Advisory Visit

River Elwy, Rhyl & St. Asaph Angling Association

May 2017

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Elwy, near St. Asaph, Denbighshire, North Wales, on 18th May, 2017. Comments in this report are based on observations on the day of the site visit and discussions with John Davidson, Bob Hall and other members of the Rhyl & St. Asaph Angling Association (RSAAA) committee.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream. Specific locations are identified using the Ordnance Survey National Grid Reference system.

2.0 Catchment / Fishery Overview

River	River Elwy
Waterbody Name	Elwy - Clwyd to Melai
Waterbody ID	GB110066060020
Management Catchment	Clwyd
River Basin District	Western Wales
Current Ecological Quality	Overall status of **Good**
U/S Grid Ref inspected	SJ0383672237
D/S Grid Ref inspected	SJ0408972860
Length of river inspected	~1km in total

The Elwy is a tributary of the River Clwyd, their confluence being between St. Asaph and Rhuddlan. Both rivers contain brown trout but are better known for their runs of sea trout and salmon. The section of river inspected

on this visit is near Bryn-polyn Nurseries, on the A525 south of St. Asaph. Of particular interest to RSAAA is a section of actively eroding bank (Grid Reference SJ0414672650) and the recently installed hydro-electricity generation turbine on the weir at Penucha-ro-fawr (SJ0385672435).

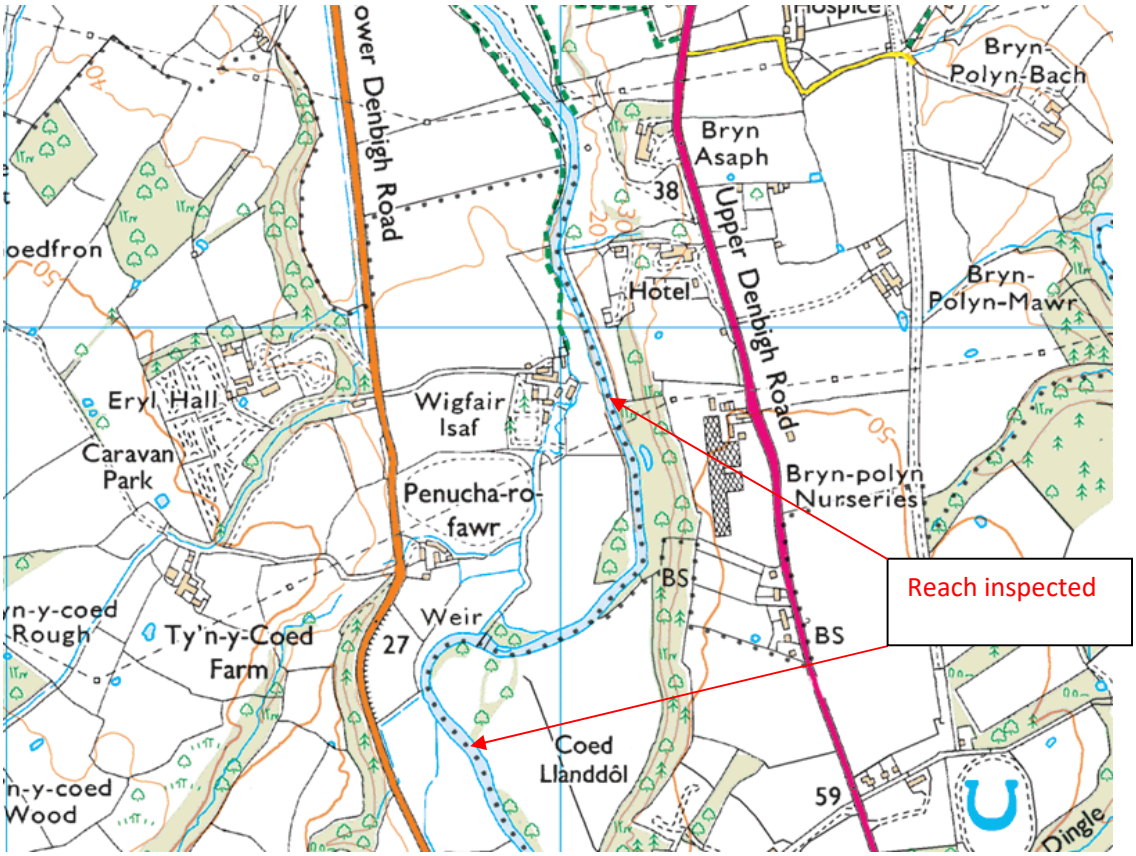

Figure 1 Reach inspected, river flowing south to north.

3.0 Habitat Assessment

The actively eroding bank is on the right hand bank adjacent to the steeply sloping, wooded valley side leading down from Bryn-polyn Nurseries (Photos 1 & 2). RSAAA members and the landowner stated that the channel had been realigned here in the past and previously it had been further to the east, closer to the base of the valley slope. A relict channel is visible in the wood (and on Figure 1, the small pond on the RHB).

Subsequent research using old maps available online (www.old-maps.co.uk) gives an indication of the historic plan-form of the channel in this location. Figures 2 – 5 in the Appendix give examples of historic maps for this location and indicate that there was a weir and sluice here circa 1892, but it had disappeared by 1899. This weir is shown supplying water to a mill channel on the RHB leading to a hydraulic pump at Bryn-Elwy and returning to the main river just upstream of Bryn-Asaph. The river is shown following the course further east up until the mid-1960s, after which it is shown as straightened with four new weirs; the latter are presumably the blockstone channel constrictions seen on this visit (Photos 4 and 5).

In addition to the former weir at Bryn-polyn, another weir structure existed approximately 730 metres further downstream at Bryn-Asaph (Figure 2), with a mill channel extending downstream into St. Asaph. According to the dates of the maps, this structure disappeared in the mid-1960s.

RSAAA are concerned at the accelerated rate of erosion taking place along this section of bank and the shallowing of pools downstream where sediment has accumulated (Photo 3). It was suggested that trees which had fallen in from the RHB (and subsequently been removed) may be responsible for the changes seen, but this is unlikely; the falling trees are a symptom of changes rather than its underlying cause.

A detailed assessment by a fluvial geomorphologist is required to identify the underlying cause(s) of the channel instability and accelerated bank erosion here. It is not possible to advise on what might be done practically without that understanding. Measures to protect the bank or divert the flow are not recommended in the meantime and are likely to fail in such a high-energy river environment, or even be counterproductive. Factors that could be contributing to the channel instability include:

- Historic changes to the channel course and gradient here, including construction and removal of the weirs at Bryn-polyn and Bryn-Asaph, and the channel realignment in the 1960s.
- Changes to the rate of sediment supply from upstream. For example, weirs upstream of the reach (such as at Penucha-ro-fawr) would, after initial construction, interrupt sediment transport until the river bed upstream had re-graded to the weir crest height and bedload (gravel,

cobbles) was once more carried downstream during higher water. Even after the upstream river bed had re-graded, sediment transport across the weir is likely to be at a lower rate than would be the case in the weir's absence. Such restriction of sediment supply from upstream causes increased rates of bed erosion and head-cutting downstream (with associated bank erosion). It is very likely that the river bed upstream of Penucha-ro-fawr had re-graded since the weir was constructed (given the length of time the weir has been in existence), but the legacy of reduced sediment transport rates, plus any recent gravel removal (associated with the hydropower station construction), could have triggered increased erosion rates in the reach downstream.

Photo 1 Actively eroding bank, upstream view.

Photo 2 Actively eroding bank, downstream view.

Photo 3 Pool immediately downstream of the reach shown in Photos 1 and 2, showing the gravel bar, a recently formed feature which is shallowing an established fishing pool.

Photo 4 Blockstone channel pinch points which are presumably the features described as weirs on the 1960s maps following the realignment of the river course.

Photo 5 As above

Photo 6 A deep pool downstream of the above flume.

At Penucha-ro-fawr weir, a hydro-electricity generating scheme has recently been installed. RSAAA objected to the scheme on various grounds that had the potential to impact upon the fishery and biodiversity of the Elwy, but these were rejected at a planning appeal and permission for the scheme was granted.

The scheme consists of a single large Archimedes screw turbine with a Larinier fish pass alongside it against the LHB (Photos 7 and 8). Prior to the construction of the scheme, fish passage was provided by a pool-traverse fish pass in the centre of the weir and a notched pre-barrage at the downstream extent of the weir structure; the pool-traverse channel remains, but the upstream end of the pass has been sealed (Photo 9) to concentrate the attraction flow for upstream migrants in the vicinity of the new fish pass entrance.

At the time of the visit, the turbine was not in use, presumably because the flow in the river was less than a hands-off flow condition. The flow across the structure was therefore split between the fish pass (against the left bank) and the central notch of the pre-barrage (Photo 8). This highlighted a

problem, i.e. when the turbine is not in use, there is a considerable attraction flow through the notch in the pre-barrage, potentially leading upstream migrants away from the entrance to the new Larinier fish pass and into a “blind alley”. Relocation of the notch in the pre-barrage closer to the left bank or removal of the entire pre-barrage may alleviate this issue.

Presumably when the turbine is operating, the main flow is concentrated near the new fish pass, providing attraction flow. However, it is striking how large the screw turbine is for this location, which raises questions over whether it is appropriate (and the consented size?) for the prevailing flow regime in the Elwy. Another potential issue was illustrated in video footage taken by an RSAAA committee member of the turbine in operation (https://youtu.be/EypXoDuMwbo); this shows the turbine generating large waves which are reflecting off the concrete retaining wall opposite (Photo 10) and likely reducing the attraction for fish towards the fish pass entrance beyond.

The sealing of the upstream end of the former pool-traverse pass has effectively raised the level of the weir crest, diverting more flow to the new fish pass and turbine. This has increased the impounding effect in the reach upstream of the weir, exacerbating the interruption of sediment transport caused by the weir, with potential impacts on the downstream reach (see comments above, pages 4 – 5). If gravel has been removed from upstream of the weir (Photo 16) this could also have reduced the rate of sediment transport across the weir.

The effective increase in weir crest height may also have implications for flood flows circumventing the weir via a relict channel which bypasses the meander (Photos 13 – 15). The channel is visible on the 1874-92 map (Figure 3, Appendix), labelled COCR (Centre of Old Course of River). It is too straight to have been a former natural course and may have been a temporary flow diversion during original construction of the weir, which was subsequently back-filled. RSAAA report that during floods in recent years, mass slippage of material has occurred at the downstream end of this channel, caused by water seeping through and destabilising the ground (Photo 15). If flood flows and/or sub-surface flows are being diverted via this channel more regularly, there is the potential for the river to eventually break through and bypass the weir.

It is recommended that RSAAA check what conditions apply to the hydropower development and that they are being met. As the development was the subject of a planning appeal, the Inspector may have attached relevant conditions to ensure the site operated in a proper way. The fish pass approval process operated via Natural Resources Wales (NRW) should have a condition for the operator to show that the fish pass is working effectively.

A stand of Japanese knotweed was observed during the visit (Photo 12). This should be treated appropriately to prevent its spread. Stem injection of herbicide by an appropriately trained person is the best method. It should on no account be strimmed or flailed, as this plant can propagate itself from small fragments.

Photo 7 Upstream view towards the weir at Penucha-ro-fawr with recently installed hydropower facility.

Photo 8 Closer view of the above weir, showing location of fish pass entrance (A) (far side of the channel, against LHB), the adjacent Archimedes screw turbine (B) and the flow through the central notch of the weir pre-barrage (C). The turbine was not operating at the time of the visit, presumably because of a hands-off flow condition in lower flows.

Photo 9 Upstream end of the former pool-traverse fish pass in the centre of the weir, now sealed off.

Photo 10 Area downstream of the fish pass and turbine, showing how the wall opposite cuts across the flow (arrow), reflecting the large waves caused when the turbine is in operation and potentially impacting upon the effectiveness of the fish pass.

Photo 11 Impounded reach upstream of the weir.

Photo 12 A stand of Japanese knotweed (*Fallopia japonica*) at grid reference SJ0381672288.

Photo 13 Former channel which cuts off the meander with Penucha-ro-fawr weir at its apex. This is visible on the 1874-92 map (Figure 3, Appendix), labelled COCR (Centre of Old Course of River). It is too straight to have been a former natural course and may have been a temporary flow diversion during weir construction that was subsequently back-filled.

Photo 14 Upstream end of above channel with river in the background – a plug of made-up ground that is being eroded by successive floods weiring over the bank?

Photo 15 Downstream end of above channel, where mass slippage of ground has occurred during floods in recent years. This may be a symptom of it being made-up ground from when the channel was back-filled.

Photo 16 View across to the LHB opposite the location in Photo 14 (downstream of the weir). Note the gravel spread on the floodplain, possibly spoil from the hydropower construction.

4.0 Recommendations

- Seek advice from a professional fluvial geomorphologist on the root causes of the bank erosion and downstream sediment accumulation at Bryn-polyn.
- Identify the conditions attached to the hydropower development and fish pass at Penucha-ro-fawr weir and check that they are being met. If enforcement of the conditions is required, request this in writing from the Local Planning Authority and NRW as appropriate.

5.0 Acknowledgement

The WTT would like to thank the John Ellerman Foundation for supporting our work.

6.0 Disclaimer

Appendix

Figure 2 OS County Series 1:10560 Flintshire 1878-1880, showing three weirs including the existing weir (A), a weir at Bryn-polyn (B) and a weir at Bryn-Asaph (C). Weir B at Bryn-polyn appears on the 1874-92 1:2500 map (Figure 2), but is absent on the 1899 map (Figure 3). Weir C at Bryn-Asaph is present on the 1964 (1:10560) map and absent on the 1968-69 map of the same scale.

Figure 3 OS County Series 1:2500 Flintshire 1874 – 1892 showing existing weir and former weir near Bryn-polyn.

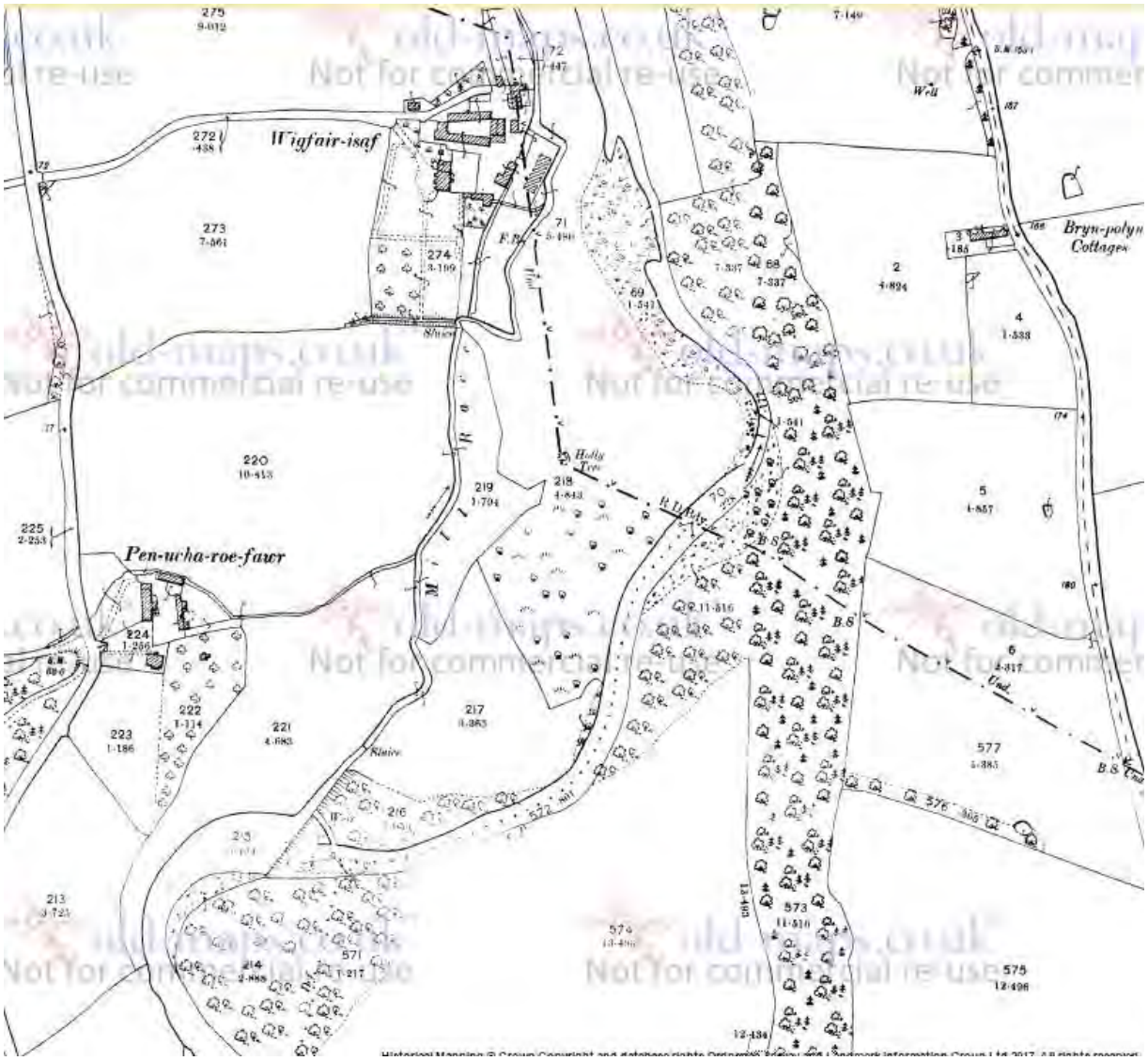

Figure 4 OS County Series 1:2500 Flintshire 1899 showing existing weir and absence of Bryn-polyn weir. The river is shown in the same course as this in subsequent maps up to and including the 1964 1:10560 map.

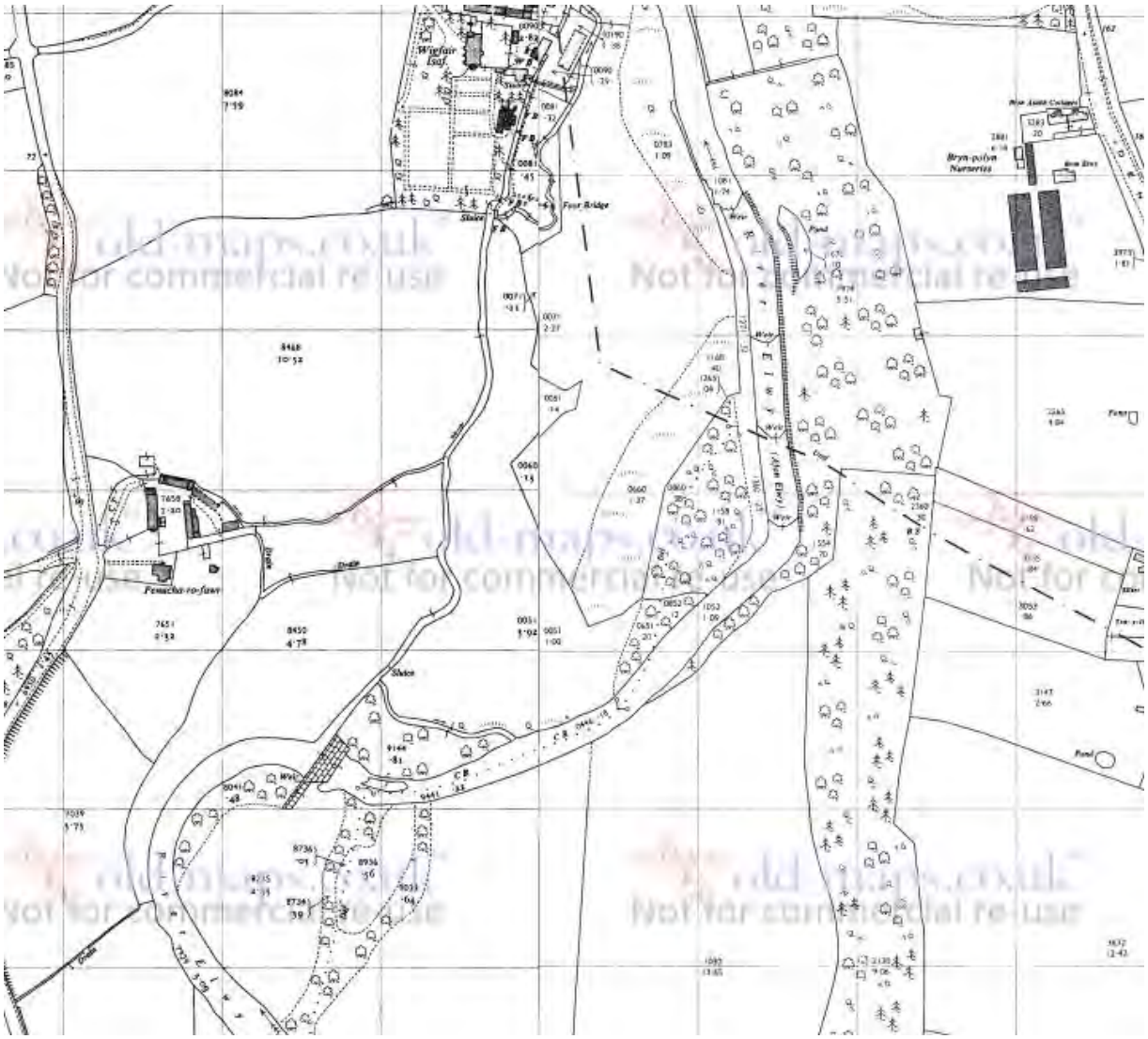

Figure 5 OS Plan 1:2500 1962 – 1963 Showing straightened course of the river at Bryn-polyn and four weirs within the straightened section. The river is also shown in this course in t1968 – 1969 1:10560 map.