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Croesor

Hydropower Geomorphology Photographic Survey

Site visit conducted in November 2018

Ref:	Issue:	Date:	Written by:	Reviewed by:
00	01	11/12/2018	RS	ML

Introduction

The purpose of this report is to give a clearer visualisation of the geomorphological features on the affected reach. In order to make suitable design decisions for the scheme the general characteristics of the reach must be understood.

A photographic survey was undertaken following the guidelines laid out in guidance note HGN-10 as close as practicable. Photos were taken at various points of interest along the reach (using a one metre survey staff for scale). The resulting images form the basis of this report. Grid coordinates of the points at which photos were taken are documented on the adjoining map provided at the end of this report.

Summary

A brief summary of the geomorphological features is provided in this section.

The overall characteristics of the reach were found to remain relatively comparable in nature throughout; having similar variations in deposit type and size but also being dominated by larger, long standing boulders and bedrock throughout. The upper stretch of the river leading to the intake follows a comparatively wide channel (compared to further downstream) lined with bed rock, grassland and trees. As previously mentioned the reach contains numerous large boulders that, by the extent of moss growth, are presumed to be exposed through most flow conditions. The upper section of the reach are relatively flat; providing low sediment mobility due to low velocities.

The nature of the proposed intake location (point 3) creates a small impoundment in its existing state. This is followed by a small waterfall over the impounding bedrock formation. The foot of the drop creates a pool approximately 1metre depth from the crest height. Sediment around the foot of the proposed intake location was minimal, again being dominated by larger outcrops of exposed bed rock and boulders.

Further downstream (approximately 25 metres, point 4) a larger waterfall was observed (approx. 3 metres in height). The foot of the waterfall creates deep pools within the bedrock. Continuing downstream to photograph point five a large well developed bar was found. The bar was surrounded by large boulders and had mature trees situated upon it. (Note the direction of vegetation on the exposed bar, suggesting during high flow events that this bar becomes submerged).

The reach contains a number of waterfalls in succession. Each fall having its associated scour pool and finer sediments deposits at the pools extremities. The reach continues in this fashion; moving through cascades of varying scale.

Further downstream, it was found that some significant waterfalls exist along the reach (point 12-13).

The proposed outfall location is situated in an area of predominantly bedrock. The outfall will discharge back into a scour pool created by an existing waterfall, the amount of sediment and deposits in this area were seen to be minimal. As the water depth decreased it was seen that the extent of deposits increased. The nature of the river bed returns to a condition analogous to the upper reaches; whereby the channel widens and passes through cascading regions of exposed boulders and bedrock.

Since it was observed that the naturally occurring rock formations that exist create large pools and impoundment like areas, and considering the numerous waterfalls and the variations in river level that occur; it has been concluded that, providing a sympathetic intake design is used, the scheme will not have a major impact on the downstream transport of sediments.

Point 1A: 365 m upstream from proposed intake [SH 62840 44498]

Figure 1. View upstream from point 1A showing small cascade

Figure 2. View across the river from view point 1A showing deposits along centre line of the watercourse

Figure 3. View downstream of point 1A

Point 1B: 50 m upstream from proposed intake [SH 62655 44296]

Figure 4. View downstream of point 1B

Point 1C: Proposed intake position [SH 62612 44264]

Figure 5. Proposed intake location

Figure 6. View upstream from proposed intake position

Figure 7. View downstream from proposed intake position

Point 2A: The depleted reach - 50 m downstream from the proposed intake [SH62568 44206]

Figure 8. View downstream from point 2A

Point 2B: The depleted reach [SH 62568 44206]

Figure 9. View upstream from point 2B

Figure 10. View downstream from point 2B

Point 3: The depleted reach [SH 62543, 44202]

Figure 11. View upstream from point 3

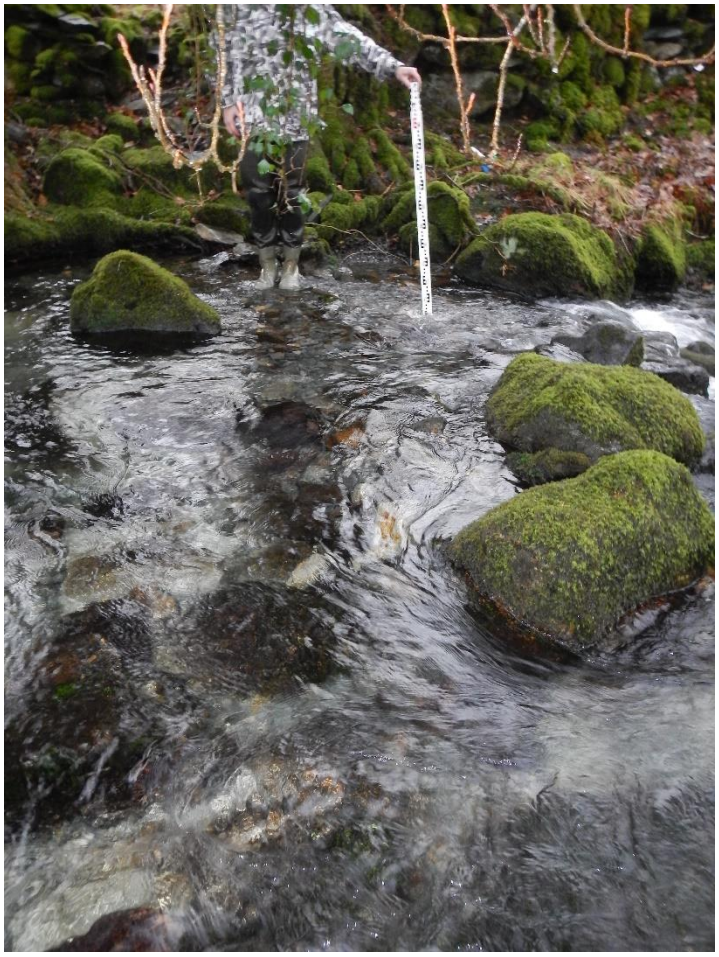


Figure 12. View across the river at point 3

Figure 13. View downstream from point 3

Point 4: The depleted reach [SH 62531, 44178]

Figure 14. Waterfall found at point 4

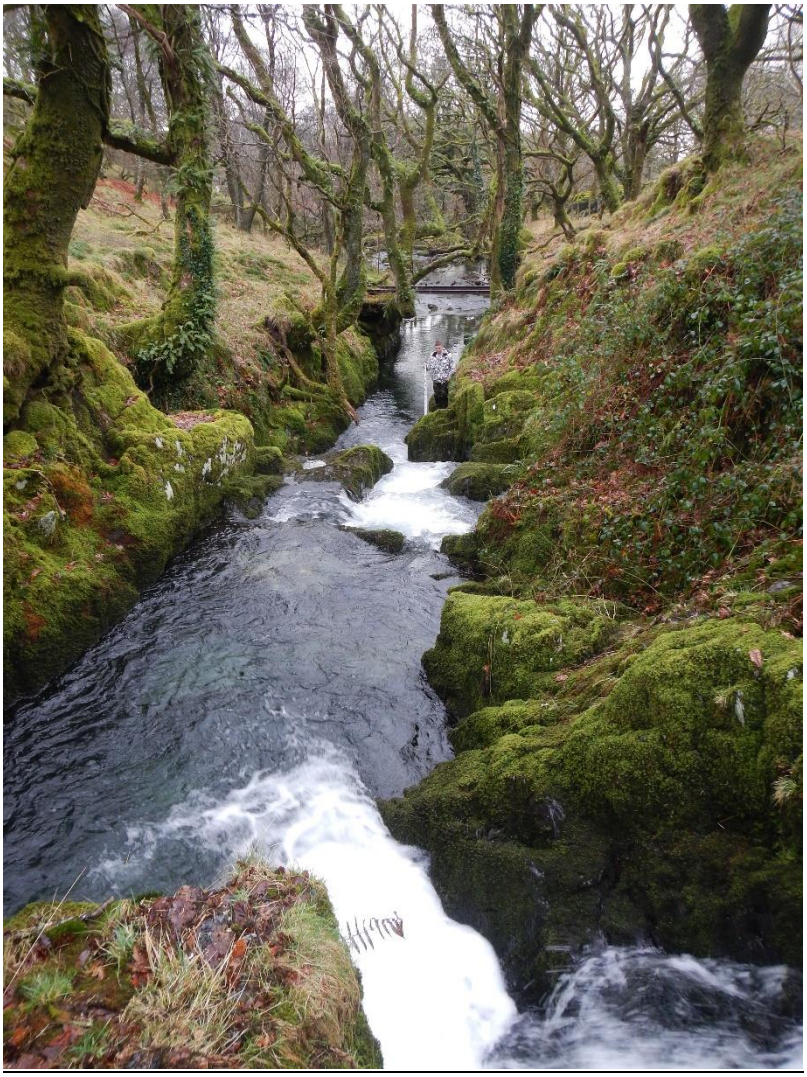


Figure 15. View downstream from point 4

Point 5: The depleted reach [SH 62492, 44093]

Figure 16. View upstream from point 5 showing large well developed bar with vegetation

Figure 17. View across the river from point 5

Point 6: The depleted reach [SH 62393, 44022]

Figure 18. Waterfall found at point six

Point 7: The depleted reach [SH 62357, 44002]

Figure 19. View upstream at point 7 towards water fall at point 6

Figure 20. Downstream view from point 7

Point 8: The depleted reach [SH 62329, 43937]

Figure 21. View upstream from point 8

Figure 22. Downstream view from point 8

Point 9: The depleted reach [SH 62278, 43854]

Figure 23. Waterfall found at point 9

Point 10: The depleted reach [SH 62215, 43793]

Figure 24. Upstream view from point 10

Figure 25. Downstream view from point 10

Point 11: Proposed outfall location [SH 62083, 43749]

Figure 26. Upstream view from point 11

Figure 27. Downstream view from point 11

Point 12: Waterfall - 53 m downstream of proposed outfall [SH 62039, 43727]

Figure 28. Waterfall found at point 12 showing large scour pool below.

Figure 29. View downstream of point 12 looking over crest of waterfall

Point 13: Waterfall - 90 m downstream of proposed outfall [SH 62039, 43691]

Figure 30 View of waterfall looking upstream at point 13

Point 14: 275 m downstream from proposed outfall [SH 61899, 43587]

Figure 31. Upstream view from point 14

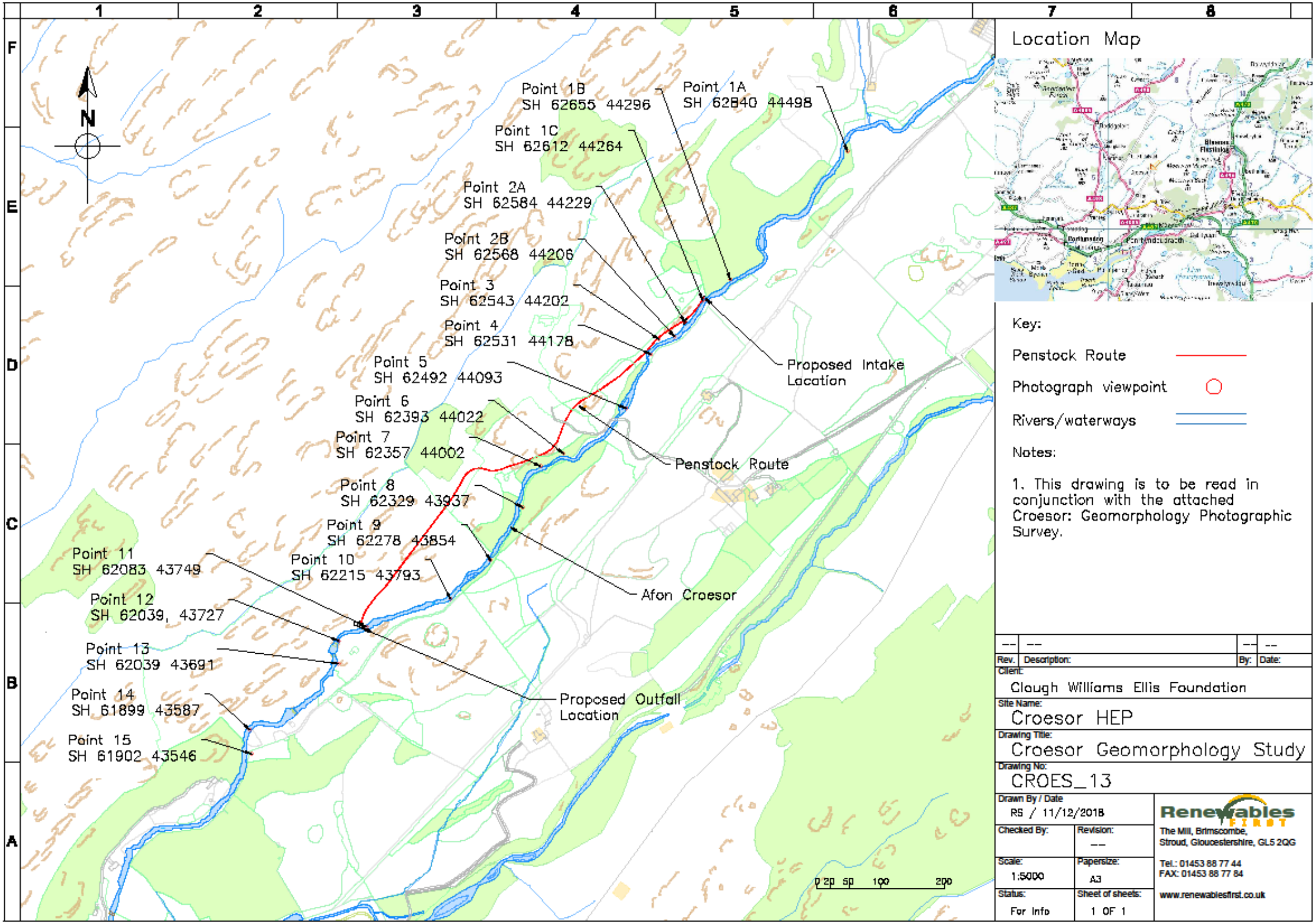
Figure 32. Downstream view from point 14

Point 15: 315 m downstream from proposed outfall [SH 61902, 43546]

Figure 33. View upstream from point 15

Figure 34. View back across stream towards point 15

Figure 35. View of river bed at point 15 showing deposit variation (typical of entire reach)


Point 1B
SH 62655 44296
Point 1A
SH 62840 44498
Point 1C
SH 62612 44264
Point 2A
SH 62584 44229
Point 2B
SH 62568 44206
Point 3
SH 62543 44202
Point 4
SH 62531 44178
Point 5
SH 62492 44093
Point 6
SH 62393 44022
Point 7
SH 62357 44002
Point 8
SH 62329 43937
Point 9
SH 62278 43854
Point 10
SH 62215 43793
Point 11
SH 62083 43749
Point 12
SH 62039, 43727
Point 13
SH 62039 43691
Point 14
SH 61899 43587
Point 15
SH 61902 43546
Proposed Intake Location
Penstock Route
Afon Croesor
Proposed Outfall Location
N
0 20 50 100 200
Location Map
Key:
Penstock Route
Photograph viewpoint
Rivers/waterways
Notes:
1. This drawing is to be read in conjunction with the attached Croesor: Geomorphology Photographic Survey.
Rev. -- Description: -- By: -- Date: --
Client: Clough Williams Ellis Foundation
Site Name: Croesor HEP
Drawing Title: Croesor Geomorphology Study
Drawing No: CROES_13
Drawn By / Date: RS / 11/12/2018
Checked By:
Revision: --
Scale: 1:5000
Papersize: A3
Status: For Info
Sheet of sheets: 1 OF 1
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