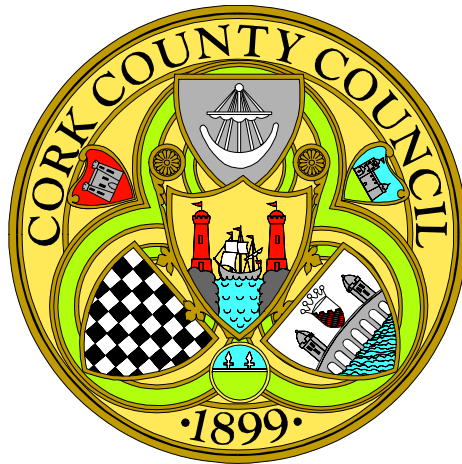


**CORK COUNTY COUNCIL
NORTHERN DIVISION**



BOHERBUE WASTEWATER TREATMENT PLANT

FLOW & LOAD SURVEY

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1.0 BOHERBUE WWTP

The system, which caters for the village and secondary school, treats a PE of 600. An ejector station is situated on secondary school land from where sewerage is pumped up to as far as the R.C Church and then gravitates to the treatment plant. The sewerage from the remaining houses east of the secondary school gravitates to an ejector station at Laharan East but this is currently used as a septic tank. Pumps and electrics would need to be installed for the ejector station to become operational.

The sewer network was further extended in early 2003 by 750m, along the road from the village to Loumanagh North.

Influent gravitating to the plant initially enters the primary settlement zone in an Imhoff tank from where it goes to two trickling filters. Final settlement takes place in two Humus tanks and the effluent then settles in a large wetland that was constructed in 1998. After filtering through the wetland effluent from the treatment plant is discharged to the Brogeen River.

1.1 Flow Survey

A survey of all flows entering the WWTP was undertaken over the period 16th February, 2008 to 5th March, 2008 inclusive by Water Technology Ltd. The equipment used was the Isco Area Velocity Logger. An Isco 675 Tipping Bucket Rain Gauge was also set up at the WWTP site to log Rainfall during the survey and an automatic sampler was provided for use by Cork County Council personnel over the survey period.

A flow proportional sample at the WWTP inlet was taken over a 24-hour period on 3 occasions over the survey period. The results are detailed in Table 1, with the average of the 3 days calculated and compared with typical domestic wastewater characteristics. The population equivalent discharging to the WWTP based on the survey results is also shown for each day, based on 60gBOD/h/d.

Table 1: Flow Analysis Results at Boherbue WWTP Inlet

Description/Date	18/02/08	26/02/08	28/02/08	Typical Values
Total Flow (m ³ /d)	158	165	95	
Biochemical Oxygen Dmd, BOD (mg/l)	354	390	250	260
Chemical Oxygen Dmd, COD (mg/l)	554	1029	736	520
Suspended Solids, SS (mg/l)	128	499	220	260
Total Phosphorus, TP (mg/l)	4.9	9.3	5.5	10
TP as Orthophosphate (mg/l)	2.2	4.0	2.3	8
pH	7.5	6.7	7.4	7
Rainfall over previous 24hr period (mm)	0.0	0.81	0.00	
PE based on 60gBOD/h/d	932	1073	396	

It is obvious from the typical wastewater characteristics shown above that the wastewater received at the WWTP is as per typical expected values indicating that there is very little infiltration of groundwater into the foul sewer network. The collection system is a partially combined system with some storm water allowed to enter the foul sewer network. However, there had been little or no rain prior to two of the sampling dates so there should have been little or no storm water in the collection system while 0.8mm of rainfall fell over the previous 24hr period for the sample collected on 26th February, which resulted in elevated levels for the different parameters. The present population equivalent entering the plant based on biological analysis is 800PE

1.2 Analysis of Survey

For analysis purposes, it is assumed that 0.5mm of rainfall over a 24 hour period would not affect the flows entering the wastewater treatment plant. The average dry weather flow (DWF) over the survey period can therefore be calculated as follows:

Table 2

Date	Total (cu.m)	Rainfall (mm)
16/02/08	173	0.00
17/02/08	158	0.00
18/02/08	132	0.00
19/02/08	128	0.00
20/02/08	104	0.20
21/02/08	109	0.00
22/02/08	113	0.41
27/02/08	95	0.00
01/03/08	146	0.00
04/03/08	190	0.10
05/03/08	150	0.2
Total	1498	
Average	136	

The average DWF is therefore 136 cu.m/day

$$1\text{DWF} = 136 \text{ cu.m/day (5.67cu.m/hr)}$$

$$3\text{DWF} = 408 \text{ cu.m/day (17.00 cu.m/hr)}$$

Allowing a hydraulic loading of 200litres/head/day, the population being served by the plant is

$$136 \div 0.2 = \mathbf{680 \text{ PE.}}$$

The maximum flow recorded entering the plant over the survey period was 60.9 cu.m/hr which is approximately 11 times increase of the DWF entering the plant.

Table 3 below shows the recorded flow rates at the inlet to the WWTP from 16th February to 5th March, 2008. There was 13mm approx of rainfall in the Boherbue area over the survey period. The total input volume recorded at the WWTP in the period was 3006 cu.m averaging 158m³/d.

To estimate the infiltration to the existing collection system, it has been assumed that the minimum flow on each day (usually occurring around 4-6am) is infiltration flow only. This is reasonable as there should be little or no wastewater discharges at night in a village the size of Boherbue and with no major industry discharging to the collection system. The total volume minus the infiltration flow gives us an estimation of the actual wastewater delivered to the WWTP.

Table 3: Flow Measurements at Boherbue WWTP Inlet

Date	Average (cu.m/hr)	Maximum (cu.m/hr)	Minimum (cu.m/hr)	Total (cu.m)	Rainfall (mm)	Infiltration (cu.m)	Wastewater (cu.m)
16/02/08	7.2	33.6	2.5	173	0.00	169	4
17/02/08	6.6	34.8	2.3	158	0.00	104	54
18/02/08	5.5	29.8	2.5	132	0.00	101	31
19/02/08	5.3	31.8	2.0	128	0.00	105	23
20/02/08	4.3	32.5	1.6	104	0.20	71	33
21/02/08	4.5	32.3	1.8	109	0.00	47	62
22/02/08	4.7	32.9	1.4	113	0.41	101	12
23/02/08	4.0	21.6	1.8	96	0.81	57	39
24/02/08	6.8	38.4	2.5	163	1.02		
25/02/08	6.9	30.7	2.0	165	0.81	98	67
26/02/08	5.7	27.0	1.6	137	1.22		
27/02/08	4.0	30.2	1.1	95	0.00	37	58
28/02/08	3.7	27.3	1.1	89	0.71	72	17
29/02/08	11.8	60.9	0.9	284	1.12	64	220
01/03/08	6.1	37.2	2.3	146	0.00	123	23
02/03/08	6.7	42.0	1.8	162	1.83	114	48
03/03/08	17.2	55.0	2.7	412	4.57	173	239
04/03/08	7.9	37.5	3.9	190	0.10	185	5
05/03/08	6.3	37.0	2.7	150	0.2	148	2
	Average 6.6	Max Flow 60.9	Min Flow 0.9	Total 3006 Average 158	Total 13.00	Average 104	Average 55

It is shown that the average flow to the plant over the 19 days was 158m³/day with infiltration making up approximately 66% of the flows.

It should be noted that, if one assumes the average wastewater flow to the plant is 158m³/d and the population equivalent is 800 (based on biological analysis), an average wastewater flow of 197l/h/d is discharged. This is very similar to the typical assumed wastewater discharge is 200l/h/d when no allowance is made for acceptable levels of infiltration.

2.0 SUMMARY

From the above tables it can be seen that the dry weather flow presently entering the plant is equivalent to 680PE. However from interpretation of the analysis results and flows entering the plant present PE is estimated to be 800PE

There are 2no. pumping stations located on the sewer network and the high peaks that occur 6-7 times a day can be attributable to the cutting in and out of the pumps. The assessment of the flows entering the plant between the hours of 4am and 6am may not be accurate as a result of pumped flows entering the treatment works over this period.

It can be seen from the daily graphs that rainfall events resulted in substantial increases in flows entering the treatment works. It can be seen that 4.6mm of rainfall fell on 3rd March which resulted in an 161% increase over the average daily flow over the survey period. In addition the following was noted:

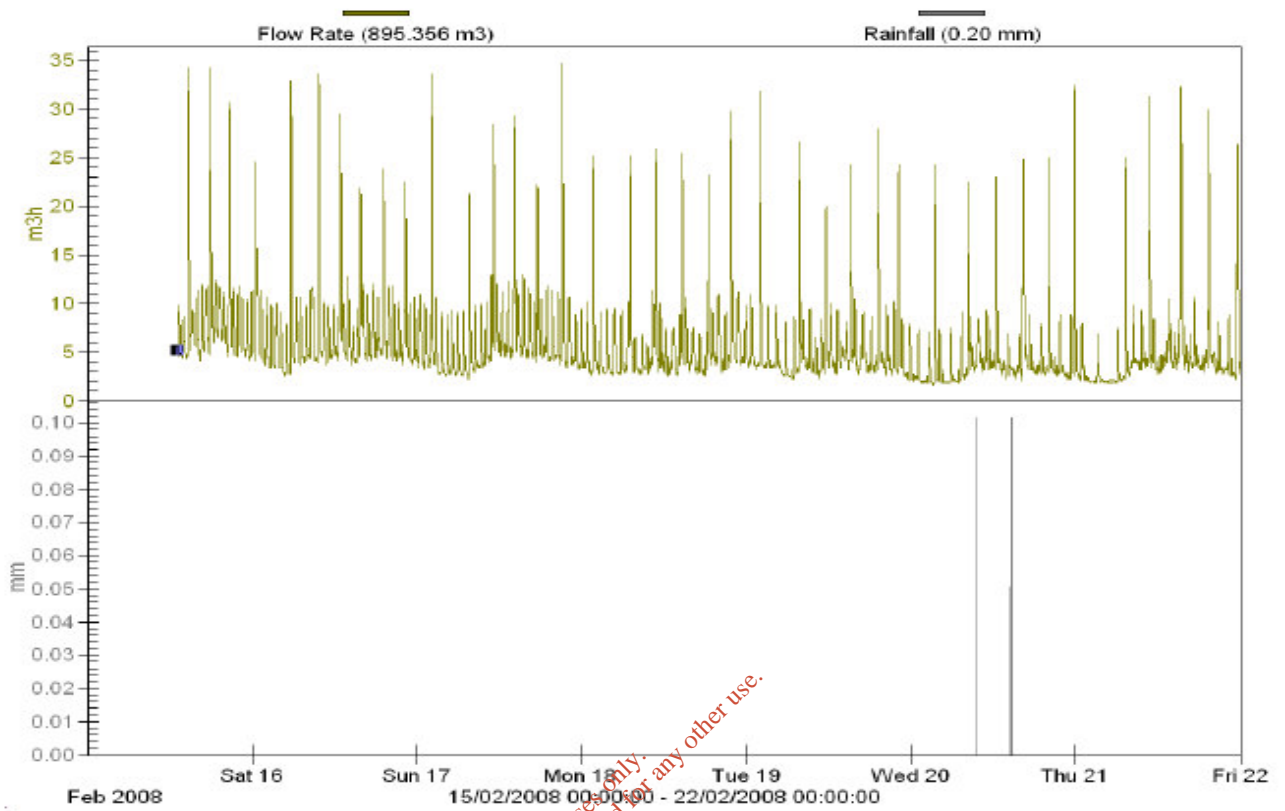
- 0.8mm of rain over a 48min period on 24th February increased the flow entering the plant by 30cu.m/hr approx
- 1.0mm of rain over a 2.5hour period on 29th February resulted in a gradual increase in flows entering the plant

The maximum flow recorded entering the plant over the survey period was 60.9 cu.m/hr which is approximately 9 times increase of the DWF entering the plant.

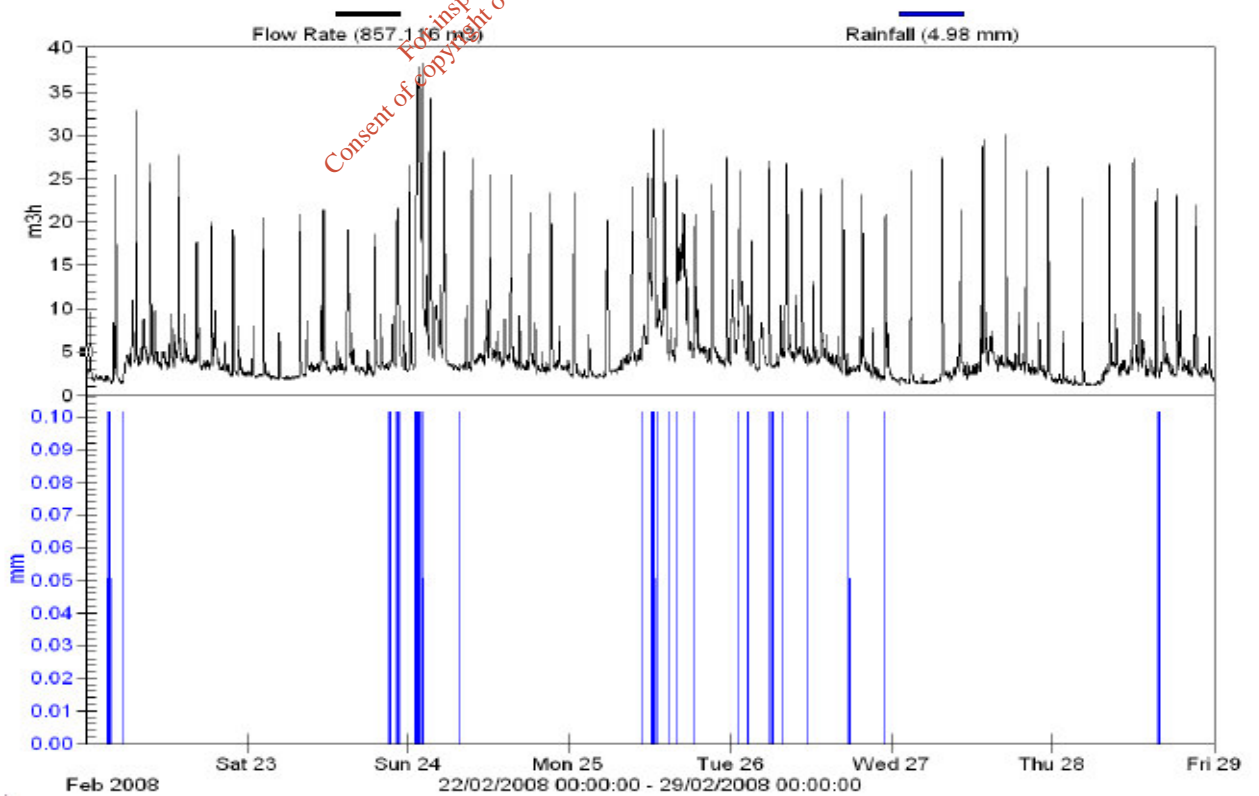
When calculating for upgrading of the plant an allowance will have to be made for any development presently under construction and future development within the village.

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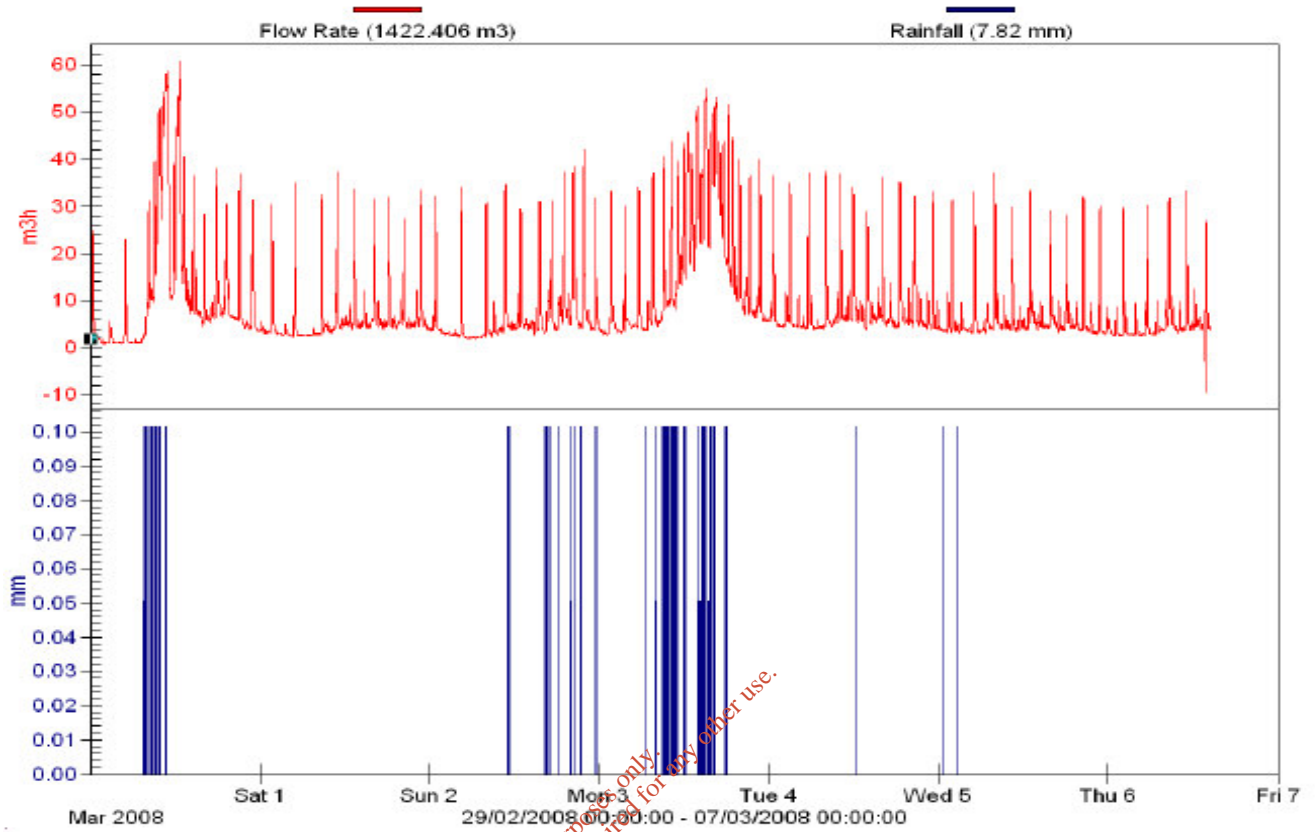
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Boherbue WWTP week 2

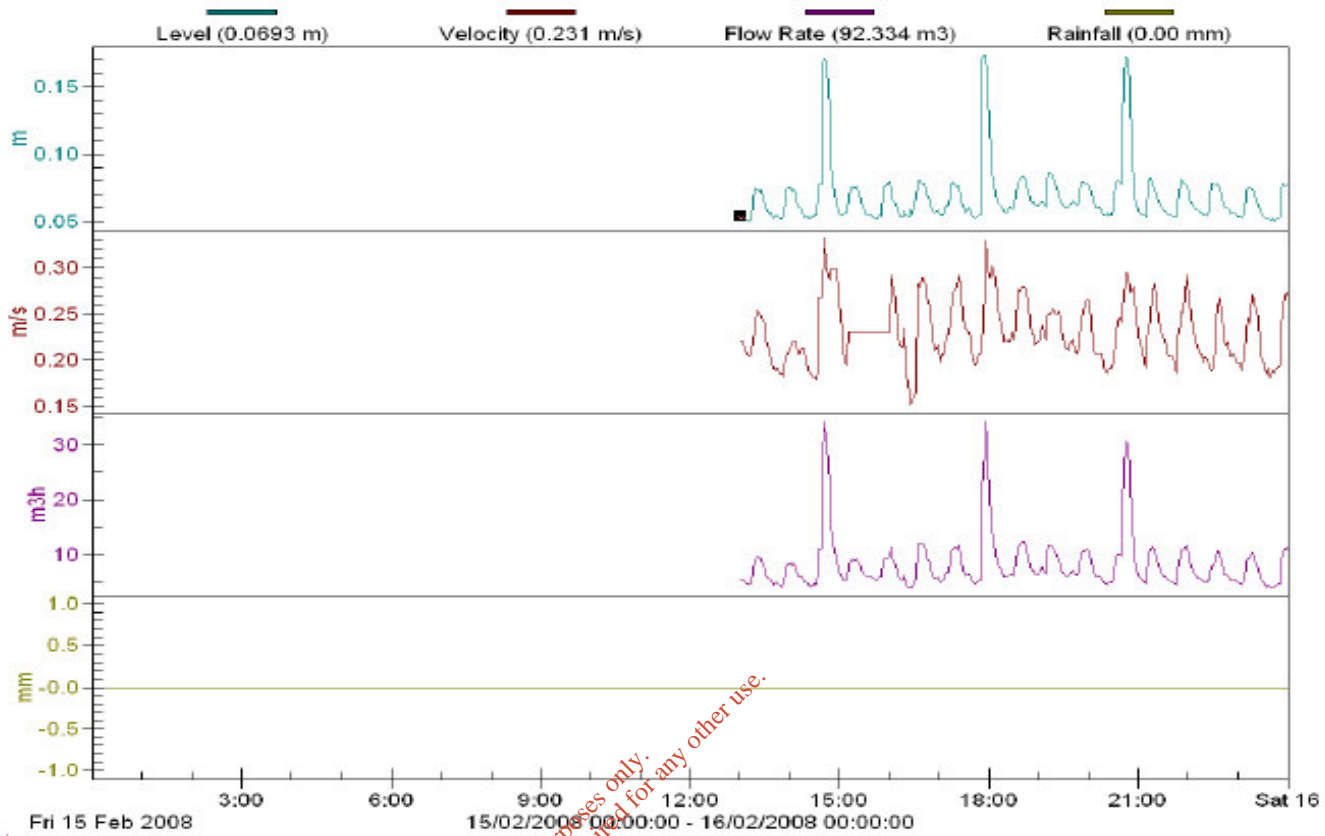


Boherbue WWTP week 3



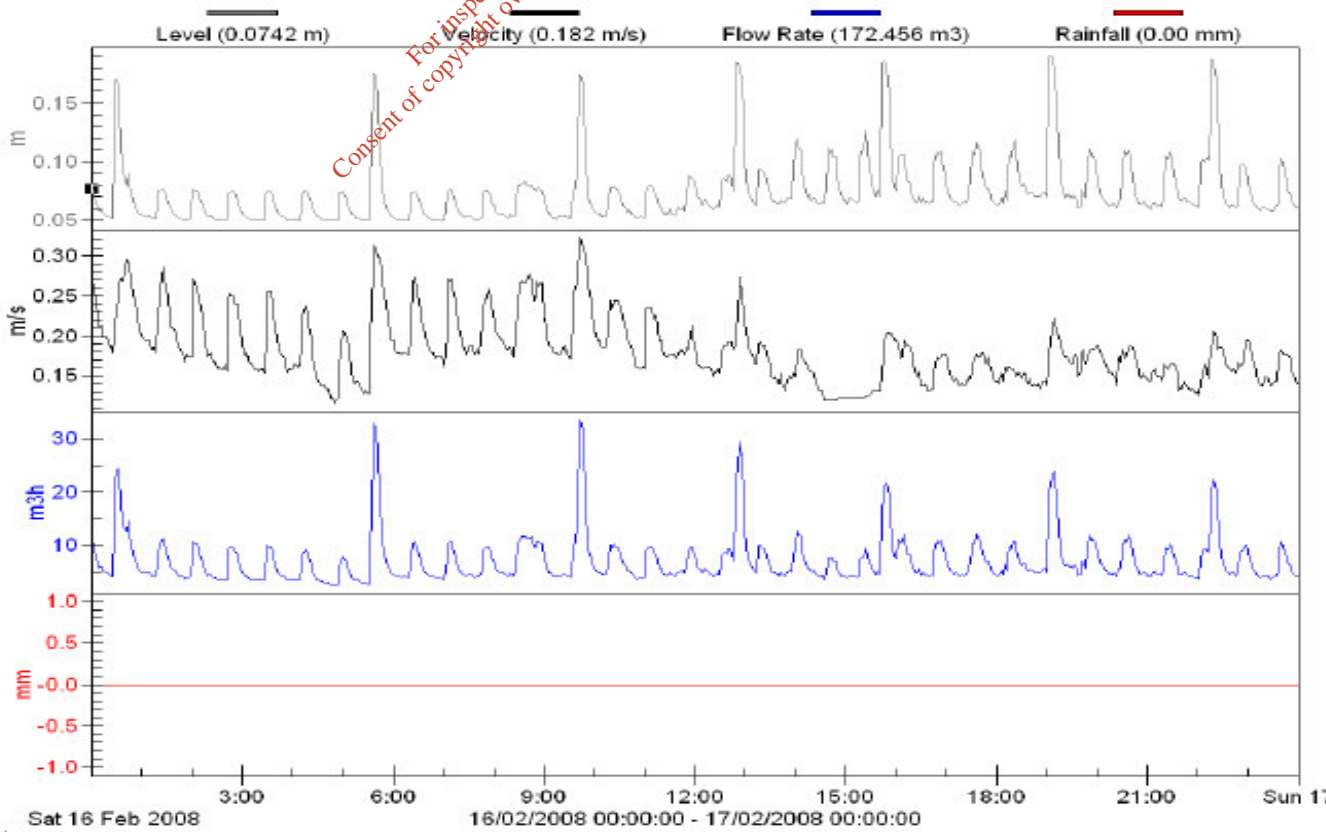
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Boherbue fri 15 feb



16/2/2008 00:00, 0.077

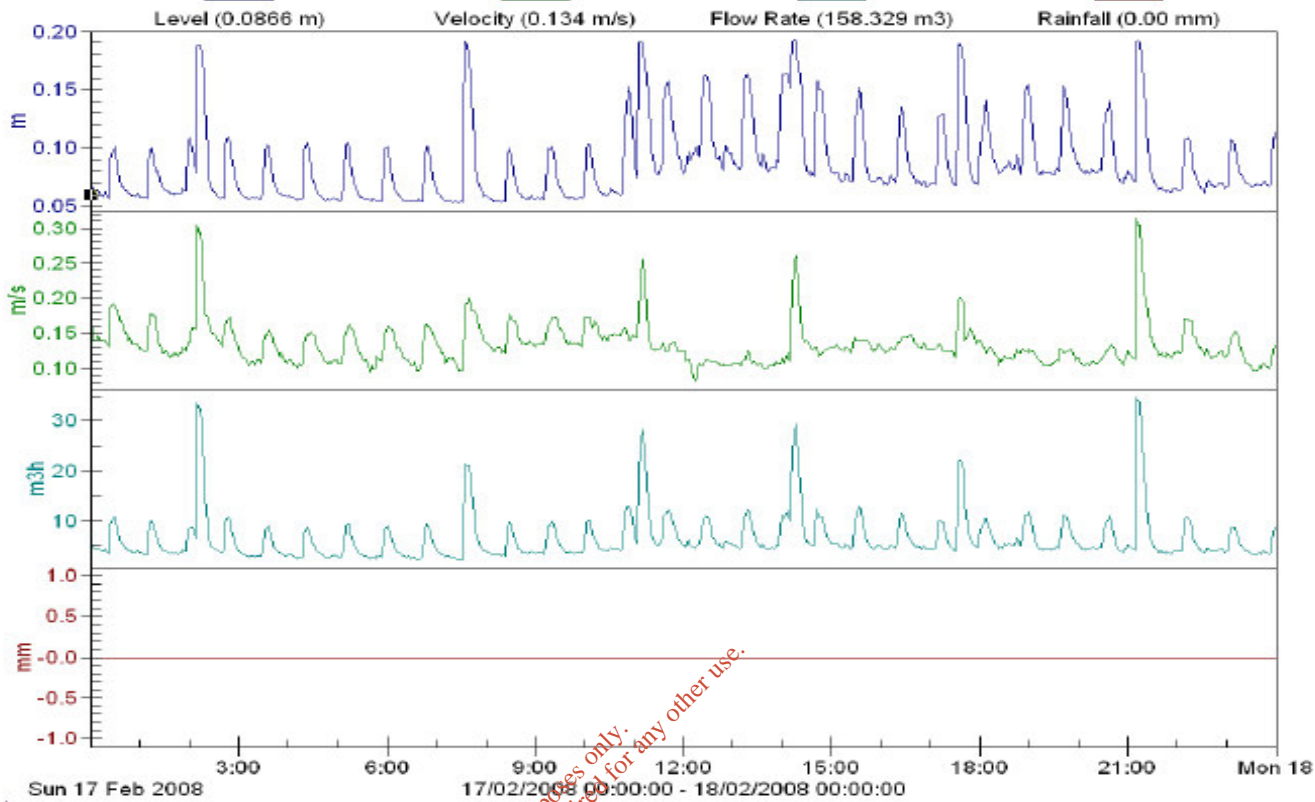
Boherbue sat 16 feb



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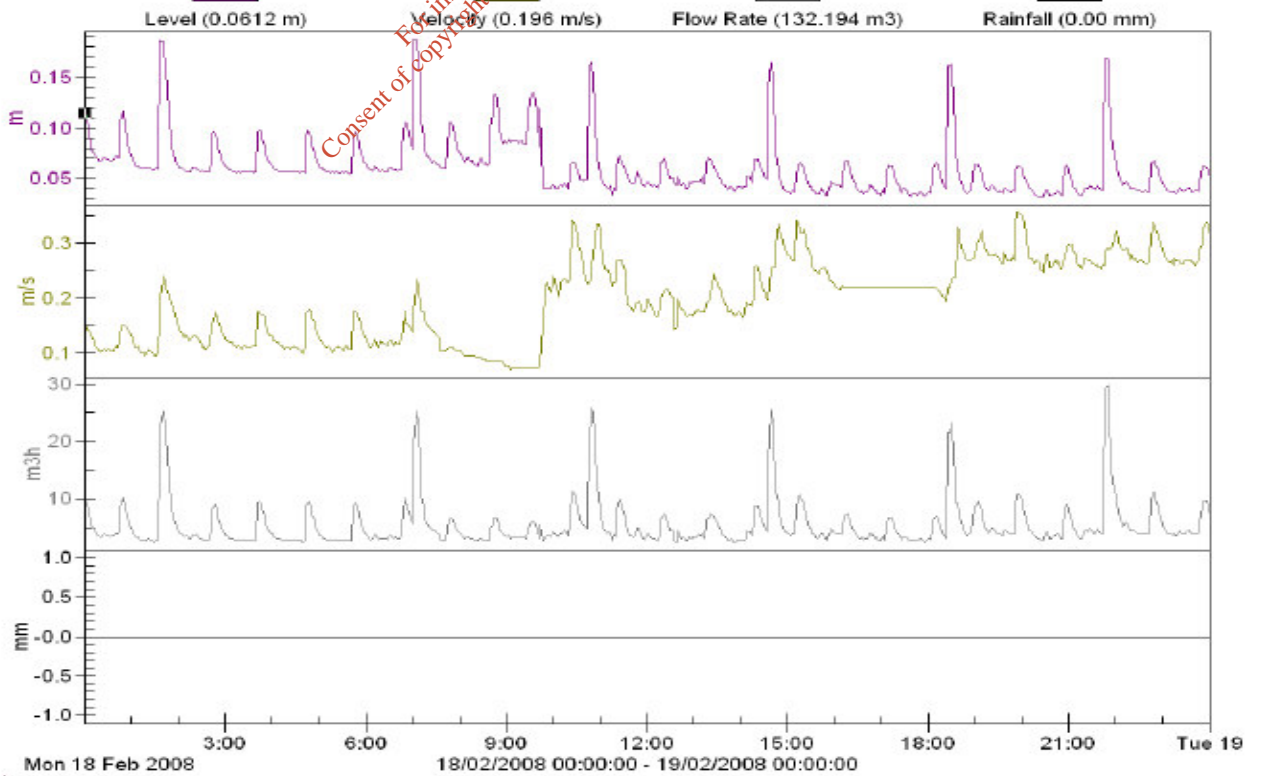
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Boherbue sun 17 feb



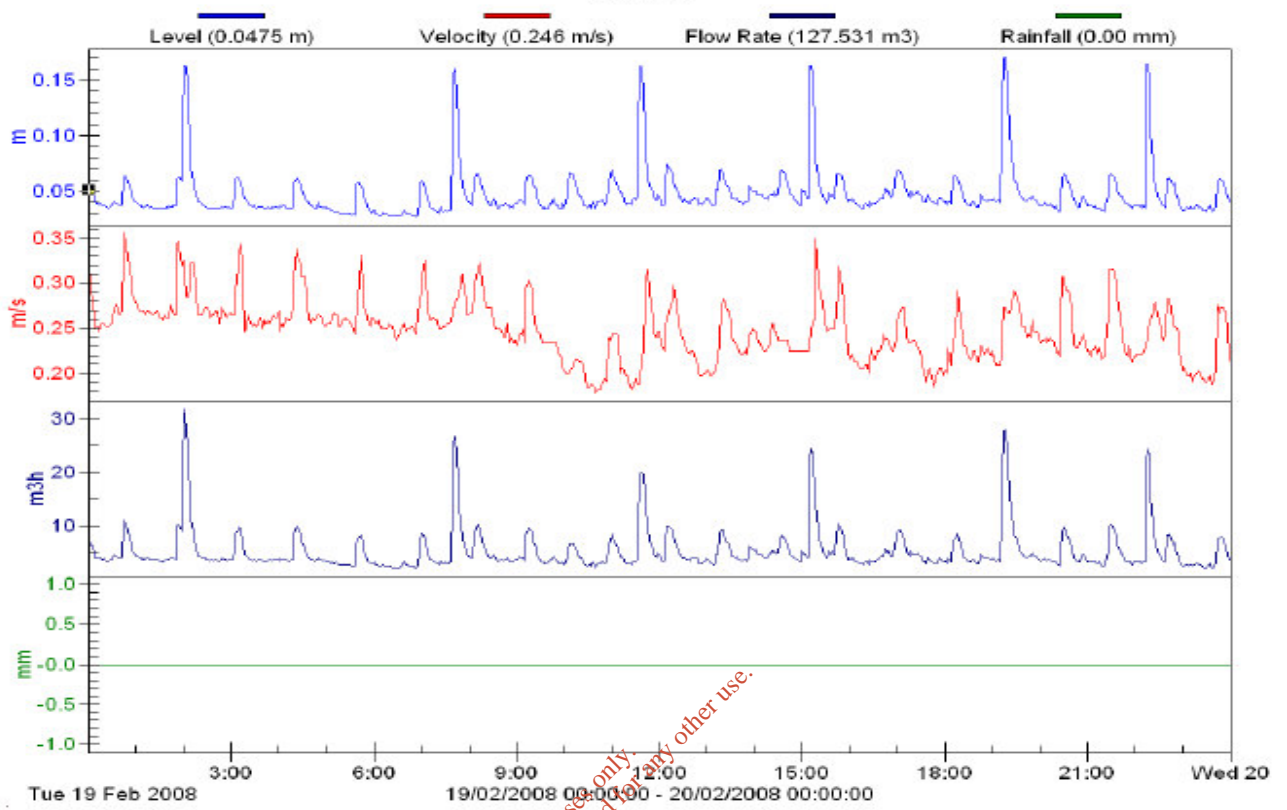
18/2/2008 00:00, 0.115

Boherbue mon 18 feb



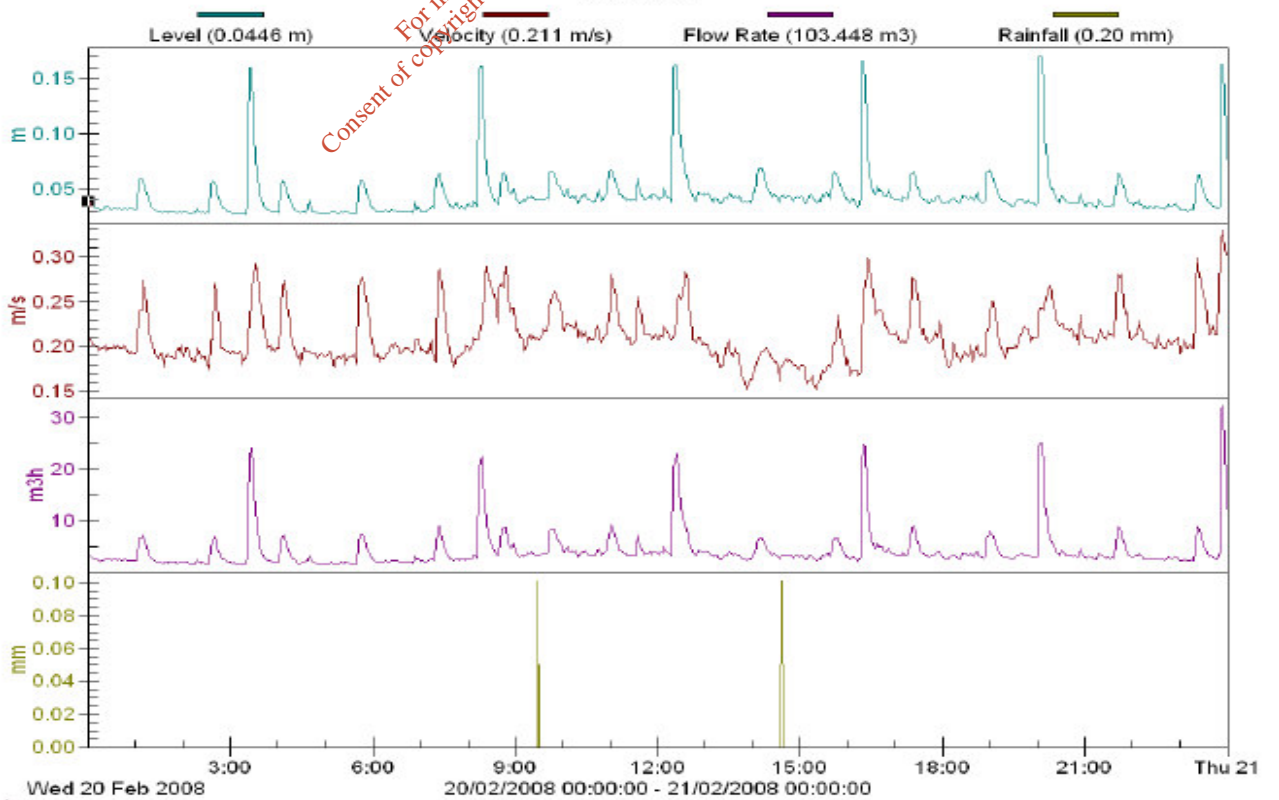
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Boherbue Tue 19 Feb



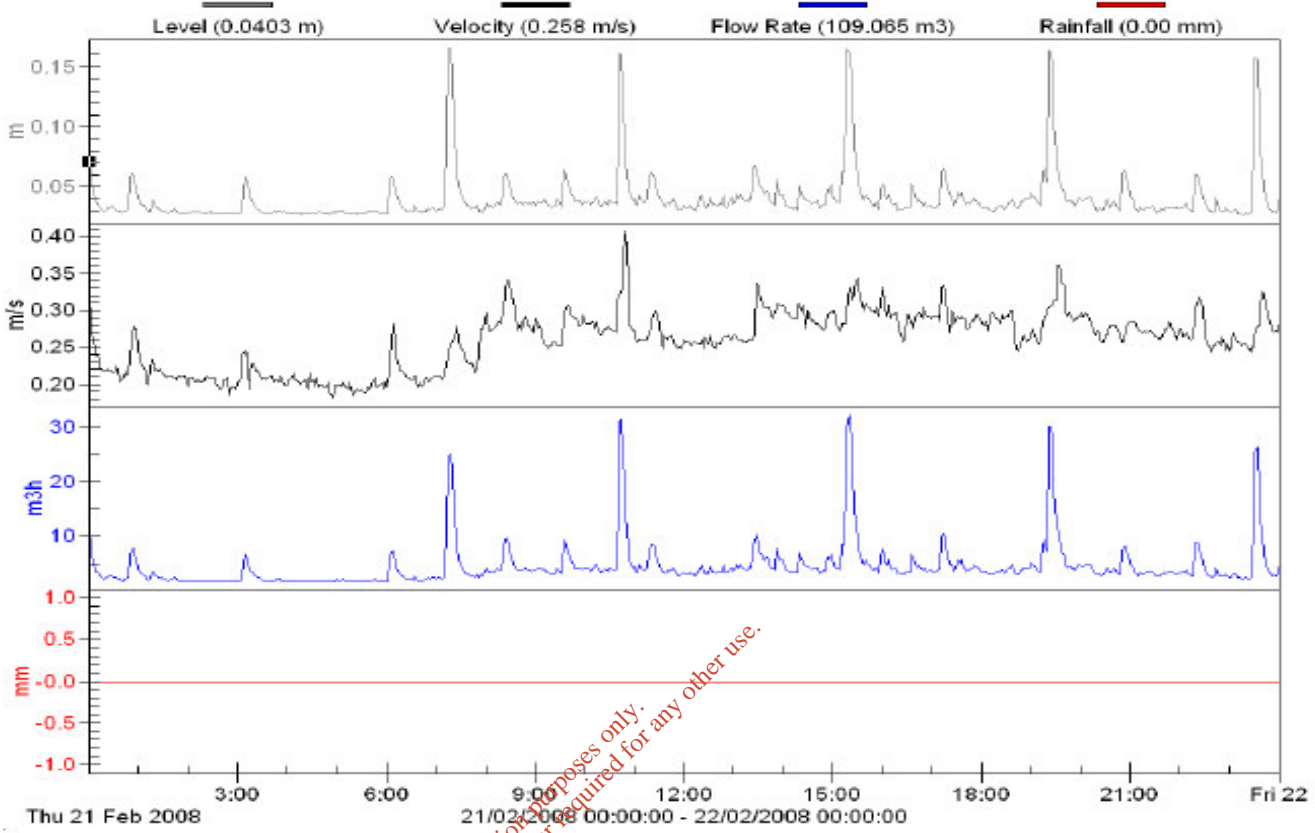
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Boherbue Wed 20 Feb



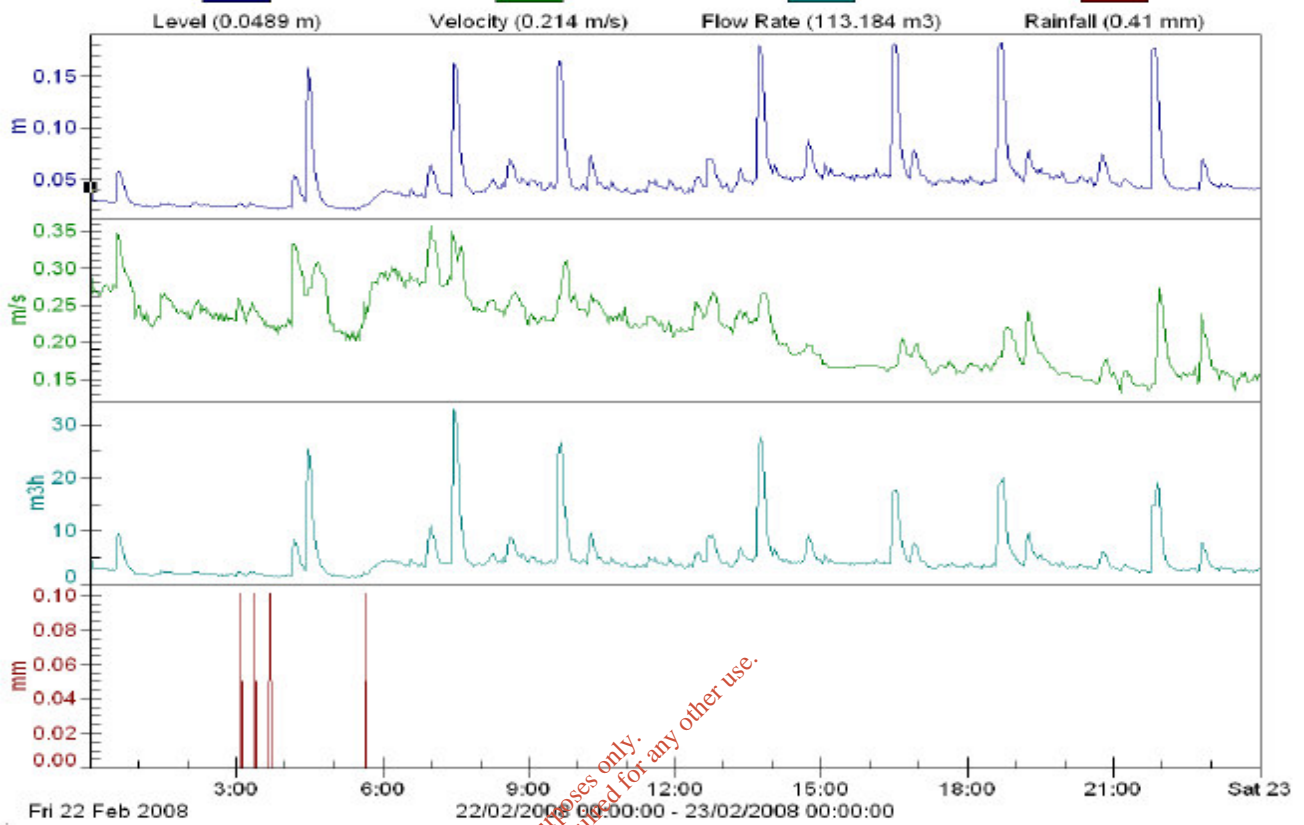
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Boherbue Thu 21 Feb



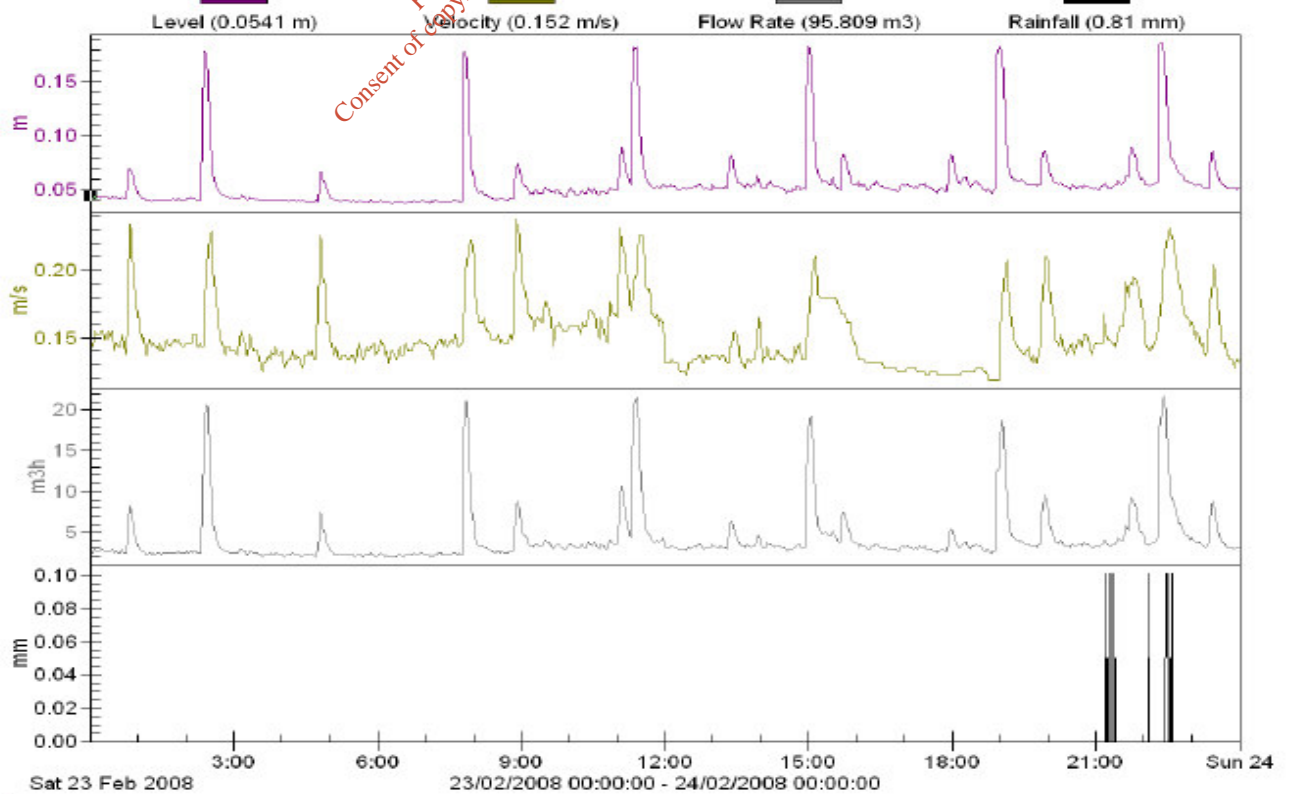
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Boherbue fri 22 feb



23/2/2008 00:00, 0.043

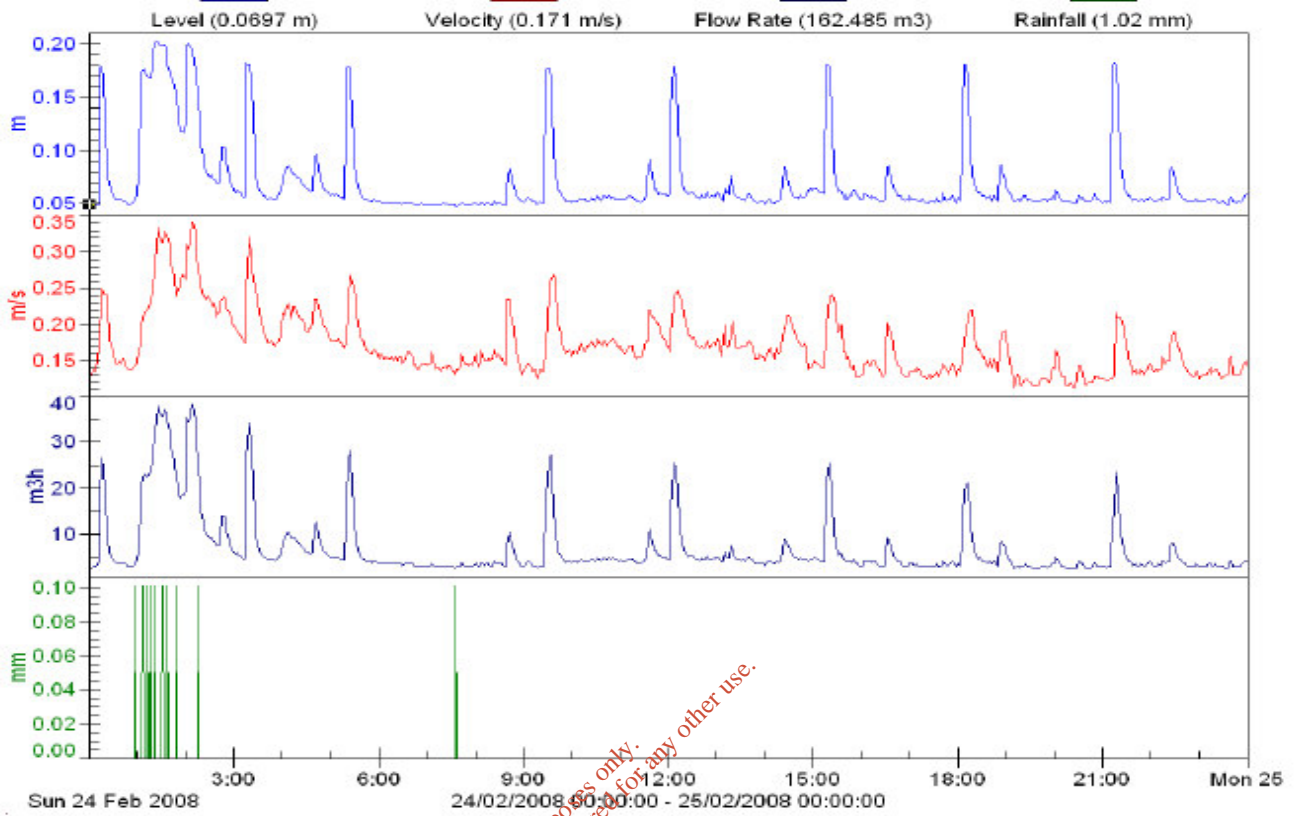
Boherbue sat 23 feb



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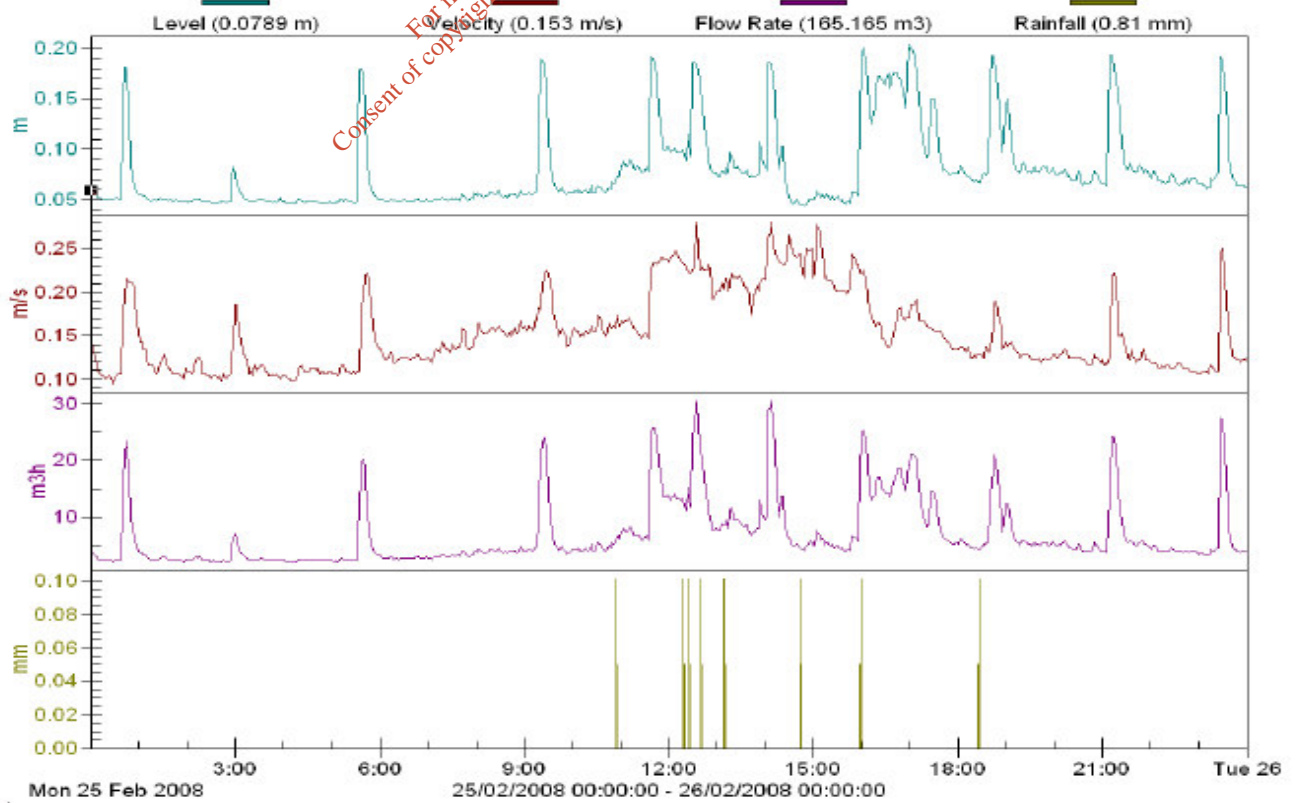
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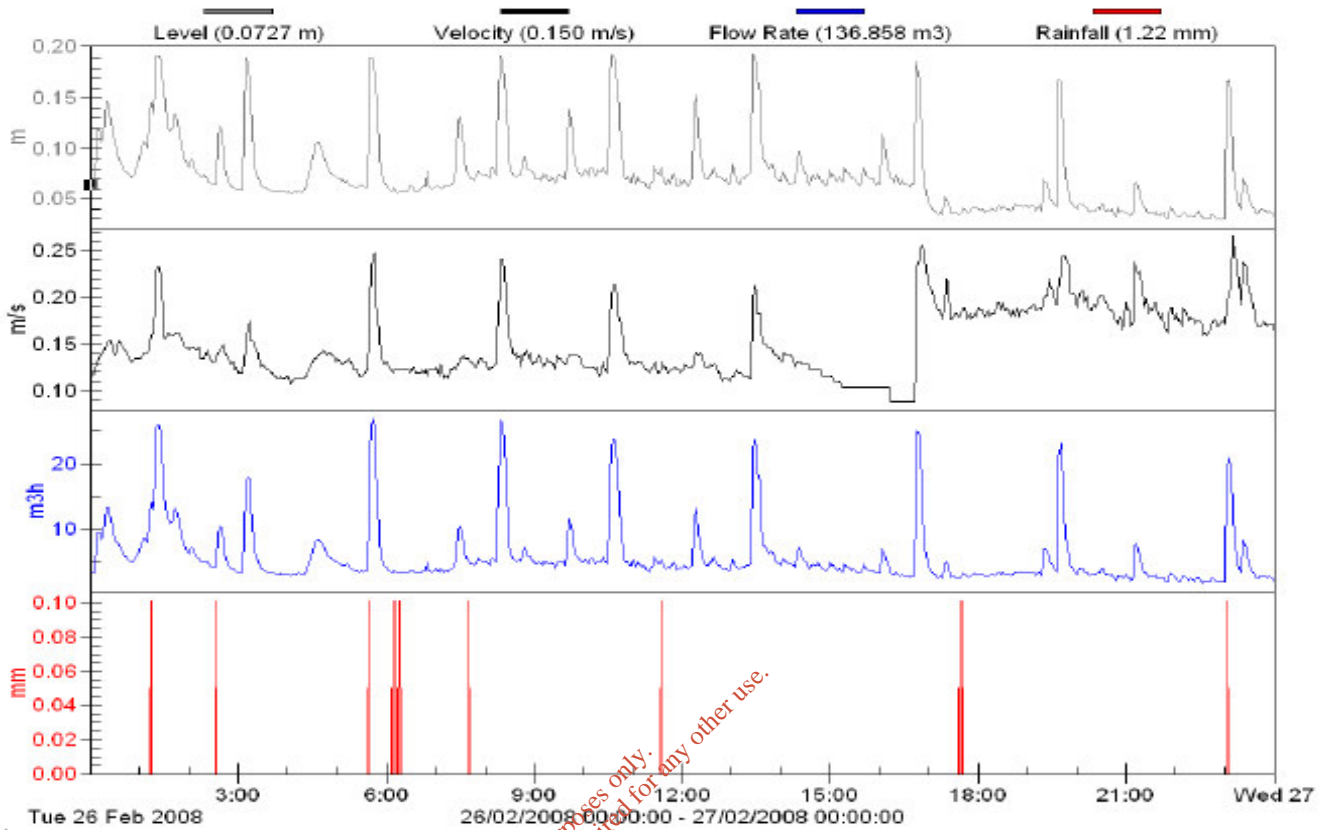
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Boherbue mon 25 feb



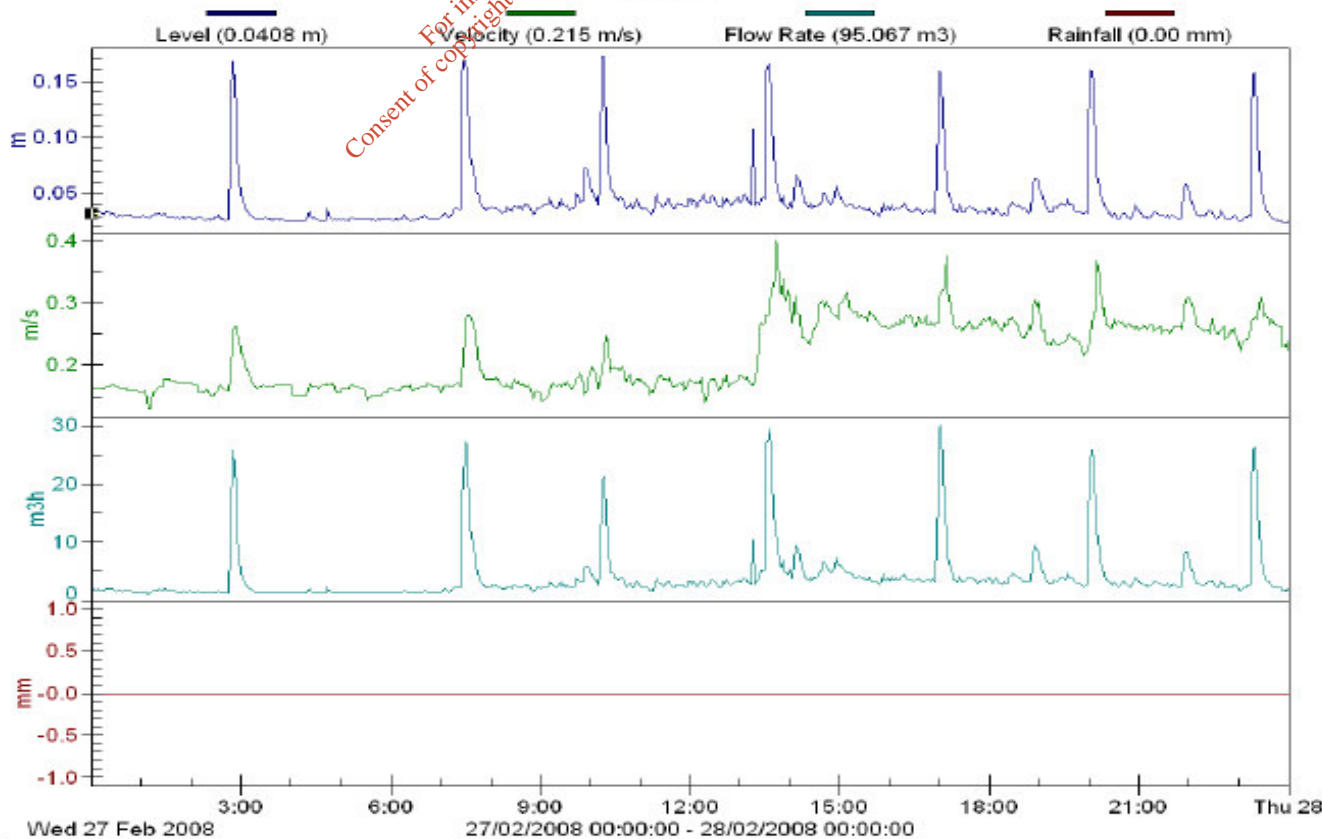
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Boherbue Tue 26 Feb



27/2/2008 00:00 - 0:00:00

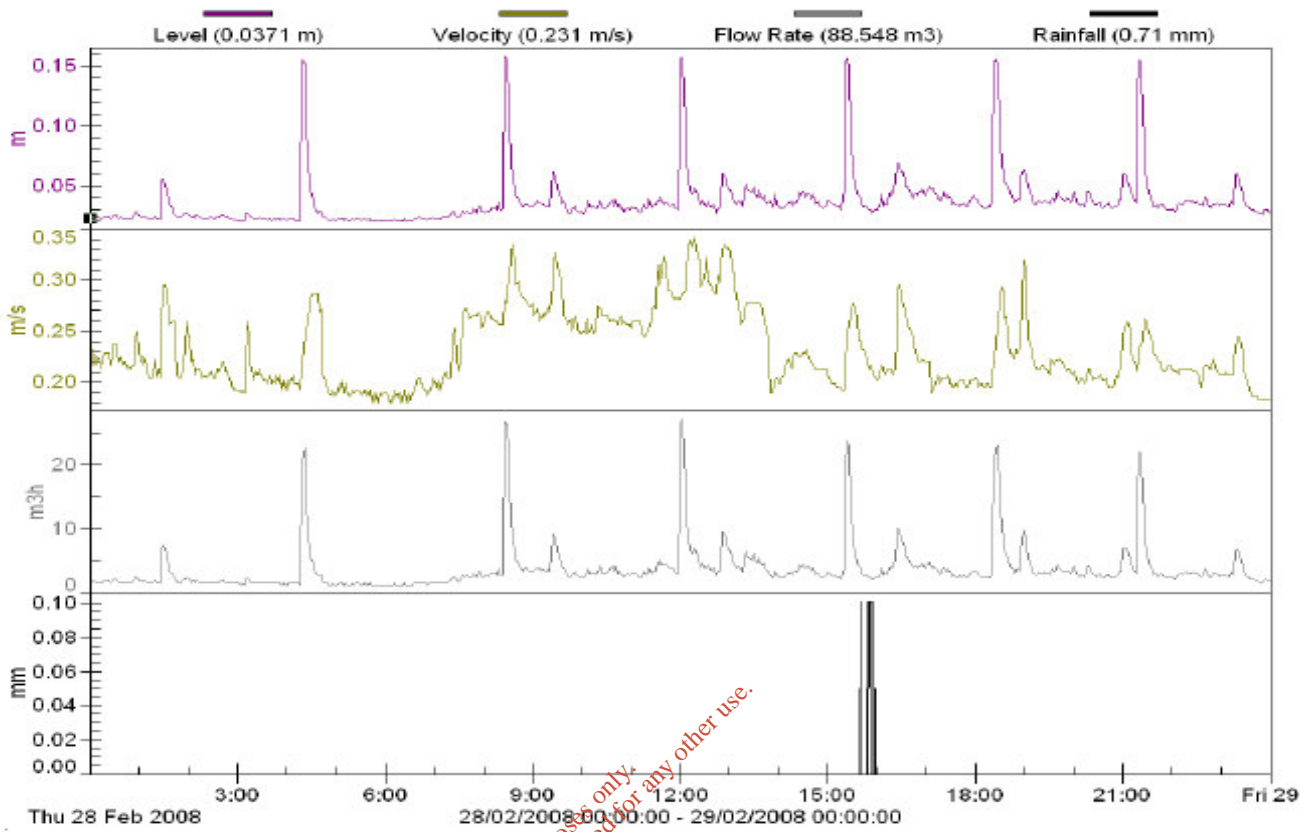
Boherbue Wed 27 Feb



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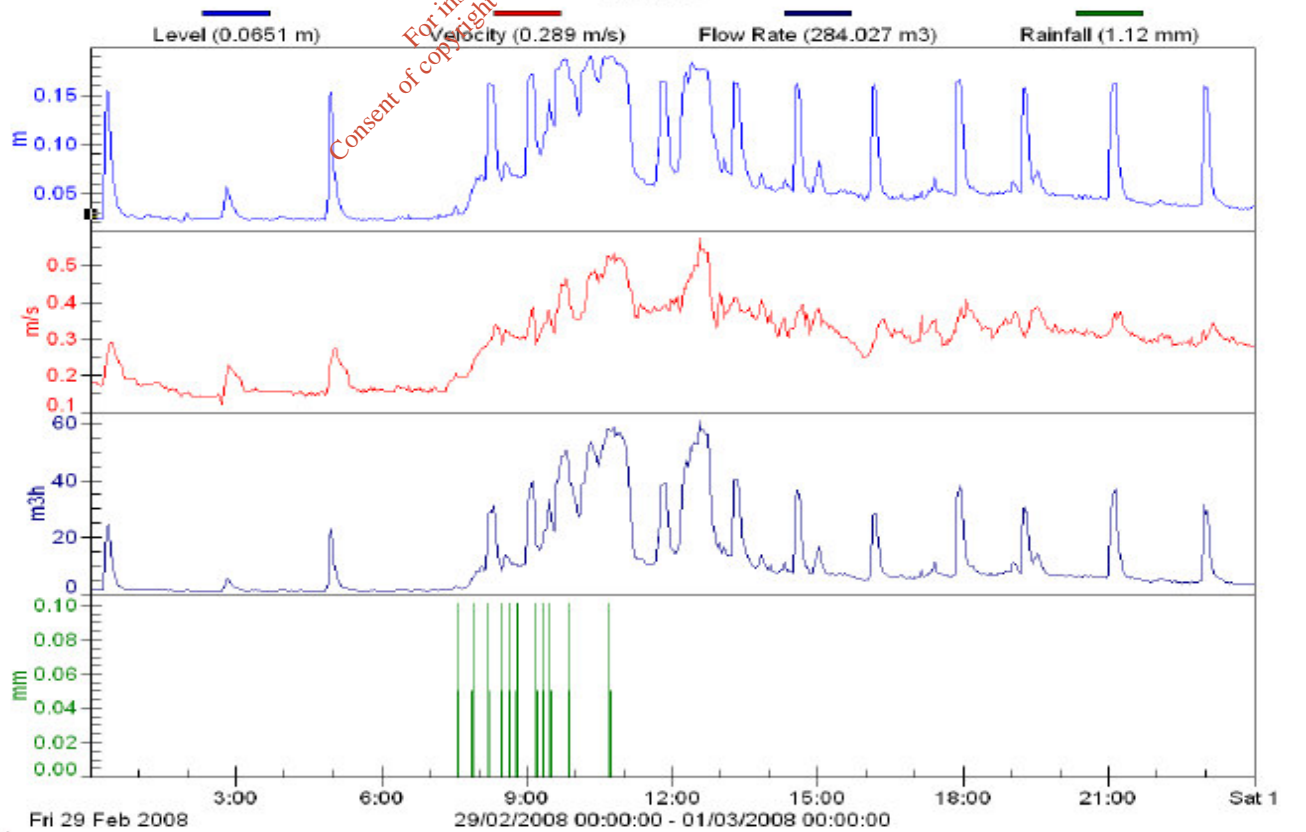
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Boherbue thu 28 feb



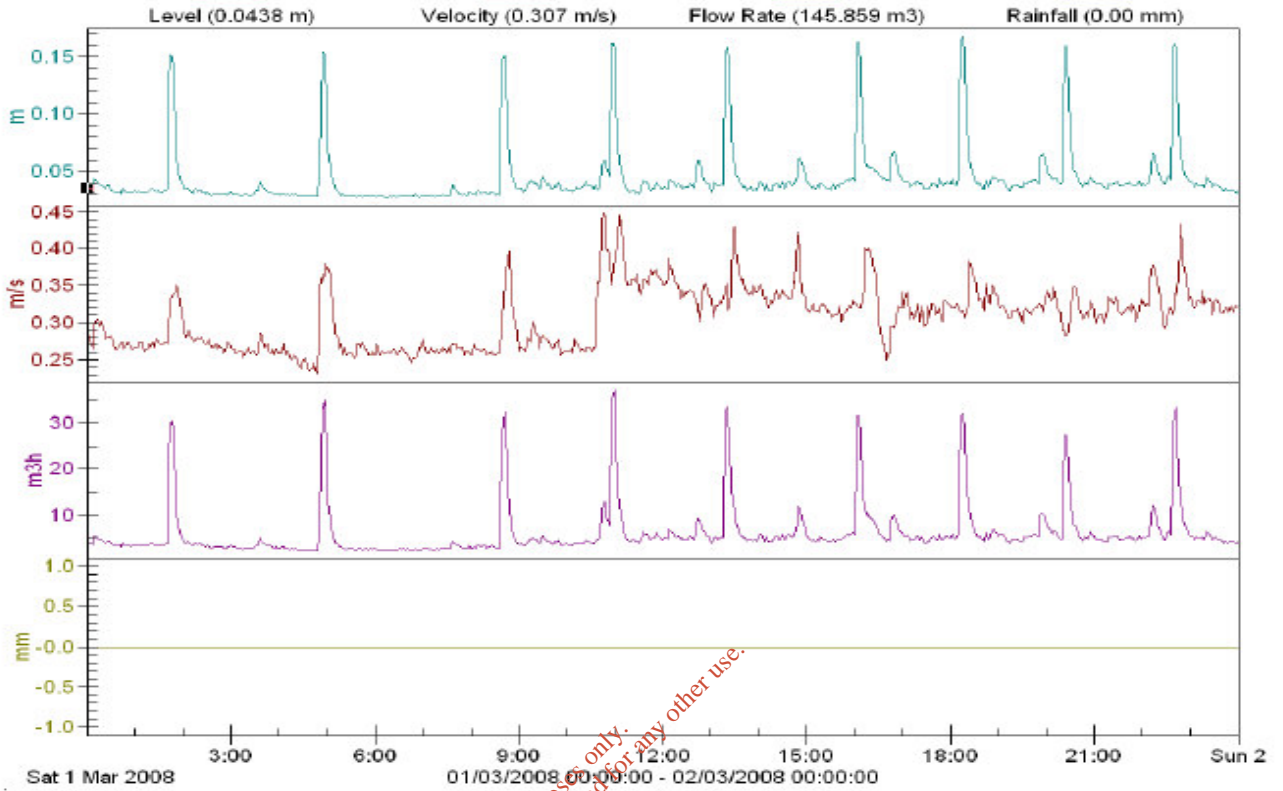
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Boherbue thu 29 feb



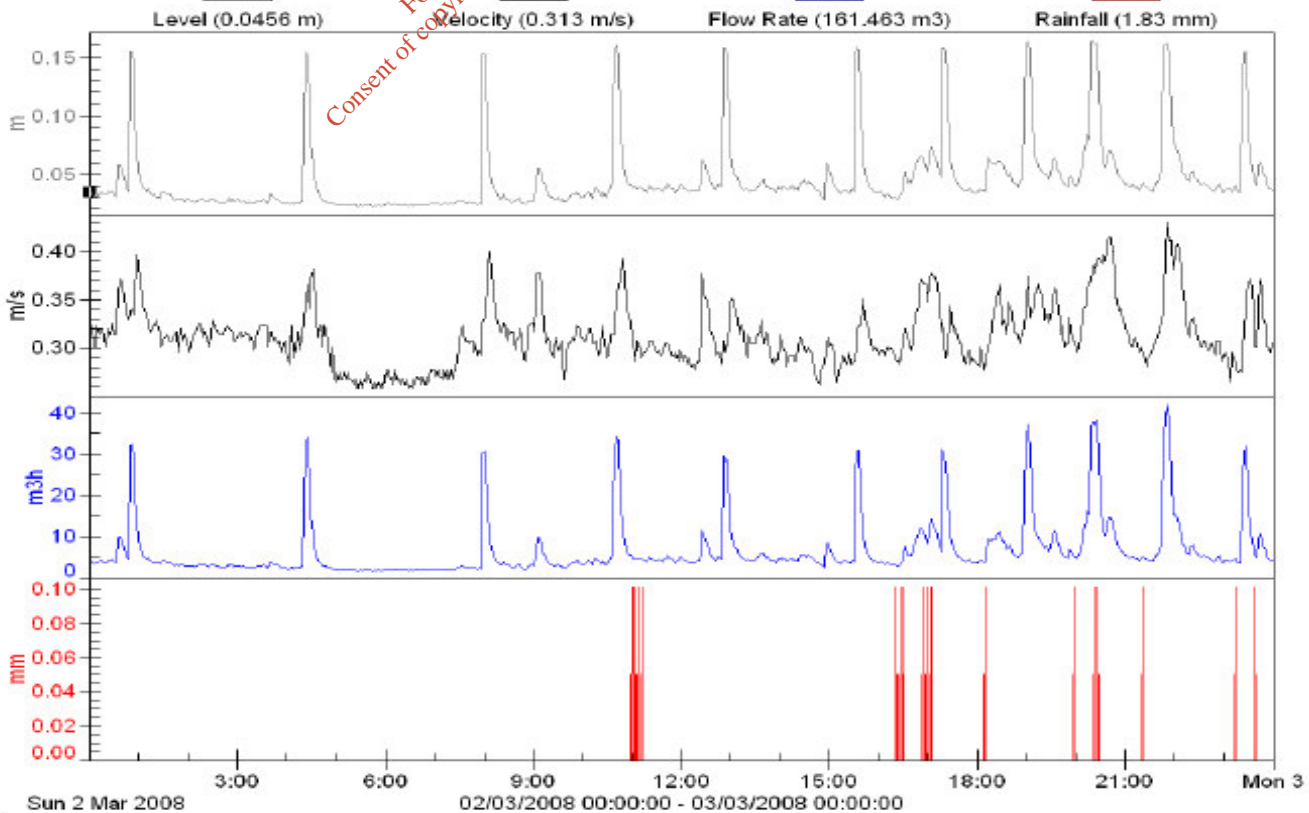
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Boherbue sat 1 mar



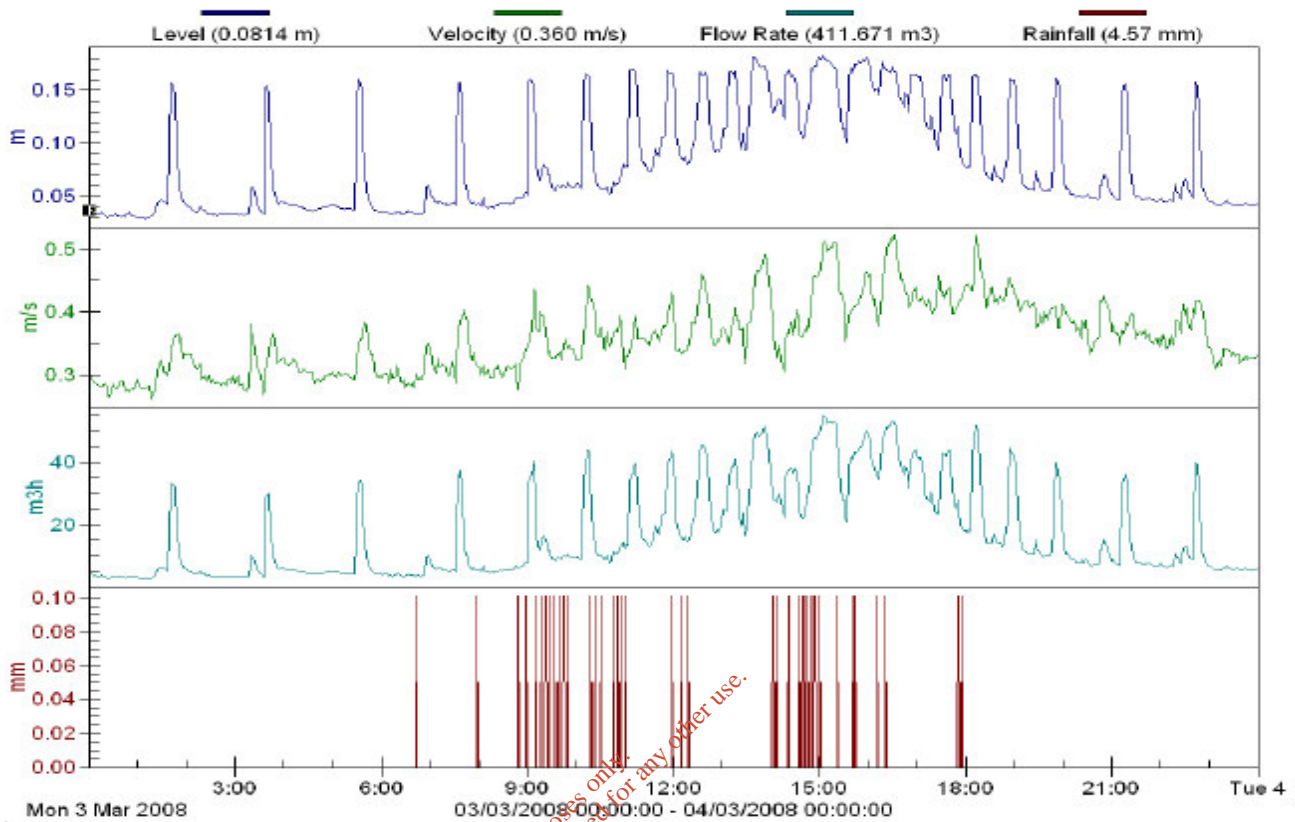
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Boherbue sun 2 mar



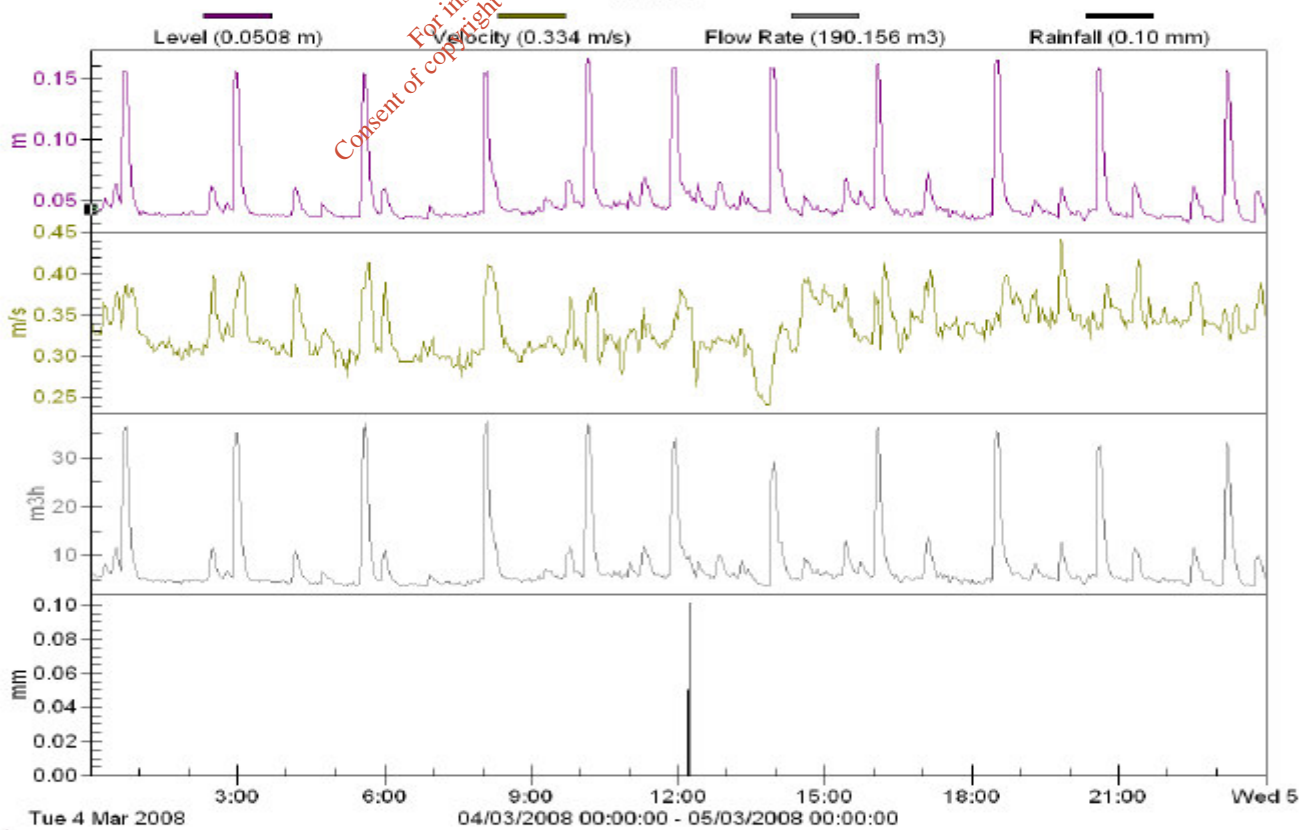
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Boherbue mon 3 mar

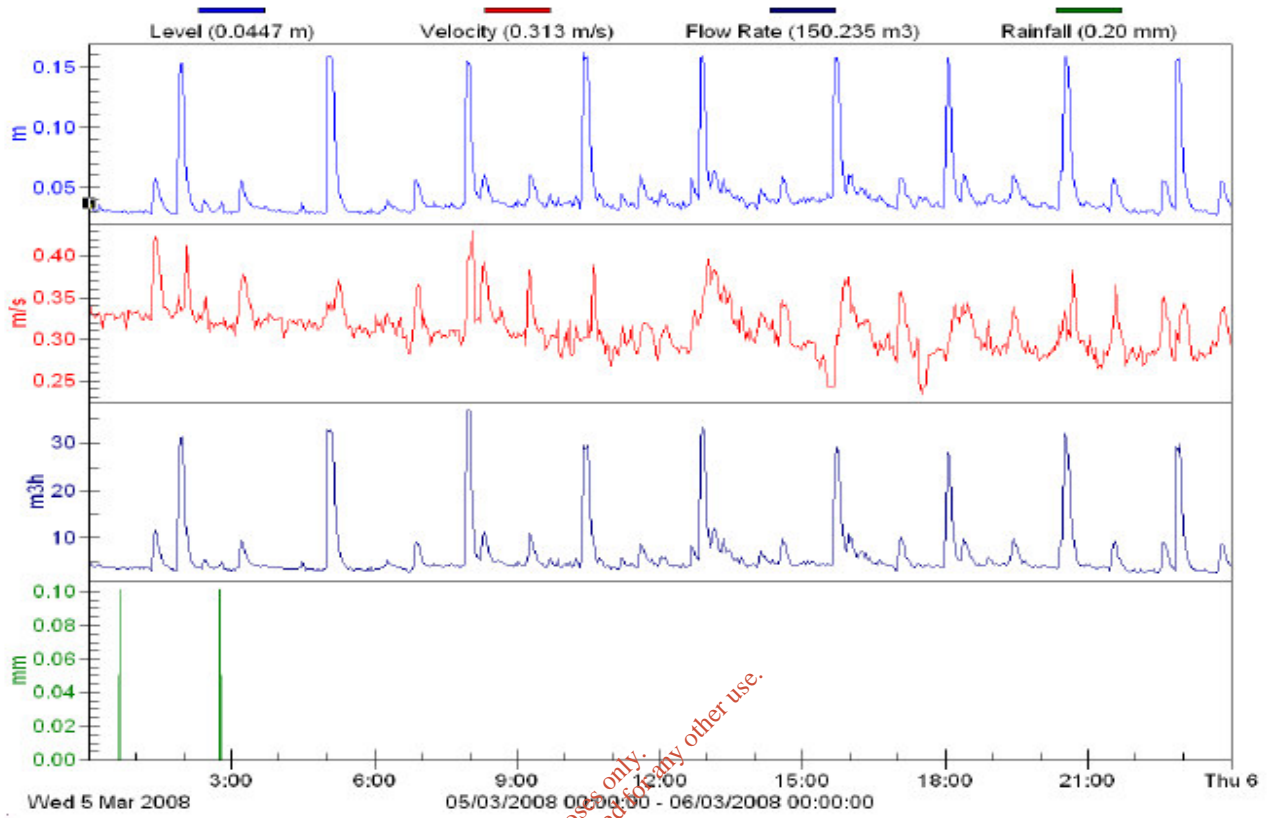


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Boherbue tue 4 mar



Boherbue wed 5 mar



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