 provides a summary of the data presented within the 2025 survey report[4].

Table 2 Results of the electrofishing survey carried out on the Pollanroe Burn on 6 September 2025

Site Reference	Number of 0+ Atlantic salmon	Number of >0+ salmon	Number of 0+ brown trout	Number of >0+ brown trout
Upstream of POLL_003	0	0	0	0

4.2.16 An electrofishing survey of the Pollanroe Burn on 10 June 2021 carried out by The Loughs Agency confirmed the presence of juvenile Atlantic salmon and brown trout in the lower reaches of the burn. A summary of the Loughs Agency findings in relation to salmonid fish is presented in Table 3 below.

Table 3 Summary of Loughs Agency Atlantic salmon and brown trout Pollanroe Burn survey data[13]

Site Reference	Number of 0+ Atlantic salmon	Number of >0+ salmon	Number of 0+ brown trout	Number of >0+ brown trout
POLL_001	0	12	25	9
POLL_002	0	0	28	11
POLL_003	0	0	0	0

4.2.17 Interestingly, no 0+ juvenile Atlantic salmon were recorded at site Poll_001 on the Pollanroe which is very close to the Pollanroe-Owenreagh confluence. The capture of a total of 12 >0+ juvenile salmon suggests that they entered the Pollanroe during spate conditions in the Owenreagh River. No juvenile salmon were recorded at site Poll_002 which is some distance upstream from the Pollanroe – Owenreagh River confluence. However, large numbers of 0+ and >0+ brown trout were recorded at both Poll_001 and Poll_002.

4.2.18 An electrofishing survey of the Pollanroe Burn on 28 June 2022 carried out by Ricardo[9] at site POLL_002 confirmed the presence of juvenile Atlantic salmon and brown trout in the Pollanroe Burn. A summary of the Ricardo findings in relation to salmonid fish is presented in Table 4

Table 4 Summary of Ricardo Atlantic salmon and brown trout Pollanroe Burn survey data[9]

Site Reference	Number of 0+ Atlantic salmon	Number of >0+ salmon	Number of 0+ brown trout	Number of >0+ brown trout
POLL_002	3	12	70	6

4.2.19 The results of the 28 June 2022 electrofishing survey of the Poll_002 site is of interest because 0+ and >0+ juvenile salmon were recorded – unlike the 10 June 2021 electrofishing survey of the site by The Loughs Agency when no juvenile salmon were recorded at this site. The results of the 28 June 2022 electrofishing survey are also remarkable in that only three 0+ salmon were recorded compared to twelve >0+ salmon. In an upland burn, such relative numbers would not be unusual for brown trout because in some years brown trout ova are washed out of gravel patches in upland streams and when electrofishing surveys are carried out during the following summer months 0+ brown trout are either absent or under-represented. However, both [redacted] and [redacted] each have 30-40 years of electrofishing survey work experience and neither of us have ever come across such a result. There are a number of possible interpretations of this result as follows:

1. Adult salmon spawned close to Poll_002 during the winters of 2020-2021 and 2021-2022 and the progeny of the 2021-2022 winter spawning fared less well than those of the 2020-2021 winter spawning
2. The fish identified as three 0+ salmon were incorrectly identified as 0+ salmon (and were actually 0+ brown trout
3. The fish identified as three 0+ salmon were actually salmon-brown trout hybrids with the male parent(s) being precociously mature 1+ salmon parr

4.2.20 Of the above three possible interpretations of the electrofishing results, we suggest that interpretations 1 and 2 are the least likely to apply.

4.2.21 Based on the results of all the electrofishing surveys, it is clear that juvenile Atlantic salmon and brown trout are confined to the lower reaches of the burn and that from site POLL_003 upstream no fish are present.

4.2.22 It is also clear that juvenile Atlantic salmon were recorded at site POLL_001 in June 2021 (by The Loughs Agency) but not at site POLL_002. However, juvenile Atlantic salmon were recorded at site POLL_002 in June 2022 by Ricardo. These results highlight differences in juvenile Atlantic salmon distribution in the Pollanroe Burn between years.

4.2.23 It is also clear that where brown trout occur, the population is dominated by 0+ fish which is in keeping with the expected age distribution for small burns. It indicates that brown trout or sea trout have probably spawned in this burn during the month of November preceding the 2021 and 2022 surveys.

4.2.24 Juvenile Atlantic salmon in the Pollanroe Burn were recorded at sites POLL_001, which is immediately upstream of the burn's confluence with the Owenreagh River and at site POLL_002, which is further upstream. The dominance of >0+ juvenile Atlantic salmon at site POLL_001 in June 2021 and at site POLL_002 in June 2022 indicates that it is highly unlikely that these fish were spawned in the Pollanroe Burn and that it is far more likely that they entered the burn during hydrologically favourable conditions either in their first (in the case of the 0+ fish) or first or second year of life in the case of the >0+ fish.

4.2.25 The hydrological conditions which might allow 0+ or older Atlantic salmon parr to enter the Pollanroe Burn from the Owenreagh River could develop as follows. During a flood event in the Owenreagh River catchment area, the Pollanroe Burn (with a catchment area of just 2km^2) would be expected to reach peak discharge in advance of the Owenreagh River and also that the duration of the flood event in the Owenreagh River would be longer than that in the Pollanroe Burn. Accordingly, as the discharge in the Pollanroe Burn recedes, that of the Owenreagh River continues and the higher water levels on the Owenreagh River inundate the Pollanroe Burn at the confluence. Juvenile salmon looking for shelter from the torrent of the Owenreagh find the backwater at the confluence and enter the burn, encouraged by the receding discharge and lowering levels of suspended solids in the burn.

4.2.26 A summary of all Pollanroe Burn electrofishing data is presented in Table 5 below.

Table 5 Summary of the Pollanroe Burn electrofishing data

			Atlantic Salmon		Brown trout	
Burn Name	**Site Reference**	**Date**	**0+**	**1+**	**0+**	**1+**
Pollanroe	Poll_001	10-Jun-21	0	12	25	9
Pollanroe	**Poll_002**	**10-Jun-21**	**0**	**0**	**28**	**11**
Pollanroe	Poll_003	10-Jun-21	0	0	0	0
Pollanroe	15_025	21-Sept-21	9	0	14	5
Pollanroe	15_025	28-Sept-22	1	2	8	17
Pollanroe	15_025	07-Sept-23	8	3	12	7
Pollanroe	15_025	17-Sept-24	26	6	0	4
Pollanroe	**15_026**	**21-Sept-21**	**13**	**0**	**18**	**5**
Pollanroe	**15_026**	**28-Sept-22**	**8**	**4**	**9**	**12**
Pollanroe	**Poll_002**	**28-Jun-22**	**3**	**12**	**70**	**6**
Note: Pollanroe 15_025 = Poll_001; Pollanroe 15_026 = Poll_002; Poll_003 = site furthest from Owenreagh River						

4.2.27 On the Pollanroe Burn, site Poll_001 / 15_025 is located immediately upstream of the confluence with the Owenreagh River. It is not surprising that juvenile salmon have been recorded at this location during a number of electrofishing surveys carried out by Loughs Agency personnel (10 June 2021 / 21 Sept 2021 / 28 Sept 2022 / 7 Sept 2023 / 17 Sept 2024. What is of interest is the relative numbers of 0+ and >0+ juvenile salmon recorded during each of these surveys at site 15_025 / Poll_001 (see Table 6):

Table 6 Numbers of 0+ and >0+ juvenile salmon and brown trout recorded at site Poll_001 / 15_025

Date	Salmon (0+ / >0+)	Brown trout (0+ / >0+)
10 June 2021	0/12	25/9
21 Sept 2021	9/0	14/5
28 Sept 2022	1/2	8/17
7 Sept 2023	8/3	12/7
17 Sept 2024	26/6	0/4

4.2.28 No 0+ juvenile salmon were recorded at this site on 10 June 2021 and no >0+ juvenile salmon were recorded at site Poll_001 / 15_025 three months later (21 Sept 2021). We have no idea how this result is possible.

4.2.29 At electrofishing site Poll_002 / 15_026 which is located several hundred metres upstream from Poll_001 / 15_026, the following results were obtained during Loughs Agency personnel electrofishing surveys (see):

Table 7 Numbers of 0+ and >0+ juvenile salmon and brown trout recorded at site Poll_002 / 15_026

Date	Salmon (0+ / >0+)	Brown trout (0+ / >0+)
10 June 2021	0/0	28/11
21 Sept 2021	13/0	18/5
28 June 2022*	**3/12**	**70/6**
28 Sept 2022	8/4	9/12
***28 June 2022 survey carried out by Ricardo on behalf of the project proposer**		

4.2.30 No juvenile salmon were recorded at this site on 10 June 2021 yet three months later (21 Sept 2021) 13 0+ juvenile salmon were recorded. We have no idea how this result is possible.

4.2.31 In conclusion, there is every reason to expect juvenile salmon to occur in the Pollanroe Burn in close proximity to the confluence with the Owenreagh River. These juveniles can easily gain access to the Pollanroe during spate conditions in the Owenreagh River. However, explaining their presence at site 15_026 / Poll_002 several hundred metres upstream from the confluence with the Owenreagh is more problematical. The Pollanroe is a very small burn and in the region of 2m wide in the vicinity of the Owenreagh River. In our opinion, it does not present the requisite spatial, hydrological and habitat characteristics of adult Atlantic salmon spawners of either 1SW or MSW category.

4.2.32 The project proposer's consultant team was never allowed to gain access to Pollanroe site 15_025 / Pollanroe_001 and never allowed to carry out any electrofishing survey work at this location and, accordingly, are at somewhat of a disadvantage when it comes to interpreting results from this site.

4.2.33 However, the project proposer's consultant team did carry out electrofishing survey work at site Poll_002 / 15_026 on the Pollanroe Burn on 28 June 2022 when both 0+ and >0+ juvenile salmon were recorded. We really have no explanation why juvenile salmon would be absent from this site on 10 June 2021; why 0+ juvenile salmon would be present at this site three months later (21 Sept 2021) and why both 0+ and >0+ juvenile salmon would be present at this site on 28 June 2022 (Ricardo survey) and also on 28 Sept 2022 when the site was surveyed by Loughs Agency personnel.

4.2.34 In summary, our remit is not to reason why juvenile salmon may or may not be present in the lower reaches of the Pollanroe and Unnamed burns and even further upstream on the Pollanroe Burn in some years. The very minor changes in burn flows which will occur post mine works will have no impact on the overall hydrology of the burns and no impact on the potential of the burns to support juvenile Atlantic salmon in their lower reaches. It is understood that the Curraghinalt Burn has been in receipt of water from the underground mine workings since 1987 (Discharge consent No. 10611/87). In 2014, this existing discharge of water was issued a new consent (Consent No. 068/12/2) for a maximum considered flow rate of up to 9.75 L/s. Discharge measurements for 2025 are likely to show an average flow rate of 4-5 L/s. No concerns have been raised by anyone in relation to the hydrology and salmonid habitat of the Curraghinalt Burn - because no changes have been detected. The proposed consent to Curraghinalt Burn, represents an approximate 30% increase in the flow rate currently permitted (i.e., up to 12.6 L/s).

Unnamed Burn (Owenreagh River tributary)

4.2.35 The electrofishing site on the Unnamed Burn is very close to its confluence with the Owenreagh River. It is not therefore surprising that 0+ and >0+ juvenile salmon were recorded at this location. The results do not provide evidence that adult salmon spawned in the lower reaches of the Unnamed Burn and it is more likely that juvenile salmon entered this part of the Unnamed Burn mainly during their first year of life (as 0+ fish) during spate conditions in the Owenreagh River.

4.2.36 Electrofishing surveys of the Unnamed Burn has been carried out by the Loughs Agency from September 2021 to September 2024. A summary of the Loughs Agency findings within their submission to Donegal County Council (April 2025) in relation to salmonid fish is presented in Table 8 below.

Table 8 Summary of Loughs Agency Atlantic salmon and brown trout Unnamed Burn survey data

			Atlantic Salmon		Brown trout	
Burn Name	**Site Reference**	**Date**	**0+**	**1+**	**0+**	**1+**
Unnamed	15_024	21-Sept-21	4	1	9	0
Unnamed	15_024	28-Sept-22	7	3	8	2
Unnamed	15_024	07-Sept-23	10	0	24	0
Unnamed	15_024	17-Sept-24	15	1	0	0

Conclusions of the survey data

4.2.37 The absence of brown trout in the 17 Sept 2024 survey is hard to interpret as this species is somewhat ubiquitous in the burns.

4.2.38 With regard to the status of the Curraghinalt and Pollanroe burns, The Loughs Agency commented in their June 2021 electrofishing survey report that 'In the case of the Curraghinalt Burn the range of habitat which was accessible to fish was small, but nevertheless it was felt that it would at the very least provide a refuge for juvenile salmonids in times of spate in the main Owenkillew River. The Pollanroe Burn was deemed to have a greater expanse of suitable habitat capable of providing spawning, nursery and pockets of holding. Therefore, all three habitat types required for salmonids to complete their life cycle were judged to be present in the lower section of the Pollanroe Burn.'

4.2.39 The key question here is the origin of the Atlantic salmon parr which were recorded on the lower reach of the Pollanroe Burn and in the case of the Attagh Burn, the single salmon parr which was recorded in the small pool at the confluence with the Owenkillew River. Were these Atlantic salmon parr spawned in the Pollanroe and Attagh burns?

4.2.40 The physical dimensions of the lower reaches of the burns preclude them being utilised by adult Atlantic salmon for spawning purposes. The spawning habitat requirements for one-sea-winter (ISW) and multi-sea-winter (MSW) salmon are well understood and the physical dimensions of the burns, their hydrology (river flows and water velocities) and morphology (gravel dimensions, extent and depth of gravel) make them entirely unsuitable for spawning sea run adult salmon of any sea age.

4.2.41 In the first instance, there is a need to define the term 'salmonid' which is widely used by the competent authority, The Loughs Agency, in documentation relating to the project proposal and to clarify what is meant by a brown trout / sea trout. In the documentation the term 'salmonid' relates to two species which occur in the Foyle system and in the Owenkillew / Owenreagh sub-catchment areas, namely, Atlantic salmon (*Salmo salar* L.) and brown trout (*Salmo trutta* L.). The vast majority of juvenile Atlantic salmon which survive into their second, third and even fourth year of life in freshwater physiologically transform as 1-yr-old / 2-yr-old / 3-yr-old 'smolt' and migrate to sea. Some males belonging to these year classes will also have matured sexually and as a consequence do not survive their time at sea as well as immature smolts. With regard to brown trout, some of these juveniles in their second / third or fourth year of life can also physiologically transform into 'smolt' and migrate to sea and return to freshwater as immature or maturing fish after perhaps only a few months at sea. It is not possible to morphologically identify potential sea trout among juvenile brown trout prior to smoltification and it is possible to separate sea run trout from their freshwater resident conspecifics using growth rate and chemical composition of scales. Thus, we can say that in sea trout producing catchments, sea trout and brown trout are one and the same species with one component becoming migratory and the other remaining resident in freshwater.

4.2.42 Both the Curraghinalt and Pollanroe burns are upland burns with relatively high gradient and with hydrological and stream bed characteristics which would be considered mainly harsh in the context of suitability for juvenile salmonids. They typically offer short sections of riffle habitat interspersed with small pools. This type of habitat typically supports 0+ salmonids, mainly 0+ brown trout and some older individuals, again mainly brown trout, which inhabit the small pools.

4.2.43 The long-term information on the salmonid populations in the Owenkillew and Owenreagh rivers indicates that the salmonid population is dominated by juvenile salmon, mainly 0+ individuals, in river sections selected as index study sites and where electrofishing survey work has been carried out. In the burns which are tributaries to these rivers, it has been found that the salmonid populations are dominated by brown trout. At burn locations which are in close proximity to the Owenkillew and Owenreagh rivers, 0+ and >0+ juvenile salmon have also been recorded e.g. Pollanroe and Attagh.

4.2.44 It is probable that the 0+ and older brown trout which were recorded in the Curraghinalt and Attagh and Pollanroe burns were spawned in these burns because mature resident brown trout, perhaps less than 15cm in fork-length, require only a small patch of shallow gravels in which to spawn. The redd of such a female might have a total length (pot and tail) of 60cm, a width of 25cm and eggs might be buried to a depth of 5cm[15]. Burns like the Curraghinalt, Pollanroe and Attagh represent harsh environments for juvenile salmonids and ova deposited in redds and it is not uncommon for eggs in such shallow redds to be lost during winter spates resulting in the complete absence of 0+ brown trout the following year. While it is possible that the brown trout recorded in these burns during electrofishing surveys were spawned in these burns, and perhaps spawned by brown trout or sea trout which entered the burns from the Owenkillew and Owenreagh rivers, it is almost certain that the 0+ and >0+ juvenile salmon recorded in the lower reaches of these burns (Pollanroe and Attagh) were not. This document will demonstrate that it is certain that 0+ salmon occupying salmonid habitat

[15] Crisp DT and Carling PA (1989). Observations on siting, dimensions and structure of salmonid redds. Journal of Fish Biology 34: 119–134

in the lower reaches of these burns are 'accidental' visitors which probably ascended into the lower reaches of these burns during flood events in the Owenkillew and Owenreagh rivers.

4.2.45 Just as it is certain that adult salmon do not spawn in the Curraghinalt or Attagh burns and almost certain that adult salmon do not spawn in the Pollanroe Burn, it is most likely that the 0+ and older brown trout which were recorded in these burns were spawned in these burns because the salmonid spawning habitat required for a 15cm long brown trout in terms of extent and depth of suitable gravels is probably available at many locations along these burns while this is not the case for adult salmon.

4.2.46 Consider an adult one-sea-winter (1SW) female Atlantic salmon with a fork-length of 60cm. Crisp and Carling (1989) described the redd dimensions (pot depth and width / tail length and width / egg pocket locations etc) of salmonids with a range of fork-lengths and these are described in Figure 1 and Figure 2.

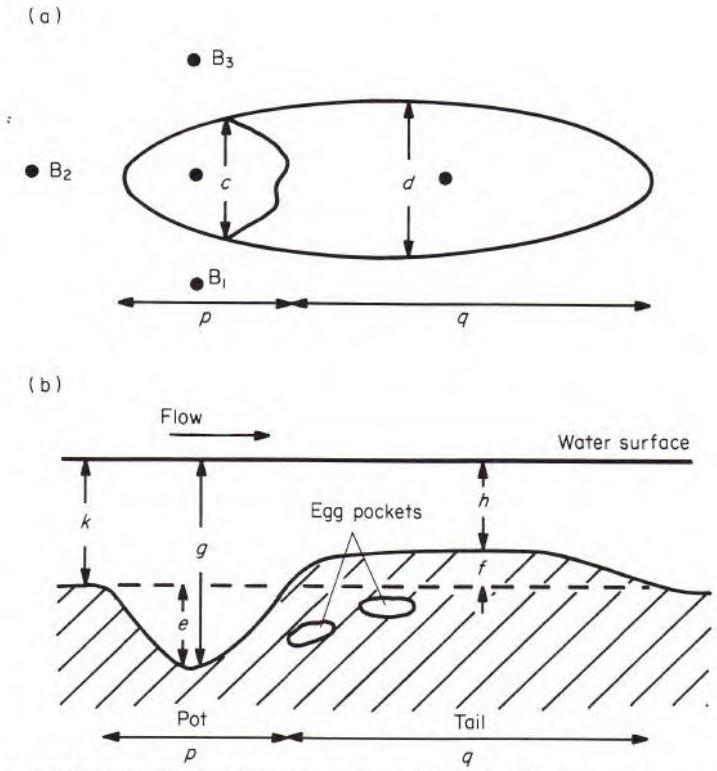

FIG. 1. (a) Plan and (b) longitudinal section of a redd, showing the dimensions measured and positions of measurements. B_1, B_2 and B_3, points for measurement of water depth around pot and water velocity at 0·6 that of depth; k, mean depth at B_1 B_2 and B_3; g, depth at the deepest part of the pot; h, depth over the middle of the tail; e, pot depth $= g - k$; f, tail height $= k - h$; p and c, respectively, length and width of pot; q and d, respectively, length and width of tail.

Figure 1 Salmon redd dimensions (after Figure 1 of Crisp and Carling 1989)

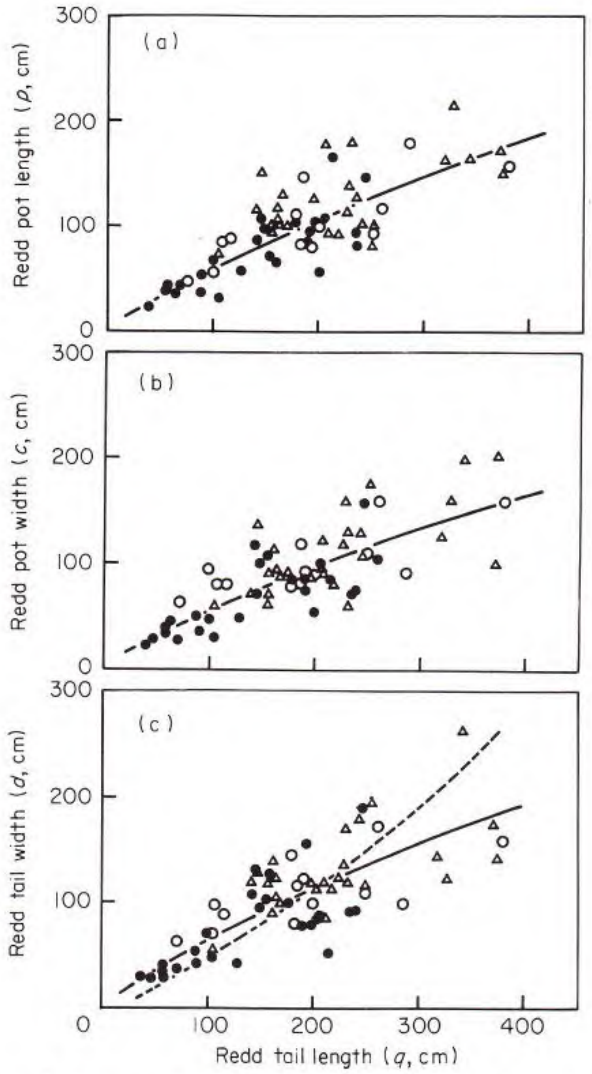

FIG. 4. Plots of data points and of curves relating horizontal dimensions of redds: (a) pot length *v.* tail length; (b) pot width *v.* tail length; (c) tail width *v.* tail length. The linear regressions (logarithmically transformed) upon which the curves are based are shown in Table V. In (c) the solid curve is derived from the regression of ln *d* upon ln *q* and the broken curve from the regression of ln *q* upon ln *d*.

Figure 2 Relationship between redd tail length and red tail width, redd pot width and redd pot length (after Figure 4 of Crisp and Carling 1989)

4.2.47 Accordingly, the following Atlantic salmon redd dimensions shown in Table 9 apply:

Table 9 Atlantic salmon redd dimensions (after Crisp and Carling 1989)

Length of female Atlantic salmon	Length of redd tail (m)	Length of redd pot (m)	Width of redd tail (m)	Area of redd (m^2)
60cm	2	1	1	3
80cm	3.5	1.7	2	10.4

4.2.48 Furthermore, Atlantic salmon egg burial depths in the redd tail would typically be 10-20cm.

4.2.49 Crisp and Carling (1989) also reported that of the 65 salmonid redds they studied, sixty-four of the sixty five females chose a site which was deeper than the maximum depth of their bodies (Figure 3). Typically, the maximum depth of a salmonid fish is 1/6 (16.6%) of the fish fork-length. Thus, a 60cm long 1SW salmon would have a maximum body depth of 10cm.

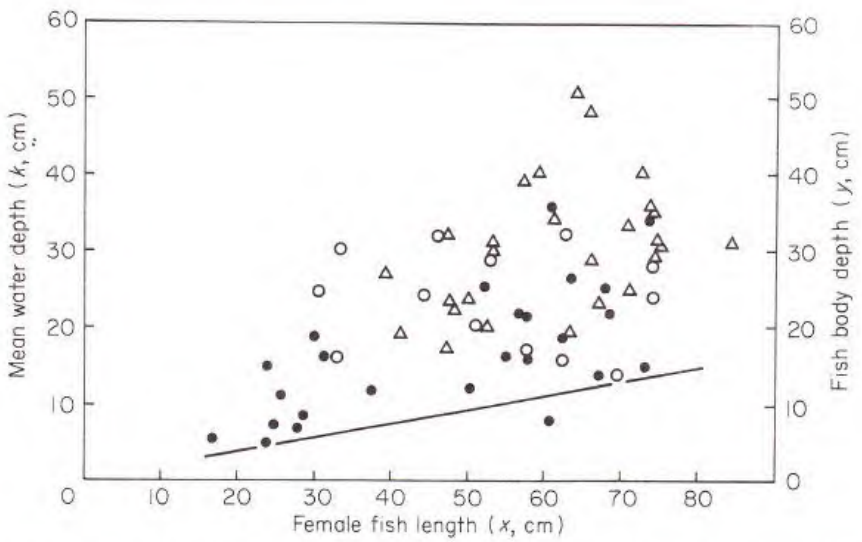

FIG. 3. Plot of mean water depth around each redd (k, cm) against length (x, cm) of female fish. Symbols as in Fig. 2. The regression line $y+bx+a$ is also shown, where y is fish body depth (cm), x is fish length (cm), $b=0{\cdot}176\pm0{\cdot}0136$ (95% C.L.), $a=0{\cdot}76\pm0{\cdot}67$, $r^2=0{\cdot}92$, and $n=61$.

Figure 3 Relationship between water depth, female length and female body depth (after Figure 3 of Crisp and Carling 1989)

4.2.50 From Figure 3 it is evident that the majority of females chose spawning sites where the water depth was significantly deeper than their body depth. Water depths of 20, 30 or 40cm in the Curraghinalt, Pollanroe and Attagh burns would only be achieved during spate conditions and would be accompanied by high water velocities which would almost certainly be in excess of the range (>15cm sec^{-1} / <2 body lengths sec^{-1}) described in Figure 4 below (Figure 2 from Crisp and Carling 1989).

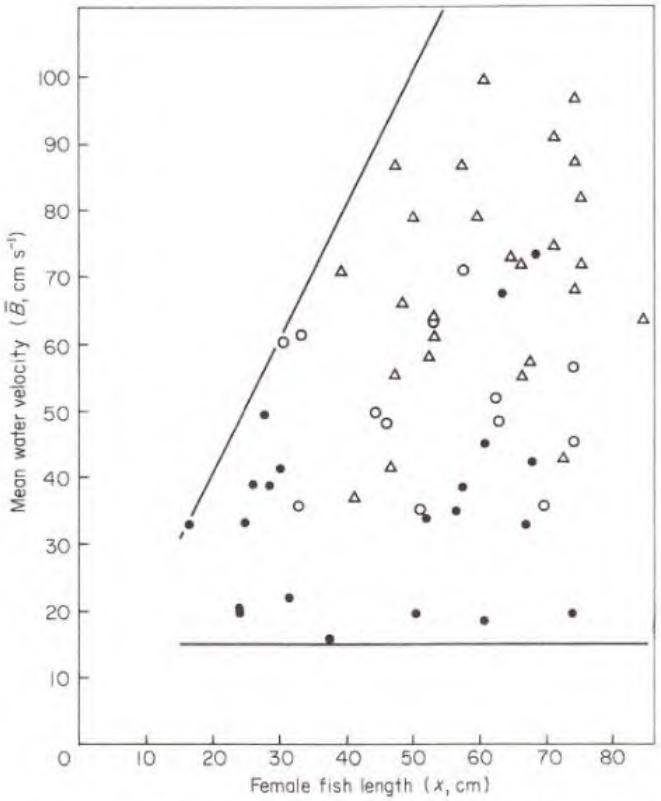

FIG. 2. Plot of mean water velocity ($\bar{B}$, cm s^{-1}) at 0·6 of depth around the redd against length (x, cm) of female fish for north-east England (●, $n=21$), south-west Wales (○, $n=13$) and Dorset (△, $n=27$). The lines $\bar{B} \div 15$ and $\bar{B} \div 2{\cdot}0\,x$ are also shown.

Figure 4 Water velocity at 0.6 depth in the vicinity of redd sites chosen by female salmonids (after Figure 2 of Crisp and Carling 1989).

4.2.51 Finally, with regard to the likelihood that 0+ and >0+ juvenile salmon recorded in the lower reaches of the Pollanroe and Attagh (0+ only) burns were fish which were spawned in the Owenreagh and Owenkillew rivers, respectively, Crisp[16] showed that unfed salmon fry which were stocked at a single location (point stocking) had occupied territories up to 500m downstream and up to 50m upstream of the stocking location by September of the same year. In a similar way, 0+ salmon which were spawned in the Owenkillew in close proximity to the Attagh burn and in the Owenreagh in close proximity to the Pollanroe could easily move into these burns in search of unoccupied territories or be displaced from these rivers during flood events.

4.3 Redd counts in the relevant part of the Foyle River system

4.3.1 In various annual assessments, the competent authority, The Loughs Agency, has presented information on the numbers and distribution of Atlantic salmon redds (spawning sites of each female salmon) in the relevant part of the Foyle River system, namely the catchments of the Owenkillew and Owenreagh rivers.

4.3.2 The data on redd distribution is presented as a 'composite' picture whereby the information on redd locations in any given year is combined with information collected during several additional years. The Loughs Agency documentation is clear about the difficulties involved in compiling redd counts.

[16] Crisp, D.T. (1994). The ecology of young stages of salmonid fish and the implications for practical river management. Institute of Freshwater Ecology UK.

The salmon spawning season may last only a matter of a few weeks and unless a reach is surveyed on a regular basis redds may be missed due to intervening flood events which have the potential to flatten and thus obscure the presence of cleaned gravel and the classic pot-tail redd structure. It would appear that no information is gathered on redd dimensions and thus the possibility of assigning a redd to a 1SW or MSW salmon or a sea trout is missed. The evidence from scientific assessments of salmon spawning activity is that frequent and demanding visits to areas where salmon are known to spawn is necessary to obtain comprehensive information. For example, Moir *et al* (2006)[17] stated that in each of three spawning seasons on a 9km long section of a Scottish river, observation surveys began on the commencement of spawning activity and continued until only sporadic incidents were detected, typically after 2 to 3 weeks. On each day when a survey was undertaken, the length of the stream from the confluence with the Black Water to the upstream limit of spawning (a waterfall impassable to fish 9 km upstream) was walked in daylight hours (0800 to 1600). A total of 49 days was spent walking the stream over the three study seasons (15 in 2000, 20 in 2001, and 14 in 2002). Such a demanding survey programme is not possible in a catchment area the size of the Owenkillew / Owenreagh, never mind the entire Foyle River system. Accordingly, it would be more appropriate for The Loughs Agency to intensively study shorter 'index' reaches each year and perhaps also consider recording the dimensions and precise locations of redds. According to The Loughs Agency, a redd was recorded in the Pollanroe Burn. However, the record of this redd cannot be assigned to any particular year and because the dimensions were not recorded it cannot be identified as having been constructed by a 1SW or MSW female salmon or much more likely a female sea trout. Atlantic salmon utilize a variety of stream widths for spawning, but they tend to prefer areas with suitable water depth, velocity, and gravel substrate. While they can spawn in streams as narrow as 3 metres, they also utilize larger river systems, with spawning activity influenced by factors like channel morphology and flow conditions. Individual redds are typically 2-5 metre long, 1-1.5 metres wide, and 0.2-0.3 metres deep and redd dimensions are generally related to the size of spawning female. Louhl *et al* (2008)[18] provide a literature review of the characteristics of spawning habitat of Atlantic salmon and brown trout and general criteria and intra-gravel factors which determine spawning site selection. Ottaway *et al* (1981)[19] made detailed observations on the structure of brown trout redds. The article by Moir *et al* (2006) described not only site selection by spawning Atlantic salmon in a Scottish stream but also the influence of flows and hydraulic conditions on spawning activity and concluded that adult salmon do not spawn during conditions of rapidly changing discharge.

4.3.3 It seems obvious to the project proposal consultant team that adult Atlantic salmon do not spawn in the lower reaches of the Pollanroe Burn, not only because the habitat requirements of spawning salmon (dimensions and depths of available spawning gravels) are not met but also because the required hydrology (suitably constant flows at suitable water velocities which provide adequate water depths for spawning fish) of the burn are not in keeping with the requirements of spawning adult Atlantic salmon.

[17] Moir HJ, Gibbins CN, Soulsby C and Webb JH (2006). Discharge and hydraulic interactions in contrasting channel morphologies and their influence on site utilization by spawning Atlantic salmon (Salmo salar). Canadian Journal of Fisheries and Aquatic Science 63: 2567–2585.

[18] Louhl P, Maki-Petays A and Erkinaro J (2008). Spawning habitat of Atlantic salmon and brown trout: general criteria and intra-gravel factors. River Research and applications 24: 330–339.

[19] Ottaway EM, Carling PA, Clarke A and Reader NA (1981). Observations on the structure of brown trout, Salmo trutta Linnaeus, redds. Journal of Fish Biology 19: 593–607

4.4 Assessment of the value of the five burns (Pollanroe, Unnamed, Curraghinalt, Attagh and Glenealy) to Atlantic salmon in the Foyle River system

4.4.1 The Foyle catchment area extends to 4450km^2 (Newton *et al* 2016)[20]. The combined catchment areas of the five burns of interest is 6.1km^2 (0.14% of the entire catchment area). These statistics should help readers to put the status of the burns, with regard to their importance to Atlantic salmon in the Foyle catchment, in perspective.

4.4.2 The evidence presented in this document shows that the Curraghinalt Burn (catchment area 1km^2) and the Attagh Burn (catchment area 0.6km^2) do not support juvenile Atlantic salmon. Accordingly, the combined catchment area of the remaining burns totals 4.5km^2 (0.10% of the entire Foyle catchment area).

4.4.3 However small the burn catchment areas are in the context of the Foyle River system, The Loughs Agency, the competent authority, is at pains to explain that the salmon of the burns are functionally linked with the salmon of the Owenkillew SAC and further downstream with the River Finn SAC. The Loughs Agency has argued that this is so because Atlantic salmon smolt, originating from the burns, migrate downstream through a component of the River Finn SAC where they have the potential to interact with other Atlantic salmon smolt migrating from the River Finn SAC. This is biologically meaningless.

4.4.4 Atlantic salmon smolts migrating from the Owenkillew SAC have the potential to mingle with Atlantic salmon migrating from the River Finn SAC because, in general, smolt migrating from different parts of a catchment tend to arrive at the lower reaches of a catchment and its estuary with timing which provides them with the best prospects of survival in terms of freshwater / estuary / marine temperature conditions. But that is where the similarities end. Smolts from different catchment areas may mingle and form aggregations but they don't impact each other – they don't prey on each other and they don't impact each other's relative survival during their migration. The logical extension of the Loughs Agency thinking is that salmon smolt emanating from the Foyle River system should be linked to the SAC's of other catchments throughout Ireland because they may intermingle during their marine migration en route to the North-East Atlantic Ocean feeding areas.

4.4.5 There are other concerns which could occupy the attention of The Loughs Agency with regard to the status of Atlantic salmon in the Owenkillew and River Finn SACs and these include the high mortality of salmon smolt migrating through Lough Foyle which has been estimated at 82% by Newton *et al* (2018)[21]. The Loughs Agency has fish and fisheries jurisdiction here and can implement fisheries management initiatives to address this issue.

4.4.6 Similarly, The Loughs Agency determines and implements Atlantic salmon management regulations throughout the Foyle River system. Currently, licenced salmon anglers are allowed to harvest rod caught fish and are also encouraged to practice catch and release – even if their allowable rod catch harvest has not been achieved. By allowing harvest angling and catch and release angling in the Foyle River system, The Loughs Agency is interfering with the achievement of the objectives of SACs within the Foyle catchment area with regard to Atlantic salmon.

[20] Newton M, Barry J, Dodd JA, Lucas MC, P. Boylan P and Adams CE (2016). Does size matter? A test of size-specific mortality in Atlantic salmon Salmo salar smolts tagged with acoustic transmitters. Journal of Fish Biology (2016) 89, 1641–1650.

[21] Newton M, Barry J, Dodd JA, Lucas MC, Boylan P and Adams CE (2018). A test of the cumulative effect of river weirs on downstream migration success, speed and mortality of Atlantic salmon (Salmo salar) smolts: An empirical study. Ecology of Freshwater Fish. 2018;1–11.

4.4.7 Interestingly, Lennox *et al* (2017)[22] also include unpublished results for the River Bann (Kennedy, unpublished) where a total of 11 angled salmon were tagged (average total length 58cm / average water temperature at tagging 20°C) of which 5 did not survive (45.4%) and this would appear to confirm the conclusion of Lennox *et al* (2017) that warmer water temperatures at capture / tagging impair the survival potential of tagged fish. It also confirms that salmon released after capture by angling do not survive their ordeal.

4.4.8 Investigating the low survival of salmon smolt migrating through Lough Foyle and re-assessing salmon angling regulations are just two ways The Loughs Agency could improve the status of Atlantic salmon in SACs in the Foyle catchment area.

4.4.9 Finally, throughout The Loughs Agency >60 page submission to Donegal County Council dated 23 April 2024 under the heading 'Transboundary Consultation TB 25.01: Curraghinalt Project' the term 'This is wrong' has been used on twenty occasions in relation to text prepared by the project proposal consultant team. This term is disrespectful to the professionals engaged by the project proposer and implies a dogmatic approach to the project by Loughs Agency personnel. The Loughs Agency personnel involved in the preparation of their submission to Donegal County Council are, presumably, professionals of long-standing and they should appreciate that the professionals engaged by the project proposer are similarly professionals of long-standing who do not engage in the submission of 'bare opinion'.

[22] Lennox RJ, Cooke SJ, Davis CR, Gargan P, Hawkin LA, Havn TB, Johansen MR, Kennedy RJ, Richard A, Svenning M-A, Uglem I, Webb J, Whoriskey FG and Thorstad EB (2017). Pan-Holarctic assessment of post-release mortality of angled Atlantic salmon Salmo salar. Biological Conservation 209:150–158

APPENDIX A – SITE PHOTOGRAPHS

Attagh Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS1 Start Looking Upstream 	**RHS1 Start** Looking Downstream 
Confluence with Owenkillew River 	**Confluence with Owenkillew River** 
Major ford barrier to fish migration 	**Major ford** Looking Downstream 

Attagh Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS2 Looking Upstream 	**RHS2** Looking Downstream 
RHS3 Looking Upstream 	**RHS3** Looking Downstream 
Intermediate ford Barrier to fish migration 	**Intermediate ford** Barrier to fish migration 

Attagh Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS5 Looking Upstream 	**RHS5** Looking Downstream 
Road Culvert Looking Upstream 	**Road Culvert** Looking Downstream 

Attagh Burn site photographs from electrofishing survey – 06/09/2025	
Major ford Looking Upstream 	**Above major ford** Looking Upstream 

Attagh Burn site photographs from electrofishing survey – 06/09/2025	
Below intermediate ford	**Major ford** Looking Downstream
	

Attagh Burn site walkover photographs – 07/08/2025	
Attagh Burn Looking Upstream	**Attagh Burn** Looking Upstream
	

Curraghinalt Burn site photographs from electrofishing survey – 06/09/2025	
Above Owenkillew confluence Looking Upstream 	**Above confluence** Looking Upstream 
Downstream of chute Looking Upstream 	**Downstream of chute** Looking Upstream 

Curraghinalt Burn site walkover photographs – 07/08/2025	
Curraghinalt Burn Looking Upstream 	

Glenealy Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS1 Start Looking Upstream 	**RHS1 Start** Looking Downstream 
Chute barrier to fish migration 	**Chute** Looking Downstream 
RHS2 Looking Upstream 	**OK RHS2** Looking Downstream 

Glenealy Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS4 Looking Upstream 	**RHS4** Looking Downstream 
Downstream of ford Looking Upstream 	**Downstream of ford** Looking Upstream 
RHS5 Looking Upstream 	**RHS5** Looking Downstream 

Glenealy Burn site walkover photographs – 07/08/2025	
Glenealy Burn Looking Downstream	**Glenealy Burn** Confluence with Owenkillew
	

Pollanroe Burn site photographs from electrofishing survey – 06/09/2025	
Above Crockanboy Road Looking Downstream	**Above Crockanboy Road**
	

Pollanroe Burn site photographs from electrofishing survey – 06/09/2025	
Above Crockanboy Road Looking Upstream	**Above Crockanboy Road** Looking Upstream
	

Unnamed Burn site walkover photographs – 07/08/2025	
Unnamed Burn Looking Upstream	**Unnamed Burn** Looking Upstream
	

Unnamed Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS1 Start Looking Upstream 	**RHS1 Start** Looking Downstream 
RHS2 Looking Upstream 	**RHS2** Looking Downstream 
Bank poaching Looking Downstream 	**Bank poaching** Looking Downstream 

Unnamed Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS3 End Looking Upstream 	**RHS3** End Looking Downstream 
RHS4 Looking Upstream 	**RHS4** Looking Downstream 
Pipe culvert Upstream End 	**Pipe culvert** Downstream End 

Unnamed Burn site photographs from RHS/Fish habitat survey – 05/11/2024	
RHS5 Looking Upstream	**RHS5 Start** Looking Downstream
	

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