EDS Final Report

Elster Creek Catchment

Temporary Sewer Flow Monitoring 2017

For

South East Water

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South East Water Final Report

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1.0 EDS South East Water Project Summary 2017-18

South East Water is responsible for the operation of 40 (forty) waste water catchments. Environmental Data Services was contracted to provide short term sewer flow and rain fall monitoring to allow for model calibration of the hydraulic condition for a duration period of 6 (six) weeks.

The objective of completing a detailed network analysis and calibration is to obtain accurate flow monitoring and rain gauging data to facilitate building and calibrating hydrodynamic models, to assess system capacity and system performance.

South East Water and the Modelling Consultant identified potential location for equipment installation. From these initial site locations, EDS completed a detailed site evaluation at each location to verify suitability and condition. Following individual site review, EDS installed a combination of **48 (forty-eight) sewer flow monitors and 13 (thirteen) rain gauges** with an initial operation **period of 6 (six) weeks.** These gauges were strategically installed across 2 main catchment areas consisting of Elster Creek and Koornang Grange.

Elster Creek:	**31 Flow Monitors**
	8 Rain Gauges
Koornang Grange:	**17 Flow Monitors**
	5 Rain Gauges

Environmental Data Services installed, calibrated, maintained and co-ordinated all activities necessary to record sewage discharges, depths, velocities and rainfall data in order to calibrate hydraulic models to the tolerances.

Where the sites are unsuitable due to reasons including access and/or hydraulic issues, EDS liaised with South East Water and the Modelling Consultant (GHD and Urban Water Solutions) to identify a suitable alternative site.

A total of 47 out of 48 preferred sites were found to have safe access and were suitable condition to obtain the required data quality and availability. Elster Creek catchment site EC10 had alternate manhole selected due to manhole suitability.

Both flow monitoring equipment and rain gauges installation and commissioning commenced on the 19th October 2017 as such the data capture period commencement **midnight 3rd of November 2017.** This provided an **8-week data capture period from 3rd November 2017 to 1st January 2018.**

Sebastian Harper

General Manager
Environmental Data Services

2.0 Data Summary Elster Creek

EDS South East Water Sewer Flow Monitoring Data Summary

Brief:

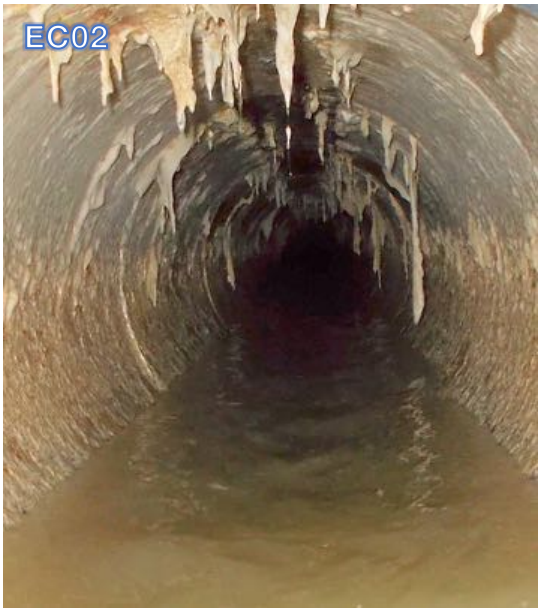
Below summary provides site specific review and comments of the flow conditions found at each sewer flow gauge installed and operated by EDS in the Elster Creek South catchment as part of the South East Water 2017 Sewer flow and rainfall monitoring project.

EDS were able to install flow gauge sensors in the upstream line of each of the selected manholes. For each of these installations EDS have taken a picture to indicate the flow conditions with this upstream pipe as well as added comments relating to the flow conditions and findings.

EC01:

The flow regime at EC01 had good flows with some travelling waves up to 7mm in height. Upstream the pipe was straight with no obstructions to compromise the quality of the flow being measured.

EC02:



EC02 was identified as a problem site by EDS. The line often surcharged with debris found in the flow. After installation, the SE Water control room advised that due to safety precautions, permission to open the manhole lid would be refused until further notice.

Entry has been refused from prior to **1/11/17 until 29/1/18 (the time of report supply).** As such, data has not been supplied for this site.

EC03:

Standing waves up to 10mm in height were noted at this site. The pipe had an amount of grease/fat at the bottom of the pipe extending up the sides of the pipe to the normal daily peak flow height.

These conditions would have some (minor) effect on the accuracy of the flow being measured. Signs of previous surcharge were noted when the flow gauge was installed.

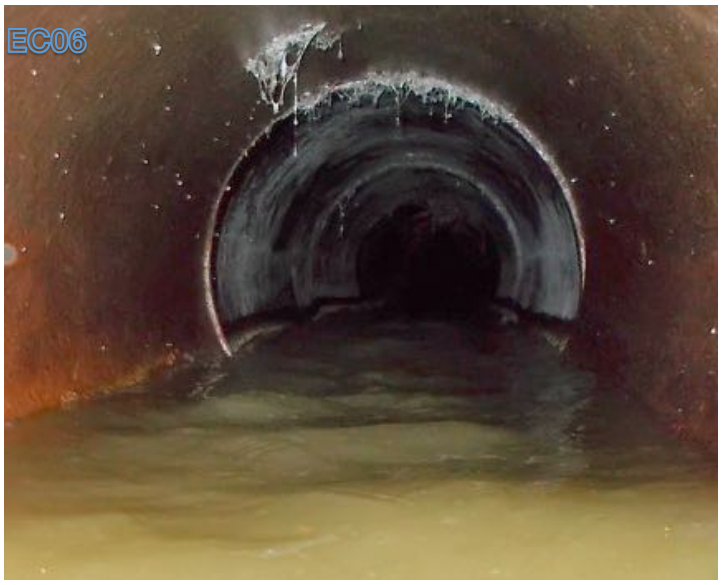
EC04:

Small travelling waves up to 3 mm in height were noted at this site. The straight upstream pipe gave good conditions for the measurement of sewer flow.

EC05:

Good smooth flows were observed at this site. The upstream pipe was fairly straight with no obstructions observed that would hinder the accurate measurement of sewer flow using the Blue-Siren flow monitoring equipment.

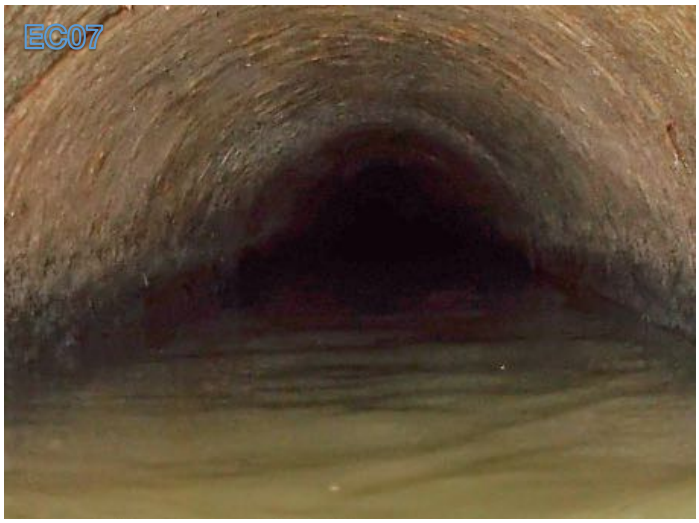
EC06:



The upstream pipe at this site had regular obstructions where segments of pipe had been connected together.

It appeared that a root infestation may be starting at these connections. Travelling waves up to 10mm in height were measured at this site.

EC07:



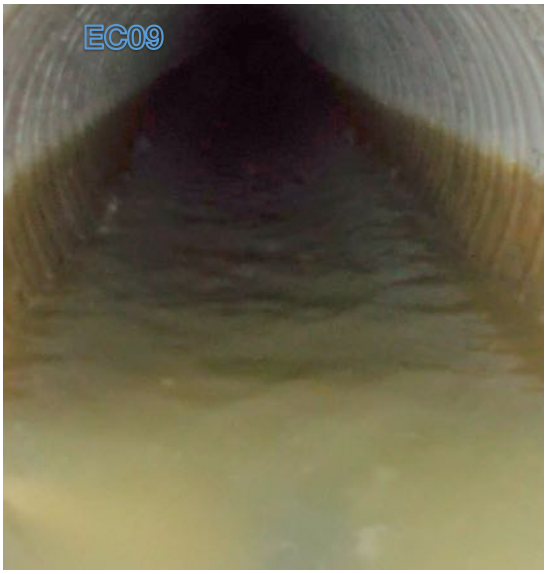
The flow regime at EC07 had good flows with some travelling waves up to 6mm in height.

Upstream the pipe was straight with minimal obstructions to compromise the quality of the flow being measured.

EC08:

This site did not have any flow to measure during any of EDS site visits. The bottom of the pipe consisted mainly of a small layer of sediment. The pipe is only 300mm diameter.

EC09:



This pipe had been relined, with the relining material having regular 'ribs' which created regular standing waves in the flow. These waves were normally less than 4mm in height and caused minimal impact on the flow being measured.

EC10:

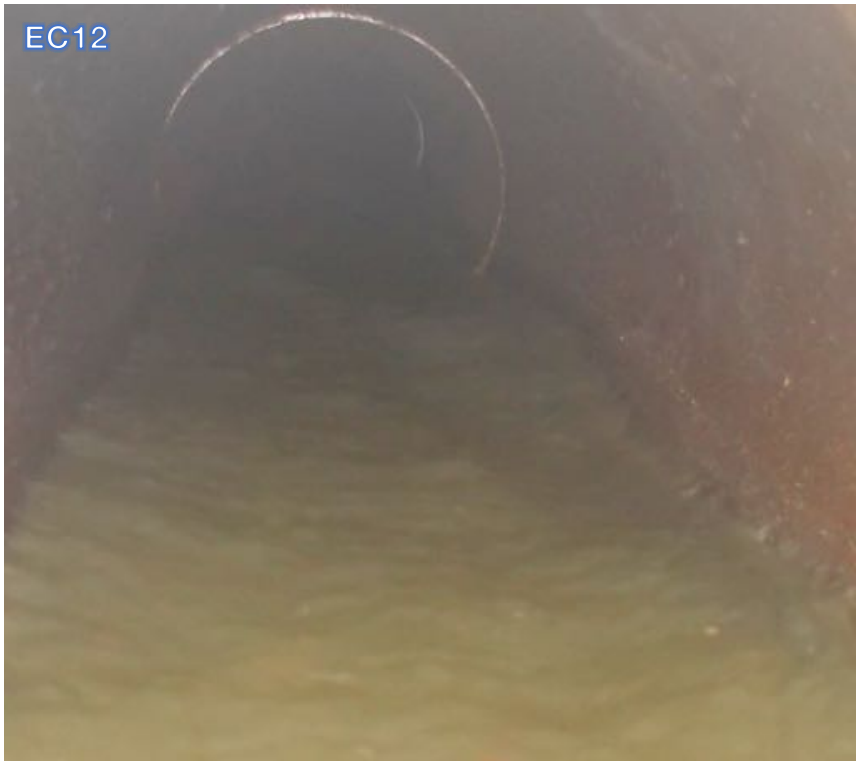
The upstream pipe segments were easily visible due to previous infiltration entering through these segments. Dirt/mud could be seen at the first upstream segment.

Sediment & debris was noted at the bottom of the pipe after rain events. This debris would then wash away by the next visit. Moving and standing waves up to 6mm in height were noted in the flow.

EC11:

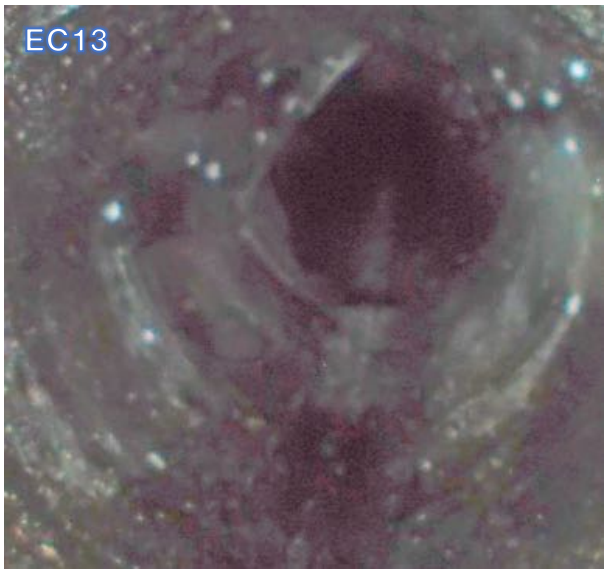
The flow regime at EC11 had good flows with some small travelling waves up to 5mm in height. Upstream the pipe was straight with no obstructions to compromise the quality of the flow being measured.

EC12



The alignment of the upstream connections of each of the pipe segments create standing waves in the sewer flow up to 6mm in height and some of the debris accumulated on the side of the pipe created moving and standing waves in the flow. EDS obtained good, repeatable calibrations at this site.

EC13

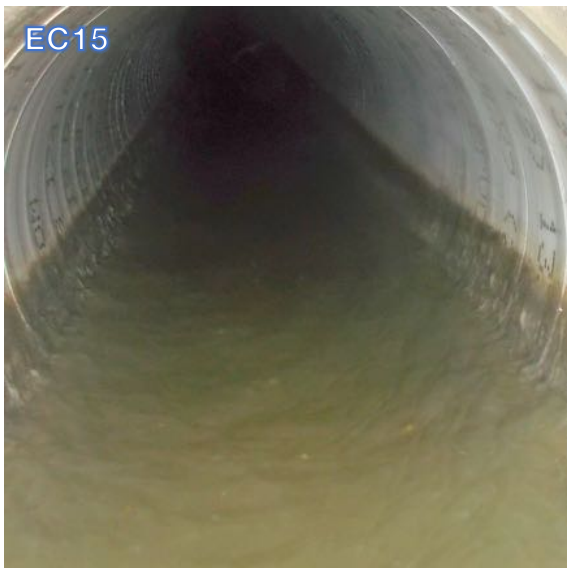


This site had no flow during all site visits during the project.

EC14

This site has been relined with a lining material that has regular 'ribs' as part of its construction. EDS noted standing waves in the flow up to 6mm in height due to these ribs. Some turbulence in the flow was also observed at the edges of the flow where the sewage was touching the side of the pipe.

EC15



This site has been relined with a lining material that has regular 'ribs' as part of its construction. EDS noted standing waves in the flow up to 6mm in height due to these ribs.

EC16

Good smooth laminar flows were usually found at this site. Good, consistent calibration were obtained from this site.

EC17

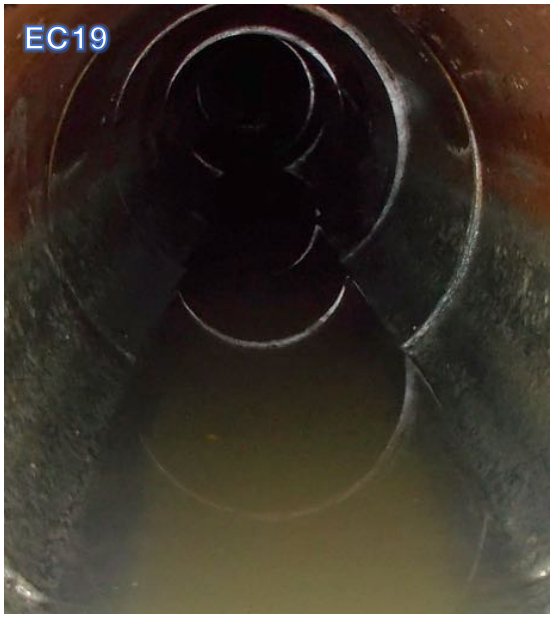
Low flows were usually observed at this site. Upstream pipe segments could be observed with previous infiltration entering through these segments. Dirt/mud could be seen at the upstream segments with minor root infestation.

Debris was noted at the bottom of the pipe during installation. Moving and standing waves were noted in the flow.

EC18

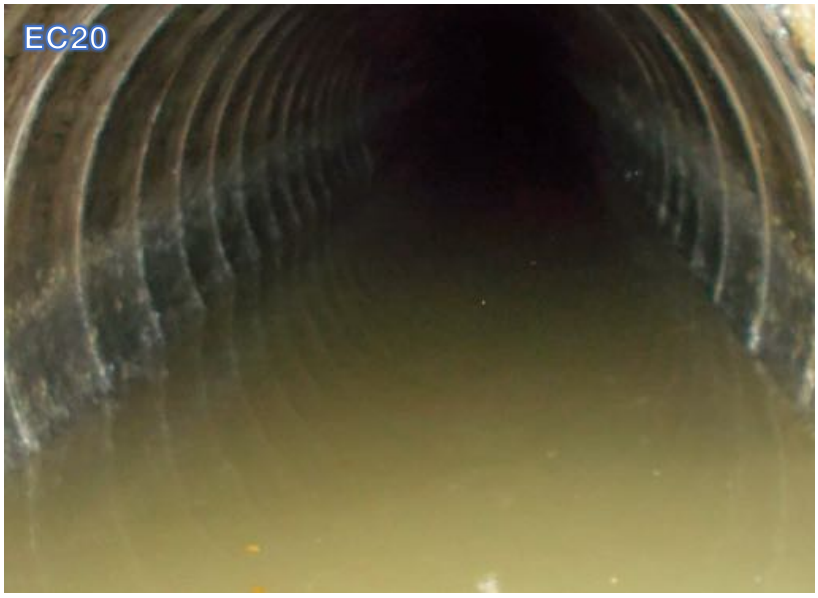
Some standing waves were noted at the side of the flow in this pipe, but the central portion was fairly smooth with good calibration results obtained during EDS visits.

EC19



This site had very smooth, laminar flows with good, consistent calibrations obtained.

EC20



The pipe at this site had been relined but even so EDS noted smooth, laminar flows with good, consistent calibrations obtained.

EC21

This site has been relined with a lining material that has regular 'ribs' as part of its construction. EDS noted standing waves in the flow up to 8mm in height due to these ribs. Upstream debris/sediment could be observed sitting in the flow.

EC22

Zero flow was noted at this site during all site visits during the project.

EC23

Some root infestation was noted in the chase at this manhole but the flow in the pipe was smooth with good calibrations recorded at this site.

EC24

Some signs of previous infiltrations were observed at the upstream pipe segments. The flow being measured had a smooth consistent quality with good repeatable calibrations obtained.

EC25

The flow at this site had a smooth, consistent quality with good repeatable calibrations obtained.

EC26

Signs of previous infiltrations were observed at the upstream pipe segments. Root infestation were large enough to trap debris. Moving waves up to 15mm in height were observed during one of EDS visits.

EC27

Moving waves up to 12mm in height were measured at this site. A large amount of sediment and debris needed to be removed prior to the installation of the velocity sensor at this site. Some sediment was also noted at this site after the rain event of 2nd December. EDS received a report of "occasional imbalances at EC30 and EC27 for short durations during wet weather events". This sediment may be the cause of these imbalances.

EC28

Good flows were noted at this site with moving waves up to 4mm. The upstream pipe segment alignments caused some minor turbulence.

EC29

Good, smooth, laminar flows were noted at this site. Repeatable and consistent calibrations were also obtained.

EC30

This was the largest pipe in the catchment at 1050mm in diameter. Depth of flow was in the order of 150-250mm. Some standing and moving waves were noted in the flow up to 15mm in height. Some sediment was also noted at this site after the rain event of 2nd December. EDS received a report of "occasional imbalances at EC30 and EC27 for short durations during wet weather events". This sediment may be the cause of these imbalances.

EC31

Travelling waves up to 5mm in height were noted at this site. These waves did not seem to affect the measurement of flow with good consistent calibrations obtained.

3.0 Installation Reports Flow and Rain Gauge

3.1 Flow Meter Installation Table Elster Creek Flow Meter Installation Summary

Site Name	MH Number	Address	City	State	Project	Install Date	Time Installed (Local Time)	Pipe Height (mm)	Pipe Width (mm)	Monitor Average Depth (mm)	Measured Average Depth (mm)	Monitor Average Velocity (mps)	Measured Average Velocity (mps)
EC01	MOE8	Opposite 31 Fletcher Rd	Melbourne	Vic	SEW17	26.10.2017	9:01	305	305	120	120	0.671	0.671
EC02	ELS93	263 Wickham Rd	Melbourne	Vic	SEW17	20.10.2017	8:53	465	465	90	90	0.681	0.679
EC03	ELS63	Moorabin Reserve behind 25 Clay St	Melbourne	Vic	SEW17	26.10.2017	12:10	440	440	205	205	0.731	0.731
EC04	ECS16	Outside Coles Express Linton St	Melbourne	Vic	SEW17	26.10.2017	10:33	620	620	150	150	0.358	0.356
EC05	NCR70	Opposite 3 Charming St	Melbourne	Vic	SEW17	27.10.2017	9:32	310	310	97	97	0.496	0.496
EC06	NCR61	Park oposite 42 Cummins Rd	Melbourne	Vic	SEW17	20.10.2017	10:00	380	380	89	89	0.66	0.654
EC07	ELS45	71 Jasper	Melbourne	Vic	SEW17	20.10.2017	11:18	300	300	133	133	0.487	0.488
EC08	ELS43	Opposite 9 Mortimer St	Melbourne	Vic	SEW17	20.10.2017	12:17	300	300	20	20	0	0
EC09	ELS29	9 Park Cres	Melbourne	Vic	SEW17	20.10.2017	13:15	280	280	82	82	0.423	0.42
EC10 Alt	ELS21A	13 Eddys Grove	Melbourne	Vic	SEW17	26.10.2017	13:08	300	300	64	64	0.37	0.371
EC11	BIS24	Outside 3A Wright St	Melbourne	Vic	SEW17	30.10.2017	16:24	880	880	244	244	0.51	0.511
EC12	CTE20-16	31A Hobart St	Melbourne	Vic	SEW17	24.10.2017	8:21	225	225	45	45	0.686	0.686
EC13	SPS907-2	2 Bolinda St	Melbourne	Vic	SEW17	24.10.2017	9:28	200	200	0	0	0	0
EC14	CTE12	Behind 454 Centre Rd	Melbourne	Vic	SEW17	24.10.2017	11:47	285	285	58	58	0.622	0.624
EC15	CTE5	285 Center Rd	Melbourne	Vic	SEW17	27.10.2017	7:08	285	285	92	92	0.666	0.665
EC16	ELC49-87	1 Bevis St	Melbourne	Vic	SEW17	26.10.2017	13:49	225	225	91	91	0.472	0.472
EC17	ELC49-47	38 Balmoral Ave	Melbourne	Vic	SEW17	26.10.2017	13:22	235	235	43	43	0.096	0.096
EC18	TUK4-16	Between 45 and 43 Lancaster St	Melbourne	Vic	SEW17	26.10.2017	15:30	225	225	41	40	0.421	0.421
EC19	ELS50D	Yard of AH Wood 302-308 Jasper Rd	Melbourne	Vic	SEW17	24.10.2017	12:53	375	375	40	40	0.08	0.08
EC20	ELC44	Cnr Murray Rd and Cadby	Melbourne	Vic	SEW17	24.10.2017	14:05	350	350	176	176	0.302	0.301
EC21	ELC34	19 Fitzroy St	Melbourne	Vic	SEW17	30.10.2017	13:35	350	350	99	99	0.338	0.338
EC22	ALN1	Park at end of Beech St	Melbourne	Vic	SEW17	24.10.2017	15:28	295	295	0	0	0	0
EC23	ELC30	End of Beech St	Melbourne	Vic	SEW17	30.10.2017	14:22	440	440	127	127	0.707	0.706
EC24	ELC27A	Beech & Whitmuir	Melbourne	Vic	SEW17	27.10.2017	10:30	450	450	54	54	0.203	0.201
EC25	ELC16A	Opposite 107 Union St	Melbourne	Vic	SEW17	30.10.2017	15:12	460	460	107	107	0.41	0.41
EC26	ELS2B	26 Rogers Ave	Melbourne	Vic	SEW17	25.10.2017	9:03	305	305	84	84	0.496	0.494
EC27	BIS14	Opposite 111 Union St	Melbourne	Vic	SEW17	01.11.2017	11:21	955	955	209	209	0.902	0.902
EC28	NTH31	Cnr Clonaig and Stone	Melbourne	Vic	SEW17	31.10.2017	8:19	300	300	113	112	0.313	0.314
EC29	ELC2	6 Milroy St	Melbourne	Vic	SEW17	27.10.2017	11:37	455	455	104	104	0.426	0.425
EC30	BIS2	Lane next to 202-208 North Rd	Melbourne	Vic	SEW17	31.10.2017	13:46	1010	1010	186	186	1.516	1.518
EC31	ELC56A	35 Bewdley St	Melbourne	Vic	SEW17	25.10.2017	10:05	385	385	85	85	0.319	0.319

3.2 Rain Gauge Installation Table Elster Creek Rain Gauge Installation Summary

Gauge Number	Catchment	Address	City	Post Code	State	Project	Install Date	Install Time	TBRG Type	Install Notes
ECRG01	EC	Hurlingham Park, Nepean Hwy	Brighton East	3187	VIC	SEWATER	2017-10-24	12:35	0.2mm	Field side of football club on lower roof. -37.911065,145013984
ECRG02	EC	94 Mckinnin Rd	Mckinnon	3204	VIC	SEWATER	2017-10-24	12:00	0.2mm	On shipping container at front of Mckinnon discount tyres, -37.910792,145.034312
ECRG03	EC	Glen Eira Sports and Aquatic Centre / Bailey Reserve	Bentleigh East	3165	VIC	SEWATER	2017-10-24	11:45	0.2mm	On top of roof change rooms and Kiosk at specified coordinates. access via area near rear toilets. -37.917096, 145.061428
ECRG04	EC	Dendy Park Soccor club - end of Breen Rd	Brighton East	3187	VIC	SEWATER	2017-10-25	11:55	0.2mm	At end culdesac just before bowls club entrance LHS roof towards front
ECRG05	EC	1/7 Dega ave	Bentleigh East	3165	VIC	SEWATER	2017-10-25	14:15	0.2mm	On Garage roof - front house. -37.929718,145.050438
ECRG06	EC	Moorleigh multicultural senior citizens centre - Bignell Rd	Bentleigh East	3165	VIC	SEWATER	2017-10-25	13:40	0.2mm	Entry opposite 99-101 Bignell Rd, - on centre adjoining roof, Ladder at RHS corner - RHS of stairs. -37.933221,145.070641
ECRG07	EC	26 Dane Rd	Hampton East	3188	VIC	SEWATER	2017-10-25	12:30	0.2mm	Moorabbin Park Cricket club fron left roof (unable to see from ground) - 37.941046,145.037596
ECRG08	EC	4 Levanswell rd	Moorabbin	3189	VIC	SEWATER	2017-10-25	12:55	0.2mm	Go Rapid repair centre front right roof corner - Ladder from side driveway, - 37.944303,145.060718

4.0 Flow Data CSV (Digital Copy Only)

Appendix A

5.0 Rainfall Data CSV (Digital Copy Only)

5.1 Elster Creek RAINFALL

Eight rain gauges were installed within the Elster Creek catchment, with the lowest recorded total rainfall during the gauging period being 164.0mm and the highest 193.0mm.

The following table shows the total rainfall recorded at the 8 gauges:

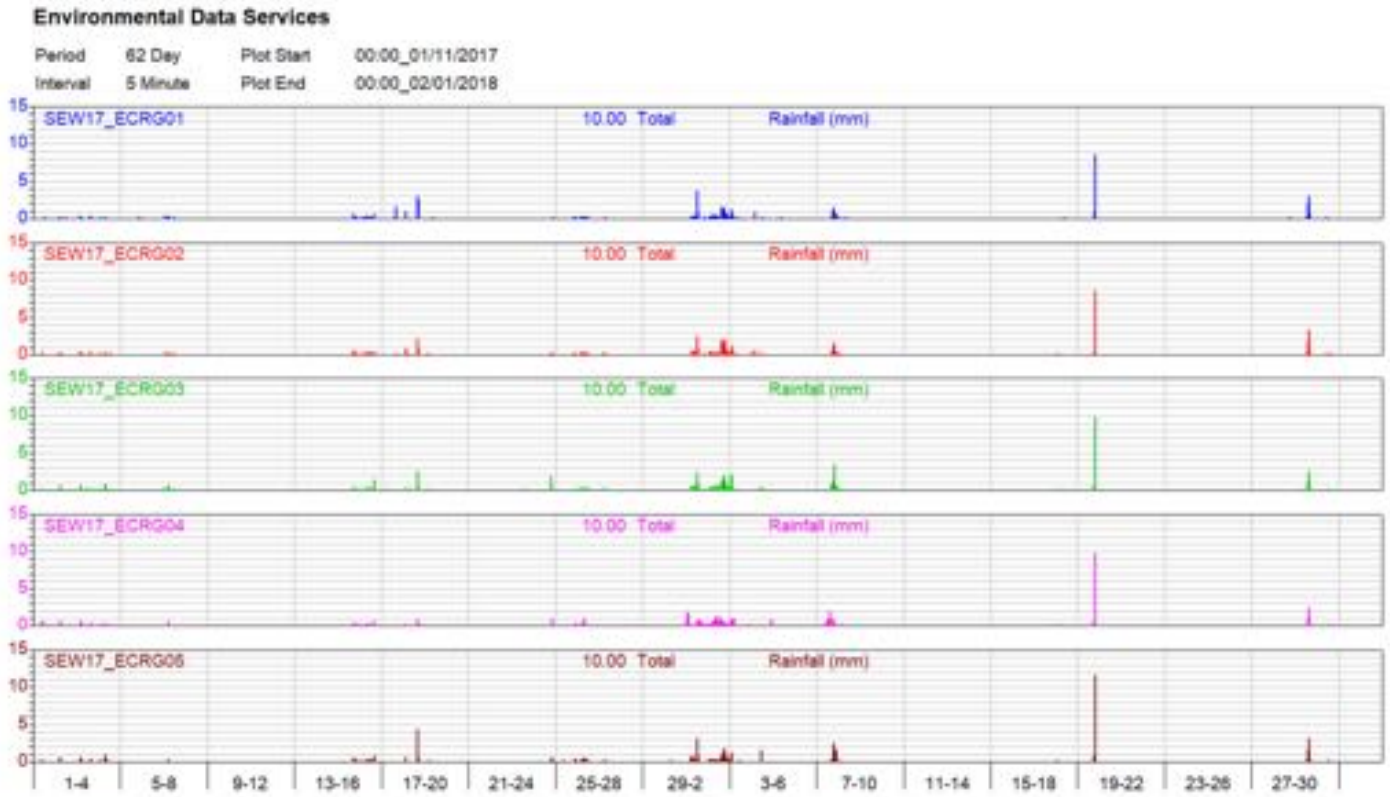
ECRG01	170.8mm
ECRG02	169.2mm
ECRG03	193.0mm
ECRG04	164.0mm
ECRG05	181.4mm
ECRG06	186.4mm
ECRG07	156.4mm
ECRG08	159.2mm
Average	**172.5mm**

The plots on the following two pages show;

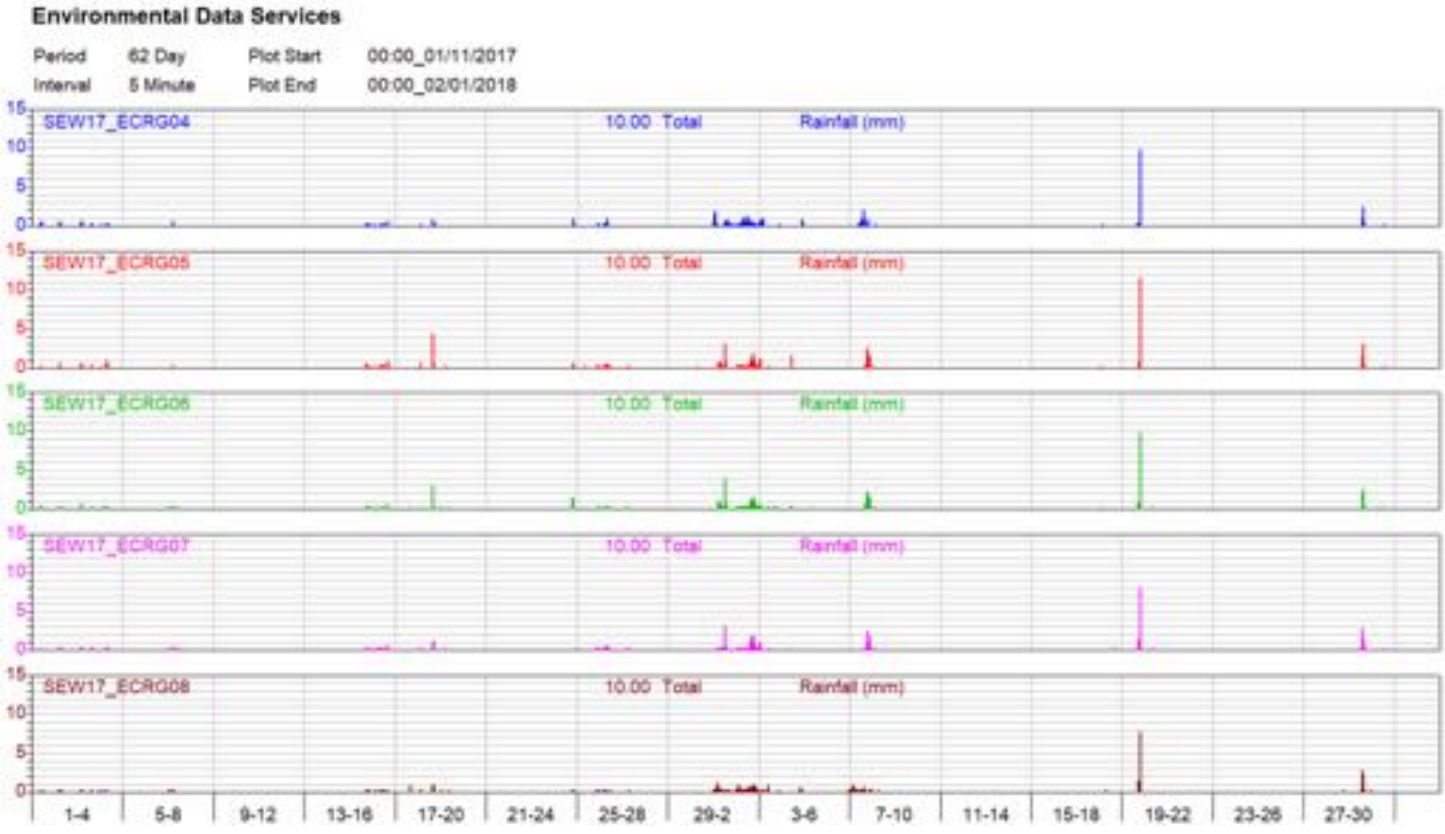
1) Hourly totals of rainfall recorded at the five rain gauges sites and
2) The cumulative totals of rainfall recorded at the five sites during the recording period.

Both plots indicate that the rainfall recorded at all sites was similar throughout the period of gauging.

As such we have selected Elster Creek rain gauge site 3 (ECRG03) as the control site to summarise the rain events that occurred during the period of contract.

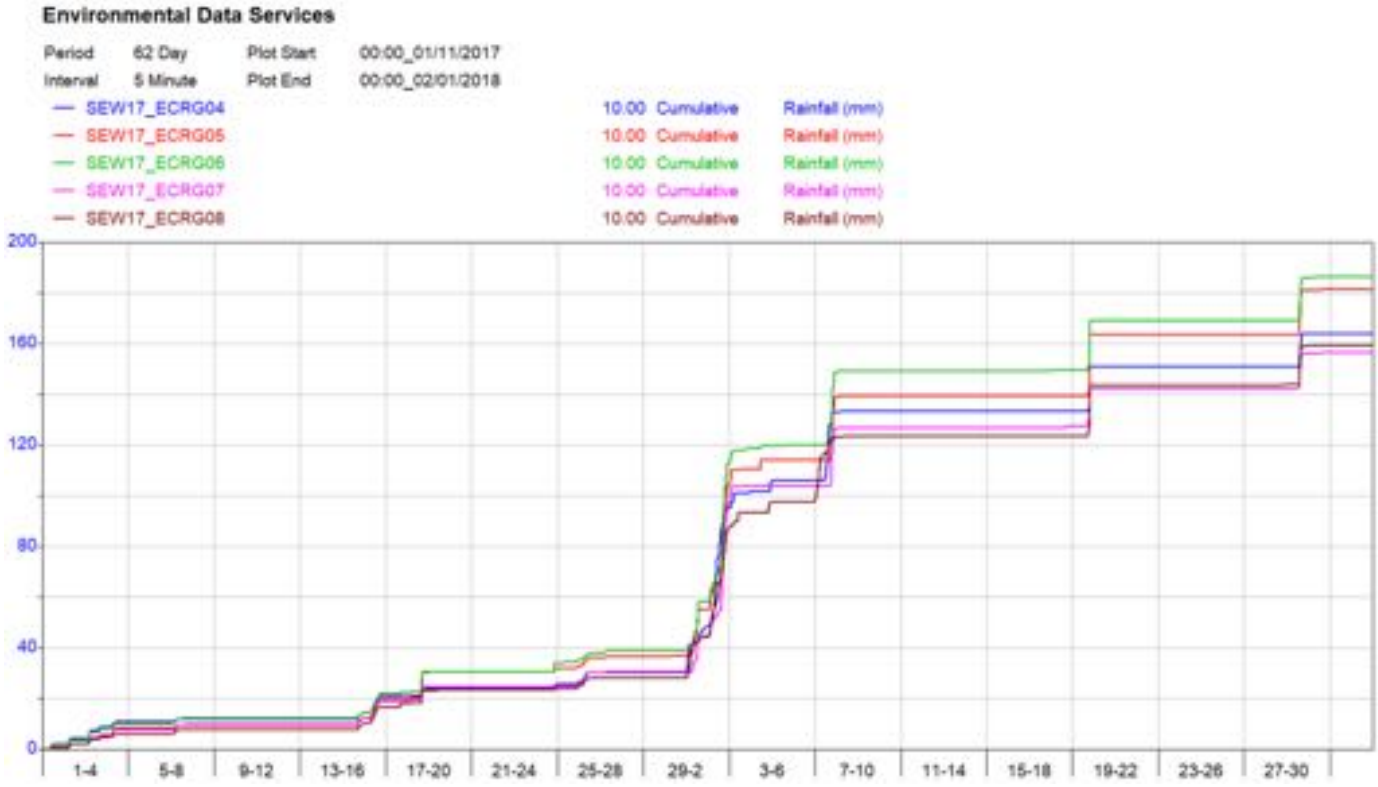


The above plot shows the rainfall recorded at hourly intervals for rain gauge sites 1 to 5



The above plot shows the rainfall recorded at hourly intervals for rain gauge sites 4 to 8

The above plot shows the cumulative rainfall recorded at rain gauge sites 1 to 5



The above plot shows the cumulative rainfall recorded at rain gauge sites 4 to 8

EC03 Rainfall Table

Site SEW17_ECRG03
Rainfall in Millimetres

Day	November	December
1	0.20	16.0
2	1.80	63.20
3	4.00	11.60
4	3.00	1.60
5	0	0
6	0	0
7	2.40	28.0
8	0	0.20
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	8.0	0
17	0.20	0
18	8.60	0.40
19	0.20	18.40
20	0	0
21	0	0
22	0	0
23	0.40	0
24	3.60	0
25	1.20	0
26	2.60	0
27	0.60	0
28	0	0
29	0	14.0
30	0	0.20
31	0	0
Mean	**1.31**	**4.95**
Maximum	**8.60**	**63.20**
Minimum	**0.00**	**0**
Total:	**39.4**	**153.6**
Wet Days	**15**	**10**
Missing Days	**0**	

Summaries

Total Rainfall	193.0mm
Wet Days	25mm
Daily Rainfall	63.20mm Maximum, 0.0mm Minimum

The above table shows the daily totals recorded at ECRG03 during the period of gauging.

Elster Creek Rainfall Events

Site SEW17_ECRG03
Rainfall (Millimetres)

Storm Intensity/Duration report for period beginning 00:00_01/11/2017 and ending 00:00_01/01/2018

Total for Period: 193.00

Maximum Storm Bursts

Duration	Start Time & Date	Amount (mm)	Intensity (mm/h)
30 Minute	19:04_19/12/2017	17.00	34.0
1 Hour	18:38_19/12/2017	17.60	17.6
2 Hour	18:00_07/12/2017	21.40	10.7
3 Hour	15:00_02/12/2017	25.80	8.6
4 Hour	15:16_02/12/2017	33.20	8.3
6 Hour	15:04_02/12/2017	42.40	7.1
12 Hour	14:54_02/12/2017	58.60	4.9
18 Hour	09:56_02/12/2017	64.60	3.6
24 Hour	02:44_02/12/2017	72.80	3.0
48 Hour	05:54_01/12/2017	90.80	1.9

The above table shows maximum rainfall intensities recorded at ECRG03 which shows that the maximum 48hour rainfall intensity was 90.8mm (or a 1.9mm average per hour) commencing at 5:54 on 1/12/17.

Whereas the maximum 30-minute rainfall intensity was 17.0mm (or a 34.0mm average per hour) commencing at 19:04 on 19/12/17.

The three main rain events occurred on the 1st December 2017, 7th December 2017 and 19th December 2017.

The following 3 tables shows the maximum intensities recorded at ECRG03 for these three rain events.

Rainfall Event 1 Recorded Summary

Site SEW17_ECRG03
Rainfall (Millimetres)

Duration	Start Time & Date	Amount (mm)	Intensity (mm/h)
10 Minute	12:54_01/12/2017	3.60	21.6
20 Minute	18:44_02/12/2017	5.80	17.4
30 Minute	18:44_02/12/2017	8.00	16.0
1 Hour	16:06_02/12/2017	12.60	12.6
2 Hour	15:10_02/12/2017	20.40	10.2
3 Hour	15:00_02/12/2017	25.80	8.6
4 Hour	15:16_02/12/2017	33.20	8.3
6 Hour	15:04_02/12/2017	42.40	7.1
12 Hour	14:54_02/12/2017	58.60	4.9
18 Hour	09:56_02/12/2017	64.60	3.6
24 Hour	02:44_02/12/2017	72.80	3.0
48 Hour	05:54_01/12/2017	90.80	1.9

Table showing rainfall intensities at ECRG03 for the rain event commencing 5:54 1st December 2017

Rainfall Event 2 Recorded Summary

Site SEW17_ECRG03
Rainfall (Millimetres)

Duration	Start Time & Date	Amount (mm)	Intensity (mm/h)
10 Minute	19:18_07/12/2017	4.80	28.8
20 Minute	19:08_07/12/2017	6.60	19.8
30 Minute	18:58_07/12/2017	8.60	17.2
1 Hour	18:28_07/12/2017	14.00	14.0
2 Hour	18:00_07/12/2017	21.40	10.7
3 Hour	17:04_07/12/2017	24.00	8.0
4 Hour	17:04_07/12/2017	25.00	6.2
6 Hour	17:04_07/12/2017	28.00	4.7
12 Hour	17:04_07/12/2017	28.20	2.3
18 Hour	17:04_07/12/2017	28.20	1.6
24 Hour	17:04_07/12/2017	28.20	1.2
48 Hour	17:04_07/12/2017	28.20	0.6

Table showing rainfall intensities at ECRG03 for the rain event commencing 17:04 7th December 2017

Rainfall Event 3 Recorded Summary

Site SEW17_ECRG03
Rainfall (Millimetres)

Duration	Start Time & Date	Amount (mm)	Intensity (mm/h)
10 Minute	19:06_19/12/2017	15.60	93.6
20 Minute	19:04_19/12/2017	17.00	51.0
30 Minute	19:04_19/12/2017	17.00	34.0
1 Hour	18:38_19/12/2017	17.60	17.6
2 Hour	17:48_19/12/2017	17.80	8.9
3 Hour	16:56_19/12/2017	18.40	6.1
4 Hour	16:56_19/12/2017	18.40	4.6
6 Hour	16:56_19/12/2017	18.40	3.1
12 Hour	16:56_19/12/2017	18.40	1.5
18 Hour	16:56_19/12/2017	18.40	1.0
24 Hour	16:56_19/12/2017	18.40	0.8
48 Hour	02:04_18/12/2017	18.80	0.4
72 Hour	02:04_18/12/2017	18.80	0.3

Table showing rainfall intensities at ECRG03 for the rain event commencing 02:04 18th December 2017

Complete Elster Creek Rainfall Table

ECRG01		
Daily Rainfall (mm)		
Day	November	December
1	0.4	16.2
2	1.4	54.4
3	4.2	10.8
4	2.4	1.2
5	0	0
6	0	0
7	1.8	26.8
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	7.6	0
17	0	0
18	9	0
19	0.2	16.2
20	0	0
21	0	0
22	0	0
23	0.2	0
24	3	0
25	1.6	0
26	2.6	0
27	0.6	0
28	0	0.2
29	0	12.2
30	0.2	0
31		0
Mean	**1.26**	**4.46**
Maximum	**9**	**54.4**
Minimum	**0**	**0**
Total:	**37.8**	**138.2**
Wet Days	**15**	**9**
Missing Days	**0**	**0**

ECRG02		
Daily Rainfall (mm)		
Day	November	December
1	0.4	16.6
2	1.6	60.4
3	3.0	5.2
4	1.8	2.0
5	0	0
6	0	0
7	1.2	21.2
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.2	0
16	5.4	0
17	0.2	0
18	10.4	0.2
19	0.2	17.8
20	0	0
21	0	0
22	0	0
23	0	0
24	0.4	0
25	0.6	0
26	2.8	0
27	0.6	0
28	0	0
29	0	14.4
30	0	0.4
31		0
Mean	**1.03**	**4.46**
Maximum	**10.4**	**60.4**
Minimum	**0**	**0**
Total:	**30.8**	**138.4**
Wet Days	**14**	**10**
Missing Days	**0**	**0**

ECRG03		
Daily Rainfall (mm)		
Day	November	December
1	0.2	16
2	1.8	63.2
3	4.0	11.6
4	3.0	1.6
5	0	0
6	0	0
7	2.4	28
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	8.0	0
17	0.2	0
18	8.6	0.4
19	0.2	18.4
20	0	0
21	0	0
22	0	0
23	0.4	0
24	3.6	0
25	1.2	0
26	2.6	0
27	0.6	0
28	0	0
29	0	14.0
30	0	0.2
31		0
Mean	**1.31**	**4.95**
Maximum	**8.6**	**63.2**
Minimum	**0**	**0**
Total:	**39.4**	**153.6**
Wet Days	**15**	**10**
Missing Days	**0**	**0**

ECRG04		
Daily Rainfall (mm)		
Day	November	December
1	2.0	18.2
2	2.2	47.0
3	4.6	6.2
4	2	4.2
5	0	0
6	0	0
7	1	27.2
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	6.6	0
17	0	0
18	2.8	0.2
19	0	17.6
20	0	0
21	0	0
22	0	0
23	0	0
24	1.8	0
25	1.0	0
26	3.6	0
27	0	0
28	0	0
29	0	12.8
30	0	0.2
31		0
Mean	**1.01**	**4.32**
Maximum	**6.6**	**47.0**
Minimum	**0**	**0**
Total:	**30.2**	**133.8**
Wet Days	**11**	**10**
Missing Days	**0**	**0**

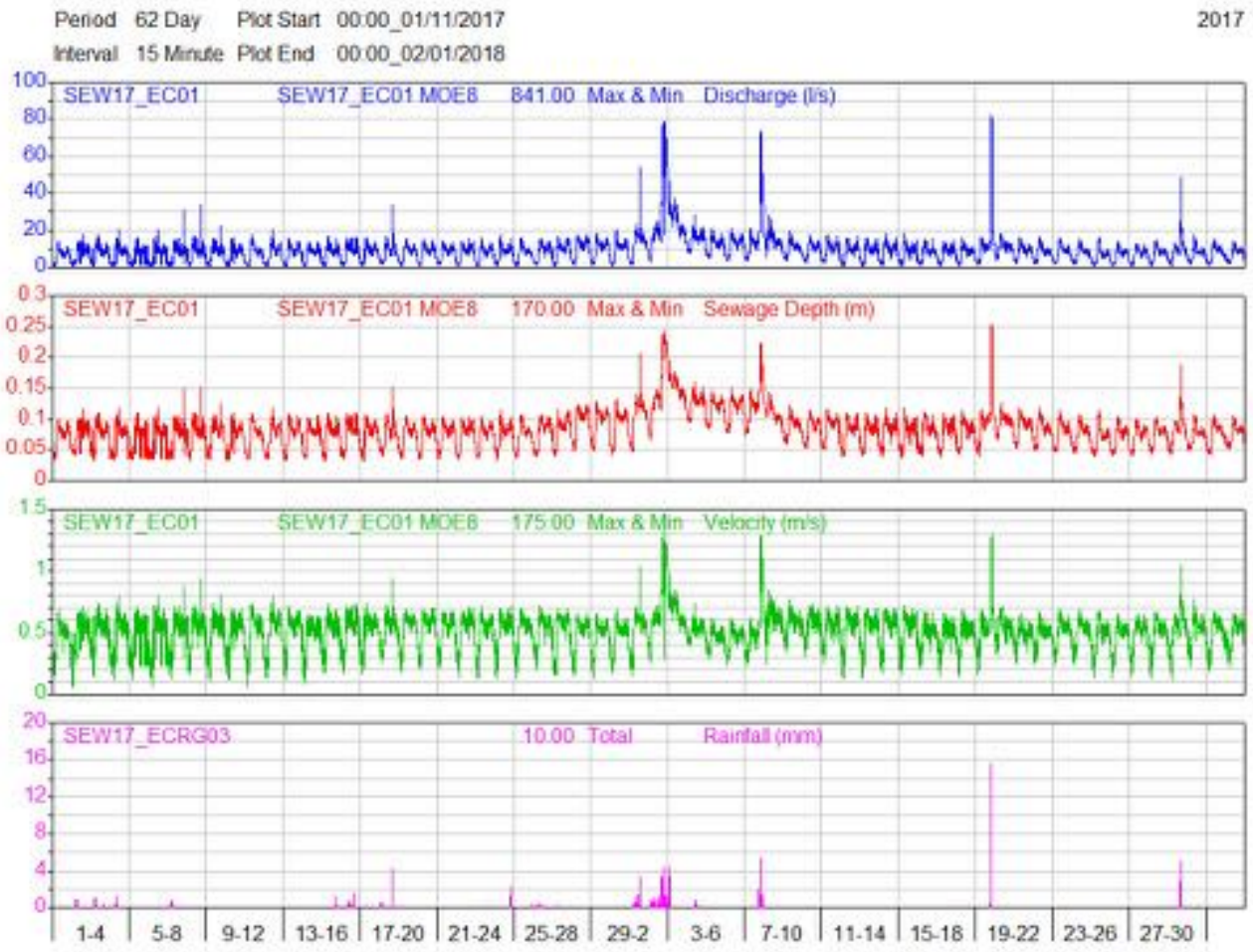
ECRG05		
Daily Rainfall (mm)		
Day	November	December
1	0.4	18.2
2	1.6	49.4
3	3.4	6.0
4	3.2	3.8
5	0	0
6	0	0
7	0.8	24.8
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.8	0
16	7.6	0
17	0	0
18	10.6	0.2
19	0.2	24.2
20	0	0
21	0	0
22	0	0
23	0	0
24	1.2	0
25	1.2	0
26	3.2	0
27	0.4	0
28	0	0
29	0	17.6
30	0.2	0.2
31		0
Mean	**1.23**	**4.66**
Maximum	**10.6**	**49.4**
Minimum	**0**	**0**
Total:	**36.8**	**144.6**
Wet Days	**14**	**10**
Missing Days	**0**	**0**

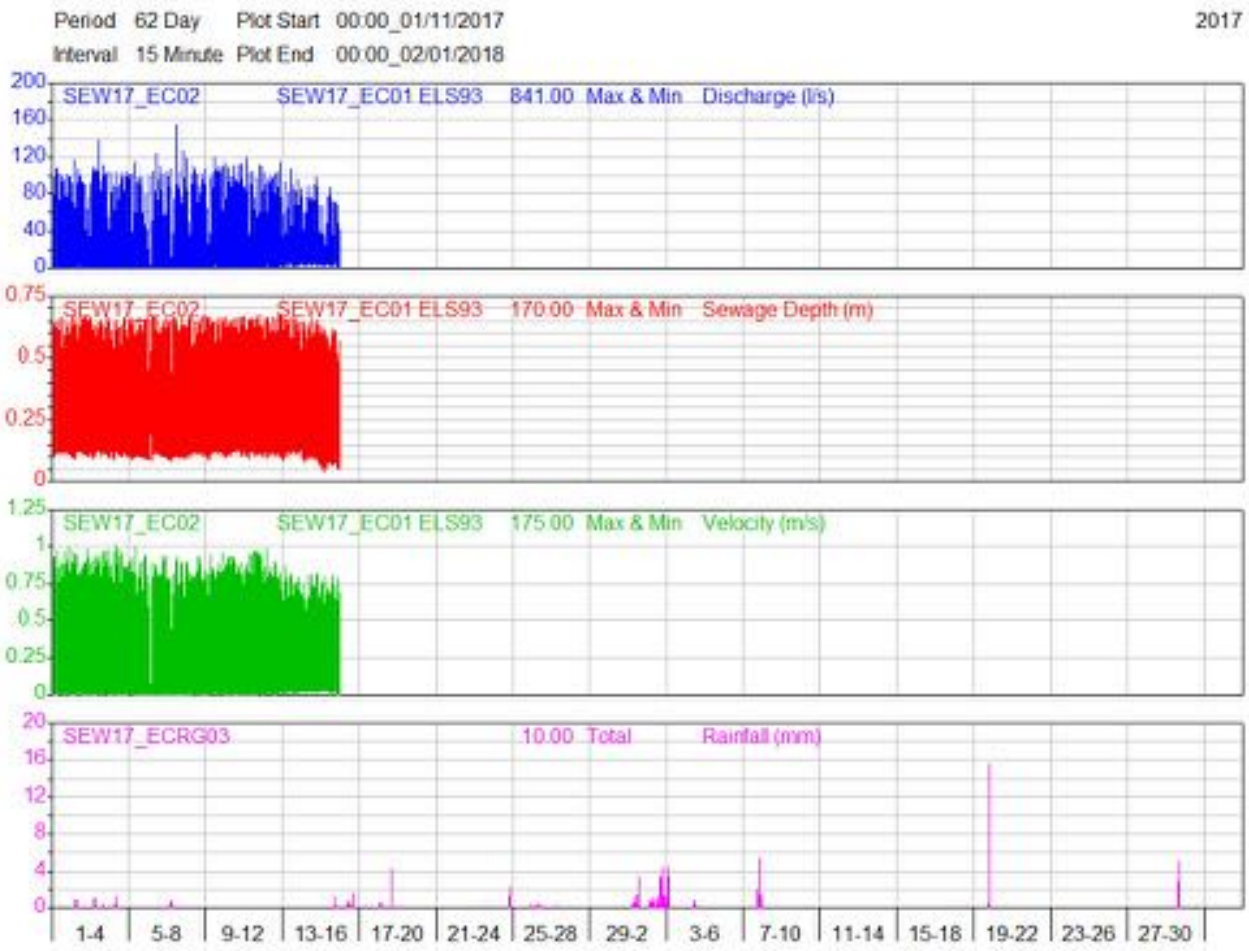
ECRG06		
Daily Rainfall (mm)		
Day	November	December
1	1.6	19.4
2	2.0	54.8
3	4.2	5.6
4	2.4	1.2
5	0	0.2
6	0	0
7	2.0	28.8
8	0	0.4
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.2	0
16	7.4	0
17	0.6	0
18	7.8	0.2
19	0.4	19.6
20	0	0.2
21	0	0
22	0	0
23	0	0
24	3.6	0
25	1.2	0
26	2.4	0
27	1.0	0
28	0	0
29	0	16.8
30	0	0.4
31		0
Mean	**1.29**	**4.76**
Maximum	**7.8**	**54.8**
Minimum	**0**	**0**
Total:	**38.8**	**147.6**
Wet Days	**14**	**12**
Missing Days	**0**	**0**

ECRG07		
Daily Rainfall (mm)		
Day	November	December
1	0.6	13.6
2	1.4	53.2
3	3.6	6.4
4	2.0	0.2
5	0	0
6	0	0
7	2.2	22.6
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	6.6	0
17	0	0
18	5.4	0.4
19	0.2	14.8
20	0	0.2
21	0	0
22	0	0
23	0	0
24	0.2	0
25	1.0	0
26	4.4	0
27	0.4	0
28	0	0
29	0	14.0
30	0	0.2
31		0
Mean	**1.02**	**4.06**
Maximum	**6.6**	**53.2**
Minimum	**0**	**0**
Total:	**30.6**	**125.8**
Wet Days	**13**	**11**
Missing Days	**0**	**0**

ECRG08		
Daily Rainfall (mm)		
Day	November	December
1	0	16.4
2	1.6	43.2
3	2.6	5.6
4	1.4	4.0
5	0	0
6	0	0
7	1.6	25.8
8	0	0.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	2.6	0
16	6.4	0
17	1.2	0
18	5.2	0.2
19	0.4	20.0
20	0	0
21	0	0
22	0	0
23	0	0
24	0.6	0
25	1.0	0
26	3.0	0
27	0.2	0
28	0	0.2
29	0	15.4
30	0	0
31		0
Mean	**0.96**	**4.23**
Maximum	**6.4**	**43.2**
Minimum	**0**	**0**
Total:	**27.8**	**131.0**
Wet Days	**13**	**10**
Missing Days	**0**	**0**

6.0 Elster Creek Hydrographs and Plots

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Interval 15 Minute Plot End 00:00_02/01/2018
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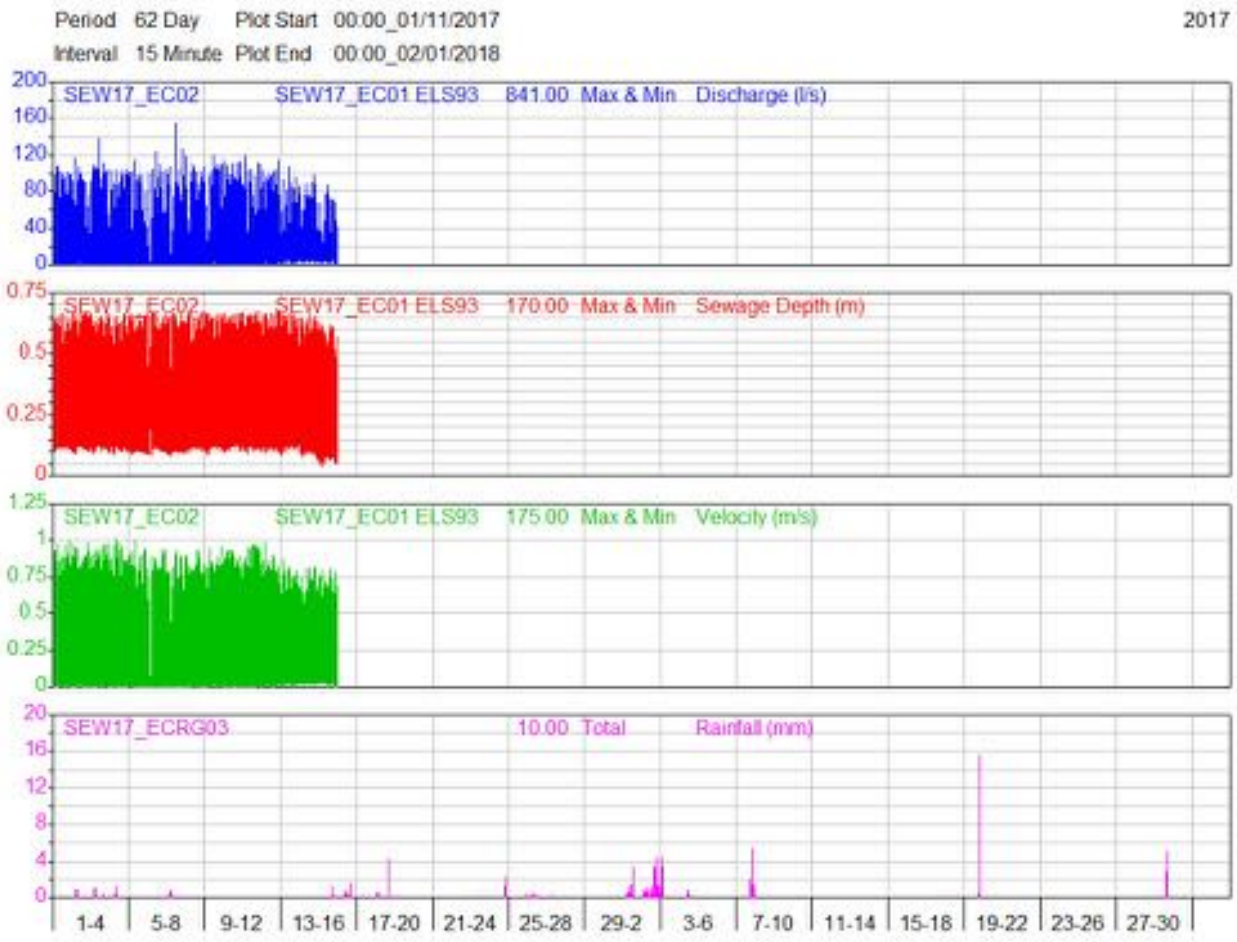
SEW17_EC02 SEW17_EC01 ELS93 170.00 Max & Min Sewage Depth (m)
SEW17_EC02 SEW17_EC01 ELS93 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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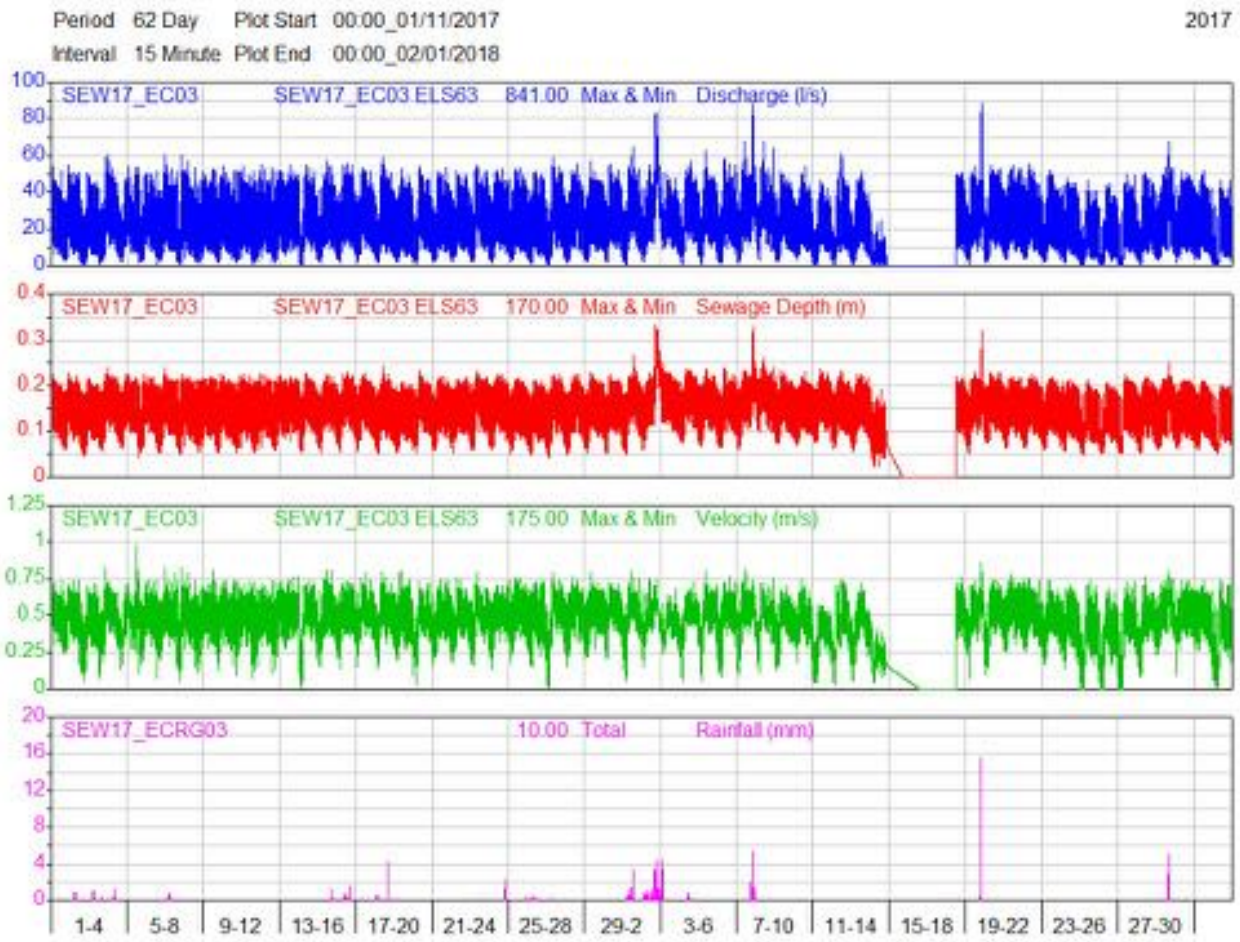
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC02 SEW17_EC01 ELS93 841.00 Max & Min Discharge (l/s)
SEW17_EC02 SEW17_EC01 ELS93 170.00 Max & Min Sewage Depth (m)
SEW17_EC02 SEW17_EC01 ELS93 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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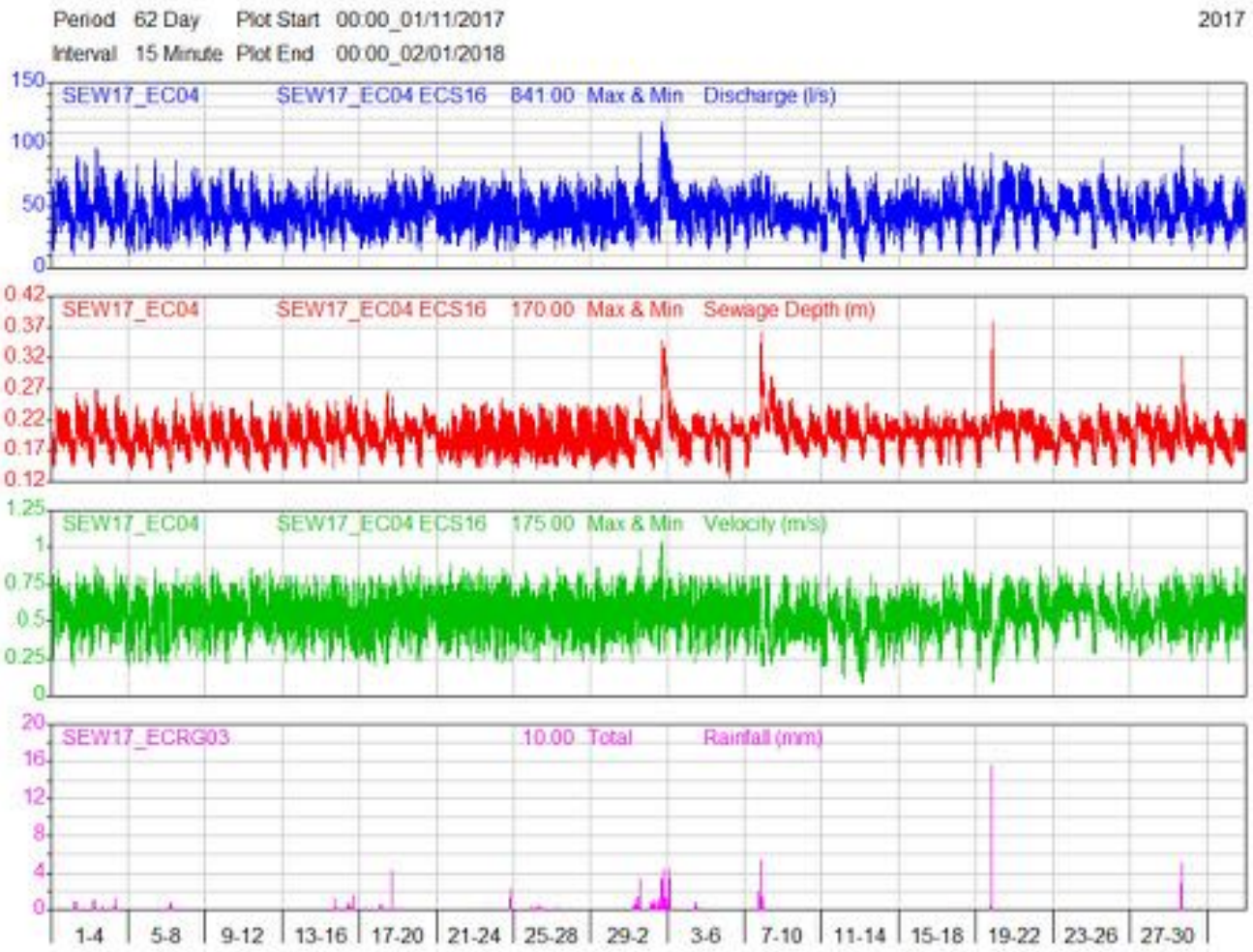
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC03 SEW17_EC03 ELS63 841.00 Max & Min Discharge (l/s)
SEW17_EC03 SEW17_EC03 ELS63 170.00 Max & Min Sewage Depth (m)
SEW17_EC03 SEW17_EC03 ELS63 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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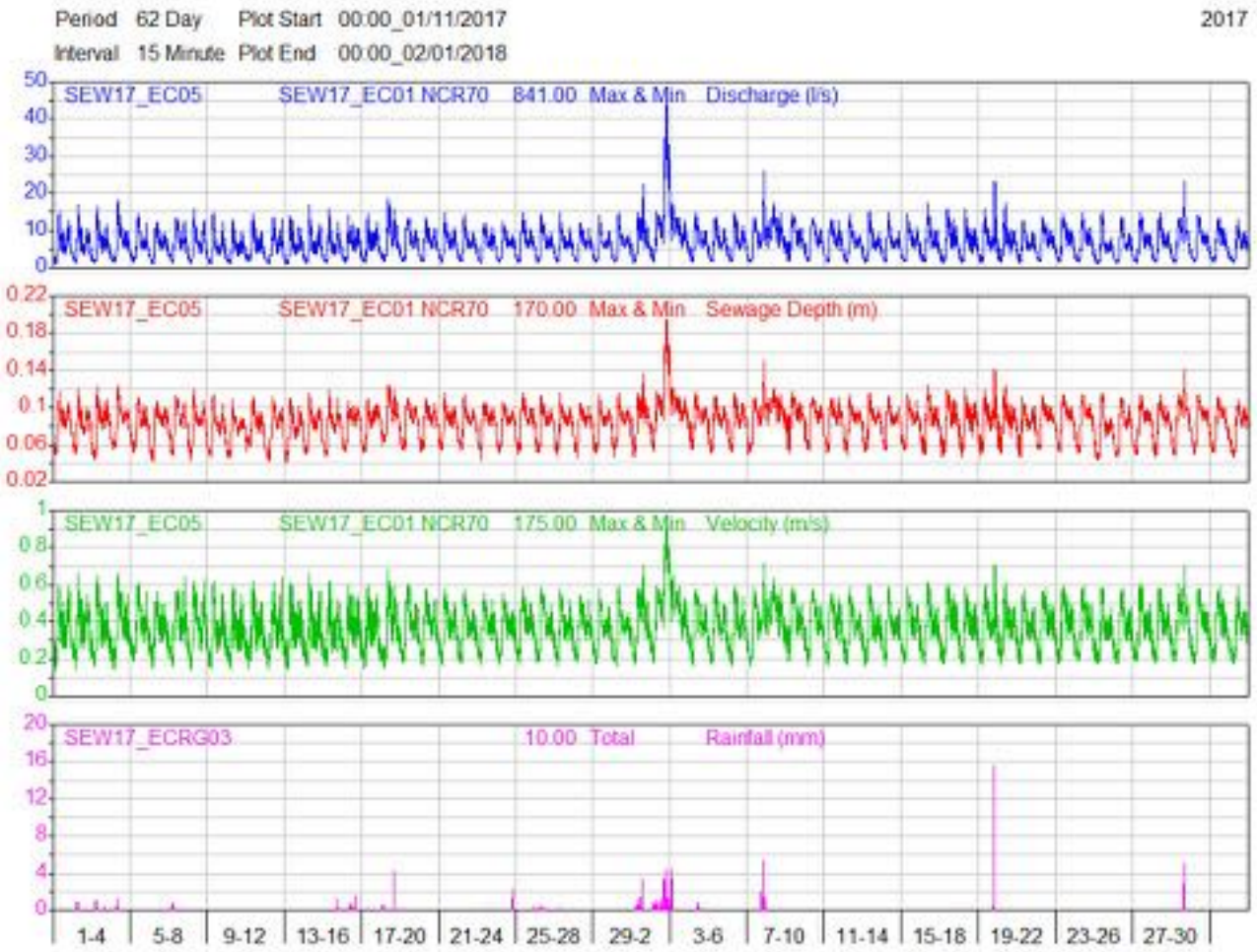
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC04 SEW17_EC04 ECS16 841.00 Max & Min Discharge (l/s)
150
100
50
0
SEW17_EC04 SEW17_EC04 ECS16 170.00 Max & Min Sewage Depth (m)
0.42
0.37
0.32
0.27
0.22
0.17
0.12
SEW17_EC04 SEW17_EC04 ECS16 175.00 Max & Min Velocity (m/s)
1.25
1
0.75
0.5
0.25
0
SEW17_ECRG03 10.00 Total Rainfall (mm)
20
16
12
8
4
0
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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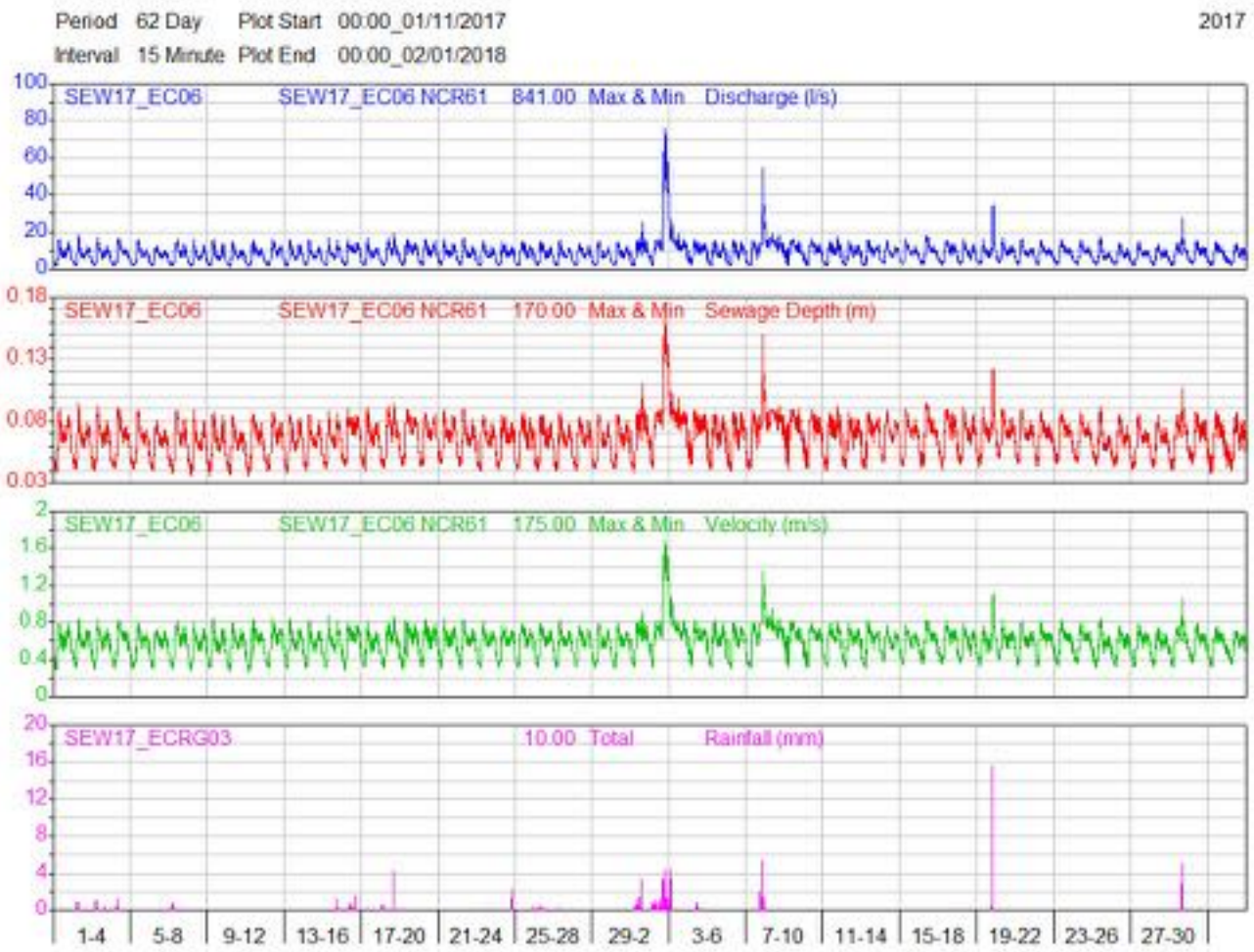
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC05 SEW17_EC01 NCR70 841.00 Max & Min Discharge (l/s)
SEW17_EC05 SEW17_EC01 NCR70 170.00 Max & Min Sewage Depth (m)
SEW17_EC05 SEW17_EC01 NCR70 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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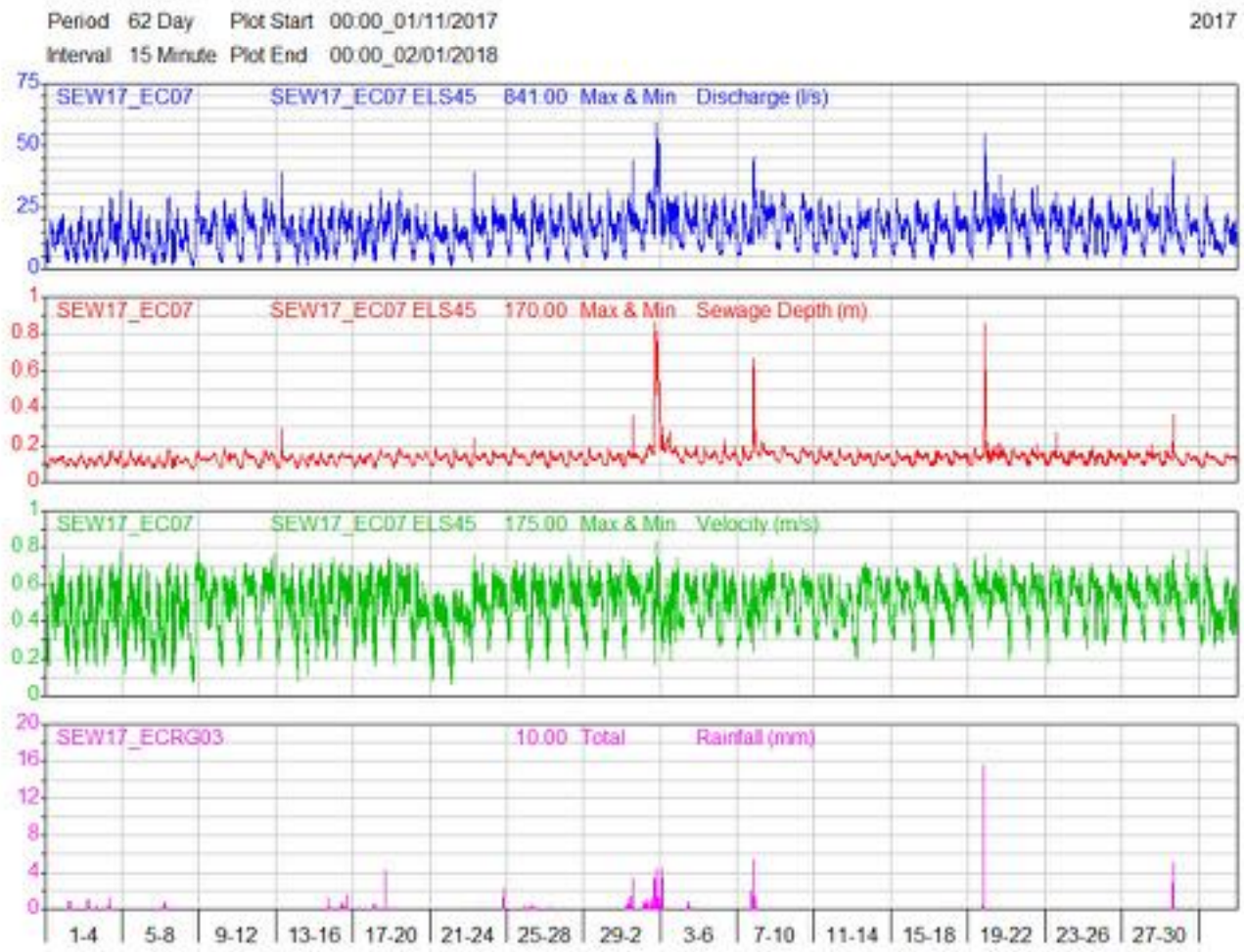
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC06 SEW17_EC06 NCR61 841.00 Max & Min Discharge (l/s)
SEW17_EC06 SEW17_EC06 NCR61 170.00 Max & Min Sewage Depth (m)
SEW17_EC06 SEW17_EC06 NCR61 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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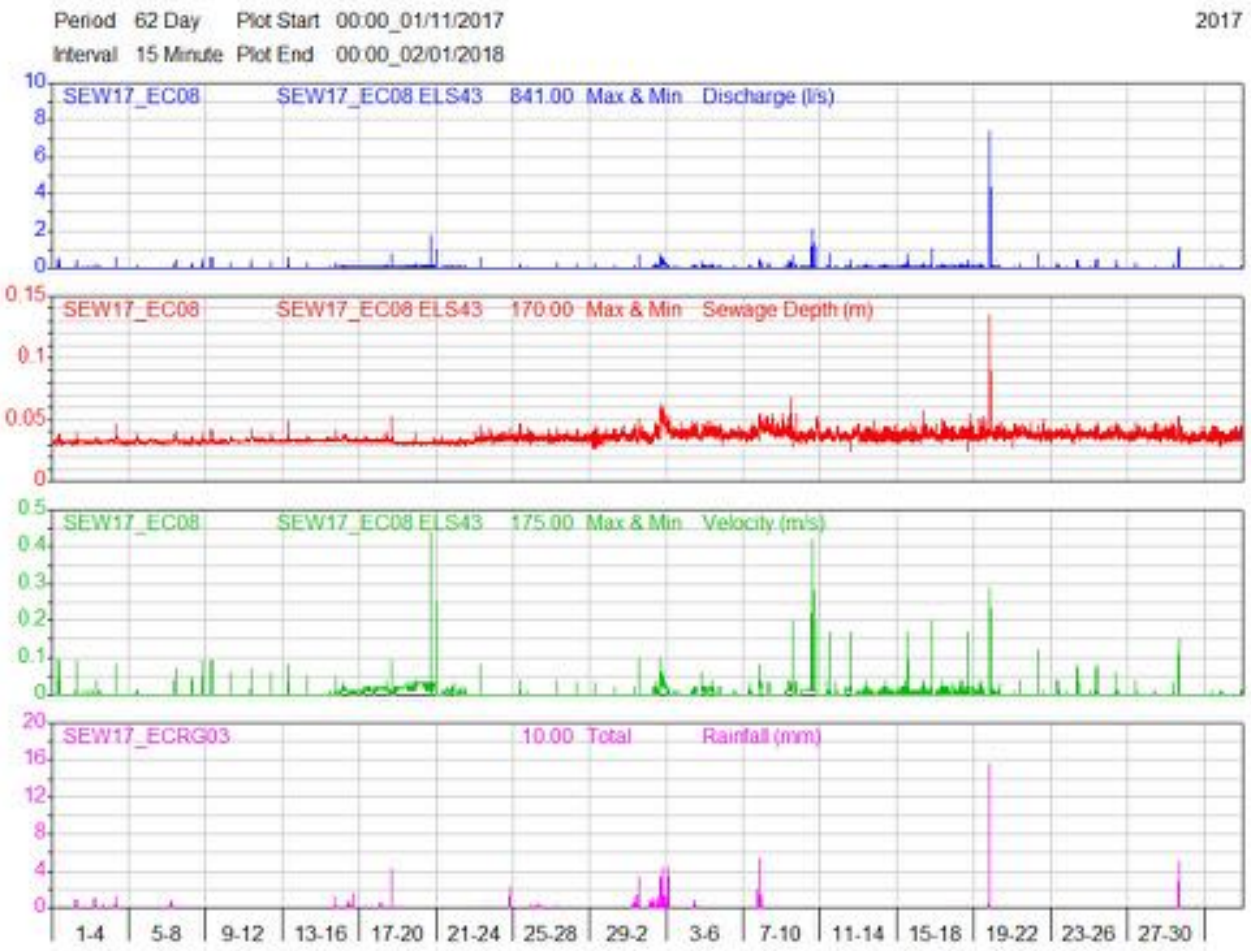
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC07 SEW17_EC07 ELS45 841.00 Max & Min Discharge (l/s)
SEW17_EC07 SEW17_EC07 ELS45 170.00 Max & Min Sewage Depth (m)
SEW17_EC07 SEW17_EC07 ELS45 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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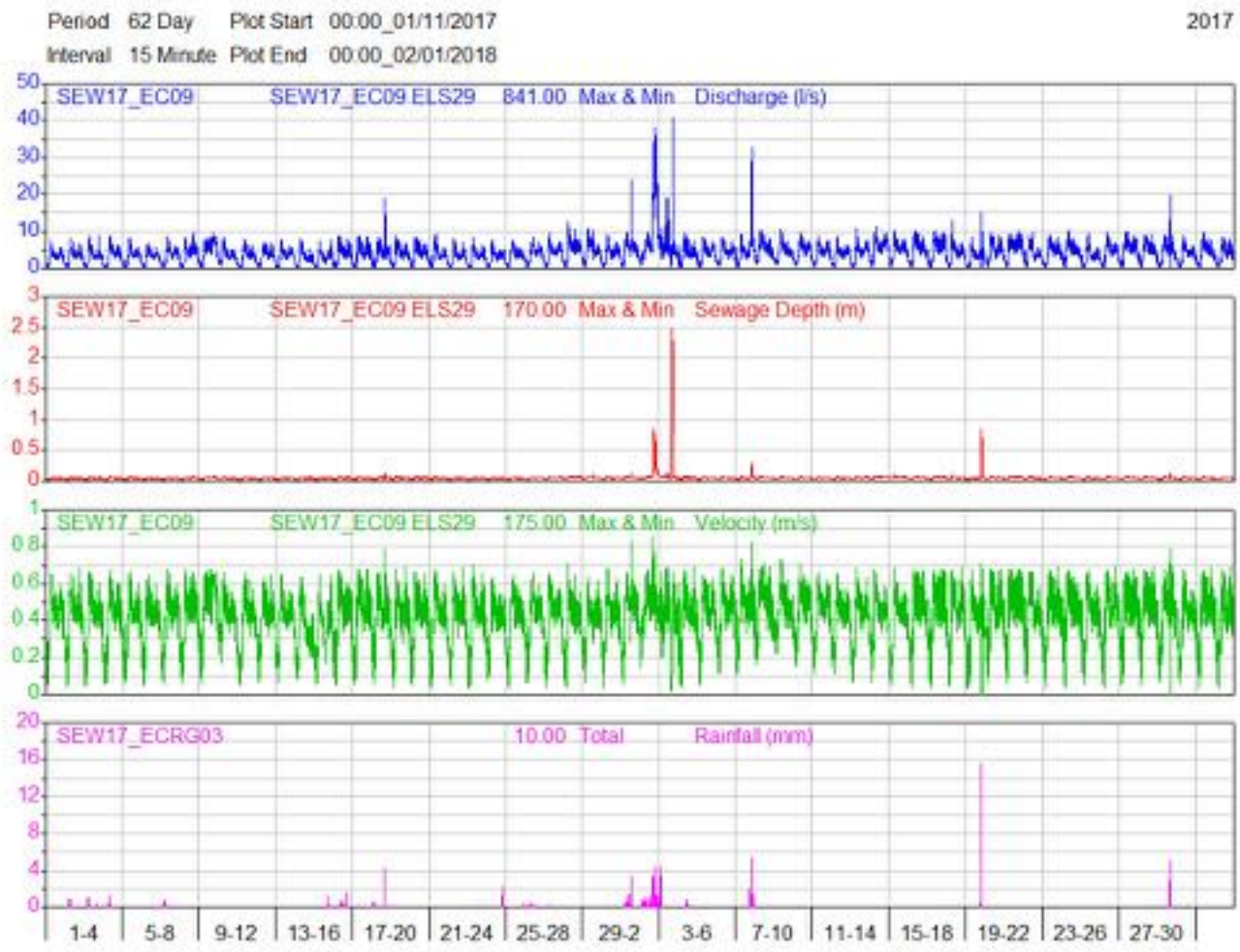
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC08 SEW17_EC08 ELS43 841.00 Max & Min Discharge (l/s)
SEW17_EC08 SEW17_EC08 ELS43 170.00 Max & Min Sewage Depth (m)
SEW17_EC08 SEW17_EC08 ELS43 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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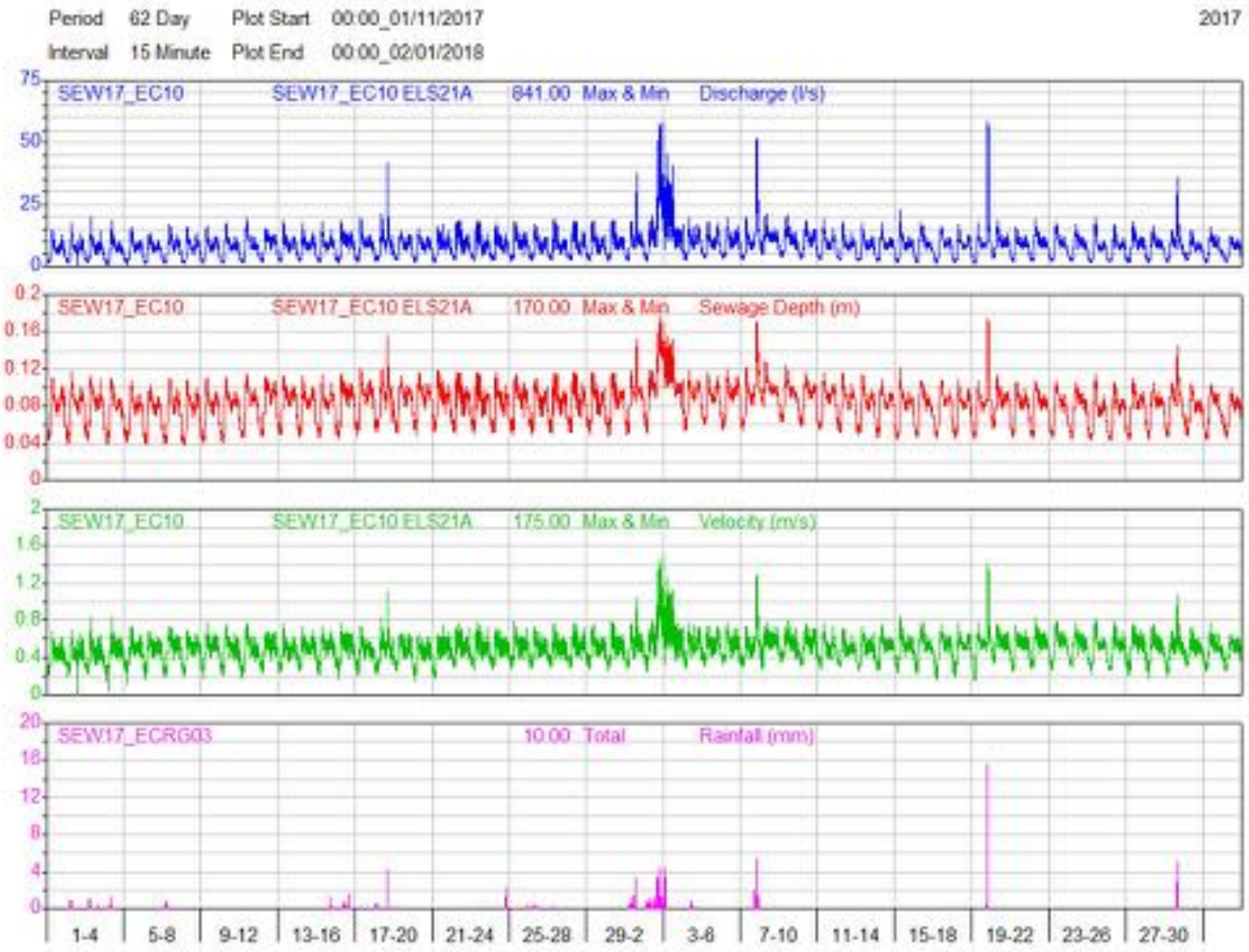
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC09 SEW17_EC09 ELS29 841.00 Max & Min Discharge (l/s)
SEW17_EC09 SEW17_EC09 ELS29 170.00 Max & Min Sewage Depth (m)
SEW17_EC09 SEW17_EC09 ELS29 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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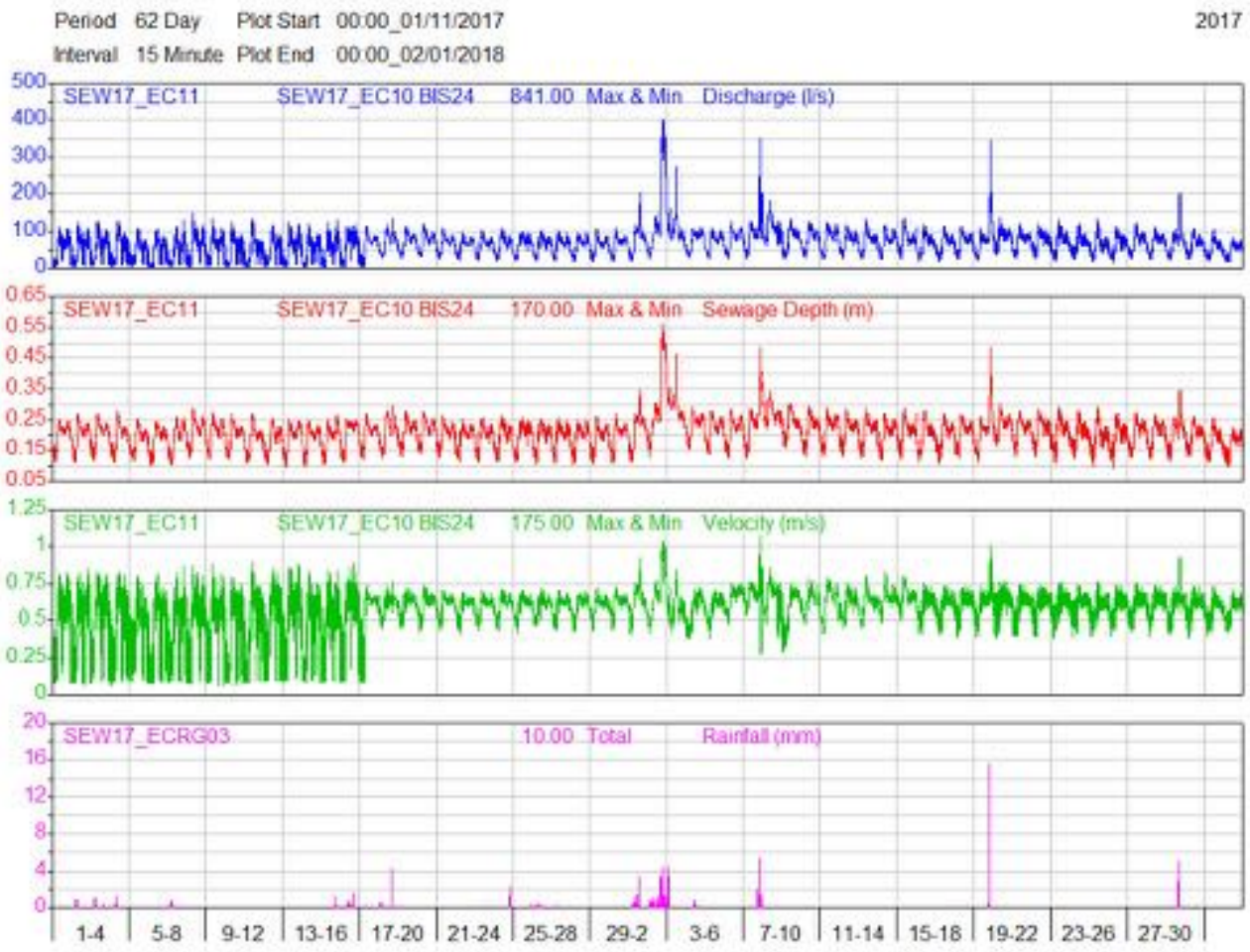
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC10 SEW17_EC10 ELS21A 841.00 Max & Min Discharge (l/s)
SEW17_EC10 SEW17_EC10 ELS21A 170.00 Max & Min Sewage Depth (m)
SEW17_EC10 SEW17_EC10 ELS21A 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30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Interval 15 Minute Plot End 00:00_02/01/2018
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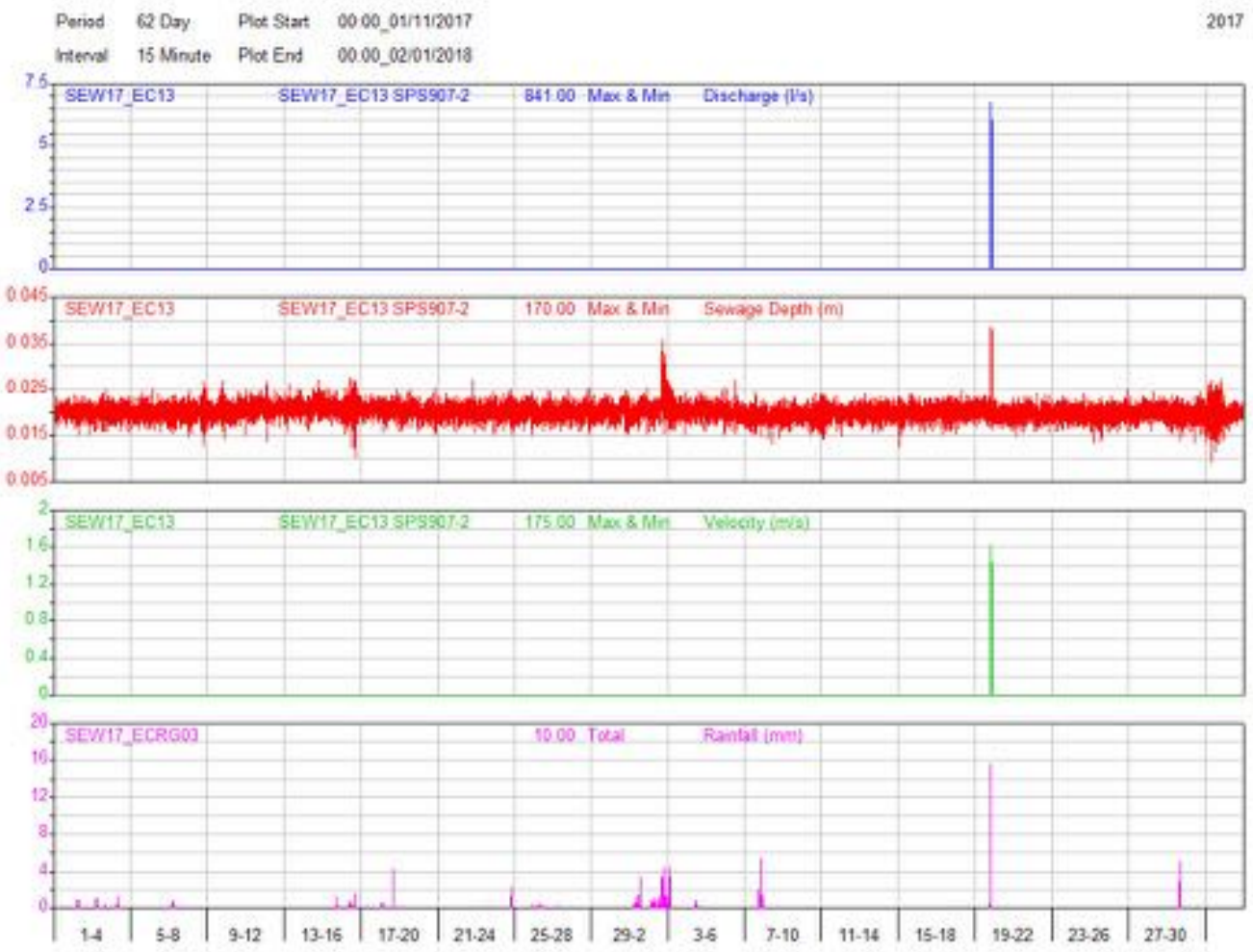
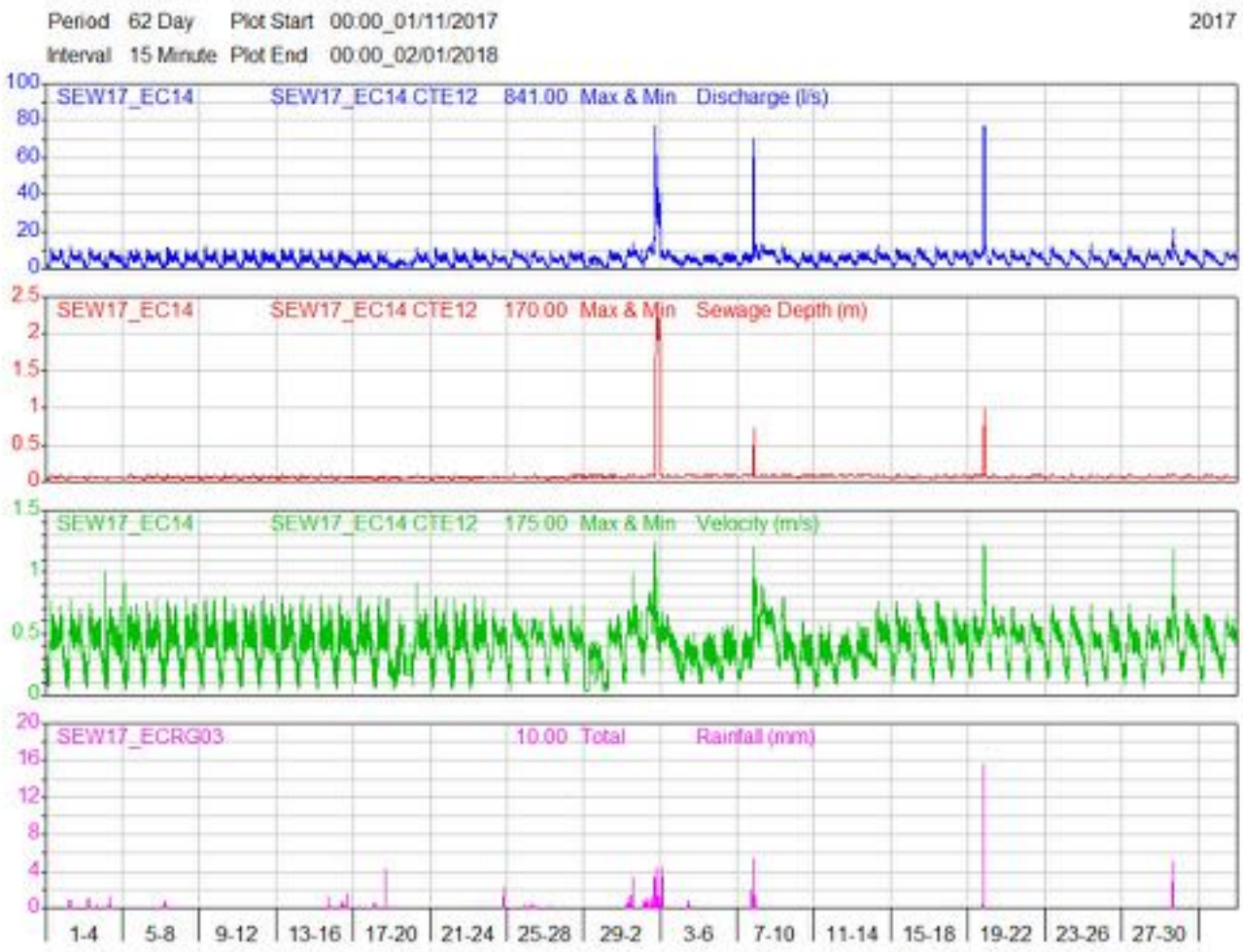
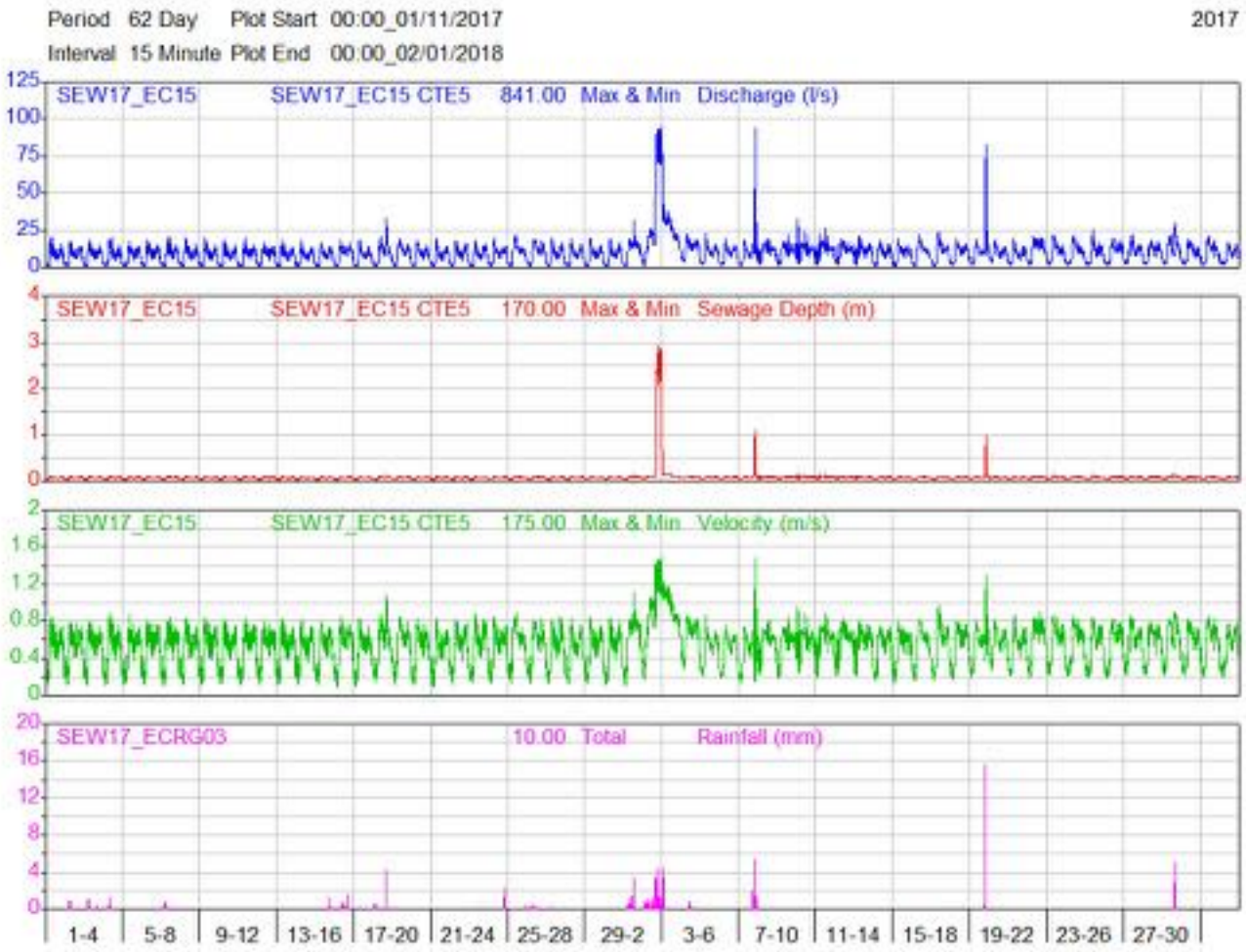
SEW17_EC11 SEW17_EC10 BIS24 841.00 Max & Min Discharge (l/s)
SEW17_EC11 SEW17_EC10 BIS24 170.00 Max & Min Sewage Depth (m)
SEW17_EC11 SEW17_EC10 BIS24 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

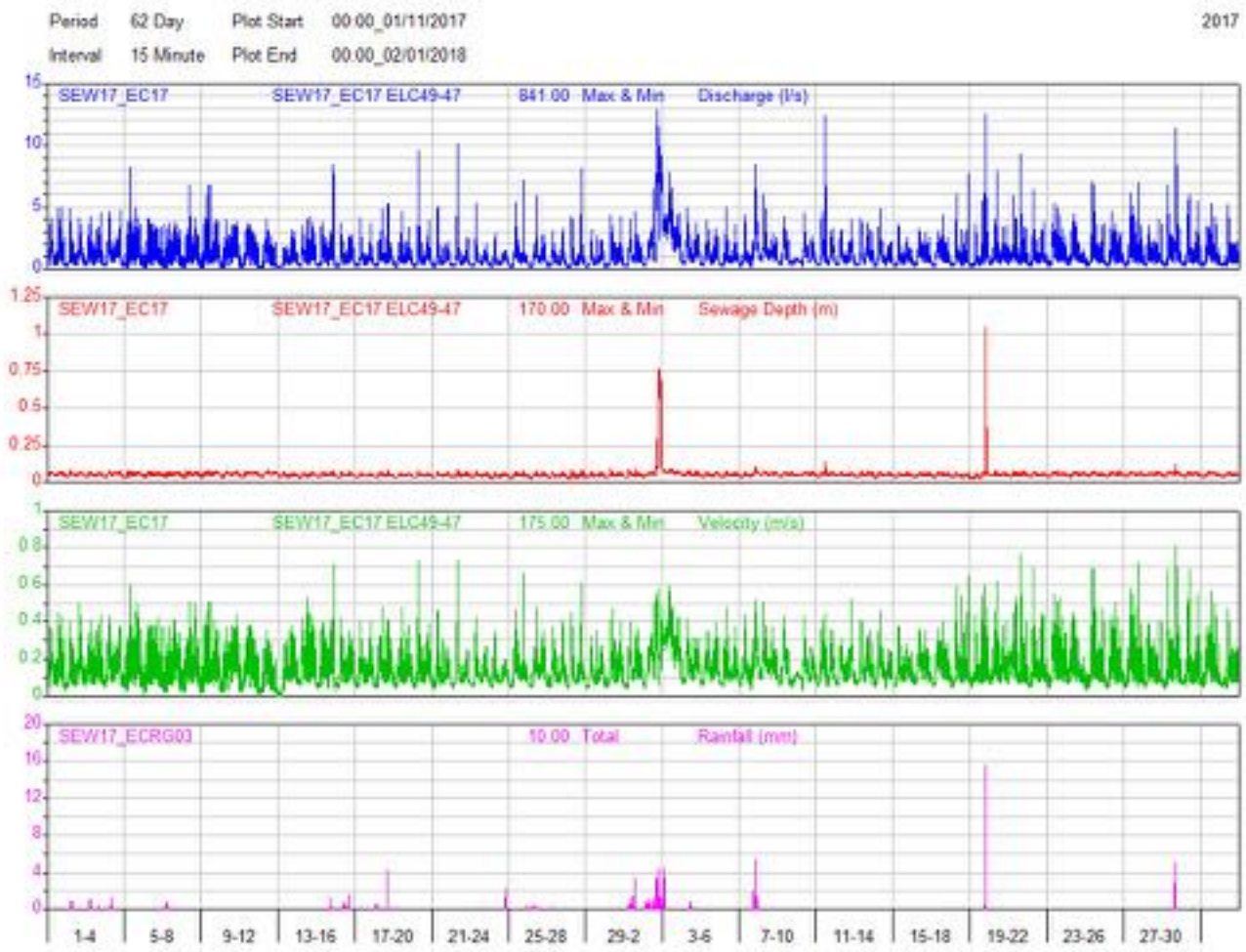
Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC12 SEW17_EC12 CTE20-16 841.00 Max & Min Discharge (l/s)
SEW17_EC12 SEW17_EC12 CTE20-16 170.00 Max & Min Sewage Depth (m)
SEW17_EC12 SEW17_EC12 CTE20-16 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

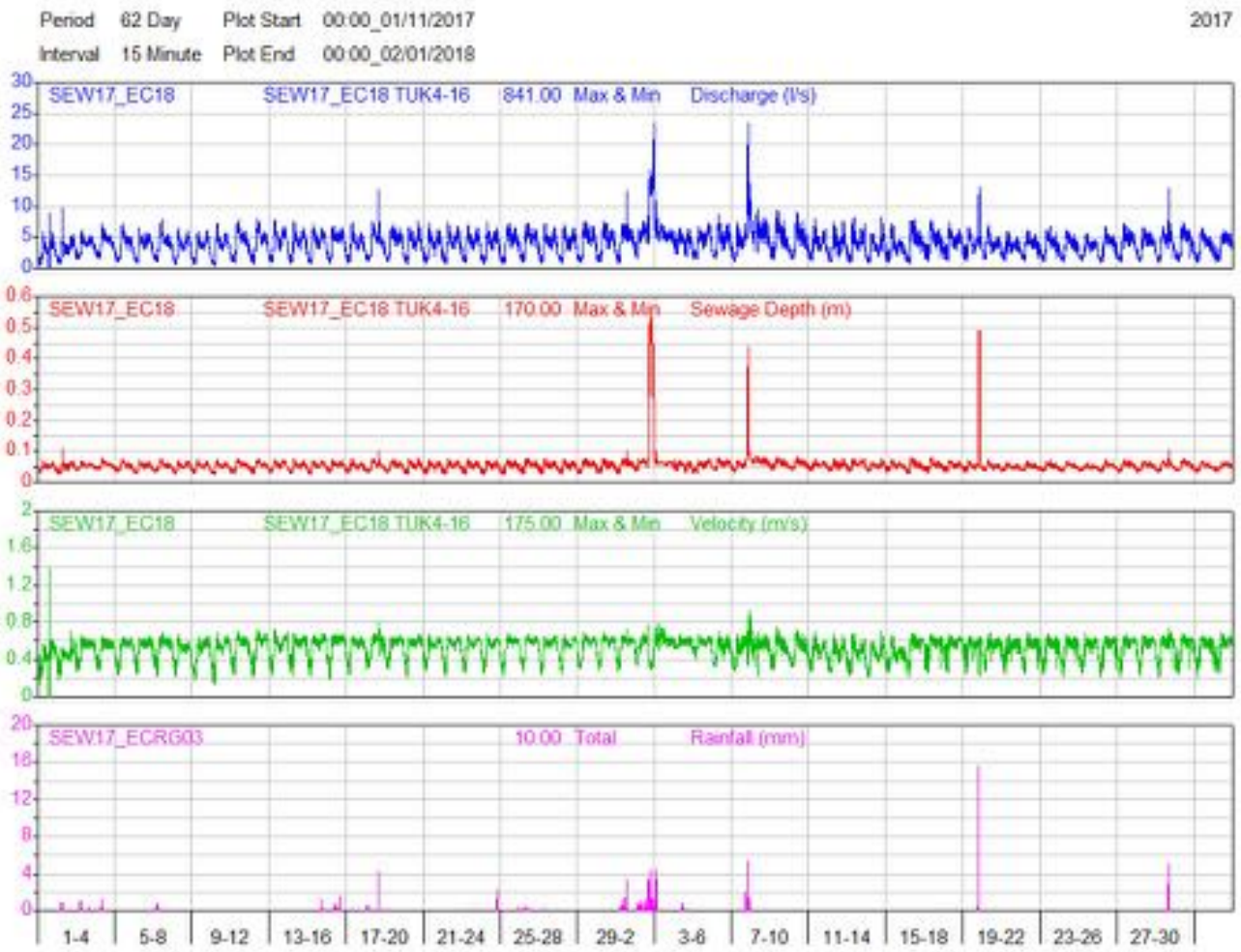

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC13 SEW17_EC13 SPS907-2 841.00 Max & Min Discharge (l/s)
SEW17_EC13 SEW17_EC13 SPS907-2 170.00 Max & Min Sewage Depth (m)
SEW17_EC13 SEW17_EC13 SPS907-2 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

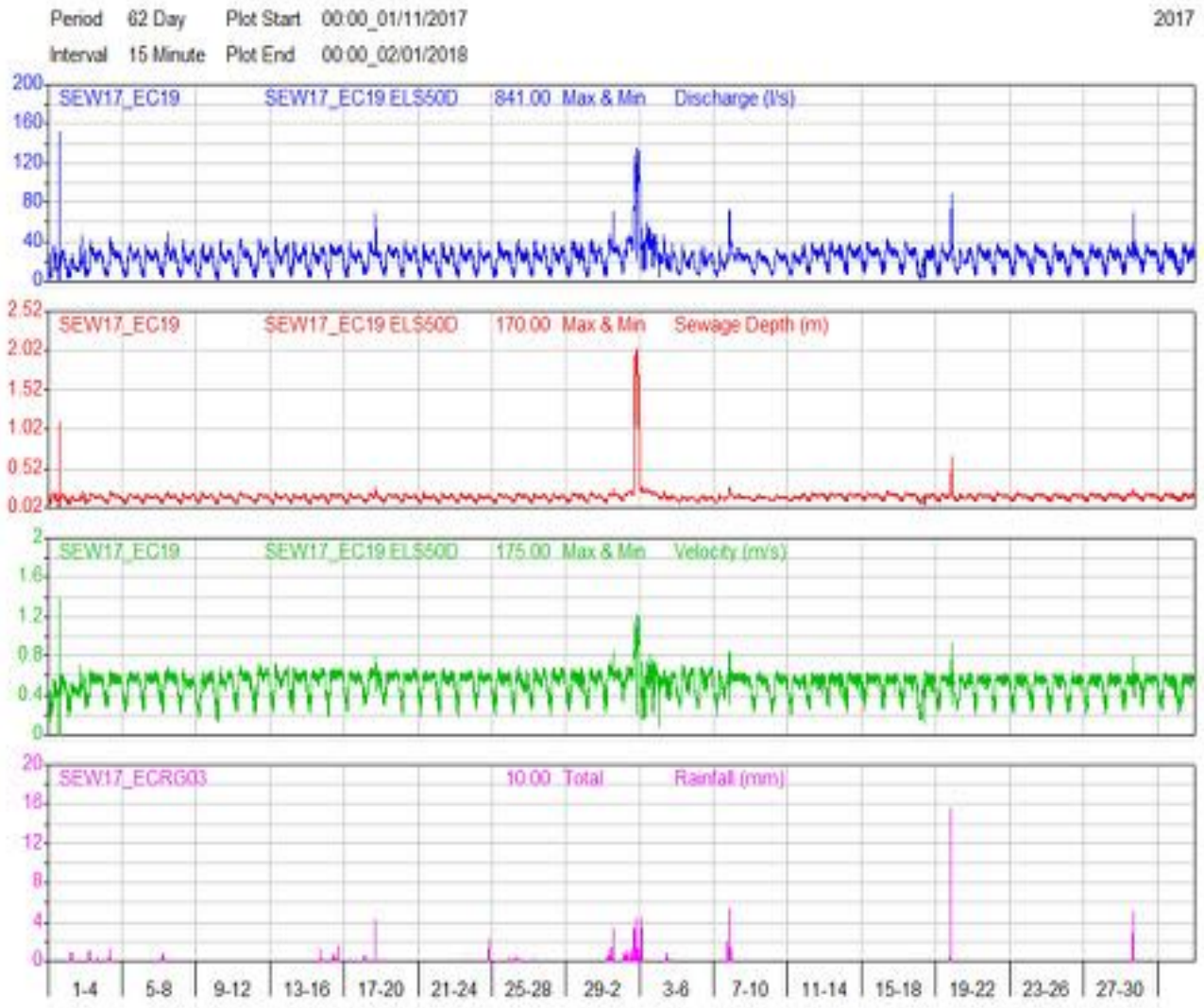

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC14 SEW17_EC14 CTE12 841.00 Max & Min Discharge (l/s)
SEW17_EC14 SEW17_EC14 CTE12 170.00 Max & Min Sewage Depth (m)
SEW17_EC14 SEW17_EC14 CTE12 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

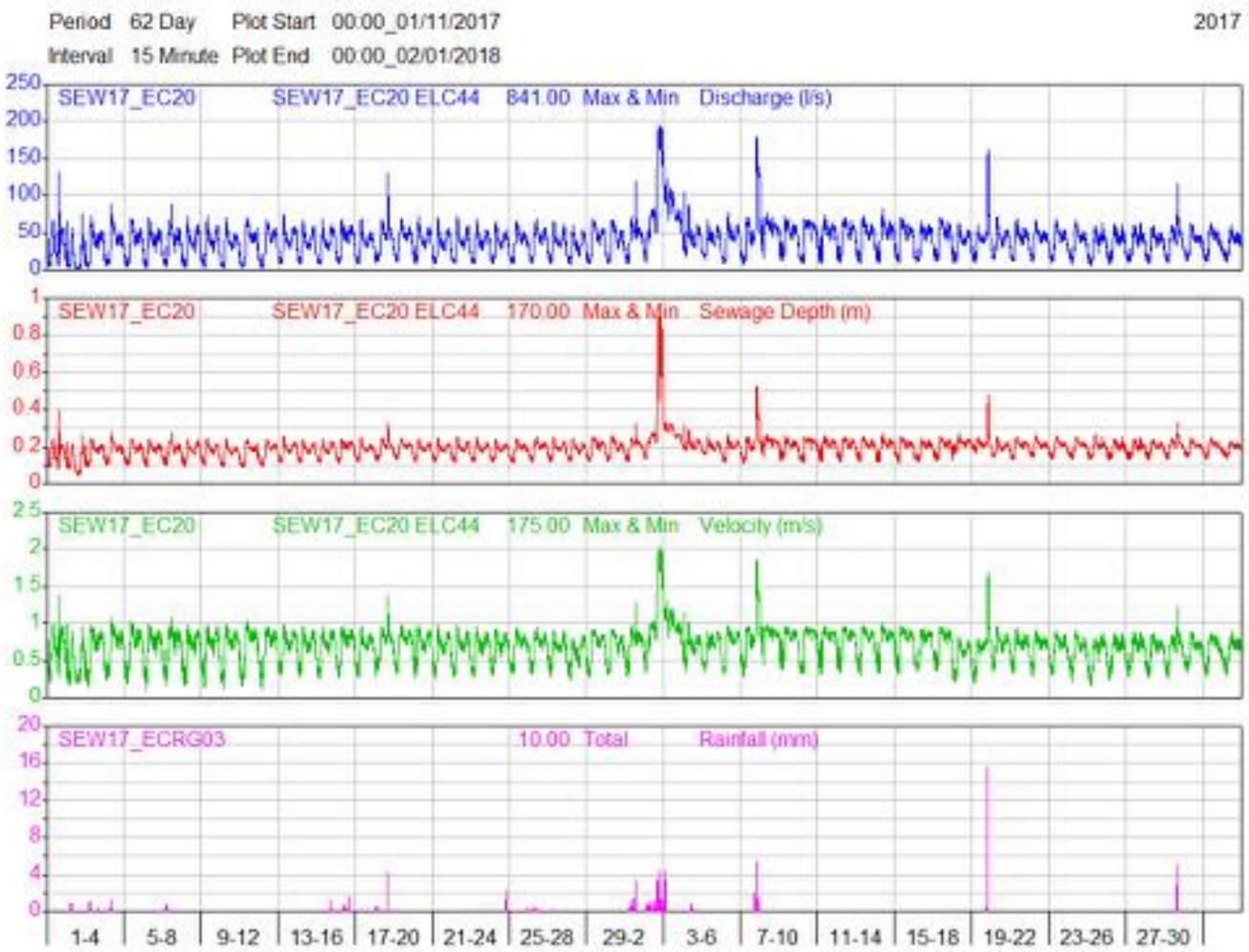

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC15 SEW17_EC15 CTE5 841.00 Max & Min Discharge (l/s)
SEW17_EC15 SEW17_EC15 CTE5 170.00 Max & Min Sewage Depth (m)
SEW17_EC15 SEW17_EC15 CTE5 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

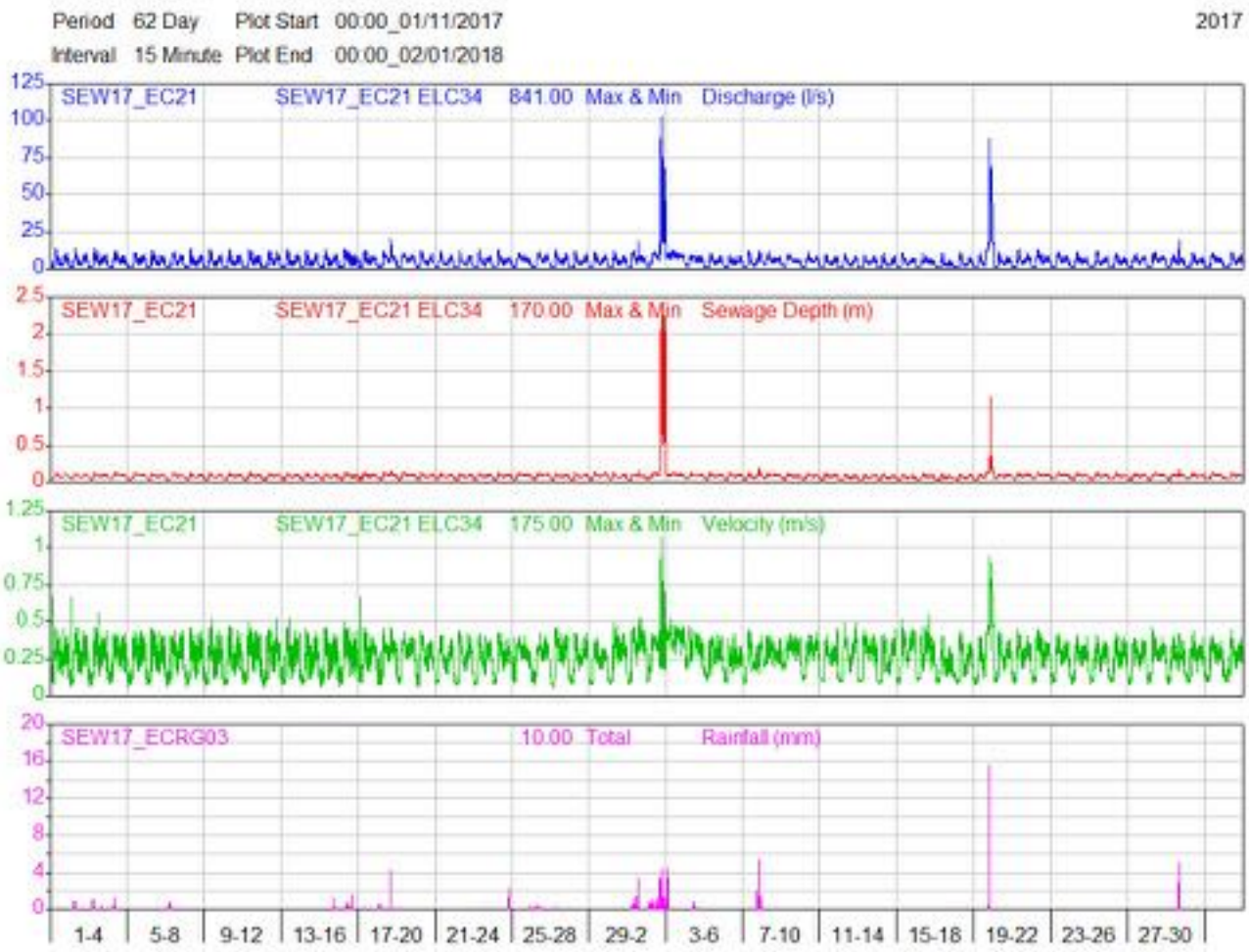
Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC16 SEW17_EC16 ELC49-87 841.00 Max & Min Discharge (l/s)
SEW17_EC16 SEW17_EC16 ELC49-87 170.00 Max & Min Sewage Depth (m)
SEW17_EC16 SEW17_EC16 ELC49-87 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

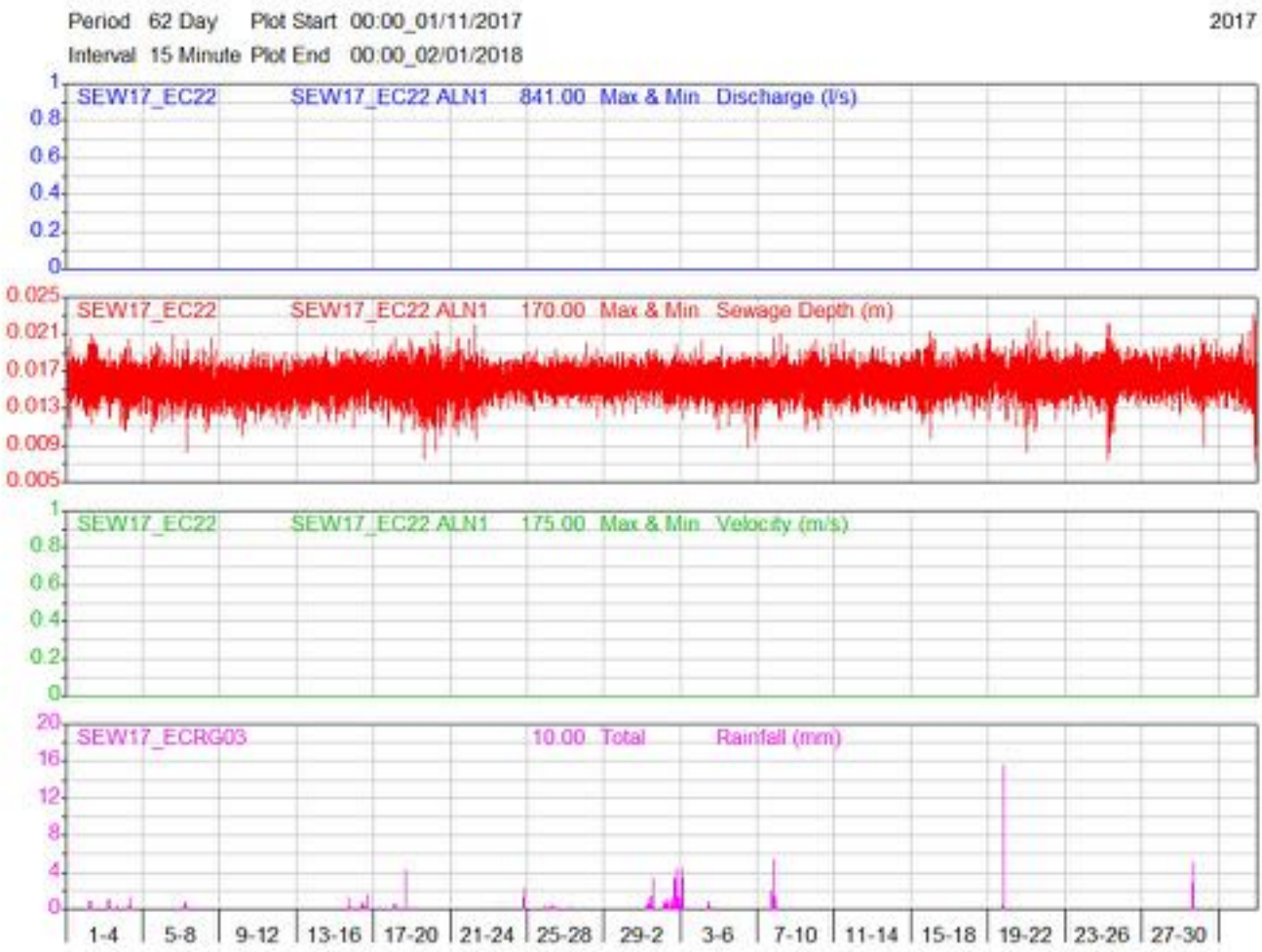

Period 62 Day Plot Start 00:00_01/11/2017 2017
Interval 15 Minute Plot End 00:00_02/01/2018
SEW17_EC17 SEW17_EC17 ELC49-47 841.00 Max & Min Discharge (l/s)
SEW17_EC17 SEW17_EC17 ELC49-47 170.00 Max & Min Sewage Depth (m)
SEW17_EC17 SEW17_EC17 ELC49-47 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4 5-8 9-12 13-16 17-20 21-24 25-28 29-2 3-6 7-10 11-14 15-18 19-22 23-26 27-30

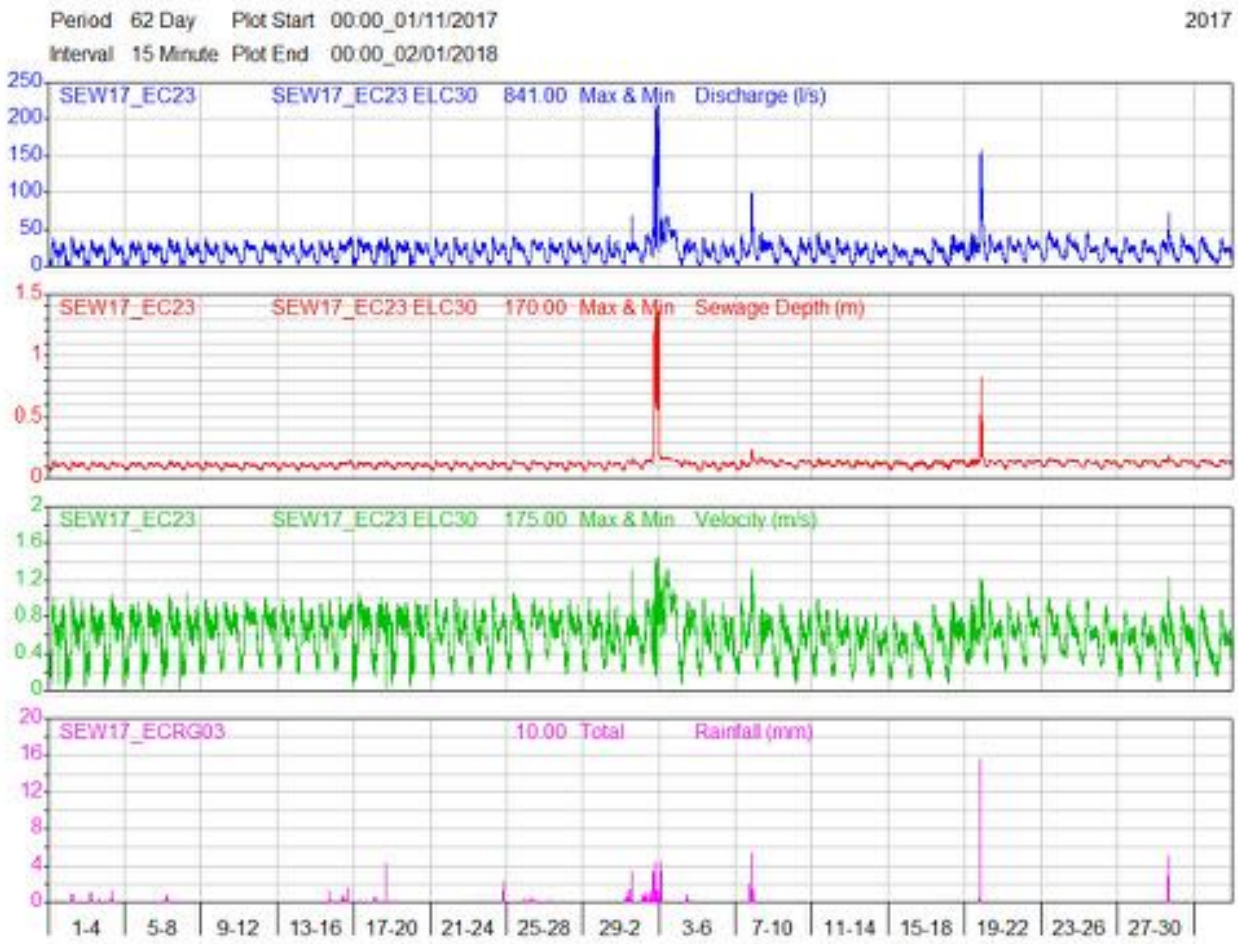

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC18 SEW17_EC18 TUK4-16 841.00 Max & Min Discharge (l/s)
SEW17_EC18 SEW17_EC18 TUK4-16 170.00 Max & Min Sewage Depth (m)
SEW17_EC18 SEW17_EC18 TUK4-16 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

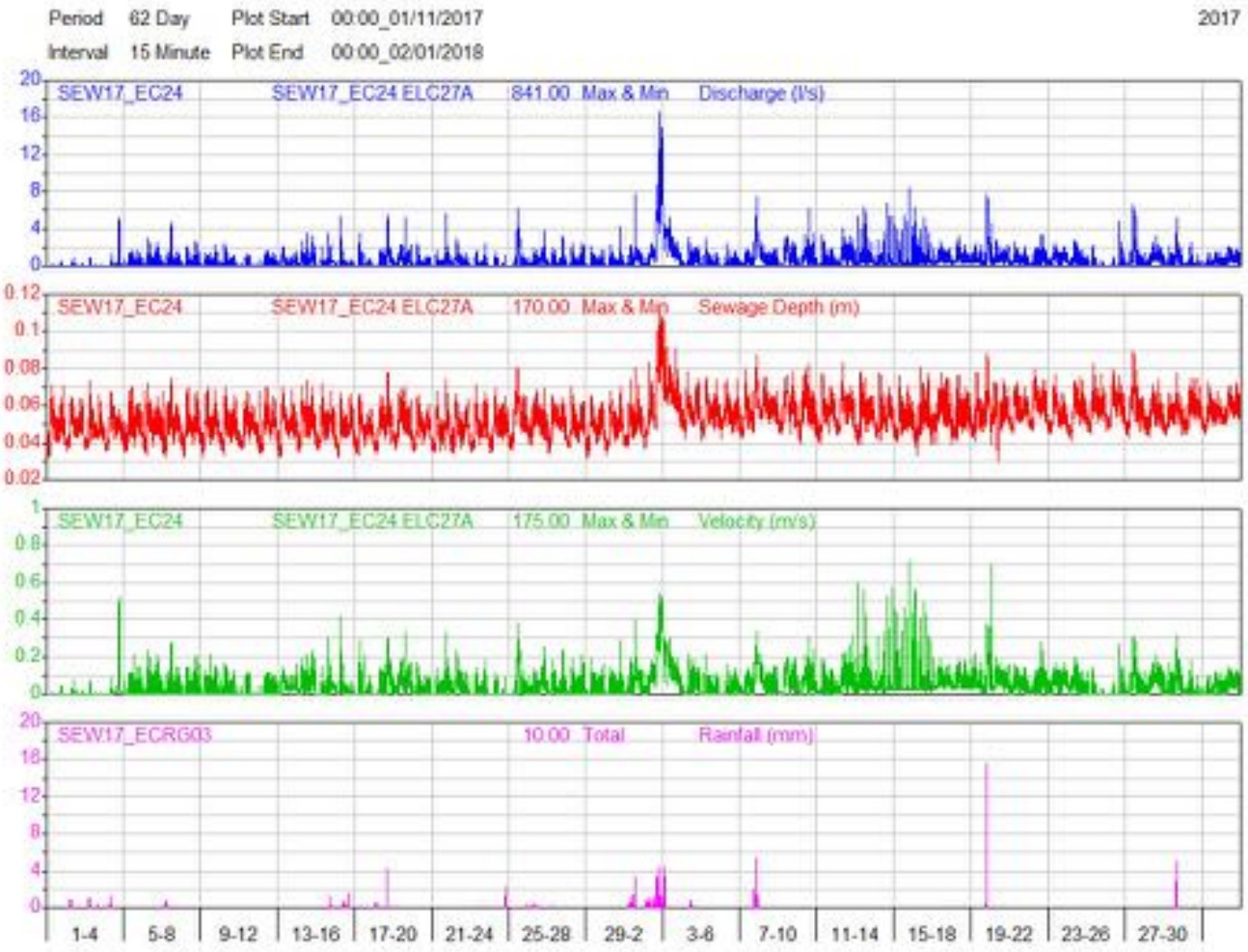

Period 62 Day Plot Start 00:00_01/11/2017 2017
Interval 15 Minute Plot End 00:00_02/01/2018
SEW17_EC19 SEW17_EC19 ELS50D 841.00 Max & Min Discharge (l/s)
SEW17_EC19 SEW17_EC19 ELS50D 170.00 Max & Min Sewage Depth (m)
SEW17_EC19 SEW17_EC19 ELS50D 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

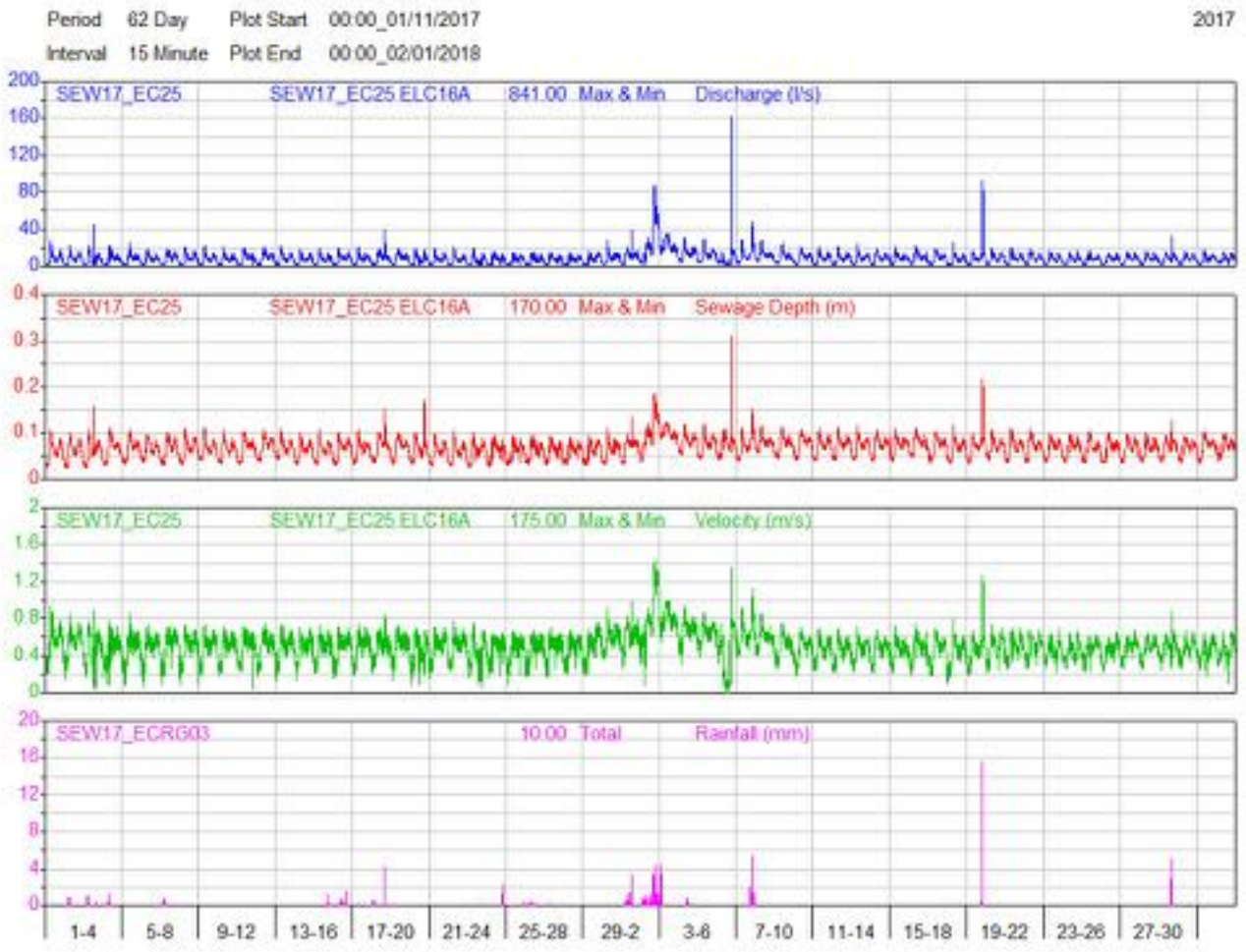

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC20 SEW17_EC20 ELC44 841.00 Max & Min Discharge (l/s)
SEW17_EC20 SEW17_EC20 ELC44 170.00 Max & Min Sewage Depth (m)
SEW17_EC20 SEW17_EC20 ELC44 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

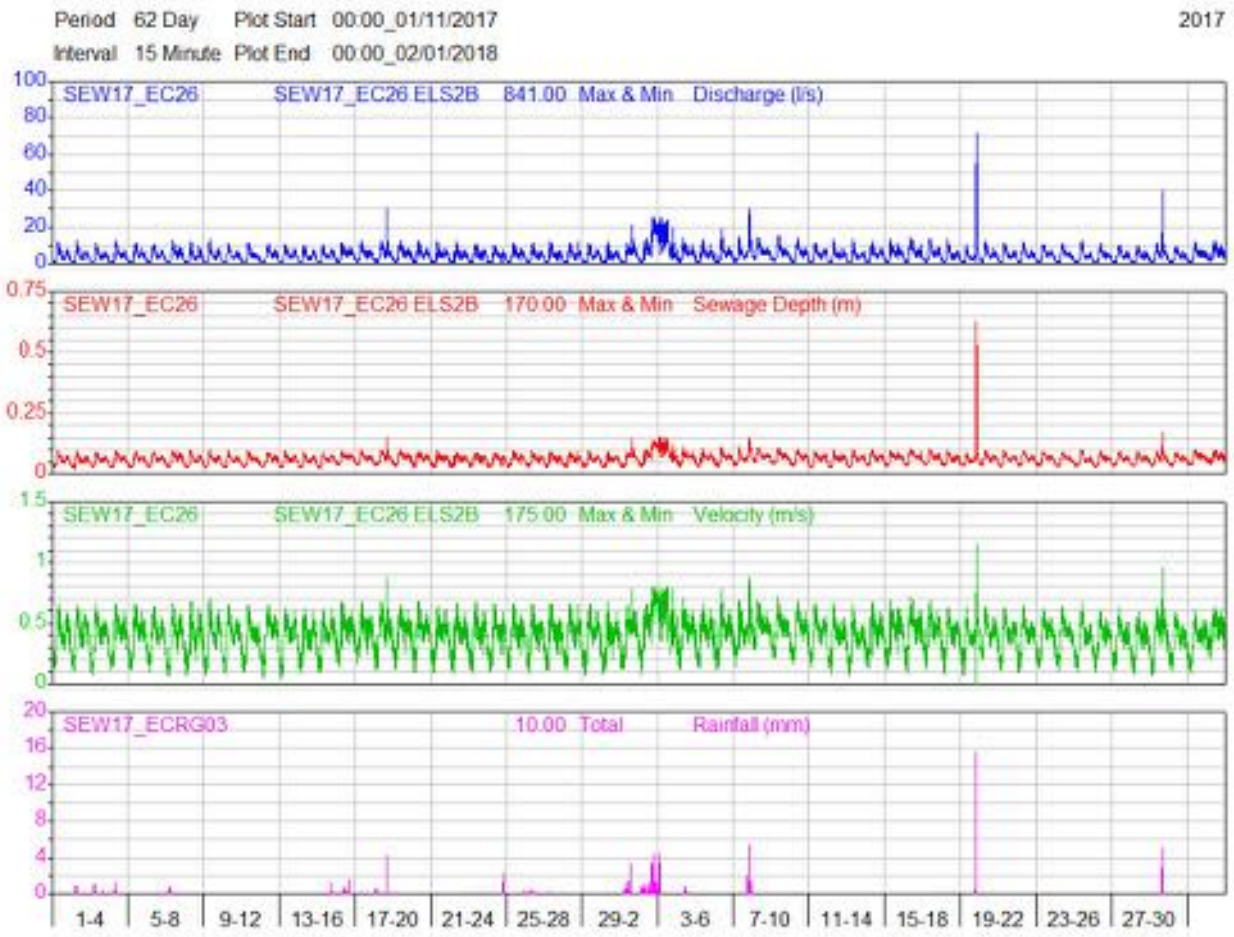

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC21 SEW17_EC21 ELC34 841.00 Max & Min Discharge (l/s)
SEW17_EC21 SEW17_EC21 ELC34 170.00 Max & Min Sewage Depth (m)
SEW17_EC21 SEW17_EC21 ELC34 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

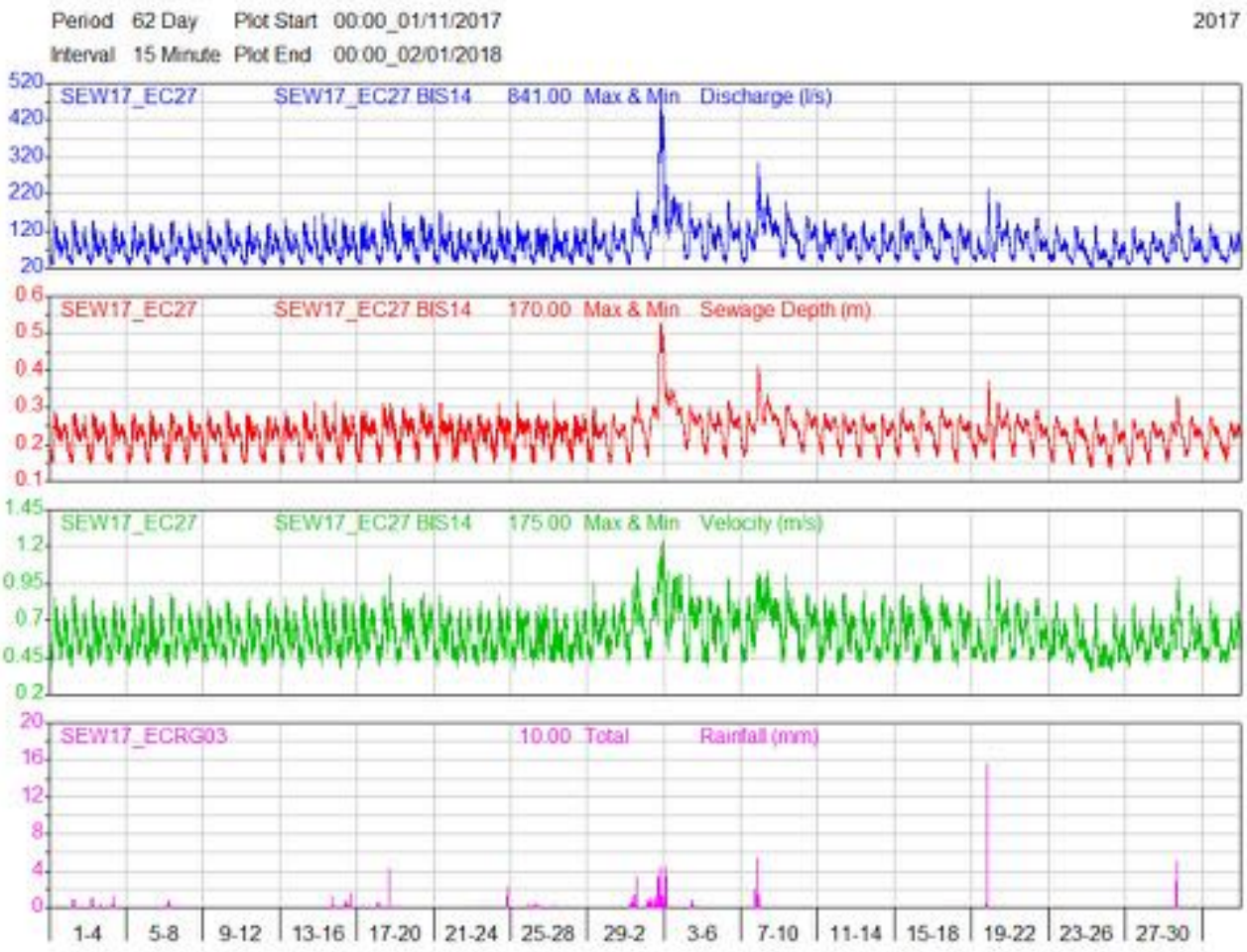

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC22 SEW17_EC22 ALN1 841.00 Max & Min Discharge (l/s)
SEW17_EC22 SEW17_EC22 ALN1 170.00 Max & Min Sewage Depth (m)
SEW17_EC22 SEW17_EC22 ALN1 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

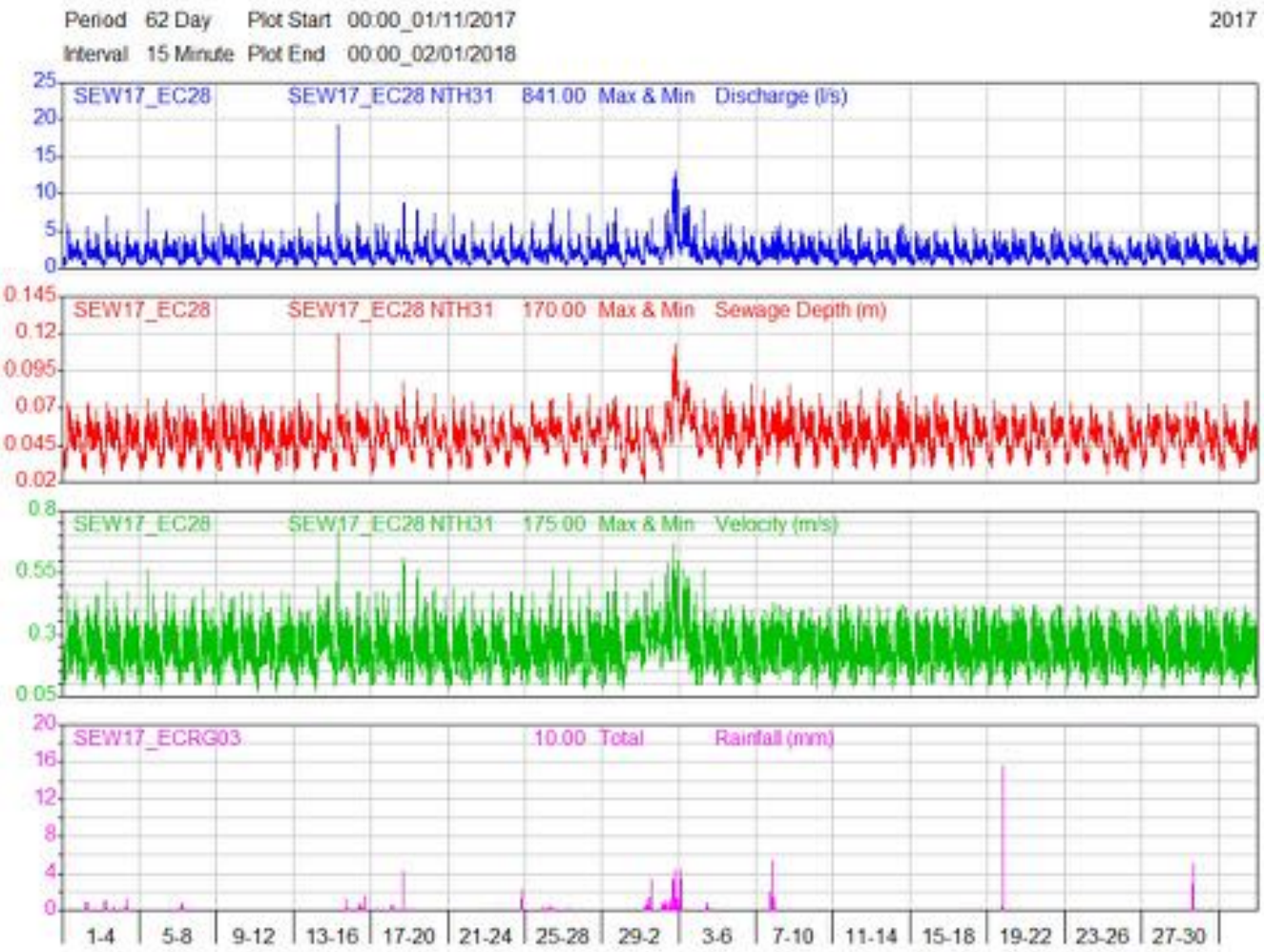

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC23 SEW17_EC23 ELC30 841.00 Max & Min Discharge (l/s)
SEW17_EC23 SEW17_EC23 ELC30 170.00 Max & Min Sewage Depth (m)
SEW17_EC23 SEW17_EC23 ELC30 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

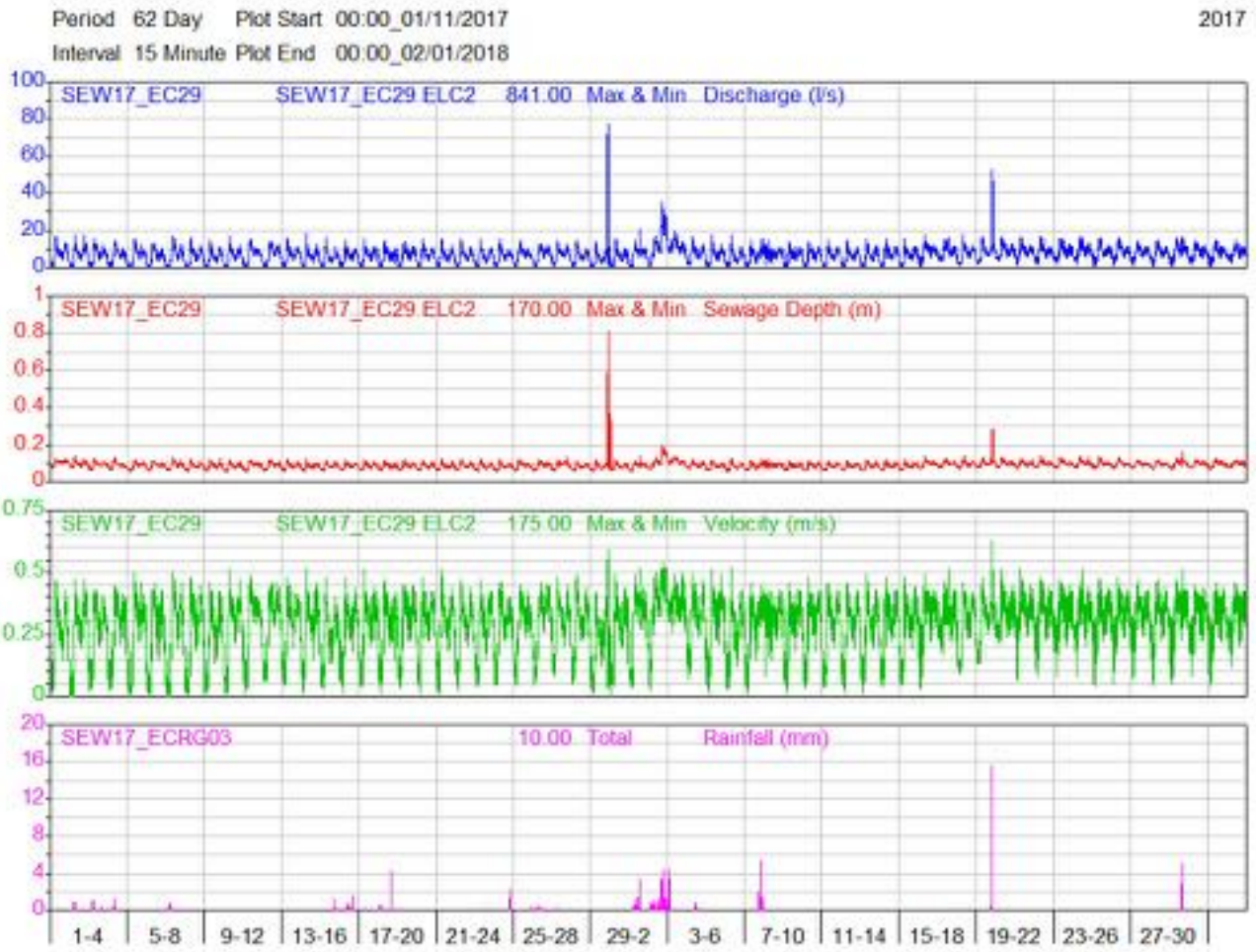

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC24 SEW17_EC24 ELC27A 841.00 Max & Min Discharge (l/s)
SEW17_EC24 SEW17_EC24 ELC27A 170.00 Max & Min Sewage Depth (m)
SEW17_EC24 SEW17_EC24 ELC27A 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

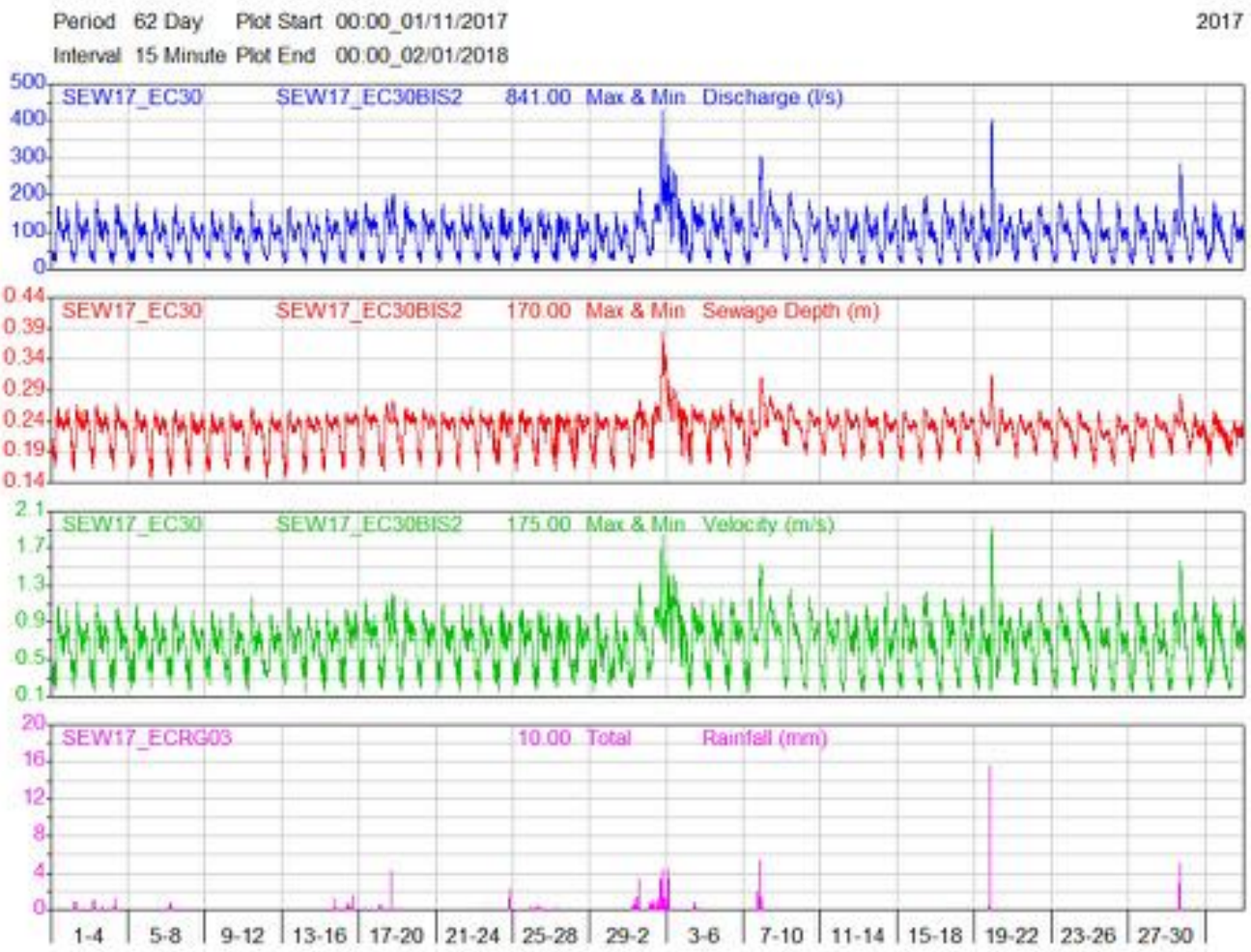

Period 62 Day Plot Start 00:00_01/11/2017 2017
Interval 15 Minute Plot End 00:00_02/01/2018
SEW17_EC25 SEW17_EC25 ELC16A 841.00 Max & Min Discharge (l/s)
SEW17_EC25 SEW17_EC25 ELC16A 170.00 Max & Min Sewage Depth (m)
SEW17_EC25 SEW17_EC25 ELC16A 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4 5-8 9-12 13-16 17-20 21-24 25-28 29-2 3-6 7-10 11-14 15-18 19-22 23-26 27-30

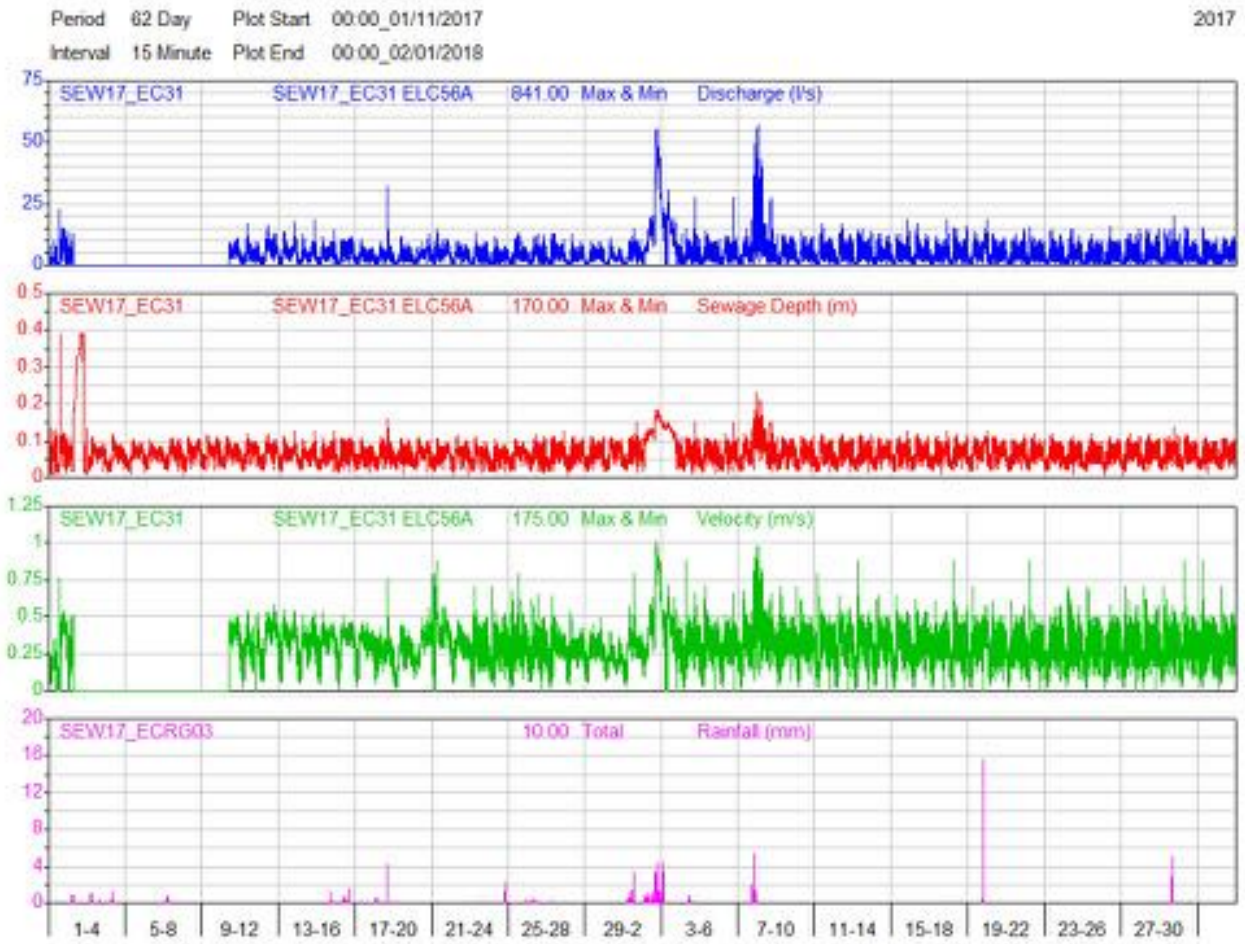

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC26 SEW17_EC26 ELS2B 841.00 Max & Min Discharge (l/s)
SEW17_EC26 SEW17_EC26 ELS2B 170.00 Max & Min Sewage Depth (m)
SEW17_EC26 SEW17_EC26 ELS2B 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30


Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC27 SEW17_EC27 BIS14 841.00 Max & Min Discharge (l/s)
SEW17_EC27 SEW17_EC27 BIS14 170.00 Max & Min Sewage Depth (m)
SEW17_EC27 SEW17_EC27 BIS14 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30


Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC28 SEW17_EC28 NTH31 841.00 Max & Min Discharge (l/s)
SEW17_EC28 SEW17_EC28 NTH31 170.00 Max & Min Sewage Depth (m)
SEW17_EC28 SEW17_EC28 NTH31 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30


Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC29 SEW17_EC29 ELC2 841.00 Max & Min Discharge (l/s)
SEW17_EC29 SEW17_EC29 ELC2 170.00 Max & Min Sewage Depth (m)
SEW17_EC29 SEW17_EC29 ELC2 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

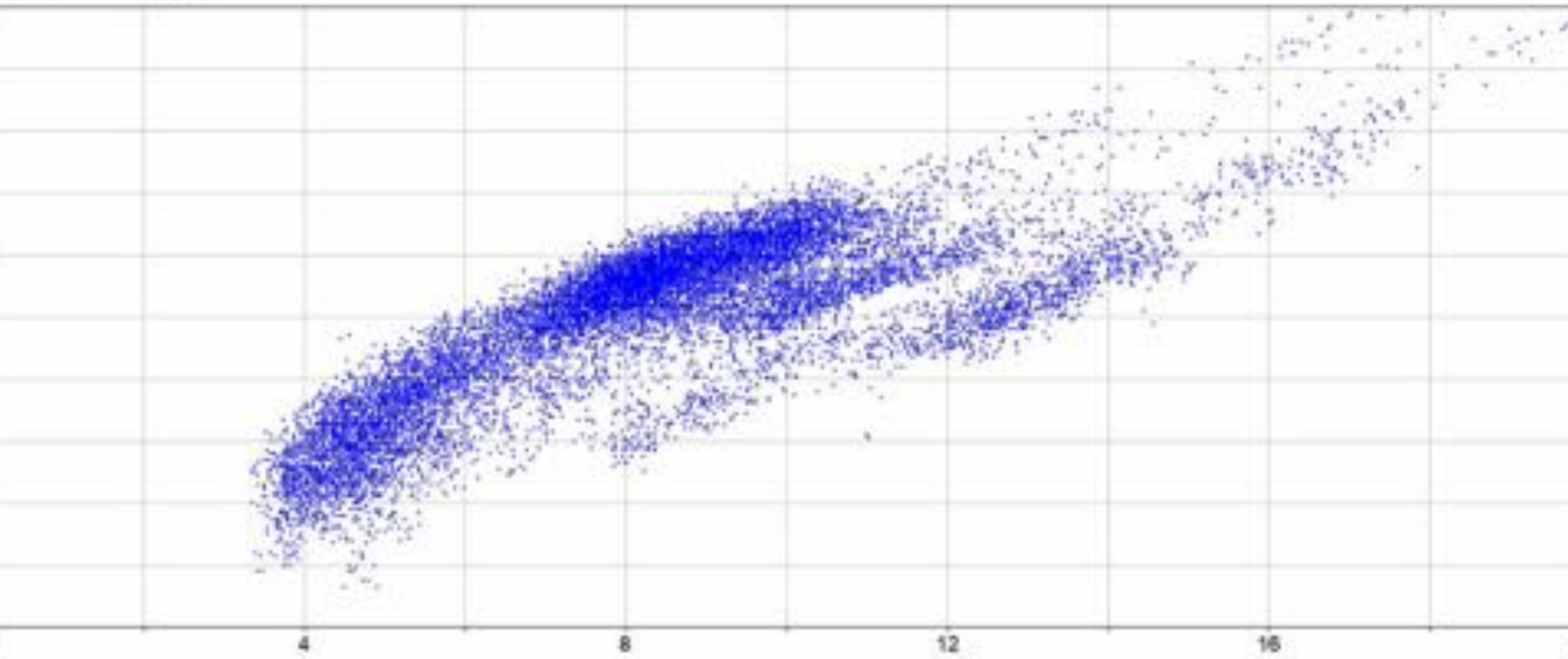

Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC30 SEW17_EC30BIS2 841.00 Max & Min Discharge (l/s)
SEW17_EC30 SEW17_EC30BIS2 170.00 Max & Min Sewage Depth (m)
SEW17_EC30 SEW17_EC30BIS2 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30


Period 62 Day Plot Start 00:00_01/11/2017
Interval 15 Minute Plot End 00:00_02/01/2018
2017
SEW17_EC31 SEW17_EC31 ELC56A 841.00 Max & Min Discharge (l/s)
SEW17_EC31 SEW17_EC31 ELC56A 170.00 Max & Min Sewage Depth (m)
SEW17_EC31 SEW17_EC31 ELC56A 175.00 Max & Min Velocity (m/s)
SEW17_ECRG03 10.00 Total Rainfall (mm)
1-4
5-8
9-12
13-16
17-20
21-24
25-28
29-2
3-6
7-10
11-14
15-18
19-22
23-26
27-30

7.0 Elster Creek Flow Scatter Plots

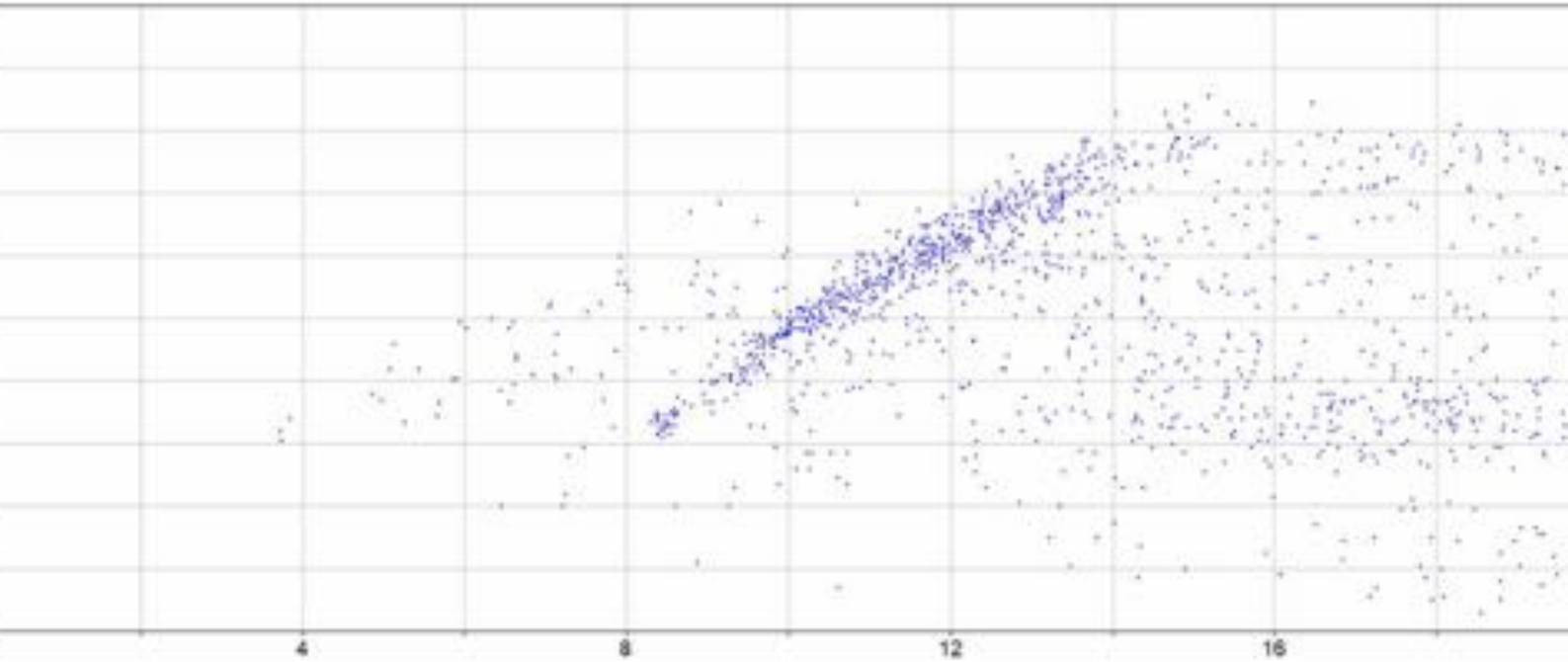
nvironmental Data Services

Axis	Transform	Site	Type	Variable
K (ind)	(None)	SEW17_EC01	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC01	Mean	175.00 Velocity (m/s)
nterval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



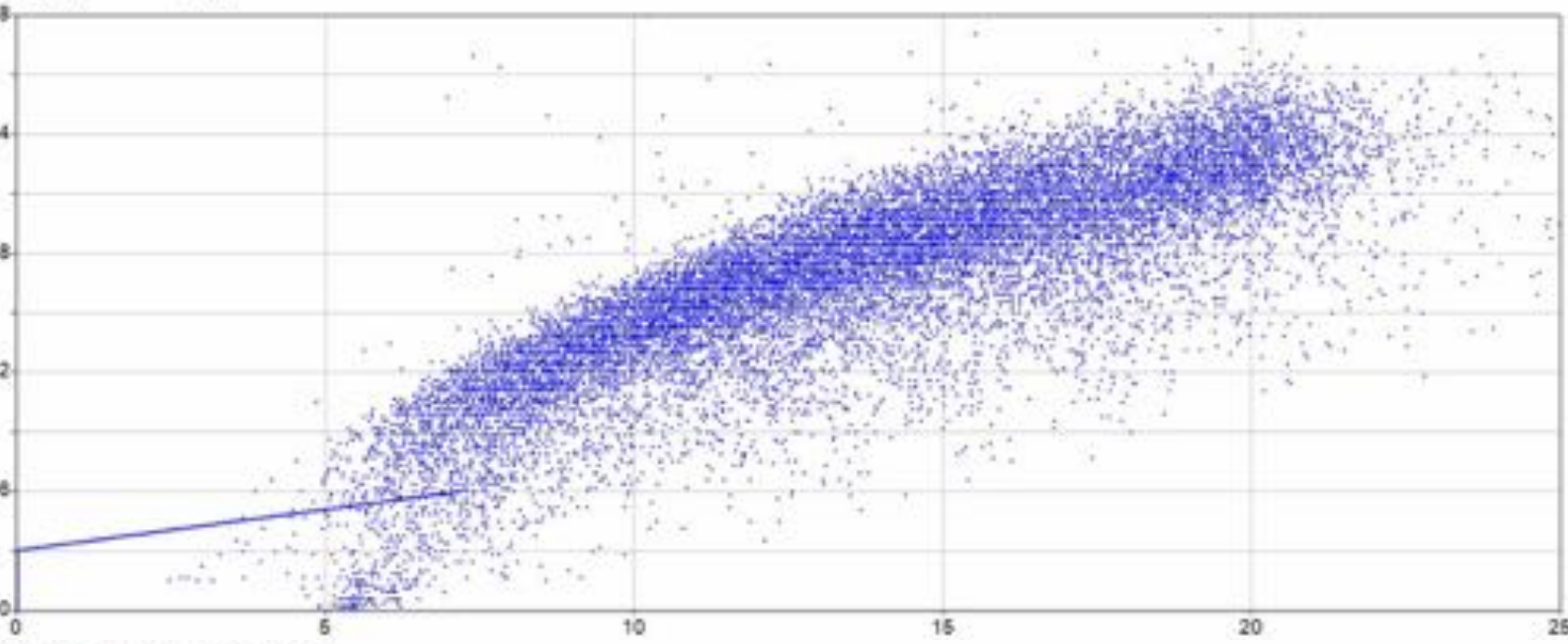
nvironmental Data Services

Axis	Transform	Site	Type	Variable
K (ind)	(None)	SEW17_EC02	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC02	Mean	175.00 Velocity (m/s)
nterval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



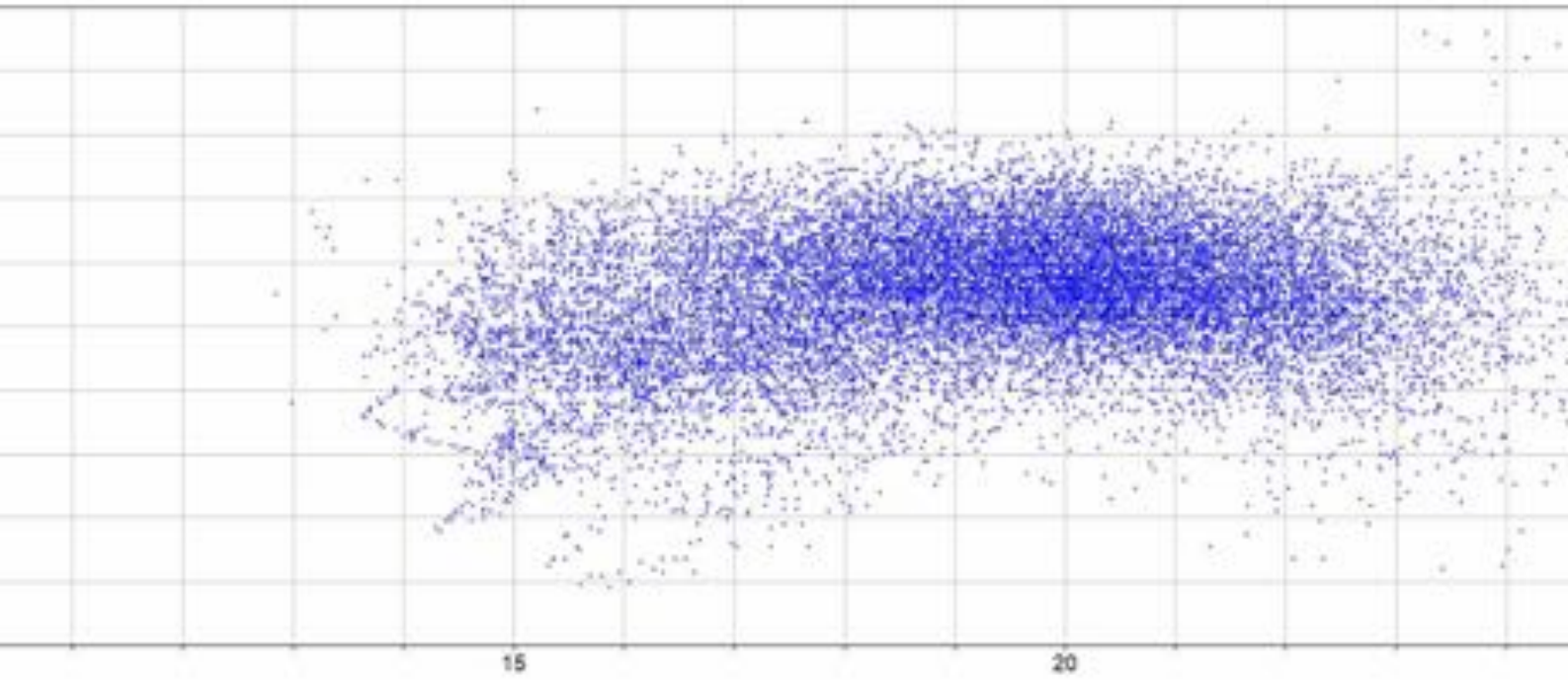
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC03	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC03	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



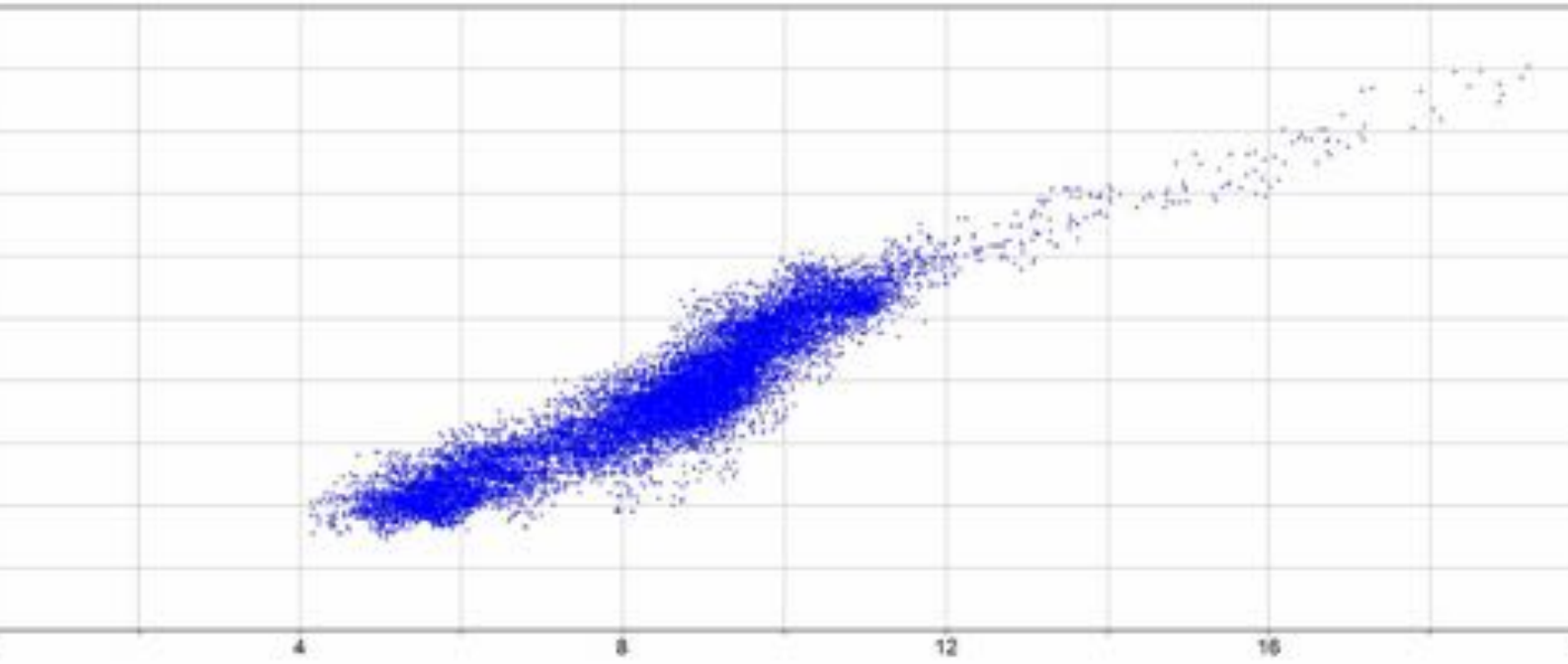
vironmental Data Services

is	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC04	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC04	Mean	175.00 Velocity (m/s)
erval	5 Minute			
art	00:00_02/11/2017			
d	00:00_02/01/2018			
ints	17568			



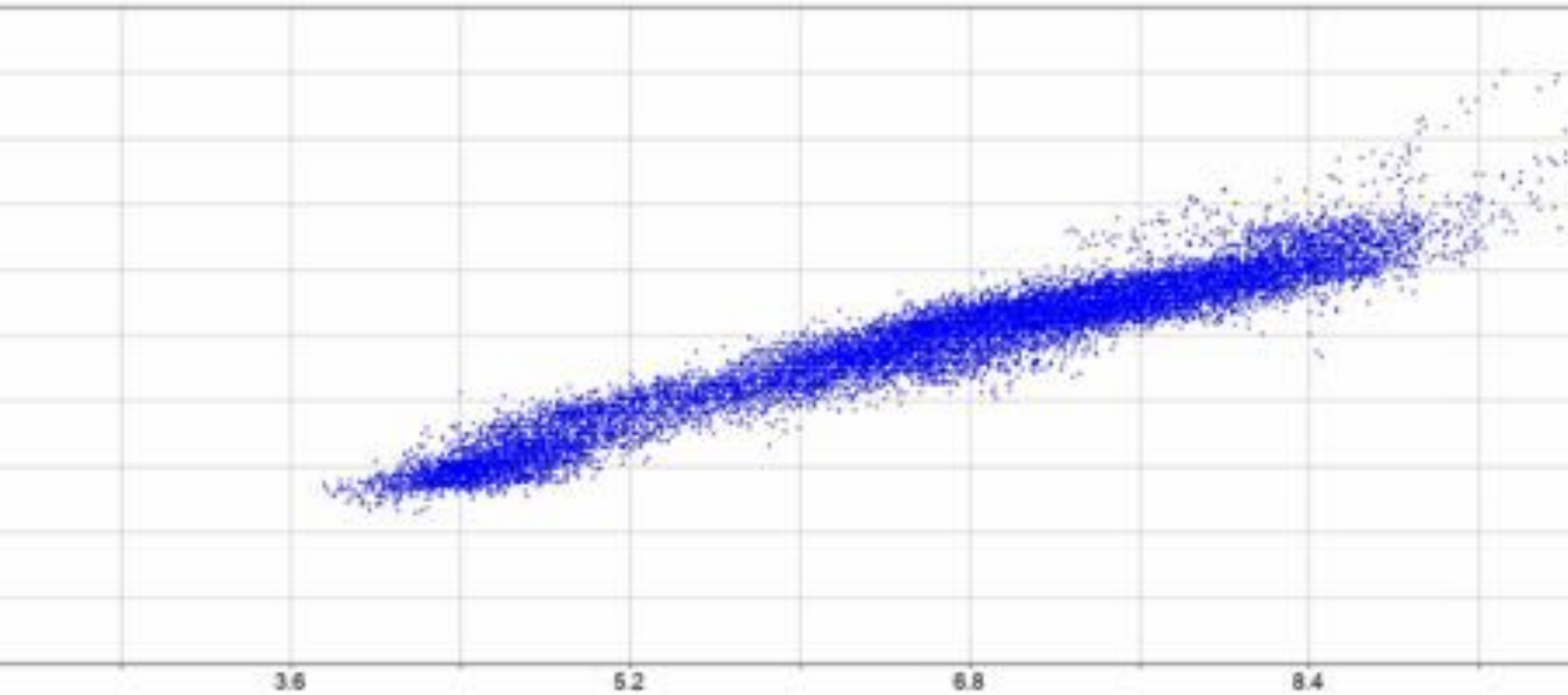
nvironmental Data Services

uis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC06	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC06	Mean	175.00 Velocity (m/s)
nterval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



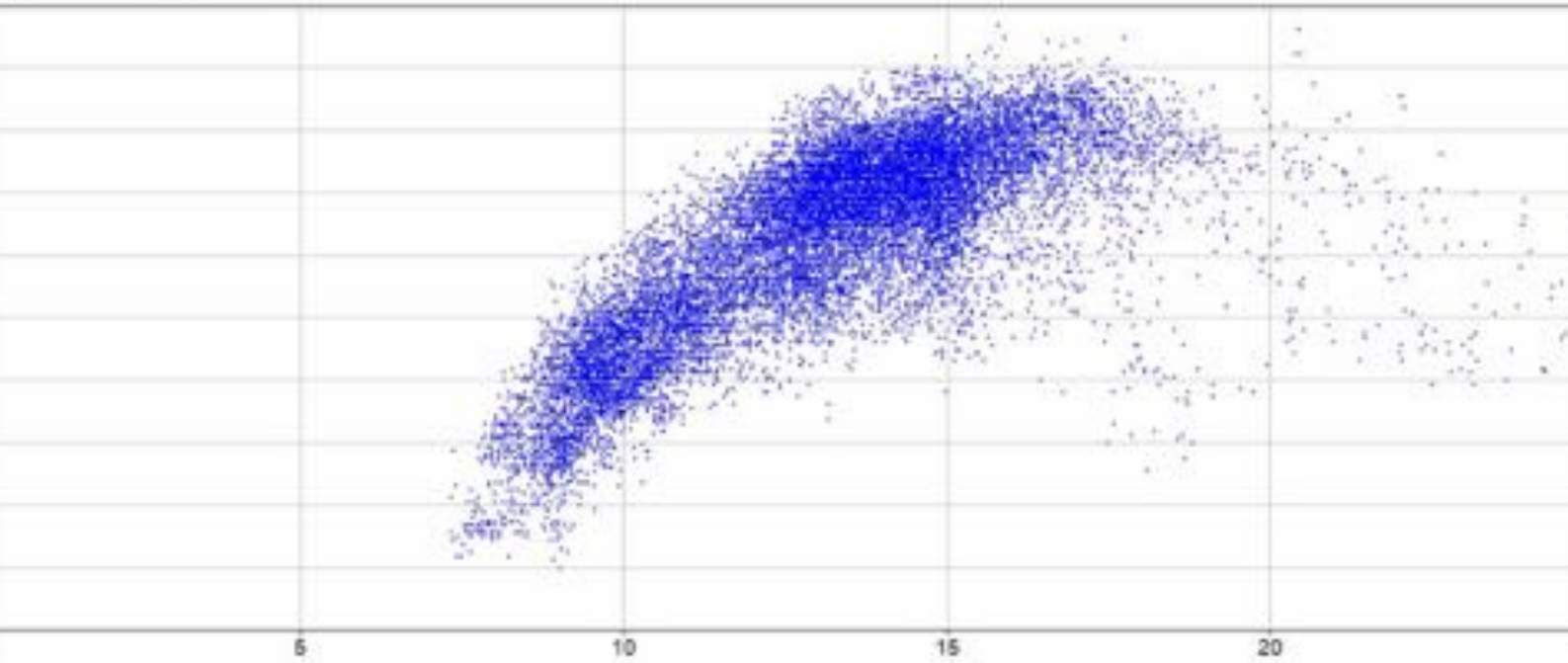
ironmental Data Services

	Transform	Site	Type	Variable
nd)	(None)	SEW17_EC06	Mean	229.00 Level (cm)
ep)	(None)	SEW17_EC06	Mean	175.00 Velocity (m/s)
rval	5 Minute			
t	00:00_02/11/2017			
	00:00_02/01/2018			
nts	17568			



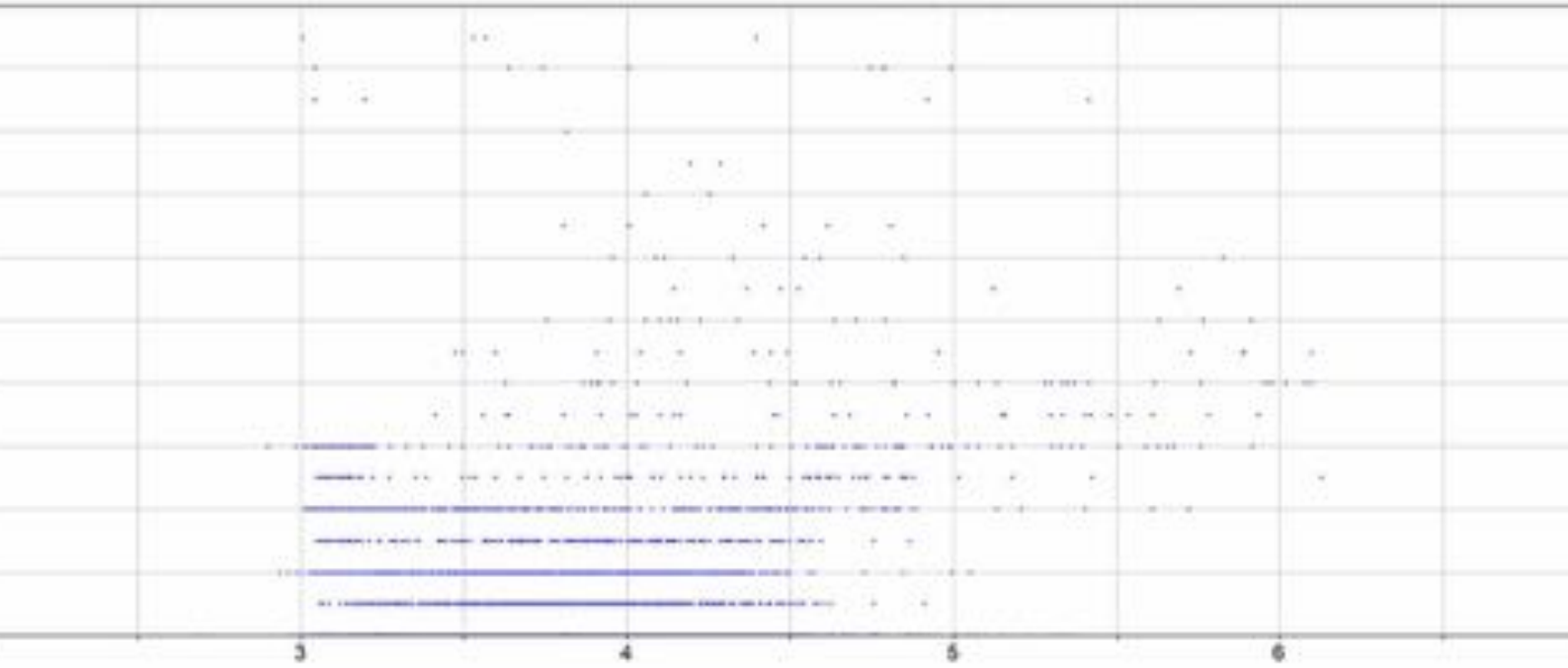
nvironmental Data Services

xis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC07	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC07	Mean	175.00 Velocity (m/s)
terval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



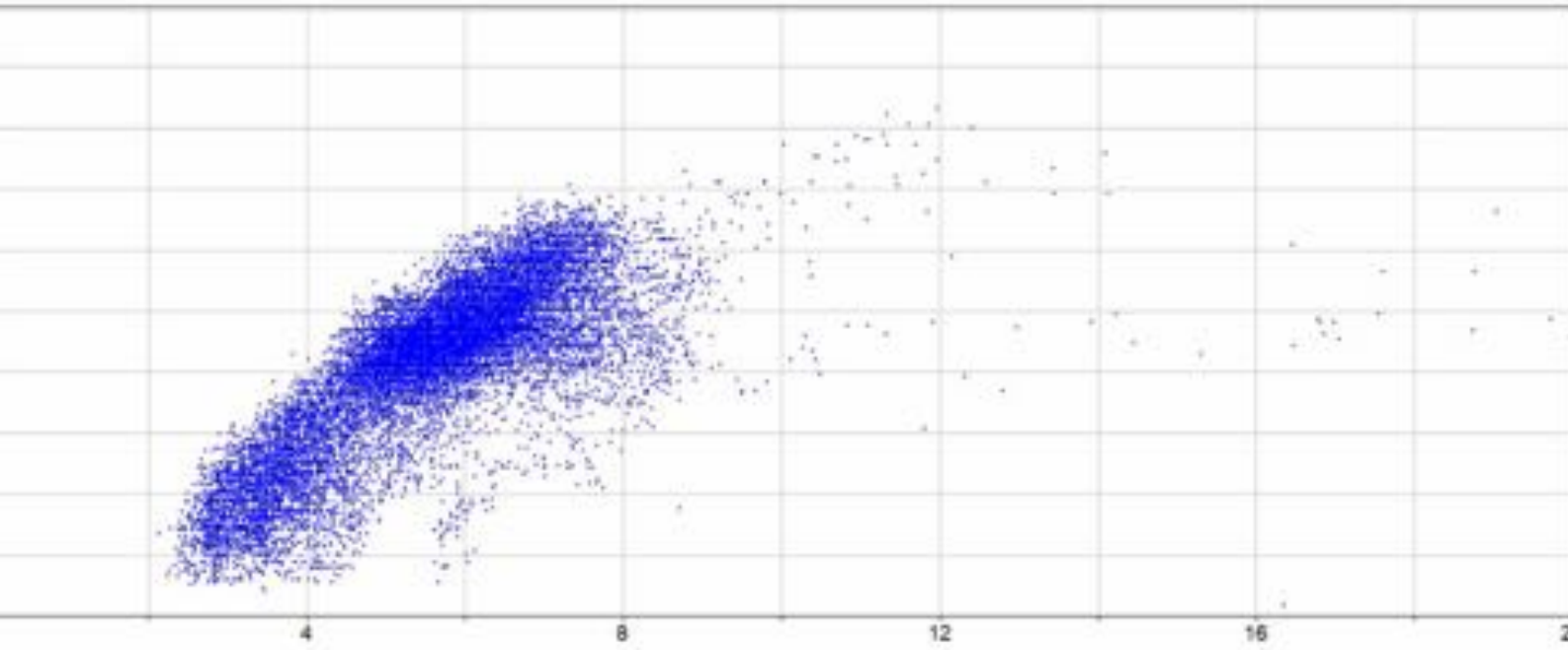
nvironmental Data Services

xis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC08	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC08	Mean	175.00 Velocity (m/s)
terval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



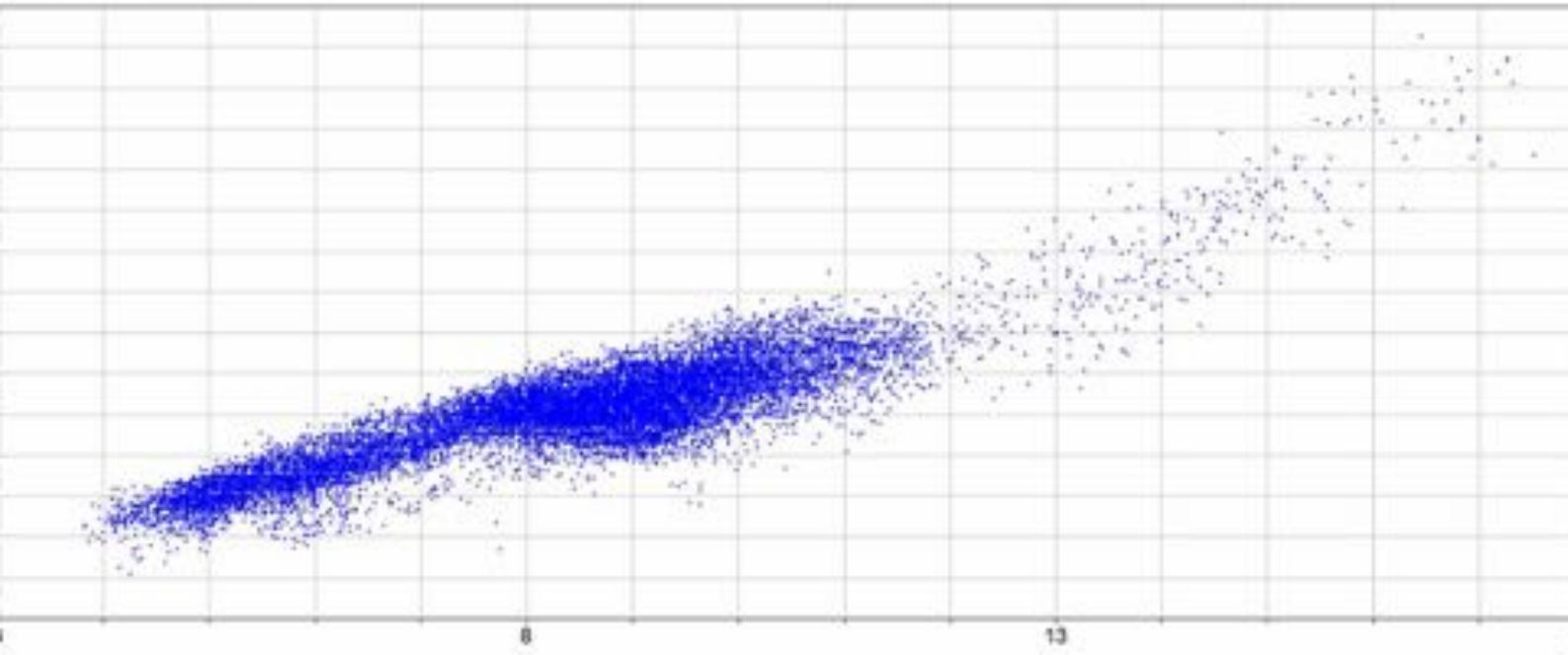
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC09	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC09	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



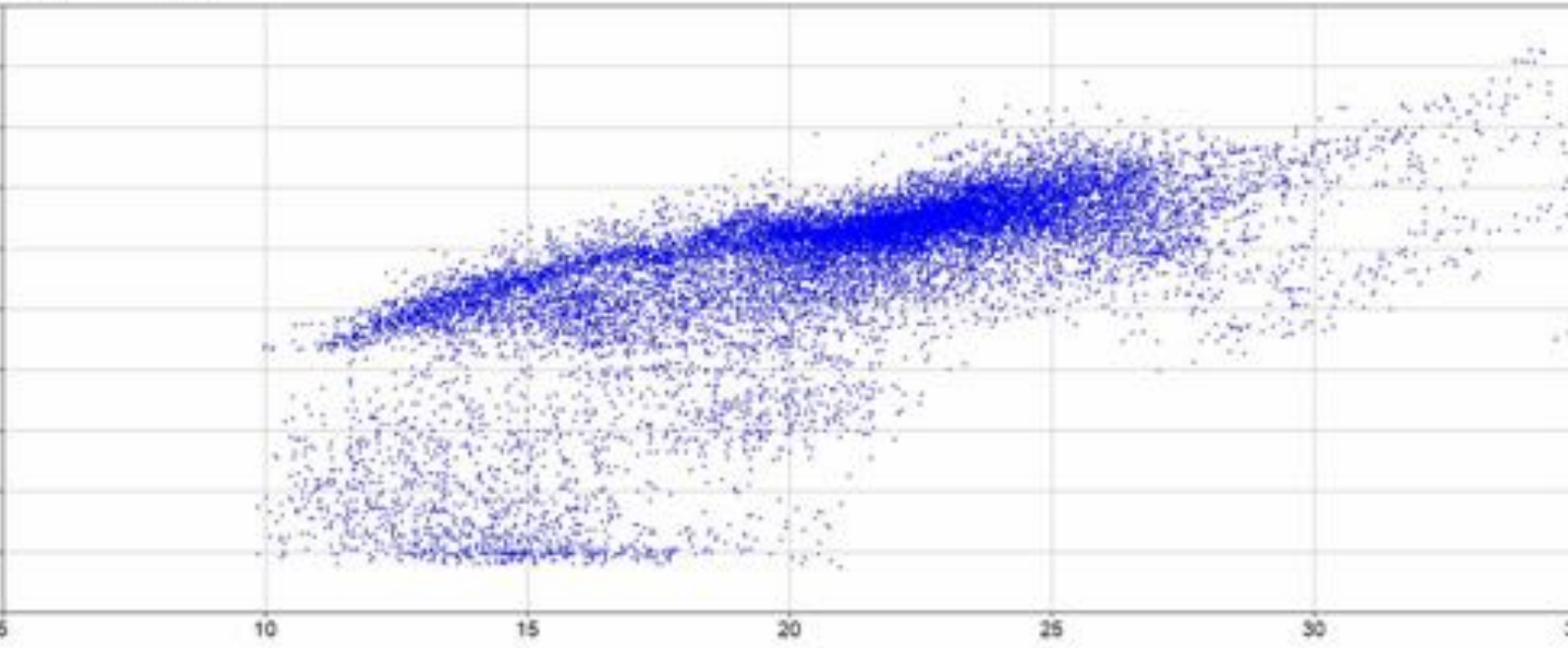
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC10	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC10	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



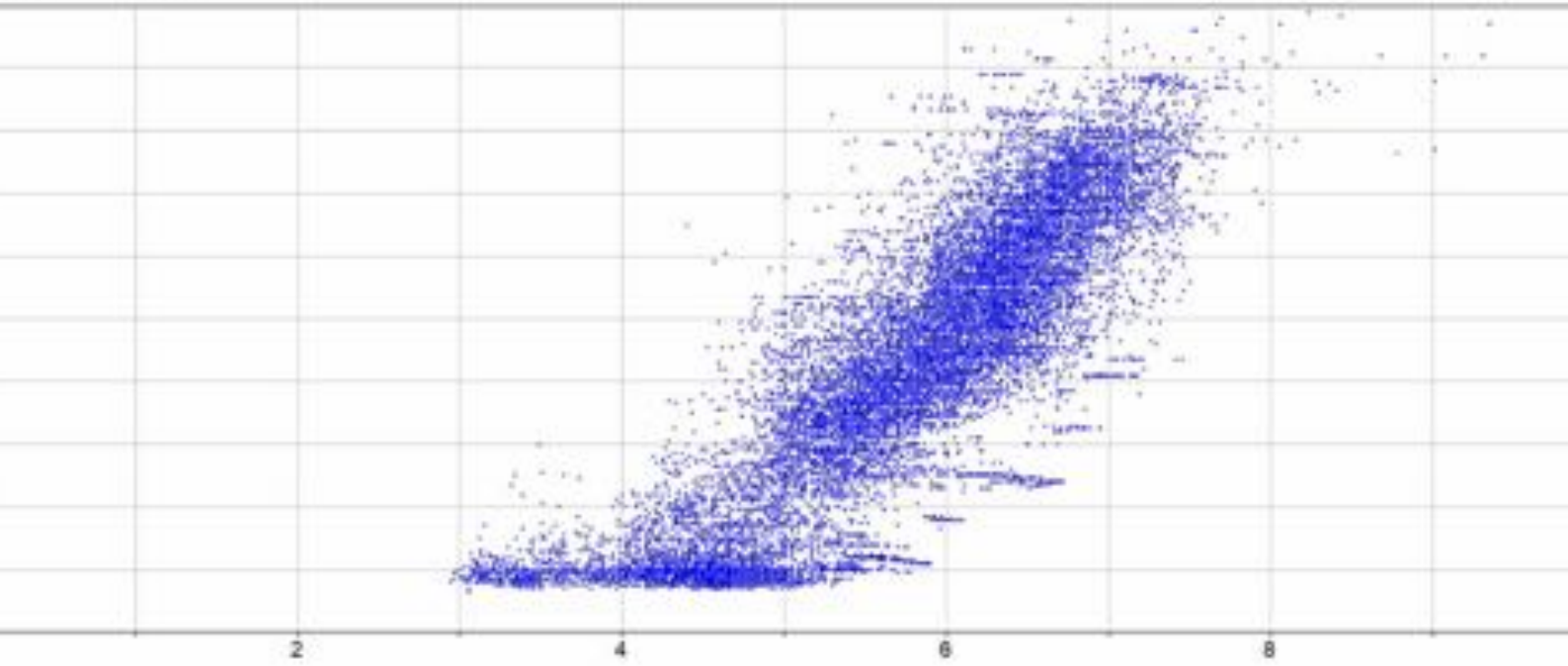
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC11	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC11	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



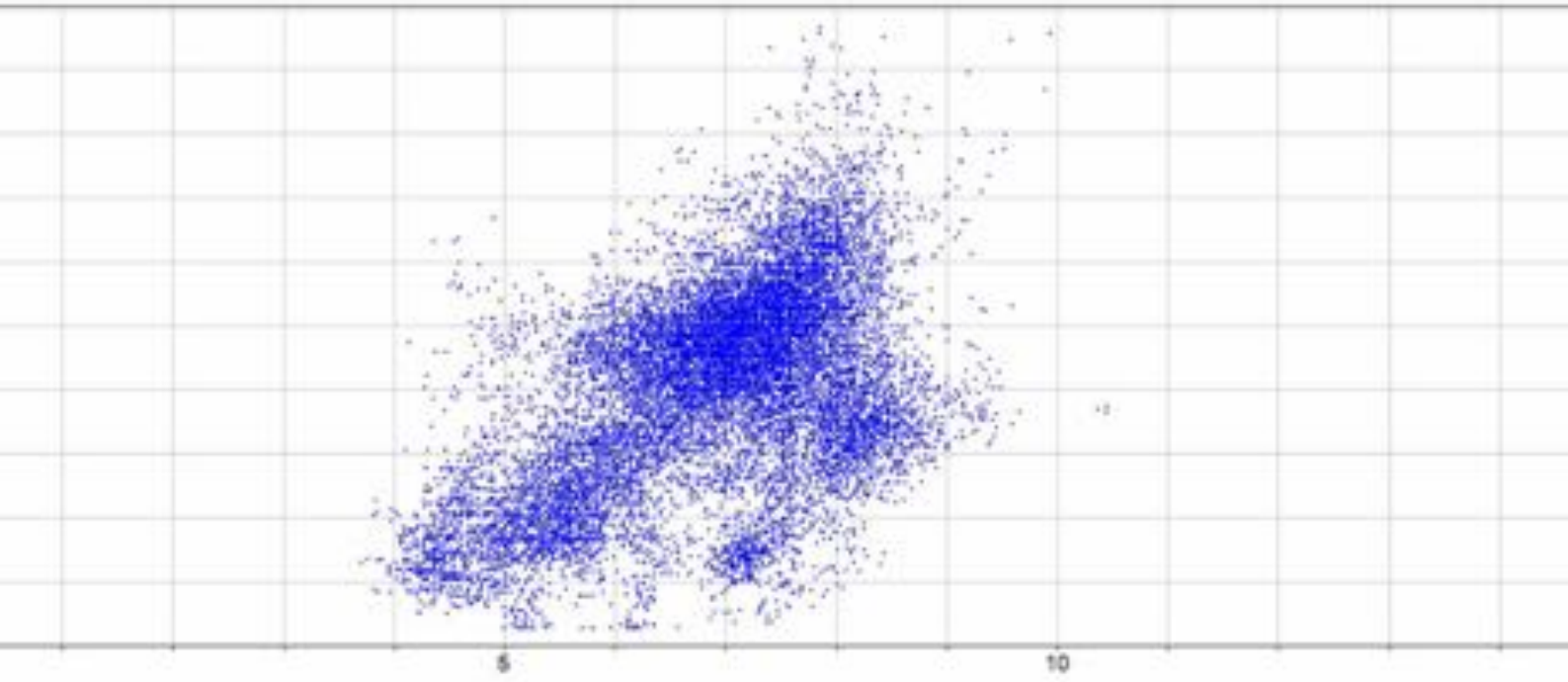
nvironmental Data Services

xis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC12	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC12	Mean	175.00 Velocity (m/s)
terval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



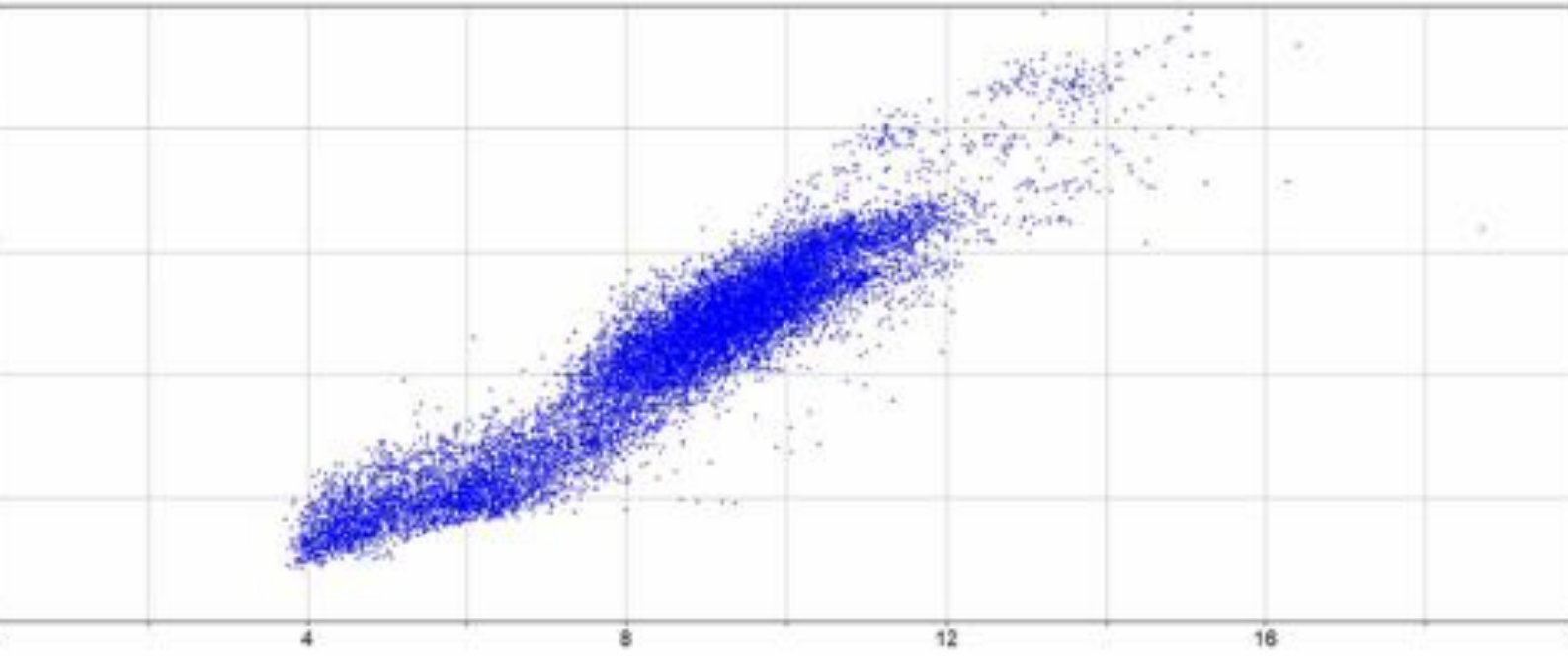
ironmental Data Services

	Transform	Site	Type	Variable
nd)	(None)	SEW17_EC14	Mean	229.00 Level (cm)
ep)	(None)	SEW17_EC14	Mean	175.00 Velocity (m/s)
rval	5 Minute			
t	00:00_02/11/2017			
	00:00_02/01/2018			
nts	17568			



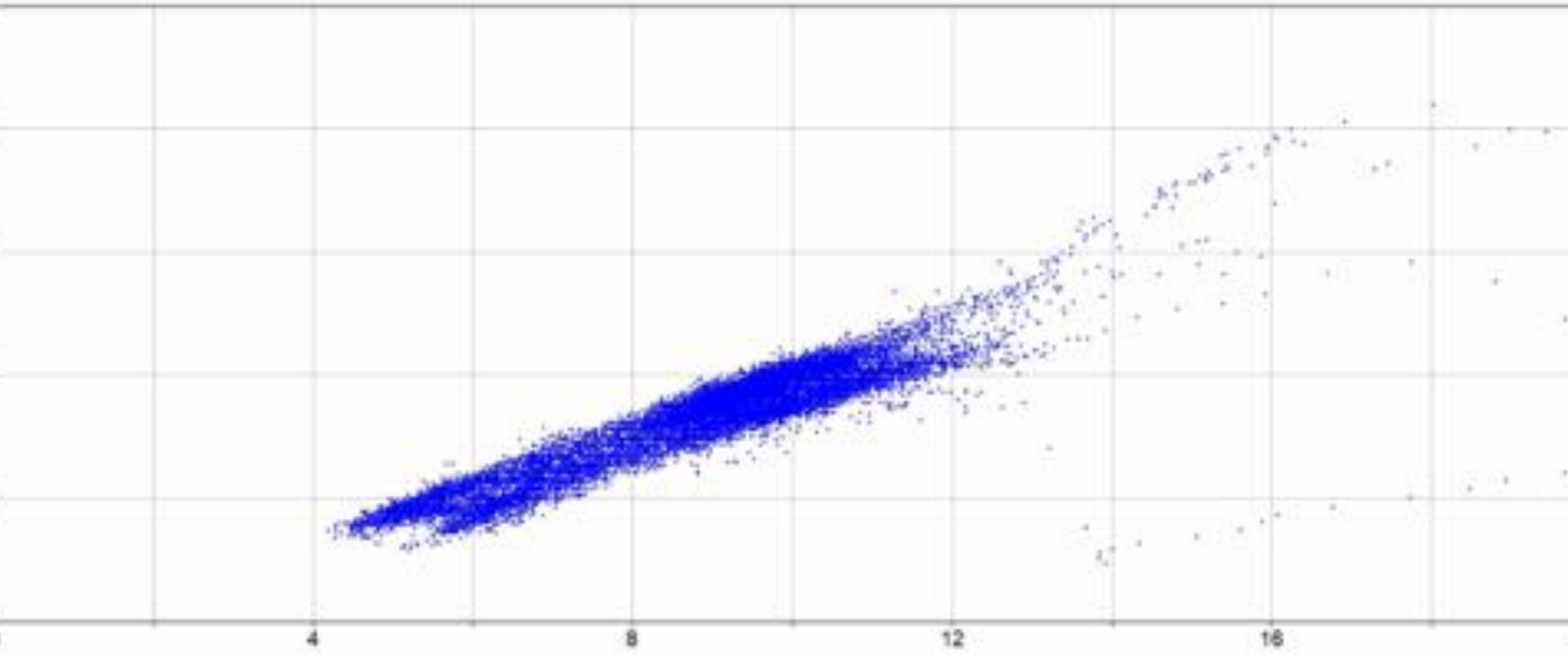
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC15	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC15	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



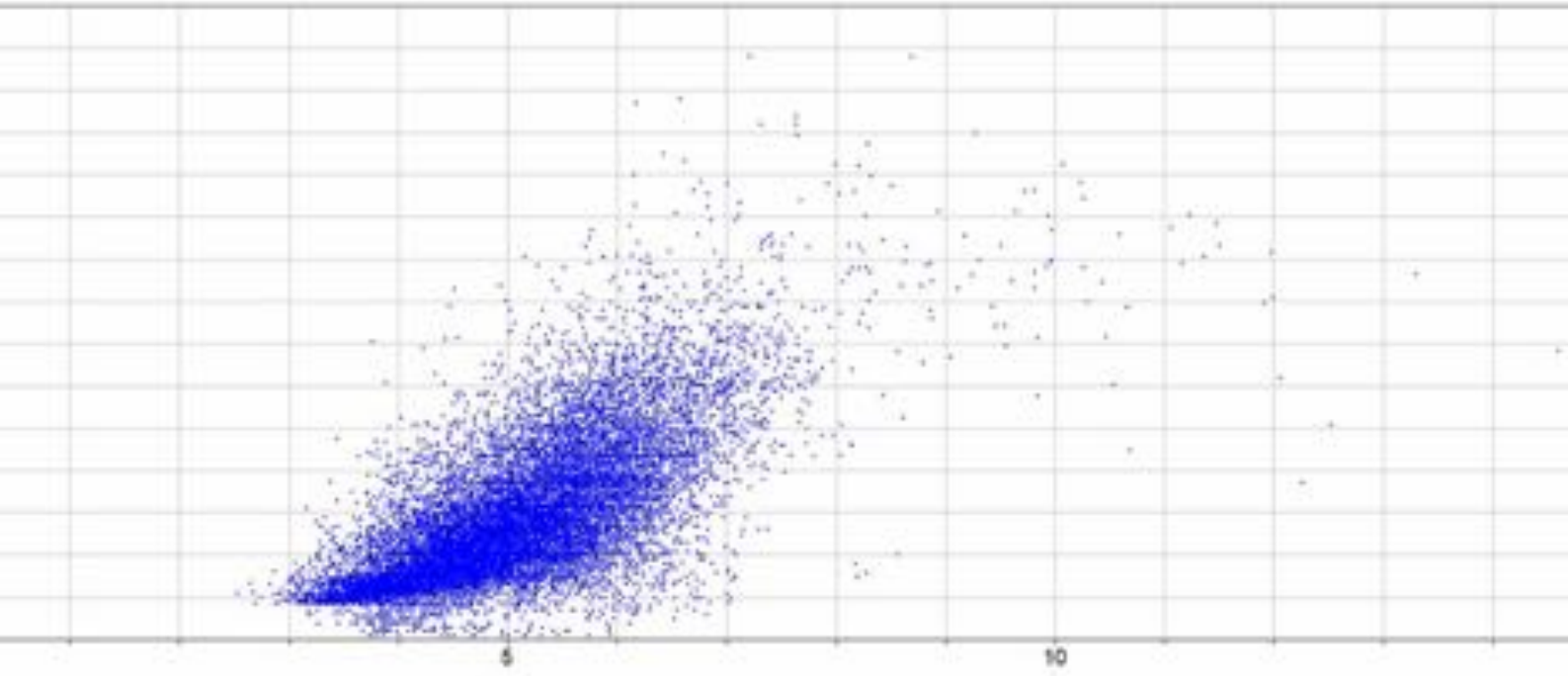
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC16	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC16	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



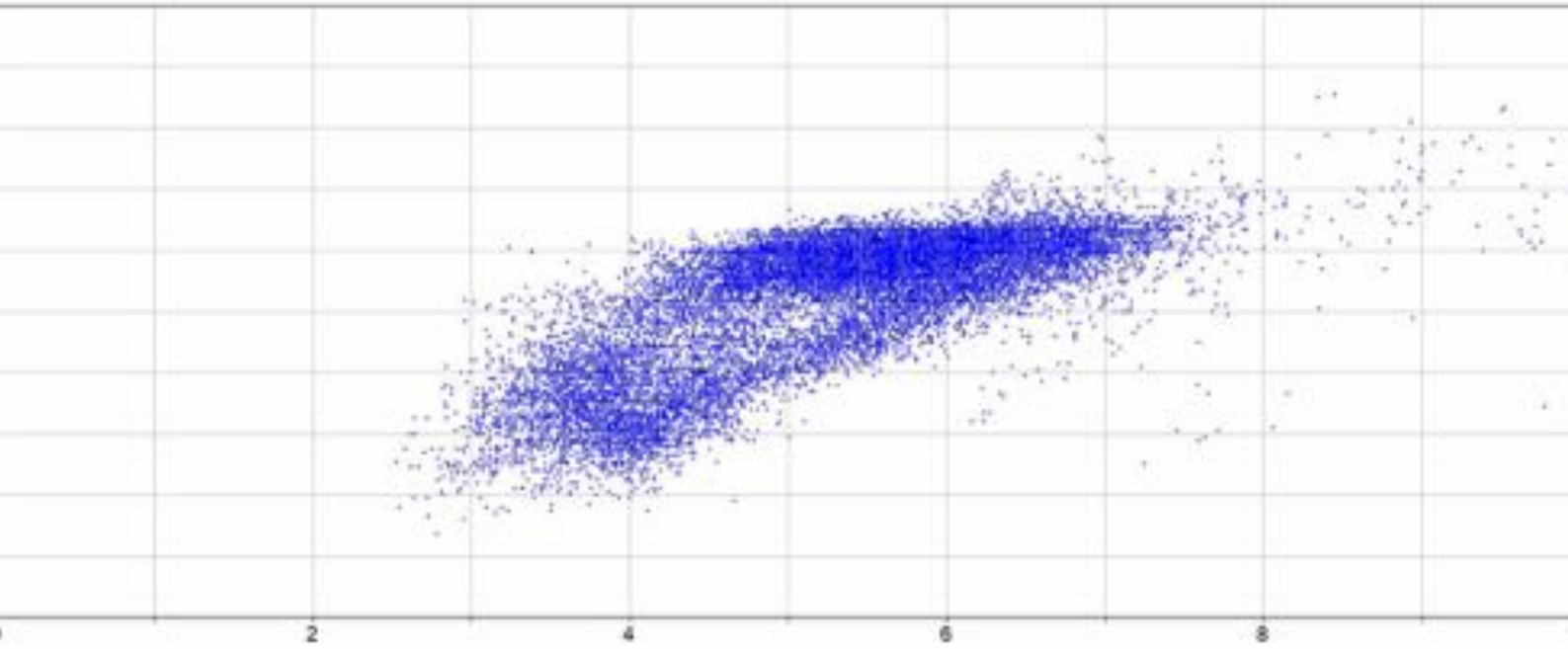
vironmental Data Services

s	Transform	Site	Type	Variable
ind)	(None)	SEW17_EC17	Mean	229.00 Level (cm)
dep)	(None)	SEW17_EC17	Mean	175.00 Velocity (m/s)
erval	5 Minute			
rt	00:00_02/11/2017			
d	00:00_02/01/2018			
nts	17568			



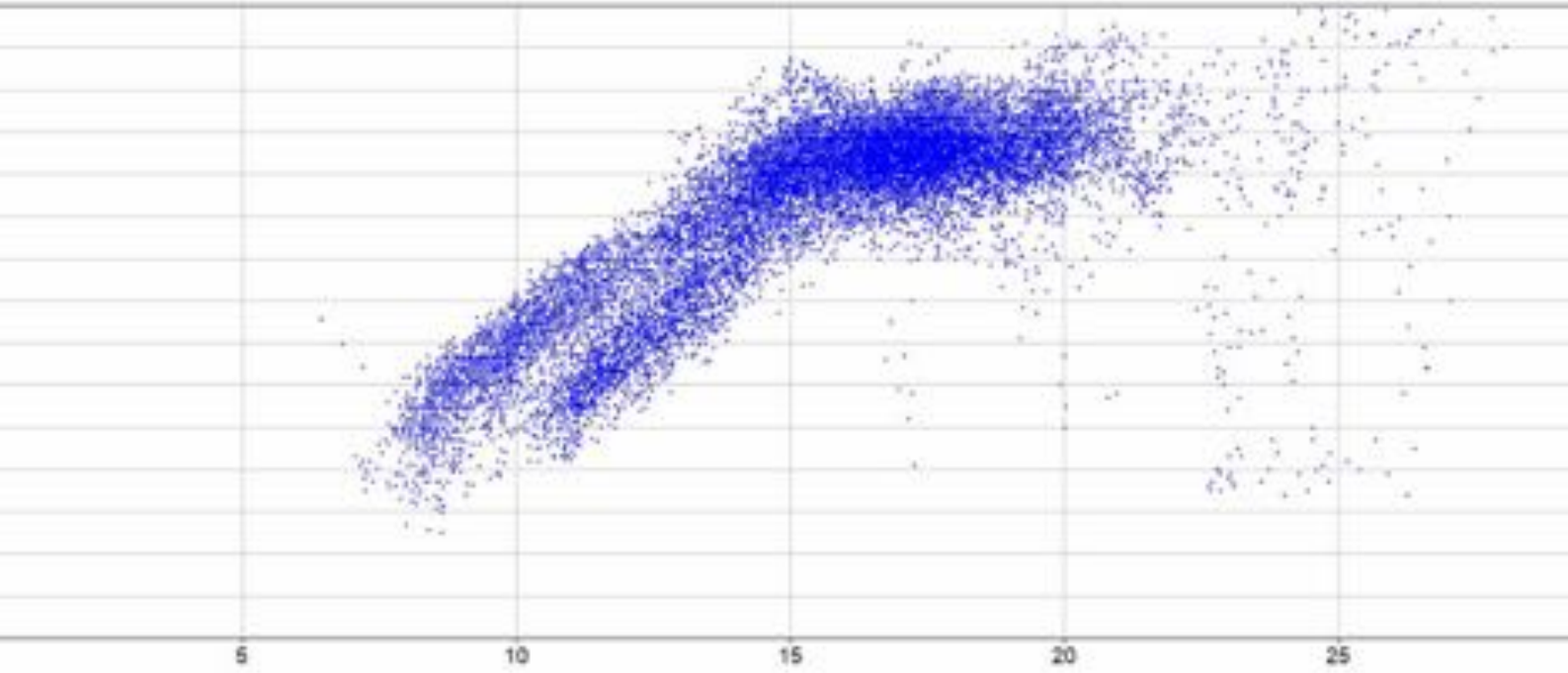
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC18	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC18	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



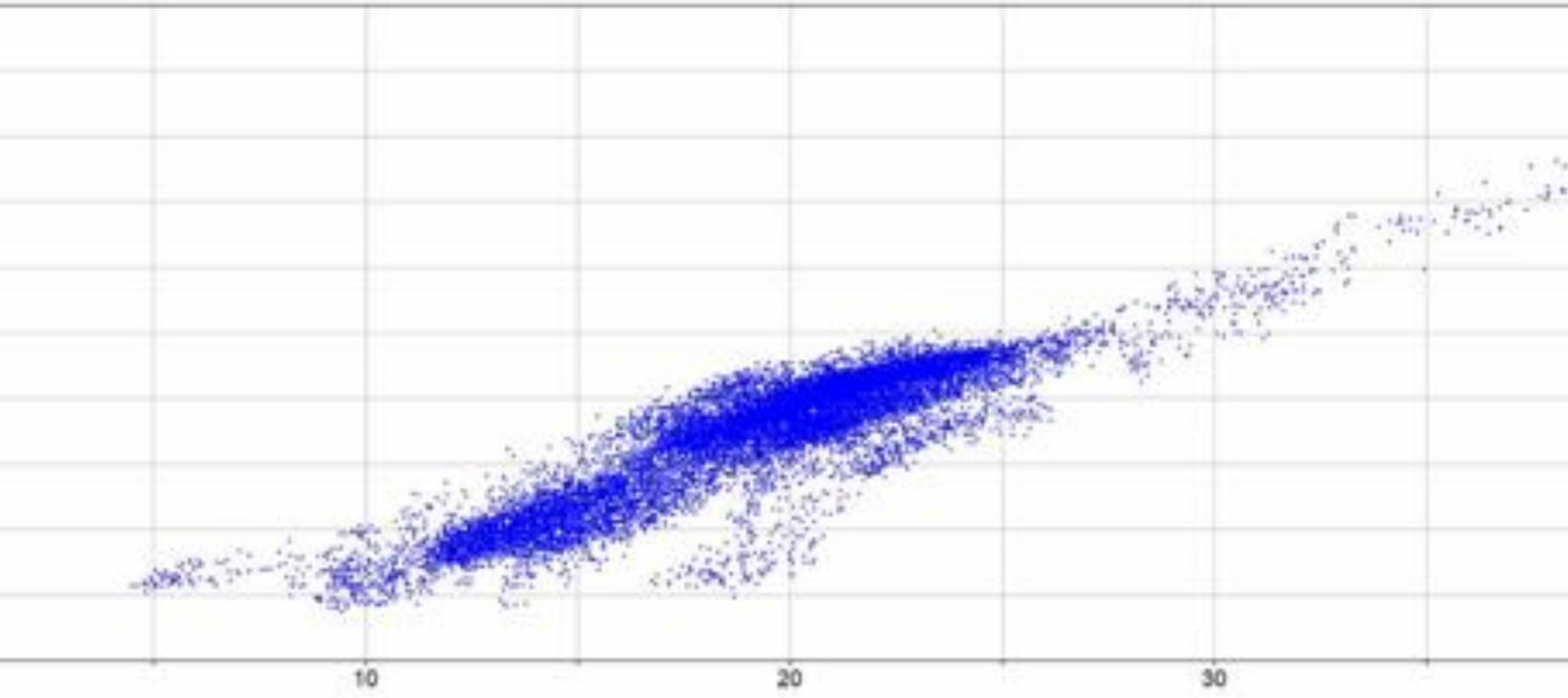
vironmental Data Services

is	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC19	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC19	Mean	175.00 Velocity (m/s)
terval	5 Minute			
art	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



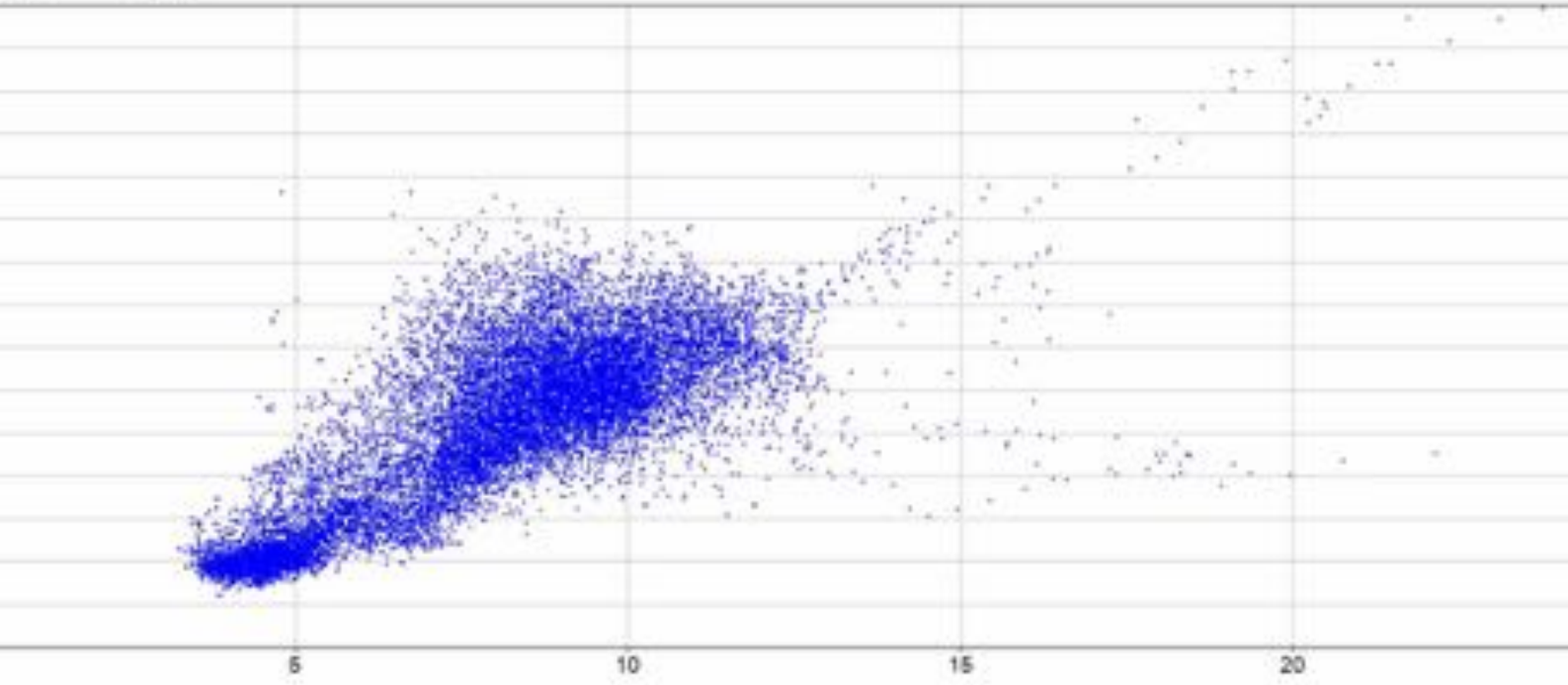
ronmental Data Services

	Transform	Site	Type	Variable
d)	(None)	SEW17_EC20	Mean	229.00 Level (cm)
p)	(None)	SEW17_EC20	Mean	175.00 Velocity (m/s)
val	5 Minute			
	00:00_02/11/2017			
	00:00_02/01/2018			
s	17568			



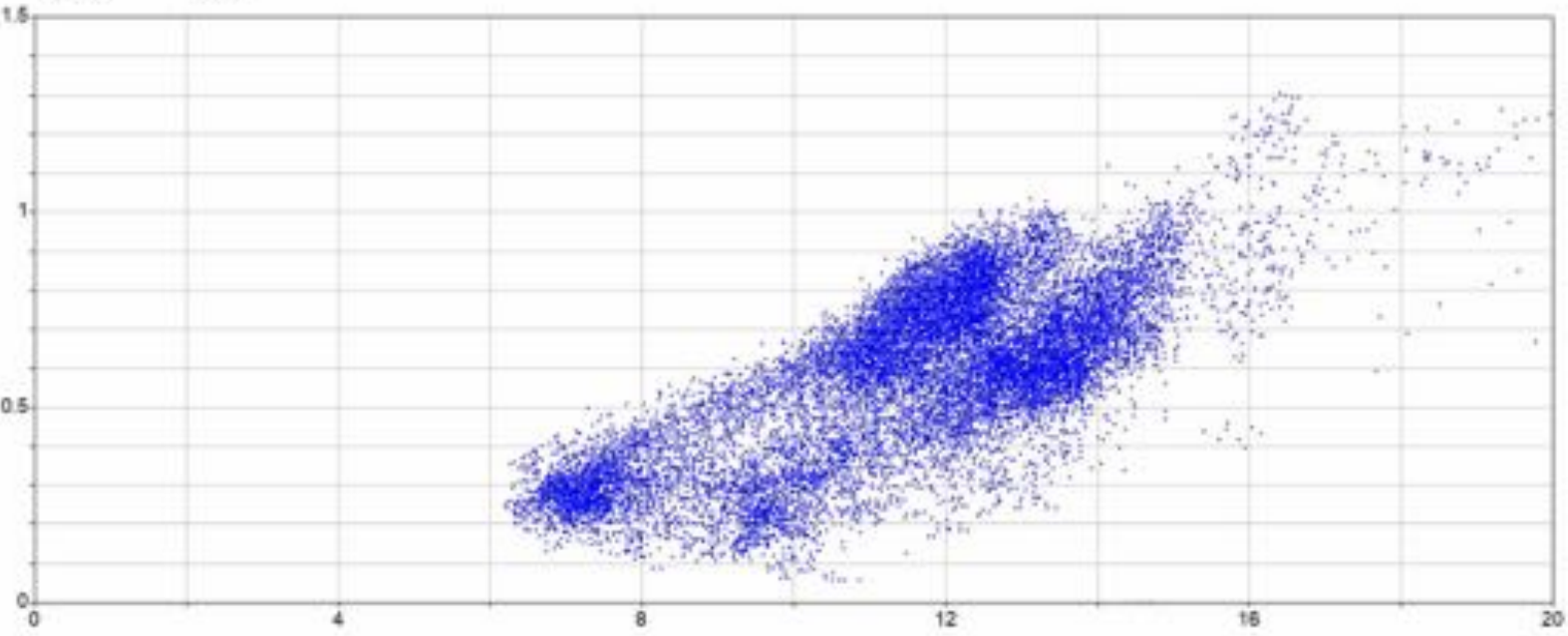
vironmental Data Services

	Transform	Site	Type	Variable
s				
ind)	(None)	SEW17_EC21	Mean	229.00 Level (cm)
dep)	(None)	SEW17_EC21	Mean	175.00 Velocity (m/s)
erval	5 Minute			
art	00:00_02/11/2017			
d	00:00_02/01/2018			
ints	17568			



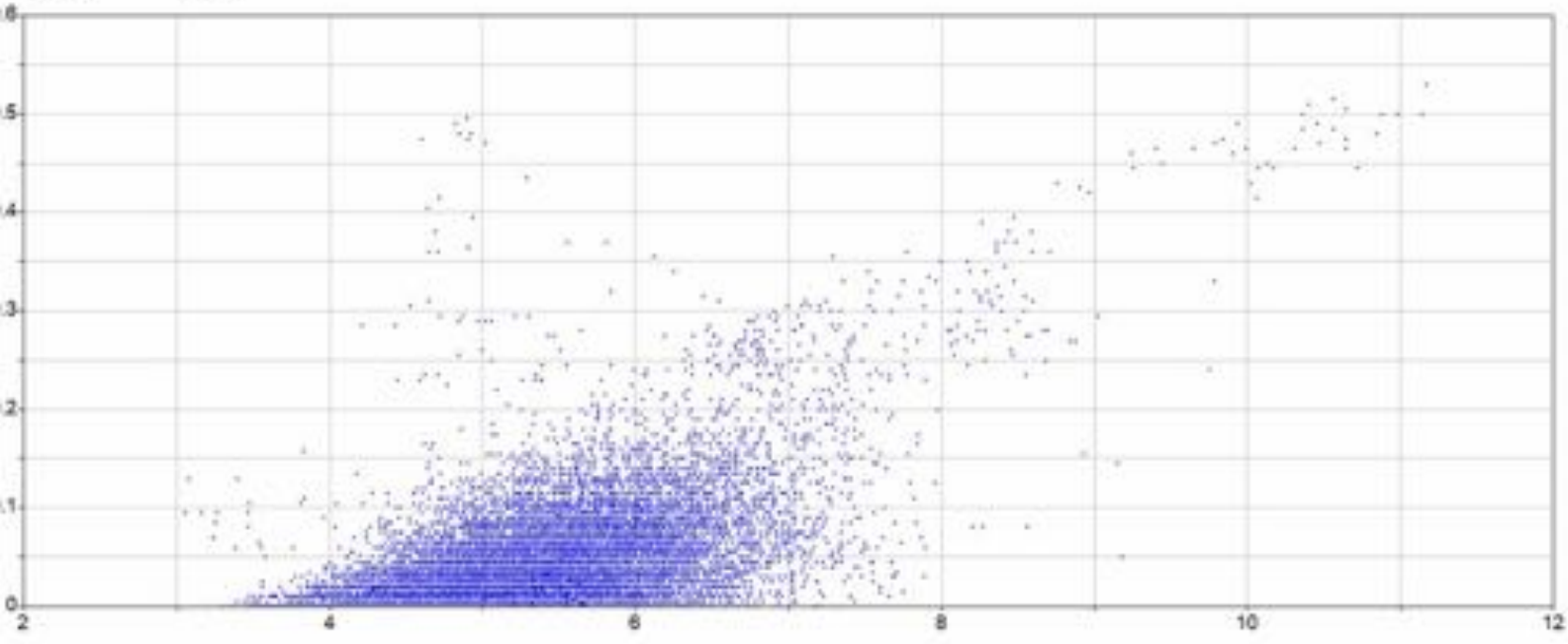
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC23	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC23	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



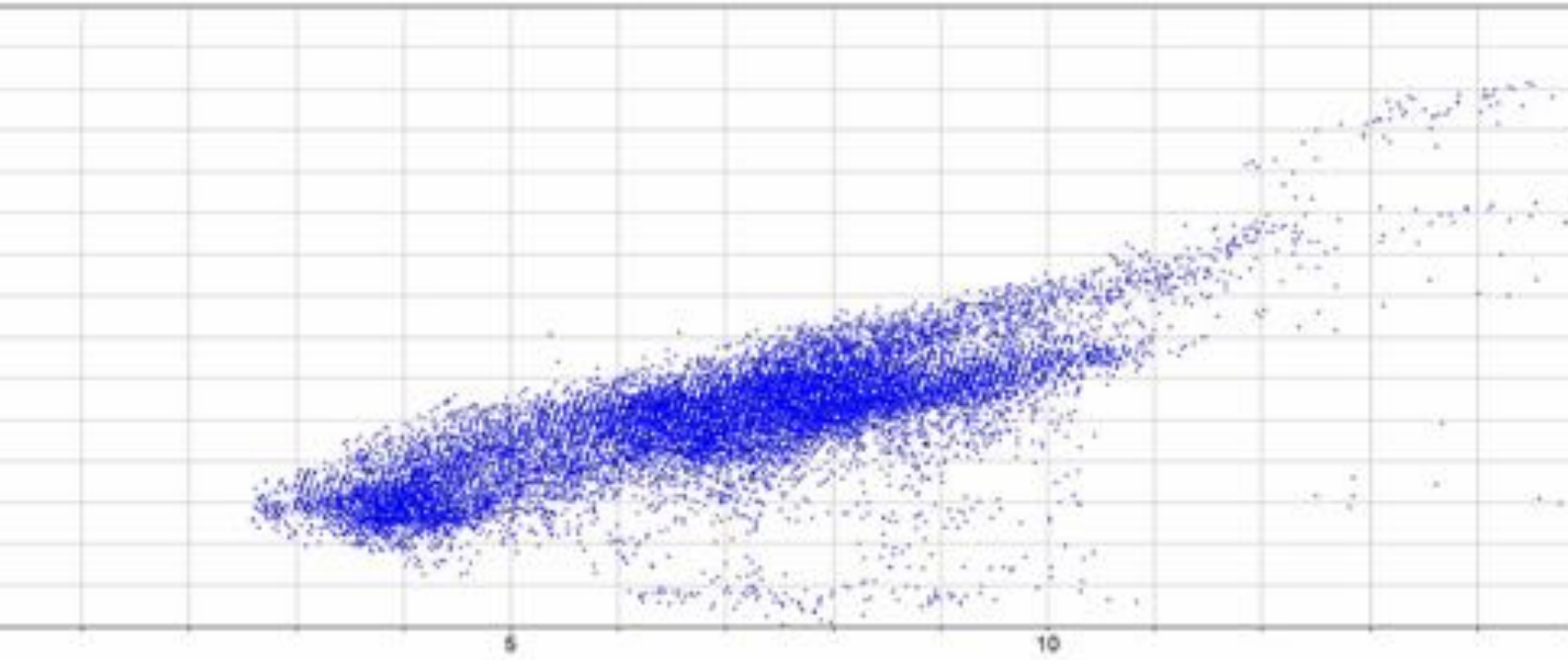
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC24	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC24	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



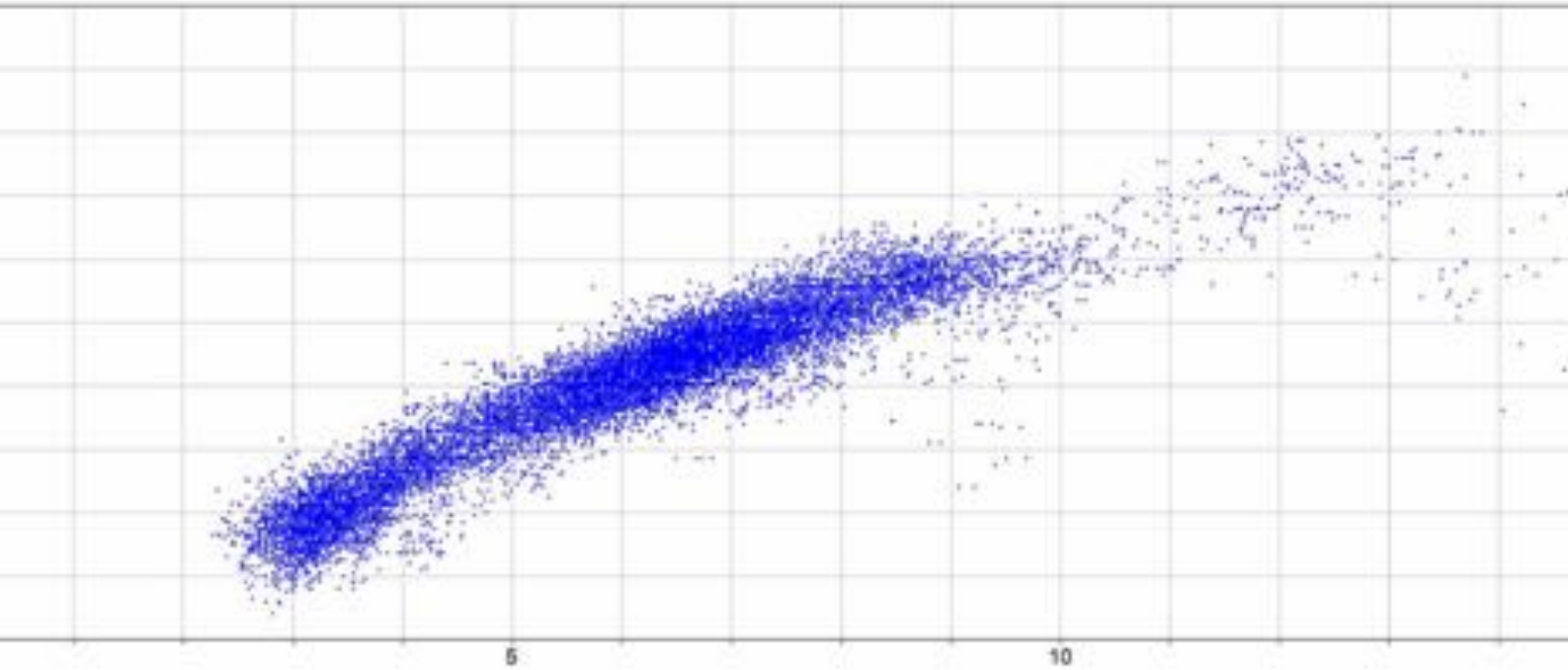
nvironmental Data Services

xis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC25	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC25	Mean	175.00 Velocity (m/s)
nterval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



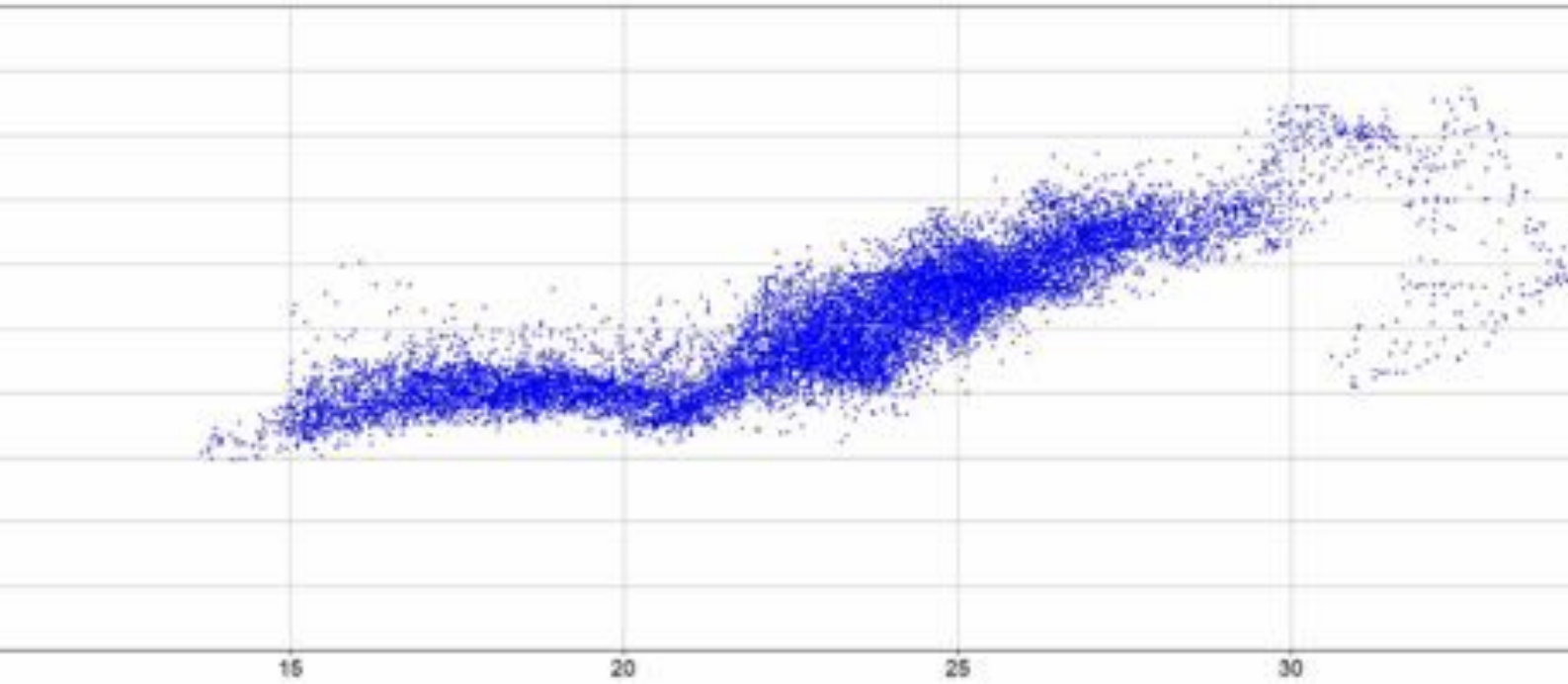
vironmental Data Services

is	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC26	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC26	Mean	175.00 Velocity (m/s)
erval	5 Minute			
art	00:00_02/11/2017			
d	00:00_02/01/2018			
ints	17568			



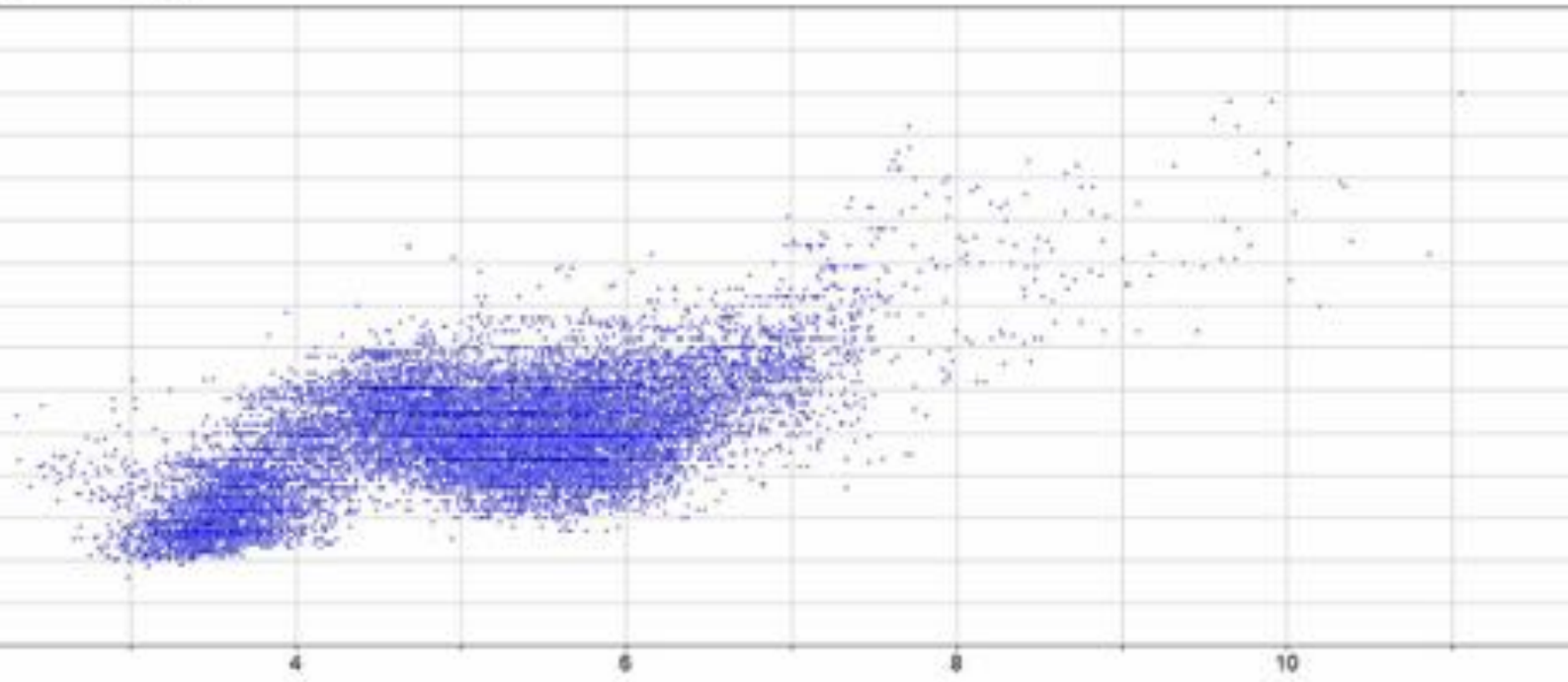
vironmental Data Services

s	Transform	Site	Type	Variable
ind)	(None)	SEW17_EC27	Mean	229.00 Level (cm)
dep)	(None)	SEW17_EC27	Mean	175.00 Velocity (m/s)
rval	5 Minute			
rt	00:00_02/11/2017			
d	00:00_02/01/2018			
nts	17568			



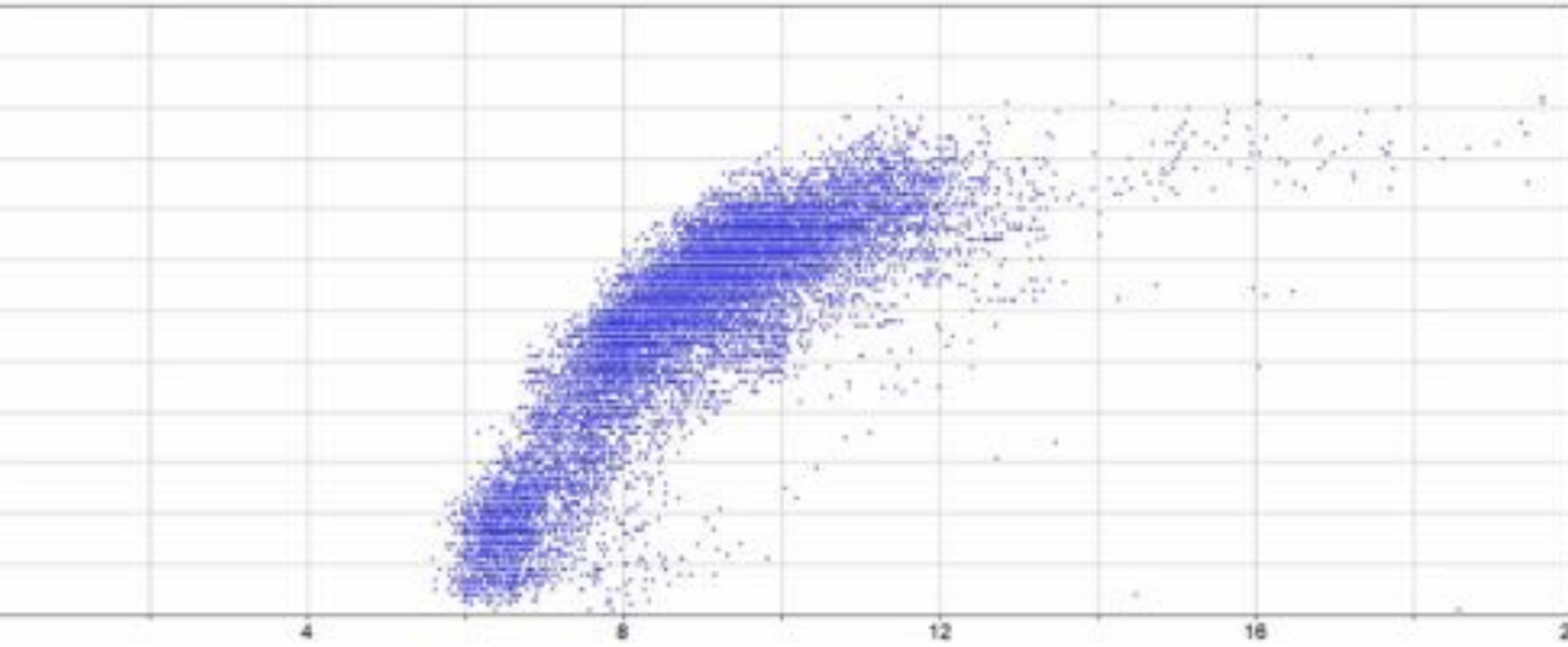
vironmental Data Services

is	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC28	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC28	Mean	175.00 Velocity (m/s)
terval	5 Minute			
art	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



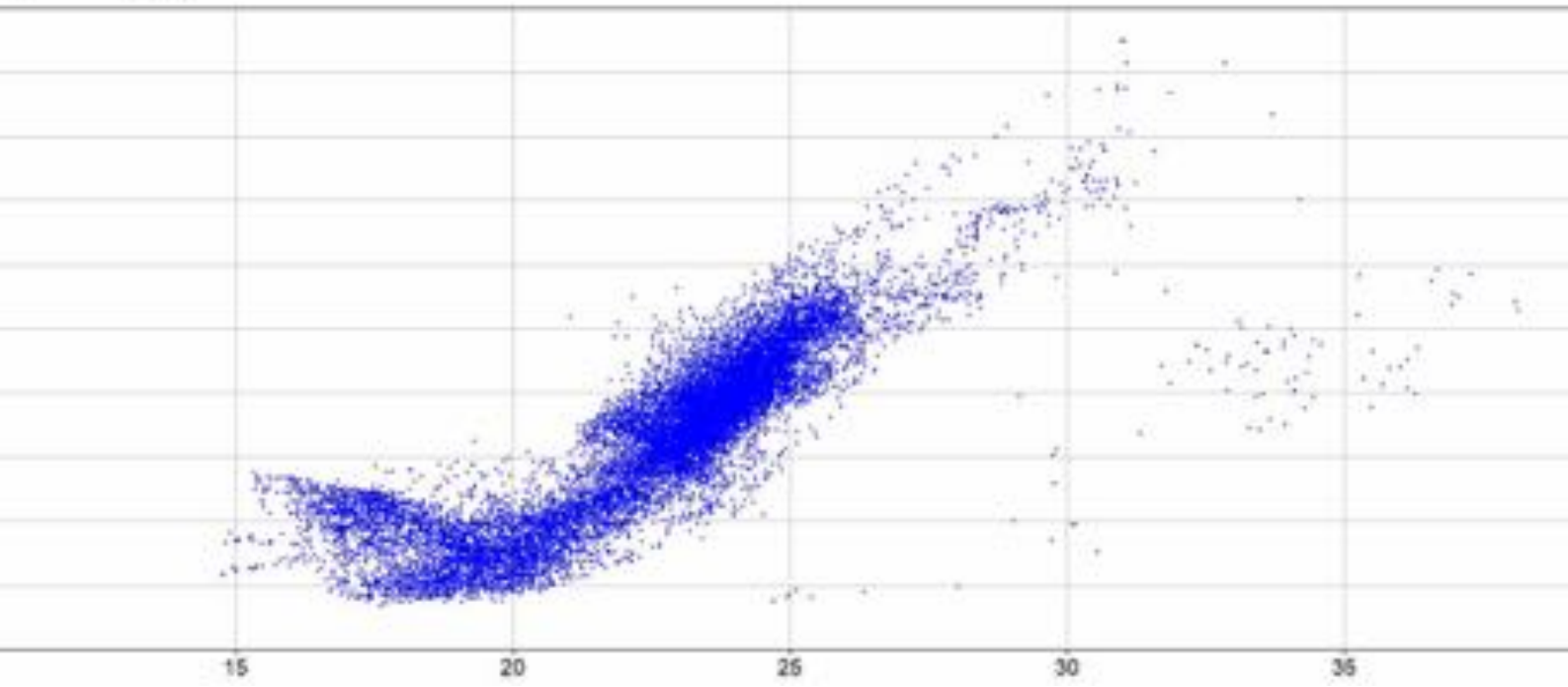
Environmental Data Services

Axis	Transform	Site	Type	Variable
X (ind)	(None)	SEW17_EC29	Mean	229.00 Level (cm)
Y (dep)	(None)	SEW17_EC29	Mean	175.00 Velocity (m/s)
Interval	5 Minute			
Start	00:00_02/11/2017			
End	00:00_02/01/2018			
Points	17568			



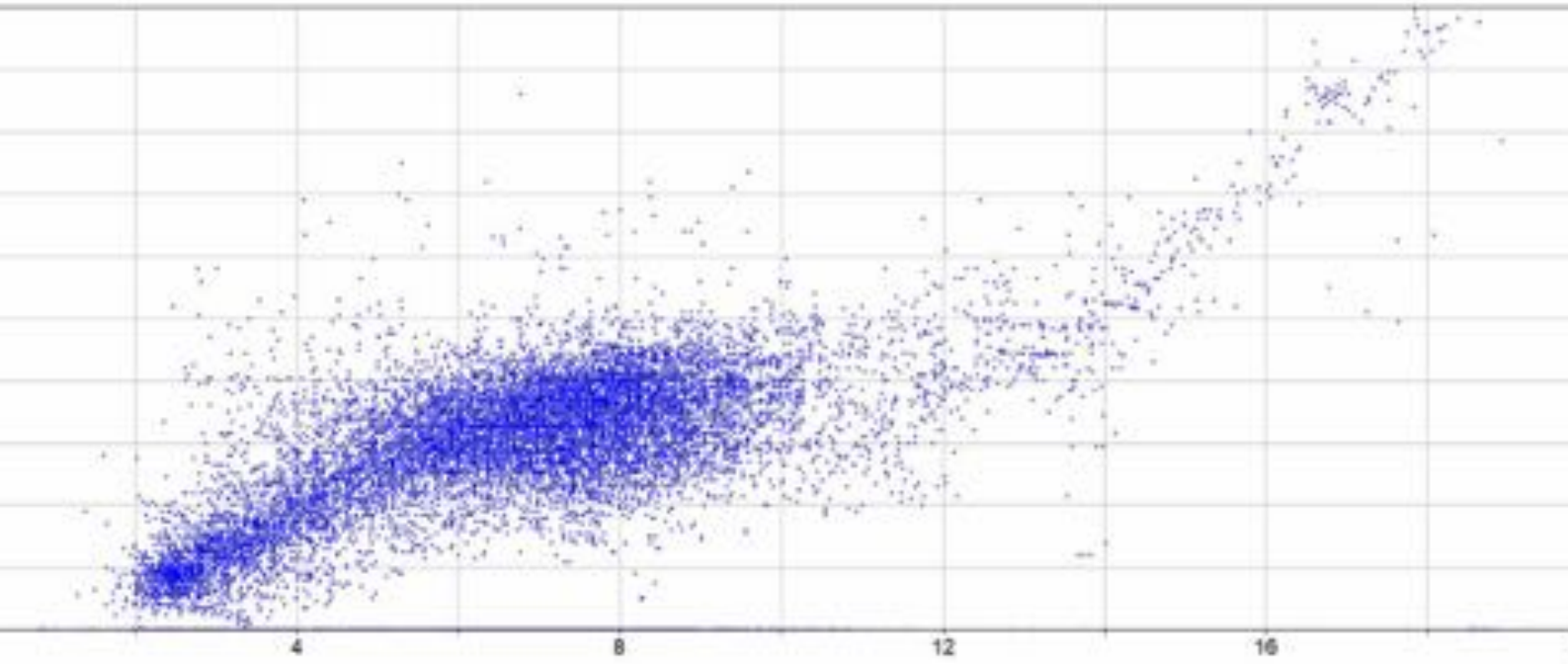
vironmental Data Services

s	Transform	Site	Type	Variable
ind)	(None)	SEW17_EC30	Mean	229.00 Level (cm)
dep)	(None)	SEW17_EC30	Mean	175.00 Velocity (m/s)
rval	5 Minute			
rt	00:00_02/11/2017			
d	00:00_02/01/2018			
nts	17568			



nvironmental Data Services

xis	Transform	Site	Type	Variable
(ind)	(None)	SEW17_EC31	Mean	229.00 Level (cm)
(dep)	(None)	SEW17_EC31	Mean	175.00 Velocity (m/s)
terval	5 Minute			
tart	00:00_02/11/2017			
nd	00:00_02/01/2018			
oints	17568			



8.0 Elster Creek Flow Meter Calibration Summary

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
1	26.10.2017	9:19	9:21	120	120	0	0.67	0.67	0	17.88	17.88	0.00	0.0
1	17.11.2017	10:11	10:13	86	86	0	0.58	0.59	0.01	9.81	9.98	0.17	1.7
1	19.12.2017	12:19	12:22	89	91	2	0.55	0.54	-0.01	9.76	9.88	0.12	1.2
					Avg:	**0.67**		**Avg:**	**0.00**		**Avg:**	**0.10**	**1.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
2	20.11.2017	9:18	9:20	90	90	0	0.68	0.68	0	15.69	15.69	0.00	0.0
					Avg:	**0.00**		**Avg:**	**0.00**		**Avg:**	**0.05**	**0.5**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
3	26.10.2017	12:48	12:52	205	205	0	0.73	0.73	0	50.69	50.69	0.00	0.0
3	12.12.2017	14:29	14:32	108	110	2	0.44	0.44	0	12.75	13.08	0.33	2.6
3	18.12.2017	13:14	13:17	191	192	1	0.6	0.59	-0.01	37.98	37.61	-0.38	-0.9
3	09.01.2018	10:39	10:41	169	172	3	0.35	0.35	0	18.83	19.28	0.45	2.3
					Avg:	**1.50**		**Avg:**	**0.00**		**Avg:**	**0.10**	**1.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
4	26.10.2017	10:46	10:49	150	152	2	0.35	0.36	0.01	19.72	20.67	0.95	4.8
4	13.12.2017	8:30	8:34	219	221	2	0.74	0.74	0	70.56	71.44	0.88	1.2
4	29.12.2017	7:39	7:42	219	219	0	0.74	0.74	0	70.56	70.56	0.00	0.0
					Avg:	**1.33**		**Avg:**	**0.00**		**Avg:**	**0.61**	**2.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
5	27.10.2017	9:46	9:49	97	97	0	0.49	0.48	-0.01	9.89	9.69	-0.20	-2.0
5	17.11.2017	13:11	13:14	94	94	0	0.51	0.52	0.01	9.86	10.05	0.19	1.9
5	14.12.2017	8:41	8:43	101	100	-1	0.54	0.53	-0.01	11.53	11.16	-0.37	-3.1
					Avg:	**-0.33**		**Avg:**	**0.00**		**Avg:**	**-0.13**	**-1.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
6	20.10.2017	10:18	10:21	89	86	-3	0.66	0.66	0	13.34	12.71	-0.63	-4.7
6	13.12.2017	10:08	10:11	73	73	0	0.68	0.69	0.01	10.36	10.52	0.15	1.4
6	04.01.2018	6:22	6:25	68	68	0	0.39	0.41	0.02	5.37	5.64	0.28	5.1
					Avg:	**-1.00**		**Avg:**	**0.01**		**Avg:**	**-0.07**	**0.6**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
7	20.10.2017	11:46	11:49	133	135	2	0.48	0.49	0.01	14.52	15.12	0.59	4.1
7	13.12.2017	11:55	11:58	134	133	-1	0.66	0.66	0	20.16	19.97	-0.20	-0.9
7	29.12.2017	6:08	6:09	132	129	-3	0.49	0.5	0.01	14.68	14.53	-0.15	-1.0

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
8	20.10.2017	12:41	12:21	21	19	-2	0	0	0	0.00	0.00	0.00	0.0
8	22.11.2017	14:08	14:12	33	34	1	0	0	0	0.00	0.00	0.00	0.0
8	19.12.2017	12:55	12:58	38	38	0	0	0	0	0.00	0.00	0.00	0.0
					Avg:	**-0.33**		**Avg:**	**0.00**		**Avg:**	**0.00**	**0.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
9	20.10.2017	13:22	13:25	82	83	1	0.42	0.42	0	6.31	6.42	0.11	1.7
9	21.11.2017	12:55	12:59	45	45	0	0.46	0.45	-0.01	2.94	2.88	-0.06	-2.1
9	14.12.2017	7:29	7:31	79	78	-1	0.57	0.57	0	8.13	7.99	-0.14	-1.7
9	19.12.2017	13:18	13:21	51	53	2	0.43	0.42	-0.01	3.30	3.40	0.11	3.2
9	28.12.2017	9:32	9:38	80	79	-1	0.49	0.5	0.01	7.11	7.13	0.02	0.2
9	11.01.2018	8:04	8:07	84	83	-1	0.59	0.59	0	9.17	9.02	-0.15	-1.6
9	16.01.2018	7:58	8:02	79	82	3	0.42	0.4	-0.02	5.99	6.01	0.02	0.3
9	16.01.2018	12:31	12:35	49	51	2	0.38	0.38	0	2.75	2.91	0.16	5.9
					Avg:	**0.75**		**Avg:**	**0.00**		**Avg:**	**0.01**	**1.2**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
0	26.10.2017	13:31	13:35	64	64	0	0.37	0.37	0	4.08	4.08	0.00	0.0
0	13.12.2017	12:29	12:31	86	87	1	0.49	0.5	0.01	8.20	8.51	0.30	3.7
0	28.12.2017	9:07	9:10	101	99	-2	0.58	0.58	0	12.13	11.80	-0.33	-2.7
0	11.01.2018	7:29	7:31	80	78	-2	0.69	0.69	0	10.44	10.08	-0.36	-3.4
0	16.01.2018	8:29	8:36	82	79	-3	0.51	0.54	0.03	7.99	8.03	0.04	0.4
0	16.01.2018	12:52	12:54	83	80	-3	0.49	0.52	0.03	7.81	7.87	0.06	0.7
					Avg:	**-2.50**		**Avg:**	**0.01**		**Avg:**	**-0.05**	**-1.2**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
1	30.10.2017	16:36	16:39	244	248	4	0.51	0.52	0.01	70.13	73.15	3.02	4.3
1	28.11.2017	15:29	15:32	201	198	-3	0.58	0.59	0.01	60.69	60.43	-0.26	-0.4
1	07.12.2017	9:38	9:41	256	259	3	0.75	0.75	0	110.28	112.08	1.80	1.6
1	28.12.2017	11:08	11:11	256	256	0	0.72	0.71	-0.01	105.87	104.40	-1.47	-1.3
					Avg:	**1.00**		**Avg:**	**0.00**		**Avg:**	**0.77**	**1.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
2	24.10.2017	8:36	8:39	45	44	-1	0.68	0.68	0	3.85	3.73	-0.12	-3.1
2	21.11.2017	9:07	9:09	54	55	1	0.42	0.44	0.02	3.08	3.31	0.23	7.5
2	19.12.2017	17:34	17:38	67	65	-2	0.52	0.53	0.01	5.16	5.05	-0.12	-2.2
2	21.12.2017	9:56	9:59	57	57	0	0.71	0.72	0.01	5.62	5.70	0.08	1.4
					Avg:	**-0.50**		**Avg:**	**0.01**		**Avg:**	**0.02**	**0.8**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
3	24.10.2017	9:48	9:52	19	21	2	0	0	0	0.00	0.00	0.00	0.0
3	13.12.2017	13:04	13:06	19	19	0	0	0	0	0.00	0.00	0.00	0.0

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
4	24.10.2017	12:05	12:09	58	58	0	0.62	0.63	0.01	5.77	5.87	0.09	1.6
4	14.12.2017	6:31	6:34	77	79	2	0.67	0.65	-0.02	9.32	9.37	0.05	0.5
4	18.12.2017	9:08	9:11	71	72	1	0.47	0.48	0.01	5.83	6.08	0.24	4.1
					Avg:	**1.00**		**Avg:**	**0.00**		**Avg:**	**0.13**	**2.1**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
5	27.10.2017	7:16	7:19	92	95	3	0.66	0.67	0.01	11.76	12.47	0.72	6.0
5	14.11.2017	7:18	7:22	91	92	1	0.58	0.59	0.01	10.18	10.51	0.33	3.2
5	13.12.2017	7:13	7:18	122	122	0	0.71	0.72	0.01	18.51	18.77	0.26	1.4
5	21.12.2017	7:28	7:31	99	101	2	0.85	0.85	0	16.74	17.20	0.46	2.7
					Avg:	**1.50**		**Avg:**	**0.01**		**Avg:**	**0.44**	**3.3**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
6	26.10.2017	14:09	14:13	91	92	1	0.47	0.47	0	7.08	7.19	0.10	1.4
6	14.12.2017	7:04	7:06	115	115	0	0.52	0.52	0	10.63	10.63	0.00	0.0
6	18.12.2017	9:33	9:36	111	110	-1	0.5	0.49	-0.01	9.77	9.47	-0.31	-3.1
					Avg:	**0.00**		**Avg:**	**0.00**		**Avg:**	**-0.07**	**-0.5**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
7	26.10.2017	13:38	13:39	43	44	1	0.09	0.09	0	0.49	0.51	0.02	3.3
7	21.11.2017	9:44	9:49	46	45	-1	0.2	0.21	0.01	1.20	1.22	0.02	1.7
7	19.12.2017	15:29	15:32	59	58	-1	0.28	0.28	0	2.39	2.33	-0.06	-2.3
					Avg:	**-0.33**		**Avg:**	**0.00**		**Avg:**	**-0.01**	**0.9**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
8	26.10.2017	15:39	15:42	41	41	0	0.42	0.42	0	2.08	2.08	0.00	0.0
8	18.12.2017	10:11	10:18	56	55	-1	0.62	0.61	-0.01	4.79	4.59	-0.20	-4.0
8	29.12.2017	10:12	10:14	63	64	1	0.61	0.61	0	5.56	5.68	0.12	2.2
					Avg:	**0.00**		**Avg:**	**0.00**		**Avg:**	**-0.02**	**-0.6**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
9	24.10.2017	13:00	13:04	41	40	-1	0.08	0.08	0	0.52	0.51	-0.02	-3.5
9	18.12.2017	10:49	10:54	170	169	-1	0.54	0.53	-0.01	26.28	25.60	-0.68	-2.6
9	11.01.2018	9:33	9:37	192	189	-3	0.62	0.62	0	35.28	34.59	-0.70	-1.9
					Avg:	**-1.67**		**Avg:**	**0.00**		**Avg:**	**-0.47**	**-2.7**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
0	24.10.2017	14:16	14:19	176	176	0	0.3	0.29	-0.01	14.54	14.05	-0.48	-3.3
0	21.11.2017	10:33	10:36	194	194	0	0.76	0.77	0.01	41.60	42.15	0.55	1.3
0	28.12.2017	10:15	10:17	235	234	-1	0.79	0.79	0	54.26	54.00	-0.26	-0.4

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
1	30.10.2017	1:42	1:46	99	100	1	0.33	0.34	0.01	7.38	7.71	0.33	4.4
1	20.11.2017	11:52	11:56	79	79	0	0.23	0.23	0	3.74	3.74	0.00	0.0
1	19.12.2017	16:09	16:11	120	120	0	0.38	0.38	0	11.09	11.09	0.00	0.0
					Avg:	**0.33**		**Avg:**	**0.00**		**Avg:**	**0.11**	**1.4**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
2	24.10.2017	15:07	15:09	0	0	0	0	0	0	0.00	0.00	0.00	0.0
2	18.12.2017	11:55	11:56	0	0	0	0	0	0	0.00	0.00	0.00	0.0
					Avg:	**0.00**		**Avg:**	**0.00**		**Avg:**	**0.00**	**0.0**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
3	30.10.2017	14:34	14:36	127	126	-1	0.71	0.71	0	25.82	25.53	-0.28	-1.1
3	20.11.2017	10:54	10:55	112	112	0	0.6	0.59	-0.01	18.29	17.99	-0.30	-1.6
3	19.12.2017	16:39	16:41	124	124	0	0.55	0.57	0.02	19.34	20.05	0.70	3.6
					Avg:	**-0.33**		**Avg:**	**0.00**		**Avg:**	**0.04**	**0.2**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
4	27.10.2017	10:44	10:46	54	54	0	0.21	0.21	0	2.27	2.27	0.00	0.0
4	17.11.2017	13:42	13:45	42	43	1	0	0	0	0.00	0.00	0.00	0.0
4	17.11.2017	13:55	13:57	47	47	0	0.02	0.02	0	0.18	0.18	0.00	0.0
4	20.12.2017	11:44	11:46	52	54	2	0.13	0.13	0	1.33	1.41	0.08	5.6
					Avg:	**0.75**		**Avg:**	**0.00**		**Avg:**	**0.02**	**1.4**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
5	30.10.2017	15:22	15:23	107	108	1	0.41	0.41	0	12.03	12.19	0.16	1.3
5	29.11.2017	9:08	9:11	85	84	-1	0.55	0.55	0	11.62	11.42	-0.20	-1.6
5	20.12.2017	6:22	6:24	91	92	1	0.72	0.71	-0.01	16.77	16.80	0.03	0.1
5	09.01.2018	9:55	9:57	190	190	0	1.34	1.35	0.01	86.82	87.46	0.65	0.7
					Avg:	**0.25**		**Avg:**	**0.00**		**Avg:**	**0.16**	**0.1**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
6	25.10.2017	9:18	9:20	84	84	0	0.49	0.47	-0.02	8.02	7.69	-0.33	-4.0
6	18.12.2017	12:36	12:38	62	61	-1	0.38	0.37	-0.01	4.05	3.85	-0.20	-4.8
6	29.12.2017	10:45	10:47	67	68	1	0.45	0.45	0	5.35	5.47	0.11	2.1
					Avg:	**0.00**		**Avg:**	**-0.01**		**Avg:**	**-0.14**	**-2.2**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
7	01.11.2017	11:51	11:52	210	210	0	0.9	0.91	0.01	105.09	106.26	1.17	1.1
7	29.11.2017	8:26	8:28	268	269	1	0.81	0.81	0	133.40	134.10	0.70	0.5
7	20.12.2017	6:01	6:02	240	240	0	0.51	0.51	0	71.95	71.95	0.00	0.0
					Avg:	**0.33**		**Avg:**	**0.00**		**Avg:**	**0.62**	**0.5**

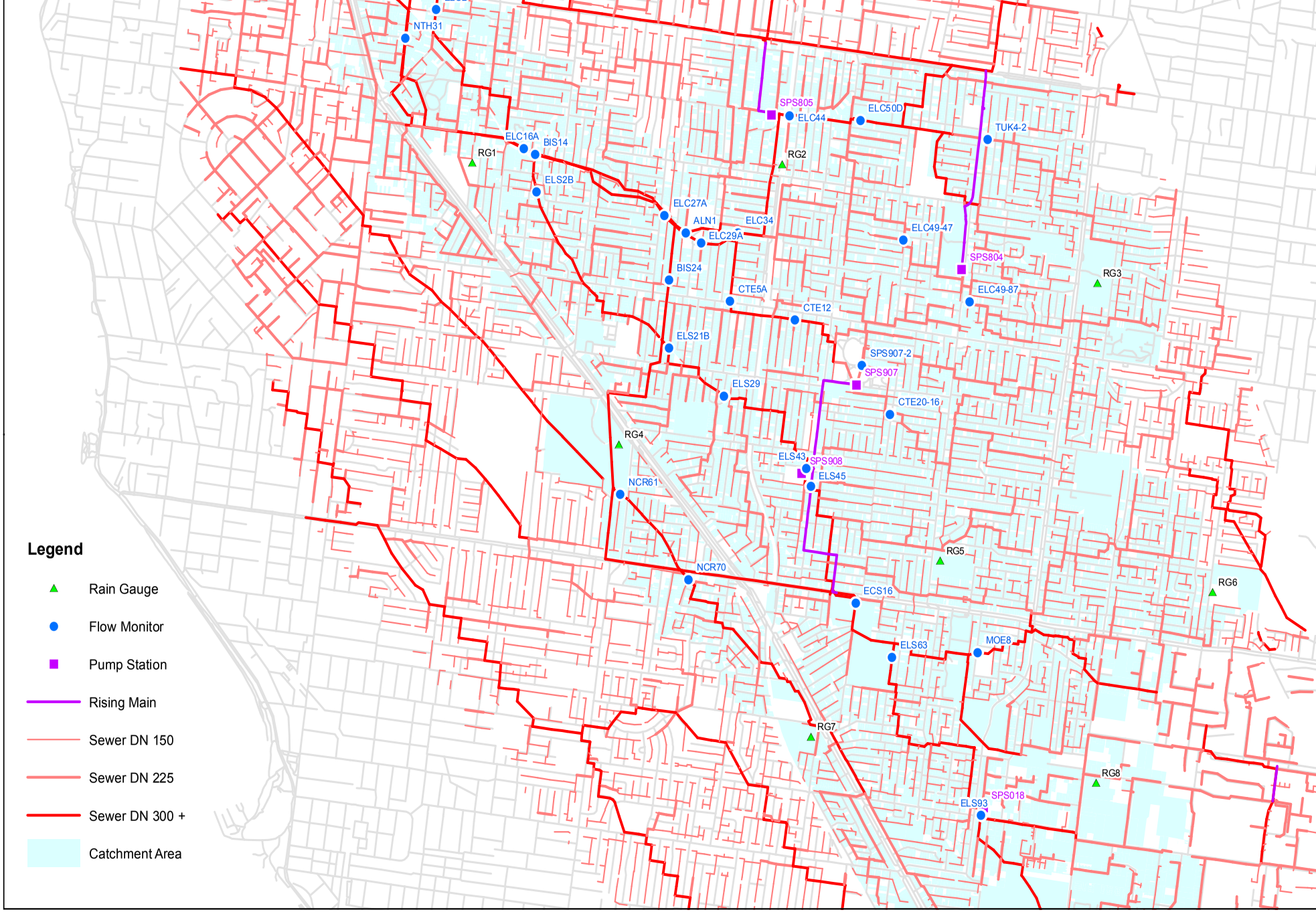
te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
8	31.10.2017	8:48	8:50	113	113	0	0.31	0.32	0.01	7.55	7.79	0.24	3.2
8	14.11.2017	9:01	9:03	55	56	1	0.23	0.23	0	2.04	2.10	0.05	2.6
8	14.11.2017	9:06	9:08	53	51	-2	0.34	0.34	0	2.86	2.71	-0.15	-5.3
8	21.12.2017	7:04	7:05	60	59	-1	0.29	0.28	-0.01	2.92	2.75	-0.17	-5.7
					Avg:	**-0.50**		**Avg:**	**0.00**		**Avg:**	**-0.01**	**-1.3**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
9	27.10.2017	11:56	11:59	104	104	0	0.42	0.43	0.01	11.76	12.04	0.28	2.3
9	15.12.2017	11:43	11:48	86	86	0	0.3	0.3	0	6.40	6.40	0.00	0.0
9	15.12.2017	11:49	11:53	83	81	-2	0.29	0.28	-0.01	5.88	5.48	-0.40	-6.7
9	29.12.2017	11:49	11:51	100	101	1	0.36	0.36	0	9.53	9.67	0.14	1.4
					Avg:	**-0.25**		**Avg:**	**0.00**		**Avg:**	**0.00**	**-0.7**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
0	31.10.2017	14:01	14:02	186	186	0	1.51	1.52	0.01	153.02	154.04	1.01	0.6
0	01.12.2017	11:22	11:24	244	244	0	0.81	0.8	-0.01	120.88	119.39	-1.49	-1.2
0	07.12.2017	8:01	8:03	247	247	0	1.09	1.08	-0.01	165.50	163.99	-1.52	-0.9
0	21.12.2017	9:21	9:24	247	245	-2	0.99	0.99	0	150.32	148.60	-1.72	-1.1
					Avg:	**-0.50**		**Avg:**	**0.00**		**Avg:**	**-0.93**	**-0.6**

te me	Date	Start Time	Finish Time	Monitor Depth (mm)	Measured Depth (mm)	Depth Difference (mm)	Monitor Velocity (m/s)	Measured Velocity (m/s)	Velocity Difference (m/s)	Monitor Flow (l/s)	Measured Flow (l/s)	Flow Difference (l/s)	Flow Differenc (%)
1	25.10.2017	10:18	10:20	85	85	0	0.32	0.32	0	6.11	6.11	0.00	0.0
1	18.12.2017	14:07	14:09	72	71	-1	0.32	0.33	0.01	4.82	4.87	0.05	1.0
1	29.12.2017	11:19	11:21	89	90	1	0.3	0.29	-0.01	6.11	6.00	-0.11	-1.7
1	09.01.2018	11:18	11:21	80	80	0	0.32	0.31	-0.01	5.60	5.43	-0.18	-3.1
					Avg:	**0.00**		**Avg:**	**0.00**		**Avg:**	**-0.06**	**-0.9**

9.0 Sewer Network Schematic Diagrams Elster Creek



Paper Size A3

0 115 230 460 690 920

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Note:Rain gauge locations are indicative only and are to be selected by the contractor within 500 m of those locations shown

South East Water
Elster Creek Sewer Model

Monitor Locations

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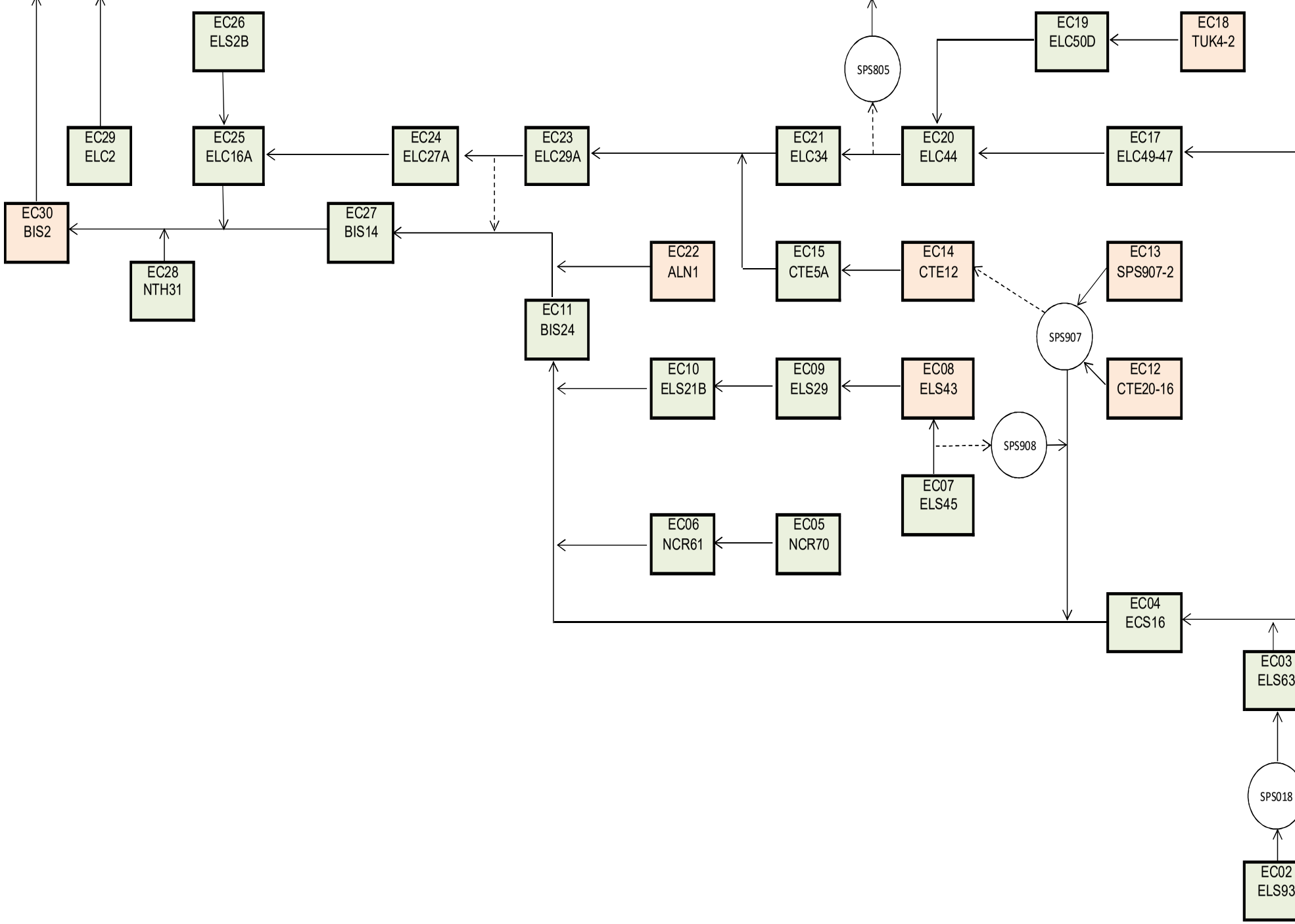

Elster Creek Schematic

Site Ref Location — Similar Site Used Before

Site Ref Location — Proposed Additional Site

SPS018 — Pump Station

Appendix A: Flow Meter Elster Creek Installation Reports

(Digital Copies Only)

Appendix B: Elster Creek Calibration Reports

(Digital Copies Only)

Appendix C: Project Photos

(Digital Copies Only)

Appendix D: EDS SEW Project Query Response

EDS Sewer Flow Monitoring Safety Interaction

Elster Creek & Elster Creek South and Koornang & Grange Catchments

For

South East Water

Contact person for this project:

Tim Fleming
Project Manager
Work: (07) 5578 3622
Mobile: 0424 756 300
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EDS Environmental Data Services

1.0 Brief:

Information outlined in below report is in response to supplied EDS-Site Observation report as per completed audit by SEW on the 31st October.

EDS is confident we have successfully addressed recommendations and results outlined by SEW. EDS is committed to delivering safe and successful projects, as such we welcome any opportunity for improvements to achieve this goal.

Overall EDS trust the audit outcome was positive with 3 Opportunities for Improvement identified. See below specific points identified.

2.0 SEW Positive Observations

1. All documentation in order. Generic SWMS were understood and signed by each worker.
2. EDS had engaged Traffica to set up traffic control for the sites that day.
3. Work truck and storage shelving on truck was stored neatly during inspection.
4. All crew members in the correct PPE during inspection.
5. Tools and CSE equipment used were appropriate for the activity.
6. Entrant was wearing Harness and connected at all times.

3.0 Opportunities for Improvement

1. Traffic control set up by Traffica was not adequate, bollards and traffic was too close to the pit and tripod they also allowed workers to lean on the bollards and position themselves next to the bollard without a lateral safety zone.
2. The pit lid was fully removed and the Standby/Safety observer was not protected from a fall by a fence, barrier or fall arrest system
3. The Standby person was not wearing hygienic gloves even though he was pulling up ropes that had been in the sewer.
4. Contractor is required to explain how CSE training works and who is allowed /authorised to use the gas detectors as they might not have explained their process very well. They might like to provide more information on why the do Frist Aid raining at a different time to the CSE training as this not normal practice with our supplier.

4.0 EDS Responses

1. EDS reviewed supplied traffic management plan (TMP) and has alerted contractor Traffica in writing and verbally of potential hazard. EDS also requested a update TMP to show increase distance from manhole from bollards and fencing. Please see TMP below as supplied to SEW.

2. In EDS SWMS, it is not standard practice to have standby person secured to tripod as this increase potential for collapse of tripod by lateral movements. IT is also best practice to have clear line of site to person in CSE. EDS can revise or implement changes if required subject to agreement with SEW. Please address any variations or changes. Please also see below extract from EDS responsibilities of standby person.

Standby Person *– a competent person assigned to remain on the outside of and in close proximity to the confined space and capable of being in continuous communication with and if practicable, to observe those inside. In addition, where necessary, initiate emergency response procedures and operate and monitor equipment used to ensure safety during entry and work in the confined space.*

3. EDS has issued EDS employee warning for failure to wear correct appropriate PPE. ED Shas also providing refresher training to staff to ensure correct PPE is worn at all times. We trust this will resolve requirement for further action.

4. Please note it is not "normal practice" to obtain first aid or CPR with CSE national training RIIWHS202D. All EDS staff are trained to national requirement RIIWHS202D Enter and work in confined spaces. Please see attached revised updates as of May 2017 released by the Australian Government for entering and working in a confined space.

   However, to assist further please see on page 5 training criteria as outlined by Australian Government in released updated module RIIWHS202D that replaced older module RIIWHS202A. To confirm all CSE training includes the correct use and operation of atmospheric testing equipment. Ther

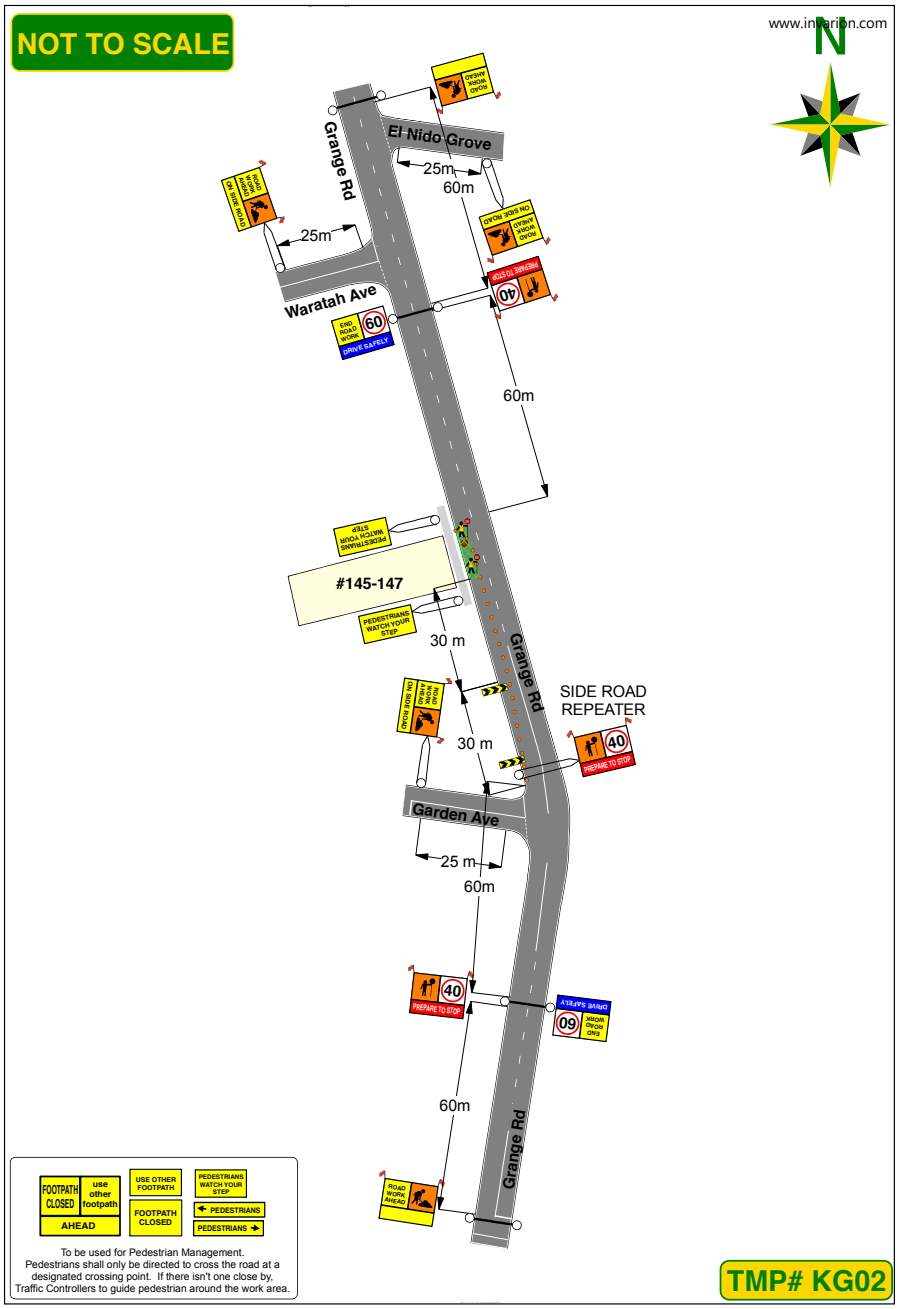
   Please note First Aid and CPR have a separate course with a separate training module and standard. Can SEW please clarify actual requirements as there is conflicting requesting being made.

   - **First Aid: HLTAID003 Provide first aid (previously known as Apply First Aid, Senior First Aid or Level 2 Workplace First Aid)**
   - **CPR: HLTAID001 Provide cardiopulmonary resuscitation (CPR)**

5.0 Conclusion

EDS is confident the actions put in place and refresher training will ensure points raised have adequately been addressed.

EDS Environmental Data Services



Traffica Traffic Management Plan for KG02

Response to Supplied EDS-Site Observation Report by South East Water

Elements and Performance Criteria

1 Plan and prepare for working in confined space	1.1 Access, interpret and apply procedures for confined space entry and the environmental management plan and ensure the work activity is compliant 1.2 Obtain, confirm, clarify and apply work instructions and agreed procedure 1.3 Obtain, confirm, clarify and apply safety requirements 1.4 Obtain and confirm authorisation (entry permit) meets regulatory requirements 1.5 Confirm the emergency response procedure is with the stand-by person and understood 1.6 Identify, obtain and implement signage and barrier requirements 1.7 Select tools and equipment for the tasks, check for serviceability and rectify or report any faults 1.8 Identify, confirm and apply the environmental protection requirements 1.9 Position rescue equipment by the entry permit
2 Work in confined space	2.1 Gain access to confined space 2.2 Ensure that the atmosphere is tested and monitored for harmful elements 2.3 Correctly apply tagging and lock-out procedures 2.4 Enter the confined space correctly 2.5 Maintain ongoing communication with the stand-by person 2.6 Comply with entry permit requirements 2.7 Monitor and adhere to allocated entry time
3 Exit confined space	3.1 Exit confined space correctly 3.2 Recover tools, equipment and materials 3.3 Conduct inspection of the confined space 3.4 Secure access to the confined space 3.5 Remove tagging and lock-out 3.6 Accurately complete confined space entry permit
4 Clean up	4.1 Clear work area and dispose of or recycle materials 4.2 Clean, check, maintain and store tools and equipment 4.3 Remove, clean and store barriers and signs

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Appendix E: Equipment Data Sheets

ave Doppler AV_UART Rev18

DUAL-WAVE DOPPLER
DIGITAL VELOCITY SENSOR

BLUE SIREN

MADE IN USA
Blue-Siren Inc. #103 3030 Venture Lane, Melbourne Florida, 32934, USA (321) 242-0300

Dual-Wave Velocity Sensor

Introduction

Using acoustic technology, it is possible to measure velocity directly using the Doppler effect. The following table explains the ultrasonic Doppler effect.

DOPPLER EFFECT	VARIABLES
$V = K (F_R - F_T)$	$V = K (F_R - F_T)$ *V = Velocity* *K = Calibration Constant* *F_R = Frequency Received* *F_T = Frequency Transmitted*

Using the Doppler principal:

- Ultrasonic energy is continuously transmitted under water into the flow stream.
- The sound waves are reflected from tiny solid matter in the flow stream.
- The transmitted frequency is compared to particle bounce frequency.
- Thousands of velocity return signals are collected and averaged to produce representative average velocity.
- Average velocity is a function of sample time and echo reduction parameters.

Two models of the Dual-Wave Sensor are available, Dual-Wave - [AV] and Dual Wave - [V]. The Dual-Wave AV combines a highly sensitive and accurate pressure depth and velocity sensor, while the Dual-Wave V only contains the velocity sensor.

All sensor electronics are encapsulated within the sensor housing. Sensor velocity is output via a serial digital data stream and depth is output via an analog 0-5V signal. In the event a user wants to measure pulse directly, this feature can be added at the time of manufacturing to the [V] version only.

The sensor warm up time is 2 seconds and the input voltage is between 6 to 16 Volts. Four Doppler frequency values in Hz will stream out at a rate of four (velocity values) per second. In this case the Doppler frequency is proportional to the speed of water in m/s. Pulse rates can also be measured where 1 pulse is equal to one Hz. The following describes how to connect the sensor to a Data Logger, PLC or RTU.

Specification

The following describes the specification of the Dual-Wave Doppler Velocity Sensor.

Power:

INPUT VOLTAGE	CURRENT DRAW	WARMUP TIME	CABLE
6 to 16 V DC	60 mA	2 seconds	25ft standard

Dimension:

LENGTH	WIDTH	HEIGHT	CABLE DIAMETER
4 in (103mm)	2 in (51mm)	1 in (25mm)	0.2 in (5mm)

Velocity Signal Output:

SERIAL OUTPUT	BAUD RATE	FLOW CONTROL	RATE
UART - TTL	4800	none	4 samples/second

Velocity Specification:

RANGE	FREQUENCY	RESOLUTION	OUTPUT
0 to 10m/s	0 to 10000 Hz	1 mm/s or 1 Hz/sec	Linear

Depth Specification:

DEPTH OUTPUT	PRESSURE	HEIGHT	ACCURACY
0 - 5 V	15 psi	30 ft	1mm

BURST HEIGHT	BURST PRESSURE	RESOLUTION	TYPE
> 100 ft	4 times Rated	> 1 mm	Atmospheric

Dimensions

IMPERIAL (IN)

METRIC (MM)

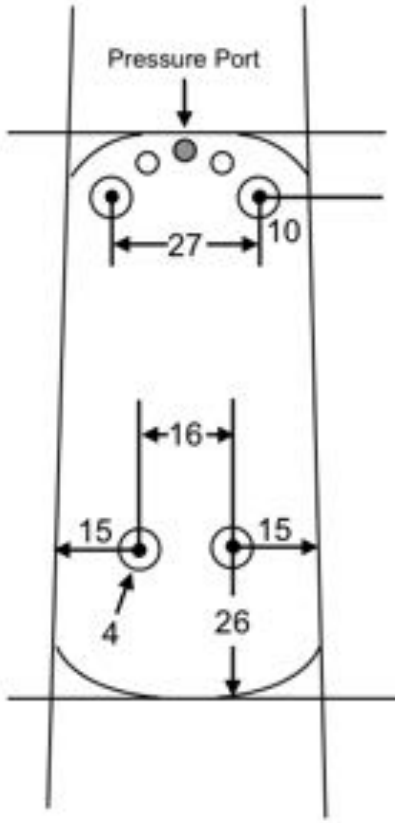
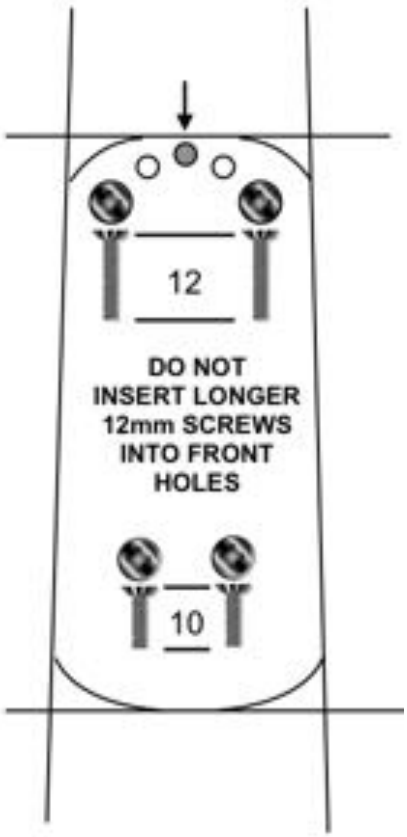
MADE IN USA
Blue-Siren Inc. #103 3030 Venture Lane, Melbourne Florida, 32934, USA (321) 242-0300

Sensor Mounting

The Dual Wave Doppler AV Sensor is shipped with four 4-40 screws used to fasten the sensor to a band or steel plate to be installed in the flow stream.

The stainless steel front screws are slightly shorter than the back screws. It is very important that the front screws are not substituted with longer screws.

The following shows the mounting configuration and dimension of the AV sensor mounting.

MOUNT SPACING	SCREW DIMENSION
 **FRONT**	

Wire Connections

The Dual Wave Doppler AV Sensor is a four wire serial sensor with an analog zero to five volt depth output if you are using the AV Option.

The wire color code for AV Type Dual Wave Sensors are

COLOR	CONNECTION	VALUE
RED	POWER - IN	6 to 16 Volts DC
BLACK	GROUND	GROUND
WHITE	VELOCITY - OUT	4800 UART TTL
GREEN	DEPTH OUT	0.5 to 5 Volts DC

NOTE * * DO NOT BEND OR KINK THE PINK VENT TUBE FOUND IN THE CABLE

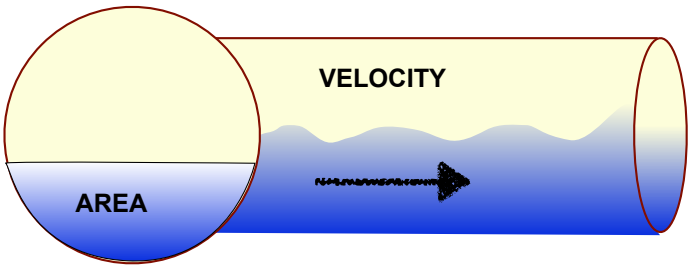
The wire color code for V only Type Dual Wave Sensors are

COLOR	CONNECTION	VALUE
RED	POWER - IN	6 to 16 Volts DC
BLACK	GROUND	GROUND
WHITE	VELOCITY - OUT	4800 UART TTL
GREEN	5V Pulse OUTPUT	5V

NOTE * * When using the Pulse Output you will need to count the number of pulses per second, in this case 1 Pulse is equal to 1 Hz which is proportional to 1 mm/s

AV SENSOR WIRE CONFIGURATION

NOTE * * Cable length can be extended to over 300 ft, however in areas of high EM noise, you may find additional signals or pulses on the line as the data steams in.



MADE IN USA
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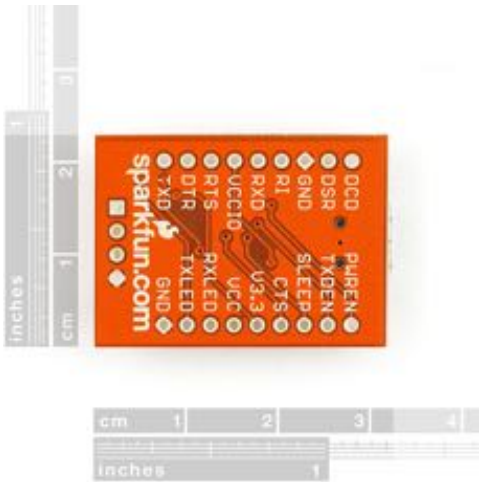
Example Sensor connection using HyperTerminal

You can easily apply power to the sensor and test it using HyperTerminal, however, you will need to purchase a BREAKOUT board first, which converts sensor signals to USB signals. This board can be purchased online at the Blue-Siren store or directly from SparFun a local electronics store, click one of the links located in the image box.

https://www.sparkfun.com/products/718	https://www.sparkfun.com/products/718
	

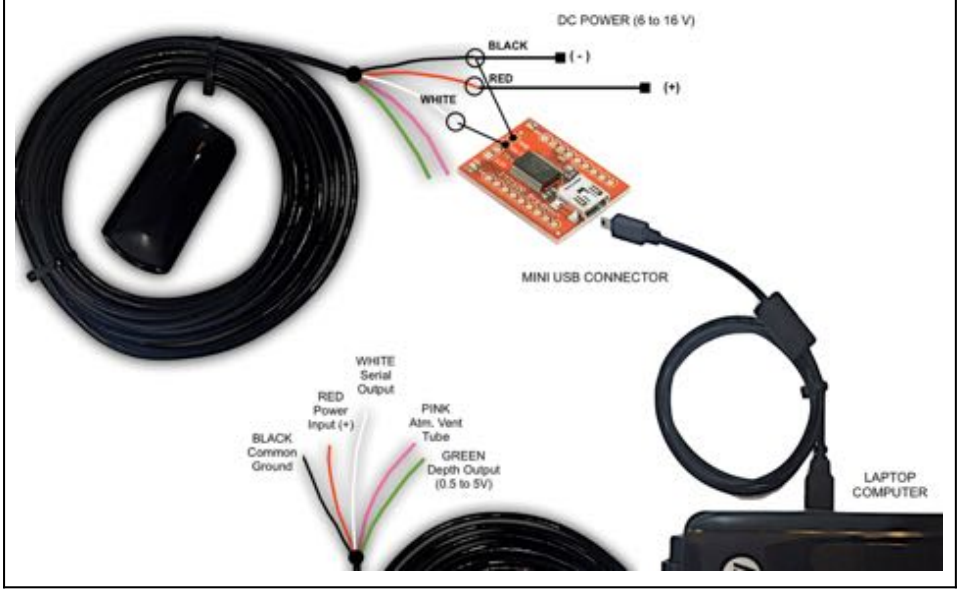
HyperTerminal Connection

1. Connect the WHITE wire from the sensor to RX-I on the FT232R Breakout Board
2. Connect the BLACK wire from the sensor to Ground
3. Connect Ground to GND on the FT232R Breakout Board
4. Connect RED to a 6 to 16 V DC Power Supply

NOTE * * IF YOU TOUCH THE WHITE WIRE TO INPUT POWER YOU WILL DESTROY THE SERIAL OUTPUT INTERFACE AND THE SENSOR WILL BE PERMANENTLY DAMAGED

Refer to the connection Image on the following page for details

SERIAL WIRE INTERFACE

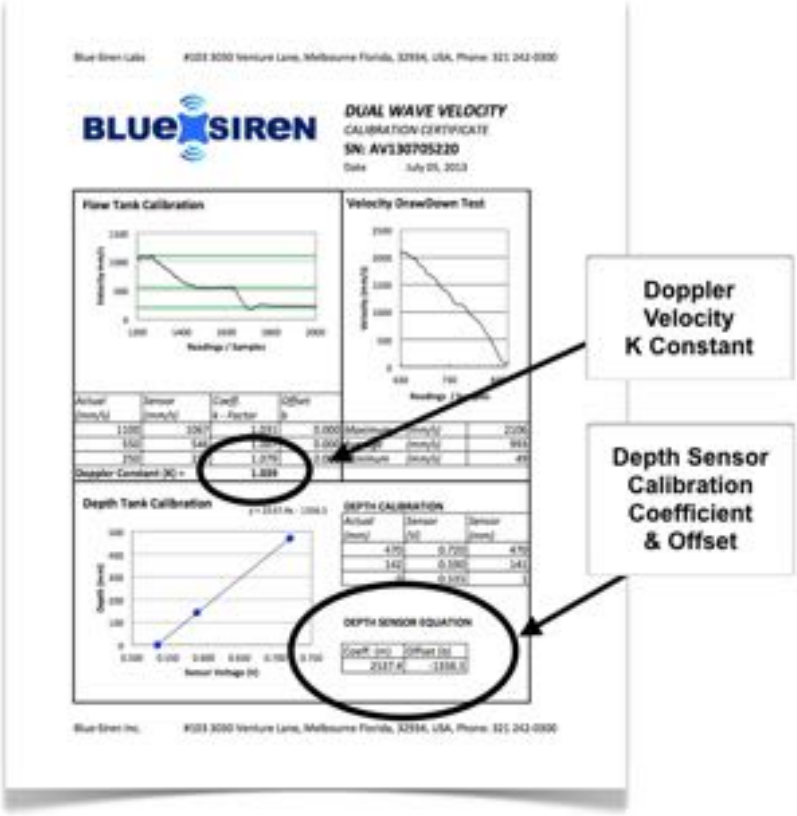


5. Start HyperTerminal
6. Select Your COMM Port
7. Select 4800 Baud Rate
8. Select None for Hardware and Flow Control

At this point data will start streaming in at four velocity samples per second.

SENSOR CALIBRATION

AV sensors are calibrated using Blue-Siren Labs using a velocity flow tank that will measure from a maximum of 2 m/s down to 0.01 m/s. Each sensor is digitally calibrated and wet tested. Four tests are completed, the first being a drawdown test, and second three point calibration test. Depth sensors are also wet tested for 24 hours, and run though 24 level cycles ranging from 470 down to 140 mm. All testes are conducted at 33ft above sea level. When you receive your new sensors you can easily calibrate the depth sensor by submersing it in a bucket and taking a voltage vs depth reading, or you can plug in the factory calibration.



8000 Updated

OBSERVATOR
instruments

RIM8000 Rain Gauge

The RIMCO RIM8000 series rain gauge utilises the bucket and siphon assembly of the high performance RIMCO RIM7499 series to ensure accuracy and a long service life but at a lower cost.

All materials used are corrosion resistant and designed for almost all environmental conditions.

The RIMCO RIM8000 is accurate to better than 3% up to 200mm/hr and useful to over 500mm/hr.

Rain falling on the 203mm (8") diameter collecting funnel is directed through a siphon control unit and discharges as a steady stream into a precision two compartment bucket mounted in unstable equilibrium. As each compartment fills the bucket tilts alternately about its axis. Each tilt produces a momentary contact closure as a result of a magnet sweeping past a reed switch assembly. Each contact closure corresponds to 0.2mm, 0.25mm or 0.5mm of rainfall according to bucket capacity.

An individual calibration certificate is supplied with every RIM8000 rain gauge.

FEATURES

- Rugged and corrosion resistant construction.
- Minimal maintenance, 15 years+ deployment life.
- Low friction, non-seizing bucket bearings.
- Gold plated buckets for minimal retention.
- Dual reed switch output.
- Stable calibration.
- Built-in bubble level.
- Optional heater for operation below –30°C.
- Mounting pedestal available.

APPLICATIONS

- General meteorology.
- Water resources studies.
- Hydrology.
- Flood warning systems.
- Automatic logging systems.

SPECIFICATIONS

Receiving Collector	203 (8”) ± 0.2mm diameter	
Accuracy	±1.0% at the reference rate (typically 60mm/hr or as specified by customer), bucket capacity for 5mm/hr or less, ±3.0% or better from 5mm/hr to 200mm/hr, Useful to over 500mm/hr.	
Bucket Capacities	0.2mm	(model RIM8020)
	0.25mm	(model RIM8025)
	0.5mm	(model RIM8050)
Switch and Rating	Dual reed switch assembly with individual surge protection built-in. 50V ac/dc at 0.5A non-inductive. Series resistance 24 ohms.	
Contact Timing	Closure 100 ± 50 milliseconds; 0.75 milliseconds bounce time max	
Termination	Screw termination (2.5mm^2).	
Overall Dimensions	300mm	height
	230mm	body diameter
	275mm	mounting flange diameter
Mounting	Three 10mm holes at 120° pitch on mounting flange at 256 mm diameter between centres	
Materials	Collector	Copper
	Rim	Copper
	Jacket	Stainless Steel
	Base	Marine Grade Aluminium
	Bucket	Gold Plated Brass
	Bridge	Marine Grade Aluminium
	Switch Holder	Delrin® or similar
	Fasteners	Stainless Steel

OBSERVATOR
instruments

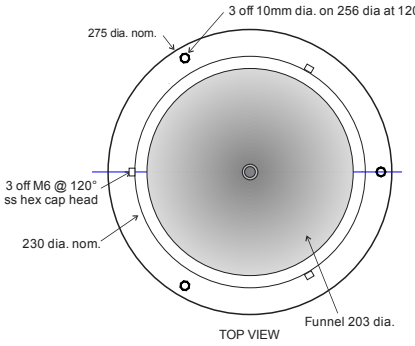
Rietdekkerstraat 6
2984 BM Ridderkerk

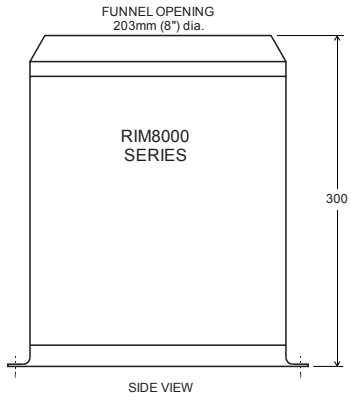
P.O. Box 60
2980 AB Ridderkerk
The Netherlands

Phone +31 (0)180 463 411
Telefax +31 (0)180 463 530
E-mail info@observator.com
www.observator.com

Physical	2.8kg net 4.5kg shipping weight Shipping carton - 330 x 330 x 430mm	
Heater Option	12V or 24V ac/dc (48W max) multistage resistive heating with electronic control factory set to 5°C. Specify operating voltage at time of order. (P/N 7499TCH).	
Data Logger Option	Several models available depending on application requirements. Some data loggers may be installed within the body of the rain gauge.	
Temperature	Operating	0° to +60°C (no heating). -30° to +60°C (heating).
	Storage	-40°C to +75°C.

Non-siphon and imperial resolution versions are also available with differing accuracy specifications. Other RIMCO rain gauge models are available with 200cm^2 (RIM8500), 400cm^2 (RIM8400) and 300mm(12”) (RIM8300) diameter collectors.





File: RIM8000 Observator V1

The Observator range is in continuous development and so specifications may be subject to change without prior notice