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MCS Hydro Transition Installer 123

Greenearth Hydro

Wyn Jones – Afon Gennog – Geomorphological Statement - Version 2 (15.11.13)

Key points:

1. Existing natural steps in the watercourse will be utilised in building the weir, such that the impoundment is limited to 8 metres upstream of the weir. There are a number of other examples of flat sections in the watercourse of this order of length (see below) suggesting that sediment, cobbles and boulders are able to travel across them.

2. Catchment Area and Watercourse Flow
    a. Catchment Area: 1.46 square kilometres
    b. Annual Rainfall: 3929mm
    c. Annual Runoff: 3649mm
    d. Average Daily Flow (ADF): 174 litres per second
    e. Length of depleted reach: 338 metres
3. Flow Rates & Abstraction Regime
    a. Design Flow (Max Turbine Flow): 190 litres per second
    b. Minimum Turbine Flow: 13 litres per second
    c. Hands Off Flow (Q95): 14 litres per second
    d. Abstraction Regime Above Q95: 50%
    e. Abstraction Regime Jan, Feb & Mar: 50% above Q95

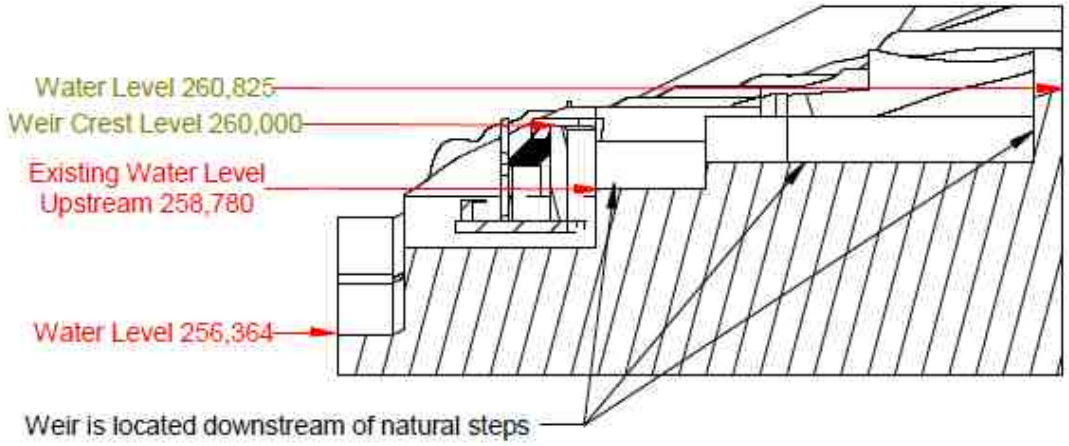
4. The stream (Afon Gennog) is too small to have been assessed for ecological quality. The larger watercourse into which it flows (the Afon Nant Peris) is currently assessed as Moderate quality, with a predicted quality in 2015 of Moderate. The Afon Nant Peris is classed as 'does not require assessment' for chemical quality.

5. There are numerous existing significant waterfalls in the depleted reach (see below).

Intake site: NGR SH 62109 56648

A concrete weir would be built at the intake site, as shown in the photos and drawings below:

Weir crest line, shown in red, below series of natural steps



Effect of abstraction on flow regime:
Due to the possibility of salmon spawning within the lower section of the depleted reach the abstraction regime is limited to a percentage take of 50% all year round. The proposed Hands Of Flow is 14 litres per second.

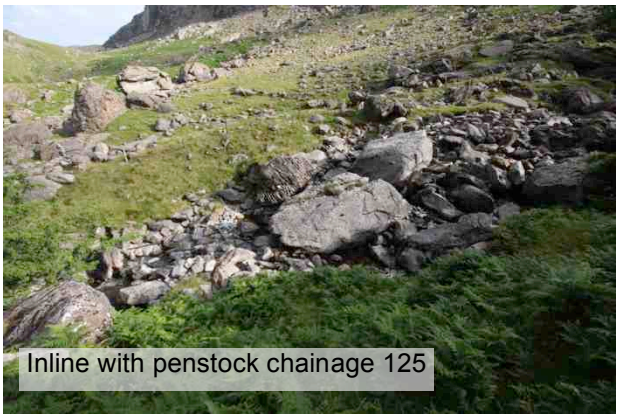
% Exceedance Probability	Flow upstream of abstraction [l/s]	Abstraction [l/s]	Abstraction as percentage of upstream flow	Residual flow downstream of weir [l/s]	Residual flow as percentage of upstream flow
5%	593	174	29.3%	419	70.7%
10%	411	174	42.3%	237	57.7%
15%	330	158	47.9%	172	52.1%
20%	249	118	47.2%	132	52.8%
25%	210	98	46.7%	112	53.3%
30%	170	78	45.9%	92	54.1%
35%	145	65	45.2%	79	54.8%
40%	119	53	44.1%	67	55.9%
45%	103	45	43.2%	59	56.8%
50%	87	37	42.0%	51	58.0%
55%	76	31	40.7%	45	59.3%
60%	64	25	39.1%	39	60.9%
65%	56	21	37.4%	35	62.6%
70%	47	17	35.1%	31	64.9%
75%	40	13	32.5%	27	67.5%
80%	33	0	0.0%	33	100.0%
85%	28	0	0.0%	28	100.0%
90%	22	0	0.0%	22	100.0%
95%	14	0	0.0%	14	100.0%
100%	8	0	0.0%	8	100.0%

Features and Streambed Photos from the Depleted Reach


At intake weir site

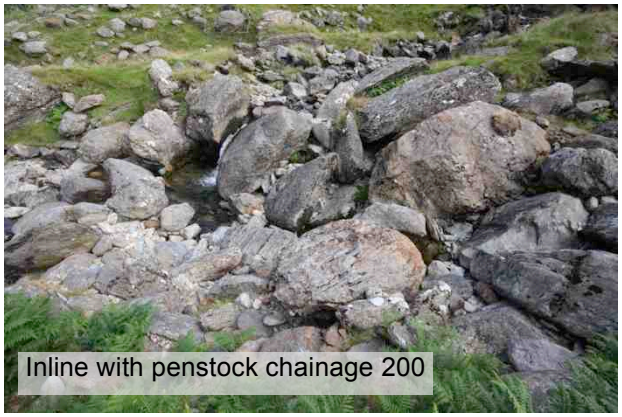

Inline with penstock chainage 75


Inline with penstock chainage 125

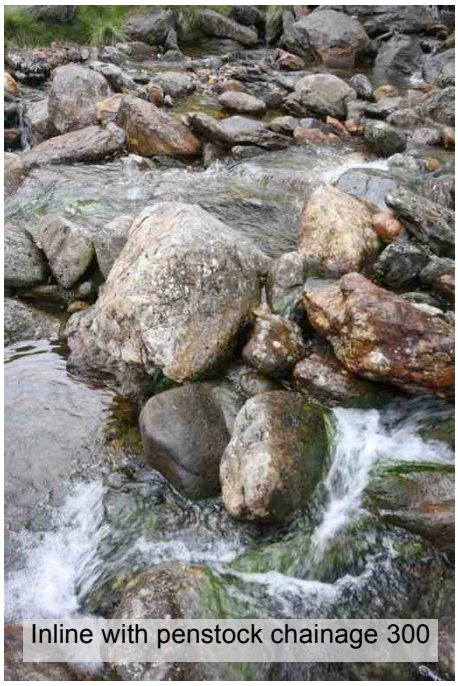

Inline with penstock chainage 125

Inline with penstock chainage 150

Inline with penstock chainage 175



Inline with penstock chainage 200



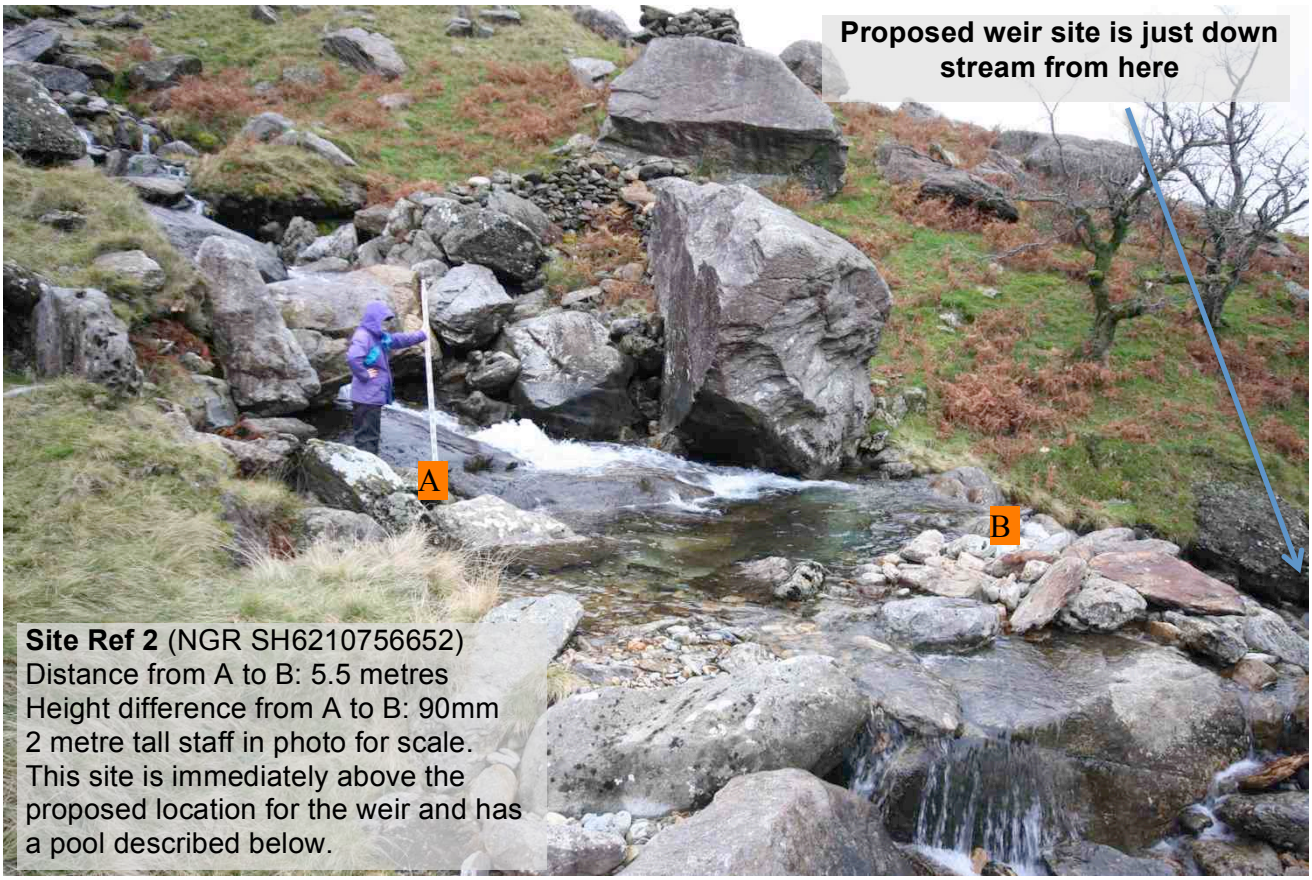
Inline with penstock chainage 300

Inline with penstock chainage 325

Sediment, cobble and boulder transfer

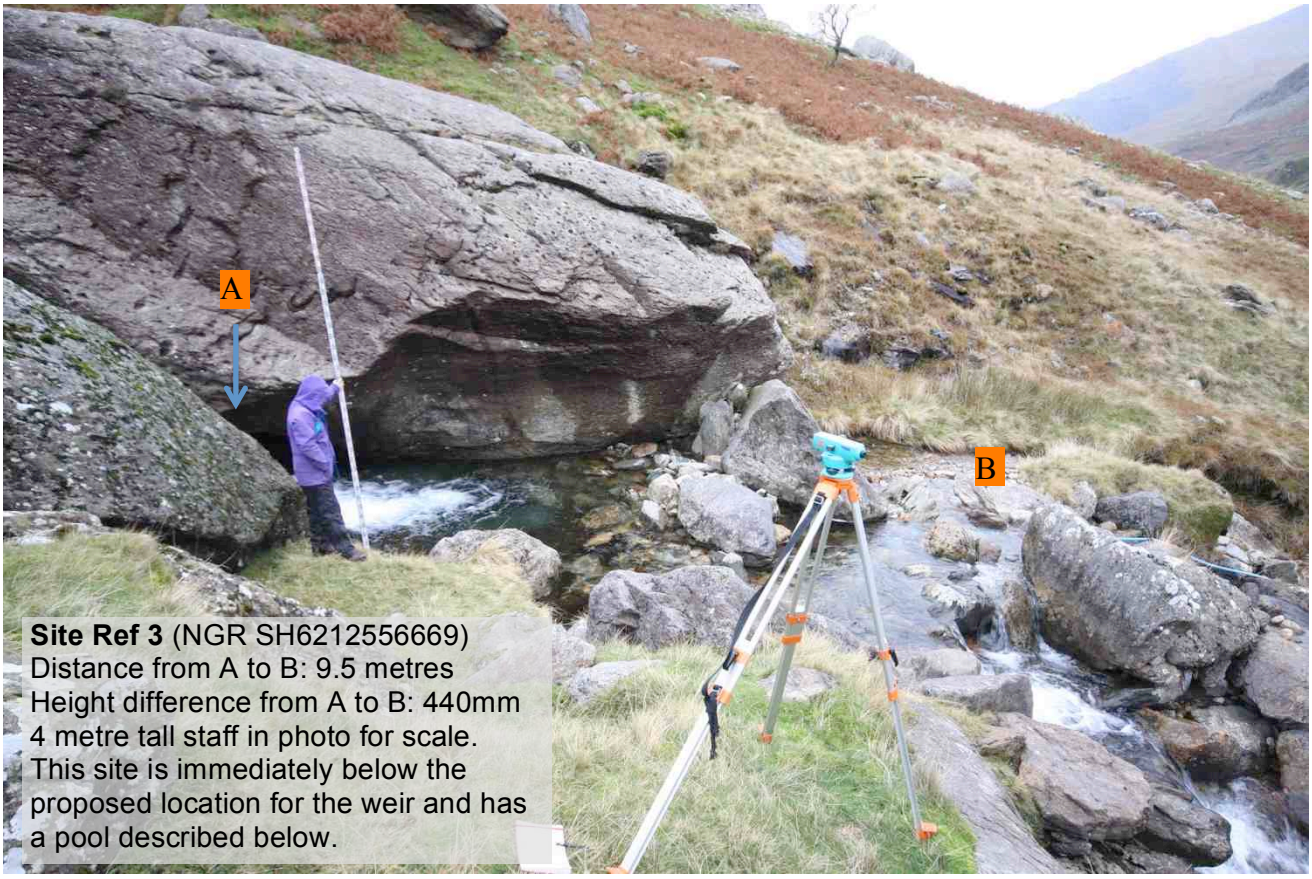
As the intake weir will create an 8 metre long impoundment the watercourse has been surveyed to check that there are existing examples of flat sections to prove that the watercourse can move sediment, cobbles and boulders successfully across flat sections of this length. Examples are as follows:

Site Ref 1 (NGR SH62026 56567)
Distance from A to C: 11.4 metres
Height difference from A to C: 300mm
4 metre tall staff in photo for scale



Site Ref 2 (NGR SH6210756652)
Distance from A to B: 5.5 metres
Height difference from A to B: 90mm
2 metre tall staff in photo for scale.
This site is immediately above the proposed location for the weir and has a pool described below.

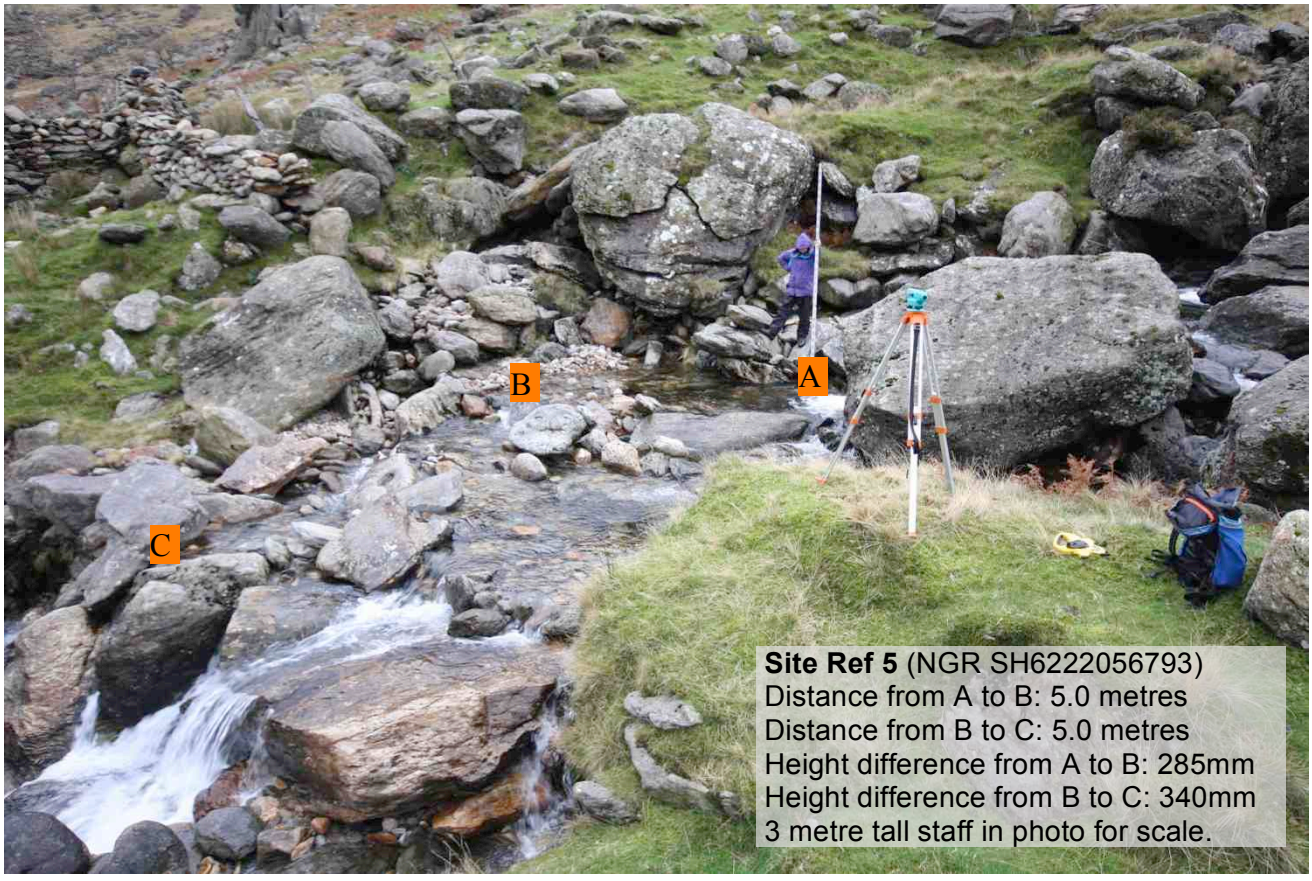
Site Ref 2 (NGR SH6210756652)
This pool has not filled with stones and is 0.6 metres deep
1.2 metre tall staff in photo for scale



Site Ref 3 (NGR SH6212556669)
Distance from A to B: 9.5 metres
Height difference from A to B: 440mm
4 metre tall staff in photo for scale.
This site is immediately below the proposed location for the weir and has a pool described below.

Site Ref 3 (NGR SH6212556669)
This pool has not filled with stones and is 1.3 metres deep

Site Ref 4 (NGR SH6218756752)
Distance from A to B: 6.0 metres
Height difference from A to B: 165mm
3 metre tall staff in photo for scale.



Site Ref 5 (NGR SH6222056793)
Distance from A to B: 5.0 metres
Distance from B to C: 5.0 metres
Height difference from A to B: 285mm
Height difference from B to C: 340mm
3 metre tall staff in photo for scale.

Site Ref 5 (NGR SH6222056793)
Typical bed material.
1.2 metre rule for scale.

Site Ref 6 (NGR SH6224656824)
Distance from A to B: 7.0 metres
Height difference from A to B: 770mm
5 metre tall staff in photo for scale.

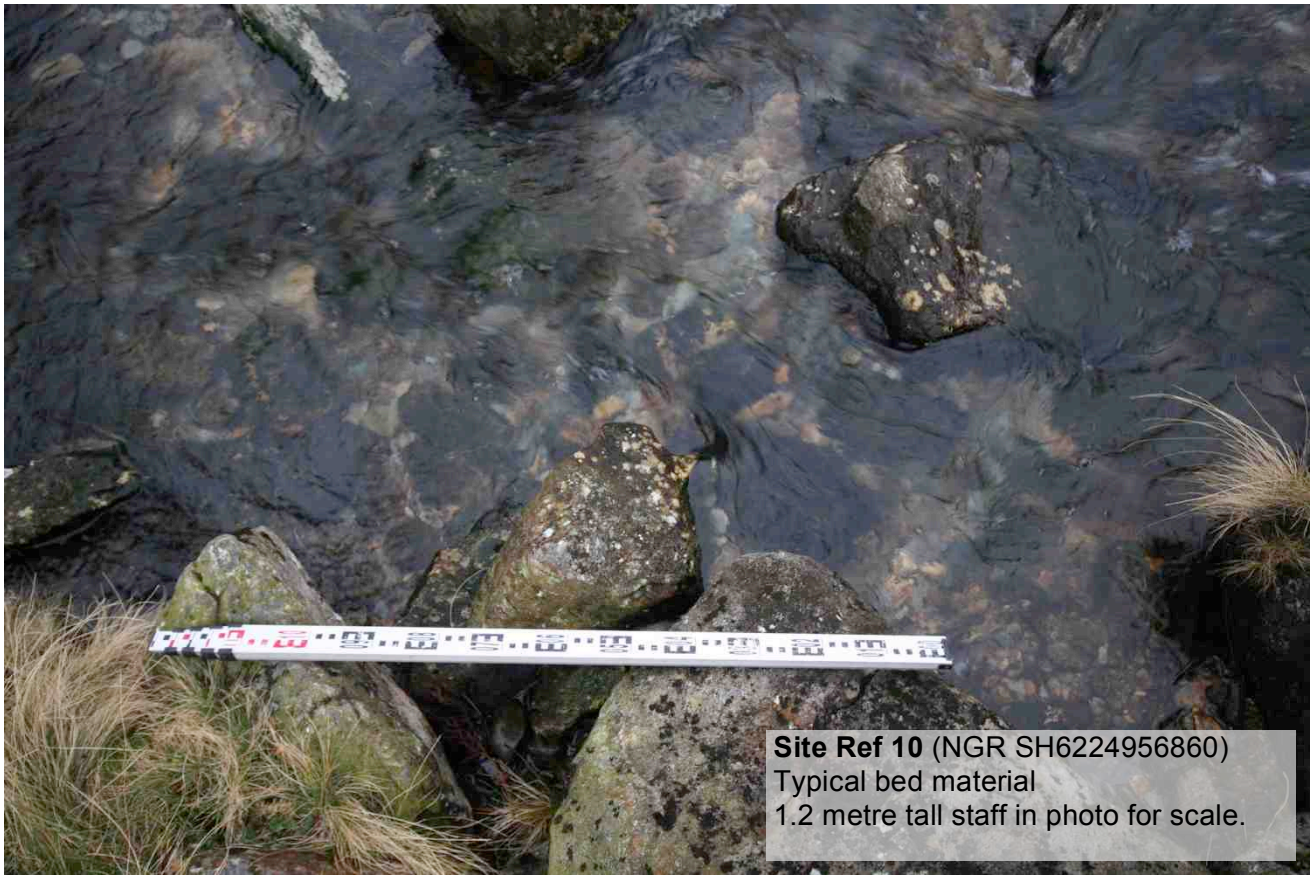
Site Ref 7 (NGR SH6224656824)
Distance from A to B: 9.0 metres
Height difference from A to B: 195mm
5 metre tall staff in photo for scale.

Site Ref 8 (NGR SH6225256844)
Distance from A to B: 10.0 metres
Height difference from A to B: 250mm
5 metre tall staff in photo for scale.

Site Ref 8 (NGR SH6225256844)
Typical bed material
1.2 metre tall staff in photo for scale.

Site Ref 9 (NGR SH6225056841)
Distance from A to B: 8.0 metres
Height difference from A to B: 60mm
5 metre tall staff in photo for scale.

Site Ref 10 (NGR SH6224956860)
Distance from A to B: 7.5 metres
Height difference from A to B: 205mm
5 metre tall staff in photo for scale.

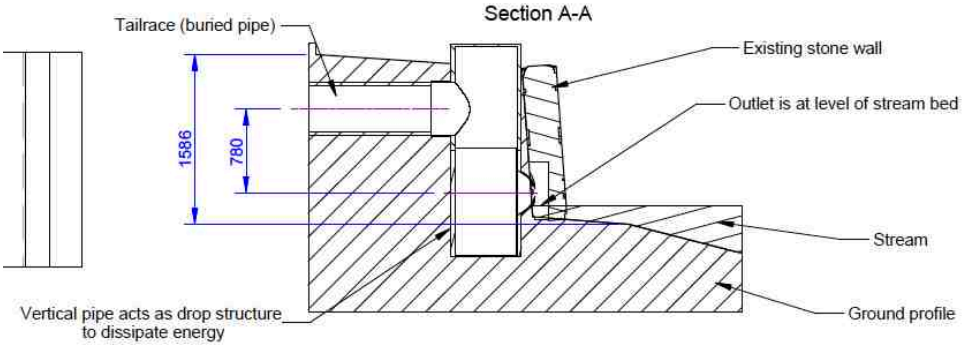


Site Ref 10 (NGR SH6224956860)
Typical bed material
1.2 metre tall staff in photo for scale.

Outfall Location

Large boulders exists across the full stream bed's width, limiting issues regarding erosion from the outfall. A 'drop-pipe' style outfall has been designed which limits the outfall water velocities to 1 m/s (see drawing 130817MP01 for more details).

'Drop-pipe' style outfall proposed with outlet here



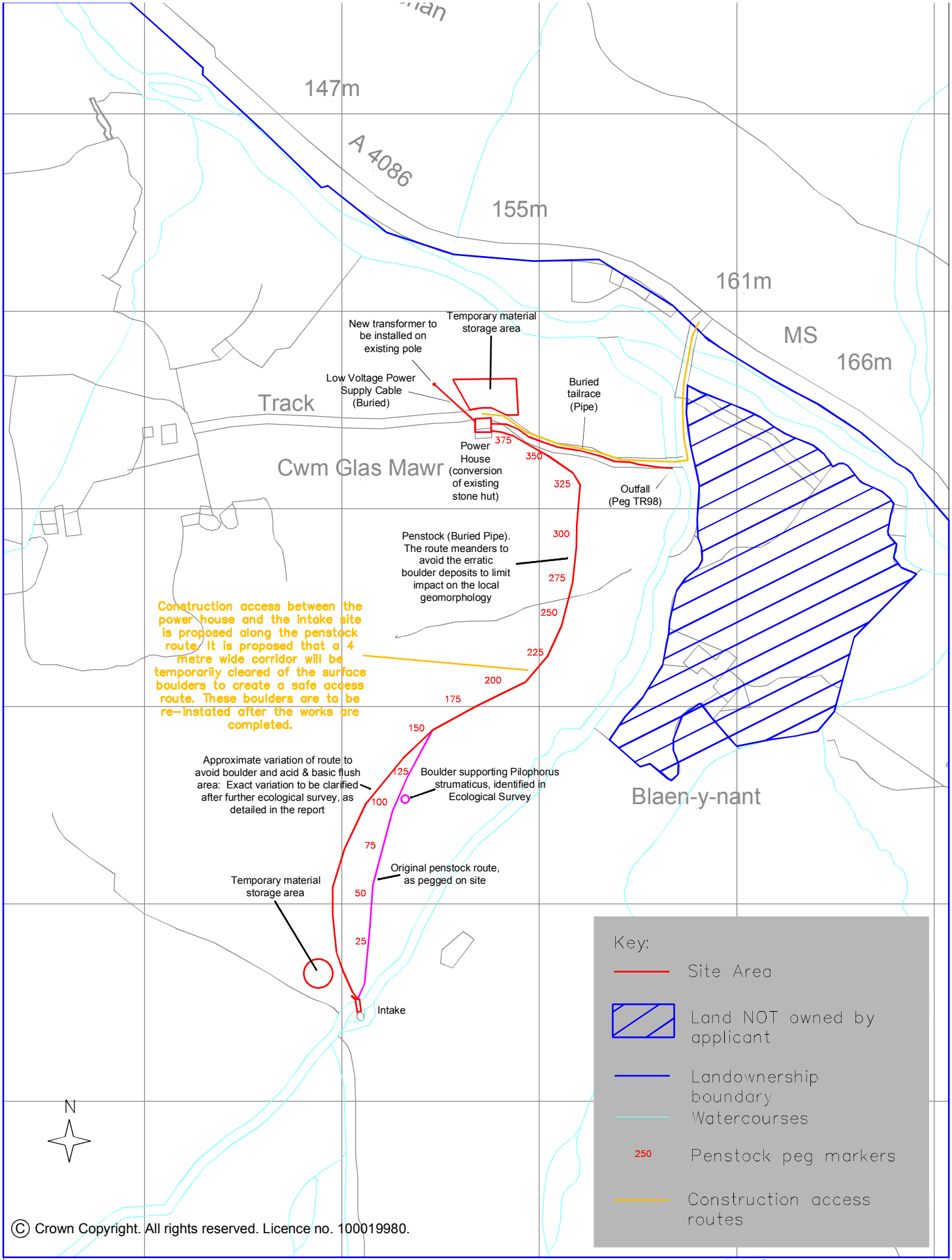
View upstream of outfall

View downstream of outfall

Site Layout & Long Profile of Depleted Reach

Intake Grid Reference:	SH 62109 56648
Turbine Grid Reference:	SH 62171 56942
Outfall Grid Reference:	SH 62267 56921

See the attached site layout plan and a long profile through the depleted reach.



Client: Wyn Jones, Bryniog Isa, Melin Y Coed, Llanrwst, LL26 0TR
Drawing Title: Afon Gennog Micro Hydro Site Layout Map
Drawn By: LMB Date: 3rd October 2013
Scale: 1:2500 @ A4
Dwg.No: 13081701LB Version: 4 (Storage areas added, Route amended)

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Long profile of the ground along the penstock route

NOTE: The numbers on the line represent the chainages in metres along the penstock