APPENDIX 7-21 CHANNEL SURVEY PHOTOGRAPHS & STREAM CROSS-SECTIONAL PROFILES

<u>Photograph 1</u>: Upstream of Culvert 1 (looking upstream)

<u>Photograph 2</u>: Culvert 1 (upstream end)

<u>Photograph 3</u>: Culvert 1 (downstream end) – Note Starflow flowmeter installed

<u>Photograph 4</u>: Reach 1 (looking upstream) – Note two quarry discharge pipes, one discharging

<u>Photograph 5</u>: Reach 1 (looking downstream)

<u>Photograph 6</u>: Reach 1 - Note overbank flow on west bank

Photograph 7: Reach 1 (looking downstream, approaching Culvert 2)

Photograph 8: Culvert 2 (upstream end)

<u>Photograph 9</u>: Culvert 2 (downstream end)

<u>Photograph 10</u>: Reach 2 (looking downstream)

Photograph 11: Culvert 3 (upstream end)

Photograph 12: Culvert 3 (downstream end)

<u>Photograph 13</u>: Reach 3 (looking downstream) – Note concrete brick wall surrounding reach

<u>Photograph 14</u>: Culvert 4 (upstream end) – Note smaller pipe on left diverts water to private pumphouse

<u>Photograph 15</u>: Culvert 4 (downstream end) – very overgrown on banks

<u>Photograph 16</u>: Reach 4 (looking downstream)

<u>Photograph 17</u>: Reach 4 (looking upstream from Culvert 5) – Note waterwheel in stream

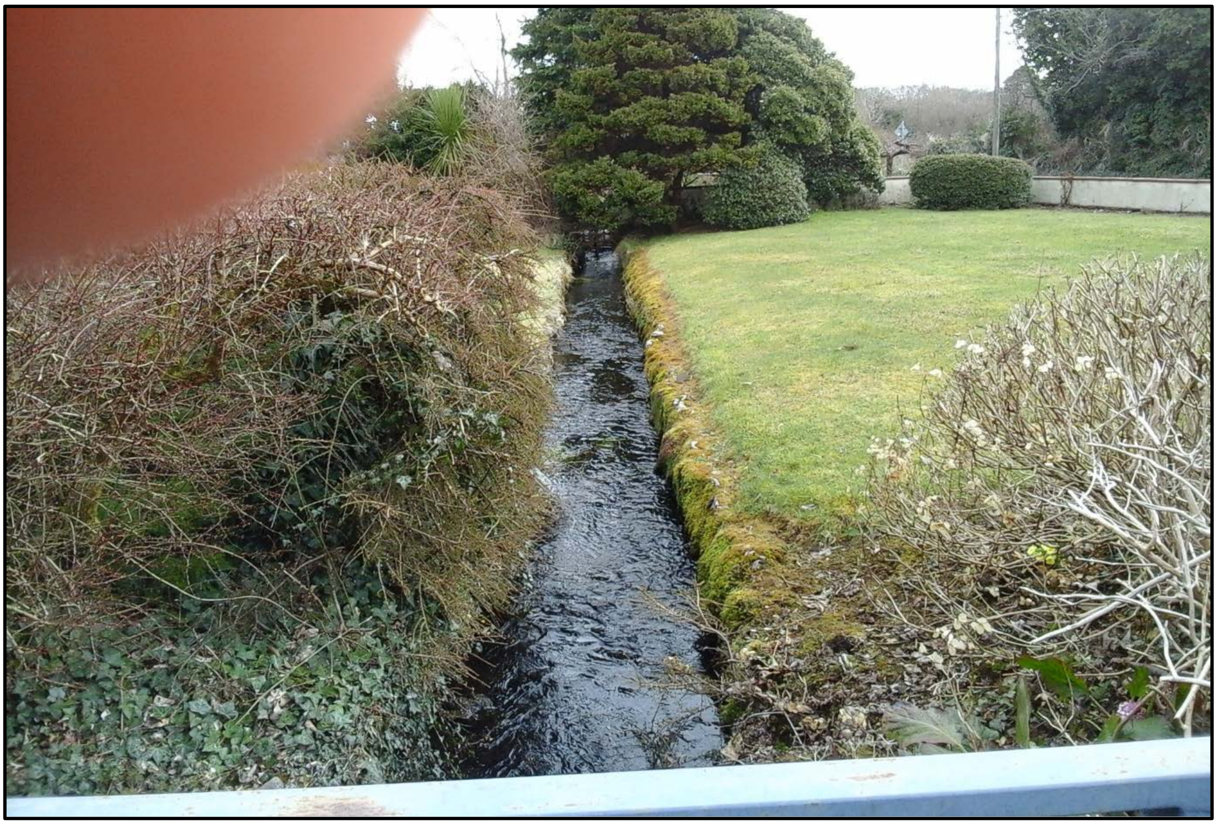
<u>Photograph 18</u>: Reach 4 – Weir in stream next to waterwheel

<u>Photograph 19</u>: Reach 4 – Surface water drains on adjacent local road leading to stream

<u>Photograph 20</u>: Culvert 5 (upstream end) – Arched culvert under main public road R287

Photograph 21: Culvert 5 (downstream end)

Photograph 22: Reach 5 (looking downstream from bridge at Culvert 5)



<u>Photograph 23</u>: Reach 5 (looking downstream from bridge at Byrne's residence)

<u>Photograph 24</u>: Reach 5 (looking downstream from bridge at Judge's residence)

<u>Photograph 25</u>: Reach 5 (looking upstream at Culvert 6) – Note perforated concrete fence over stream

<u>Photograph 26</u>: Culvert 6 (upstream end)

<u>Photograph 27</u>: Culvert 6 (downstream end)

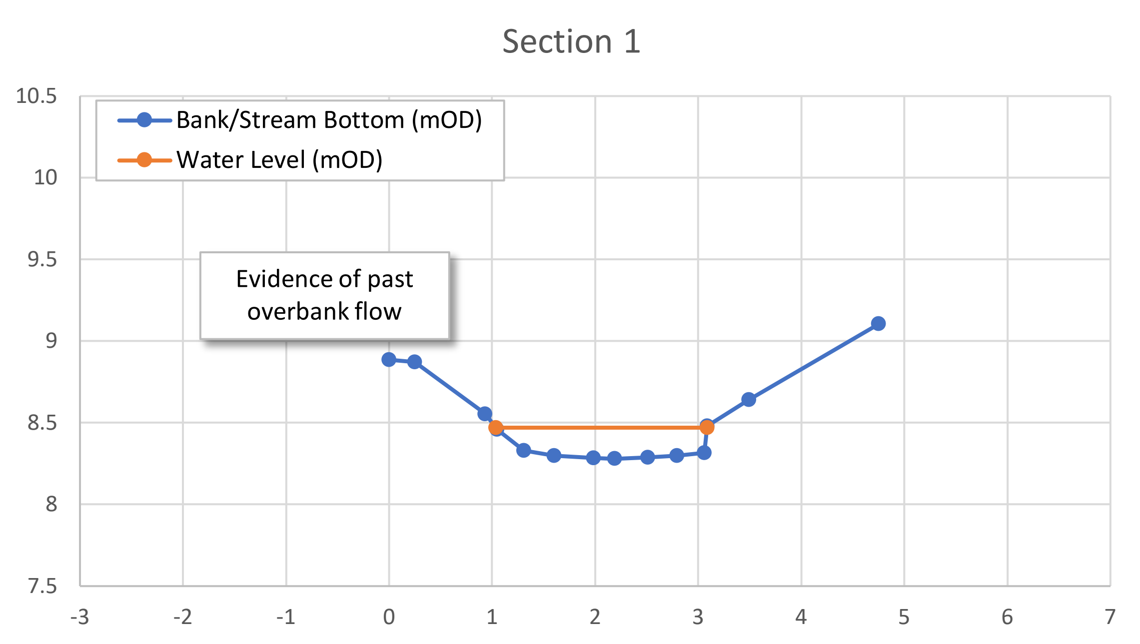
<u>Photograph 28</u>: Reach 6 (looking downstream from bridge at Culvert 6)

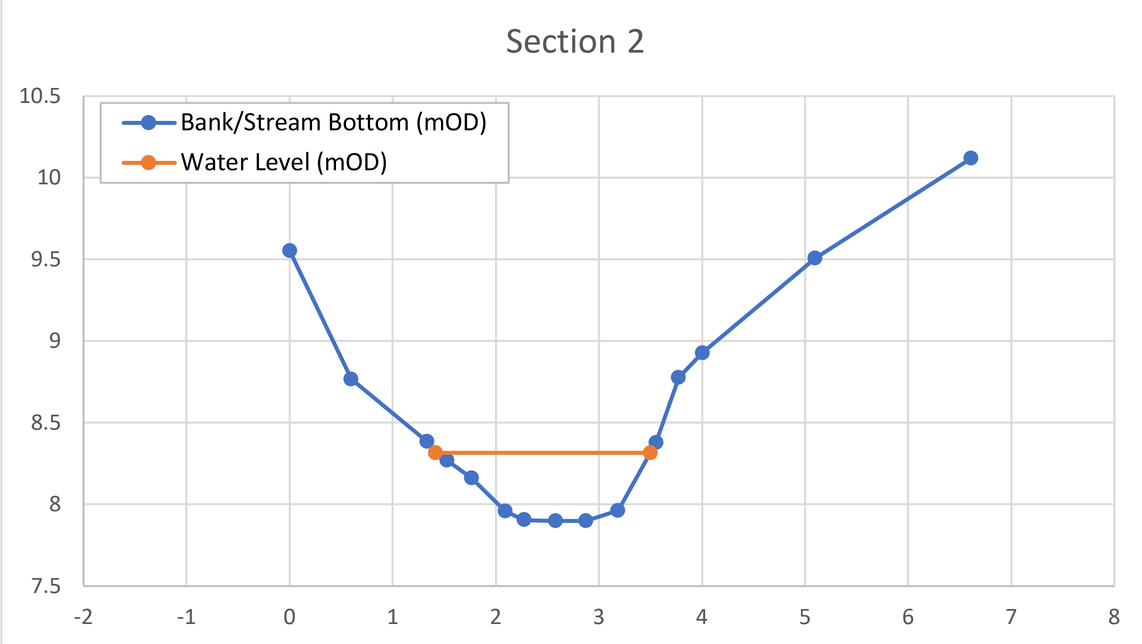
Photograph 29: Culvert 7 (upstream end)

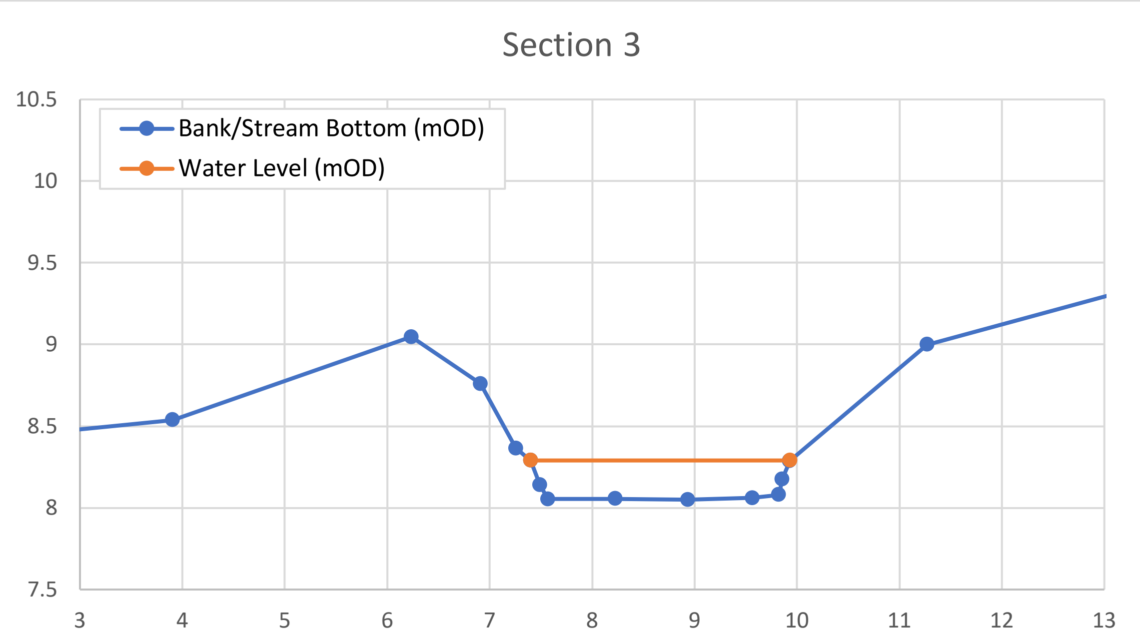
Photograph 30: Culvert 7 (downstream end)

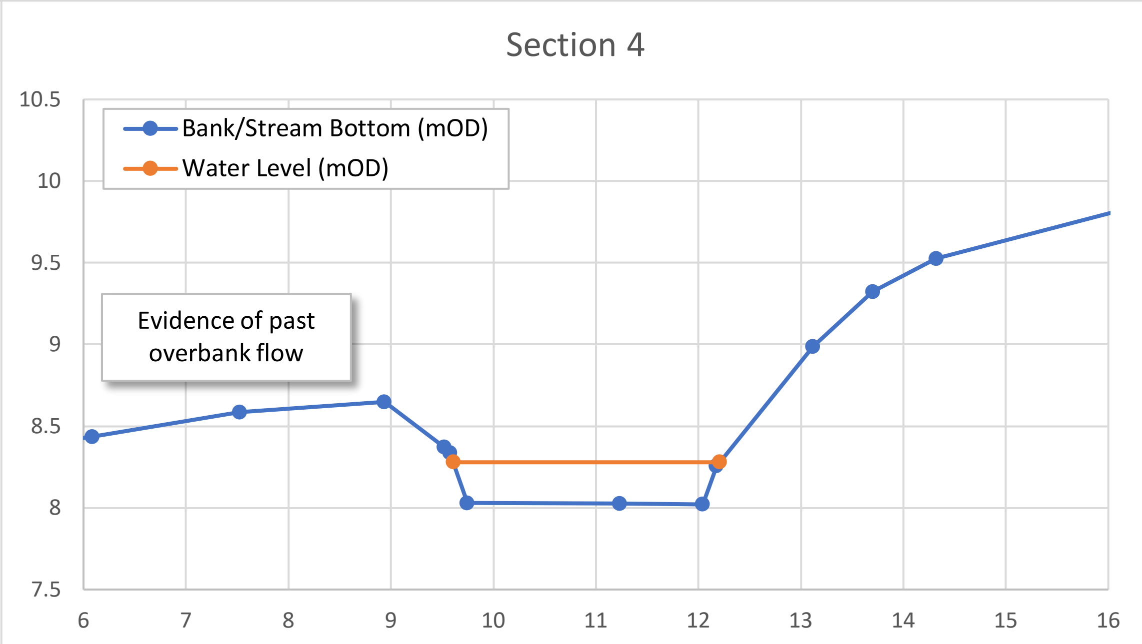
<u>Photograph 31</u>: Reach 7 (looking downstream to Lough Gill)

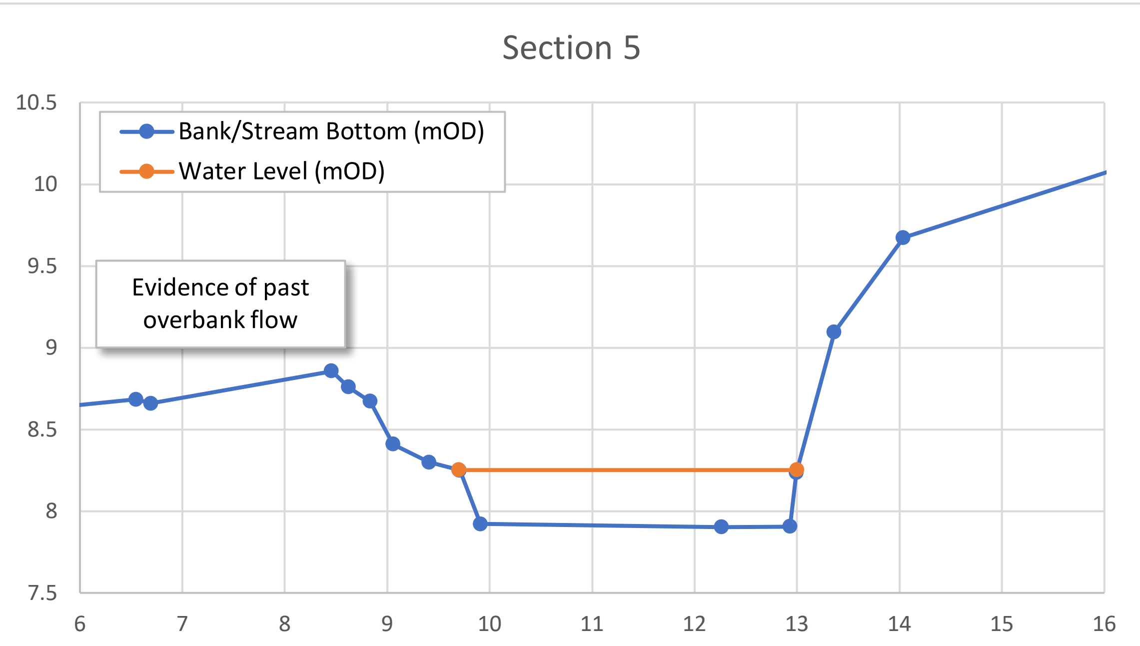
Stream Cross-Sectional Profiles

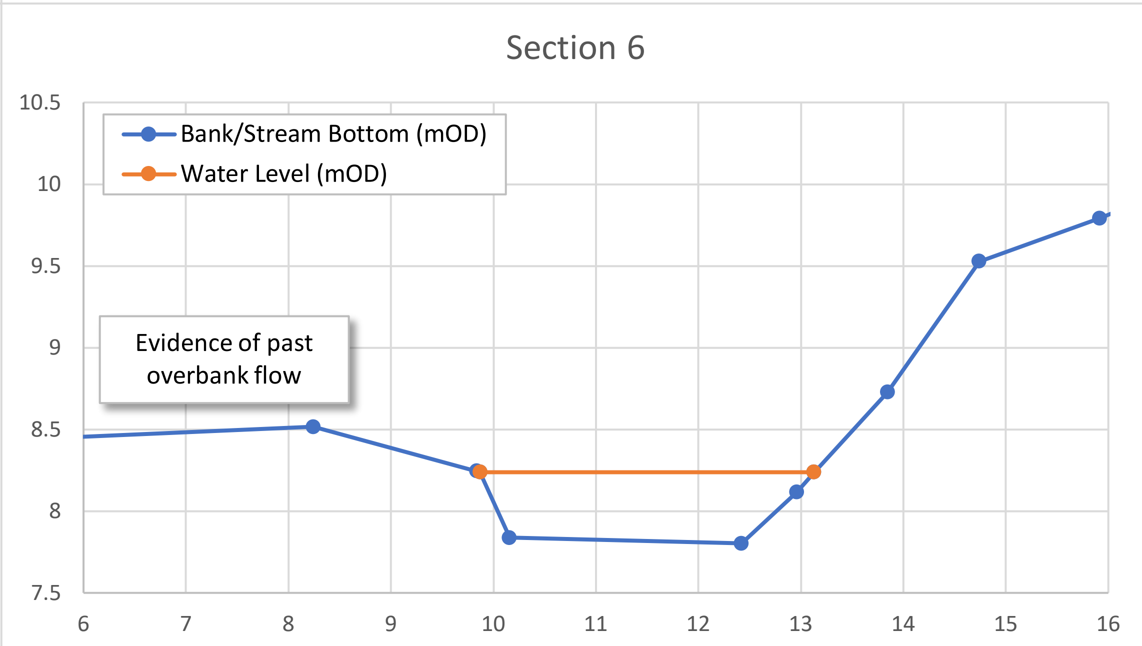


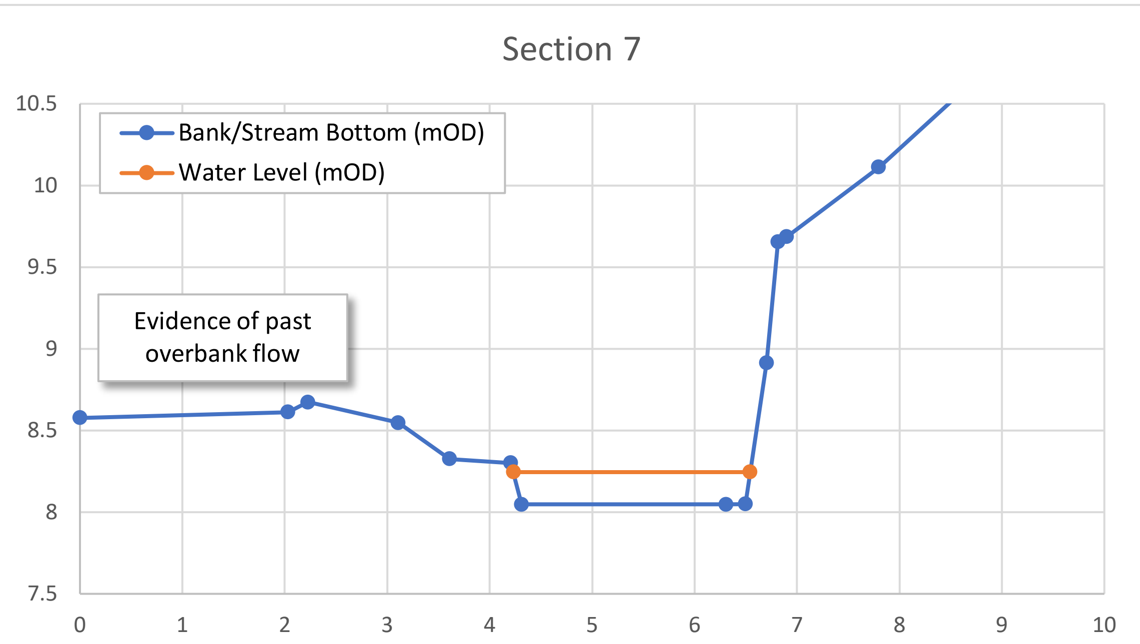


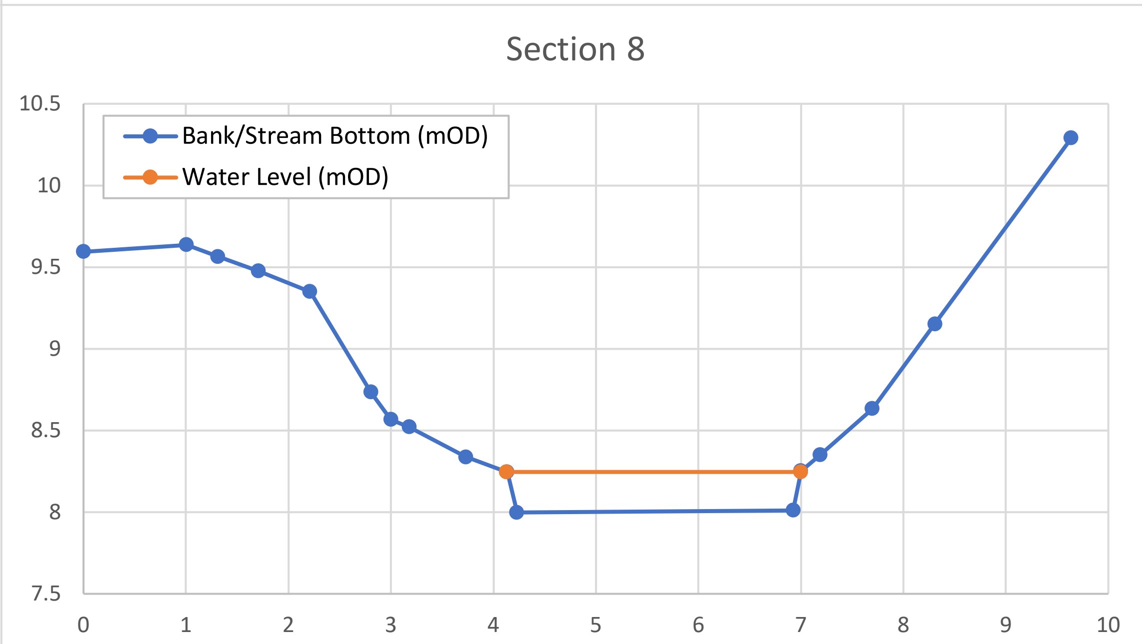


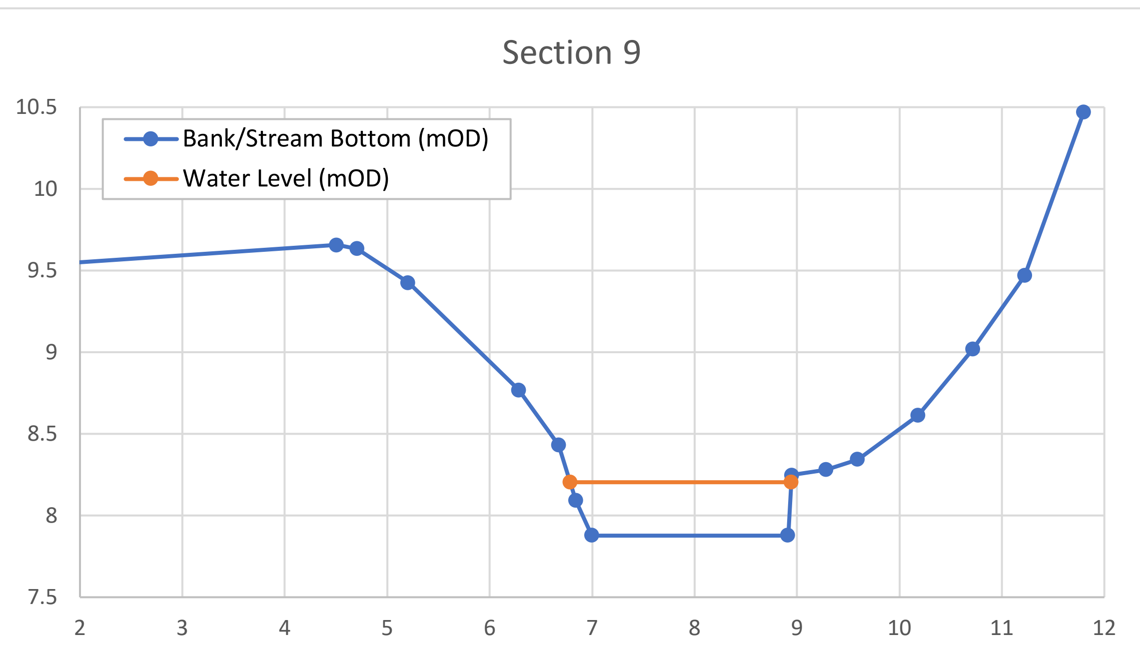


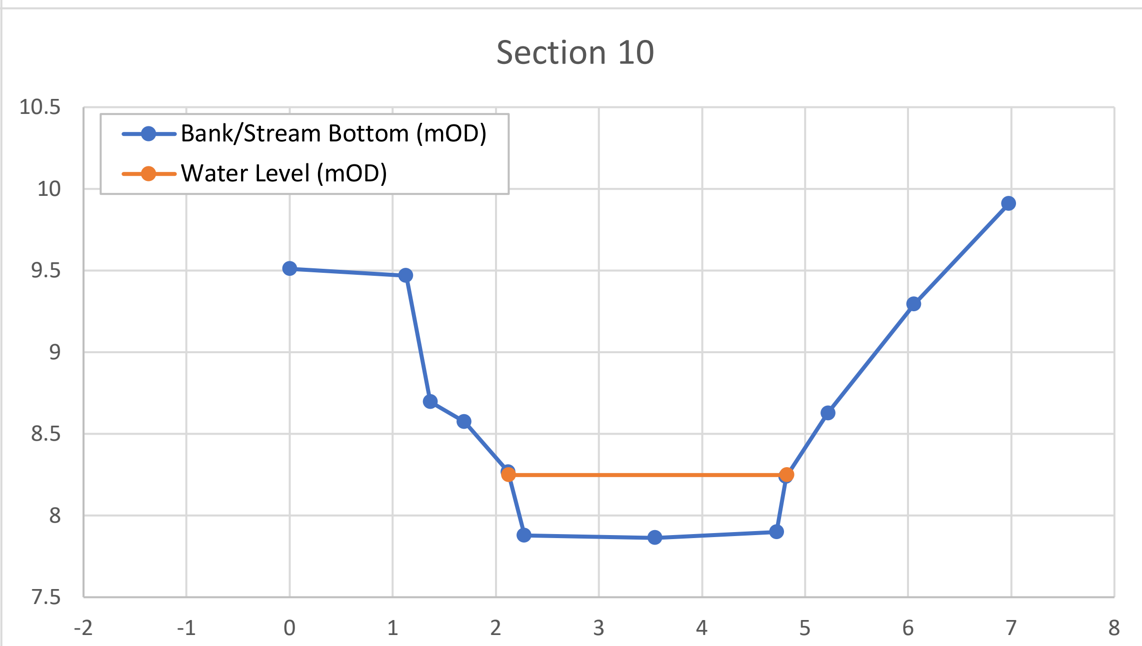






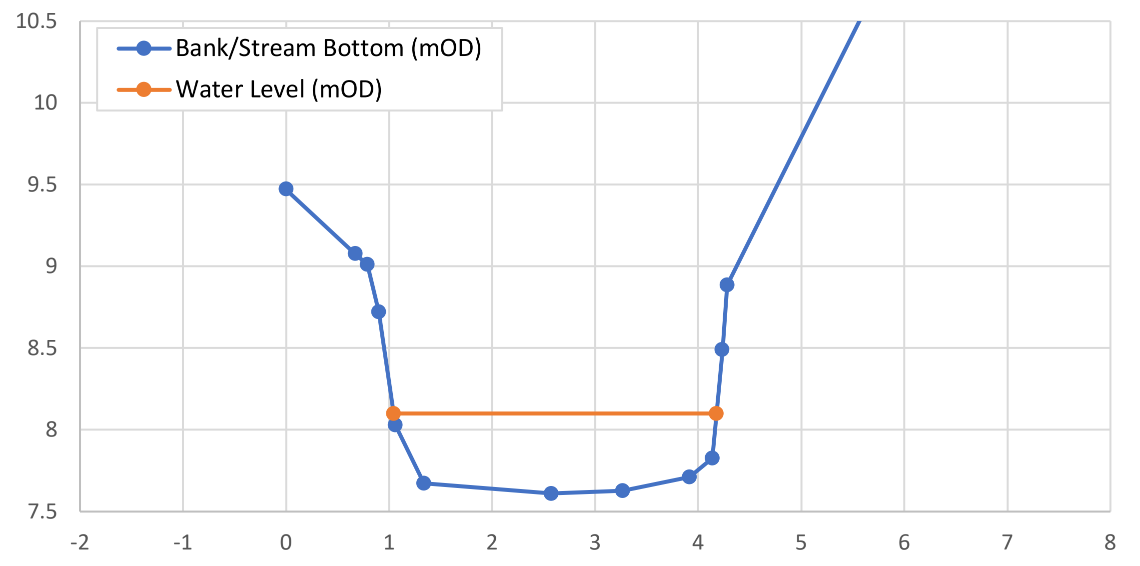




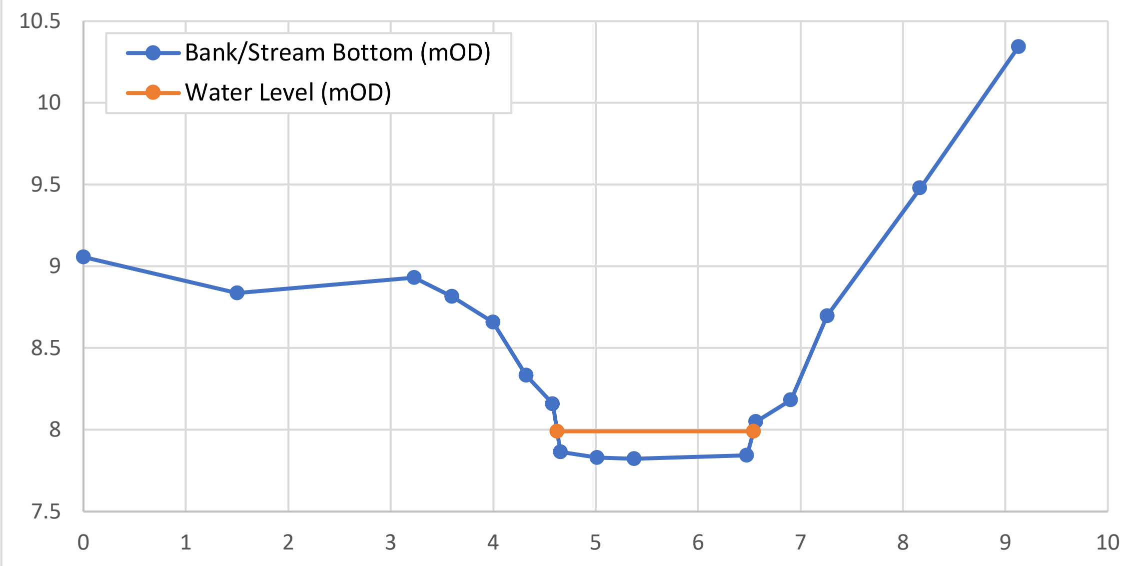


Stream Cross-Sectional Profiles

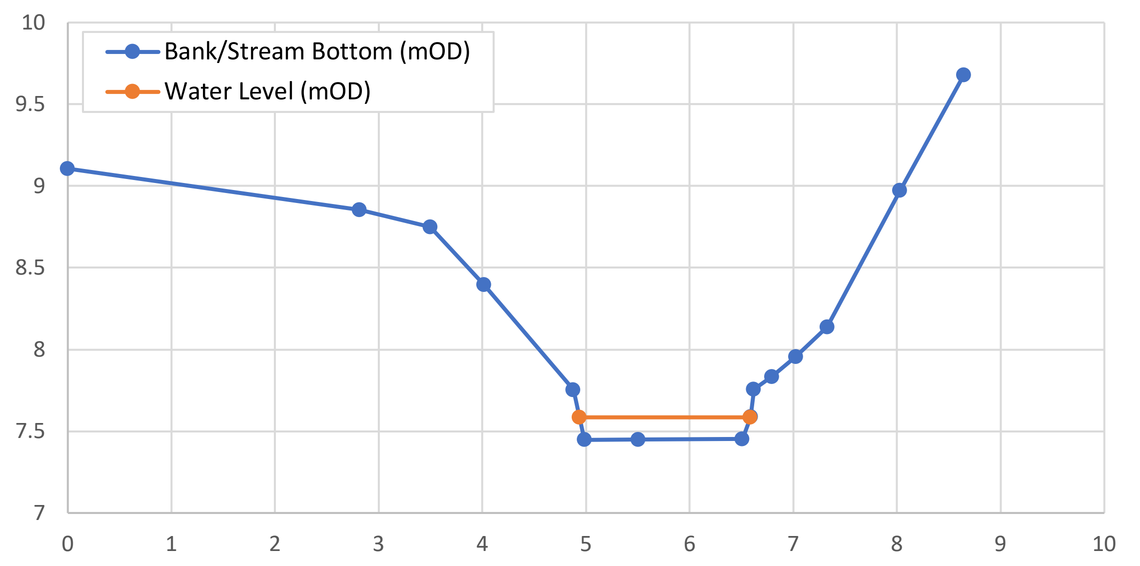
Section 11



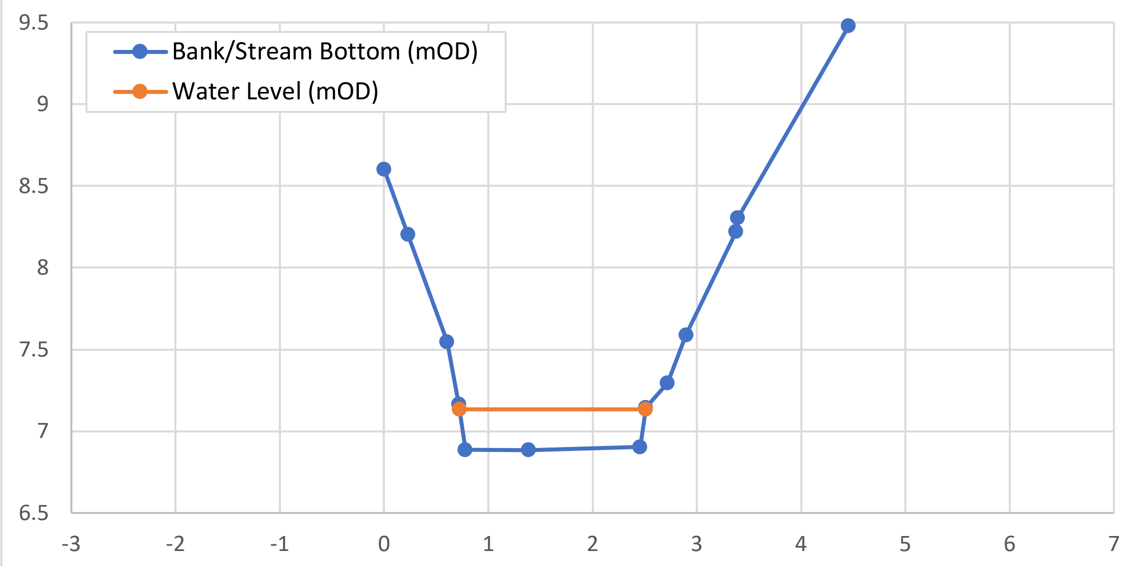
Section 12



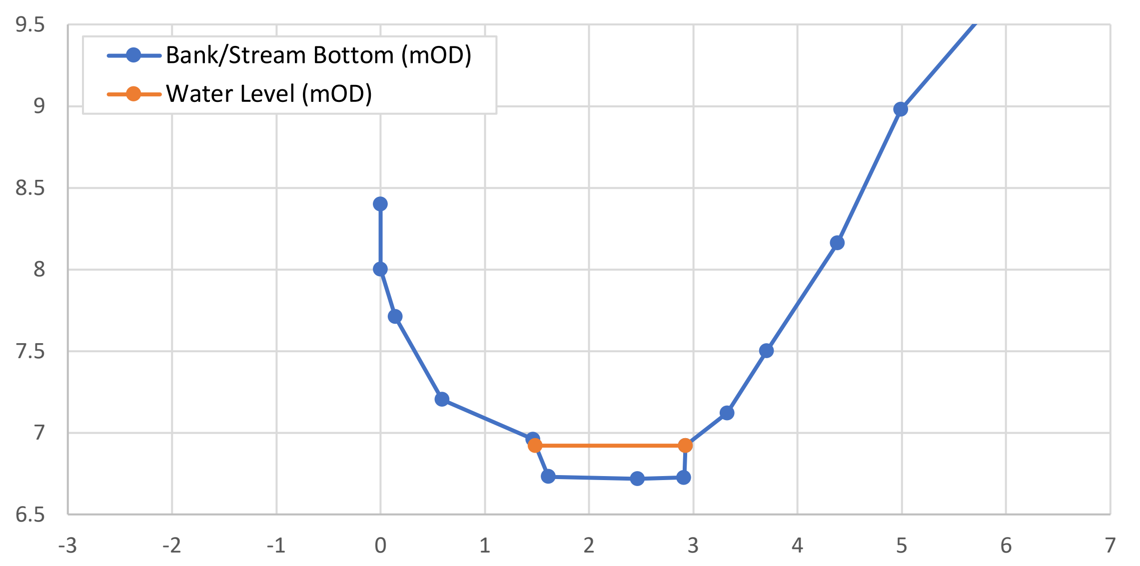
Section 13



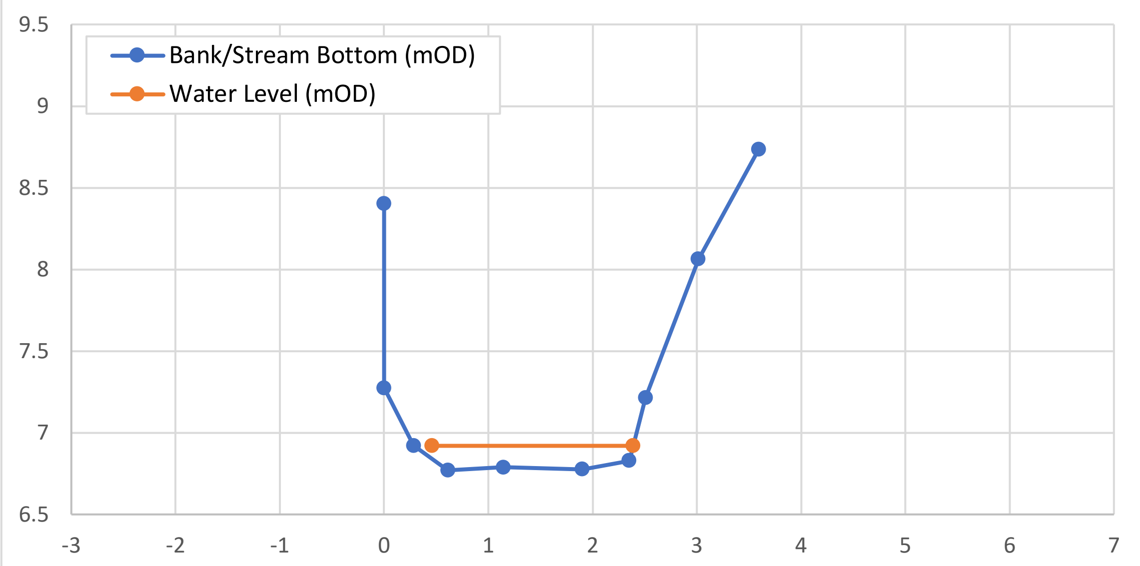
Section 14



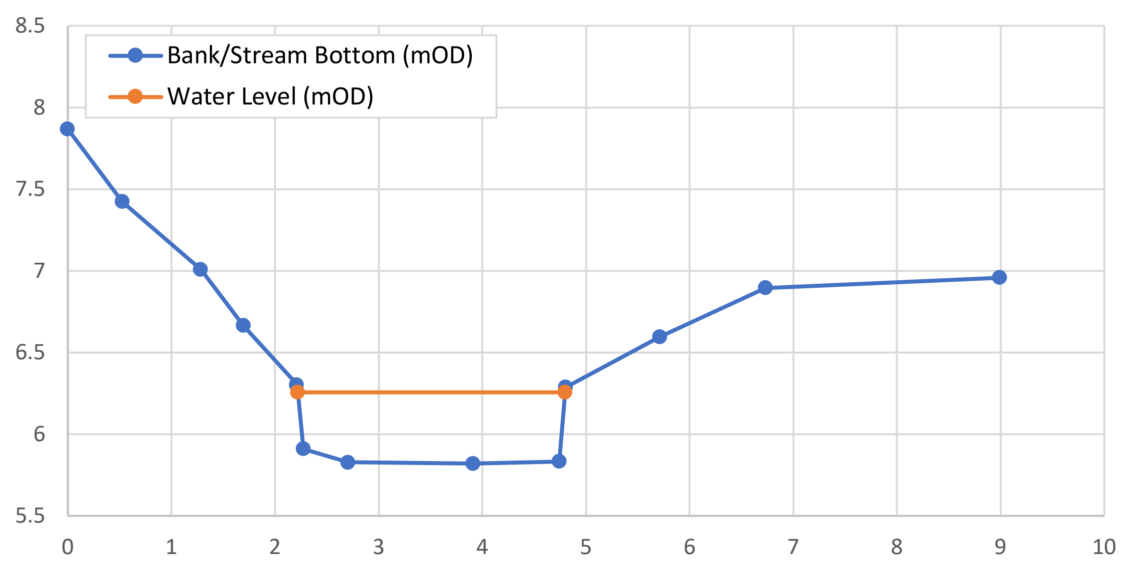
Section 15



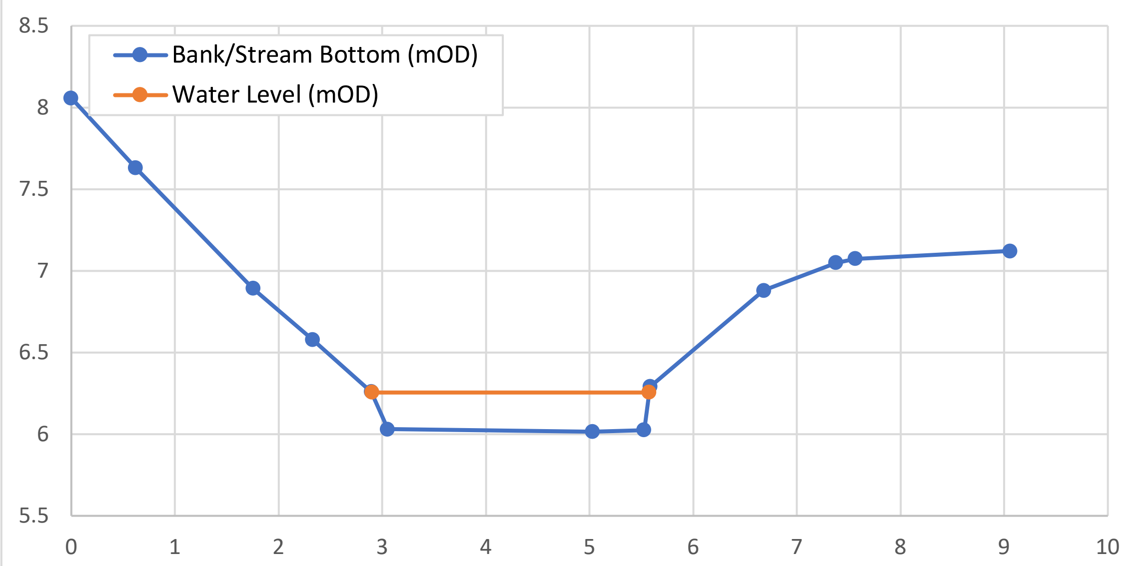
Section 16



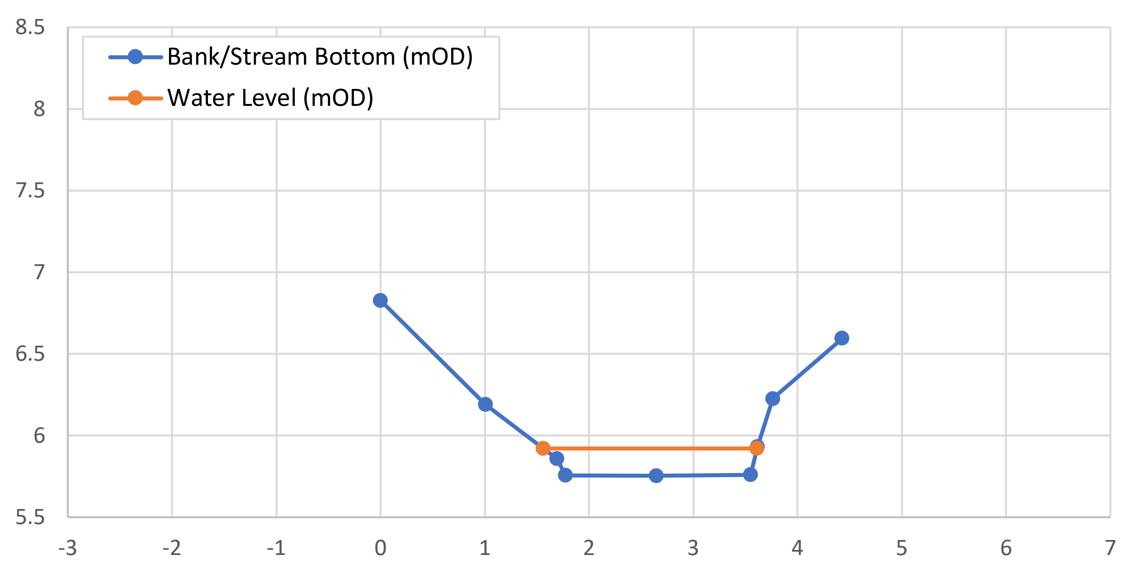
Section 17



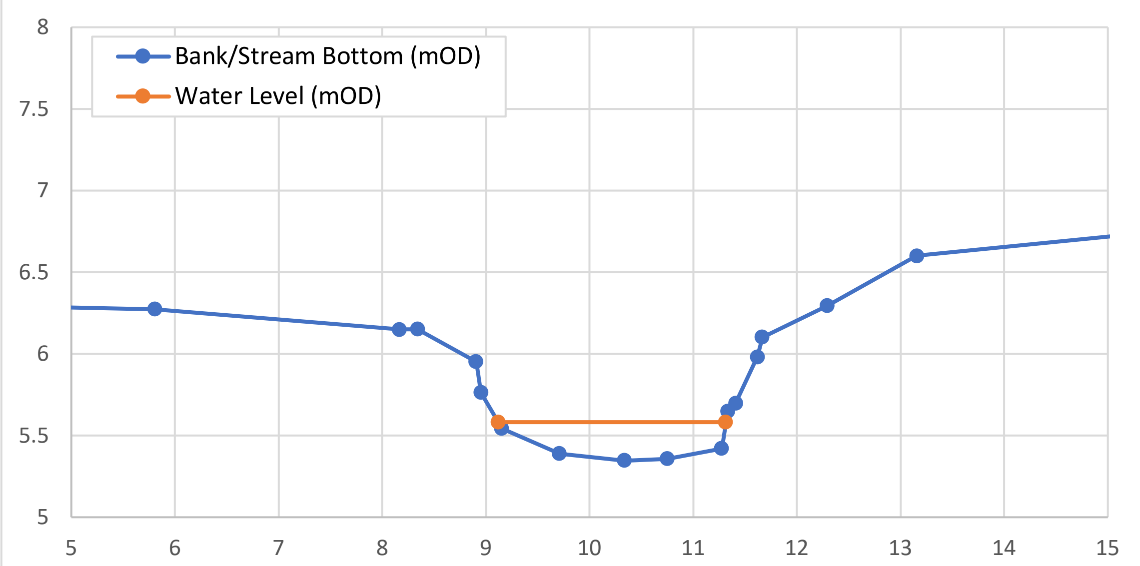
Section 18



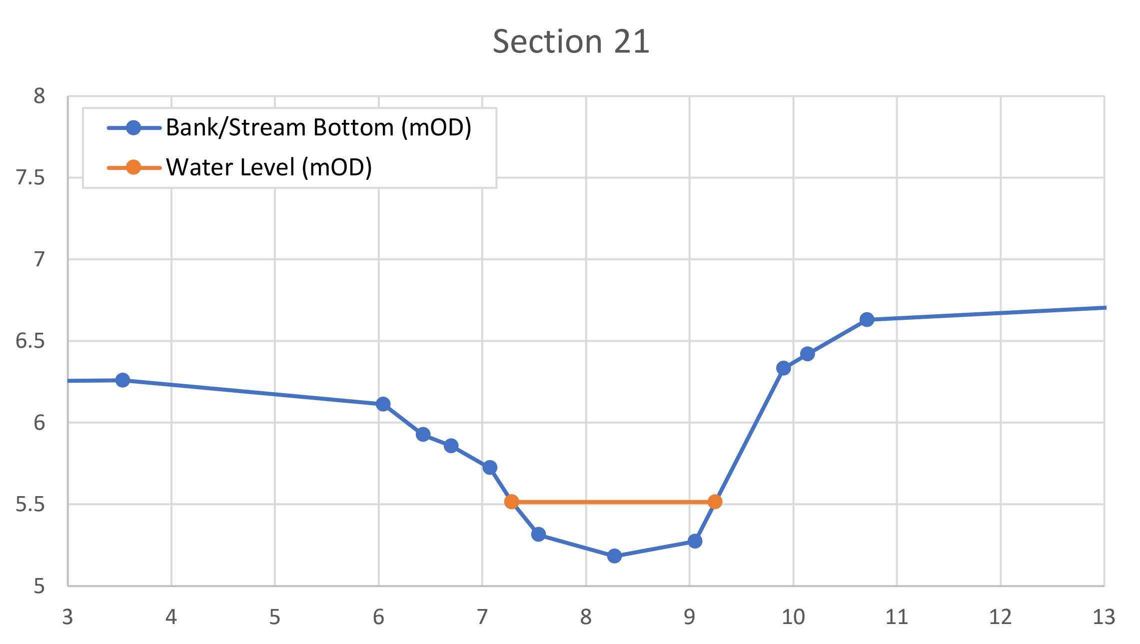
Section 19

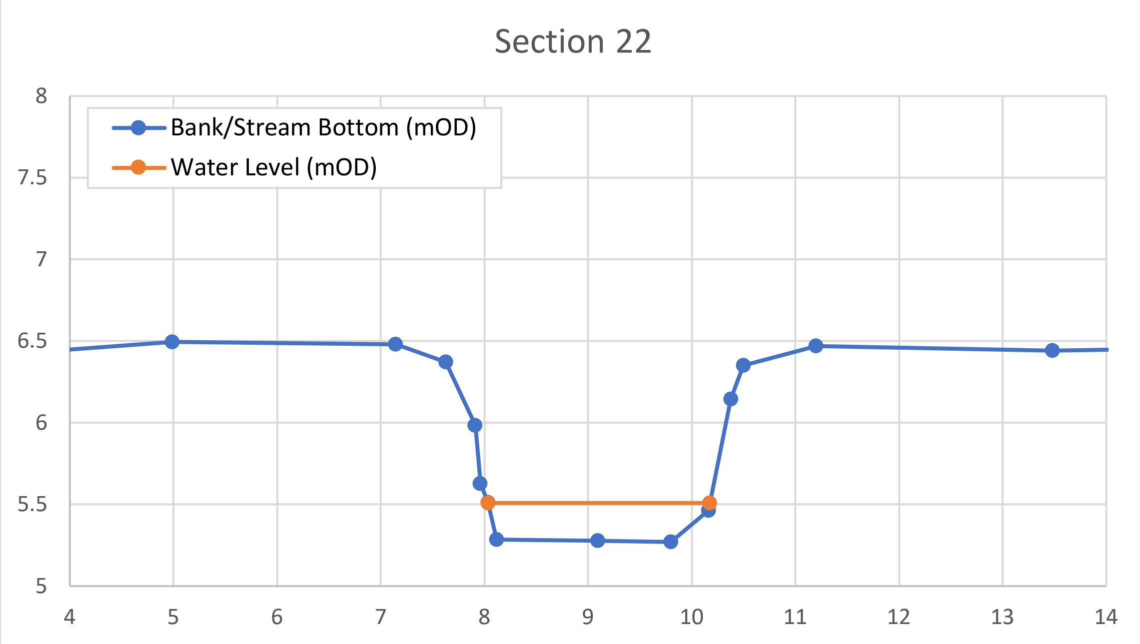


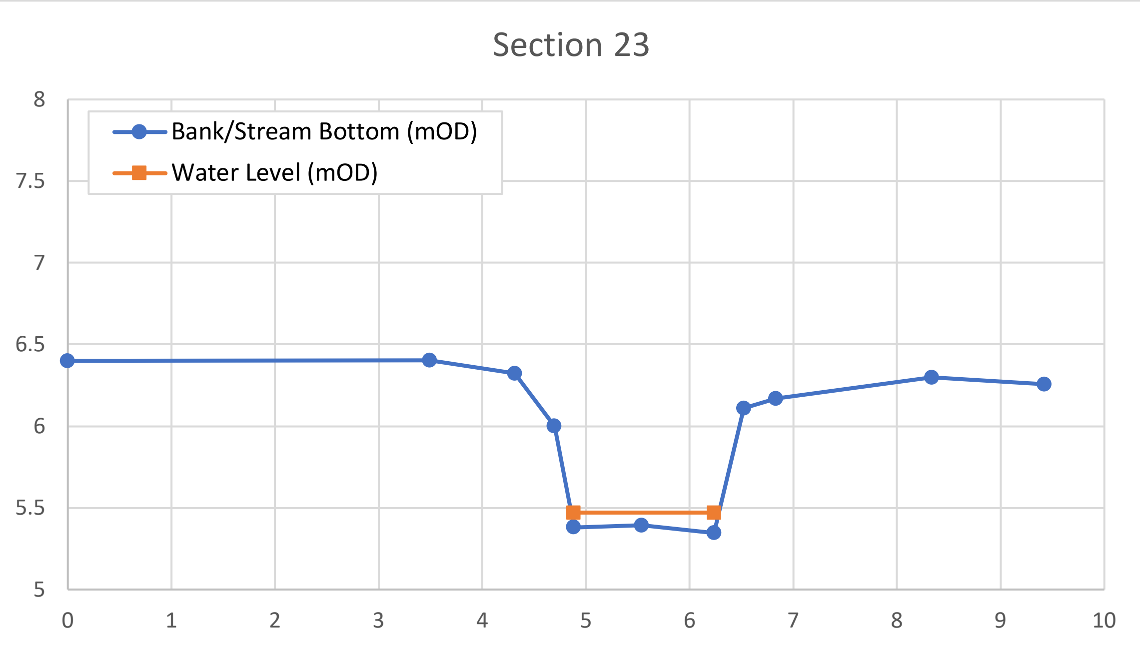
Section 20

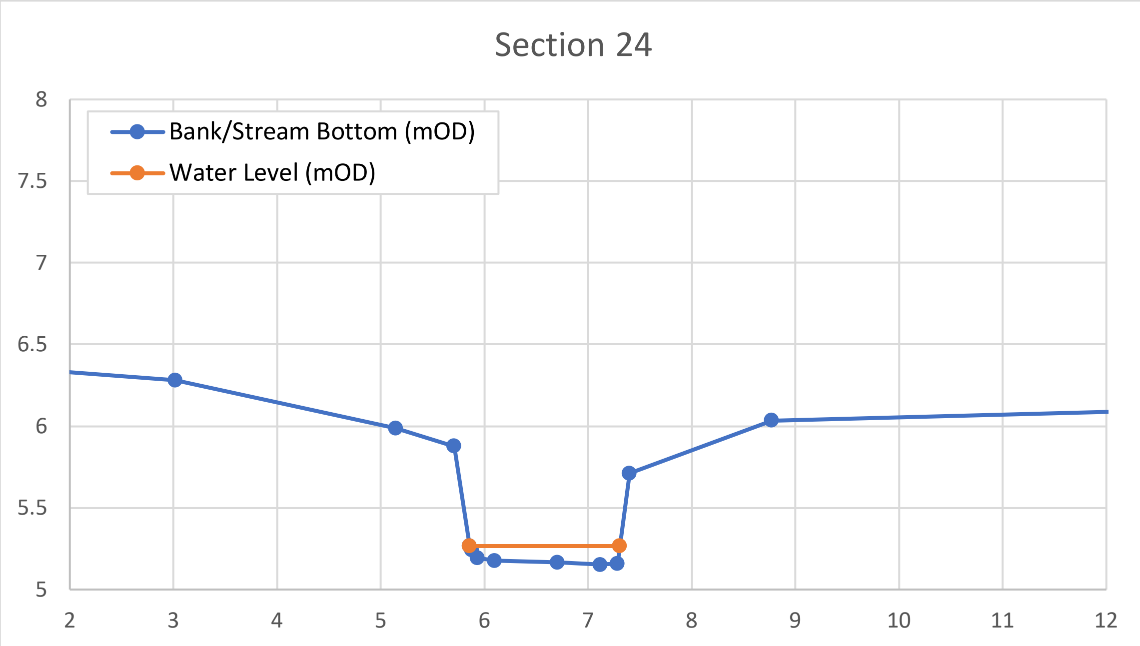


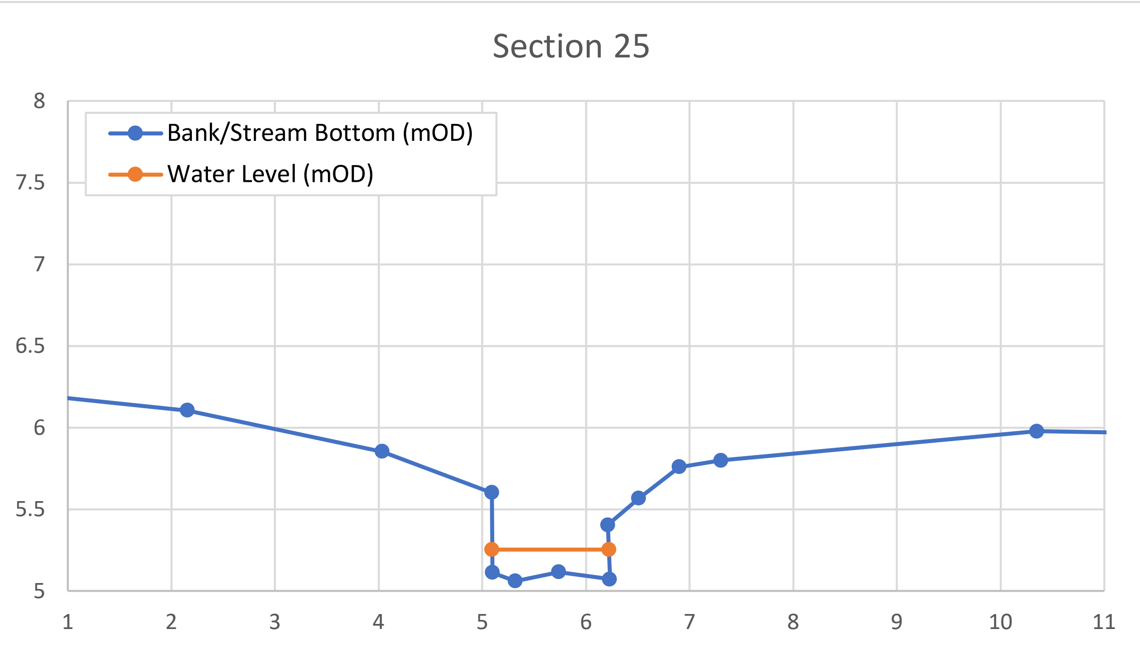
Stream Cross-Sectional Profiles

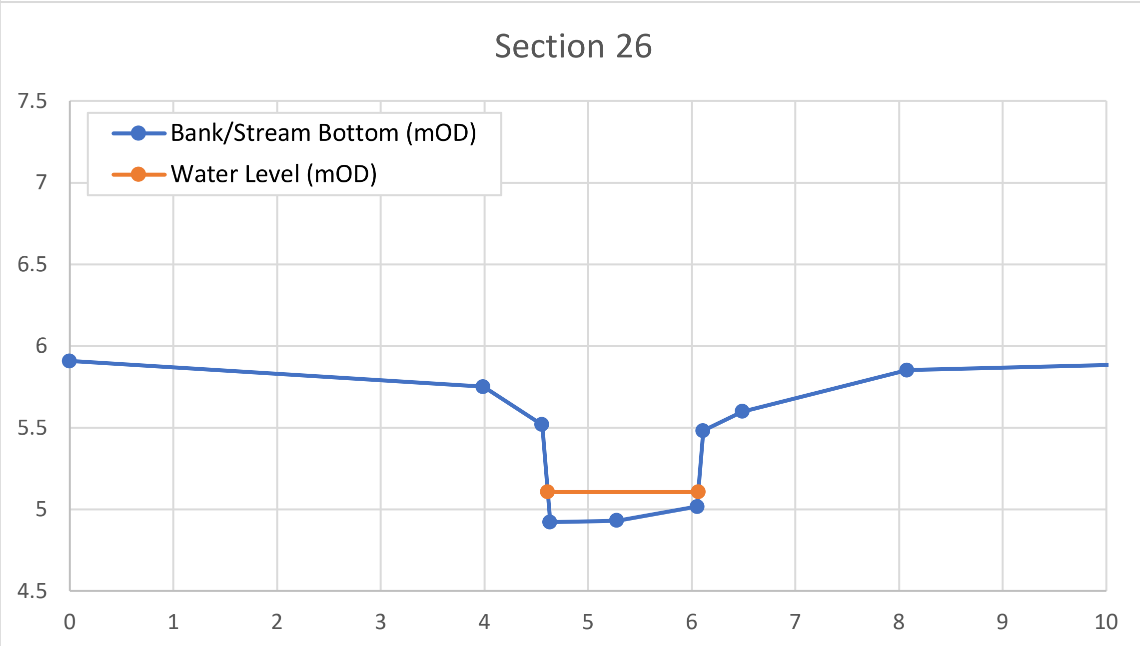


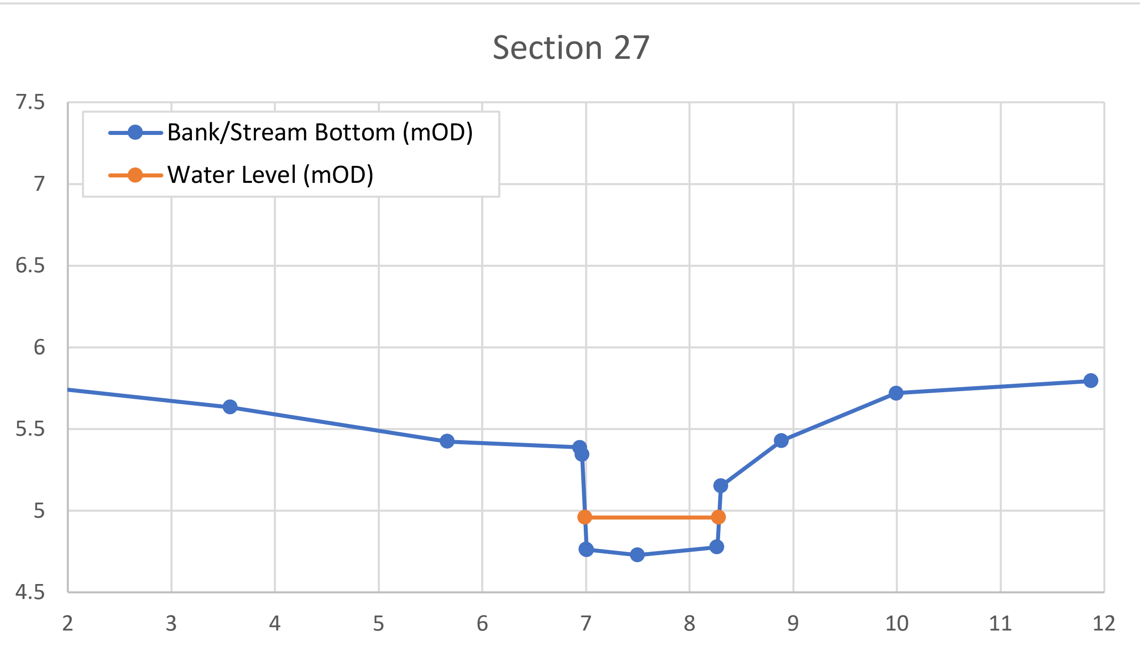


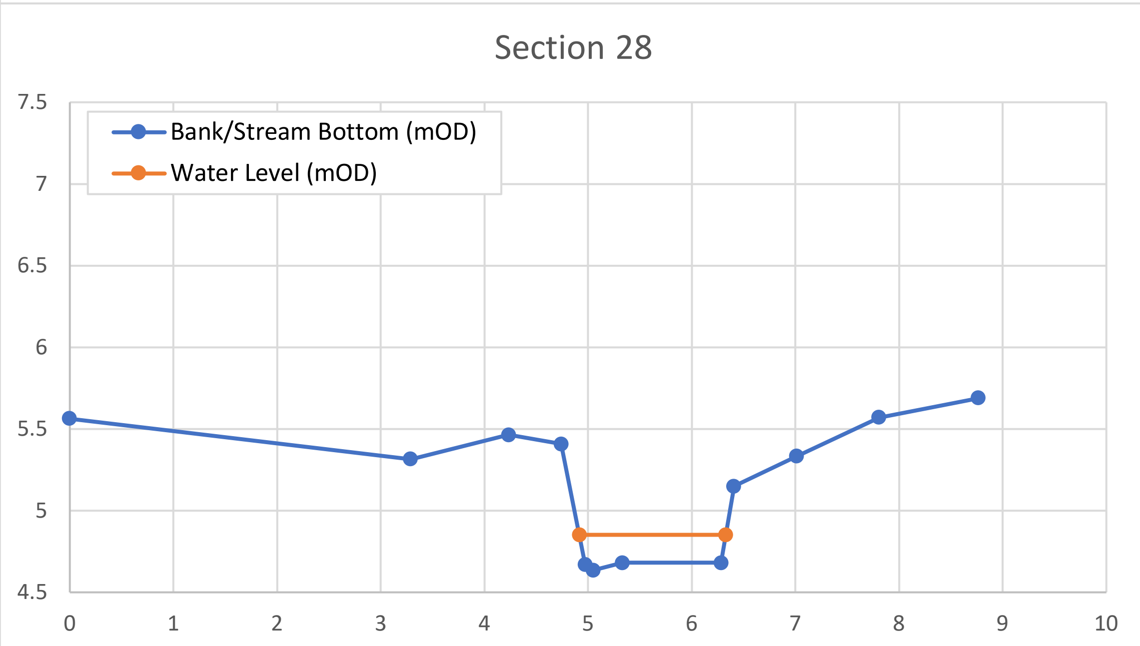


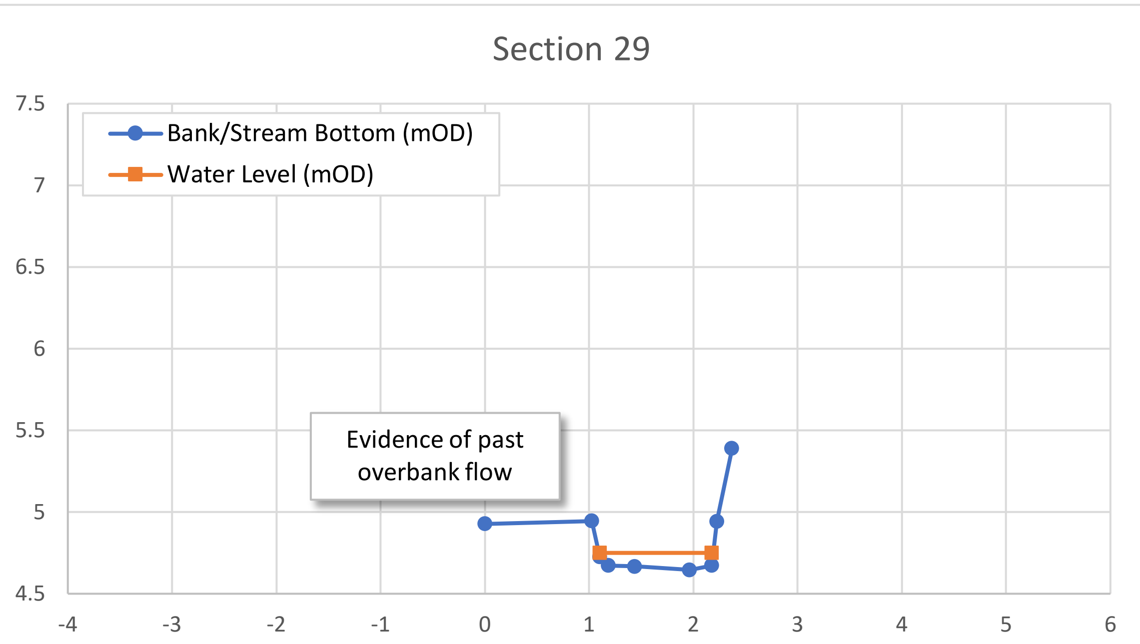


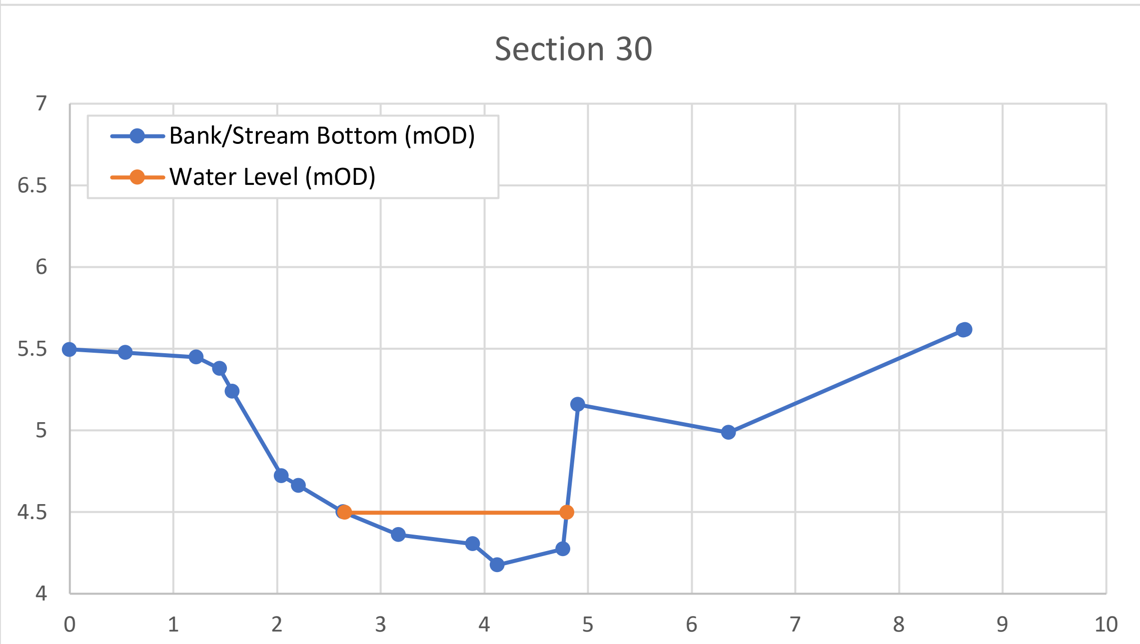




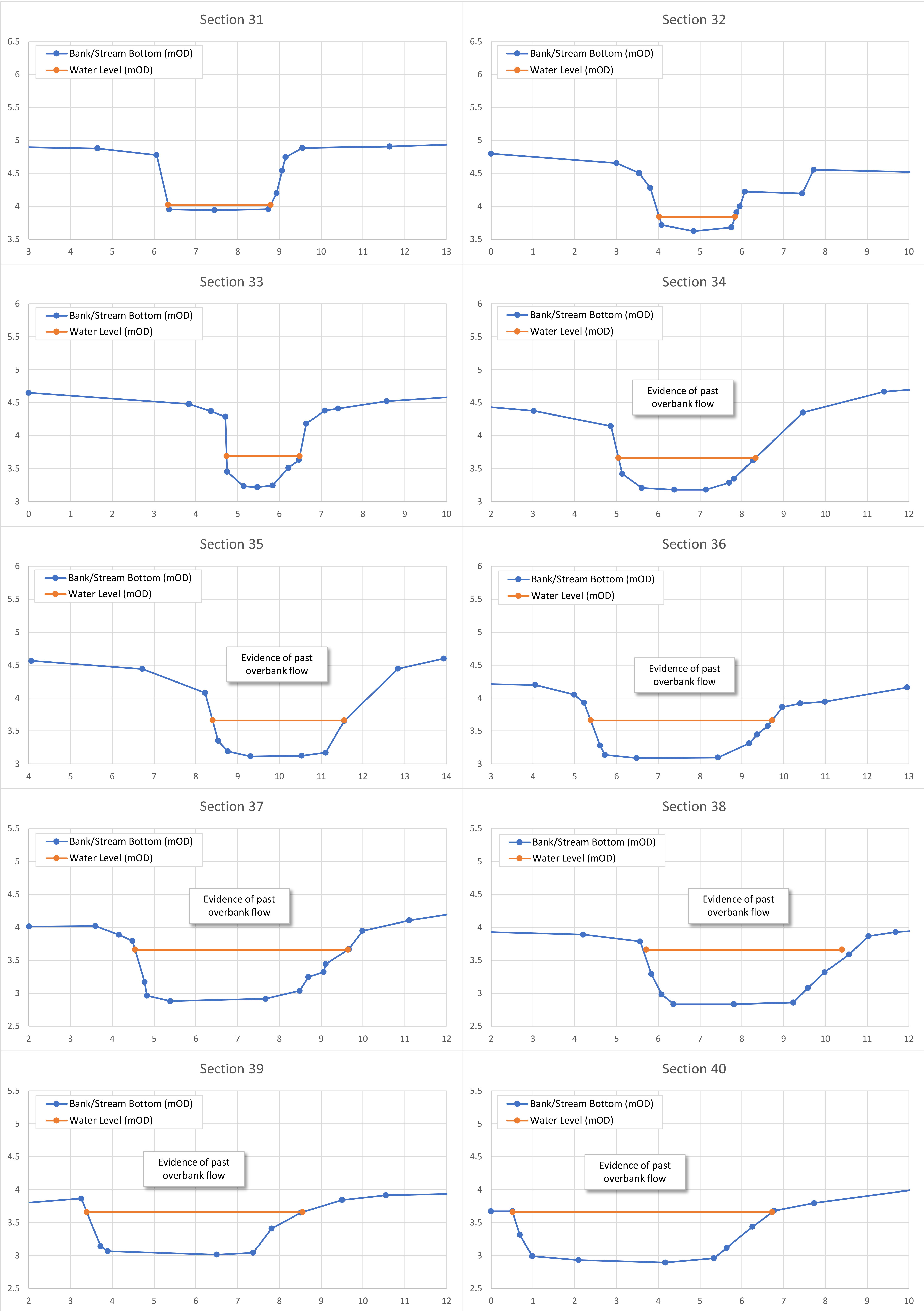




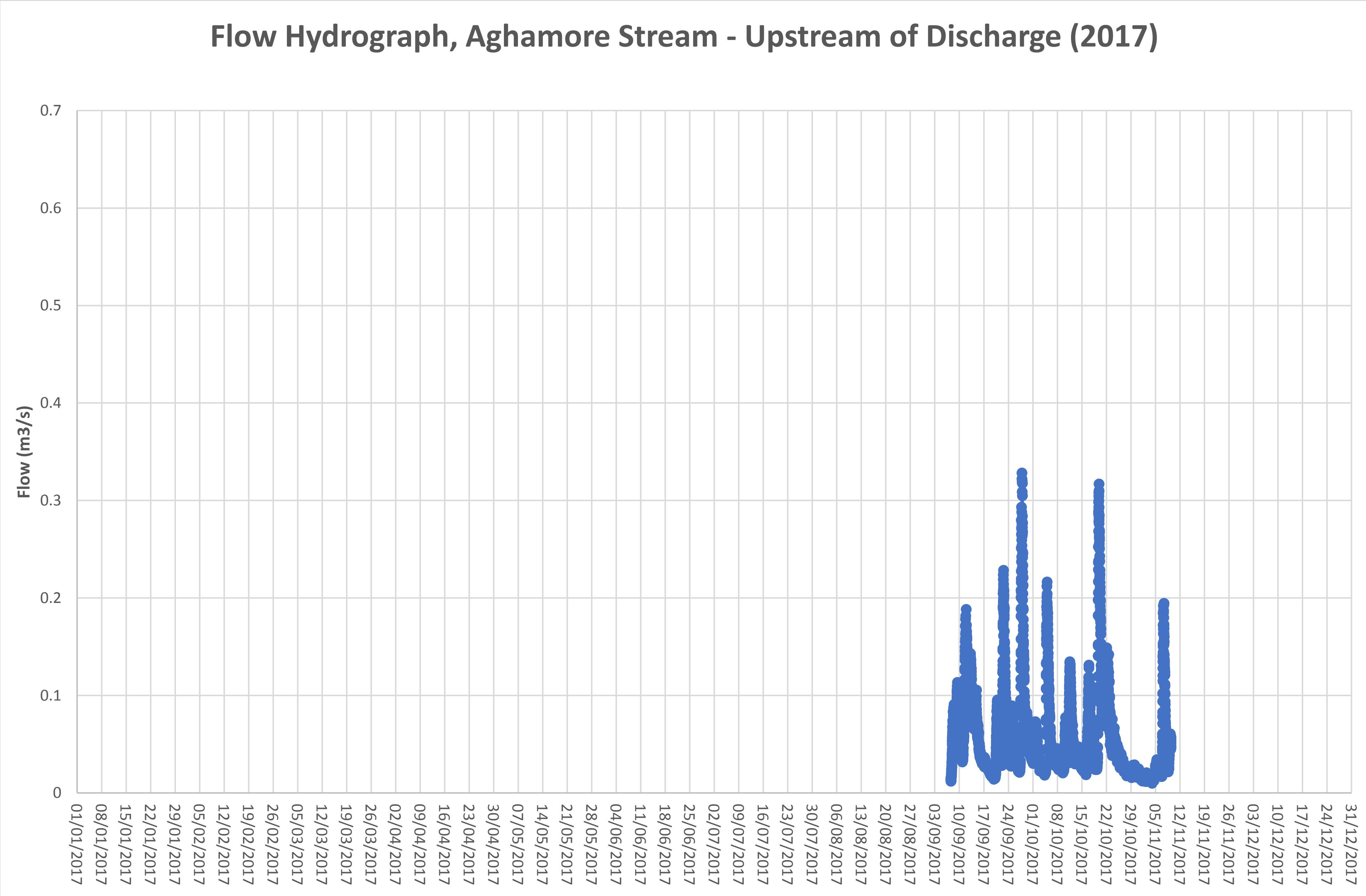


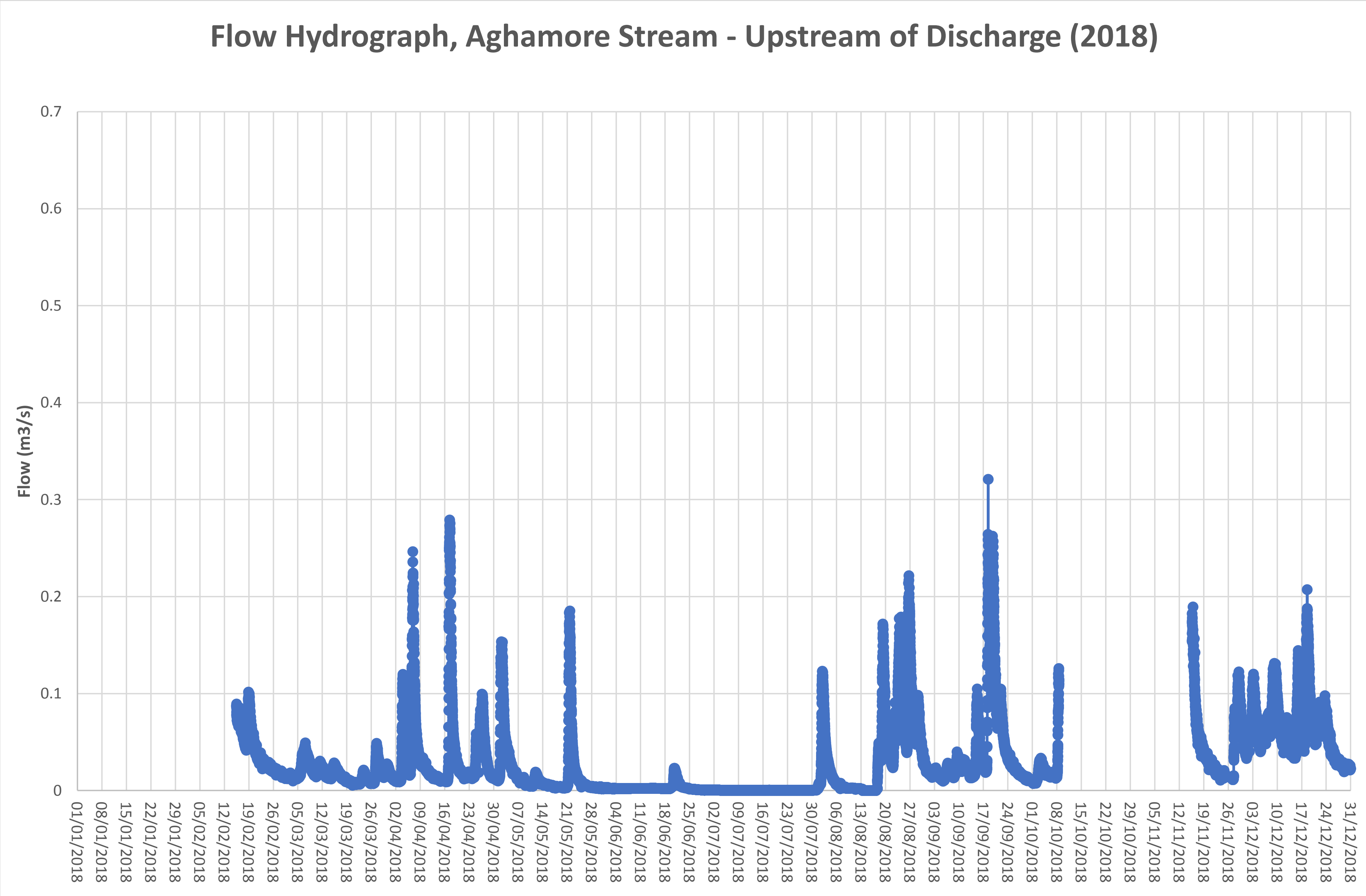


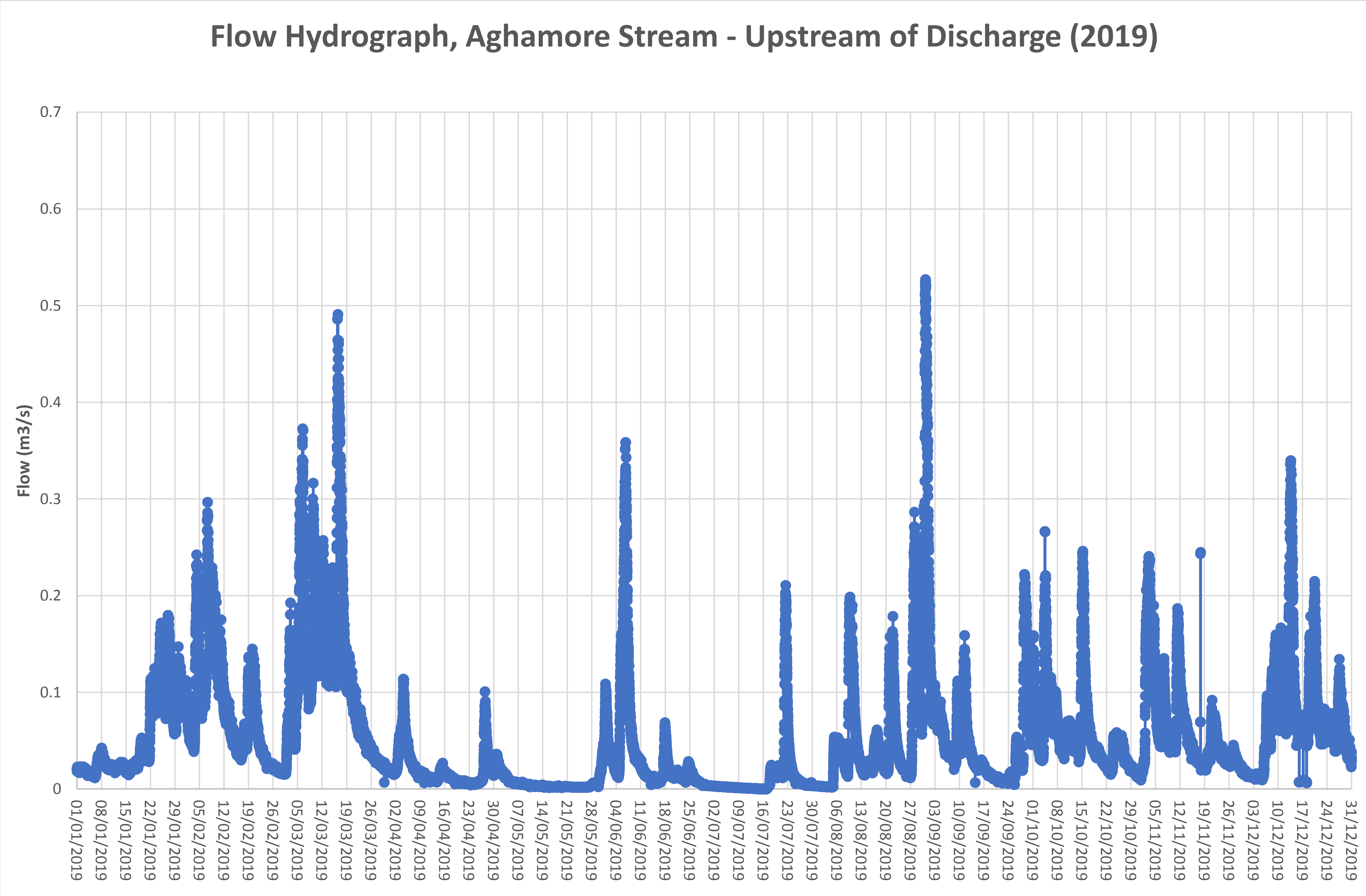
Stream Cross-Sectional Profiles



APPENDIX 7-22 HYDROGRAPHS & FLOW CALCULATIONS


Flow Hydrograph, Aghamore Stream - Upstream of Discharge (2017)
Flow (m3/s)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/01/2017
08/01/2017
15/01/2017
22/01/2017
29/01/2017
05/02/2017
12/02/2017
19/02/2017
26/02/2017
05/03/2017
12/03/2017
19/03/2017
26/03/2017
02/04/2017
09/04/2017
16/04/2017
23/04/2017
30/04/2017
07/05/2017
14/05/2017
21/05/2017
28/05/2017
04/06/2017
11/06/2017
18/06/2017
25/06/2017
02/07/2017
09/07/2017
16/07/2017
23/07/2017
30/07/2017
06/08/2017
13/08/2017
20/08/2017
27/08/2017
03/09/2017
10/09/2017
17/09/2017
24/09/2017
01/10/2017
08/10/2017
15/10/2017
22/10/2017
29/10/2017
05/11/2017
12/11/2017
19/11/2017
26/11/2017
03/12/2017
10/12/2017
17/12/2017
24/12/2017
31/12/2017


Flow Hydrograph, Aghamore Stream - Upstream of Discharge (2018)
Flow (m3/s)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/01/2018
08/01/2018
15/01/2018
22/01/2018
29/01/2018
05/02/2018
12/02/2018
19/02/2018
26/02/2018
05/03/2018
12/03/2018
19/03/2018
26/03/2018
02/04/2018
09/04/2018
16/04/2018
23/04/2018
30/04/2018
07/05/2018
14/05/2018
21/05/2018
28/05/2018
04/06/2018
11/06/2018
18/06/2018
25/06/2018
02/07/2018
09/07/2018
16/07/2018
23/07/2018
30/07/2018
06/08/2018
13/08/2018
20/08/2018
27/08/2018
03/09/2018
10/09/2018
17/09/2018
24/09/2018
01/10/2018
08/10/2018
15/10/2018
22/10/2018
29/10/2018
05/11/2018
12/11/2018
19/11/2018
26/11/2018
03/12/2018
10/12/2018
17/12/2018
24/12/2018
31/12/2018



Flow Hydrograph, Aghamore Stream - Upstream of Discharge (2019)
Flow (m3/s)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/01/2019
08/01/2019
15/01/2019
22/01/2019
29/01/2019
05/02/2019
12/02/2019
19/02/2019
26/02/2019
05/03/2019
12/03/2019
19/03/2019
26/03/2019
02/04/2019
09/04/2019
16/04/2019
23/04/2019
30/04/2019
07/05/2019
14/05/2019
21/05/2019
28/05/2019
04/06/2019
11/06/2019
18/06/2019
25/06/2019
02/07/2019
09/07/2019
16/07/2019
23/07/2019
30/07/2019
06/08/2019
13/08/2019
20/08/2019
27/08/2019
03/09/2019
10/09/2019
17/09/2019
24/09/2019
01/10/2019
08/10/2019
15/10/2019
22/10/2019
29/10/2019
05/11/2019
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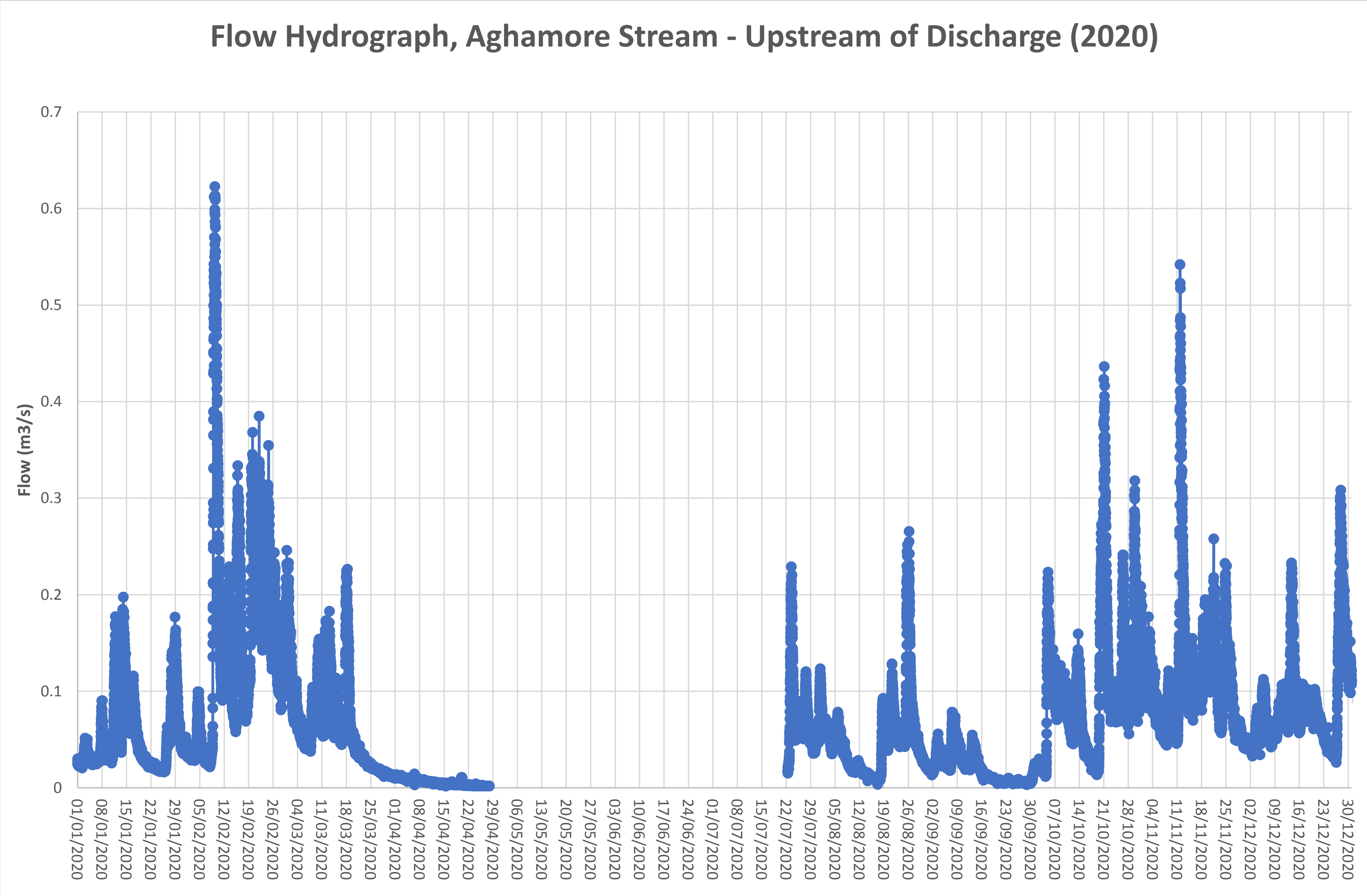
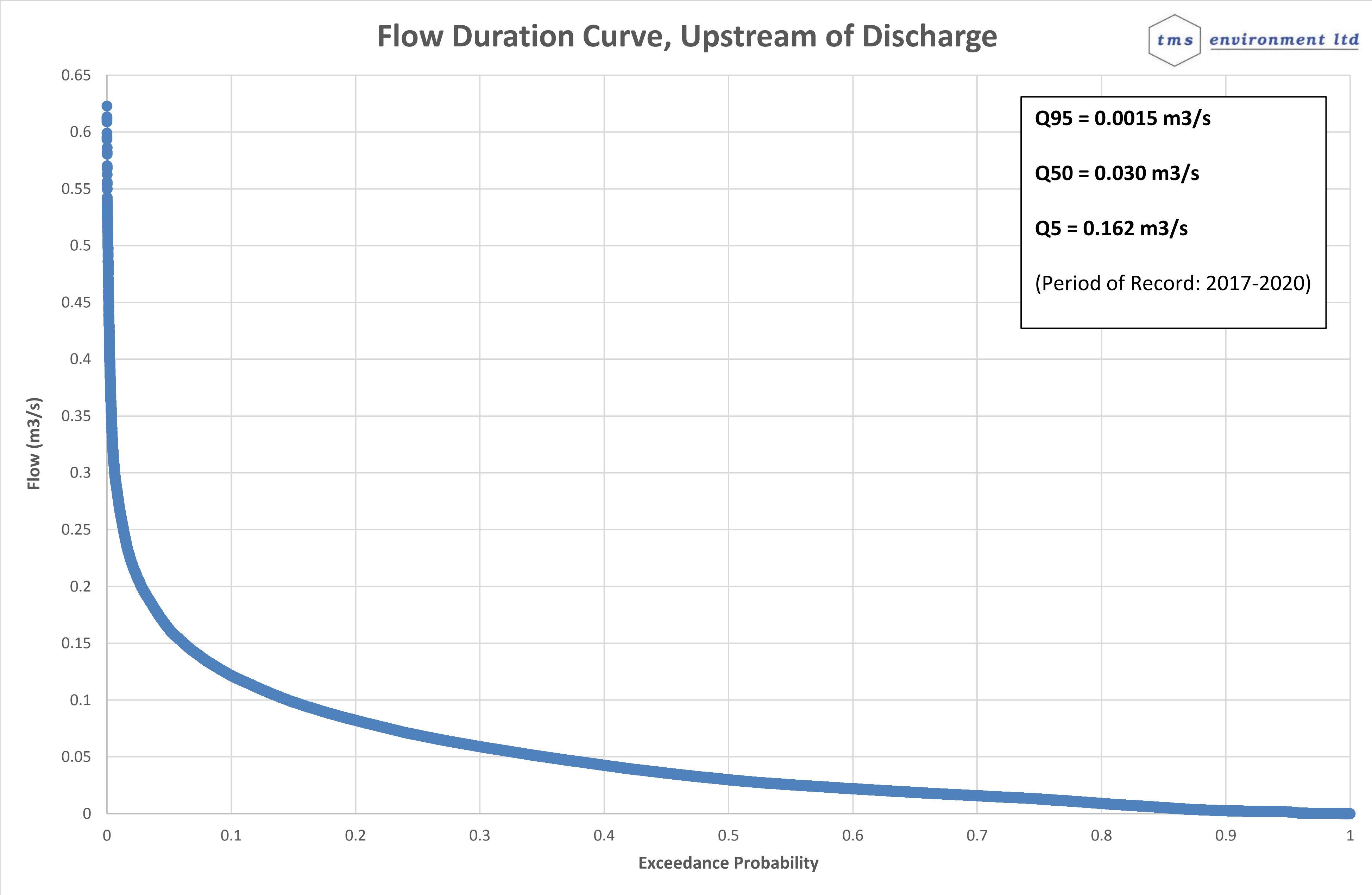
03/12/2019
10/12/2019
17/12/2019
24/12/2019
31/12/2019


Flow Hydrograph, Aghamore Stream - Upstream of Discharge (2020)
Flow (m3/s)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/01/2020
08/01/2020
15/01/2020
22/01/2020
29/01/2020
05/02/2020
12/02/2020
19/02/2020
26/02/2020
04/03/2020
11/03/2020
18/03/2020
25/03/2020
01/04/2020
08/04/2020
15/04/2020
22/04/2020
29/04/2020
06/05/2020
13/05/2020
20/05/2020
27/05/2020
03/06/2020
10/06/2020
17/06/2020
24/06/2020
01/07/2020
08/07/2020
15/07/2020
22/07/2020
29/07/2020
05/08/2020
12/08/2020
19/08/2020
26/08/2020
02/09/2020
09/09/2020
16/09/2020
23/09/2020
30/09/2020
07/10/2020
14/10/2020
21/10/2020
28/10/2020
04/11/2020
11/11/2020
18/11/2020
25/11/2020
02/12/2020
09/12/2020
16/12/2020
23/12/2020
30/12/2020


Flow Duration Curve, Upstream of Discharge
tms environment ltd
Q95 = 0.0015 m3/s
Q50 = 0.030 m3/s
Q5 = 0.162 m3/s
(Period of Record: 2017-2020)
Flow (m3/s)
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Exceedance Probability

Stream Cross-Section Calculations

	Reach No.	Channel Centre		Bank Full			S	n	Manning		Notes
		Easting (ITM)	Northing (ITM)	A (m^2)	WP (m)	R (m)			V (m/s)	Q_{max} (m^3/s)	
Section 1	-	570570.087	831874.943	1.545	4.498	0.343	0.00050	0.065	0.169	0.261	Field evidence of past overbank flow at this location
Section 2	1	570569.918	831892.256	5.044	6.447	0.782	0.00050	0.065	0.292	> 1.473	Section 2 located in small gorge, top of bank not surveyed
Section 3	1	570566.379	831915.101	3.378	5.821	0.580	0.00092	0.065	0.325	1.097	
Section 4	1	570564.762	831937.320	1.772	4.271	0.415	0.00092	0.065	0.260	0.460	Field evidence of past overbank flow at this location
Section 5	1	570563.232	831956.098	3.610	5.856	0.616	0.00008	0.065	0.097	0.348	Field evidence of past overbank flow at this location
Section 6	1	570562.130	831974.635	2.352	5.735	0.410	0.00008	0.065	0.074	0.173	Field evidence of past overbank flow at this location
Section 7	1	570564.670	831984.484	1.853	5.138	0.361	0.00008	0.065	0.068	0.125	Field evidence of past overbank flow at this location
Section 8	1	570569.095	832010.852	8.205	9.087	0.903	0.00008	0.065	0.124	1.021	
Section 9	1	570572.396	832018.913	7.285	8.313	0.876	0.00008	0.065	0.122	0.889	
Section 10	1	570576.044	832026.173	5.921	6.847	0.865	0.00008	0.065	0.121	0.716	
Section 11	2	570581.921	832048.599	6.265	7.035	0.891	0.00100	0.065	0.450	2.821	
Section 12	2	570595.658	832055.004	3.164	8.533	0.371	0.03210	0.070	1.321	4.180	
Section 13	2	570600.867	832062.909	5.806	9.469	0.613	0.03210	0.070	1.847	10.725	
Section 14	2	570609.168	832078.035	4.388	5.706	0.769	0.03210	0.070	2.148	9.427	
Section 15	3	570616.536	832090.897	5.453	6.301	0.865	0.00037	0.065	0.269	1.468	
Section 16	3	570616.125	832093.558	4.351	5.542	0.785	0.00037	0.065	0.252	1.098	
Section 17	4	570694.424	832181.212	3.941	8.786	0.449	0.01140	0.065	0.963	3.793	
Section 18	4	570700.250	832186.462	4.326	9.323	0.464	0.01140	0.065	0.985	4.259	
Section 19	4	570714.431	832202.855	2.394	5.137	0.466	0.01140	0.065	0.987	2.364	
Section 20	5	570739.284	832229.108	3.279	13.224	0.248	0.00189	0.065	0.264	0.866	
Section 21	5	570767.530	832244.169	2.835	7.040	0.403	0.00189	0.065	0.365	1.034	
Section 22	5	570779.033	832251.771	2.908	5.470	0.532	0.00189	0.065	0.439	1.277	
Section 23	5	570789.654	832259.343	1.722	5.141	0.335	0.01074	0.055	0.909	1.565	
Section 24	5	570798.425	832263.323	2.123	11.173	0.190	0.01074	0.055	0.623	1.322	
Section 25	5	570808.509	832268.818	1.944	9.184	0.212	0.01074	0.055	0.669	1.301	
Section 26	5	570822.717	832276.636	2.219	11.284	0.197	0.01074	0.055	0.637	1.414	
Section 27	5	570834.505	832283.738	3.231	12.907	0.250	0.01074	0.055	0.748	2.418	
Section 28	5	570841.960	832289.233	1.377	4.175	0.330	0.01074	0.055	0.899	1.239	
Section 29	5	570847.666	832293.155	0.319	1.602	0.199	0.01074	0.065	0.544	0.173	Field evidence of past overbank flow at this location
Section 30	6	570865.433	832303.567	4.534	9.433	0.481	0.01074	0.065	0.978	4.436	
Section 31	6	570881.121	832313.345	3.103	13.588	0.228	0.00684	0.065	0.475	1.475	
Section 32	6	570902.656	832325.211	2.408	5.672	0.425	0.00684	0.065	0.719	1.731	
Section 33	6	570922.170	832339.025	2.962	11.535	0.257	0.00684	0.065	0.514	1.523	
Section 34	7	570943.185	832345.099	5.747	11.513	0.499	0.00002	0.065	0.048	0.274	Field evidence of past overbank flow at this location
Section 35	7	570961.388	832353.255	5.765	10.648	0.541	0.00002	0.065	0.050	0.290	Field evidence of past overbank flow at this location
Section 36	7	570990.329	832373.123	6.215	14.544	0.427	0.00002	0.065	0.043	0.267	Field evidence of past overbank flow at this location
Section 37	7	571009.843	832375.621	5.771	11.880	0.486	0.00002	0.065	0.047	0.270	Field evidence of past overbank flow at this location
Section 38	7	571027.656	832383.554	5.252	13.279	0.396	0.00002	0.065	0.041	0.215	Field evidence of past overbank flow at this location
Section 39	7	571041.011	832387.681	3.821	7.180	0.532	0.00002	0.065	0.050	0.190	Field evidence of past overbank flow at this location
Section 40	7	571058.043	832390.662	3.920	6.787	0.578	0.00002	0.065	0.053	0.206	Field evidence of past overbank flow at this location

Notes:

A - Area
WP - Wetted Perimeter
R - Hydraulic Radius
S - Slope
n - Manning's roughness coefficient
V - Velocity
Q_{max} - Maximum flow rate

Manning Equation:

$$Q = VA = \left(\frac{1.00}{n}\right) AR^{\frac{2}{3}}\sqrt{S} \quad [SI]$$

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Culvert Calculations

	Description		Easting (ITM)	Northing (ITM)	IL (mOD)	WL (mOD)	A (m^2)	WP (m)	R (m)	S	n	V (m/s)	Q (m^3/s)	Q_{max} (m^3/s)	Notes
Culvert 1	Single concrete pipe, diameter 900mm	Upstream	570570.264	831874.957	8.333	8.470	0.636	2.827	0.225	0.00653	0.014	2.136	1.359	1.359	
		Downstream	570569.833	831892.249	8.220	8.316									
Culvert 2	Single concrete pipe, diameter 840mm upstream/1180mm downstream	Upstream	570578.629	832032.969	8.117	8.230	0.554	2.639	0.210	0.00917	0.014	2.416	1.339	1.339	Q_{max} restricted by smaller diameter upstream
		Downstream	570581.101	832044.712	8.007	8.120									
Culvert 3	Two concrete pipes, diameter 600mm	Upstream (L)	570608.000	832076.000	6.833	7.071	0.283	1.885	0.150	0.00950	0.014	1.967	0.557	1.113	
		Downstream (L)	570615.000	832083.000	6.739	6.946									
		Upstream (R)	570608.000	832076.000	6.833	7.071	0.283	1.885	0.150	0.00950	0.014	1.967	0.557		
		Downstream (R)	570615.000	832083.000	6.739	6.946									
Culvert 4	Two PVC/concrete pipes, diameter 450mm upstream (PVC)/600mm downstream (concrete)	Upstream (L)	570615.793	832093.607	6.805	6.920	0.159	1.414	0.112	0.00652	0.012	1.568	0.249	0.498	Q_{max} restricted by smaller diameter upstream
		Downstream (L)	570683.428	832172.200	6.129	6.416									
		Upstream (R)	570616.575	832093.490	6.783	6.920	0.159	1.414	0.112	0.00651	0.012	1.566	0.249		
		Downstream (R)	570683.943	832171.745	6.111	6.416									
Culvert 5	Arched culvert, height 766mm upstream, 1011mm downstream	Upstream	570722.439	832214.776	5.818	5.931	1.120	4.553	0.246	0.04696	0.030	2.836	3.176	3.176	Q_{max} restricted by smaller area upstream
		Downstream	570725.458	832217.564	5.625	5.732	1.564	5.050	0.310						
Culvert 6	Two concrete pipes, diameter 450mm upstream/600mm downstream	Upstream (L)	570847.521	832293.300	4.667	4.750	0.159	1.414	0.112	0.01071	0.014	1.722	0.274	0.509	Q_{max} restricted by smaller diameter upstream
		Downstream (L)	570865.375	832303.464	4.447	4.496									
		Upstream (R)	570847.895	832292.924	4.646	4.750	0.159	1.414	0.112	0.00788	0.014	1.477	0.235		
		Downstream (R)	570865.032	832302.853	4.490	4.496									
Culvert 7	Single concrete pipe, diameter 750mm	Upstream	570922.182	832339.001	3.268	3.691	0.442	2.356	0.188	0.00378	0.014	1.439	0.636	0.636	
		Downstream	570925.938	832340.293	3.263	3.686									

Notes:
IL - Invert Level
WL - Water Level (on date surveyed)
A - Area
WP - Wetted Perimeter
R - Hydraulic Radius
S - Slope
n - Manning's roughness coefficient
V - Velocity
Q - flow rate
Q_{max} - Maximum flow rate

Manning Equation:

$$Q = VA = \left(\frac{1.00}{n}\right) A R^{\frac{2}{3}} \sqrt{S} \quad [SI]$$

Estimation of Peak Flow for Aghamore Stream at Culvert 1

1. Monitored Rainfall-Runoff Events

	Rainfall Event						Hydrograph						
No.	Start	Finish	Centre of Mass	Duration (hrs)	Total Rainfall (mm)	Mean Intensity (mm/hr)	Start RL	Peak Flow	Peak Flow (m^3/s)	T_p (hrs)	Lag (hrs)	1st IP	T_c (hrs)
1	27/09/2017 02:00	27/09/2017 16:00	27/09/2017 10:00	14	27.6	1.971	27/09/2017 09:00	27/09/2017 20:30	0.328	11.5	10.5	28/09/2017 18:15	26.25
2	04/10/2017 08:00	05/10/2017 00:00	04/10/2017 16:00	16	13.9	0.869	04/10/2017 15:00	05/10/2017 02:30	0.216	11.5	10.5	06/10/2017 06:15	30.25
3	05/04/2018 23:00	06/04/2018 17:00	06/04/2018 08:30	18	18.7	1.039	06/04/2018 03:45	06/04/2018 20:30	0.246	16.75	12	07/04/2018 19:00	26
4	16/04/2018 14:00	17/04/2018 04:00	16/04/2018 23:00	14	22.1	1.579	16/04/2018 20:00	17/04/2018 09:15	0.279	13.25	10.25	18/04/2018 08:15	28.25
5	01/05/2018 05:00	02/05/2018 03:00	01/05/2018 16:30	22	17.1	0.777	01/05/2018 14:00	02/05/2018 04:45	0.153	14.75	12.25	03/05/2018 03:30	24.5
6	20/05/2018 20:00	21/05/2018 12:00	21/05/2018 03:30	16	19.2	1.200	21/05/2018 02:30	21/05/2018 14:45	0.183	12.25	11.25	22/05/2018 12:00	24

Notes:
Start RL - Start of Rising Limb of Hydrograph
T_p - Time to Peak
1st IP - First inflection point on Receding Limb of Hydrograph
T_c - Time of Concentration

2. Estimation of Runoff Coefficient from Monitored Events

$Q_p = 0.278CiA$ Rational Method

Where:
Q_p Peak flow (m^3/s)
C Runoff Coefficient (-)
i Mean intensity (mm/hr)
A Catchment Area (km^2)

Rainfall Event	Q_p	i	A	C
1	0.328	1.971	2.722	0.220
2	0.216	0.869	2.722	0.329
3	0.246	1.039	2.722	0.313
4	0.279	1.579	2.722	0.234
5	0.153	0.777	2.722	0.260
6	0.183	1.200	2.722	0.202

3. Estimation of Peak Flow for Worst Case

No.	Duration (hrs)	Total Rainfall (mm)	ARF	Rainfall Frequency (AEP %)	Mean Intensity (mm/hr)
1	14	27.6	0.979	51.3	1.971
2	16	13.9	0.98	59.3	0.869
3	18	18.7	0.981	56.4	1.039
4	14	22.1	0.979	53.6	1.579
5	22	17.1	0.982	58	0.777
6	16	19.2	0.98	55.7	1.200
Worst Case	26.5	85.6	0.983	1	3.230

Notes:
ARF - Areal Reduction Factor
AEP - Annual Exceedance Probability

With lowest Runoff Coefficient:

C	0.202	-
i	3.230	mm/hr
A	2.722	km^2
Q_p	0.494	m^3/s

With highest Runoff Coefficient:

C	0.329	-
i	3.230	mm/hr
A	2.722	km^2
Q_p	0.804	m^3/s

Estimated Peak Flow (Q_p) ranges from 0.494 - 0.804 m^3/s

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APPENDIX 7-23 ASSIMILATIVE CAPACITY ANALYSIS

Assimilative Capacity Calculations for Discharge to Aghamore Stream

1. Assimilative Capacity of Stream at Low Flow (General Case):

	Max. Permissible Conc. (mg/l)	Mean Background Conc. (mg/l)	95%ile Flow (m3/s)	Constant	Assimilative Capacity (kg/day)
Total Suspended Solids	25	5.01	0.002	86.4	**3.454**
Biological Oxygen Demand	2.6	1.36	0.002	86.4	**0.214**
Nitrate	50	2.98	0.002	86.4	**8.125**
Nitrite	0.015	0.01	0.002	86.4	**0.001**
Total Ammonia	0.14	0.034	0.002	86.4	**0.018**
Orthophosphate	0.075	0.019	0.002	86.4	**0.010**
Arsenic (Total)	10	0.57	0.002	86.4	**1.630**
Cadmium (Filtered)	0.9	0.25	0.002	86.4	**0.112**
Chromium (Total)	32	1	0.002	86.4	**5.357**
Copper (Total)	30	5.29	0.002	86.4	**4.270**
Lead (Filtered)	14	0.5	0.002	86.4	**2.333**
Mercury (Filtered)	0.07	0.005	0.002	86.4	**0.011**
Nickel (Filtered)	34	3.71	0.002	86.4	**5.234**
Selenium (Total)	10	0.4	0.002	86.4	**1.659**
Zinc (Total)	100	9	0.002	86.4	**15.725**

Note:

Assimilative Capacity = (Max Permissible Concentration - $\text{Concentration}_{\text{Background}}$) x Flow x 86.4

2. Concentrations Downstream of Discharge (General Case):

	Stream Flow (m3/day)	Mean Background Conc. (mg/l)	Max. Discharge Rate (m3/day)	Mean Discharge Conc. (mg/l)	Downstream Conc. (mg/l)	Max. Permissible Conc. (mg/l)
Total Suspended Solids	172.8	5.01	3500	1.5	**1.665**	**25**
Biological Oxygen Demand	172.8	1.36	3500	0.57	**0.607**	**2.6**
Nitrate	172.8	2.98	3500	4.06	**4.009**	**50**
Nitrite	172.8	0.01	3500	0.01	**0.010**	**0.015**
Total Ammonia	172.8	0.034	3500	0.014	**0.015**	**0.14**
Orthophosphate	172.8	0.019	3500	0.035	**0.034**	**0.075**
Arsenic (Total)	172.8	0.57	3500	0.66	**0.656**	**10**
Cadmium (Filtered)	172.8	0.25	3500	0.25	**0.250**	**0.9**
Chromium (Total)	172.8	1	3500	1	**1.000**	**32**
Copper (Total)	172.8	5.29	3500	4.5	**4.537**	**30**
Lead (Filtered)	172.8	0.5	3500	0.5	**0.500**	**14**
Mercury (Filtered)	172.8	0.005	3500	0.017	**0.016**	**0.07**
Nickel (Filtered)	172.8	3.71	3500	4.5	**4.463**	**34**
Selenium (Total)	172.8	0.4	3500	1.27	**1.229**	**10**
Zinc (Total)	172.8	9	3500	13.4	**13.193**	**100**

Note:

Downstream Concentration = [($\text{Flow}_{\text{Upstream}}$ x $\text{Concentration}_{\text{Upstream}}$) + ($\text{Flow}_{\text{Discharge}}$ x $\text{Concentration}_{\text{Discharge}}$)] / ($\text{Flow}_{\text{Upstream}}$ + $\text{Flow}_{\text{Discharge}}$)

3. Assimilative Capacity Used (General Case):

	Max. Permissible Conc. (mg/l)	Mean Background Conc. (mg/l)	Downstream Conc. (mg/l)	Assimilative Capacity Used
Total Suspended Solids	25	5.01	1.665	**-17%**
Biological Oxygen Demand	2.6	1.36	0.607	**-61%**
Nitrate	50	2.98	4.009	**2%**
Nitrite	0.015	0.01	0.010	**0%**
Total Ammonia	0.14	0.034	0.015	**-18%**
Orthophosphate	0.075	0.019	0.034	**27%**
Arsenic (Total)	10	0.57	0.656	**1%**
Cadmium (Filtered)	0.9	0.25	0.250	**0%**
Chromium (Total)	32	1	1.000	**0%**
Copper (Total)	30	5.29	4.537	**-3%**
Lead (Filtered)	14	0.5	0.500	**0%**
Mercury (Filtered)	0.07	0.005	0.016	**18%**
Nickel (Filtered)	34	3.71	4.463	**2%**
Selenium (Total)	10	0.4	1.229	**9%**
Zinc (Total)	100	9	13.193	**5%**

Note:

% AC Used = [(Max Permissible Concentration - $\text{Concentration}_{\text{Background}}$) - (Max Permissible Concentration - $\text{Concentration}_{\text{Downstream}}$) / (Max Permissible Concentration - $\text{Concentration}_{\text{Background}}$)] x 100

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Background Concentrations (Upstream Samples)

	pH	Total Suspended Solids	BOD	Nitrate	Nitrite	Total Ammonia	Orthophosphate	Arsenic (Total)	Cadmium (Filtered)	Chromium (Total)	Copper (Total)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Selenium (Total)	Zinc (Total)
Units	-	mg/l	mg/l O_2	mg/l NO_3	mg/l N	mg/l N	mg/l P	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
30/01/2018	7.72	< 3	1	4.76	0.006	0.03	< 0.02	< 1	< 0.5	< 2	10	< 1	< 0.01	< 3	< 0.8	< 18
27/02/2018	8.21	< 3	< 2	5.38	0.008	0.03	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	< 3	< 0.8	< 18
27/03/2018	7.32	3.1	4	3.69	0.004	0.03	< 0.02	< 2	< 0.5	< 2	< 9	< 1	< 0.01	17	< 0.8	< 18
23/04/2018	7.81	< 3	< 1	3	0.003	0.05	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	< 3	< 0.8	< 18
27/08/2018	7.24	< 3	2	1.1	0.008	0.06	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	< 3	< 0.8	< 18
06/11/2018	7.62	24.5	< 1	2.6	0.004	< 0.02	0.05	< 1	< 0.5	< 2	< 9	< 1	< 0.01	< 3	< 0.8	< 18
07/01/2019	7.31	< 3	< 1	< 0.7	< 0.08	0.03	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	< 3	< 0.8	< 18
28/03/2019	7.65						0.04									

Statistics:

pH	Total Suspended Solids	BOD	Nitrate	Nitrite	Total Ammonia	Orthophosphate	Arsenic (Total)	Cadmium (Filtered)	Chromium (Total)	Copper (Total)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Selenium (Total)	Zinc (Total)
7.72	1.5	1	4.76	0.006	0.03	0.01	0.5	0.25	1	10	0.5	0.005	1.5	0.4	9
8.21	1.5	1	5.38	0.008	0.03	0.01	0.5	0.25	1	4.5	0.5	0.005	1.5	0.4	9
7.32	3.1	4	3.69	0.004	0.03	0.01	1	0.25	1	4.5	0.5	0.005	17	0.4	9
7.81	1.5	0.5	3	0.003	0.05	0.01	0.5	0.25	1	4.5	0.5	0.005	1.5	0.4	9
7.24	1.5	2	1.1	0.008	0.06	0.01	0.5	0.25	1	4.5	0.5	0.005	1.5	0.4	9
7.62	24.5	0.5	2.6	0.004	0.01	0.05	0.5	0.25	1	4.5	0.5	0.005	1.5	0.4	9
7.31	1.5	0.5	0.35	0.04	0.03	0.01	0.5	0.25	1	4.5	0.5	0.005	1.5	0.4	9
7.65						0.04									

Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
7.61	5.01	1.36	2.98	0.010	0.034	0.019	0.57	0.25	1	5.29	0.5	0.005	3.71	0.4	9

Note:
Where result is less than laboratory reporting limit, value of 50% of limit used

Discharge Concentrations

	pH	Total Suspended Solids	BOD	Nitrate	Nitrite	Total Ammonia	Orthophosphate	Arsenic (Total)	Cadmium (Filtered)	Chromium (Total)	Copper (Total)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Selenium (Total)	Zinc (Total)
Units	-	mg/l	mg/l O_2	mg/l NO_3	mg/l N	mg/l N	mg/l P	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
30/01/2018	7.96	< 3	< 1	6.53	0.007	< 0.02	< 0.02	< 1	< 0.5	< 2	< 9	< 1	0.015	5	1.45	< 18
27/02/2018	8.39	< 3	< 2	6.54	0.003	< 0.02	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	6	1.2	< 18
27/03/2018	8.18	< 3	< 1	7.05	0.003	< 0.02	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	6	1.21	< 18
23/04/2018	8.03	< 3	< 1	2.84	0.005	0.02	0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	4	1.3	< 18
27/08/2018	8.65	< 3	< 1	1.87	0.006	0.03	< 0.02	1.6	< 0.5	< 2	< 9	< 1	< 0.01	5	1.26	< 18
06/11/2018	7.38	< 3	< 1	2.87	0.004	< 0.02	0.2	< 1	< 0.5	< 2	< 9	< 1	0.077	< 3	1.1	40
07/01/2019	8.51	< 3	< 1	0.7	< 0.08	< 0.02	< 0.02	< 1	< 0.5	< 2	< 9	< 1	< 0.01	4	1.37	< 18
28/03/2019	7.89						< 0.02									

Statistics:

pH	Total Suspended Solids	BOD	Nitrate	Nitrite	Total Ammonia	Orthophosphate	Arsenic (Total)	Cadmium (Filtered)	Chromium (Total)	Copper (Total)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Selenium (Total)	Zinc (Total)
7.96	1.5	0.5	6.53	0.007	0.01	0.01	0.5	0.25	1	4.5	0.5	0.015	5	1.45	9
8.39	1.5	1	6.54	0.003	0.01	0.01	0.5	0.25	1	4.5	0.5	0.005	6	1.2	9
8.18	1.5	0.5	7.05	0.003	0.01	0.01	0.5	0.25	1	4.5	0.5	0.005	6	1.21	9
8.03	1.5	0.5	2.84	0.005	0.02	0.02	0.5	0.25	1	4.5	0.5	0.005	4	1.3	9
8.65	1.5	0.5	1.87	0.006	0.03	0.01	1.6	0.25	1	4.5	0.5	0.005	5	1.26	9
7.38	1.5	0.5	2.87	0.004	0.01	0.2	0.5	0.25	1	4.5	0.5	0.077	1.5	1.1	40
8.51	1.5	0.5	0.7	0.04	0.01	0.01	0.5	0.25	1	4.5	0.5	0.005	4	1.37	9
7.89						0.01									

Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
8.12	1.50	0.57	4.06	0.010	0.014	0.035	0.66	0.25	1	4.5	0.5	0.017	4.5	1.27	13.4

Note:

Where result is less than laboratory reporting limit, value of 50% of limit used

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APPENDIX 7-24 SITE CHARACTERISATION REPORT & WASTEWATER TREATMENT SYSTEM DESIGN SPECIFICATION

Trinity Green
Environmental Consultants

Clonfert
Maynooth
Co. Kildare
t: 01-6290616
m: 086-2434828
Vat No. 3251411B

Site Characterisation Report

By

Dr. Eugene Bolton

Applicant: Lagan Materials

Clonfert,
Maynooth
Co. Kildare
Email: info@trinitygreen.ie
Mobile 086-2434828

SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Lagan Materials Surname:

Address:

Site Location and Townland: Aughamore, Carraroe, Co. Sligo F91 RW83

Telephone No: Fax No:

E-Mail:

Maximum no. of Residents: No. of Double Bedrooms: No. of Single Bedrooms:

Proposed Water Supply: Mains ☐ Private Well/Borehole ☑ Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Glaciofluvial Sands & Gravels

Aquifer Category: Regionally Important: Rk Locally Important: Poor:

Vulnerability: Extreme ☐ High ☑ Moderate ☐ Low ☐ High to Low ☐ Unknown ☐

Bedrock Type: Dinantian Pure bedded Limestone

Name of Public/Group Scheme Water Supply within 1 km: None

Groundwater Protection Scheme (Y/N): Yes Source Protection Area: SI ☐ SO ☐

Groundwater Protection Response: R2[1]

Presence of Significant Sites (Archaeological, Natural & Historical): Lough Gill about 1Km to northeast of site

Past experience in the area: Not in immediate area

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

The groundwater is likely to be at high because of the High vulnerability.
There are 6 6workers on site - allow 40 litres /person and 25grams BOD There are up to 5 Lorry drivers calling - Allow 5 litres and 10 grams BOD This gives 265 litres or 2PE and 200 grams BOD or PE of 4

Note: Only information available at the desk study stage should be used in this section.

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

Landscape Position: Undulating Landscape

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☐ Relatively Flat (<1:20) ☑

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses: No houses within 250m of proposed location of percolation area

Existing Land Use: Existing Quarry

Vegetation Indicators: Nothing to indicate poor soakage

Groundwater Flow Direction: To Northwest

Ground Condition: Hard

Site Boundaries: Hedge

Roads: Road to west

Outcrops (Bedrock And/Or Subsoil): Limestone exposed in surrounding hills, Clayey gravel overburden in immediate area

Surface Water Ponding: Small shallow area 200m south

Lakes: Lough Gill 1Km Northeast

Beaches/Shellfish: None

Areas/Wetlands: None

Karst Features: None

Watercourse/Stream*: Stream along road to West 200m

Drainage Ditches*: None

Springs / Wells*: Well to Northeast in excess of 100m away

Comments:
(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

Ground conditions are dry. Nothing to suggest poor soakage.

***Note and record** water level

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas, which are at or adjacent to significant sites (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 2.4

Depth from ground surface to bedrock (m) (if present):

Depth from ground surface to water table (m) (if present): 1.6

Depth of water ingress:

Rock type (if present): None Present

Date and time of excavation: 08/02/2021

Date and time of examination: 09/02/2021

	Depth of P/T Test*	Soil/Subsoil Texture & Classification**	Plasticity and dilatancy***	Soil Structure	Density/ Compactness	Colour****	Preferential flowpaths
0.1 m	P	Fill - 804	No trds or Ribs	structureless	Hard	brown	None
0.2 m	P						
0.3 m	P,	----------------------------	-------------------------	-------------------	--------------------------------Fi	-------------------	
0.4 m	P,	SAND	No trds or Ribs	Structureless	rm to hard	Grey/Brown	
0.5 m	T1-3						
0.6 m	T1-3						
0.7 m	T1-3						
0.8 m	T1-3						
0.9 m							
1.0 m							
1.1 m							
1.2 m							
1.3 m							
1.4 m							
1.5 m							
1.6 m							
1.7 m							
1.8 m							
1.9 m							
2.0 m							
2.1 m							
2.2 m							
2.3 m							
2.4 m		----------------------------	-------------------------	-------------------	-------------------------------	-------------------	---------------------------------
2.5 m		Base of trench					
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							

Evaluation:

The proposed location has a shallow cover of fill under which there is relatively compacted sand. level of compaction will reduce rate of soakage.
High watertable will mean a standard septic tank will not suffice.

Likely T value: 20

Note: *Depth of percolation test holes should be indicated on log above. (Enter P or T at depts as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

3.3(a) Percolation ("T") Test for Deep Subsoils and/or Water Table

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm) (A)	600	600	600
Depth from ground surface to base of hole (mm) (B)	1000	1000	1000
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

	1		2		3	
Date and Time pre-soaking started	09/02/2021		09/02/2021		09/02/2021	

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	010/02/2021	10/02/2021	10/02/2021
Time filled to 400 mm	9:26	9:27	9:28
Time water level at 300 mm	10:01	9:57	10:11
Time to drop 100 mm (T_{100})	35	30	43
Average T_{100}			36

If T_{100} > 300 minutes then T-value >90 – site unsuitable for discharge to ground
If $T_{100} \leq$ 210 minutes then go to Step 4;
If T_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	10:01	10:44	43	9:57	10:35	38	10:11	11:02	51
2	10:44	11:36	52	10:35	11:18	43	11:02	12:06	64
3	11:36	12:33	57	11:18	12:03	45	12:06	13:19	73
Average Δt Value			50.66666			42			62.66666
	Average Δt/4 = [Hole No.1]		12.6666666 (t_1)	Average Δt/4 = [Hole No.2]		10.5 (t_2)	Average Δt/4 = [Hole No.3]		15.6666666 (t_3)

Result of Test: T = 12.94444444444444 (min/25 mm)

Comments:

Soakage is acceptable

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1				2				3			
Fall of water in hole (mm)	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T – Value = 4.45 / K_{fs}
300 - 250	8.1				8.1				8.1			
250 - 200	9.7				9.7				9.7			
200 - 150	11.9				11.9				11.9			
150 - 100	14.1				14.1				14.1			
Average T- Value	T- Value Hole 1= (t_1)			0	T- Value Hole 1= (t_2)			0	T- Value Hole 1= (t_3)			0

Result of Test: T = 0 (min/25 mm)

Comments:

3.3(b) Percolation ("P") Test for Shallow Soil / Subsoils and/or Water Table

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

	1		2		3	
Date and Time pre-soaking started	09/02/2021		09/02/2021		09/02/2021	

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

Step 3: Measuring P_{100}

Percolation Test Hole No.	1	2	3
Date of test	10/02/2021	10/02/2021	10/02/2021
Time filled to 400 mm	9:34	9:35	9:36
Time water level at 300 mm	10:28	10:31	10:34
Time to drop 100 mm (P_{100})	54	56	58
Average P_{100}			56

If P_{100} > 300 minutes then T-value >90 – site unsuitable for discharge to ground
If $P_{100} \leq$ 210 minutes then go to Step 4;
If P_{100} > 210 minutes then go to Step 5;

Step 4: Standard Method (where $P_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δp (min)
1	10:28	11:37	69	10:31	11:32	61	10:34	11:43	69
2	11:37	12:49	72	11:32	12:41	69	11:43	12:58	75
3	12:49	14:07	78	12:41	13:57	76	12:58	14:22	84
Average Δp Value			73			68.66666			76
	Average Δp/4 = [Hole No.1]	18.25	(p_1)	Average Δp/4 = [Hole No.2]	17.1666666	(p_2)	Average Δp/4 = [Hole No.3]	19	(p_3)

Result of Test: P = 18.1388888888888 (min/25 mm)

Comments:

Results are are within acceptable range

Step 5: Modified Method (where $P_{100} > 210$ minutes)

Percolation Test Hole No.	1				2				3			
Fall of water in hole (mm)	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	P – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	P – Value = 4.45 / K_{fs}	Time Factor = T_f	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	P – Value = 4.45 / K_{fs}
300 - 250	8.1				8.1				8.1			
250 - 200	9.7				9.7				9.7			
200 - 150	11.9				11.9				11.9			
150 - 100	14.1				14.1				14.1			
Average P- Value	P- Value Hole 1= (p_1)			0	P- Value Hole 1= (p_2)			0	P- Value Hole 1= (p_3)			0

Result of Test: P = 0 (min/25 mm)

Comments:

4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

Not Suitable for Development ☐

Suitable for [1]

1. Septic tank system (septic tank and percolation area) — No

2. Secondary Treatment System

   a. septic tank and filter system constructed on-site and polishing filter; or — Yes

   b. packaged wastewater treatment system and polishing filter — Yes

Discharge Route

Discharge to Ground Water

5.0 RECOMMENDATION

Propose to install: Packaged wastewater treatment system and polishing filter

and discharge to: Ground Water

Trench Invert level (m):

Site Specific Conditions (e.g. special works, site improvement works testing etc.

It is recommended to install a Package aeration system and to polish the effluent through a soil polishing filter using a pressurised effluent distribution system. The watertable is iat 1.6m bgl. The base of the gravel infiltration layer should be about 400mm bgl. Soil is removed and the area leveled. A layer of 200mm washed gravel is placed on the surface of the prepared area. Distribution system (32mm diameter) is placed on this and covered with100mm gravel. This is covered with geotextile and finished with 200mm soil.
Effluent from the Treatment unit is pumped to the distribution pipework. With a vertical separation of 1.2m this si sufficient to meet requirements for an R2(1) response.

Size of Filter
3-people work on site full-time - Allow 40 litres of wastewater and 25g BOD Further 3 people temporary full time - allow 40 litres and 25 grams each
Up to 5 drivers - allow 5 litres and 10 grams per person
Total volume = (3 x 40) + (3 x 40) + (5 x 5) = 265 litres or a PE of 2
Organic loading = (3 x 25) + (3 x 25) + (5 x 10) = 200 grams of BOD or a PE of 4
The Treatment plant should be designed for at least 4 PE. The hydraulic load can be designed for a PE of 2 but a PE of 4 is used.
As the T-value is less than 20 filter can be loaded at 20 litres/m2. Taking the PE at 4 the equivelent hydraulic load is 600 litres requiring a filter of 30m2. The percolation area should be at least 4m from the road (internal) and 10 m from the office and 3m from all boundaries

[1] note: more than one option may be suitable for a site and this should be recorded

[2] A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.6.2.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank System

Tank Capacity (m^3):

Percolation Area		Mounded Percolation Area	
No. of Trenches		No. of Trenches	
Length of Trenches (m)		Length of Trenches (m)	
Invert Level (m)		Invert Level (m)	

SYSTEM TYPE: Secondary Treatment System

Filter Systems

Media Type	Area (m^2)*	Depth of Filter	Invert Level
Sand/Soil			
Soil			
Constructed Wetland			
Other			

Package Treatment Systems

Type: Oakstown BAF

Capacity PE: 6

Sizing of Primary Compartment: 3 m^3

SYSTEM TYPE: Tertiary Treatment System

Polishing Filter: Surface Area (m^2)*: 30

or **Gravity Fed:**

No. of Trenches:

Length of Trenches (m):

Invert Level (m):

Package Treatment System: Capacity (pe):

Constructed Wetland: Surface Area (m^2)*:

DISCHARGE ROUTE:

Groundwater: ✔

Hydraulic Loading Rate * ($l/m^2.d$): 20

Surface Water **: ☐

Discharge Rate (m^3/hr):

TREATMENT STANDARDS:

Treatment System Performance Standard (mg/l)	BOD	SS	NH_3	Total N	Total P
	20	30	20		

QUALITY ASSURANCE:

Installation & Commissioning

Installation supervised and Certified by qualified assessor or a suitably qualified person familiar with the EPA Code of Practice 2009.

On-going Maintenance

Annual maintenance contract - including desludging

* Hydrolic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

7.0 SITE ASSESSOR DETAILS

Company: Trinity Green

Prefix: Dr. First Name: Eugene Surname: Bolton

Address: Clonfert, Maynooth, Co. Kildare

Qualifications/Experience: PhD Microbiology, Site Suitability Assessment Course (FETAC)

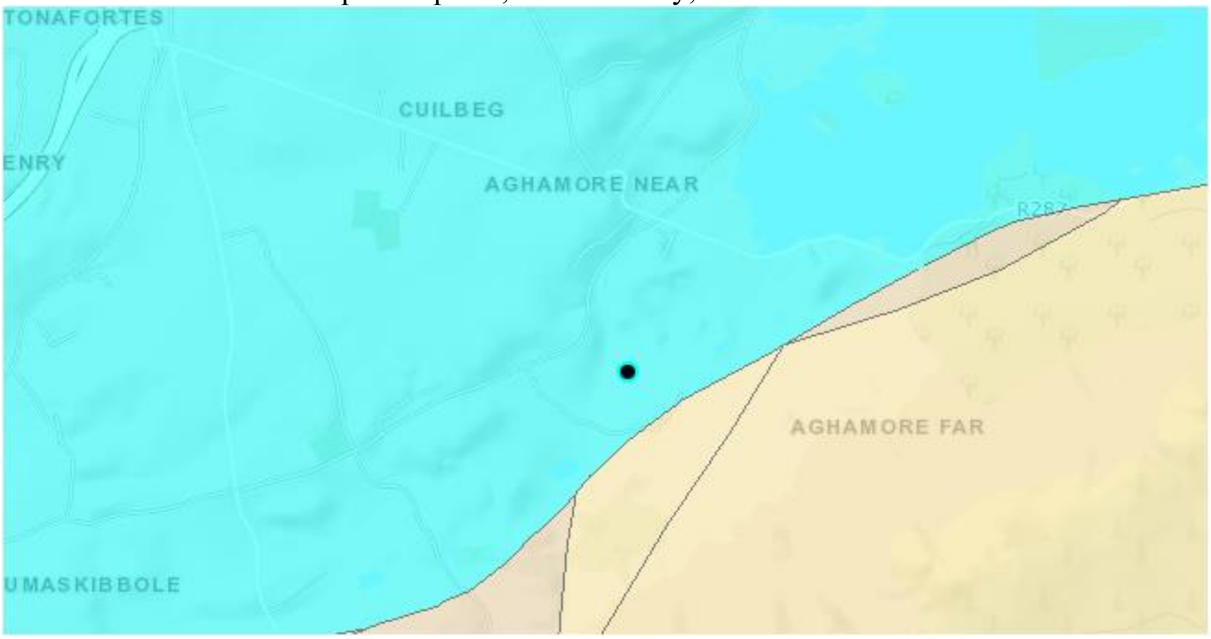
Date of Report: 15/02/2021

Phone: 086 2434828 Fax: e-mail info@trinitygreen.ie

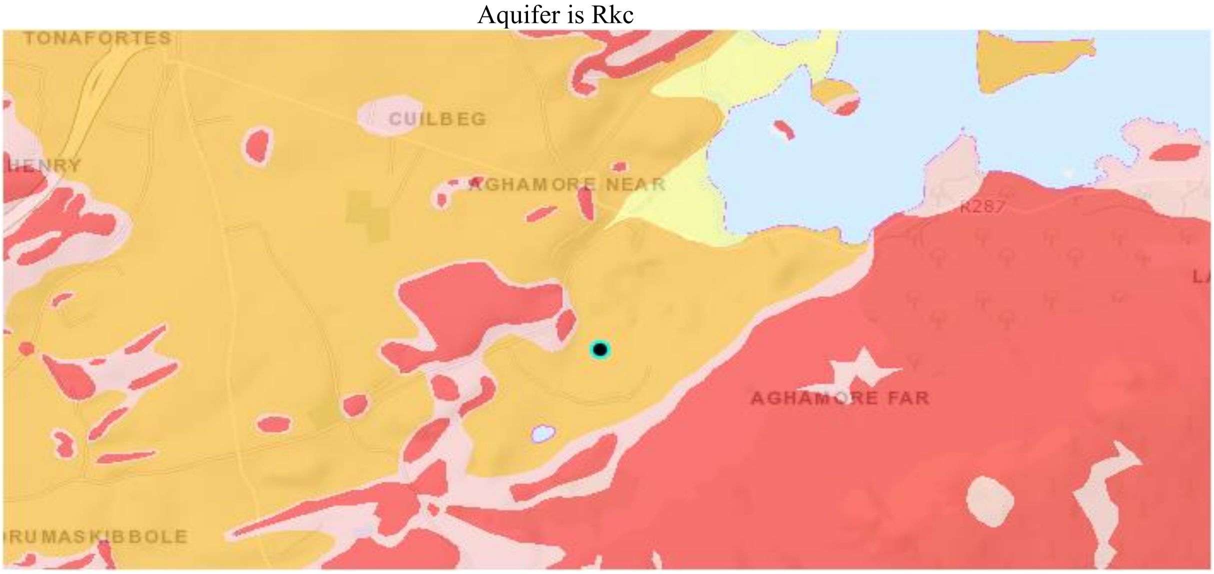
Indemnity Insurance Number: PSE00185337

Signature:

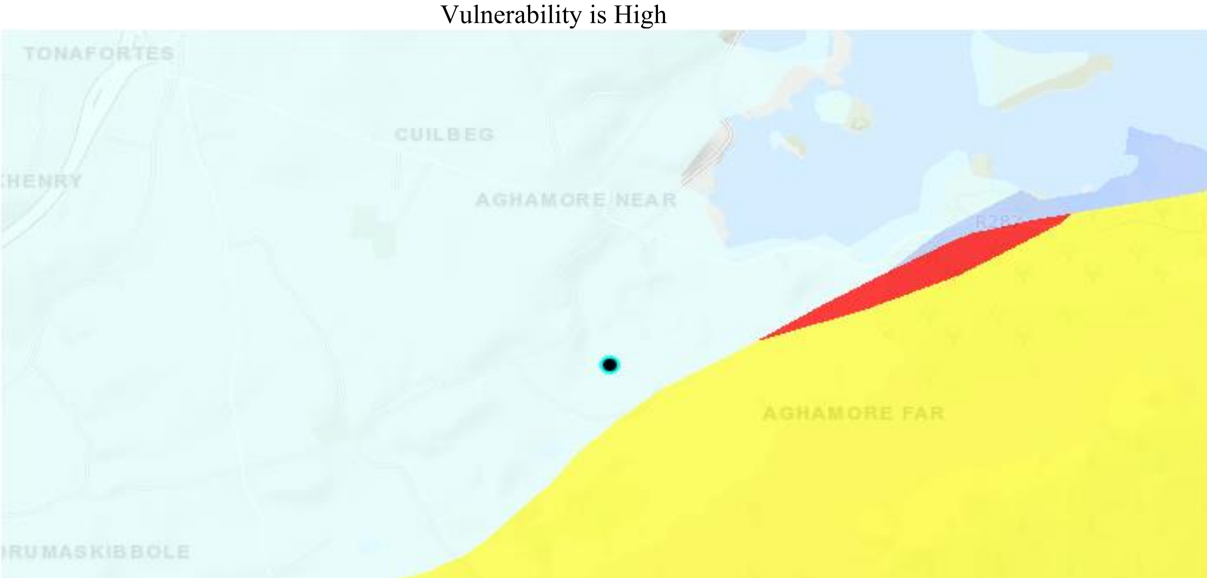
Maps – Aquifer, Vulnerability, Berdock



Aquifer is Rkc



Vulnerability is High



Bedrock is Dinantian Pure Bedded Limestones

Photos

Row 1 - P1, P2

Row 2 - P3, T1

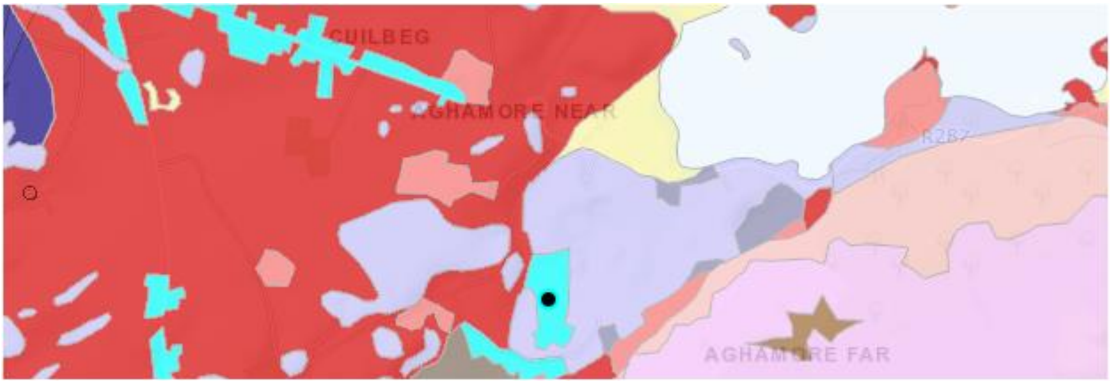
Row 3 - T2, T3

Trial Pit

Excavated Material

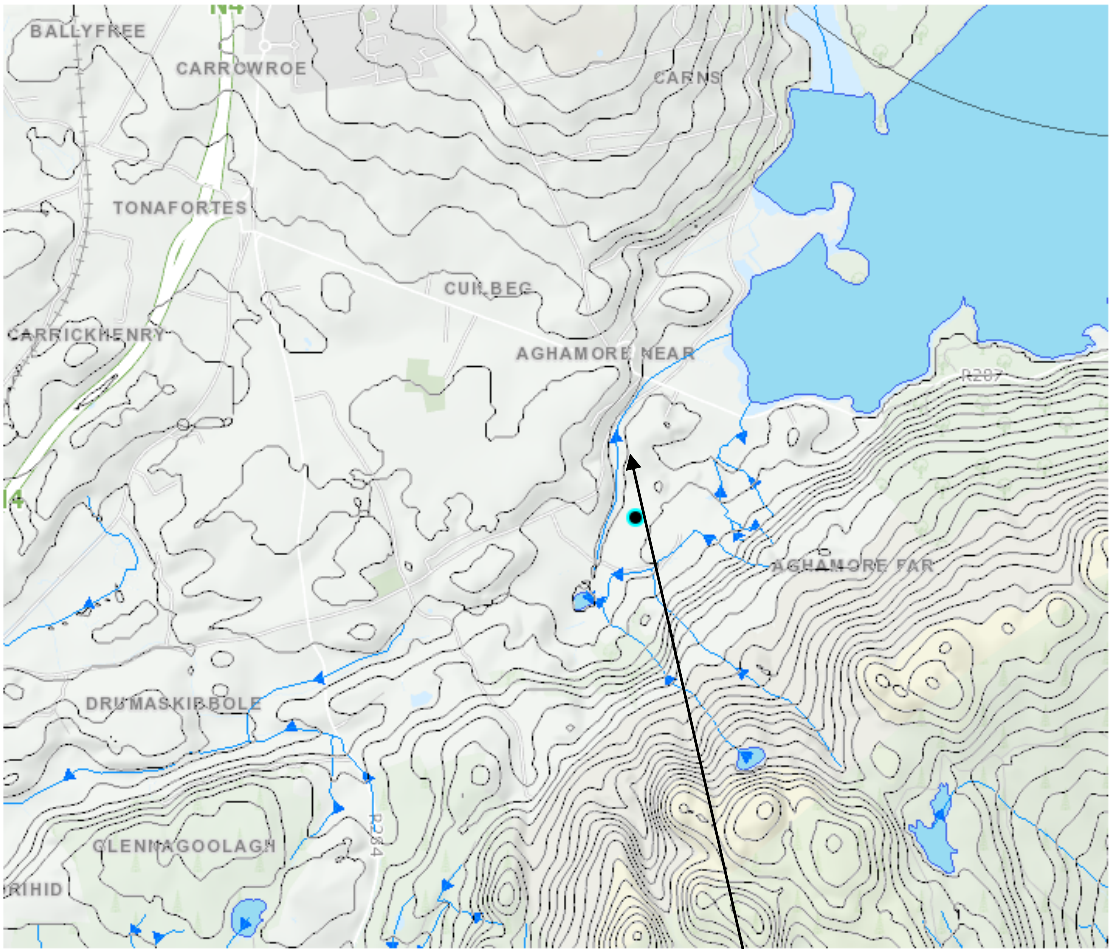
Site overview

Soil



Parent Material	GLs
Parent Material Name	Glaciofluvial sands and gravels
Parent Material Desciption	Limestone sands and gravels (Carboniferous)
Soil Group	Renzinas, Lithosols
IFS Soil Code	BminSW
IFS Soil Description	Derived from mainly calcareous parent materials
County	SLIGO
Category	Shallow well drained mineral (Mainly basic)
Legend	BminSW - Shallow well drained mineral (Mainly basic)

Site Location



Site - Location of Percolation area

Lagan Materials,
Aughamore,
Carraroe,
Co. Sligo

O'Reilly Oakstown Environmental

O'Reilly Oakstown Environmental

Oakstown, Trim
Co. Meath
Tel: 046 - 943 - 1389
Fax: 046 - 943 - 7054

E: info@oreillyoakstown.com
W: www.oreillyoakstown.com
V.A.T Reg. No.: IE 6401624D
Company Reg. No.: 381624

OAKSTOWN
BAF System

Date: 16th February 2021

Applicant Name: Lagan Materials

Site Address: Aughamore, Carraroe, Co. Sligo

The following is the design specification for the Oakstown BAF 6 PE wastewater treatment system.

1. Waste Water Treatment System Design Details:

- Maximum Daily Design Loadings as per client & EPA - Commercial Loading Rates:

	Max No. of users	Flow Litres/day/ person	Total Hydraulic Load	B0D5 (grams/day/ person)	Total Organic Loading (grams/day)
Workers	6	40	240 litres	25	300
Drivers	5	5	25 litres	10	50
Total			**265 Litres**		**350grams**

- Oakstown BAF 6 PE Maximum Capacity Design Loadings:

Total Organic Loading	0.36kg BOD/day
Total Hydraulic loading	0.9m³ /day

- Typical treated effluent standard:

BOD	20mg/litre
TSS	30mg/litre

- Proposed system details: ► **Oakstown BAF 6 P.E.**

Volume of Total Plant	6.7m³
Volume of Primary Sedimentation Chambers	2.86m³
Volume of Secondary Aeration Chamber	1.2m³
Volume of Biomedia	0.8m³

O'REILLY
OAKSTOWN
ENVIRONMENTAL

O'Reilly Oakstown Environmental

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OAKSTOWN
BAF System

2. Wastewater Treatment system description:

The Oakstown BAF 6 PE is designed to provide proven, cost effective primary and secondary wastewater treatment in robust steel reinforced concrete tanks.
The primary sedimentation chamber has a 2.2m³ capacity to allow anaerobic digestion to occur naturally while letting sludge settle on the tank floor.
Once primary treatment has taken place the effluent is further degraded in the aeration chamber where oxygen enriched wastewater provides ideal conditions for aerobic bacteria to thrive.
Before pumping to the main sewer the clear water is left to further settle in the clarifier chamber to eliminate any remaining settlable solids.

3. Guarantee and warrantees:

O'Reilly Oakstown provide a 12 month maintenance service contract on all systems from date of first occupation. We provide a 24 month warranty on all parts.

4. Percolation:

The percolation area designed must conform to the requirements of Chapter 10 or Table 8.1 of EPA Code of Practice 2009 Wastewater Treatment and Disposal System serving single houses.

The percolation area requirements are as follows:
Groundwater Protection Response: R2[1]
T-value: 12.14 as per Site Characterisation Form.
P-value: 18.14 as per Site Characterisation Form.
Depth from ground surface to water table: 1.6m BGL.
Depth from ground surface to bed rock: None Encountered BGL.
Depth from ground surface to mottling: None Encountered BGL.
Area of Soil Polishing filter: 30m^2.
Soil Polishing Filter must be covered in 25-40mm drainage stone.
Soil Polishing Filter must be covered in geo-textile cover then in topsoil.
►See Site Characterisation report for percolation area details.

O'REILLY
OAKSTOWN
ENVIRONMENTAL

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OAKSTOWN
BAF System

5. Client Responsibilities unless included in our quotation:

- Excavation and backfill.
- Connection to the main sewer as recommended by the site engineer.
- Provision of access for delivery by hi-ab truck to within 1 metre of the excavation.
- Provision of a power ducting from the tanks to the plant room.
- Mounting and connection of control panel to mains power in the plant room.

6. Operation and Maintenance:

The client is responsible for the operation and maintenance of the wastewater treatment system in accordance with the owner's manual supplied by O'Reilly Oakstown.

Please do not hesitate to contact us if there are any further queries.

Yours sincerely

Sarah O'Connor