Project Name: Mark Sealy - Energy Output Assessment (FDC below is for both watercourses combined)

% 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	Penstock Headloss [m]	Combined Turbine & Generator Efficiency [%]	Power output [kW]	Yield [kWh]
5%	321	50.0	15.6%	271	84.4%	3.74	73%	33.86	14,830
10%	213	50.0	23.5%	163	76.5%	3.74	73%	33.86	14,830
15%	170	50.0	29.4%	120	70.6%	3.74	73%	33.86	14,830
20%	127	50.0	39.4%	77	60.6%	3.74	73%	33.86	14,830
25%	107	50.0	46.7%	57	53.3%	3.74	73%	33.86	14,830
30%	87	50.0	57.5%	37	42.5%	3.74	73%	33.86	14,830
35%	75	44.8	59.7%	30	40.3%	3.05	72%	30.14	13,201
40%	63	36.4	57.8%	27	42.2%	2.08	72%	24.74	10,836
45%	55	30.8	56.0%	24	44.0%	1.52	72%	21.05	9,221
50%	47	25.2	53.6%	22	46.4%	1.05	71%	17.07	7,476
55%	41	21.0	51.2%	20	48.8%	0.75	71%	14.27	6,250
60%	35	16.8	48.0%	18	52.0%	0.50	69%	11.12	4,871
65%	31	14.0	45.2%	17	54.8%	0.35	67%	9.01	3,948
70%	27	11.2	41.5%	16	58.5%	0.23	63%	6.79	2,973
75%	24	9.1	37.9%	15	62.1%	0.16	56%	4.91	2,149
80%	21	7.0	33.3%	14	66.7%	0.10	46%	3.10	1,359
85%	18	4.6	26.0%	13	74.0%	0.04	26%	1.14	499
90%	14	0.0	0.0%	14	100.0%	0.00	0%	0.00	0
95%	11	0.0	0.0%	11	100.0%	0.00	0%	0.00	0
100%	7	0.0	0.0%	7	100.0%	0.00	0%	0.00	0
								Annual Totals	151,764
								Turbine down time for maintenance in days per year	5
								Estimated annual generation in kWh	149,685
								Capacity Factor	50.47%

Aggregate statistics & abstraction quantities (both watercourses combined):

Catchment area:	1.820	km2
Run-off:	1579	mm
Gross Head (Static Head):	98.3	m
Net Head (Dynamic Head) at Design Flow:	94.6	m
Mean Flow (Qmean)	91	l/s
Abstraction regime (Percentage take above HOF)	70%	
Hands Off Flow (HOF) Exceedance	95%	
Hands Off Flow (HOF)	11	l/s
Design Flow (Aggregate Max Instantaneous Abstraction Flow)	50.0	l/s
Min Turbine Flow as %age of max flow	5%	
Min Turbine Flow	3	l/s
Q95/Qmean Ratio (see FDC above)	0.12	
Q10/Qmean Ratio (see FDC above)	2.34	
Max hourly abstraction (Design flow x 3600 sec)	180.0	m3
Max daily abstraction (Max hourly abstract x 24h)	4,320.0	m3
Max Annual abstraction (Max Daily Abstraction x 365 days)	1,576,800	m3

Note the max instantaneous abstraction flows have be apportioned to each intake based on the fact that the tributary's mean flow (Intake 1) is 60% of Afon Alice's (Intake 2) and an aggregate design flow (max turbine flow) of 50 l/s is required]

Intake 1' (unnamed tributary) statistics & abstraction quantities:

Mean Flow (Qmean)	34	l/s
Q95/Qmean Ratio (see FDC over the page)	0.12	
Q10/Qmean Ratio (see FDC over the page)	2.32	
Max instantaneous abstraction flow	19	l/s
Max hourly abstraction (max instantaneous abstraction x 3600 sec)	67.5	m3
Max daily abstraction (Max hourly abstract x 24h)	1,620.0	m3
Max Annual abstraction (Max Daily Abstraction x 365 days)	591,300	m3

Intake 2' (Afon Alice) statistics & abstraction quantities:

Mean Flow (Qmean)	57	l/s
Q95/Qmean Ratio (see FDC over the page)	0.12	
Q10/Qmean Ratio (see FDC over the page)	2.35	
Max instantaneous abstraction flow	31	l/s
Max hourly abstraction (max instantaneous abstraction x 3600 sec)	112.5	m3
Max daily abstraction (Max hourly abstract x 24h)	2,700.0	m3
Max Annual abstraction (Max Daily Abstraction x 365 days)	985,500	m3

Flow Duration Curves for Mark Sealy (Afon Alice & one of its unnamed tributaries)

Annual Flow Duration Curve:
Low-Flow Estimates from LowFlows
www.hydrosolutions.co.uk

Intake 1&2' Combined

	P (%)	Q (m³/s)	Q (l/s)
1	5	0.321	321
2	10	0.213	213
3	20	0.127	127
4	30	0.087	87
5	40	0.063	63
6	50	0.047	47
7	60	0.035	35
8	70	0.027	27
9	80	0.021	21
10	90	0.014	14
11	95	0.011	11
12	99	0.007	7

LowFlows Runoff	1579	mm	Mean Flow (l/s)
LowFlows Rainfall	2052	mm	91
Catchment Area	1.82	km2	
BFI	0.37		
LowFlows Map	64		

Intake 1' - Unnamed Tributary

Natural FD series at annual resolution
Basin-nam Sealy Intake 4 (Intake 1 very similar) Prelim
Outlet at: SH 689 029

(Based on catchment characteristics derived at grid-resolution of 20 m)
Annual me 0.034 m³/s
Q95 0.004 m³/s

	P (%)	Q (m³/s)	Q (l/s)
1	5	0.119	119
2	10	0.079	79
3	20	0.047	47
4	30	0.032	32
5	40	0.023	23
6	50	0.017	17
7	60	0.013	13
8	70	0.01	10
9	80	0.008	8
10	90	0.005	5
11	95	0.004	4
12	99	0.003	3

1602	Intake 1 Runoff		Mean Flow (l/s)
2055	Intake 1 Rainfall		34
0.66	Intake 1 catchment area		

Intake 2' - Afon Alice

Natural FD series at annual resolution
Basin-name: Sealy Intake 2 Prelim
Outlet at: SH 694 030

(Based on catchment characteristics derived at grid-resolution of 20 m)
Annual mean f 0.057 m³/s
Q95 0.007 m³/s

	P (%)	Q (m³/s)	Q (l/s)
1	5	0.202	202
2	10	0.134	134
3	20	0.08	80
4	30	0.055	55
5	40	0.04	40
6	50	0.03	30
7	60	0.022	22
8	70	0.017	17
9	80	0.013	13
10	90	0.009	9
11	95	0.007	7
12	99	0.004	4

1555	Intake 2 Runoff		Mean Flow (l/s)
2049	Intake 2 Rainfall		57
1.16	Intake 2 catchment area