Stantec

Clydach Geomorphology Survey

29/08/2025

This report is an updated version of the “Stage 1 Geomorphology Assessment” completed by The Green Valleys CIC (see Appendix A for the original report).

Non-technical summary

“This small-scale hydropower scheme, with a depleted reach of approximately 900m, proposes an intake structure of up to 200mm in height on an existing concrete lined channel immediately below the Cwm Clydach Lake. The watercourse of Nant Clydach watercourse is severely influenced by manmade features including long concrete cascades, culverts and artificial lakes. The proposed depleted reach is entirely manmade with circa 870m being a concrete culvert and the initial 30m being a concrete lined channel. The gradient of the depleted reach is approximately 5.8% and has no opportunities for natural in stream sedimentation, flora or fauna.

TGVHydro propose to install an intake for a micro hydro scheme within a cleared section adjacent to the existing Lakeside Café. The scheme proposes to run a pipe for approximately 1100m on the southern bank (trenched through a mixture of improved amenity grassland, roadside verge and a bramble section adjacent to an athletics track to the turbine house. (See Figure 1). The watercourse is heavily modified and progresses in an easterly direction. It consists almost entirely of a concrete lined culvert with the only exception being the upper 30m, which is a concrete lined open channel. This proposal does not fit obviously within the Hydropower Good Practice Guidelines and as a consequence we are proposing a peak abstraction of 302 ls (Qmean), a HOF of Q95 and abstraction of 100% of the flows above HOF on the grounds that there is little realistic opportunity for the status of the watercourse to ever be improved. The local community group will own the scheme with economic benefits being reinvested once the scheme has paid back its loan finance. Any flexibility in lowering the HOF further would be welcomed as it would greatly improve the socio-economic benefit without unacceptable impact on the natural environment or sedimentary processes.

We have followed NRWs guidance notes for geomorphology micro hydropower assessments, Stage 1. We have to point out however that many of the requirements for photographs have not been able to be completed due the watercourse being assessed being almost entirely a concrete culvert which we have no access to. We have done as much as is reasonably possible given the site constraints and the limited potential for geomorphological or ecological impact.”

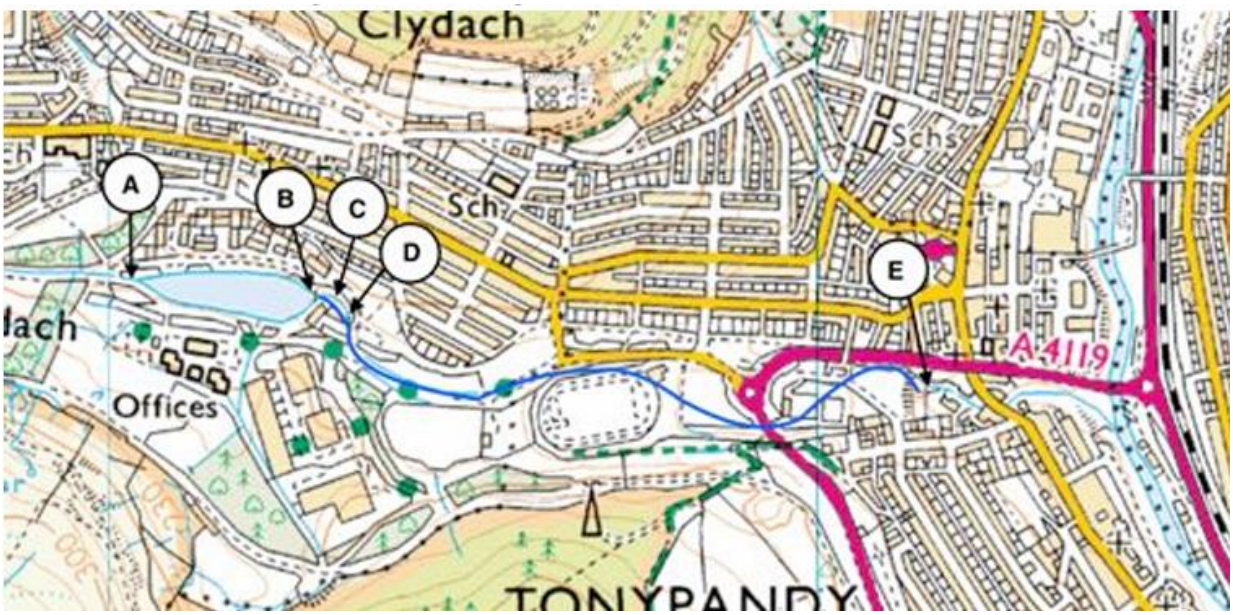


Figure 1: Location plan with referenced images.

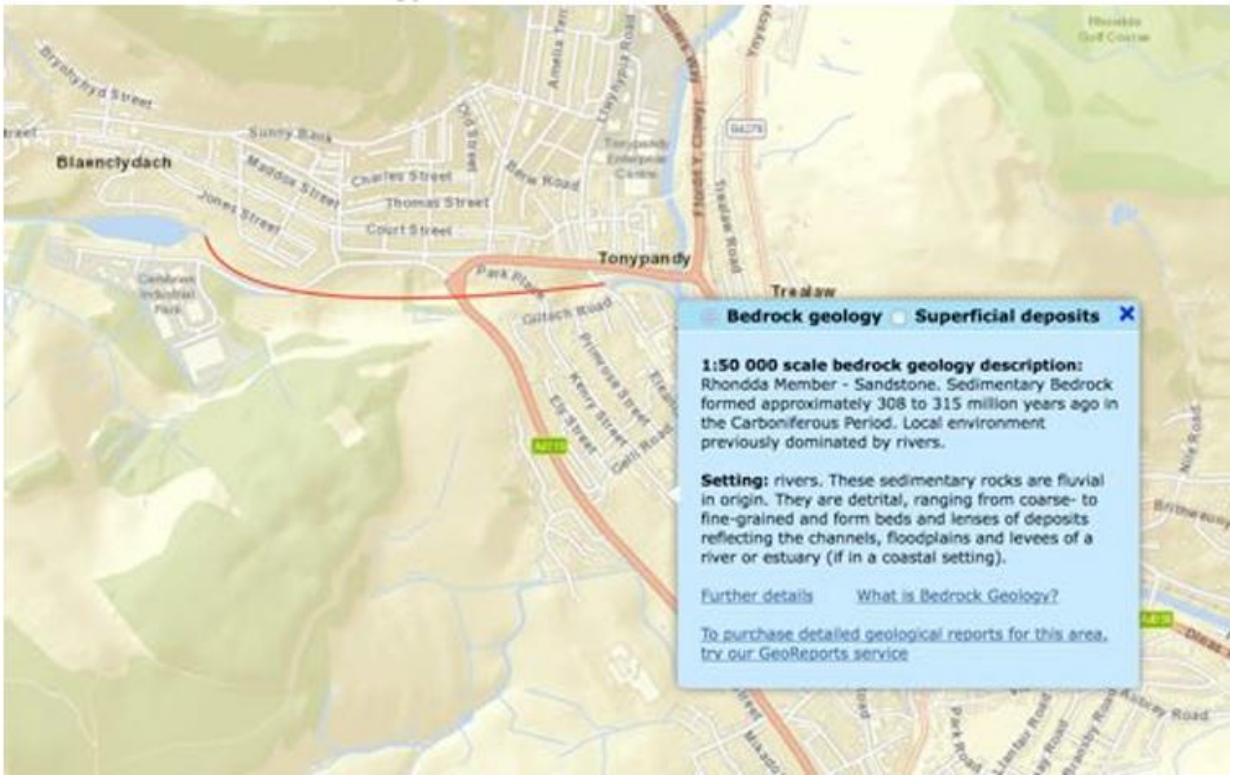
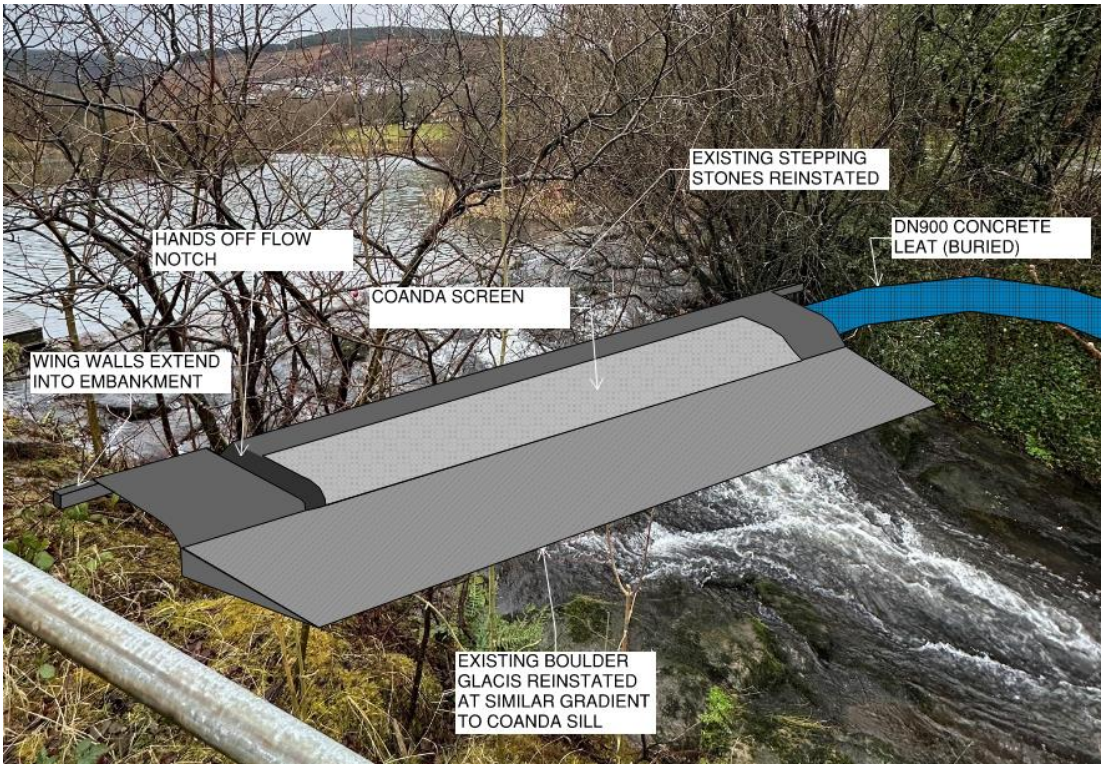


Figure 2: Bedrock geology of the area around the watercourse of Cwm Clydach (Source British Geological Survey and Google Earth). Proposed Depleted Reach shown in Red.

Weir and intake

The below images show an annotation of the intake, including an illustration of proposed structures. See Location B for more images.



Survey images

Location A

SS 98044 92848. Location approximately 300m upstream of the proposed abstraction point is the discharge of an existing community hydropower scheme. Between this location and the proposed intake is a 300m long manmade lake with a high level of sedimentation. Upstream from this photo the watercourse is heavily modified.

Location B

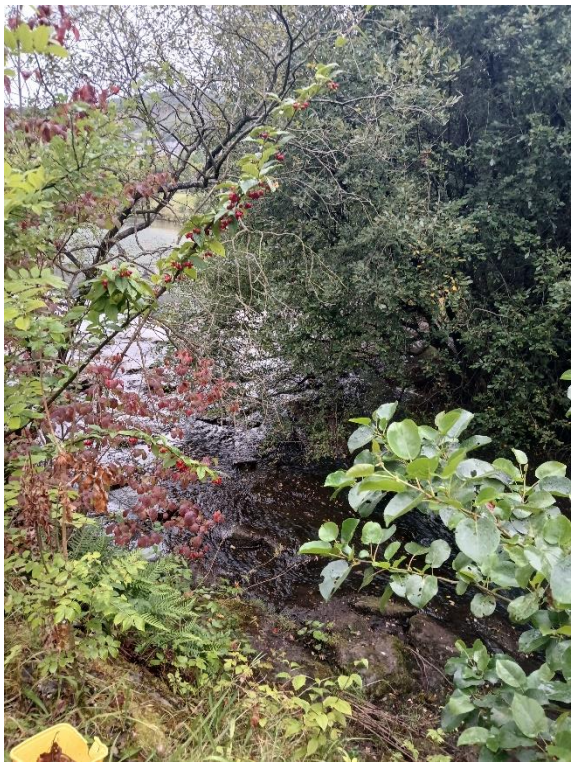
SS 98296 92820. View upstream of the proposed abstraction point. A heavily modified stretch of watercourse comprising a manmade lake that is a significant sediment trap.

SS 98296 92820. View of existing outflow from the lake and location of the leat intake (to the right where the wooden deck is). The watercourse from here is entirely manmade with the bed and banks consisting of large rocks embedded in concrete. A small weir wall (approx. 200m high) would be built downstream of the existing overflow to ensure HOF can be maintained, but would not be higher than the existing outflow crest.

SS 98296 92818. Location of the proposed intake on the bank. The excavations needed down to the watercourse for the outflow are all through manmade concrete banks materials.

Location C

SS 98329 92816. View downstream of intake location with further views of the concrete channel.

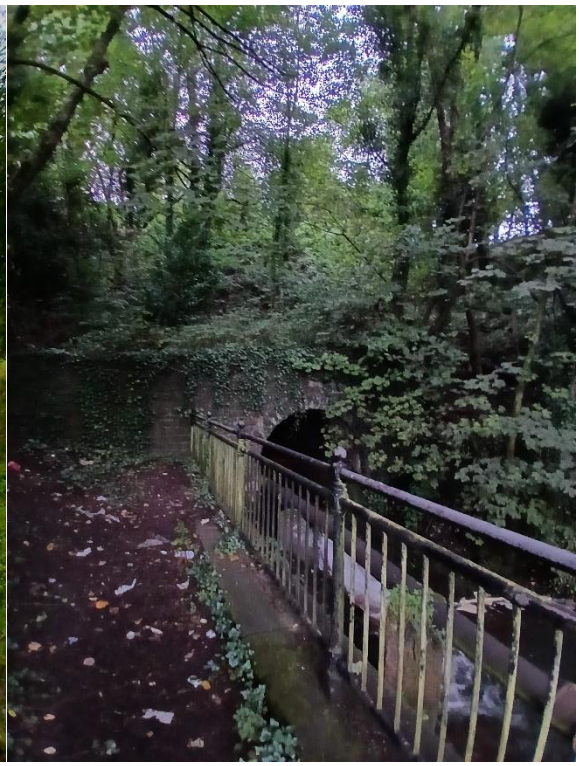


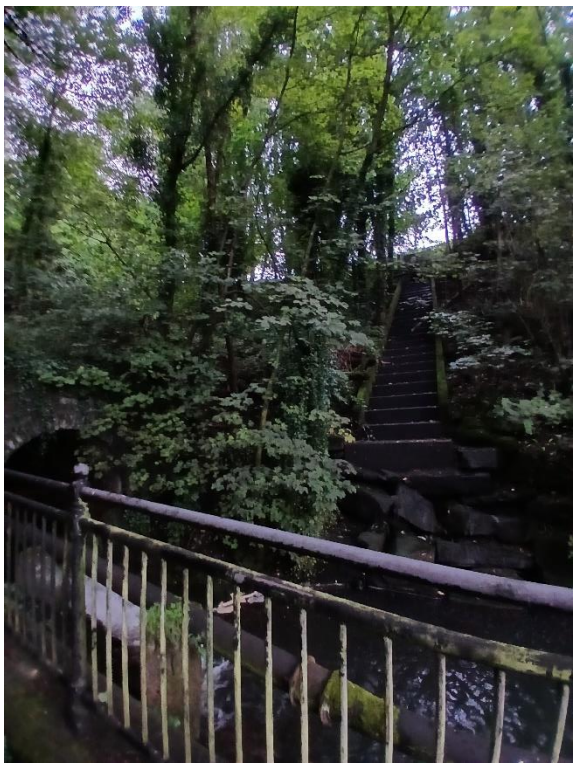
Location D

SS 98329 92816. Below the intake location the watercourse leaves the concrete lined manmade watercourse channel and enters an (approx.) 870m concrete lined channel for the remainder of the depleted reach. The abstracted water would travel down a buried penstock that takes a relatively direct route through RCT Council owned land to the discharge location.

Location E

SS 99161 92694. Location approximately 25m downstream of the proposed turbine house and 20m from the discharge of the culvert. All abstracted water would be returned adjacent to the culvert into the heavily modified channel.





Powerhouse

SS 99196 92649. Proposed location of the scheme powerhouse located in De Winton Street Car Park. Abstracted water will be transported via piping underneath the car park to the channel as shown in Location E.

Appendix A – Previous Geomorphology Survey

Stage 1 Geomorphology Assessment

This document provides additional information relating to the construction of a Micro Hydro Scheme on the Nant Clydach Watercourse, Cwm Clydach, Tonypandy, CF40 2BP.

The Green Valleys CIC

The Green Valleys Community Interest Company is a community-owned social enterprise that helps communities across Wales reduce their carbon emissions.

The Green Valleys CIC

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Non-technical Summary:

This small-scale hydropower scheme, with a depleted reach of approximately 900m, proposes an intake structure of up to 200mm in height on an existing concrete lined channel immediately below the Cwm Clydach Lake. The watercourse of Nant Clydach watercourse is severely influenced by manmade features including long concrete cascades, culverts and artificial lakes. The proposed depleted reach is entirely manmade with circa 870m being a concrete culvert and the initial 30m being a concrete lined channel. The gradient of the depleted reach is approximately 5.8% and has no opportunities for natural in stream sedimentation, flora or fauna.

TGVHydro propose to install an intake for a micro hydro scheme within a cleared section adjacent to the existing Lakeside Café. The scheme proposes to run a pipe for approximately 1100m on the southern bank (trenched through a mixture of improved amenity grassland, roadside verge and a bramble section adjacent to an athletics track to the turbine house. (See Figure 1).

The watercourse is heavily modified and progresses in an easterly direction. It consists almost entirely of a concrete lined culvert with the only exception being the upper 30m, which is a concrete lined open channel. This proposal does not fit obviously within the Hydropower Good Practice Guidelines and as a consequence we are proposing a peak abstraction of 302 ls (Qmean), a HOF of Q95 and abstraction of 100% of the flows above HOF on the grounds that there is little realistic opportunity for the status of the watercourse to ever be improved. The local community group will own the scheme with economic benefits being reinvested once the scheme has paid back its loan finance. Any flexibility in lowering the HOF further would be welcomed as it would greatly improve the socio-economic benefit without unacceptable impact on the natural environment or sedimentary processes.

We have followed NRWs guidance notes for geomorphology micro hydropower assessments, Stage 1. We have to point out however that many of the requirements for photographs have not been able to be completed due the watercourse being assessed being almost entirely a concrete culvert which we have no access to. We have done as much as is reasonably possible given the site constraints and the limited potential for geomorphological or ecological impact.

Location of Images and Figures

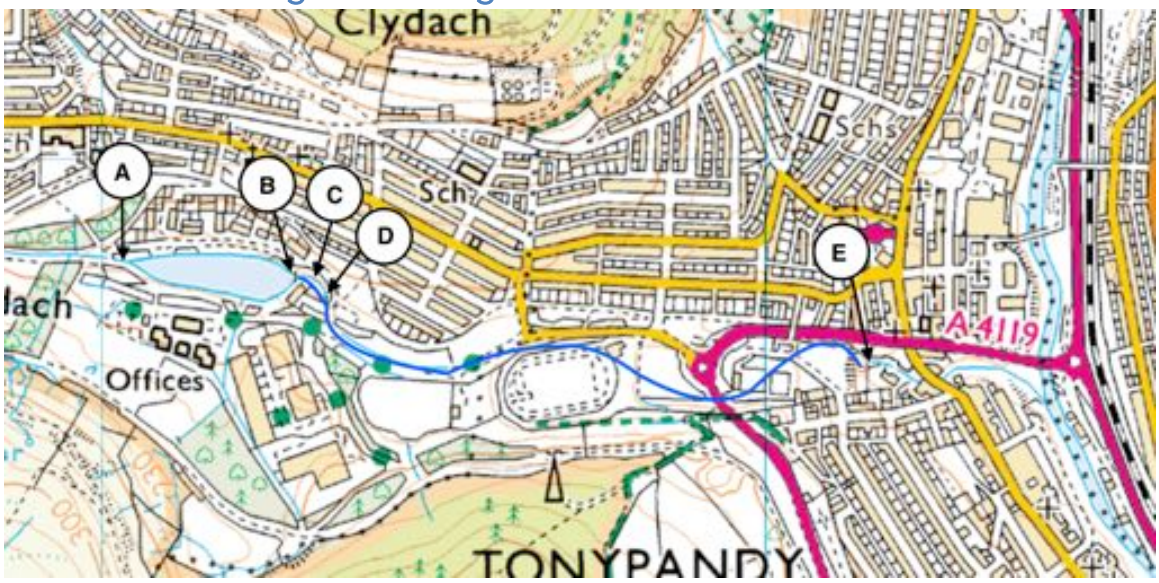


Figure 1: Cwm Clydach - Location plan of all referenced images and photos (NTS)

Overview of Site Geology

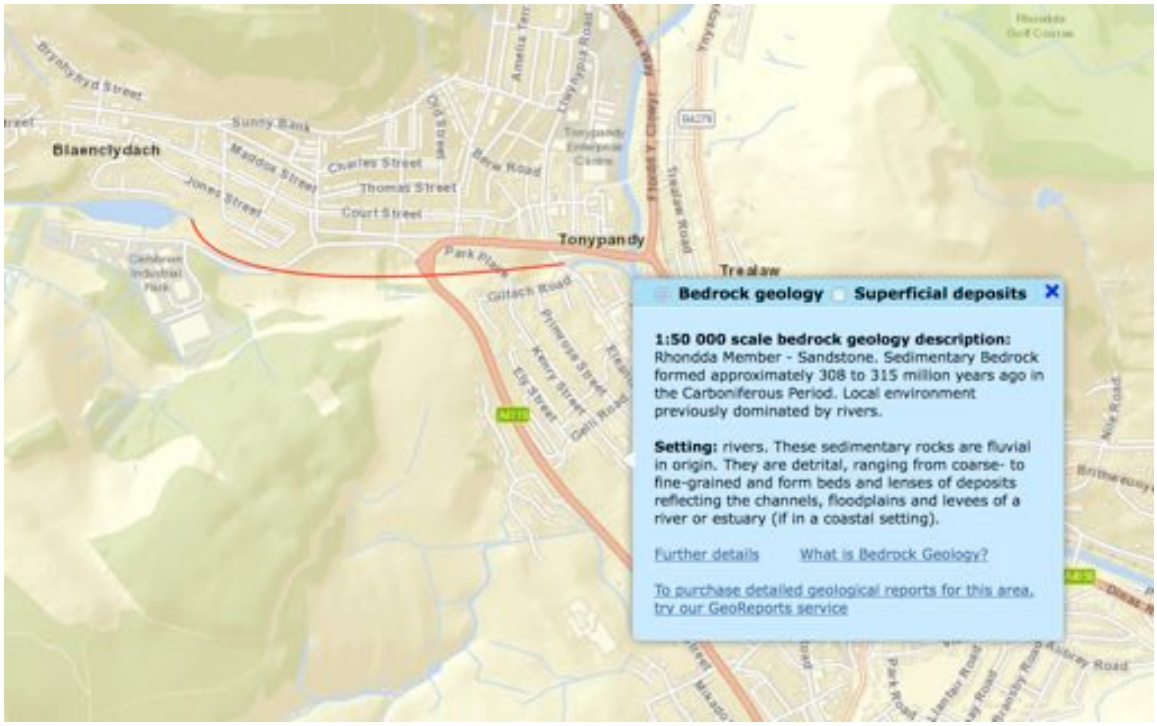


Figure 2: Bedrock geology of the area around the watercourse of Cwm Clydach (Source British Geological Survey and Google Earth). Proposed Depleted Reach shown in Red.

The underlying solid bedrock geology is Sandstone, however the entire depleted reach in question is manmade, with the majority (97%) of the route being a concrete culvert, with only the upper 30 meters being unknown origin large rocks set in a concrete channel. There are no known natural rocks or featured within the depleted reach.

Scheme Vital Statistics

Length of depleted reach:	900m (estimated – we do not know the definitive route of the concrete culvert)	
Scheme head:	52m (from intake to discharge – not mechanical head)	
NGR:	Larger Intake:	SS 98294 92819
	Discharge:	SS 99153 92699
Gradient:	5.8%	
Head line flow:	301.72 l/s (Qmean)	
Output:	100.0 kW (peak power)	

Height of Intake location (existing):	195.00m AOD
Height of Intake Weir Crest (proposed):	195.00m AOD
Height of proposed Discharge:	143.00m AOD

Site Photographs

Photo A1: SS 98044 92848. Location approximately 300m upstream of the proposed abstraction point is the discharge of an existing community hydropower scheme. Between this location and the proposed intake is a 300m long manmade lake with a high level of sedimentation. Upstream from this photo the watercourse is heavily modified.

Photo A2: SS98121 92813. View of the existing turbine house on the southern bank of the Cwm Clydach Lake.

Photo B1: SS 98296 92820. View upstream of the proposed abstraction point. A heavily modified stretch of watercourse comprising a manmade lake that is a significant sediment trap.

Photo B2: SS 98296 92820. View of existing outflow from the lake and location of the leat intake (to the right where the wooden deck is). The watercourse from here is entirely manmade with the bed and banks consisting of large rocks embedded in concrete. A small weir wall (approx. 200m high) would be built downstream of the existing overflow to ensure HOF can be maintained, but would not be higher than the existing outflow crest.

Photo B3 (Upstream) & B2 (Downstream): SS 98296 92820. Route and location of proposed leat from the existing lake outflow crest. Intake box (coanda screen) would be built into the bank with excess water cascading back into the concrete lined channel.

Photo C1: SS 98329 92816 Location of the proposed intake on the bank. The excavations needed down to the watercourse for the outflow are all through manmade concrete banks materials. Leat channel follows broadly the fence line, but would have a grill and/or be fully buried.

Photo D1 (Downstream): SS 98329 92816. Below the intake location the watercourse leaves the concrete lined manmade watercourse channel and enters an (approx.) 870m concrete lined channel for the remainder of the depleted reach. The abstracted water would travel down a buried penstock that takes a relatively direct route through RCT Council owned land to the discharge location.

Photo E1 (Upstream): SS 99161 92694. Location approximately 25m downstream of the proposed turbine house and 20m from the discharge of the culvert. All abstracted water would be returned adjacent to the culvert into the heavily modified channel.

Photo E2 (Downstream): SS 99161 92694. Downstream of the proposed a discharge location the heavily modified channel is 'open' for approximately 50m before entering into another tunnel as it travels under Tonypandy Town Centre.

Photo E3: SS 99161 92694. View of proposed turbine house location (to the left, by the bollards) and the route of the proposed tailrace to the discharge point where the culvert outflow is located.

Image C1 (Upstream): SS 98296 92820. Existing View from the northern bank towards the location of the intake. All heavily modified. Lake outflow dominates the areas.

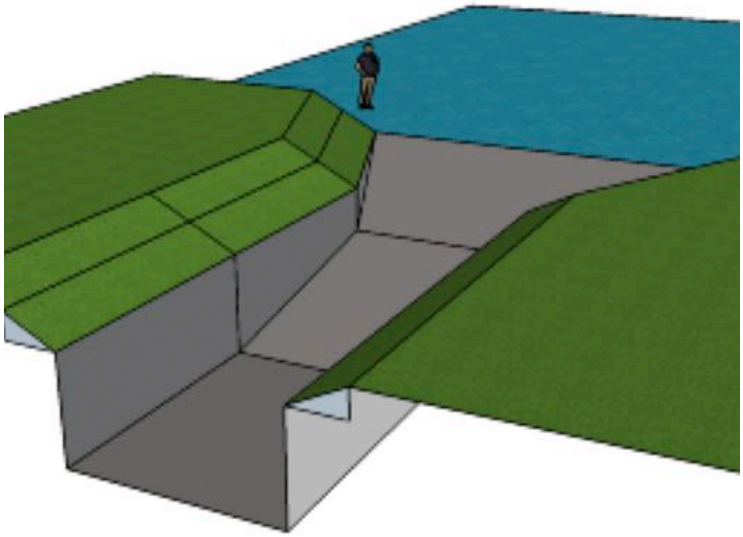
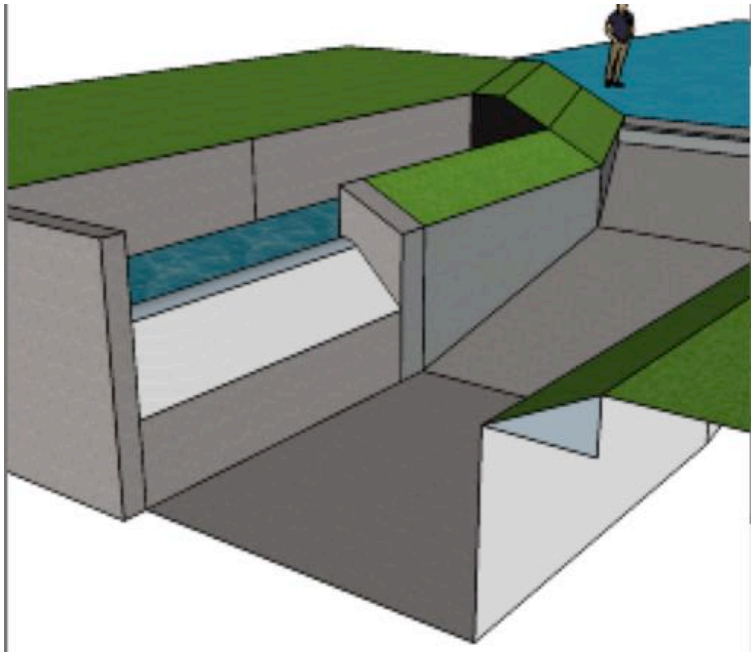


Image C2 (Upstream): SS 98296 92820. Proposed View from the northern bank towards the location of the intake. Leat channel leads from manmade lake to intake box on the bank. Excess water flows back into concrete channel.



Intake Details and Sediment Retention

The proposed Intake structure for the scheme on watercourse is to be cast from concrete. The highest point of the intake will rise above the existing concrete channel by approximately 200mm but will not exceed the height of the exiting lake outflow. A HOF Notch will either be placed on the weir wall or (preferably) as part of the intake box structure. This could lead to a dry section of concrete in the existing watercourse bed. We do not anticipate that the works will have an impact on immediate area of watercourse in terms of sediment transfer or a change to erosion levels.

Significance of Impact

We believe that small-scale weirs (crest heights of this structure above existing bed level is 200mm) will not cause any significant impact, especially considering the characteristics upstream (a manmade lake and heavily modified channel). However, we have proposed an intake design of minimal possible height to reduce both the scale of the impoundment and the potential to cause impact. The streambed stratum at the point of abstraction is concrete.

Retention of Sediment

Taken in the context of the watercourses natural sedimentary processes already being compromised by significant culverts and lakes we do not believe that the retention of sediment would have any measurable impact on the wider watercourse status as measured by the WFD and any long term impact would not be possible to measure or quantify.

Impact of Flow Regime on Erosion and Deposition

The hydro scheme will affect the levels of water flow throughout the depleted reach. However, because the entire depleted reach is either a concrete lined channel or concrete culvert we conclude that the scheme will have no meaningful impact on erosion or deposition within the depleted reach, and consequently will have no measurable impact on the current status of the Cwm Clydach.

Conclusion

A small-scale short-term impact may will occur as result of the small impoundment weir being built but will be limited through utilizing the proposed methodologies that will be worked up at full application.

Although the watercourse has not been formally assessed in line with the WFD it is considered to potentially have a status of up to 'poor' with it being difficult to see how the large culverts immediately below the proposed discharge could ever be removed or its status being improved.

TGVHydro are confident that a potential improvement in the WFD status of the watercourse will not be significantly affected by the proposed hydro scheme.