HOF and Flow Split Percentage Calculations for Nant Ffynnon-Wen watercourse (Main intake)

HOF and Flow Split Percentage Calculations

Coefficient	2.2
HOF Width (mm)	50
HOF Height (mm)	67
HOF (ls)	1.9
Abstraction %	70
Residual %	30
Peak Abstraction	12
TGV Reference	17-053 (Main watercourse)
Site Name	Pant Y Turnor

Site Name: Pant Y Turnor **TGV Reference:** 17-053 (Main watercourse)

Blue boxes (below) show calculated flow rates at peak abstraction
Orange box indicates the proposed width and flows of the Residual Flow section of the weir design

Green Boxes (below) highlight the calculated actual residual flow split left in the watercourse immediately below the intake. In this instance there is always more left in the watercourse than the licenced agreed percentage (over HOF) reducing impact on the depleted reach below that of the nationally adopted Wales Hydropower Guidelines.

					Width of Residual Notch if basic (in addition to HOF notch)		HOF Height (mm) (D)						
					164		67						
			Width of Screen (mm)		Proposed Width of Residual Flow notch (mm) (in addition to HOF notch) (B)		HOF Width (mm) (A)						
			500	500	112		50	Residual Flow Calculations			Natural Flow Calculations		
Natural Flow (based on WHS Lowflows)			Water Level above Weir Crest Height (mm) (C)	Flow over Broad-crest Screen Section (ls)	Quantity abstracted from screen section (ls)	Flow in Residual section		Flow in Hof Section (includes section above & below weir height) mm (ls)	Correct Figure in accordance with licence (HOF + residual split%) (ls)	Proposed Figure based on design (ls)	% of Proposed residual (vs abstracted)	Total Natural Flow (without hydro scheme) (ls)	Remaining Natural Flow (after hydro abstraction) (ls)	Remaining Natural Flow (after hydro abstraction) (%)
Table for reference only, does not correspond directly with adjacent table						If HOF not causing hydrological interferance (ls, pure %)	Proposed quantity in residual flow section (ls) (B)	A		A + B				
Q number	m/s	l/s	0	0.00	0.00	0.00	0.00	1.91	1.9	1.91	100.00%	1.9	1.9	100.0%
5%		0	10	1.10	1.10	0.47	0.25	2.35	2.37	2.60	38.78%	3.70	2.60	70.2%
10%		0	20	3.11	3.11	1.33	0.70	2.82	3.23	3.52	34.24%	6.63	3.52	53.1%
20%		0	30	5.72	5.72	2.45	1.28	3.32	4.35	4.60	32.11%	10.32	4.60	44.6%
30%		0	40	8.80	8.80	3.77	1.97	3.85	5.67	5.82	30.82%	14.62	5.82	39.8%
40%		0	49.2	12.00	12.00	5.14	2.69	4.36	7.04	7.05	30.01%	19.05	7.05	37.0%
50%		0	50	12.30	12.00	5.27	2.75	4.40	7.17	7.16	30.46%	19.46	7.46	38.3%
60%		0	60	16.17	12.00	6.93	3.62	4.98	8.83	8.60	35.83%	24.77	12.77	51.5%
70%		0	70	20.37	12.00	8.73	4.56	5.58	10.63	10.14	40.72%	30.51	18.51	60.7%
80%		0	80	24.89	12.00	10.67	5.58	6.20	12.57	11.78	45.14%	36.67	24.67	67.3%
90%		0	90	29.70	12.00	12.73	6.65	6.84	14.63	13.50	49.14%	43.20	31.20	72.2%
95%		0	100	34.79	12.00	14.91	7.79	7.51	16.81	15.30	52.75%	50.08	38.08	76.0%
99%		0												

Calculations use Broad-crested weir equation: $H = (Q/c*b))^{2/3}$

HOF and Flow Split Percentage Calculations for un-named tributary of the Nant Ffynnon-Wen watercourse (Feeding intake)

HOF and Flow Split Percentage Calculations

Coefficient	2.2
HOF Width (mm)	50
HOF Height (mm)	101
HOF (ls)	3.5
Abstraction %	70
Residual %	30
Peak Abstraction	10
TGV Reference	17-053 (Feeding watercourse)
Site Name	Pant Y Turnor

Site Name: Pant Y Turnor TGV Reference: 17-053 (Feeding watercourse)

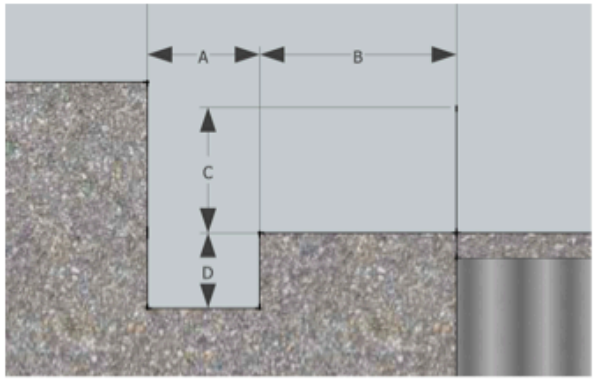
Blue boxes (below) show calculated flow rates at peak abstraction
Orange box indicates the proposed width and flows of the Residual Flow section of the weir design

Green Boxes (below) highlight the calculated actual residual flow split left in the watercourse immediately below the intake. In this instance there is always more left in the watercourse than the licenced agreed percentage (over HOF) reducing impact on the depleted reach below that of the nationally adopted Wales Hydropower Guidelines.

					Width of Residual Notch if basic (in addition to HOF notch)		HOF Height (mm) (D)						
					207		101						
			Width of Screen (mm)		Proposed Width of Residual Flow notch (mm) (in addition to HOF notch) (B)		HOF Width (mm) (A)						
			600	600	124		50						
Natural Flow (based on WHS Lowflows)			Water Level above Weir Crest Height (mm) (C)	Flow over Broad-crest Screen Section (ls)	Quantity abstracted from screen section (ls)	Flow in Residual section		Flow in Hof Section (includes section above & below weir height) mm (ls)	Residual Flow Calculations			Natural Flow Calculations		
Table for reference only, does not correspond directly with adjacent table						If HOF not causing hydrological interferance (ls, pure %)	Proposed quantity in residual flow section (ls) (B)	A	Correct Figure in accordance with licence (HOF + residual split%) (ls)	Proposed Figure based on design (ls)	% of Proposed residual (vs abstracted)	Total Natural Flow (without hydro scheme) (ls)	Remaining Natural Flow (after hydro abstraction) (ls)	Remaining Natural Flow (after hydro abstraction) (%)
								A		A + B				
Q number	m/s	l/s												
			0	0.00	0.00	0.00	0.00	3.53	3.5	3.53	100.00%	3.5	3.5	100.0%
5%		0	10	1.32	1.32	0.57	0.27	4.07	4.07	4.34	38.91%	5.66	4.34	76.7%
10%		0	20	3.73	3.73	1.60	0.77	4.63	5.10	5.40	33.74%	9.14	5.40	59.1%
20%		0	30	6.86	6.86	2.94	1.42	5.22	6.44	6.63	31.36%	13.49	6.63	49.2%
30%		0	38.57	10.00	10.00	4.29	2.07	5.74	7.79	7.80	30.08%	17.80	7.80	43.8%
40%		0	50	14.76	10.00	6.32	3.05	6.45	9.82	9.50	37.52%	24.26	14.26	58.8%
50%		0	60	19.40	10.00	8.31	4.01	7.11	11.81	11.12	43.23%	30.52	20.52	67.2%
60%		0	40.6	10.80	10.00	4.63	2.23	5.86	8.13	8.09	31.47%	18.89	8.89	47.1%
70%		0	70	24.45	10.00	10.48	5.05	7.78	13.98	12.83	48.27%	37.28	27.28	73.2%
80%		0	80	29.87	10.00	12.80	6.17	8.47	16.30	14.64	52.70%	44.51	34.51	77.5%
90%		0	90	35.64	10.00	15.27	7.37	9.18	18.77	16.55	56.61%	52.19	42.19	80.8%
95%		0	100	41.74	10.00	17.89	8.63	9.91	21.39	18.54	60.06%	60.28	50.28	83.4%
99%		0												

Calculations use Broad-crested weir equation:	H = (Q/c*b)) ^2/3

Calculations for the Residual Flow Section Width (factoring in the impact of the HOF Notch)



Calculations use Broad-crested weir equation:	H = (Q/c*b)) ^2/3

Calculations show how the increase in height of water over the weir crest (-C-) increase disproportionately the quatity of water travelling through section A. Consequently the width of the residual flow channel (B) is reduced so that when the scheme is abstracting at Qmean the amount left in the watercourse is HOF + the correct percentage of residual flow. Calculations show how 2 different broad-crested notch equations are calculated for each section (A+B). Between A and B there will be a vertical stainless steel plate seperating the two different flows.