

## Fish pass application – Bolham supporting information

### 1. Introduction

The purpose of this document is to provide a design rationale and additional information to support the application for fish passage approval at the weir on the River Exe near Bolham, at the National Grid Reference: SS 94854 15309. It should be read in conjunction with the following information and drawings:

- Bolham\_FP002
- Drawing 100-102- 0295- B01- Bolham - Outline design

The Westcountry Rivers Trust is planning to improve fish passage over Bolham weir on the River Exe, as part of the wider 'Strategic Exe Weirs' program. Assessments have indicated that Bolham Weir acts as an impediment for upstream migration of protected fish species, including but not limited to: Atlantic salmon (*Salmo salar*) and lamprey (*Lampetra* spp., and *Petromyzon marinus*). The weir is high, has a steep glacis and the current baulk traverse pass does not meet current best practice. There is currently no eel pass on the structure.

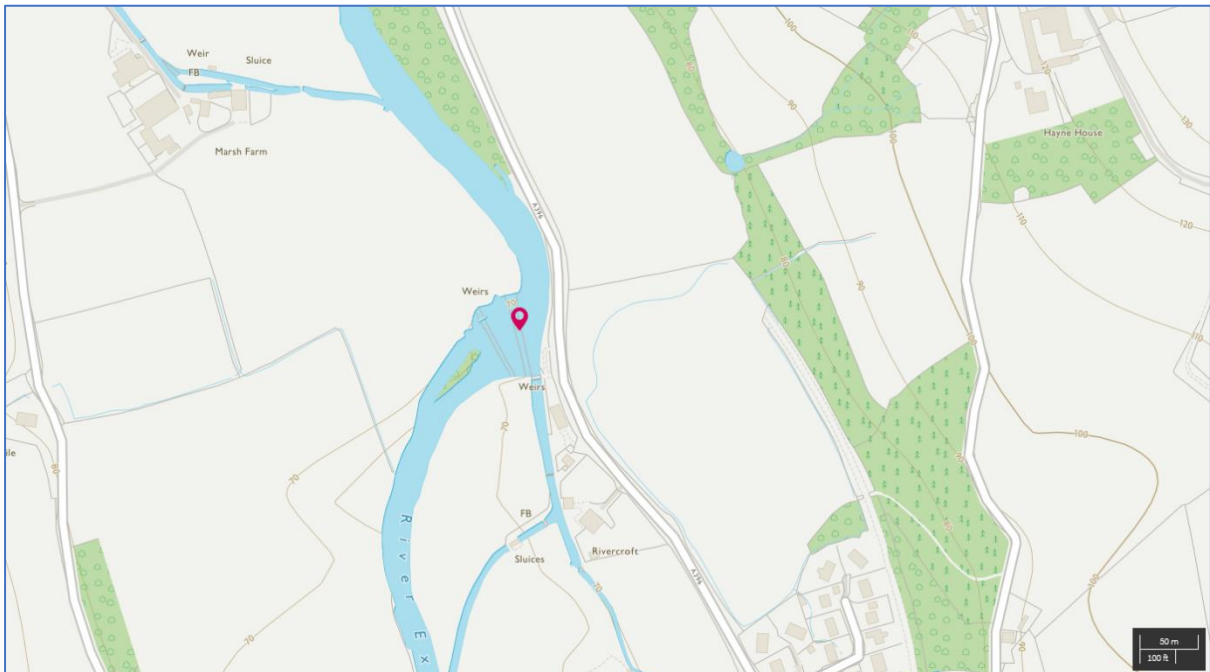
### 2. Site information

#### 2.1. Location & description

The site is located on the mainstem of the Exe, midway up the catchment, near the village of Bolham at the National Grid Reference 'SS 94854 15309'. The site is a concrete weir that runs diagonally across the River Exe. The weir feeds a leat, upstream of the true left side of the weir. There is a Southwest Water abstraction upstream. An existing fish passage facility (baulk pass) has previously been installed midway on the true right side of the weir.



Figure 1. Weir location is indicated by red pin



*Figure 2. Location of weir indicated by red pin*



*Figure 3. The downstream end of the barrier in low flows*

## 2.2. Site survey

The site was assessed by Fishtek Consulting at approximately 11:00 on the 22/03/2021 to determine a suitable location for the fishpass. The flow conditions on the day were approximately Q 41.

Low-flow downstream levels were confirmed with a site survey, conducted on 15/06/2021.

A topographic survey of the weir and surroundings was conducted on the 29/13/2021 by AP Land surveys. Flow conditions were equivalent to Q 48.

## 2.3. Site flows & water levels

Flow data the site is given in Table 1 and Flow Duration Curves in Figure 2. The flow was obtained using Low Flows 2000 software.

**Table 1: Site flows**

% Exceedance	Discharge (m <sup>3</sup> s <sup>-1</sup> )
5	41.158
10	30.387
15	24.056
20	19.671
25	16.512
30	14.068
35	12.133
40	10.405
45	8.972
50	7.752
55	6.745
60	5.819
65	5.034
70	4.322
75	3.711
80	3.200
85	2.751
90	2.283
95	1.783
99	1.18

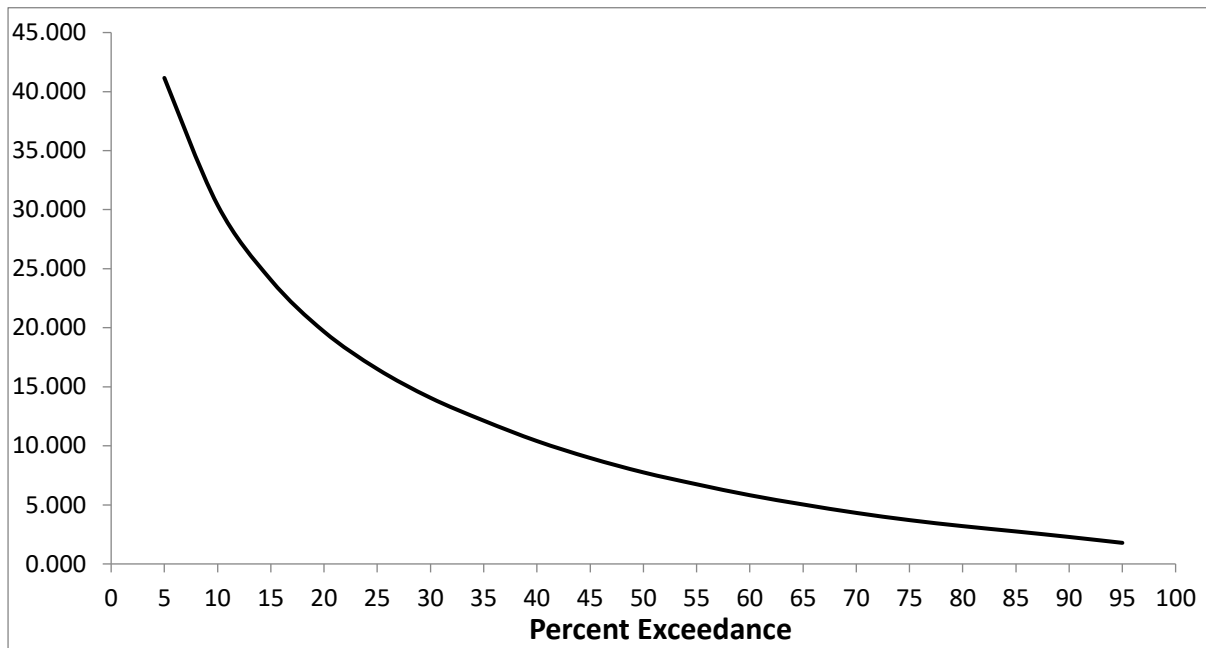


Figure 4. % Exceedance curve for the River Exe at Bolham

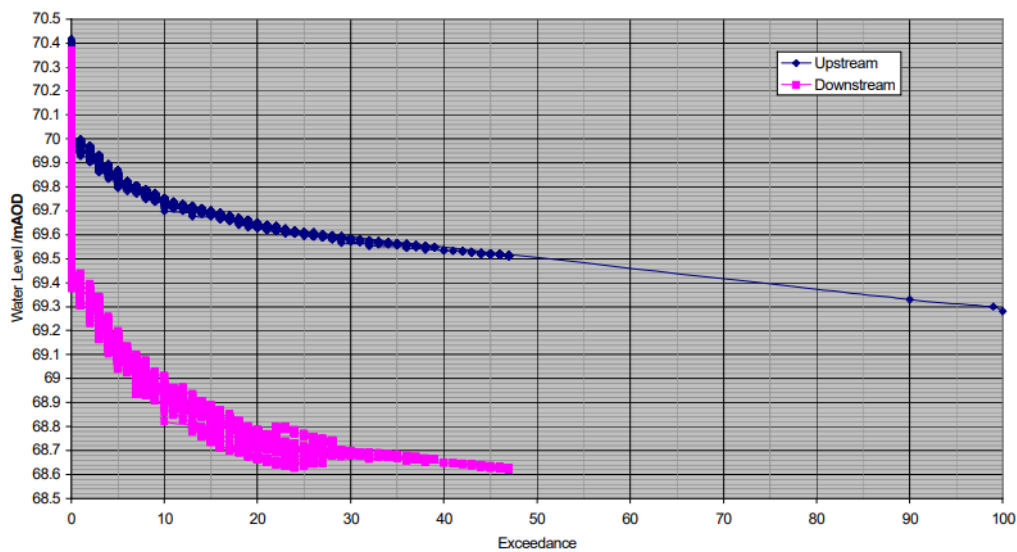


Figure 5. Measured upstream and downstream level data for Bolham weir, plotted against flow exceedance.

**Note:** Due to limited low flow downstream data, downstream low flow levels are currently estimated and will be verified by a site visit in low flows.

### 3. Design rationale

The proposed fish pass is a single flight, in-bank Larinier style fish pass, combined with a notch in the stilling basin downstream of the weir toe. The pass also includes an adjacent gravity fed eel pass. The proposed pass will have an internal 1.8 m internal width, comprising 2 x 900 mm wide baffle units (150 mm high) fixed in a reinforced concrete channel. A 1:2 downslope will be present at upstream end,

extending into the lead in channel. A notch will be cut into the stilling basin to provide an attraction flow and route to the fish pass entrance in low flows. It is important to notch the stilling basin, as this currently represents a barrier at low flows. Stop log slots will be provided up and downstream of the fish pass.

The pass is proposed to be routed through the true right-hand bank, at the most upstream point of the weir. Building the pass in bank will significantly reduce the amount of civils work on site and keep the construction costs down, a critical element of this project. Furthermore, this location will make maintenance of the pass easier.

A smolt notch will be included on the true left side of the weir as they will likely miss the entrance to the fish pass.

Other forms of fish pass were not deemed viable at this site. Weir removal is also not currently a viable option at the site, due to the presence of the Southwest Water abstraction upstream. The proposed solution is the preferred option for the site as it will provide cost-effective passage for a range of species over the large head drop, over a wide range of flows. Water depth ( $H_a$ ) over the baffles will be within guidance for large migratory salmonids between Q95 and Q10.