atmos CONSULTING

C0233-ATM-GES-ZZ-RP-X-0005

Technical Report

Fish Habitat Assessment Report

Snowdonia VIP Project - Water Discharge

HOCHTIEF UK Ltd

January 2023

Contents

Document Prepared For

David Murray
Project Manager - SVIP

Document Prepared By

Connor McKinnie
Ecological Consultant
connor.mckinnie@atmosconsulting.com

Document Approved By

Dr Greg Fullarton
Regional Director
greg.fullarton@atmosconsulting.com

Version	Date	Reason
P01	10/01/2023	Internal review
P02	27/01/2023	Draft Issued for Client Comment

1 Introduction

1.1 Terms of Reference

Atmos Consulting Ltd (Atmos) were commissioned by Hochtief UK Ltd (HUK) in November 2022 to undertake a fish habitat assessment in relation to discharge/extraction consent being sought in four locations.

The survey was undertaken in order to assess fish habitat in the watercourses that could potentially be affected by the proposed works. This comprised the stretch of river that is subject to reduced flows, as well as further stretches extending approximately 100m upstream and 500m downstream. An assessment of existing instream obstacles to fish migration was also undertaken. These areas are termed the 'survey area' and are shown in Figure 1 (Appendix A refers).

Atmos are supporting the applications with a Fish Habitat Assessment (FHA) and Habitat Regulations Assessment (HRA), which is covered in a separate report, reference C0233-ATM-GES-ZZ-RP-0004.

1.2 Site Location and Description

The Site is split over two locations, either side of the Dwyryd Estuary, located in Gwynedd, Wales. The first site is the Cilfor site, which is located just outside of Llandecwyn, within Snowdonia National Park. The second site is the Garth site and this is located just outside of Minffordd, within the jurisdiction of Gwynedd County Council. The works involve undergrounding an existing overhead line, and the two tunnel head houses are located in each of the sites above.

The four locations seeking consent are existing watercourses, shown in figure 1 and table 1, below.

Table 1: Discharge/Abstraction Location Points

Location	Grid Reference	Proximity to designated site
Discharge point 1 – Cilfor	SH61813788	1.6 km from Oakwood Bat SAC and 0.1 km from Lleyn Peninsula SAC.
Discharge point 2 - Cilfor	SH61813793	1.5 km from Oakwood Bat SAC and within Lleyn Peninsula SAC.
Discharge point 3 – Garth	SH58963902	Within Oakwood Bat SAC and 1.3 km from Lleyn Peninsula SAC.
Discharge point 4 – Garth	SH59243857	0.1 km from Oakwood Bat SAC and 1.1 km from Lleyn Peninsula SAC.

1.3 Objectives

This report assesses the value of fish habitat within the survey area and makes an assessment on the likely presence of salmonids within the survey area.

This report details the following:

- Legislative context;

- Review of existing information;
- Field survey methodology;
- Field survey results; and
- Evaluation and recommendations.

1.4 Desk Study

There are three main watercourses within the study area. From north to south are: the River Glaslyn, an unnamed watercourse approximately 400m south-east of the River Glaslyn and a second unnamed watercourse approximately a further 2.9km away towards the east south-east.

The River Glaslyn is a 26km long river with its source at Glaslyn Lake at an altitude of 605m. Within the study area, the River Glaslyn passes beneath the A487 road and a railway bridge before extending 500m towards a salt marsh. The River Gaslyn is a noted river for sea trout[1] and also contains a population of salmon. 2019 monitoring by NRW[2] grades salmon par, trout parr and fry as either fair or poor and salmon fry as good.

One of the unnamed watercourses runs through agricultural fields and discharges into the saltmarsh adjacent to the River Glaslyn. The other unnamed watercourse also flows through agricultural fields but empties into a saltmarsh forming part of the River Dwyryd system. Both watercourses appear to act as drains from surrounding land use.

A search of freely available datasets from the Biological Records Centre (Database for the Atlas of Freshwater Fish) held within the National Biodiversity Network (NBN) Atlas was undertaken - there are records of Atlantic salmon (*Salmo salar)* and brown/sea trout (*Salmo trutta*), brook charr (*Salvelinus fontinalis*), brook lamprey (*Lampetra planeri*), European eel (*Anguilla Anguilla*) and pike (*Esox Lucius*) within 5km of the site. There are no designated site relating to fish in proximity to the site.

1.5 Legislative Context

Atlantic salmon are an internationally important species and are listed under Annex II and V of the European Habitats Directive (1992) (only in freshwater), and Appendix III of the Bern Convention (1979) (only in freshwater). They are also a UKBAP Priority List species.

Brown/sea trout do not receive extensive protection within conservation legislation although sea trout are further protected within fisheries acts relating to the protection of 'salmon'. Brown/sea trout are also on the UK Biodiversity Action Plan Priority Species List while the European eel is listed on the UKBAP Priority Species List in 2007.

[1] Glaslyn Angling Association - Fishing in Wales (fishingwales.net)

[2] https://cdn.cncdev.net/media/692092/accessible-glaslyn-kyr-2019-checked.pdf

2 Methodology

2.1 Field Surveys

The fish habitat survey was undertaken by Connor McKinnie, assisted by Frances MacCormack on 14th December 2022. The survey method primarily followed a modified version of the methodologies developed by Hendry and Cragg-Hine (1997), and the Scottish Fisheries Co-ordination Centre (2007) with areas of habitat defined as detailed in Table 1 below. Spawning redds where present and accessible, would be described in terms of stability, compaction and notes on the degree of siltation present within the spawning redds. In addition to notes on physical channel morphology, notes were also taken on bankside structure and surrounding land use.

Table 2: Fish Habitat Classification

Habitat Type	Classification
Spawning redds	Stable gravel up to 30cm deep that is not compacted or contains excessive silt. Substrate size with a diameter of 0.8 to 10.2cm.
Fry habitat *	Shallow (< 0.2m) and fast flowing water indicative of riffles and runs with a substrate dominated by gravel (16 - 64mm) and cobbles (64 – 256mm).
Parr habitat *	Riffle – run habitat that is generally faster and deeper than fry habitat (0.2 - 0.4m). Substrate consists of gravels (16 - 64mm), cobbles (64 – 256mm) and boulder (> 256mm).
Glides	Smooth laminar flow with little surface turbulence and generally greater than 0.3m deep.
Pools	No perceptible flow and usually greater than 1m deep.
Flow constriction	Where flows are accelerated between narrow banksides (usually combined with deep fast flows and bedrock substrates).
Obstacles/Barrier	A structure or item identified as a potential obstruction to fish passage at certain water heights.

** If significant amounts of fry and parr habitat were found to co-exist in the same section, these habitat classifications are often combined and classified as juvenile habitat. Where parr habitat is mentioned this will refer to habitat that has principally been identified as habitat more suited to parr than fry, however will habitually contain a lower quantity of fry habitat and habitat which is suited to both fry and parr.*

The survey comprised, a walkover, noting physical morphology throughout the potentially impacted reach, as well as upstream and downstream with potential existing obstacles to migration being noted. The results of the survey were mapped and are presented in Figure 1 (Appendix A refers).

Photos and target notes were recorded in the context of varying fisheries habitat / flow types, and obstacles / barriers along the survey reach. Photos are provided in Appendix B and descriptive target notes in Table 4.

On the basis of the fish habitat classification, each stretch was allocated a fish habitat quality band (Low, Medium, Good, High) – this is a further subjective assessment based on the survey information to give a quick overview of the usefulness of each stretch for fish.

2.2 Analysis

Data collected via the site walkover was used to analyse and evaluate the quality of the habitat for fish, including fish migration and utilisation potential for juvenile and adult fish.

2.3 Limitations

The watercourses could not be surveyed in full due to access restrictions and health and safety. These included unscalable fences/walls, railway lines and saltmarshes preventing access. However, suitable assessment of the watercourses was still possible with the access that was available to the surveyors on the day. Where access was available channel features, substrate and areas of fish habitat were fully visible. It is considered that for the purpose of the survey, these limitations were not considered significant.

3 Results

3.1 Fish Habitat

This section of the report summarises the findings of the survey. Results of the habitat survey and fish habitat quality assessment are provided in Table 2 below with supporting photographs typifying the survey stretch provided in Appendix B. The table should be read in conjunction with Figure 1 (Appendix A refers) which shows the fish habitat results on a map. Both the information provided in Table 2 and the photographs are presented from the downstream extent of the survey area, working sequentially upstream. When left and right hand bank are referred to, this is taken from the perspective of looking downstream.

Abbreviations used are "d/s" which refers to "downstream" and "u/s" to "upstream".

Table 3: Fish Habitat Quality Assessment

Target note	Site Ref / photo no.	Hendry and Cragg-Hine Category	Reach/Obstacle Description	Watercourse Modification	Migratory Fish Access	Fish Habitat Quality
UNAMED WATERCOURSE 1						
1	Photo 1	Fry	Looking downstream. Slow run with low flow. Muddy, leafy substrate. Poor fry habitat.	No	Passable	Low
2	Photo 2	Fry	Bankside vegetation providing good cover for fry.	No	Passable	Medium
3	Photo 3	N/A	Sewage fungus in watercourse. Poor conditions for fish	No	Passable	Low
4	Photo 4	Fry	Pipe culvert. Watercourse 30 cm deep and 1m wide. Passable for migrating fish.	Yes	Passable	Low
5	Photo 5	Fry	Bridge culvert. Low flow, silty muddy substrate and sewage fungus visible. Poor conditions for fish.	Yes	Passable	Low
6	Photo 6	Fry	Glide, 2m wide, 50cm deep. Silty, muddy substrate with sewage fungus present.	No	Passable	Low
7	Photo 7	N/A	Significantly polluted watercourse with sewage fungus.	No	Passable	Low
8	Photo 8	N/A	Water outlet from sewage treatment plant.	Yes	Passable	Low
9	Photo 9	Fry	Pipe culvert, passable for migratory fish.	Yes	Passable	Low
10	Photo 10	Fry	Bridge, 1m wide. Passable for migratory fish.	Yes	Passable	Low
11	Photo 11	Fry	Glide, silty substrate. 2m wide, 50cm deep. Poor quality habitat for fish.	No	Passable	Low
12	Photo 12	Fry	Main road bridge. 2.5m wide, 30cm deep, silty substrate.	Yes	Passable	Low
13	Photo 13	N/A	Discharge point location, salt marsh. Inaccessible and unable to determine if there are any major obstacles to migratory fish.	Yes	N/A	Low
14	Photo 14, 15, 16	Parr	Low flow. Some cobbles in bed but silty otherwise. 2.5m wide, 30cm deep. Walled banks, lack of bankside cover for fish.	Yes	Passable	Low
UNAMED WATERCOURSE 2						
15	Photo 17	N/A	Significant level of sewage fungus in ditch. Poor conditions for fish.	No	Passable	Low
16	Photo 18	<Null>	Sewage fungus in watercourse.	No	Passable	Low

Target note	Site Ref / photo no.	Hendry and Cragg-Hine Category	Reach/Obstacle Description	Watercourse Modification	Migratory Fish Access	Fish Habitat Quality
17	Photo 19	Obstacle/ barrier	Discharge point. Small wall over water and heavily choked with vegetation and possibly impassable for migratory fish. Poor conditions for fish generally	No	Impassable	Low
18	Photo 20	Flow constriction	Watercourse choked with rushes and grass, likely flow constriction. Overgrown Culvert also present and possibly impassable for migratory fish.	Yes	Impassable	Low
19	Photo 21	Flow constriction	Culvert/bridge choked with vegetation. Unsuitable for fish.	No	Impassable	Low
20	Photo 22	Flow constriction	Watercourse choked wit vegetation.	Yes	Impassable	Low
21	Photo 23	Obstacle/barrier	Instream vegetation and culvert.	Yes	Passable	Low
22	Photo 24	Obstacle/barrier	Looking downstream towards saltmarsh. Stream is heavily choked with vegetation and polluted further upstream. Poor habitat quality for fish.	No	Passable	Low
RIVER GLASLYN						
23	Photo 25	Fry/Parr	Looking upstream. Pool with low flow. Substrate is sandy with some patches of exposed bedrock. Poor spawning habitat. Suitable for adult fish.	No	Passable	Good
24	Photo 26	Fry/Parr	Boulders and rocks visible in riverbed providing cover for fish.	No	Passable	Good
25	Photo 27	Fry/Parr	Looking downstream towards railway bridge which is just upstream of extraction point. River is 40m wide. Depth approximately 2m.	Yes	Passable	Good
26	Photo 28	Fry/parr	Large boulders and cobbles visible on riverbed bed.	Yes	Passable	Good
27	Photo 29	Fry/parr	River left wooded providing shade for fish. Banks likely contain cavities providing cover for fish.	Yes	Passable	Good

4 Discussion

Overall the site's most notable fish habitat is in the River Glaslyn which had good quality fish habitat. The two unnamed watercourses for the most part, had low quality habitat for fish and were highly modified. No fish were recorded during the survey.

Within the site boundary, the River Glaslyn lies within in a typical lowland setting, with shallow banked agricultural fields on the right and steeper banks containing broadleaved woodland on the right and sheltering/feeding opportunities for fish. The estimated depth of the river within the survey area was 1-2m. The substrate of the river appears to be mostly sandy however some instream boulders and cobbles were visible which will provide suitable cover for fish of all age classes. No barriers to fish migration were recorded on the River Glaslyn and it is thought that this river is an important watercourse for various species of fish.

The other unnamed watercourses surveyed were all found to contain low quality habitat quality for fish and were identified as being closer agricultural drainage ditches rather than natural watercourses. Unnamed watercourse 1 was shallow (averaging 20-30cm in depth) and contained high levels of silty substrate. Sewage fungus was recorded in this stream, possibly due to run-off from surrounding agricultural land use and/or a nearby sewage treatment facility. The watercourse discharges into the salt marshes of the River Dwyryd at Llandecwyn station. The exit point of the watercourse was inaccessible and could not be viewed and it thus could not be determined if there was an impassable barrier to fish migration further up the system.

Unnamed watercourse 2 also contained sewage fungus and was overgrown and choked with vegetation including grasses and rushes. Overgrown culverts along the length of this stream towards the salt marsh also present possible barriers to fish migration.

It is clear from the survey that the quality of habitat for both unnamed watercourses is poor while the River Glaslyn is a productive river for fish.

While the proposal is for a discharge/abstraction consent, it will also be important to ensure that Pollution Prevention Guidelines (PPGs) and the replacement Guidance for Pollution Prevention (GPPs) are followed and measures undertaken to minimise pollution of the aquatic environment (see Section 5.2 for further reading).

Given that there is the potential for the discharge to be brackish, calculations should be carried out to assess how the discharge could affect the overall salinity of the Afon Glaslyn and therefore the habitat and fish within it.

5 References

5.1 Fish

Armstrong, J.D., Kemp, P.S., Kennedy, G.J.A., Ladle, M. & Milner, N.J. 2003. Habitat requirements of Atlantic salmon and brown trout in rivers and streams. Fisheries Research 62, 143-170.

Armstrong, J.D. (2005) Spatial variation in population dynamics of juvenile Atlantic salmon: implications for conservation and management. Journal of Fish Biology 76, (Supplement B), 35-52.

Cowx IG & Fraser D (2003). Monitoring the Atlantic Salmon. Conserving Natura 2000 Rivers Monitoring Series No. 7, English Nature, Peterborough.

Hendry K. & Cragg-Hine D. (1996) Restoration of Riverine Salmon Habitats; A Guidance Manual, Fisheries Technical Manual 4, R & D: Technical Report W144, Environment Agency, Bristol.

Hendry, K, Cragg-Hine D (1997) – A Guidance Manual, APEM Ltd, Fisheries Technical Manual 4, R & D Technical Report W44, Version 1.0/07-97. R & D Project 603.

Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon.

5.2 Pollution Control

CIRIA 648. Control of Water Pollution from Linear Construction Projects – Technical Guidance

CIRIA 649. Control of Water Pollution from Linear Construction Projects – Site Guidance

CIRIA 650. Environmental Good Practice on Site.

Pollution Prevention Guidelines/Guidance for Pollution Prevention (www.netregs.gov.uk):

PPG 1 Understanding your environmental responsibilities - good environmental practices

GPP 2 Above ground oil storage tanks

GPP 5 Works and maintenance in or near water

PPG 6 Working at construction and demolition sites

PPG 7 Safe storage - The safe operation of refuelling facilities

PPG 8 Safe storage and disposal of used oils

PPG 18 Managing fire water and major spillages

GPP 21 Pollution incident response planning

GPP 22: Dealing with spills

Appendices

Appendix A. Figures

Snowdonia Visual Impact Tunnels

HOCHTIEF

Fish habitat survey results

Key

- Survey area
- Target Note

Fish Habitat quality

- Good
- Medium
- Low

atmos CONSULTING

Draft

0 175 350 700

Metres

N

Scale @ A3:
1:12,500

05/01/2023 64050/EC/024a

Drawn by: KM Checked by: Approved by:

Snowdonia Visual Impact Tunnels

HOCHTIEF

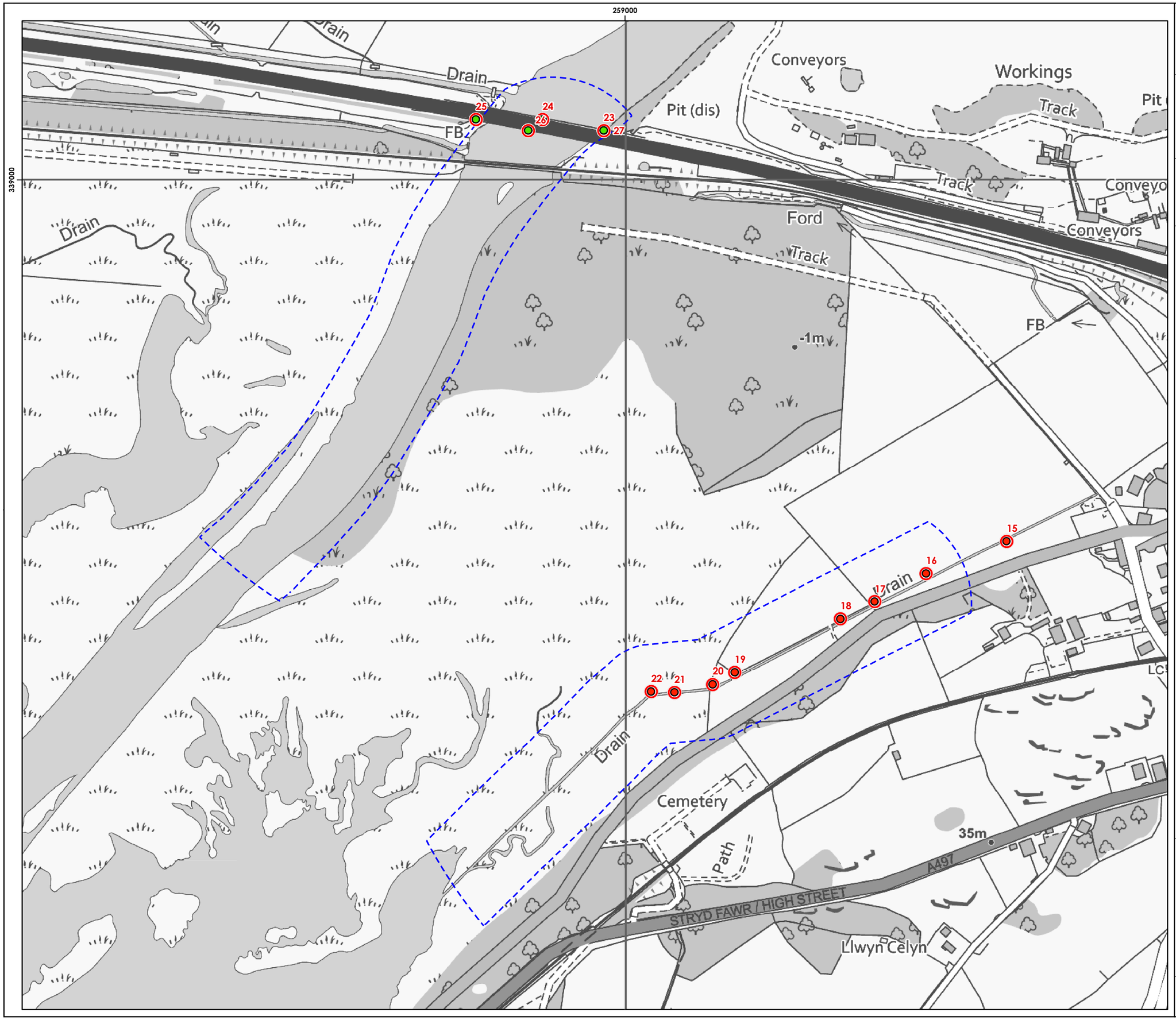
Fish habitat survey results

Key

- Survey area
- Target Note

Fish Habitat quality

- Good
- Low



atmos CONSULTING

Draft

0 50 100 200

Metres

N

Scale @ A3:

1:3,500

05/01/2023 64050/EC/024a

Drawn by: KM Checked by: Approved by:

Snowdonia Visual Impact Tunnels

HOCHTIEF

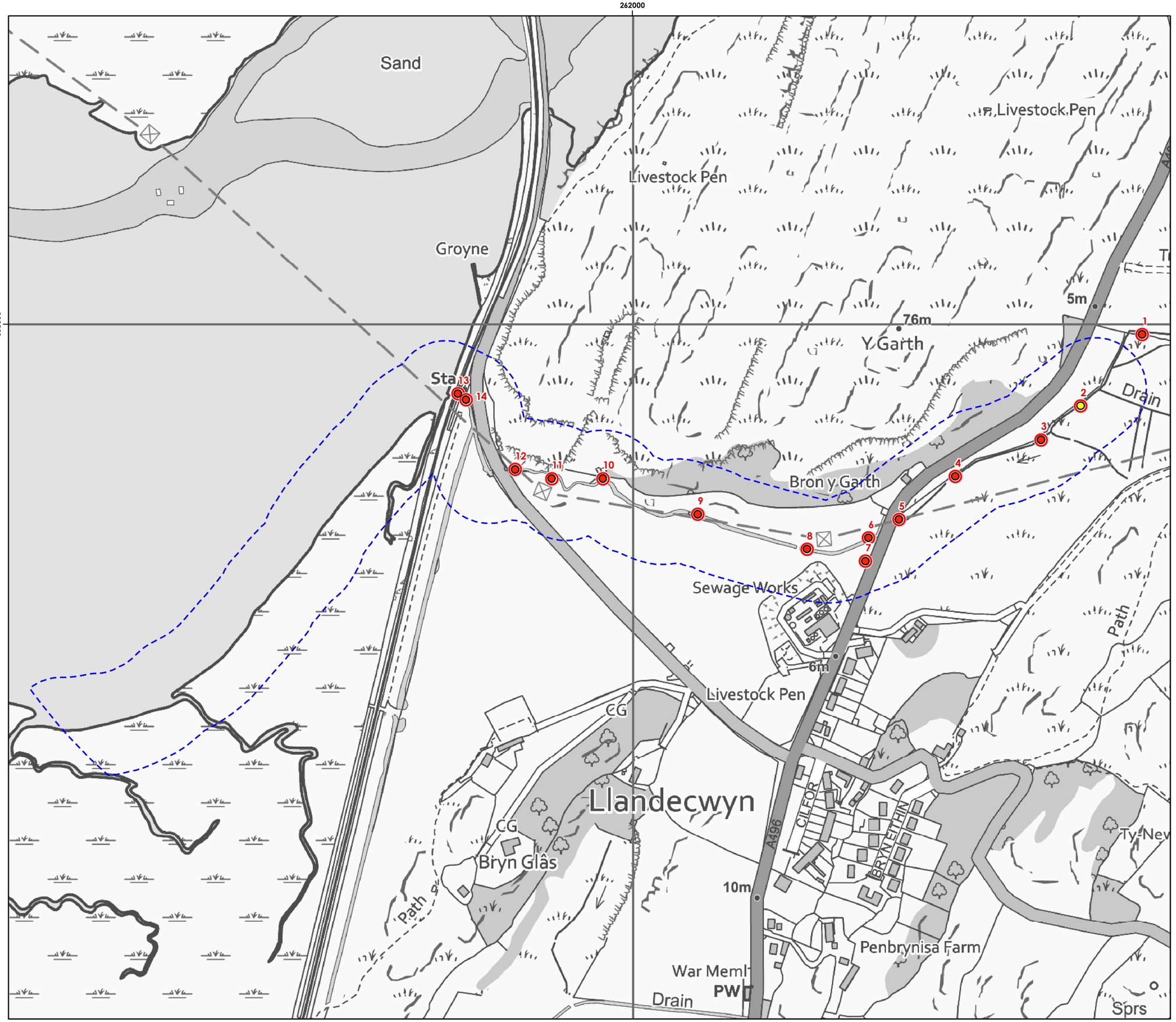
Fish habitat survey results

Key

- Survey area
- Target Note

Fish Habitat quality

- Medium
- Low



Draft

atmos CONSULTING

0 50 100 200

Metres

N

Scale @ A3: 1:3,500

05/01/2023 64050/EC/024a

Drawn by: KM Checked by: Approved by:

Appendix B. Photographs

Table 4: Target Notes and survey photographs

Target Note description	Photo
UNAMED WATERCOURSE 1	
TN1, Photo 1 – looking downstream. Slow run with low flow. Muddy, leafy substrate. Poor fry habitat.	

Target Note description	Photo
TN2, Photo 2 – bankside vegetation providing good cover for fry.	
TN3, Photo 3 – sewage fungus in watercourse next to tributary ditch. Poor conditions for fish.	

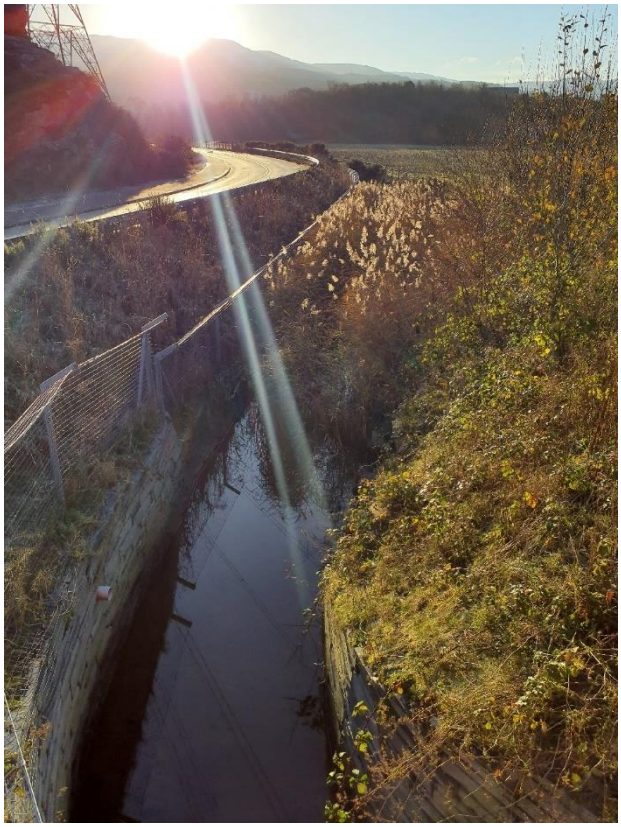
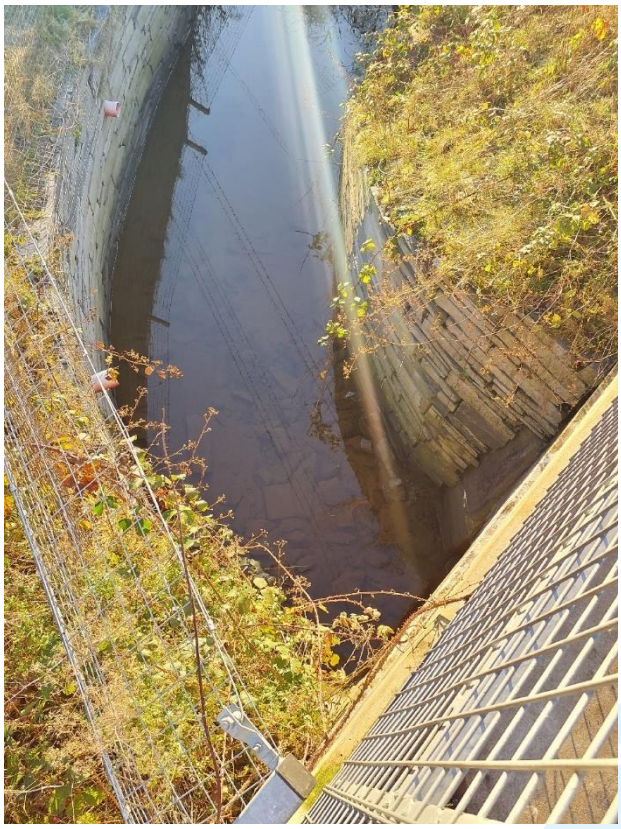
Target Note description	Photo
TN4, Photo 4 – pipe culvert. Watercourse 30 cm deep and 1m wide. Passable for migrating fish.	
TN5, Photo 5 – Bridge culvert. Low flow, silty muddy substrate and sewage fungus visible. Poor conditions for fish.	

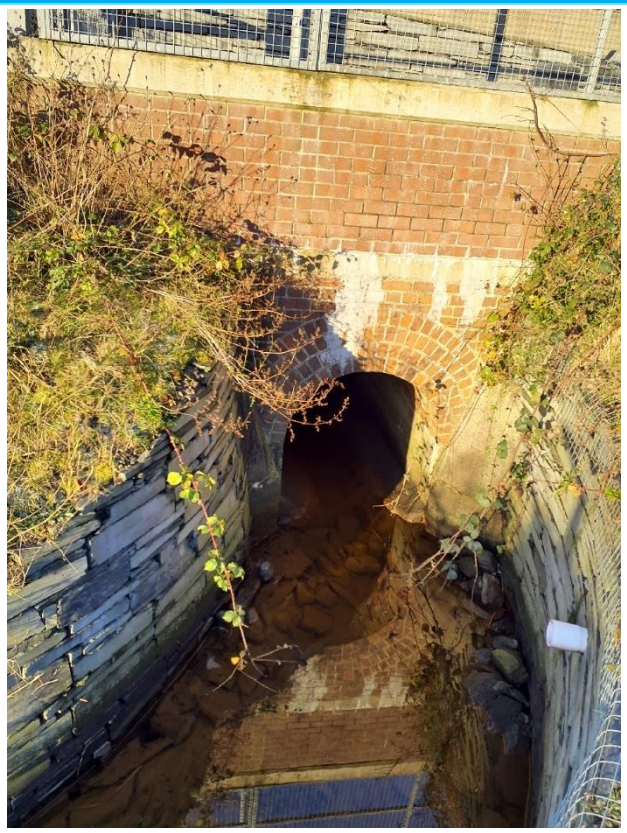
Target Note description	Photo
TN6, Photo 6 – Pool, 2m wide, 50cm deep. Silty, muddy suibstrate with sewage fungus present. Channel is highly canalised.	
TN7, Photo 7 – significantly polluted watercourse with sewage fungus.	

Target Note description	Photo
TN8, Photo 8 – water outlet from sewage treatment plant.	
TN9, Photo 9 – pipe culvert, passable for migratory fish.	

Target Note description	Photo
TN10, Photo 10 – Bridge, 1m wide. Passable for migratory fish.	
TN11, Photo 11 – pool, silty substrate. 2m wide, 50cm deep. Poor quality habitat for fish.	

Target Note description	Photo
TN12, Photo 12 – Main road bridge. 2.5m wide, 30cm deep, silty substrate.	
TN13, Photo 13 – discharge point location, salt marsh. Inaccessible and unable to determine if there are any major obstacles to migratory fish.	

Target Note description	Photo
TN14, Photos 14, 15, 16 – low flow. Some cobbles in bed but silty otherwise. 2.5m wide, 30cm deep. Lack of bankside cover for fish. Channel is highly modified..	 

Target Note description	Photo
	
UNNAMED WATERCOURSE 2	
TN15, Photo 17 – significant level of sewage fungus in ditch.no clear channel. Poor conditions for fish.	

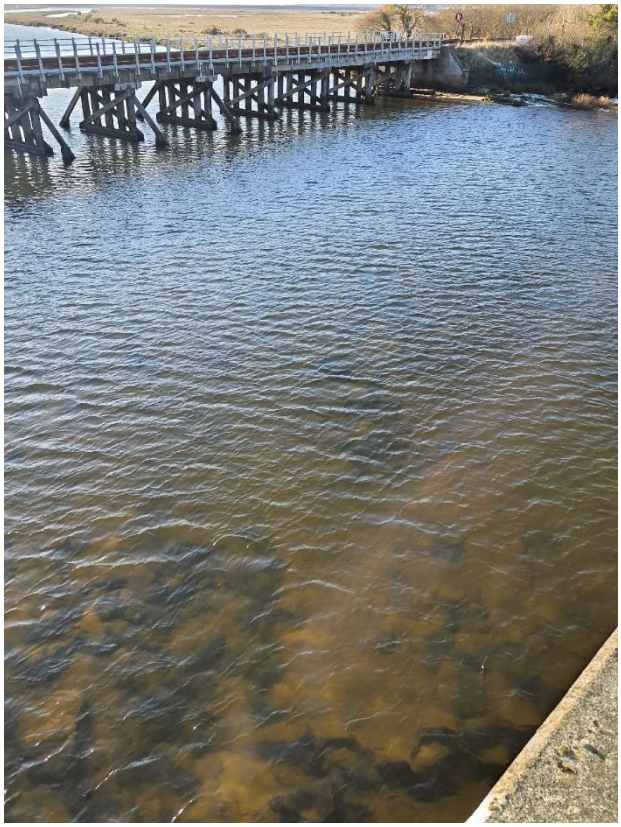
Target Note description	Photo
TN16, Photo 18 – sewage fungus in watercourse. Water level very low.	
TN17, Photo 19 - discharge point. Small wall over water and heavily choked with vegetation. Poor conditions for fish.	

Target Note description	Photo
TN18, Photo 20 – watercourse choked with rushes and grass, likely flow constriction. Overgrown Culvert also present and possibly impassable for migratory fish.	
TN19, Photo 21 – culvert/bridge choked with vegetation. Unsuitable for fish.	

Target Note description	Photo
TN20, Photo 22 – watercourse choked with vegetation.	
TN21, Photo 23 – instream vegetation and culvert.	

Target Note description	Photo
TN22, Photo 24 – looking downstream towards saltmarsh. Stream is heavily choked with vegetation and polluted further upstream. Poor habitat quality for fish.	
RIVER GLASLYN	
TN23, Photo 25 – looking upstream. Pool with low flow. Substrate is sandy with some patches of exposed bedrock. Poor spawning habitat. Suitable for adult fish.	

Target Note description	Photo
TN24, Photo 26 – boulders and rocks visible in riverbed providing cover for fish.	
TN25, Photo 27 – looking downstream towards railway bridge which is just upstream of extraction point. River is 40m wide. Depth approximately 2m.	

Target Note description	Photo
TN26, Photo 28 - large boulders and cobbles visible on riverbed bed.	
TN27, Photo 29 - river left wooded providing shade for fish. Banks likely contain sheltering opportunities for fish.