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REPORT

November 2022

TOWN OF
Dedham
MASSACHUSETTS

2022 Flow Metering

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

Town of Dedham, Massachusetts
Weston & Sampson Project No. ENG22-0032

November 22, 2022

Jason L. Mammone, PE
Director of Engineering
55 River Street
Dedham, Massachusetts 02026

Re: *Report*
2022 Flow Metering

Dear Mr. Mammone:

Weston & Sampson Engineers, Inc., is pleased to submit our report for the 2022 Flow Metering project. This report analyzes wastewater flow data for March through May 2022 and also includes review of existing available groundwater data and rainfall monitoring for that period.

This report presents our analysis of the flow metering results, identifies areas that appear to contribute excessive infiltration and inflow (I/I), and provides estimates of peak I/I. The May 2017 Department of Environmental Protection *Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey* (DEP Guidelines) were used as a guide for the flow data analysis.

System Description and Project Objectives

The municipal sewer system in the Town of Dedham is comprised of approximately 89 miles of sewer ranging in size from 6-inches to 33-inches in diameter. A summary of the existing gravity sewers in Dedham is included as Table 1, *Sewer System Summary.* In order to protect its substantial capital investment in sewer infrastructure, the Town of Dedham has taken a proactive approach towards operating and maintaining the sewer system by implementing a comprehensive annual Town-Wide Sewer Manhole Investigation & Rehabilitation Program. This program was designed in 2013 and updated in 2018 to continue the Town's aggressive pursuit towards removal of I/I from the sewer system. Years One through Five of the updated program were performed from 2018 through 2022 to assess I/I in Dedham's sewer system.

This metering data is used to obtain current system flow information, to qualify and quantify I/I, and to assess the status of the Annual I/I Program. A full breakdown of meters is included in Table 2*, Summary of Tributary Areas.*16 temporary flow meters along with eight permanent flow meters were utilized to analyze the flow from 25 subareas. MWRA data estimates a daily average of 4.04 million gallons per day (MGD) of wastewater flow during 2021.

Figure 1, *Town-Wide Flow Metering Map,* shows each sewer subarea, the limits of the wastewater collection system, and locations of the flow meters for this project. Figure 2, *Flow Schematic,* shows the flow schematic of Dedham's sewer system.

Groundwater Data Review

According to the USGS groundwater gauge located in Norfolk, Massachusetts, groundwater levels during the metering program (March through May 2022) were at higher-than-average levels for approximately the first month of the metering period and approximately average for the rest of the period. Lower-than-historical groundwater levels may decrease the baseline infiltration rates during the analysis because less groundwater may be entering the sewer system through pipe and manhole defects. Likewise, higher groundwater levels may result in increased infiltration and inflow rates.

Please note that the USGS site is located outside of Dedham and the data only serves to indicate the general groundwater trends of the region, not the immediate study area. The following figure shows actual groundwater elevations (orange line) compared to the historical average comprised of median daily statistic levels recorded over the past 20 years (dotted blue line).

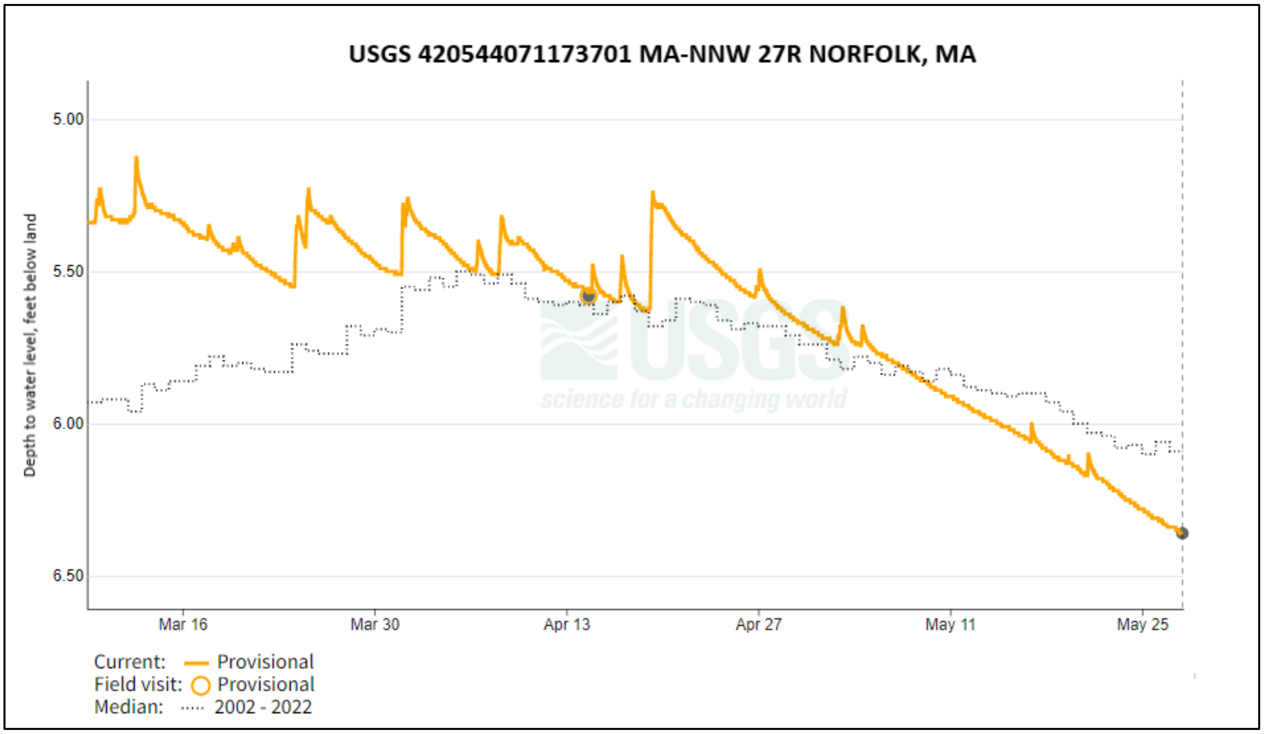


Figure 3, *USGS Groundwater Monitoring*

Three temporary groundwater gauges were installed in Sites EE, HH, and VV for the duration of the monitoring period. These gauges measured the depth to groundwater continuously in five-minute intervals. The three temporary groundwater gauges measure water level above the manhole invert, the USGS groundwater gauge measures depth below ground surface, therefore their trends are inverse. The trends are consistent across all four groundwater gauges showing a rise in groundwater levels during rain events as seen if Figure 4, *Groundwater Gauge Readings.*

Rainfall Monitoring

Rainfall information was collected by a tipping-bucket rainfall gauge installed and maintained by Flow Assessment Services, LLC (Flow Assessment) during the metering period. The rain gauge was located at the Dedham Public Works Department located at 55 River Street. The daily rainfall from the gauge is shown in Figure 5, *Daily Rainfall*. The table below summarizes the monthly rainfall recorded within Dedham during the monitoring period.

Month	Dedham Rainfall Recorded (in)
March	2.79
April	2.61
May	1.05
TOTAL:	6.45

For the purpose of this report, a rainfall event is defined as more than 0.50 inches of rain in a period of time without a break of more than three hours. The six rainfall events that met these criteria during the metering period are summarized in the following table.

Rainfall Events

Storm #	Date	Total Time (hr)	Total Rainfall (in)	Peak Hour Intensity (in/hr)	Average Intensity (in/hr)
1	03/12/2022	5.75	0.50	0.34	0.08
2	03/24/2022	9.33	0.56	0.15	0.06
3	03/25/2022	4.50	0.52	0.21	0.12
4	03/31/2022	9.75	0.57	0.23	0.06
5	04/19/2022	5.08	0.97	0.14	0.19
6	05/22/2022	0.50	0.50	0.48	1.00

Flow Monitoring

Flow metering data was analyzed to obtain current information regarding sewer system flow in order to quantify I/I rates. Weston & Sampson retained the services of Flow Assessment to install, calibrate, and maintain 16 temporary flow meters. Flow data from eight additional permanent flow meters was provided by the Massachusetts Water Resources Authority (MWRA) for use in this study. Flow from 25 subareas was directly monitored with 24 flow meters. Flows were monitored and data was accumulated from March 3 through May 28, 2022. Raw data for the metering period is available to the town upon request.

Each flow meter recorded flow volume, depth, and velocity in 5-minute intervals to calculate flow quantities. A meter was placed in a sewer pipe to measure flow from that area. Each meter was numbered according to the manhole in which it was installed. The location of each flow meter is shown in Figure 1, *Town-Wide Flow Metering Map*. A flow schematic is shown in Figure 2, *Flow Schematic*. Some meter data includes flow from meters in series or upstream, making it necessary to subtract data from upstream meter readings to obtain individual meter area data. Figure 2 illustrates how each subarea is hydraulically connected.

The meter locations, net tributary subareas, linear footage, and average net daily flow are shown in the following table. A full breakdown of meters is included in Table 2*, Summary of Tributary Areas.*

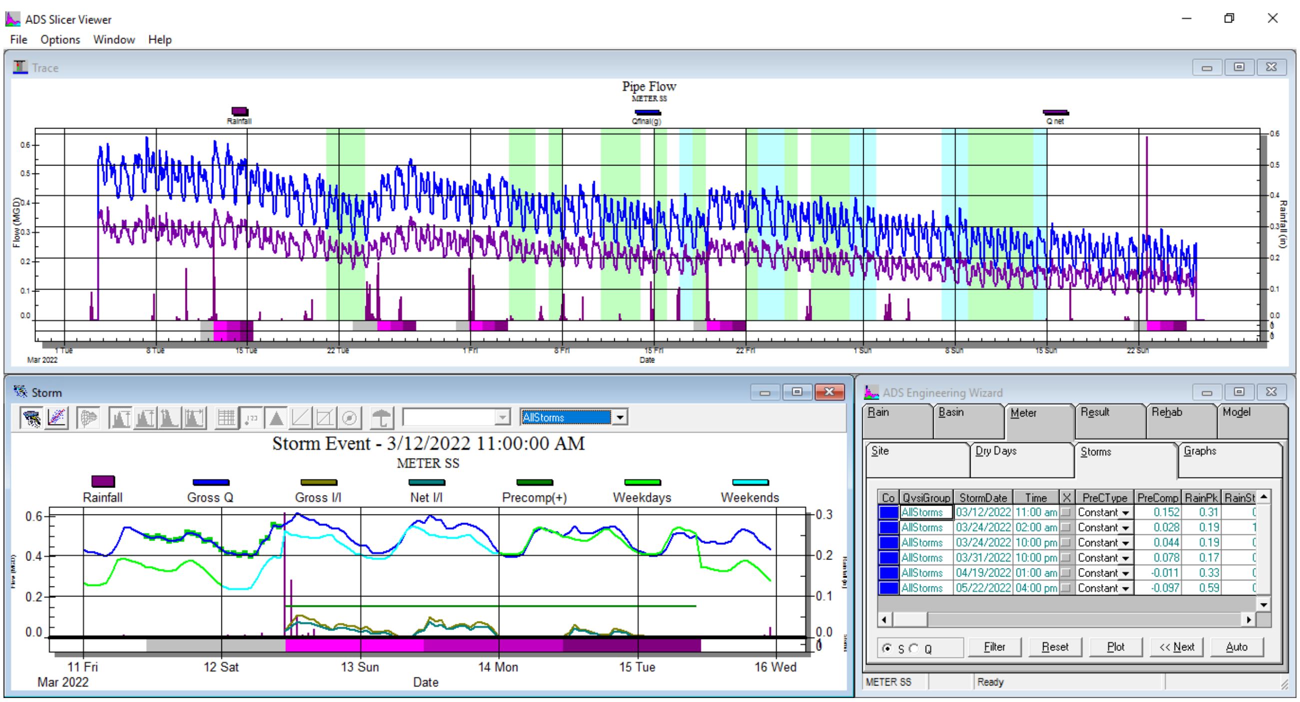
Meter	Net Tributary Subarea(s)	Total Linear Footage (lf)	Average Net Daily Flow (gpd)
DE-BO-1	AA	17,305	80,000
Site CC	CC	11,641	76,000
DE-5C	DD	20,826	830,000
Site EE	EE	15,170	70,000
Site FF	FF	22,155	96,000
Site GG	GG	27,790	145,000
Site HH	HH	30,083	138,000
Site LL	Partial Sections of II & LL	14,135	122,000
Site JJ	JJ	14,651	101,000
DE-10C	KK	17,604	193,000
DE-7C	Partial Section of MM	14,584	243,000
DE-1C	NN & Partial Section of JJ	21,373	72,000
Site OO	OO	28,447	344,000
Site PP1 NEW	Partial Section of PP	10,690	168,000
Site PP2	Partial Section of PP	2,332	58,500
DE-2C	QQ	12,179	154,000
Site RR	RR	19,406	173,000
Site SS	SS	31,071	221,000

Site TT	TT	18,140	314,000
Site UU	UU	18,497	137,000
Site VV	VV	14,269	85,000
DE-CT-1C	WW	21,701	377,000
Site YY	XX & YY	32,843	209,000
DE-9C	Partial Section of ZZ	6,141	62,000

One of the manholes (PP-810) chosen for a meter install for a portion of subarea PP was buried and could not be accessed. The field crew installed the meter (PP1) in the next available manhole (PP-260) but were unaware that the manhole they chose only took flow from a portion of the pipe segments needed. The meter was moved to a new location (PP-800) two weeks later to gather the intended portion of subarea PP.

Meter data was imported into ADS's SLiiCER flow analysis software for evaluation of base wastewater flow, groundwater infiltration and inflow. The data for each meter was analyzed to determine the quality of the data. A hydrograph depicts the diurnal curve for a subarea. Hydrographs of each meter were plotted to examine flow meter performance, data trends, and response to wet weather events. Hydrographs display the changes in average daily flow and total daily rainfall at each meter location, as well as the regular diurnal curve and the effect of I/I in each metered area. Infiltration that enters the sewer system will increase the baseline flow while inflow will cause large, temporary spikes in the sewer system during rain events. Hydrographs for each meter are included in Appendix A.

An example illustration of the SLiiCER interface is included below. The example includes a hydrograph (top) with rainfall (purple bars) and dry days (green and blue shade) and an example storm event analysis (bottom) used in the inflow analysis.



Meter data was further evaluated for accuracy by analyzing the shape of the scatter graph produced by plotting depth in inches versus velocity in feet per second. Scatter graphs for data representing uniform flow conditions should display a direct relationship between depth and velocity – where an increase in velocity occurs with an increase in depth. Scatter graphs for each meter are included in Appendix B.

Infiltration
Infiltration is extraneous groundwater that enters the sewer system through sources such as defective pipes, pipe joints, and manhole walls. Analysis of flow data for infiltration consists of selecting the lowest flow reading that occurs during dry weather conditions between the hours of 12:00 a.m. and 6:00 a.m. Nighttime flow represents a period of minimum sanitary flow, and therefore, has the highest percentage of flow attributed to infiltration. For this evaluation, the percentage of nighttime flow attributed to infiltration was assumed to be 88%.

Peak infiltration is defined as the average of the minimum flow rates (nighttime flow as described above) observed over a period of several dry days, during a period of high groundwater (i.e., during springtime). A “dry day” is defined as at least three days after the conclusion of a rain event. The estimated infiltration rates for each subarea may be found in Table 3, *Estimated Peak Infiltration*.

As shown in Table 3, an estimated 2,954,500 gallons per day (gpd) of peak infiltration was calculated. In order to compare the infiltration rates in different sized metered areas, a gallon per day per inch diameter of sewer mile (gpdim) value is calculated by dividing gallons per day of infiltration by inch-diameter miles of sewer. According to the DEP Guidelines, subareas exhibiting an infiltration rate equal to or greater than 4,000 gpdim are considered excessive and should be prioritized for further investigation. As shown in Table 3, six metered areas are considered excessive. These six metered areas include DE-2C, DE-5C, DE-7C, DE-10C, DE-CT-1C, and Site TT. Of these areas, meter DE-5C exhibited the highest infiltration rate of 23,456.6 gpdim.

Two of the MWRA meters show questionable values for infiltration. Meter DE-1C measures flow from approximately 21,000 lf of sewer pipe and shows near or at zero flow values during nighttime flow according to the hydrograph. In contrast, meter DE-5C measures flow from approximately 21,000 lf of sewer pipe and shows approximately 90% of its average daily flow as infiltration. These two meters are clear outliers in the data and should be considered unreliable.

Removing these two meters from consideration brings the total peak infiltration rate to 2,206,000 gpd and the highest concentration of infiltration is now Meter DE-7C with 9,134.6 gpdim of net peak infiltration.

In comparison to the previous flow metering project completed in 2016, 13 of the 26 subareas showed lowered peak infiltration rates and five subareas were within approximately 5,000 gpd of the 2016 estimate. Groundwater readings were approximately the same, close to the historical average reported by the USGS, giving a strong indication that infiltration has been reduced since the previous metering period. A comparison between the 2016 and 2022 peak infiltration estimates can be found in Table 7, *Priority Evaluation.*

Infiltration rates are considered to be at their peak during the spring months. However, infiltration is a year-round occurrence which decreases available wastewater system capacity. Removing infiltration increases available capacity and decreases sewer transportation and treatment costs. As noted above, rainfall and groundwater, which have a direct impact on infiltration rates, fluctuate year to year.

Inflow
Inflow is extraneous water that is discharged into the sanitary sewer system from sources such as catch basins, sump pumps, roof leaders, surface drains, holes in manhole covers, and other direct or indirect inlets. Inflow enters the sewer system through these sources during wet weather events. Inflow that enters the sewer can cause large increases in sewer flows over a short period of time. The main goal in removing inflow from the sewer system is to remove these short-but-voluminous increases in sewer flow that could potentially cause sewer system overflows and backups.

Rainfall data was collected throughout the monitoring period to identify storm events, total rainfall, and rainfall intensity. The data was used to relate variations in sewer flow during rainfall events to total storm rainfall for the purpose of identifying inflow and its components. Inflow is quantified by comparing metered flow during a rain event to flow metered during a dry weather period during the same day group (weekday or weekend) and time. This is necessary to ensure that observed flow variations are caused by inflow rather than normal diurnal fluctuations.

Peak design storm inflow is determined by estimating the inflow volume produced from a "design storm." The design storm is the five-year, twenty-four-hour storm event with a peak intensity of 0.73 inches/hour (MassDEP Guidelines, 2017).

During the monitoring period, six Rainfall Events, shown on page 4 of this report, were used to quantify inflow. Wastewater flow during these storm events was compared to flow data during dry weather on a similar day of the week during the same time.

Flow meter data was analyzed to determine the inflow quantity corresponding to the six rainfall events and to obtain several data points for use in developing a linear regression analysis. The linear regression analysis plots peak inflow versus peak rainfall intensity for each storm and a best fit regression line is applied to the data points. The linear regression analysis is used to determine the peak design storm inflow relative to the rainfall intensity. Linear regression plots are attached in Appendix C.

The quantification of inflow includes some portion of rainfall induced or dependent infiltration, which is a direct result of stormwater percolation into the ground after significant rainfall events. As shown on Table 4, *Estimated Peak Inflow,* peak design storm inflow from the linear regression analysis is approximately 3,680,000 gpd.

According to the DEP guidelines, areas contributing at least 80% of the total inflow identified through monitoring are considered excessive. 14 metered areas are considered excessive, these areas contribute approximately 2,973,000 gpd of peak design storm inflow. Meter DE-1C had the highest inflow rate with 405,000 gpd of peak inflow.

In order to compare the inflow rates in different sized area, a gallon per day per linear foot of pipe (gpd/lf) value is calculated by dividing gallons per day of inflow by total linear feet of each metered area. This is useful information to determine the relative "concentration" of inflow across the sewer system and in prioritizing potential inflow investigations. Metered area PP2 and DE-2C showed the highest inflow rates when using this comparison at 84.9 gpd/lf and 22.6 gpd/lf respectively. Metered area PP2 contains private sewer lines from the Legacy Place development which is not counted towards the total pipe length contributing towards its high relative inflow rate.

Peak inflow rates have decreased in 16 of the 22 subareas that were metered for inflow analysis when compared to the 2016 analysis. This is most likely due to removal of rainfall induced infiltration from manhole and sewer lining. A comparison between the 2016 and 2022 results can be found in Table 7, *Priority Evaluation*.

Flow Isolation

Flow isolation is a means to measure infiltration rates in manhole-to-manhole reaches of sewers and is ideally performed during periods of high groundwater and minimum wastewater flow, such as the early morning hours of the spring season. Under the direction of Weston & Sampson, Flow Assessment performed flow isolation between the hours of 12:00 and 6:00 AM during May of 2022. The flow isolation data collected by Flow Assessment was used to obtain a baseline peak infiltration rate for the sections of sewer investigated under this phase of the projects. Areas of concern that could not be flow metered due to multiple connections to the MWRA system were flow isolated in order to quantify infiltration within subarea BB and partial sections of II, LL, and MM.

Approximately 39,810 linear feet (lf) of 6-inch to 12-inch sewers were flow isolated. The flow isolation measured an approximate total of 50,688 gpd of infiltration. A summary of the flow isolation results is presented in Table 5, *Flow Isolation Results*. The table also shows the concentration of infiltration in each line segment in gpdim.

Flow isolation could not be completed on approximately 839 lf of sewers due to lack of access or pipeline configurations. These pipes are listed in Table 4 with a pipe material of "NO FI". A summary of the flow isolation results is included on the next page.

Subarea	Linear Feet Flow Isolated (lf)	Total Infiltration (gpd)	Total Infiltration (gpdim)
BB	8,663	24,624	1,828.3
II	16,799	7,200	282.9
LL	10,679	6,408	409.1
MM	3,669	12,456	2,105.8
Total	39,810	50,688	837.8

Annual Program Prioritization
Based on the results of this study, Weston & Sampson recommends creating a new annual program to target problem areas to reduce inflow and infiltration. Investigations have been completed through Year Five of the existing prioritization of the current five-year program. Construction for the Year Five project is expected to begin in 2023, the conclusion of construction will end the Annual Program.

For the creation of a new Annual Program a priority evaluation has been created to prioritize subareas based on the results of this study and grouped together so that approximately 100,000 lf of sewer are targeted for investigation each year. The prioritization is included as Table 7, *Priority Evaluation*.

Summary, Conclusions, and Recommendations
Peak infiltration for each area is presented in Table 3. An estimated 2,961,500 gpd of peak net infiltration exists in this metered portion of Dedham's sewer system. Six metered areas exceeded the 4,000 gpdim threshold referenced in the DEP Guidelines as considered excessive. The table below shows systemwide I/I versus MWRA estimates.

	Average Daily Flow (mgd)	Peak Infiltration (mgd)	Average Annual Infiltration (mgd)	Peak Inflow (mgd)
2022 Flow Metering Results	4.49*	2.96	1.70	3.47
MWRA Estimates (2020)	3.56	3.82	1.45	N/A**

*2022 Flow Metering results only look at springtime values which are generally the highest throughout the entire year.
**MWRA does not calculate estimated inflow using a design storm methodology as used in this report.

I/I removal work has shown positive results according to this metering program. According to Table 7, *Priority Evaluation*, 13 of the 26 subareas have shown a decrease in infiltration compared to the previous flow metering conducted in 2016. Infiltration values for all subareas are likely to increase year over year due to pipe and manhole degradation and also are highly dependent on annual weather and groundwater conditions.

According to Table 6, *Previous Metering Comparison,* total peak infiltration increased from 2016 to 2022, however this includes Meter DE-5C which is believed to be unreliable and should be discounted from the results. The total 2022 peak infiltration would then be 2,247,188 gpd, a 571,727 decrease in peak infiltration between 2016 and 2022. Peak inflow has decreased through all three metering periods, with a dramatic decrease between 2016 and 2022 down 3.38 mgd of peak inflow.

It is recommended that the MWRA be contacted to address possible issues related to meters DE-1C and DE-5C under-reporting and over-reporting flow respectively.

Peak baseline design storm inflow rates for each area are presented in Table 4. Estimated peak baseline design storm inflow for a five-year, twenty-four-hour storm was approximately 3,680,000 gpd. The peak design storm inflow was derived by plotting the peak inflow versus peak hour rainfall intensity, creating a line-of-best-fit, then projecting the peak design storm inflow for the total baseline design storm rainfall intensity. This is shown in the linear regression analysis that can be found in Appendix C.

Inflow can be categorized as direct or delayed. Direct inflow is the result of direct connections from drain structures such as catch basins, driveway drains, roof leaders, or manhole vent holes. Delayed inflow is the result of rainfall induced infiltration and sump pumps connected to the sewer. Most metered areas showed signs of delayed inflow. Hydrographs will show a rise in flow during rain events and a slow decrease to normal flow over hours or days depending on the amount of rain.

Meter PP2 has the highest concentration of inflow at 84.9 gpd/lf. Part of this is due to some private sewer length not counted towards the total length of this metered area. However, this is still a significant concentration of inflow, the hydrograph shows signs of direct inflow. This metered area should be investigated for direct connections of drainage structures by smoke testing.

It is important to note that the wastewater collection infrastructure is a dynamic system that can degrade over time. Peak inflow could be significantly reduced, but overall inflow rates depend on variable annual rainfall and storm events. As system defects or I/I sources are repaired, other defects that were not as severe will continue to degrade. In addition, new connections may be permitted resulting in an increase in flows. Rainfall and groundwater, which have a direct impact on I/I rates, fluctuate year to year. Therefore, it is difficult to make an exact comparison for flow reductions and/or increases over time.

Continuing to pursue the removal of I/I through the establishment of an Annual Program will serve to protect the Town of Dedham's substantial investment in sewer infrastructure. The Annual Program provides benefits including I/I reduction, but also operation and maintenance of the sewer system regardless of excessive flow and have proven to locate backups and significant structural defects before they become emergency issues.

We wish to thank you and members of the Department of Public Works and Engineering staff for their assistance while completing this project. We are available to meet with you at your earliest convenience to discuss this report. Please do not hesitate to contact me at (978) 532-1900 with any questions or comments you may have.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

Nathan E. Michael, PE
Team Leader

cc: Nathan S. Buttermore, PE, Infrastructure Engineer (via email)
Ronald I. Lawrence, Project Engineer (via email)
Jon Szarek, PE, MWRA (via email)

FIGURES

Flow Meter ID	Meter Manhole	Subarea	Inch-Miles	Length (lf)	Acres
DE-BO-1	AA5	AA	28.34	17,305	101.38
DE-5C	CC10	DD	31.91	20,826	190.51
Site CC	CC20	CC	18.03	11,641	86.11
Site EE	EE10	EE	25.16	15,170	152.24
Site FF	FF10	FF	34.69	22,155	179.30
Site GG	GG20	GG	46.10	27,790	468.27
Site HH	JJ1080	HH	48.49	30,083	348.02
DE-1C	JJ130	NN & Partial Section of JJ	43.19	21,373	162.08
Site JJ	JJ570	JJ	33.77	14,651	139.96
DE-10C	KK10	KK	26.59	17,604	124.07
Site LL	LL480	Partial Section of II & LL	20.95	14,135	142.65
DE-7C	MM160	Partial Section of MM	22.88	14,584	123.52
Site OO	OO10	OO	57.42	28,447	254.93
Site PP1	PP800 (1)	Partial Section of PP	3.69	2,332	143.26
Site PP2	PP800 (2)	Partial Section of PP	19.55	10,690	121.93
DE-2C	QQ20	QQ	20.66	12,179	137.19
Site RR	RR10	RR	29.69	19,406	119.40
Site SS	SS15	SS	50.55	31,071	210.81
Site TT	TT50	TT	28.35	18,140	131.48
Site UU	UU10	UU	30.98	18,497	119.50
Site VV	VV30	VV	24.91	14,269	138.67
DE-CT-1C	WW10	WW	37.83	21,701	197.16
Site YY	YY10	XX & YY	51.77	32,843	250.04
DE-9C	ZZ400	Partial Section of ZZ	8.63	6,141	52.71

NOTES: Approximately 29,115 linear feet of sewers were not metered during the program.
This includes sewer subarea BB and partial sections of sewer subareas II, JJ, LL, MM, and ZZ.

FIGURE 1

TOWN OF DEDHAM, MASSACHUSETTS
SANITARY SEWER SYSTEM

TOWN-WIDE FLOW METERING MAP

AUGUST, 2022 SCALE: NOTED

Weston & Sampson

FIGURE 2 – FLOW SCHEMATIC

TOWN OF DEDHAM, MA
2022 FLOW METERING

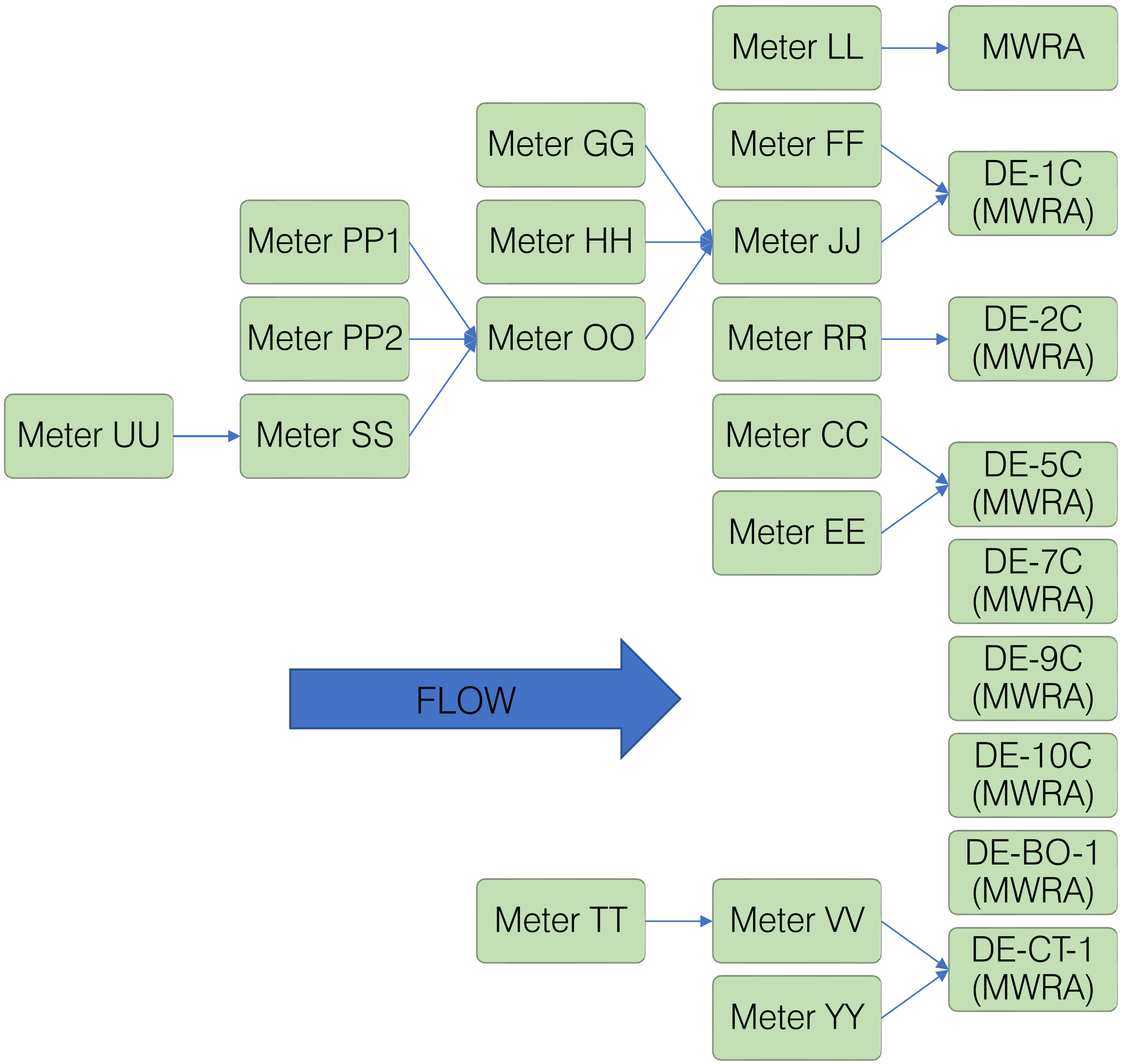
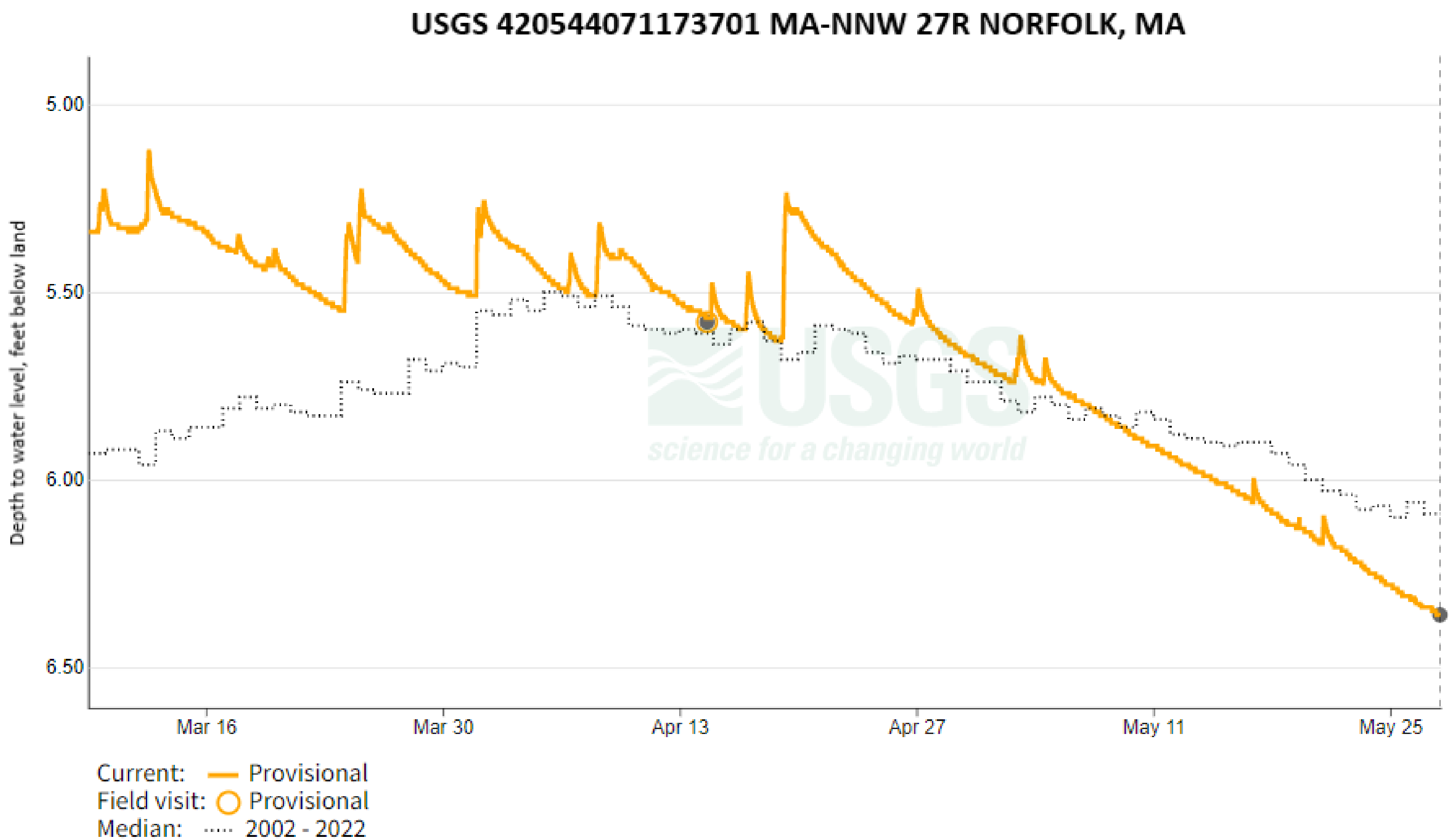


FIGURE 3 – USGS GROUNDWATER MONITORING

TOWN OF DEDHAM, MA

2022 FLOW METERING



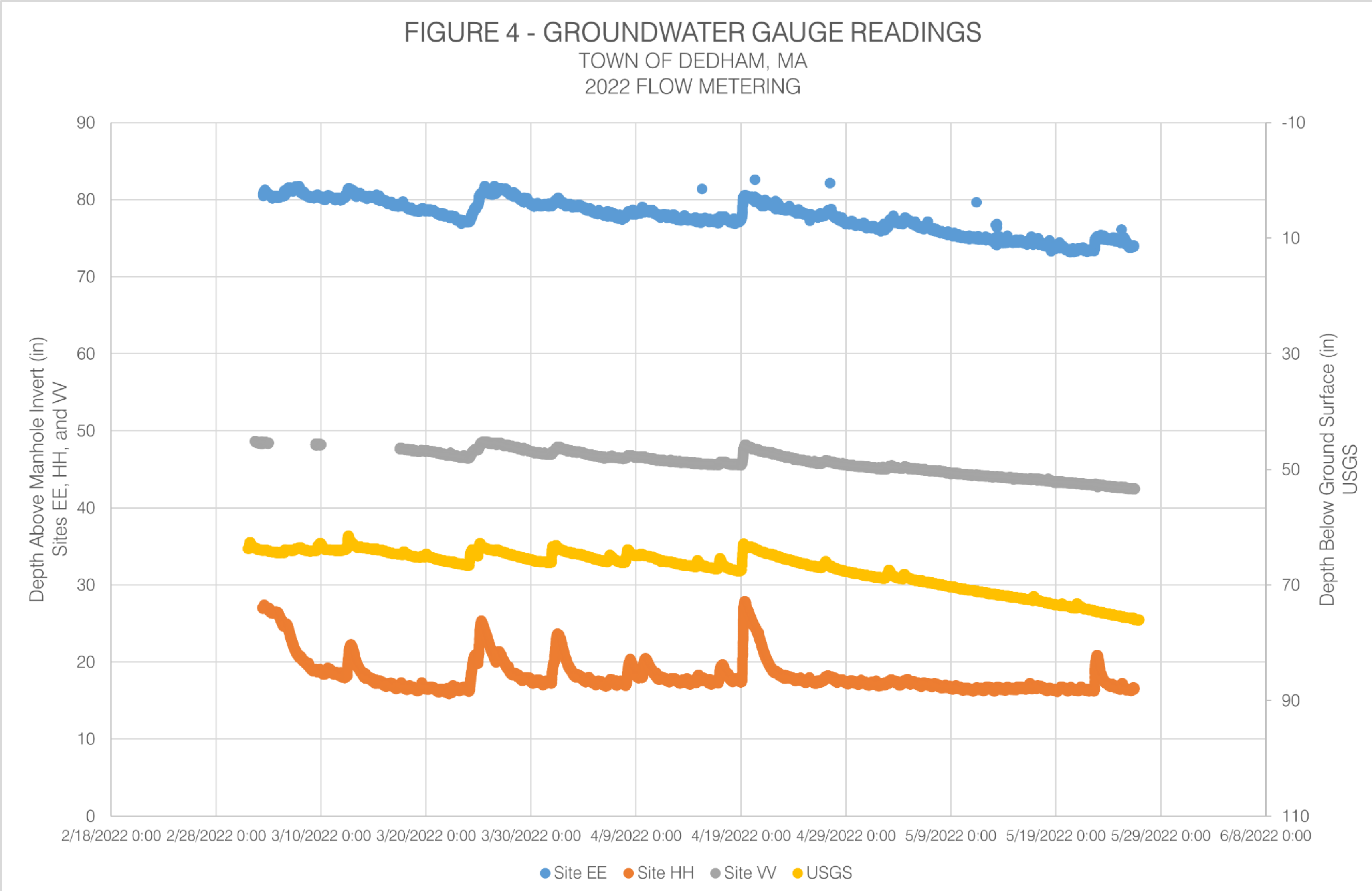


FIGURE 4 - GROUNDWATER GAUGE READINGS
TOWN OF DEDHAM, MA
2022 FLOW METERING
Depth Above Manhole Invert (in)
Sites EE, HH, and VV
Depth Below Ground Surface (in)
USGS
90
80
70
60
50
40
30
20
10
0
-10
10
30
50
70
90
110
2/18/2022 0:00
2/28/2022 0:00
3/10/2022 0:00
3/20/2022 0:00
3/30/2022 0:00
4/9/2022 0:00
4/19/2022 0:00
4/29/2022 0:00
5/9/2022 0:00
5/19/2022 0:00
5/29/2022 0:00
6/8/2022 0:00
Site EE
Site HH
Site VV
USGS

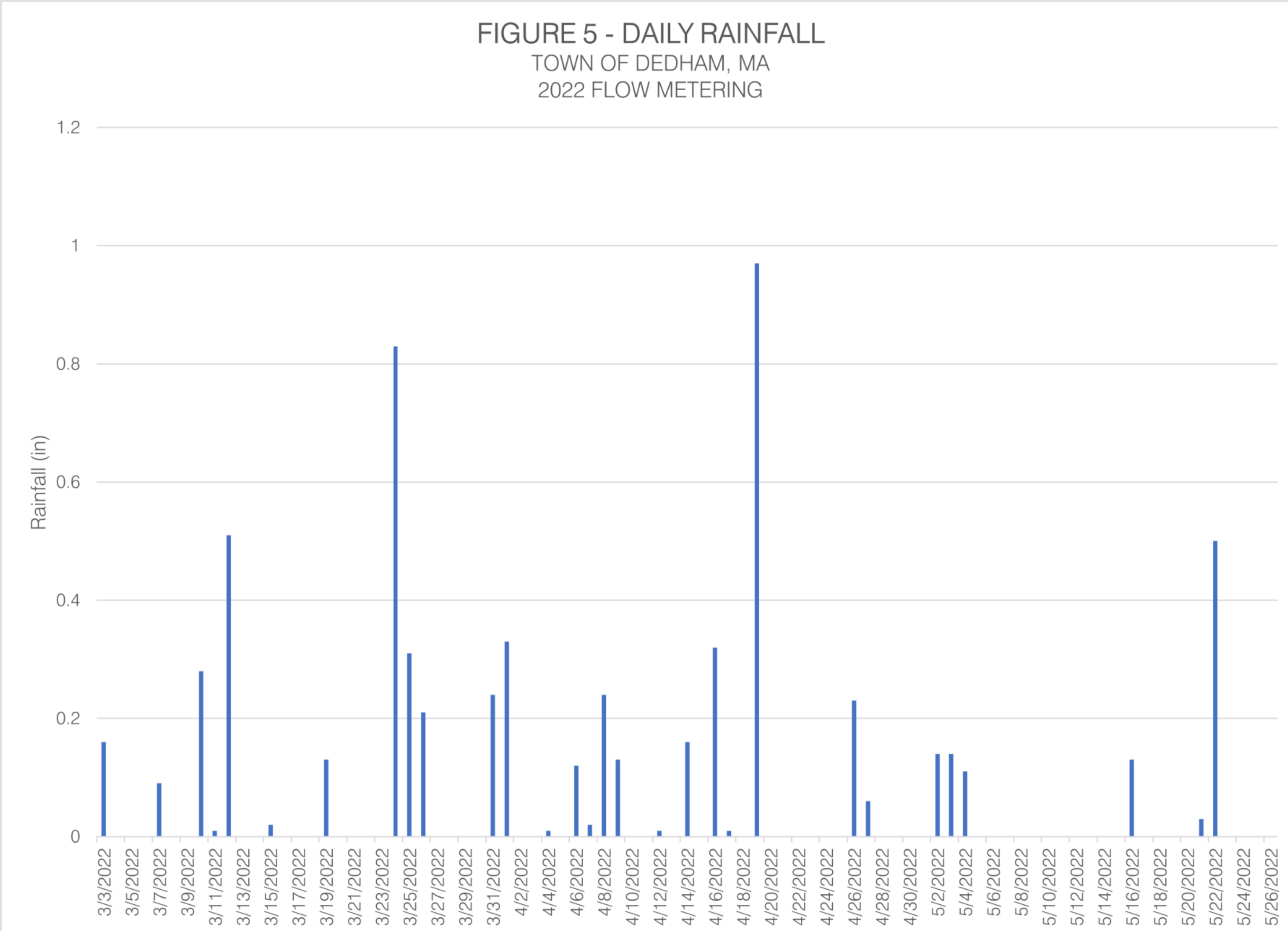


FIGURE 5 - DAILY RAINFALL
TOWN OF DEDHAM, MA
2022 FLOW METERING
Rainfall (in)
1.2
1
0.8
0.6
0.4
0.2
0
3/3/2022
3/5/2022
3/7/2022
3/9/2022
3/11/2022
3/13/2022
3/15/2022
3/17/2022
3/19/2022
3/21/2022
3/23/2022
3/25/2022
3/27/2022
3/29/2022
3/31/2022
4/2/2022
4/4/2022
4/6/2022
4/8/2022
4/10/2022
4/12/2022
4/14/2022
4/16/2022
4/18/2022
4/20/2022
4/22/2022
4/24/2022
4/26/2022
4/28/2022
4/30/2022
5/2/2022
5/4/2022
5/6/2022
5/8/2022
5/10/2022
5/12/2022
5/14/2022
5/16/2022
5/18/2022
5/20/2022
5/22/2022
5/24/2022
5/26/2022

TABLES

TABLE 1 - SEWER SYSTEM SUMMARY

TOWN OF DEDHAM, MA

2022 FLOW METERING

Subarea	Estimated Linear Footage (ft)	Inch-Miles	Estimated Manholes
AA	17,348	28.4	91
BB	8,881	13.9	46
CC	12,724	20.9	64
DD	12,702	19.6	78
EE	14,696	24.6	80
FF	21,448	33.9	112
GG	26,932	45.6	152
HH	26,594	43.5	174
II	24,797	37.7	154
JJ	26,831	64.0	137
KK	17,602	26.6	95
LL	17,253	25.5	105
MM	18,278	29.0	108
NN	11,481	18.1	59
OO	25,764	51.7	143
PP	11,896	22.8	85
QQ	12,471	21.9	62
RR	19,820	30.3	86
SS	31,356	51.9	151
TT	19,470	31.8	105
UU	18,702	31.4	109
VV	13,643	23.1	73
WW	21,090	36.8	115
XX	16,381	25.2	110
YY	15,940	25.8	85
ZZ	8,048	12.1	48
TOTAL	472,148	796.1	2,627

TABLE 2 - TRIBUTARY METER AREA SUMMARY

TOWN OF DEDHAM, MA

2022 FLOW METERING

Flow Meter ID	Meter Manhole	Subarea	Length (lf)	Inch-Miles	Acres
DE-BO-1	AA5	AA	17,305	28.34	101.38
Site CC	CC20	CC	11,641	18.03	86.11
DE-5C	CC10	DD	20,826	31.91	190.51
Site EE	EE10	EE	15,170	25.16	152.24
Site FF	FF10	FF	22,155	34.69	179.30
Site GG	GG20	GG	27,790	46.10	468.27
Site HH	JJ1080	HH	30,083	48.49	348.02
Site LL	LL480	Partial Section of II & LL	14,135	20.95	142.65
Site JJ	JJ570	JJ	14,651	33.77	139.96
DE-10C	KK10	KK	17,604	26.59	124.07
DE-7C	MM160	Partial Section of MM	14,584	22.88	123.52
DE-1C	JJ130	NN & Partial Section of JJ	21,373	43.19	162.08
Site OO	OO10	OO	28,447	57.42	254.93
Site PP1 NEW	PP800	Partial Section of PP	2,332	3.69	143.26
Site PP2	PP800	Partial Section of PP	10,690	19.55	121.93
DE-2C	QQ20	QQ	12,179	20.66	137.19
Site RR	RR10	RR	19,406	29.69	119.40
Site SS	SS15	SS	31,071	50.55	201.81
Site TT	TT50	TT	18,140	28.35	131.48
Site UU	UU10	UU	18,497	30.98	119.50
Site VV	VV30	VV	14,269	24.91	138.67
DE-CT-1C	WW10	WW	21,701	37.83	197.16
Site YY	YY10	XX & YY	32,843	51.77	250.04
DE-9C	ZZ400	Partial Section of ZZ	6,141	8.63	52.71
		TOTAL	443,033	744.13	4086.19

NOTES: Approximately 29,115 linear feet of sewers were not metered during the program. This includes sewer subarea BB and partial sections of sewer subareas II, JJ, LL, MM, and ZZ.

TABLE 3 - ESTIMATED PEAK INFILTRATION

TOWN OF DEDHAM, MA
2022 FLOW METERING

Flow Meter ID	Subarea(s)	Total Length (lf)	Inch-Miles	Net Peak Infiltration (gpd)	Net Peak Infiltration (mgd)	Net Peak Infiltration (gpdim)
DE-7C	Partial Section of MM	14,584	22.88	209,000	0.209	9,134.6
Site TT	TT	18,140	28.35	235,500	0.236	8,306.9
DE-CT-1C	WW	21,701	37.83	290,000	0.290	7,665.9
DE-10C	KK	17,604	26.59	160,000	0.160	6,017.3
DE-2C	QQ	12,179	20.66	120,000	0.120	5,808.3
Site PP1 NEW	Partial Section of PP	10,690	19.55	77,500	0.078	3,964.2
Site SS	SS	31,071	50.55	158,500	0.159	3,135.5
Site VV	VV	14,269	24.91	75,000	0.075	3,010.8
Site LL	Partial Section of II & LL	14,135	20.95	59,000	0.059	2,816.2
Site UU	UU	18,497	30.98	85,000	0.085	2,743.7
Site YY	XX & YY	32,843	51.77	135,500	0.136	2,617.3
Site CC	CC	11,641	18.03	44,500	0.045	2,468.1
Site RR	RR	19,406	29.69	66,500	0.067	2,239.8
Site GG	GG	27,790	46.10	97,500	0.098	2,115.0
Site JJ	JJ	14,651	33.77	71,000	0.071	2,102.5
DE-9C	Partial Section of ZZ	6,141	8.63	18,000	0.018	2,085.7
Site PP1*	Partial Section of PP	3,069	4.98	9,500	0.010	1,907.6
Site HH	HH	30,083	48.49	85,000	0.085	1,752.9
Site OO	OO	28,447	57.42	93,500	0.094	1,628.4
Site EE	EE	15,170	25.16	40,000	0.040	1,589.8
Site FF	FF	22,155	34.69	47,500	0.048	1,369.3
Site PP2	Partial Section of PP	2,332	3.69	4,000	0.004	1,084.0
DE-BO-1C	AA	17,305	28.34	24,000	0.024	846.9
Total		400,834	640.24	2,206,000	2.206	3,445.6

MWRA Meters With Questionable Data

DE-1C	NN & Partial Section of JJ	21,373	43.19	Negligible	Negligible	Negligible
DE-5C	DD	20,826	31.91	748,500	0.749	23,456.6
Total		42,199	75.10	748,500	0.749	9,966.7
Grand Total		443,033	715.34	2,954,500	2.955	4,130.2

*Site PP1 total length does not count towards the grand total length as it is included with Site PP1 NEW's length.

TABLE 4 - ESTIMATED PEAK INFLOW

TOWN OF DEDHAM, MA
2022 FLOW METERING

Flow Meter ID	Subarea(s)	Total Length (lf)	Inch-Miles	Regression Slope	Estimated Peak Design Storm Inflow (gpd)	Estimated Peak Design Storm Inflow (gpd/lf)	% of Total Design Storm Inflow	Cumulative % of Total Design Storm Inflow
Site GG	GG	27,790	46.10	2.52	290,000	10.4	9.76%	9.76%
Site HH	HH	30,083	48.49	2.61	280,000	9.3	9.43%	19.19%
DE-2C	QQ	12,179	20.66	2.65	275,000	22.6	9.26%	28.45%
DE-CT-1	WW	21,701	37.83	3.11	235,000	10.8	7.91%	36.36%
Site PP2	Partial Section of PP	2,332	3.69	3.69	198,000	84.9	6.67%	43.03%
Site TT	TT	18,140	28.35	4.56	160,000	8.8	5.39%	48.42%
Site JJ	JJ	14,651	33.77	4.71	155,000	10.6	5.22%	53.64%
DE-BO-1C	AA	17,305	28.34	5.03	145,000	8.4	4.88%	58.52%
Site OO	OO	28,447	57.42	5.93	140,000	4.9	4.71%	63.23%
Site SS	SS	31,071	50.55	5.25	139,000	4.5	4.68%	67.91%
Site YY	XX & YY	32,843	51.77	5.57	131,000	4.0	4.41%	72.32%
Site RR	RR	19,406	29.69	6.35	115,000	5.9	3.87%	76.20%
Site EE	EE	15,170	25.16	6.58	111,000	7.3	3.74%	79.93%
Site FF	FF	22,155	34.69	7.85	93,000	4.2	3.13%	83.06%
DE-10C	KK	17,604	26.59	7.93	92,000	5.2	3.10%	86.16%
DE-7C	Partial Section of MM	14,584	22.88	8.02	91,000	6.2	3.06%	89.23%
Site UU	UU	18,497	30.98	9.01	81,000	4.4	2.73%	91.95%
Site LL	Partial Section of II & LL	14,135	20.95	9.73	75,000	5.3	2.53%	94.48%
Site CC	CC	11,641	18.03	14.04	52,000	4.5	1.75%	96.23%
DE-9C	Partial Section of ZZ	6,141	8.63	17.80	41,000	6.7	1.38%	97.61%
Site PP1*	Partial Section of PP	3,069	4.98	19.21	38,000	12.4	1.28%	98.89%
Site VV	VV	14,269	24.91	22.12	33,000	2.3	1.11%	100.00%
Site PP1 NEW**	Partial Section of PP	10,690	19.55	-	-	-	-	-
	Total	**400,834**	**669.03**		**2,970,000**	**7.4**	**100.00%**	

*Site PP1 pipe lengths do not count towards the total length as it is included with Site PP1 NEW's length.
**Site PP1 NEW did not receive enough storm events for an accurate model of inflow

MWRA Meters With Questionable Data

DE-1C	NN & Partial Section of JJ	21,373	43.19	1.80	405,000	18.9	-	-
DE-5C	DD	20,826	31.91	2.39	305,000	14.6	-	-
	Total	**42,199**	**75.10**		**710,000**	**16.8**		
	Grand Total	**443,033**	**744.13**		**3,680,000**	**8.3**		

TABLE 5 - FLOW ISOLATION RESULTS

TOWN OF DEDHAM, MA

2022 FLOW METERING

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
AIELLO DRIVE	LL	390	LL	380	VC	6	29	0	0
AIELLO DRIVE	LL	400	LL	390	VC	6	255	0	0
ALICE WAY	LL	330	LL	160	VC	8	208	0	0
BIRCH STREET	LL	230	LL	220	VC	8	204	1,080	3,494
BIRCH STREET	LL	240	LL	230	VC	8	173	0	0
BIRCH STREET	LL	250	LL	240	VC	8	167	0	0
BIRCH STREET	LL	260	LL	250	VC	8	224	0	0
BIRCH STREET	LL	270	LL	260	VC	8	142	0	0
BIRCH STREET	LL	275	LL	270	VC	8	161	0	0
BONAD ROAD	II	690	II	610	VC	8	159	0	0
BONAD ROAD	II	700	II	690	VC	8	93	0	0
BONAD ROAD	II	710	II	700	VC	8	191	0	0
BROOKDALE AVENUE	II	1390	II	1340	VC	8	27	0	0
BROOKDALE AVENUE	II	1410	II	1390	VC	8	163	720	2,915
BROOKDALE AVENUE	II	1420	II	1410	VC	8	190	0	0
BROOKDALE AVENUE	II	1430	II	1420	VC	8	160	0	0
BUSSEY STREET	LL	410	LL	380	VC	6	178	0	0
BUSSEY STREET	MM	040	MM	030	VC	12	53	0	0
BUSSEY STREET	MM	120	MM	040	VC	12	166	0	0
BUSSEY STREET	MM	130	MM	120	VC	8	139	0	0
BUSSEY STREET	MM	140	MM	130	VC	6	203	0	0
BUSSEY STREET	MM	270	MM	030	VC	8	200	1,728	5,702
BUSSEY STREET	MM	280	MM	270	VC	8	207	0	0
BUSSEY STREET	MM	290	MM	280	VC	8	190	2,880	10,004
BUSSEY STREET ESMT	LL	368	LL	367	VC	8	220	0	0
BUSSEY STREET ESMT	LL	370	LL	368	VC	8	234	0	0
BUSSEY STREET ESMT	LL	380	LL	370	VC	6	143	0	0
CHAUNCEY STREET	MM	300	MM	290	VC	8	194	1,080	3,674
CHAUNCEY STREET	MM	310	MM	300	VC	6	153	0	0
CHAUNCEY STREET	MM	320	MM	310	VC	6	84	0	0
CHAUNCEY STREET	MM	330	MM	300	VC	6	144	288	1,760

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
CLAYBANK ROAD	BB	090	BB	080	NO FI	10	226		
CLAYBANK ROAD	BB	100	BB	090	NO FI	10	113		
CLAYBANK ROAD	BB	470	BB	090	NO FI	6	500		
CLAYBANK ROAD ESMT	BB	011	BB	010	VC	10	37	0	0
CLAYBANK ROAD ESMT	BB	080	BB	011	VC	10	183	0	0
CLEVELAND STREET	LL	310	LL	230	VC	8	241	0	0
CLEVELAND STREET	LL	320	LL	310	VC	8	111	0	0
COLBURN STREET	LL	430	KK	010	VC	8	233	0	0
COLBURN STREET	LL	440	LL	430	VC	8	140	0	0
COLBURN STREET	LL	450	LL	440	VC	8	100	0	0
COLUMBIA TERRACE	II	910	II	440	VC	8	216	0	0
COLUMBIA TERRACE	II	920	II	910	VC	8	82	0	0
COLUMBIA TERRACE	II	930	II	920	VC	8	105	0	0
CUNNINGHAM ROAD	BB	370	BB	220	VC	8	317	1,440	2,998
CUNNINGHAM ROAD	BB	380	BB	370	VC	8	100	0	0
CUNNINGHAM ROAD	BB	430	BB	260	VC	8	200	720	2,376
CUNNINGHAM ROAD	BB	440	BB	430	VC	8	252	0	0
CUNNINGHAM ROAD	BB	450	BB	440	VC	8	250	0	0
CUNNINGHAM ROAD	BB	460	BB	450	VC	8	110	0	0
CURVE STREET	II	390	II	380	VC	8	204	0	0
CURVE STREET	II	400	II	390	VC	8	192	0	0
CURVE STREET	II	410	II	400	VC	8	236	0	0
CURVE STREET	II	410 S (STUB)	II	410	VC	8	61	0	0
CURVE STREET	II	430	II	420	VC	8	150	0	0
CURVE STREET	II	440	II	430	VC	8	138	0	0
CURVE STREET	II	450	II	440	VC	8	226	0	0
CURVE STREET	II	460	II	450	VC	8	261	0	0
CURVE STREET	II	470	II	460	VC	8	130	0	0
CURVE STREET	II	470 S (STUB)	II	470	VC	8	51	0	0
DEDHAM BOULEVARD	LL	210	LL	180	VC	8	89	0	0
DEDHAM BOULEVARD	LL	220	LL	223	VC	8	247	0	0
DEDHAM BOULEVARD	LL	220 S (STUB)	LL	220	VC	8	200	144	475
DEDHAM BOULEVARD	LL	223	LL	210	VC	8	162	0	0
DEDHAM BOULEVARD	LL	225	LL	220	VC	8	138	432	2,066
DEMETRA TERRACE	II	1370	II	1350	VC	8	50	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
DEMETRA TERRACE	II	1380	II	1370	VC	8	95	0	0
DEMETRA TERRACE	II	1385	II	1380	VC	8	45	0	0
EAST STREET	II	1350	II	1340	VC	8	177	0	0
EAST STREET	II	1360	II	1350	VC	8	174	0	0
EAST STREET	II	1435	II	1340	VC	8	129	0	0
EAST STREET	II	1440	II	1435	VC	8	130	0	0
EAST STREET	II	1450	II	1440	VC	8	231	0	0
EAST STREET ESMT	II	1340	II	1330	VC	8	175	0	0
EASTBROOK ROAD	II	1170	II	1160	VC	8	87	0	0
EASTBROOK ROAD	II	1180	II	1170	VC	8	112	0	0
EASTBROOK ROAD	II	1190	II	1170	VC	8	50	0	0
EASTBROOK ROAD	II	1255	II	1190	VC	8	82	0	0
EASTBROOK ROAD	II	1260	II	1255	VC	8	117	0	0
EASTBROOK ROAD	II	1270	II	1260	VC	8	109	0	0
EMMETT AVENUE	KK	170	LL	360	VC	8	165	0	0
EMMETT AVENUE	LL	350	LL	020	VC	8	325	0	0
EMMETT AVENUE	LL	355	LL	350	VC	8	342	0	0
EMMETT AVENUE	LL	357	LL	355	VC	8	127	0	0
EMMETT AVENUE	LL	360	LL	355	VC	8	30	0	0
EVERGREEN WAY	II	340	II	330	VC	8	199	0	0
FLEMING STREET	LL	312	LL	310	VC	8	229	0	0
HARVEY DRIVE	II	1010	II	400	VC	8	176	0	0
HILL AVENUE	MM	100	MM	080	VC	8	112	0	0
HILL AVENUE	MM	110	MM	100	VC	8	109	0	0
HILL AVENUE	MM	110 S (STUB)	MM	110	VC	8	172	0	0
HITCHINS DRIVE	II	990	II	410	VC	8	293	0	0
HITCHINS DRIVE	II	1000	II	990	VC	8	74	0	0
INCINERATOR ROAD	II	1195	II	1185	VC	8	30	0	0
INCINERATOR ROAD	II	1205	II	1195	VC	8	85	0	0
INCINERATOR ROAD	II	1215	II	1205	VC	8	104	0	0
INCINERATOR ROAD ESMT	II	1185	II	1180	VC	8	255	0	0
JENNEY LANE	BB	035	BB	030	VC	8	215	144	442
JENNEY LANE	BB	040	BB	030	VC	8	250	0	0
JENNEY LANE	BB	050	BB	040	VC	8	234	0	0
JENNEY LANE	BB	060	BB	050	VC	8	256	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
JENNEY LANE	BB	070	BB	060	VC	8	258	0	0
JENNEY LANE	BB	075	BB	070	VC	8	125	0	0
JENNEY LANE ESMT	BB	020	BB	010	VC	8	301	0	0
JENNEY LANE ESMT	BB	030	BB	020	VC	8	164	0	0
LEONARD STREET	LL	280	LL	250	VC	8	165	0	0
LEONARD STREET	LL	290	LL	250	VC	8	240	0	0
LEONARD STREET	LL	300	LL	290	VC	8	110	0	0
LEWIS FARM ROAD	LL	090	LL	080	VC	8	222	0	0
LEWIS FARM ROAD	LL	100	LL	090	VC	8	95	0	0
LEWIS FARM ROAD	LL	110	LL	100	VC	8	139	0	0
LEWIS FARM ROAD	LL	110 S (STUB)	LL	110	VC	8	76	0	0
LILAC LANE	II	980	II	940	VC	8	197	0	0
LOWER EAST STREET	II	510	II	500	VC	8	88	0	0
LOWER EAST STREET	II	520	II	510	VC	8	46	0	0
LOWER EAST STREET	II	550	II	520	VC	8	149	0	0
LOWER EAST STREET	II	560	II	550	VC	8	62	0	0
LOWER EAST STREET	II	570	II	560	VC	8	312	0	0
LOWER EAST STREET	II	580	II	570	VC	8	156	0	0
LOWER EAST STREET	II	590	II	580	VC	8	67	0	0
LOWER EAST STREET	II	600	II	590	VC	8	173	0	0
LOWER EAST STREET	II	610	II	600	VC	8	169	0	0
LOWER EAST STREET	II	1160	II	490	VC	8	155	0	0
LYNCH AVENUE	BB	390	BB	230	VC	8	72	0	0
LYNCH AVENUE	BB	400	BB	390	VC	8	349	0	0
LYNCH AVENUE	BB	410	BB	400	VC	8	204	0	0
MAVERICK STREET	II	310	II	320	VC	8	213	0	0
MAVERICK STREET	II	320	II	330	VC	8	49	0	0
MAVERICK STREET	II	330	II	350	VC	8	167	0	0
MAVERICK STREET	II	350	II	360	VC	8	232	0	0
MAVERICK STREET	II	370	II	310	VC	8	339	0	0
MAVERICK STREET	II	380	II	370	VC	8	60	0	0
OAK STREET	II	790	II	780	VC	8	223	1,080	3,196
OAK STREET	II	800	II	790	VC	8	207	0	0
OAK STREET	II	810	II	800	VC	8	202	0	0
OAK STREET	II	820	II	810	VC	8	184	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
OAK STREET	II	830	II	820	VC	8	185	0	0
OAK STREET	II	940	II	470	VC	8	119	0	0
OAK STREET	II	950	II	940	VC	8	195	1,080	3,655
OAK STREET	II	960	II	950	VC	8	188	0	0
OAK STREET	II	970	II	960	VC	8	149	0	0
OAKLAND STREET	LL	030	LL	010	VC	8	262	0	0
OAKLAND STREET	LL	040	LL	030	VC	8	152	4,320	18,758
OAKLAND STREET	LL	050	LL	040	VC	8	183	0	0
OAKLAND STREET	LL	060	LL	050	VC	8	204	0	0
OAKLAND STREET	LL	070	LL	060	VC	8	166	0	0
OAKLAND STREET	LL	080	LL	070	VC	8	294	432	970
ODYSSEY LANE	LL	359	LL	357	VC	8	240	0	0
PINE STREET	BB	110	BB	100	VC	10	170	0	0
PINE STREET	BB	130	BB	110	VC	8	301	7,200	15,787
PINE STREET	BB	140	BB	130	VC	8	125	720	3,802
PINE STREET	BB	150	BB	140	VC	8	208	0	0
PINE STREET	BB	160	BB	150	VC	8	205	0	0
PINE STREET	BB	170	BB	160	VC	8	160	0	0
RIDGE AVENUE	II	880	II	790	VC	8	204	0	0
RIDGE AVENUE	II	890	II	880	VC	8	240	0	0
RIDGE AVENUE	II	900	II	890	VC	8	165	0	0
ROSEMARY ROAD	BB	220	BB	110	VC	10	283	8,640	16,120
ROSEMARY ROAD	BB	230	BB	220	VC	10	232	2,880	6,554
ROSEMARY ROAD	BB	240	BB	230	VC	8	171	0	0
ROSEMARY ROAD	BB	250	BB	240	VC	8	201	0	0
ROSEMARY ROAD	BB	260	BB	250	VC	8	147	2,160	9,698
ROSEMARY ROAD	BB	270	BB	260	VC	8	211	720	2,252
ROSEMARY ROAD	BB	280	BB	270	VC	8	70	0	0
ROSEMARY ROAD	BB	290	BB	280	VC	8	74	0	0
ROSEMARY ROAD	BB	300	BB	290	VC	8	325	0	0
ROSEMARY ROAD	BB	310	BB	300	VC	8	299	0	0
ROSEMARY ROAD	BB	320	BB	310	VC	8	258	0	0
ROSEMARY ROAD	BB	330	BB	320	VC	8	124	0	0
SAW MILL LANE	LL	020	LL	010	VC	8	30	0	0
SAW MILL LANE	MM	010	LL	010	VC	12	244	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
SAW MILL LANE	MM	020	MM	010	VC	12	30	0	0
SAW MILL LANE	MM	030	MM	020	VC	12	269	0	0
SAW MILL LANE	MM	050	MM	040	VC	8	271	0	0
SAW MILL LANE	MM	060	MM	050	VC	8	90	0	0
SAW MILL LANE	MM	070	MM	060	VC	8	125	0	0
SAW MILL LANE	MM	080	MM	070	VC	8	219	4,320	13,019
SAW MILL LANE	MM	090	MM	080	VC	8	295	2,160	4,833
SCHILLER ROAD	II	840	II	800	VC	8	176	0	0
SCHILLER ROAD	II	850	II	840	VC	8	195	0	0
SCHILLER ROAD	II	860	II	850	VC	8	190	0	0
SCHILLER ROAD	II	870	II	860	VC	8	164	0	0
SCHILLER ROAD	II	1470	II	800	VC	8	113	0	0
SHERWOOD STREET	LL	120	LL	130	VC	8	20	0	0
SHERWOOD STREET	LL	130	LL	140	VC	8	271	0	0
SHERWOOD STREET	LL	145	LL	140	VC	8	221	0	0
SHERWOOD STREET	LL	150	LL	145	VC	8	183	0	0
SHERWOOD STREET	LL	160	LL	150	VC	8	109	0	0
SHERWOOD STREET	LL	170	LL	160	VC	8	69	0	0
SHERWOOD STREET	LL	180	LL	170	VC	8	124	0	0
SHERWOOD STREET ESMT	LL	140	LL	070	VC	8	193	0	0
STORMY HILL	LL	190	LL	180	VC	8	38	0	0
STORMY HILL	LL	200	LL	190	VC	8	62	0	0
SUMMER STREET	II	620	II	570	VC	8	206	360	1,153
VETERANS ROAD	LL	800	LL	795	VC	12	91	0	0
VETERANS ROAD	LL	810	LL	800	VC	8	230	0	0
VETERANS ROAD	LL	815	LL	810	VC	8	89	0	0
VETERANS ROAD	LL	820	LL	815	VC	8	109	0	0
VETERANS ROAD	LL	830	LL	800	VC	8	376	0	0
VETERANS ROAD	LL	840	LL	800	VC	8	172	0	0
VETERANS ROAD	LL	850	LL	840	VC	8	66	0	0
VETERANS ROAD	LL	860	LL	840	VC	8	219	0	0
VETERANS ROAD	LL	870	LL	860	VC	8	242	0	0
VINE ROCK STREET	BB	190	BB	150	VC	8	159	0	0
VINE ROCK STREET	BB	200	BB	190	VC	8	182	0	0
VINE ROCK STREET	BB	210	BB	200	VC	8	248	0	0

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length	GPD	GPDIM
VINE ROCK STREET	BB	340	BB	330	VC	8	226	0	0
VINE ROCK STREET	BB	350	BB	340	VC	8	228	0	0
VINE ROCK STREET	BB	360	BB	350	VC	8	179	0	0
WASHINGTON STREET	II	480	II	420	VC	8	81	0	0
WASHINGTON STREET	II	730	II	480	VC	8	270	0	0
WASHINGTON STREET	II	735	II	730	VC	8	264	0	0
WASHINGTON STREET	II	740	II	735	VC	8	276	0	0
WASHINGTON STREET	II	741	II	740	VC	8	269	0	0
WASHINGTON STREET	II	750	II	420	VC	8	246	1,440	3,863
WASHINGTON STREET	II	760	II	750	VC	8	230	0	0
WASHINGTON STREET	II	770	II	760	VC	8	231	1,800	5,143
WASHINGTON STREET	II	780	II	770	VC	8	225	720	2,112
WASHINGTON STREET	II	1280	II	1270	VC	8	196	0	0
WASHINGTON STREET	II	1290	II	1280	VC	8	194	0	0
WASHINGTON STREET	II	1290	II	1300	VC	8	284	0	0
WASHINGTON STREET	II	1300	II	1310	VC	8	165	0	0
WASHINGTON STREET	II	1310	II	1250	VC	8	25	0	0
WASHINGTON STREET	II	1320	II	1250	VC	8	121	0	0
WASHINGTON STREET	II	1330	II	1320	VC	8	92	0	0
WASHINGTON STREET	II	1680	II	420	VC	8	25	0	0
WASHINGTON STREET	II	1690	II	1680	VC	8	163	0	0
WASHINGTON STREET	II	1700	II	1690	VC	8	170	0	0
WASHINGTON STREET ESMT	II	1225	II	1215	VC	8	225	0	0
WASHINGTON STREET ESMT	II	1230	II	1225	VC	8	203	0	0
WASHINGTON STREET ESMT	II	1240	II	1230	VC	8	237	0	0
WASHINGTON STREET ESMT	II	1250	II	1240	VC	8	168	0	0
WILLIS STREET	II	630	II	590	VC	8	276	0	0
WINTER STREET	II	720	II	700	VC	8	210	0	0
TOTAL LENGTH OF PIPE							40,649	50,688	
TOTAL LENGTH OF PIPE FLOW ISOLATED							39,810		

NOTES:
1. "NO FI" - Flow Isolation was not performed on this pipe segment.

TABLE 6 - PREVIOUS METERING COMPARISON (INFILTRATION)

TOWN OF DEDHAM, MA

2022 FLOW METERING

Flow Meter ID	Subarea	Length (lf)	Inch-Miles	2011 Peak Infiltration (gpd)	2011 Peak Infiltration (gpdim)	2016 Peak Infiltration (gpd)	2016 Peak Infiltration (gpdim)	2022 Peak Infiltration (gpd)	2022 Peak Infiltration (gpdim)
DE-BO-1	AA	17,305	28.34	72,941	2,583	45,692	1,618	24,000	846.9
Site CC	CC	11,641	18.03	80,000	4,675	34,663	2,026	44,500	2,468.1
DE-5C	DD	20,826	31.91	107,143	3,288	126,425	3,880	748,500	23,456.6
Site EE	EE	15,170	25.16	136,667	5,786	99,712	4,221	40,000	1,589.8
Site FF	FF	22,155	34.69	130,000	3,792	56,516	1,649	47,500	1,369.3
Site GG	GG	27,790	46.10	140,000	3,137	94,916	2,127	97,500	2,115.0
Site HH	HH	30,083	48.49	39,879	821	83,281	1,714	85,000	1,752.9
Site LL	Partial Section of II & LL	14,135	20.95	133,846	6,469	64,912	3,137	59,000	2,816.2
Site JJ	JJ	14,651	33.77	211,154	6,384	102,133	3,088	71,000	2,102.5
DE-10C[1]	KK	17,604	26.59	127,368	4,790	138,846	5,222	160,000	6,017.3
DE-7C	Partial Section of MM	14,584	22.88	90,000	3,963	132,615	5,840	209,000	9,134.6
DE-1C	NN & Partial Section of JJ	21,373	43.19	Negligible	Negligible	133,068	3,111	Negligible	Negligible
Site OO	OO	28,447	57.42	211,739	3,999	263,624	4,979	101,500	1,767.7
Site PP1	Partial Section of PP	3,069	4.98	-	-	-	-	9,500	1,907.6
Site PP1 NEW	Partial Section of PP	2,332	3.69	-	-	-	-	77,500	3,964.2
Site PP2[2]	Partial Section of PP	10,690	19.55	54,000	1,616	41,354	1,237	4,000	1,084.0
DE-2C	QQ	12,179	20.66	Negligible	Negligible	110,959	5,347	120,000	5,808.3
Site RR	RR	19,406	29.69	176,842	5,980	158,579	5,362	66,500	2,239.8
Site SS	SS	31,071	50.55	322,632	6,326	266,196	5,219	158,500	3,135.5
Site TT	TT	18,140	28.35	390,000	13,768	268,124	9,466	235,500	8,306.9
Site UU	UU	18,497	30.98	143,333	5,006	79,250	2,768	85,000	2,743.7
Site VV	VV	14,269	24.91	225,652	9,340	124,358	5,147	75,000	3,010.8
DE-CT-1C	WW	21,701	37.83	134,444	3,559	174,421	4,617	290,000	7,665.9
Site YY	XX & YY	32,843	51.77	180,000	3,518	147,636	2,885	135,500	2,617.3
DE-9C	Partial Section of ZZ	6,141	8.63	Negligible	Negligible	15,077	1,747	18,000	2,085.7
	TOTAL[3]	443,033	744.13	3,107,640	4,176	2,762,357	3,712	2,962,500	3,981.2

NOTES:

1 Subarea KK was split into two meters for the 2011 and 2016 metering periods, infiltration/inflow values have been combined to compare to the 2022 metering.
2 Subarea PP was combined into one meter for the 2011 and 2016 metering periods, infiltration/inflow values have been entered into Site PP2 for comparison
3 Total length and total inch-miles are based on totals for 2022 metering period.

TABLE 6 - PREVIOUS METERING COMPARISON (INFLOW)

TOWN OF DEDHAM, MA

2022 FLOW METERING

Flow Meter ID	Subarea	Length (lf)	Inch-Miles	2011 Peak Inflow (gpd)	2011 Peak Inflow (gpd/lf)	2016 Peak Inflow (gpd)	2016 Peak Inflow (gpd/lf)	2022 Peak Inflow (gpd)	2022 Peak Inflow (gpd/lf)
DE-BO-1	AA	17,305	28.34	73,438	4.2	21,054	1.2	145,000	8.4
Site CC	CC	11,641	18.03	140,000	12.0	37,149	3.2	52,000	4.5
DE-5C	DD	20,826	31.91	240,000	11.5	78,300	3.8	305,000	14.6
Site EE	EE	15,170	25.16	217,412	14.3	367,488	24.2	111,000	7.3
Site FF	FF	22,155	34.69	210,000	9.5	154,947	7.0	93,000	4.2
Site GG	GG	27,790	46.10	310,000	11.2	109,272	3.9	290,000	10.4
Site HH	HH	30,083	48.49	1,035,096	34.4	192,879	6.4	280,000	9.3
Site LL	Partial Section of II & LL	14,135	20.95	290,000	20.5	162,342	11.5	75,000	5.3
Site JJ	JJ	14,651	33.77	340,000	23.2	437,697	29.9	155,000	10.6
DE-10C[1]	KK	17,604	26.59	398,315	22.6	799,356	45.4	92,000	5.2
DE-7C	Partial Section of MM	14,584	22.88	78,822	5.4	380,016	26.1	91,000	6.2
DE-1C	NN & Partial Section of JJ	21,373	43.19	770,000	36.0	588,468	27.5	405,000	18.9
Site OO	OO	28,447	57.42	380,000	13.4	195,924	6.9	140,000	4.9
Site PP1	Partial Section of PP	3,069	4.98	-	-	-	-	38,000	12.4
Site PP1 NEW	Partial Section of PP	2,332	3.69	-	-	-	-	198,000	84.9
Site PP2[2]	Partial Section of PP	10,690	19.55	550,000	51.4	193,053	18.1	198,000	18.5
DE-2C	QQ	12,179	20.66	270,000	22.2	351,306	28.8	275,000	22.6
Site RR	RR	19,406	29.69	260,000	13.4	418,206	21.6	115,000	5.9
Site SS	SS	31,071	50.55	349,740	11.3	677,295	21.8	139,000	4.5
Site TT	TT	18,140	28.35	573,678	31.6	677,817	37.4	160,000	8.8
Site UU	UU	18,497	30.98	240,000	13.0	272,310	14.7	81,000	4.4
Site VV	VV	14,269	24.91	180,000	12.6	96,396	6.8	33,000	2.3
DE-CT-1C	WW	21,701	37.83	590,000	27.2	716,358	33.0	235,000	10.8
Site YY	XX & YY	32,843	51.77	206,103	6.3	314,766	9.6	131,000	4.0
DE-9C	Partial Section of ZZ	6,141	8.63	30,000	4.9	19,314	3.1	41,000	6.7
	TOTAL[3]	443,033	744.13	7,732,604	17.5	7,261,713	16.4	3,878,000	8.8

NOTES:

1 Subarea KK was split into two meters for the 2011 and 2016 metering periods, infiltration/inflow values have been combined to compare to the 2022 metering.

2 Subarea PP was combined into one meter for the 2011 and 2016 metering periods, infiltration/inflow values have been entered into Site PP2 for comparison

3 Total length and total inch-miles are based on totals for 2022 metering period.

TABLE 7 - PRIORITY EVALUATION

TOWN OF DEDHAM, MA

2022 FLOW METERING

Subarea	Meter	Linear Footage	Inch-Miles	2016 Estimated Peak Infiltration		2016 Estimated Peak Inflow		2022 Estimated Peak Infiltration		2022 Estimated Peak Inflow	
		LF	IDM	GPD	GPDIM	GPD	GPD/LF	GPD	GPDIM	GPD	GPD/LF
DD	DE-5C	12,702	19.6	126,425	3,880	78,300	3.8	748,500	23,456.6	305,000	14.6
TT	Site TT	19,470	31.8	268,124	9,466	677,817	37.5	235,500	8,306.9	160,000	8.8
WW	DE-CT-1C	21,090	26.8	174,421	4,617	716,358	33.0	290,000	7,665.9	235,000	10.8
MM[1]	DE-7C	18,278	29.0	132,615	5,840	380,016	26.5	221,456	6,345.4	91,000	6.2
KK	DE-10C	17,602	26.6	138,846	5,220	799,356	53.0	160,000	6,017.3	92,000	5.2
QQ	DE-2C	12,471	21.9	110,959	5,347	367,488	25.6	120,000	5,808.3	275,000	22.6
YEAR 1 TOTAL		101,613	155.7	YEAR 1 TOTAL				1,775,456	11,403.1	1,158,000	11.4
PP	Site PP1 NEW/PP2	11,896	22.8	14,354	1,237	193,053	9.9	81,500	3,574.6	236,000	19.8
SS	Site SS	31,356	51.9	266,196	5,219	677,295	21.9	158,500	3,135.5	139,000	4.5
VV	Site VV	13,643	23.1	124,358	5,147	96,396	7.0	75,000	3,010.8	33,000	2.3
UU	Site UU	18,702	31.4	79,250	2,768	272,310	16.0	85,000	2,743.7	81,000	4.4
YY[2]	Site YY	15,940	25.8	147,636	2,885	314,766	9.7	135,500	2,617.3	131,000	4.0
XX	Site YY	16,381	25.2	-	-	-	-	-	-	-	-
YEAR 2 TOTAL		107,918	180.2	YEAR 2 TOTAL				535,500	2,971.7	620,000	5.7
CC	Site CC	12,724	20.9	34,663	2,026	37,149	3.4	44,500	2,468.1	52,000	4.5
RR	Site RR	19,820	30.3	158,579	5,362	418,209	21.7	66,500	2,239.8	115,000	5.9
GG	Site GG	26,932	45.6	94,916	2,127	109,272	4.1	97,500	2,115.0	290,000	10.4
JJ	Site JJ	26,861	64.0	102,133	3,088	437,697	31.1	71,000	2,102.5	155,000	10.6
ZZ	DE-9C	8,048	12.1	15,077	1,747	19,314	3.1	18,000	2,085.7	41,000	6.7
BB[4]	N/A	8,881	13.9	41,612	2,994	-	-	24,624	1,828.3	-	-
YEAR 3 TOTAL		103,266	186.8	YEAR 3 TOTAL				322,124	1,724.4	653,000	6.3
HH	Site HH	26,594	43.5	83,281	1,714	192,879	6.5	85,000	1,752.9	280,000	9.3
OO	Site OO	25,764	51.7	263,624	4,979	195,924	7.6	93,500	1,628.4	140,000	4.9
LL[3]	Site LL	17,253	25.5	64,912	3,137	162,342	11.6	65,408	1,591.4	75,000	5.3

TABLE 7 - PRIORITY EVALUATION

TOWN OF DEDHAM, MA

2022 FLOW METERING

Subarea	Meter	Linear Footage	Inch-Miles	2016 Estimated Peak Infiltration		2016 Estimated Peak Inflow		2022 Estimated Peak Infiltration		2022 Estimated Peak Inflow	
		LF	IDM	GPD	GPDIM	GPD	GPD/LF	GPD	GPDIM	GPD	GPD/LF
EE	Site EE	14,696	24.6	99,712	4,221	367,488	25.6	40,000	1,589.8	111,000	7.3
YEAR 4 TOTAL		84,307	145.3	YEAR 4 TOTAL				283,908	1,953.9	606,000	7.2
FF	Site FF	21,448	33.9	56,516	1,649	154,947	7.1	47,500	1,369.3	93,000	4.2
AA	DE-BO-1C	17,348	28.4	45,692	1,618	21,054	1.2	24,000	846.9	145,000	8.4
II[4]	Site LL	24,797	37.7	41,946	1,113	-	-	7,200	282.9	-	-
NN	DE-1C	11,481	18.1	133,068	3,111	588,468	27.8	Negligible	Negligible	405,000	18.9
YEAR 5 TOTAL		75,074	118.1	YEAR 5 TOTAL				78,700	666.4	643,000	8.6
TOTAL		472,178	786.1	2,818,915	3,586	7,277,898	15.4	2,995,688	3,810.8	3,680,000	7.8

1 Includes flow isolation results

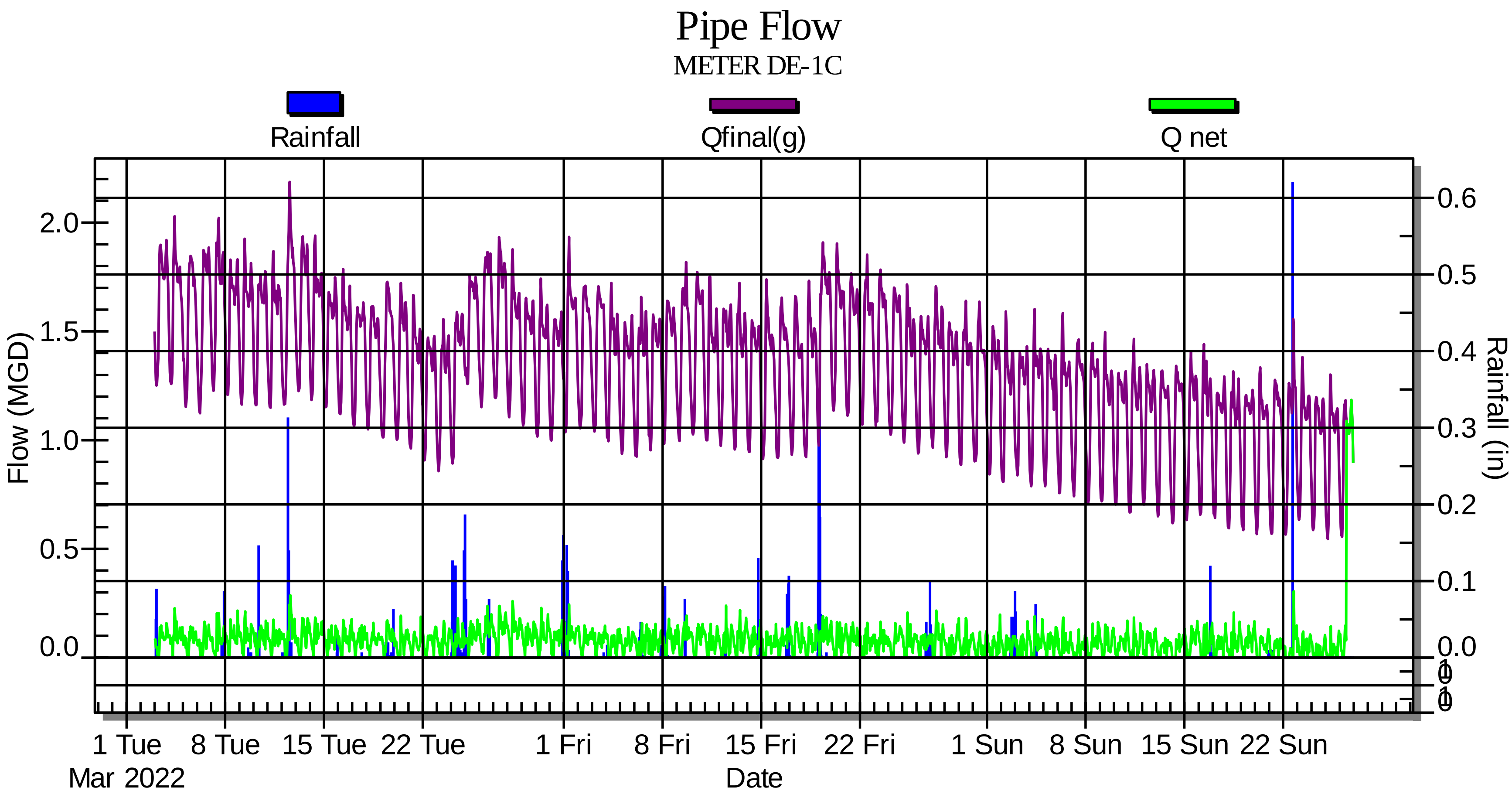
2 Meter YY includes results from subarea XX and subarea YY

3 Includes partial results from subarea II and flow isolation results

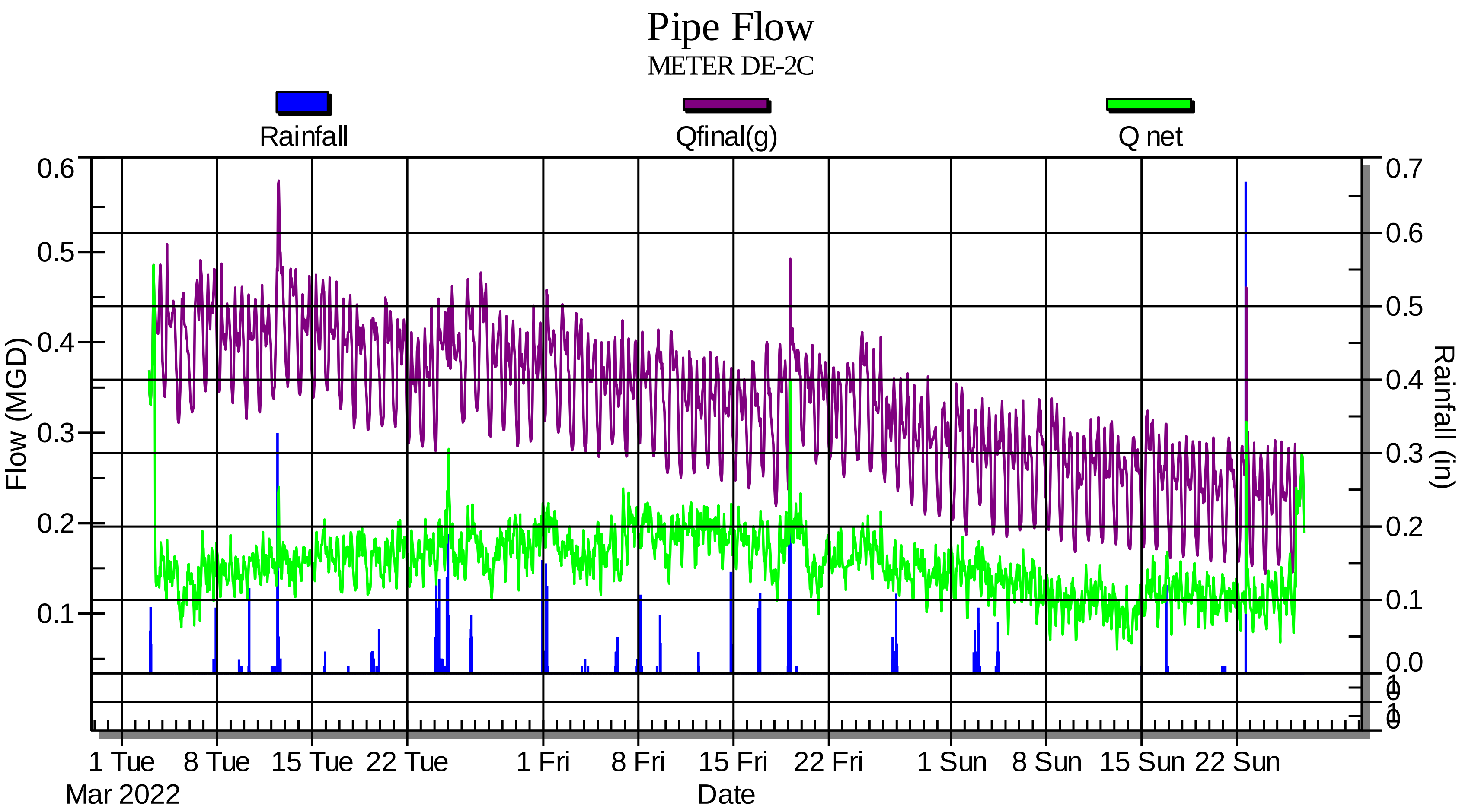
4 Uses flow isolation results only

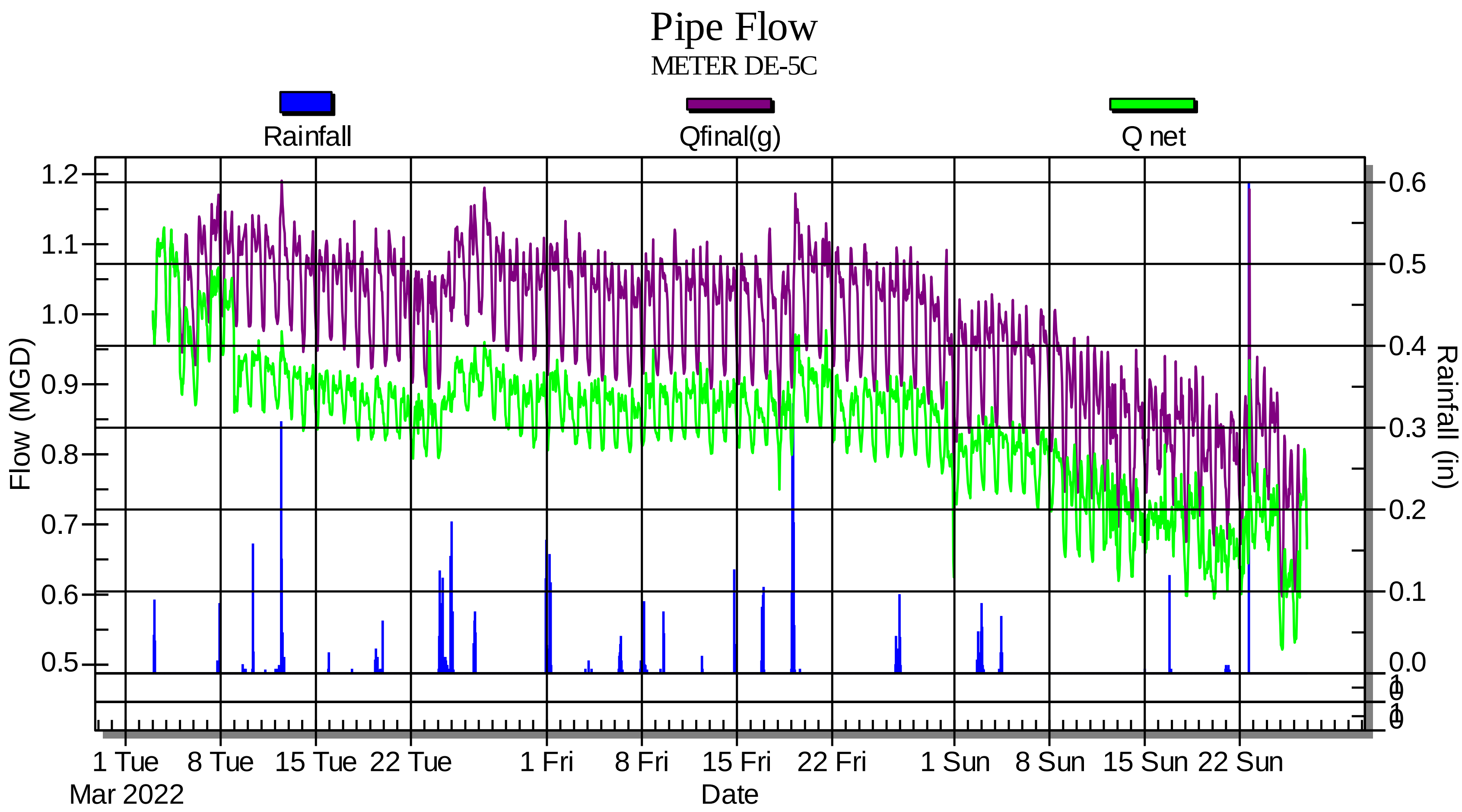
APPENDIX A

HYDROGRAPHS

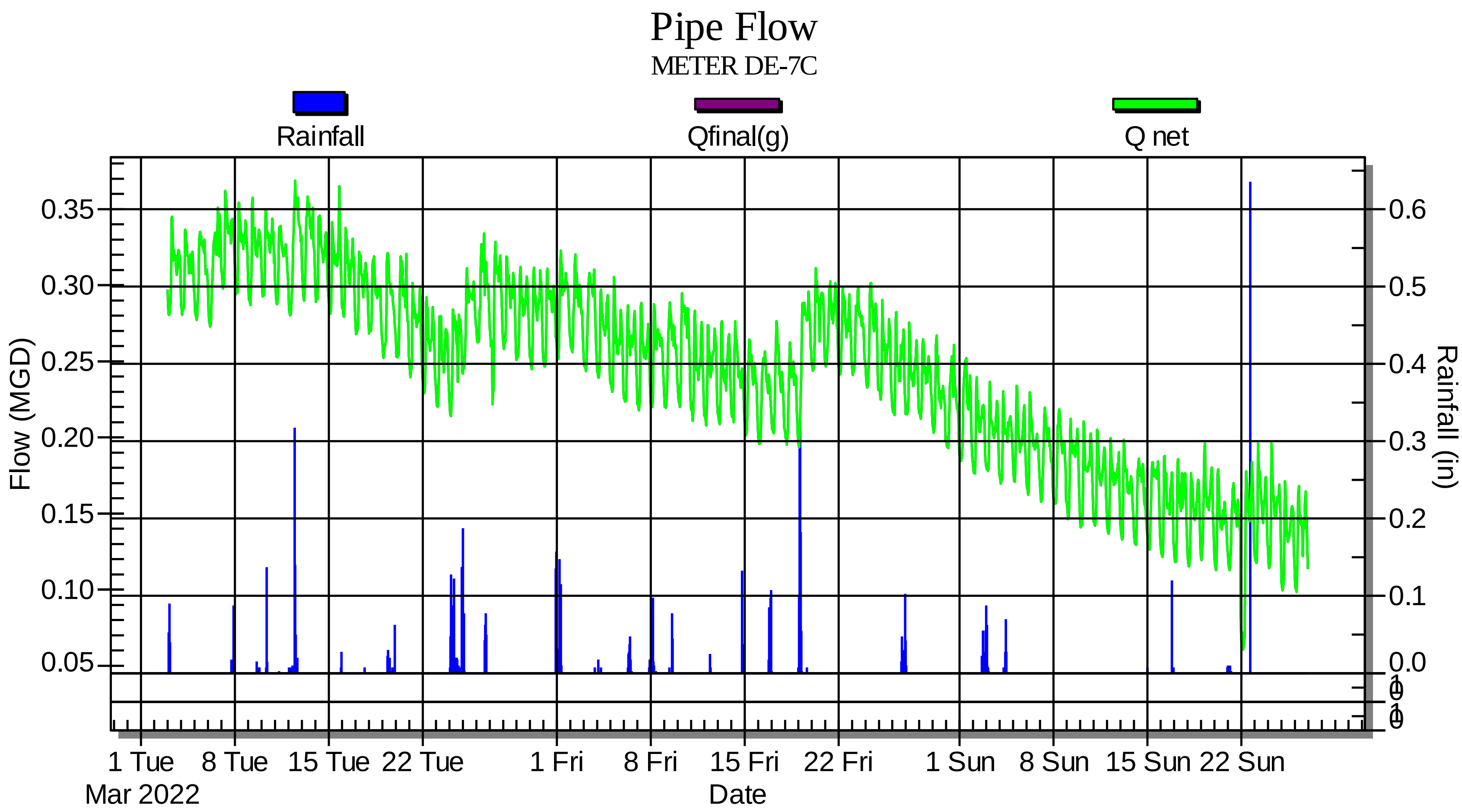


Pipe Flow
METER DE-1C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
2.0
1.5
1.0
0.5
0.0
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date


Pipe Flow
METER DE-2C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.6
0.5
0.4
0.3
0.2
0.1
Rainfall (in)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date



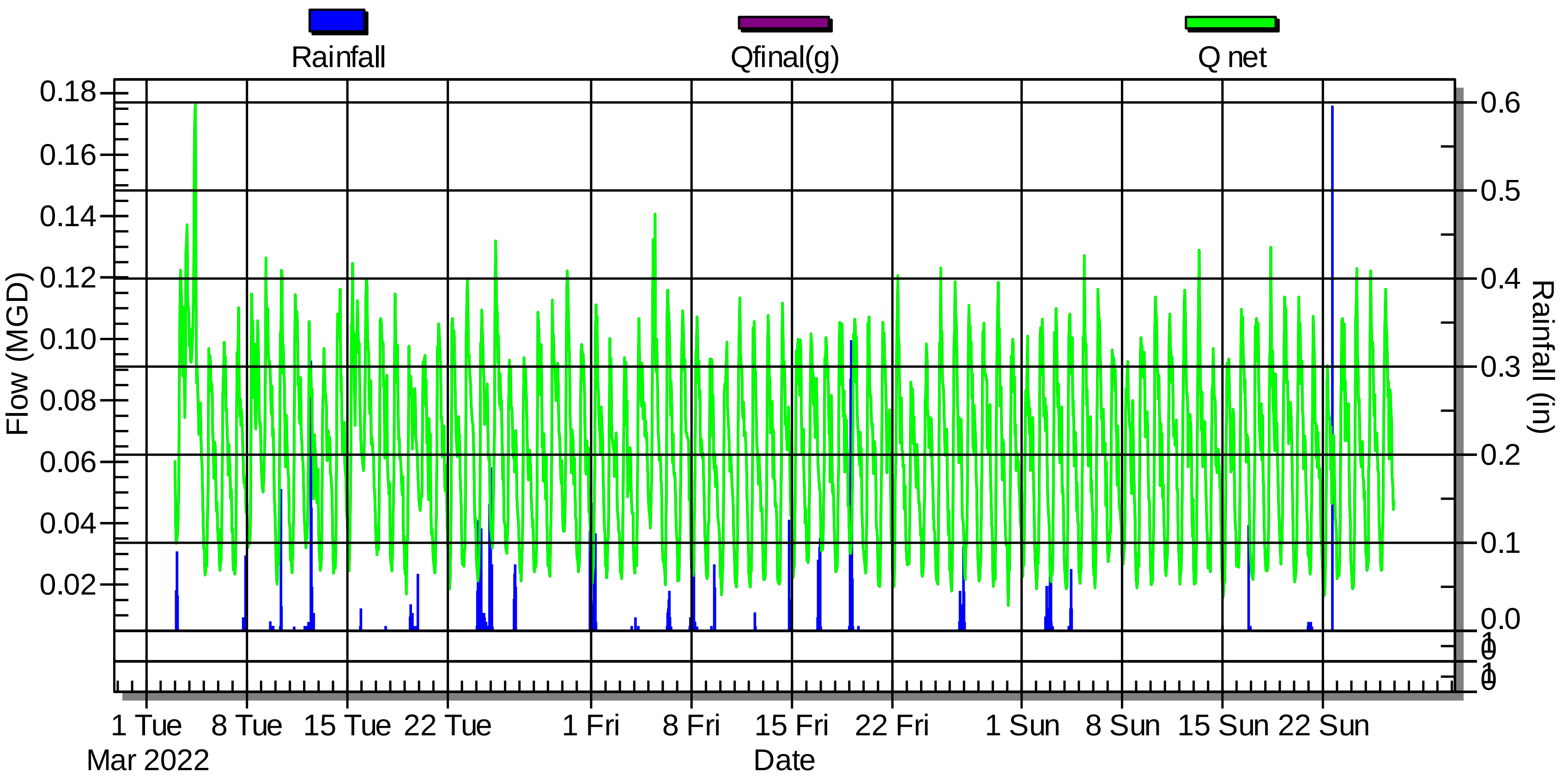
Pipe Flow
METER DE-5C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

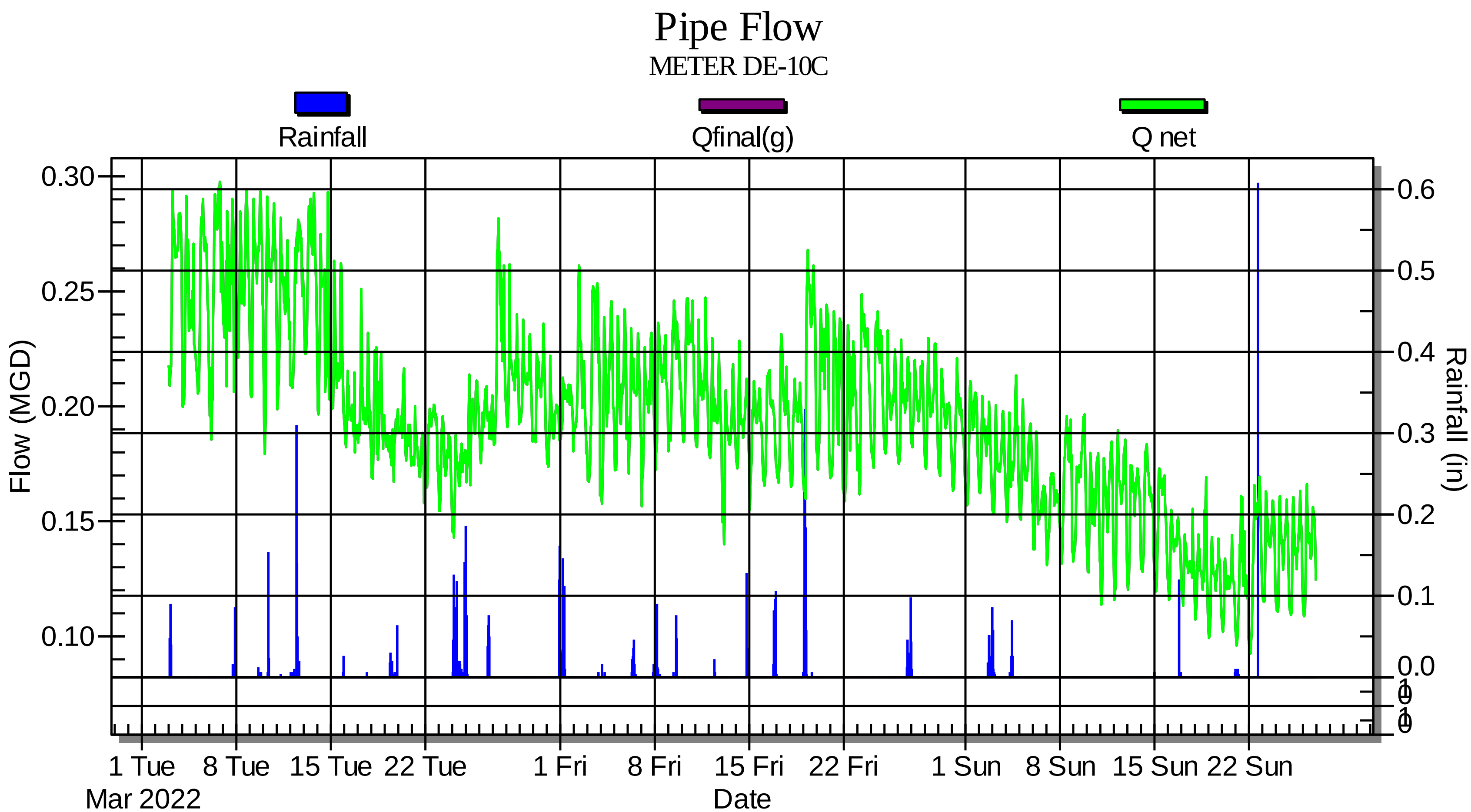


Pipe Flow
METER DE-7C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1
0
1
0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

Pipe Flow

METER DE-9C





Pipe Flow
METER DE-10C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
Rainfall (in)
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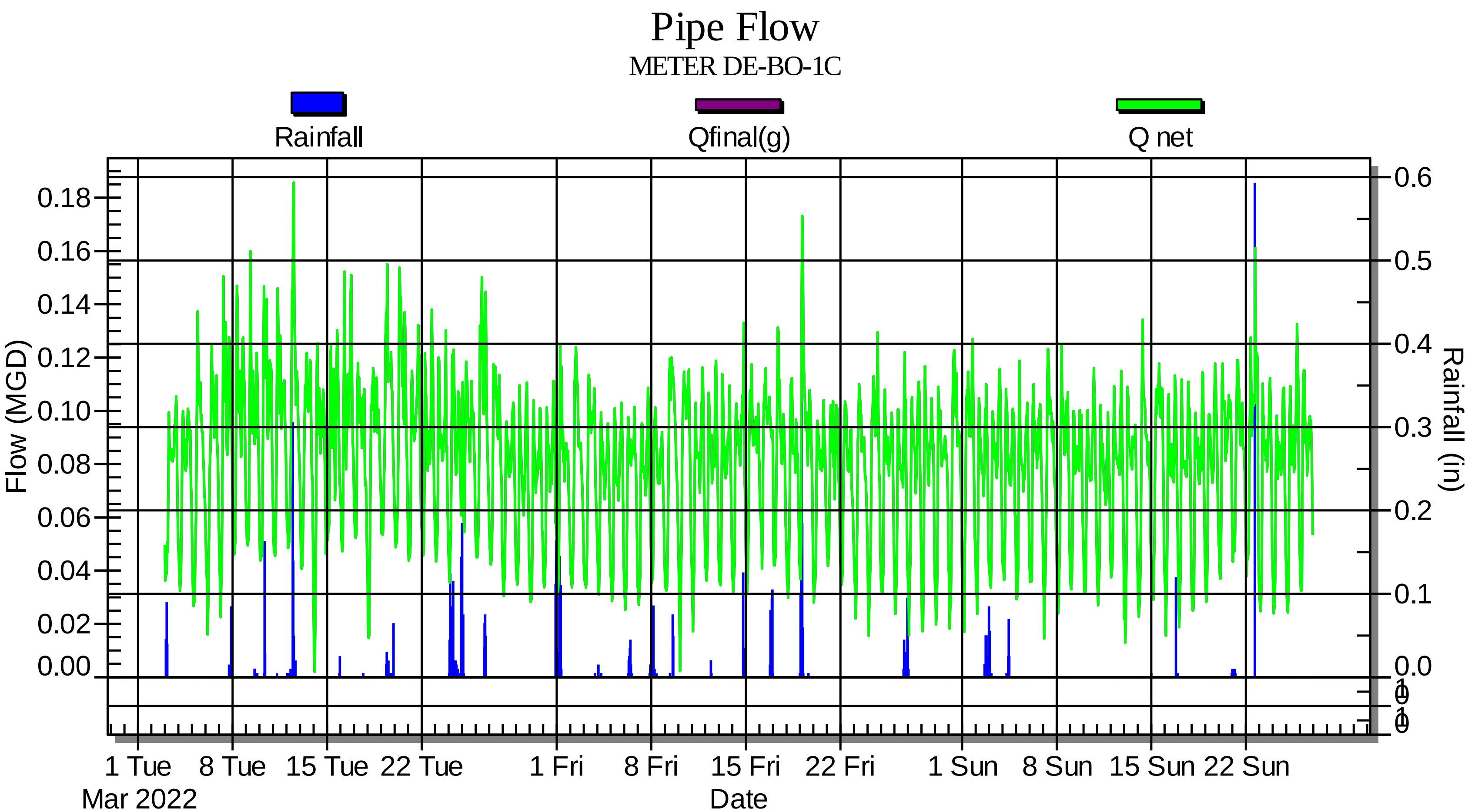
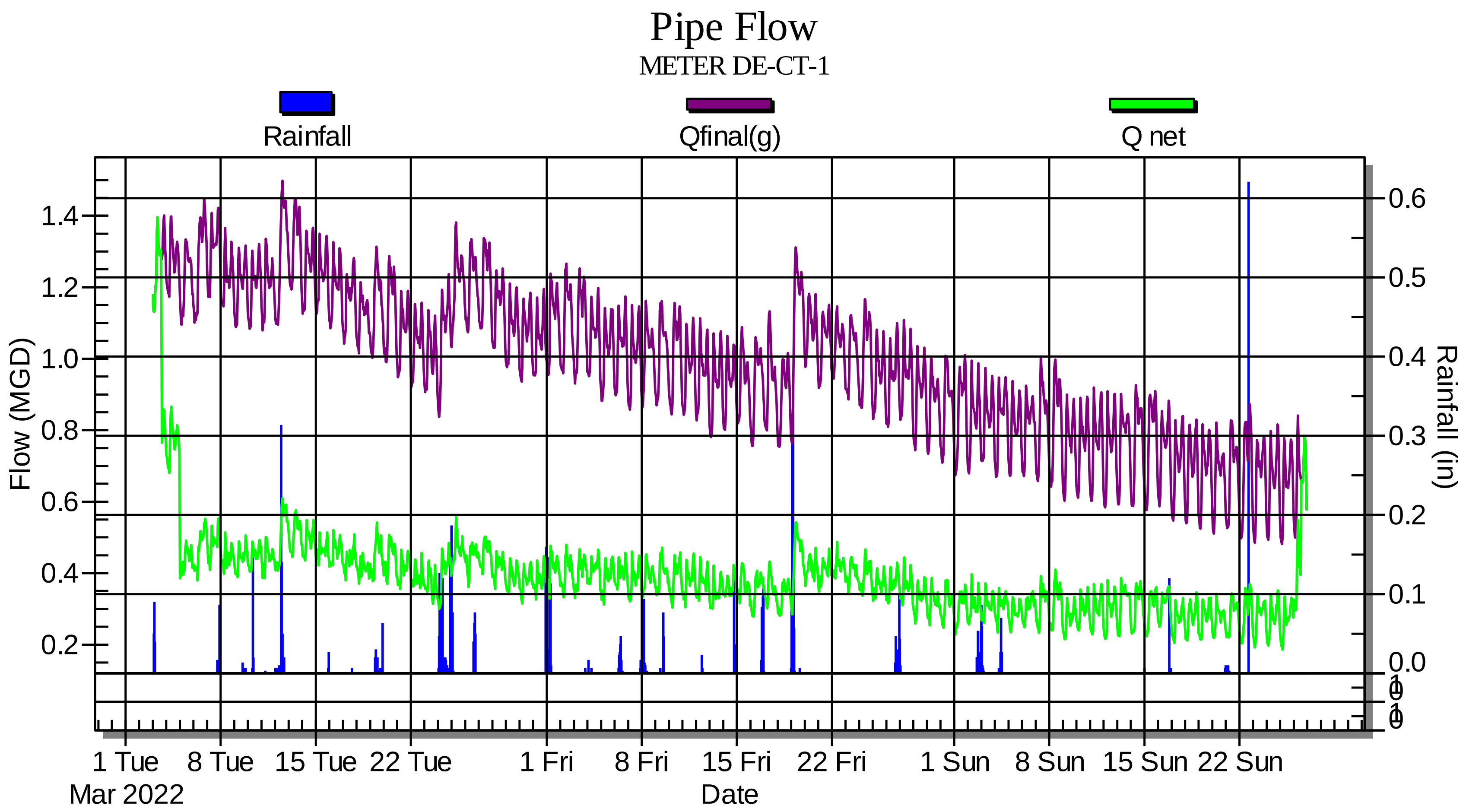
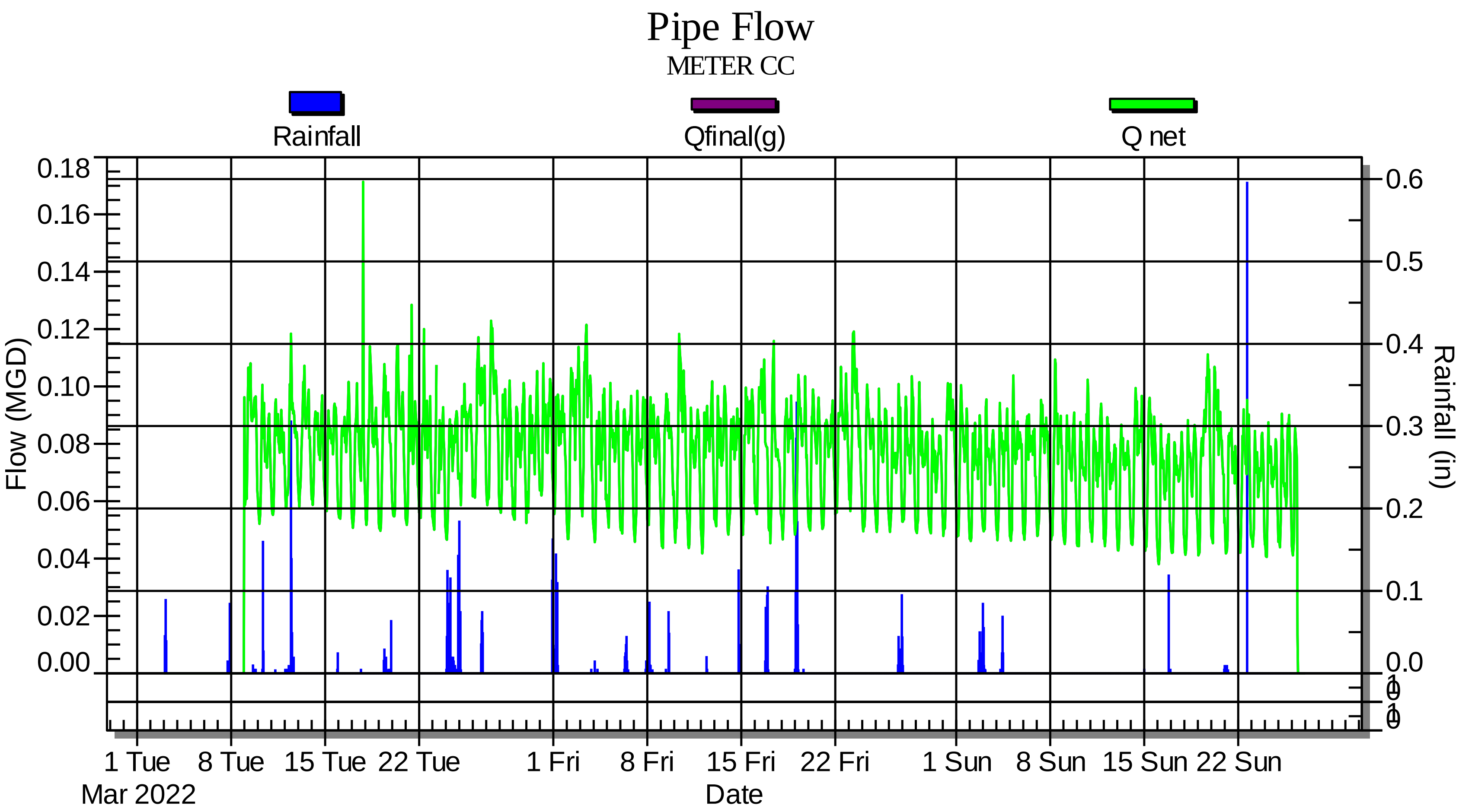
0.25
0.20
0.15
0.10
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

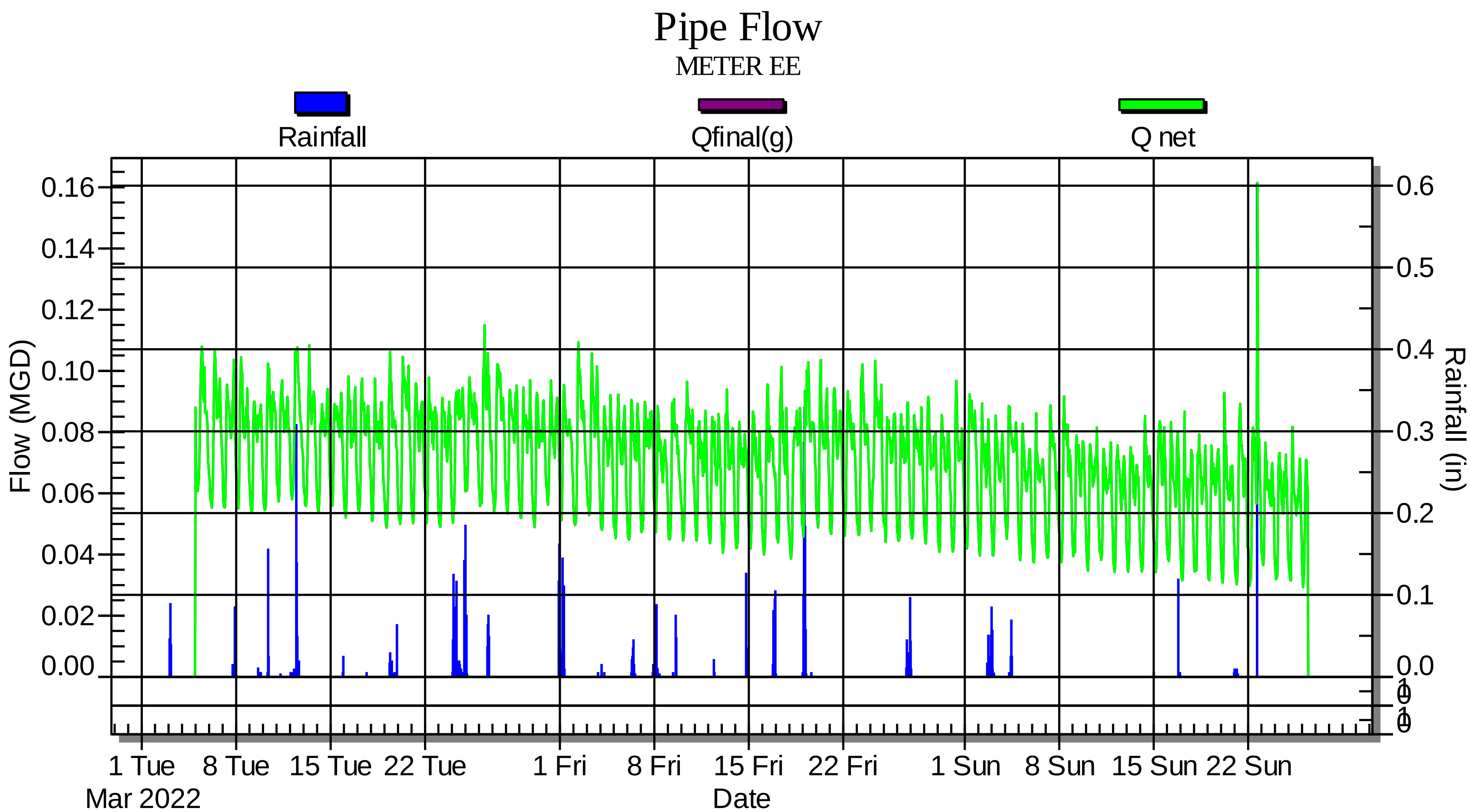


Pipe Flow
METER DE-BO-1C
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

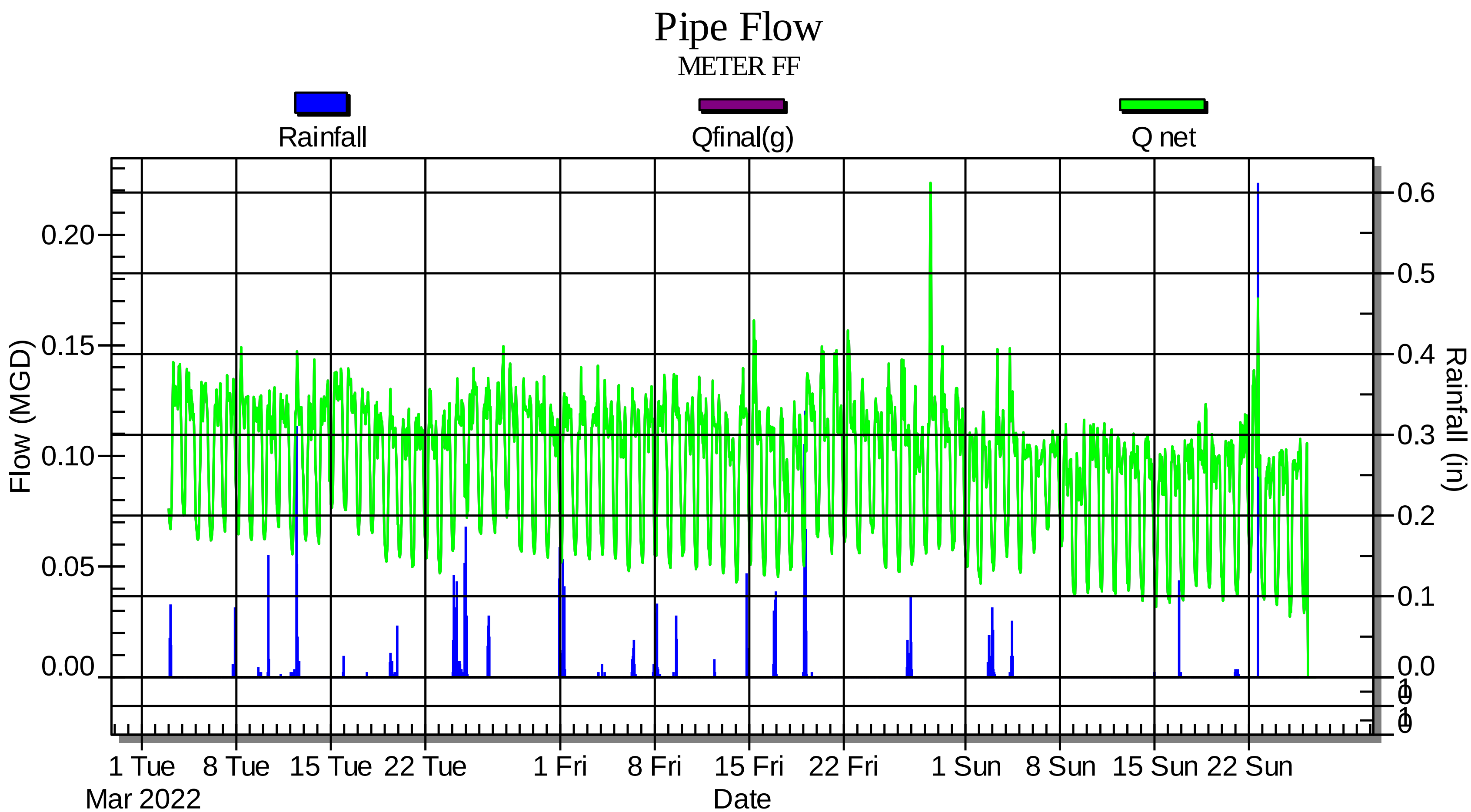


Pipe Flow
METER DE-CT-1
Rainfall
Qfinal(g)
Q net
Flow (MGD)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

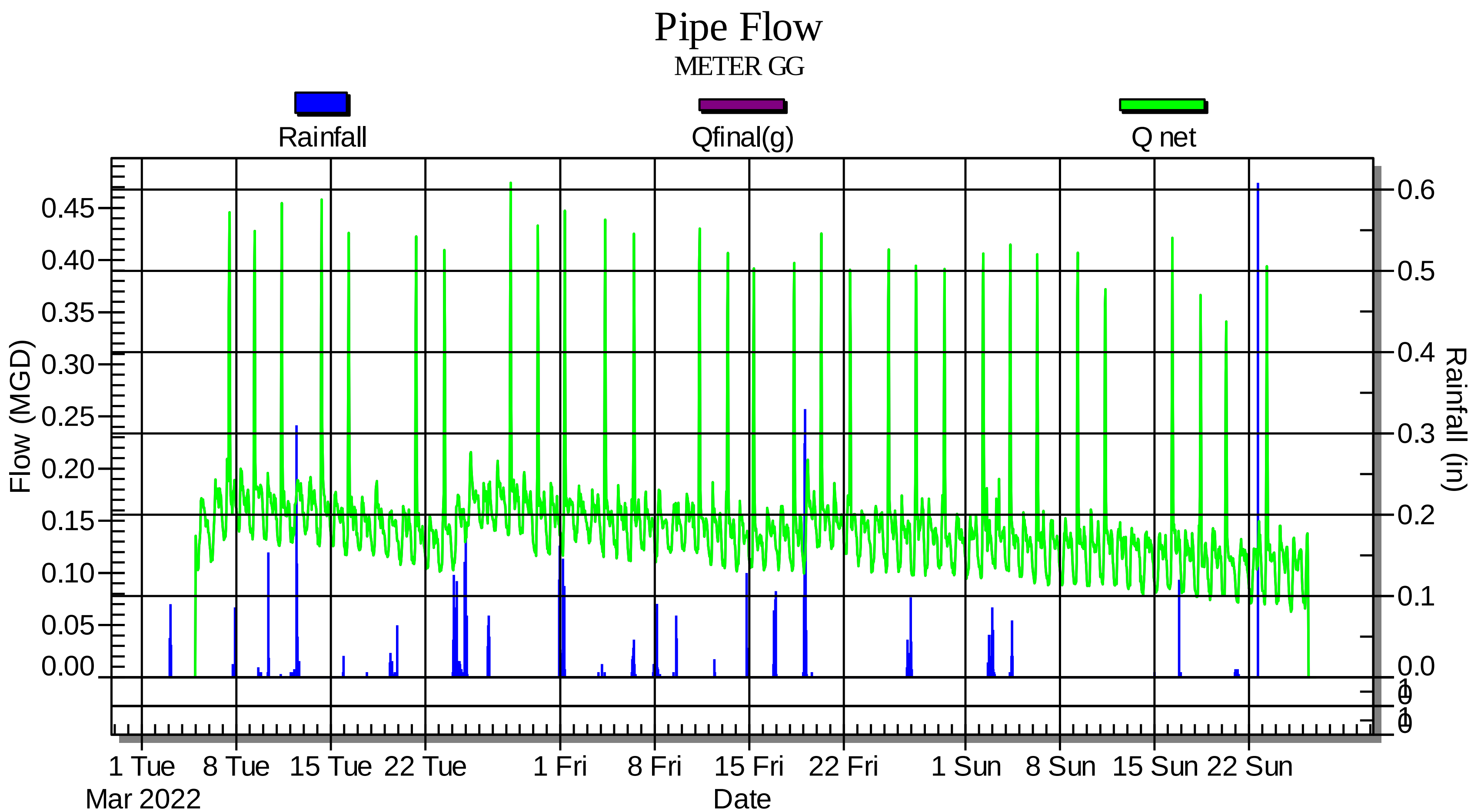

Pipe Flow
METER CC
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

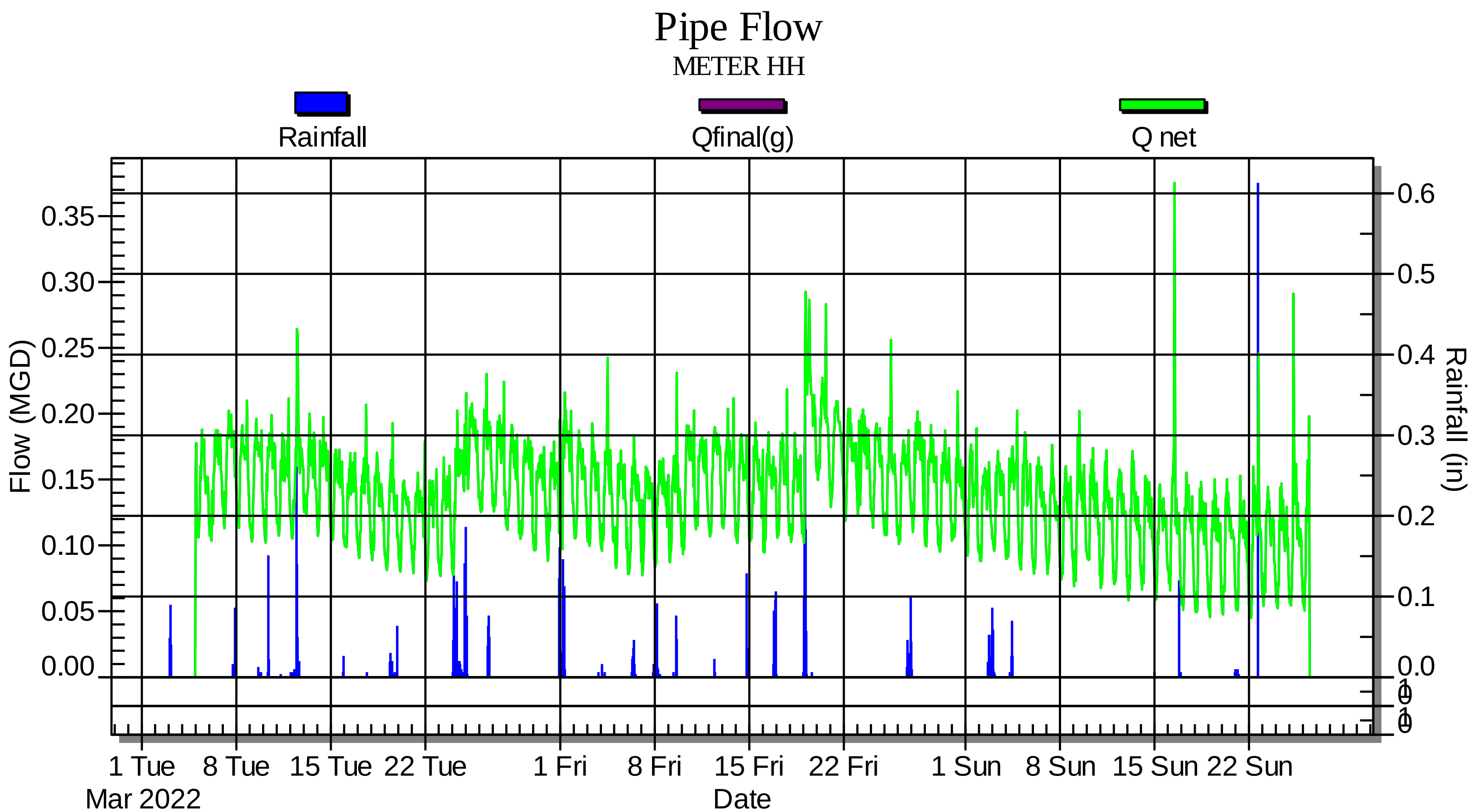


Pipe Flow
METER EE
Rainfall
Qfinal(g)
Q net
Flow (MGD)
Rainfall (in)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

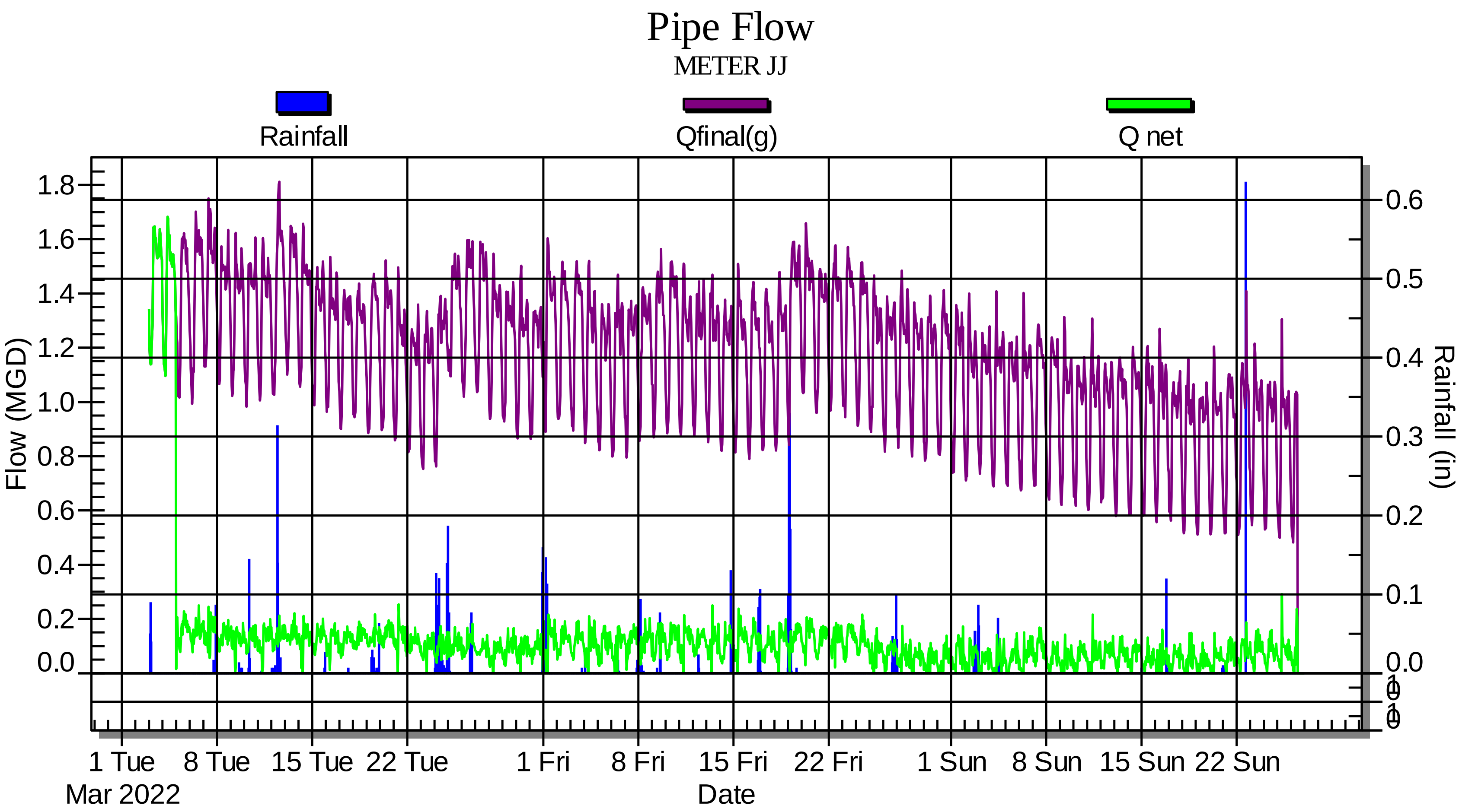


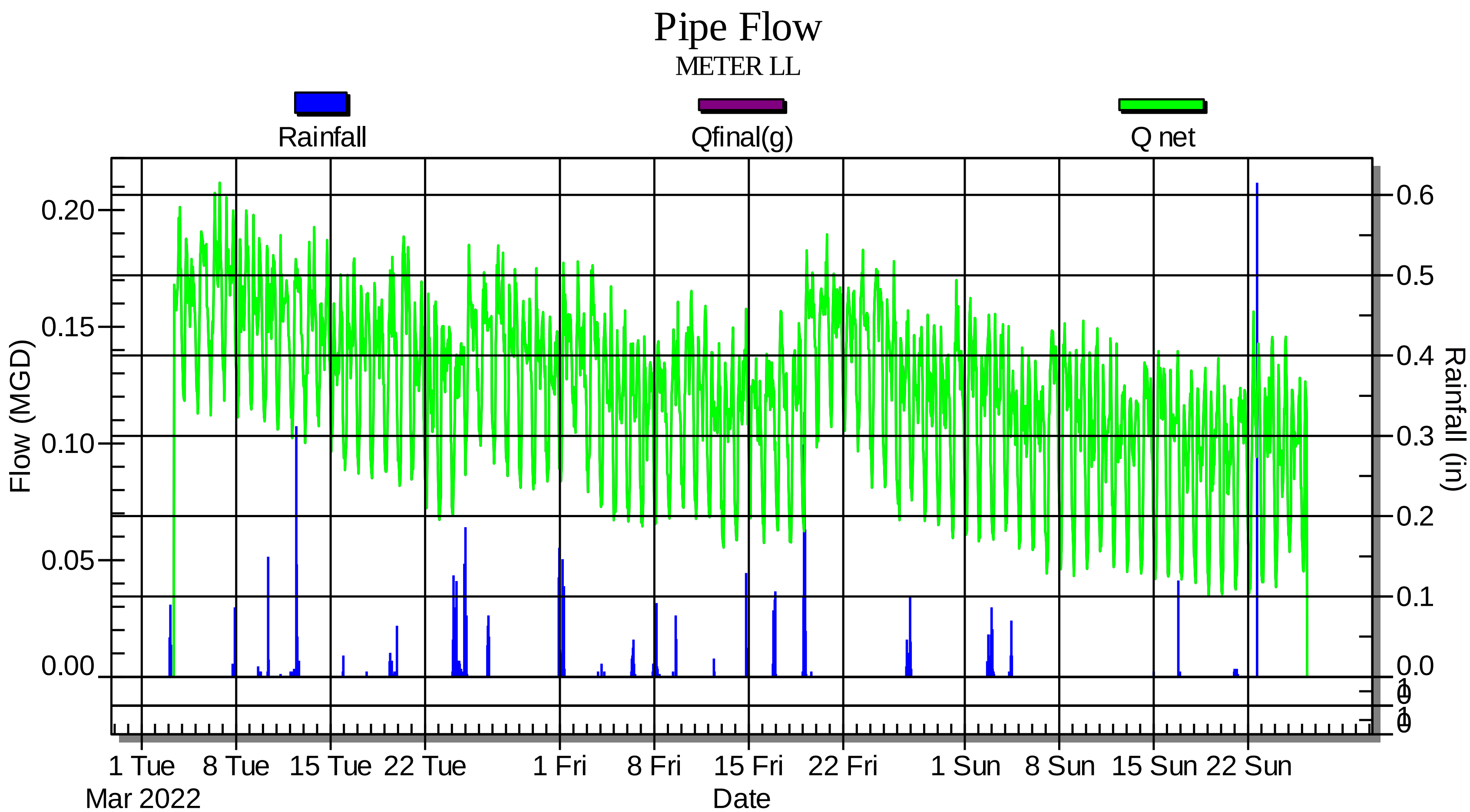
Pipe Flow
METER FF
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.20
0.15
0.10
0.05
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date


Pipe Flow
METER GG
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date



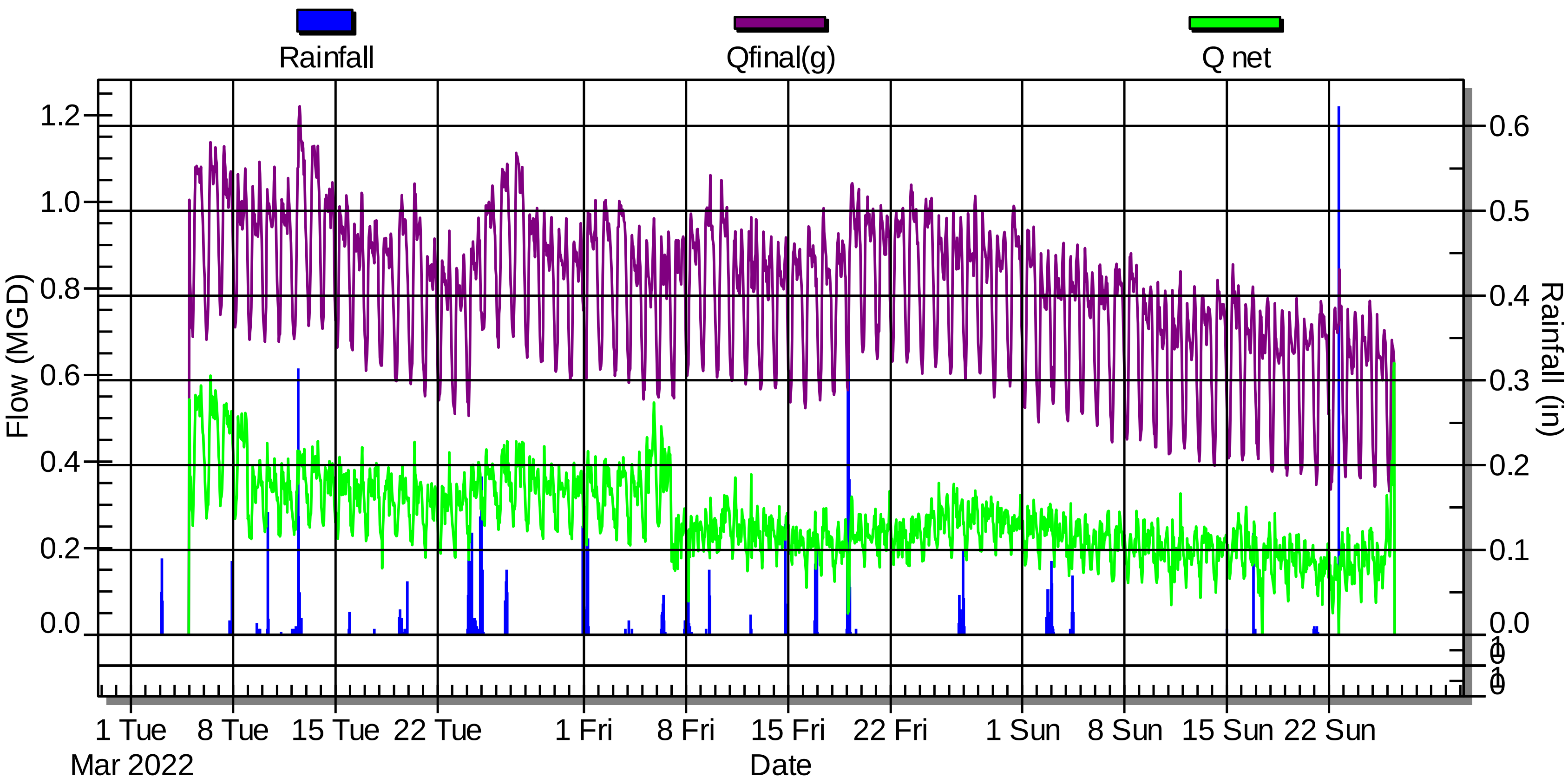
Pipe Flow
METER HH
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

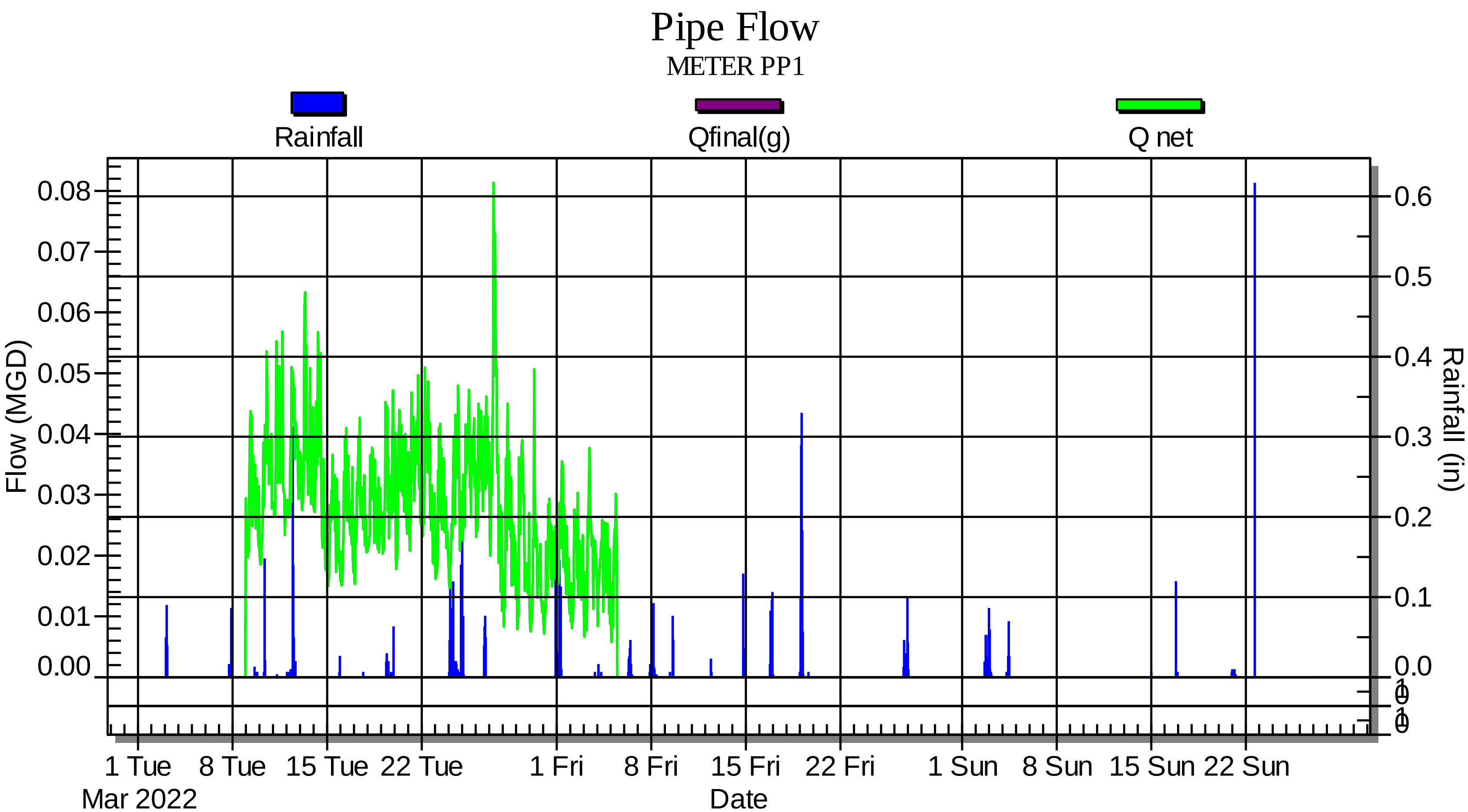

Pipe Flow
METER JJ
Rainfall
Qfinal(g)
Q net
Flow (MGD)
Rainfall (in)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
Mar 2022
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Date


Pipe Flow
METER LL
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.20
0.15
0.10
0.05
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

Pipe Flow

METER OO

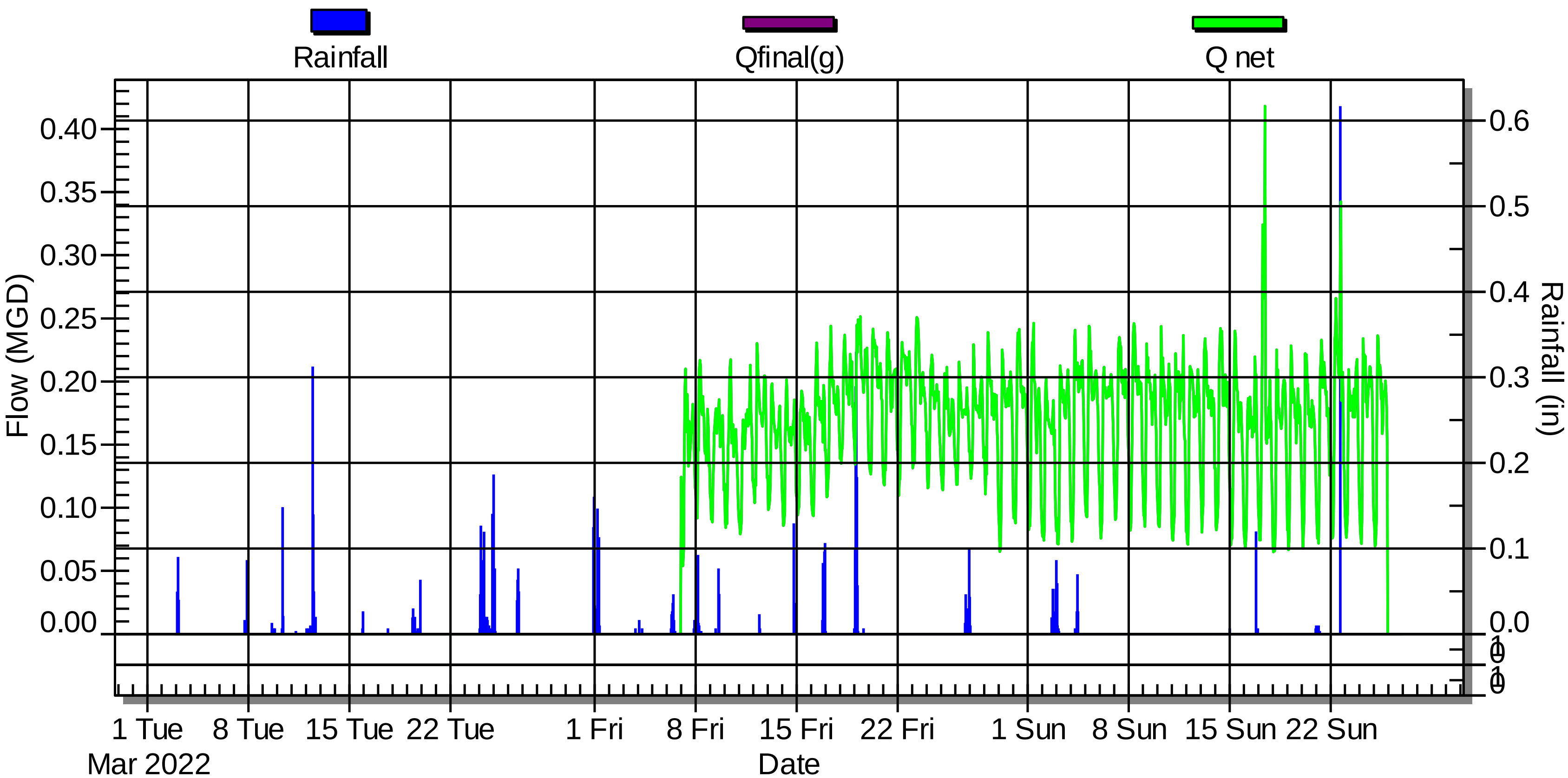




Pipe Flow
METER PP1
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

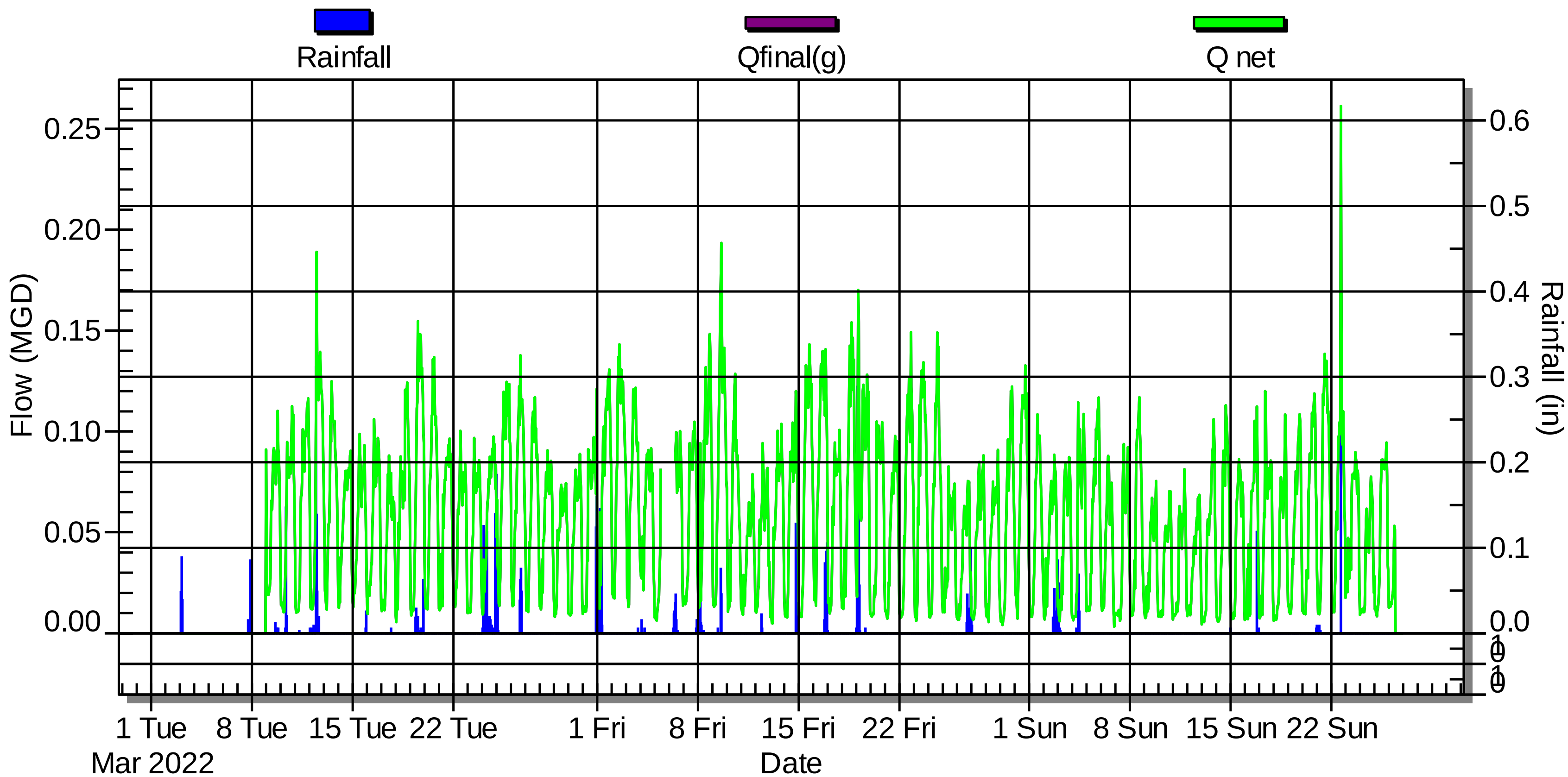
Pipe Flow

METER PP1 NEW



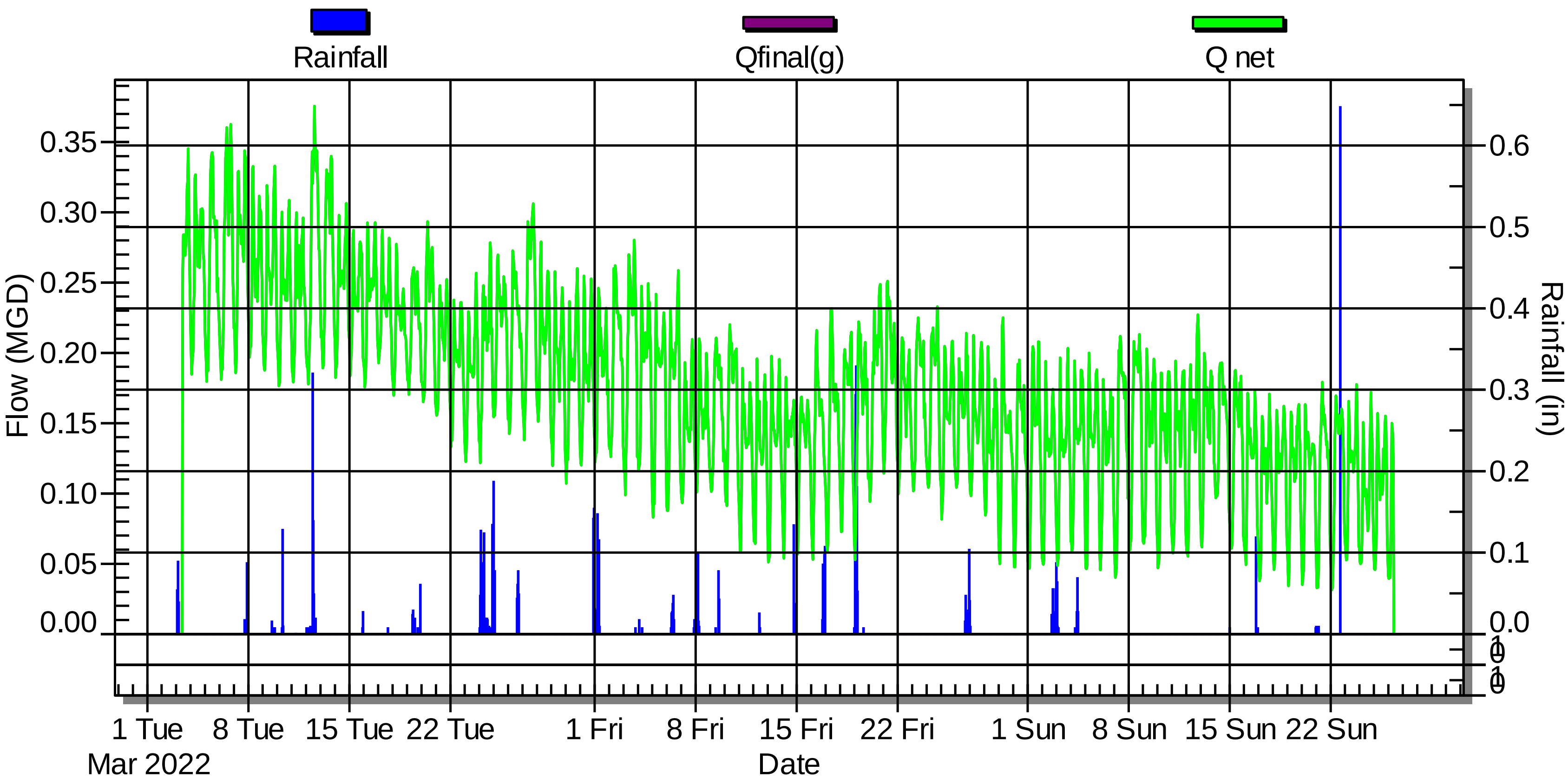
Pipe Flow

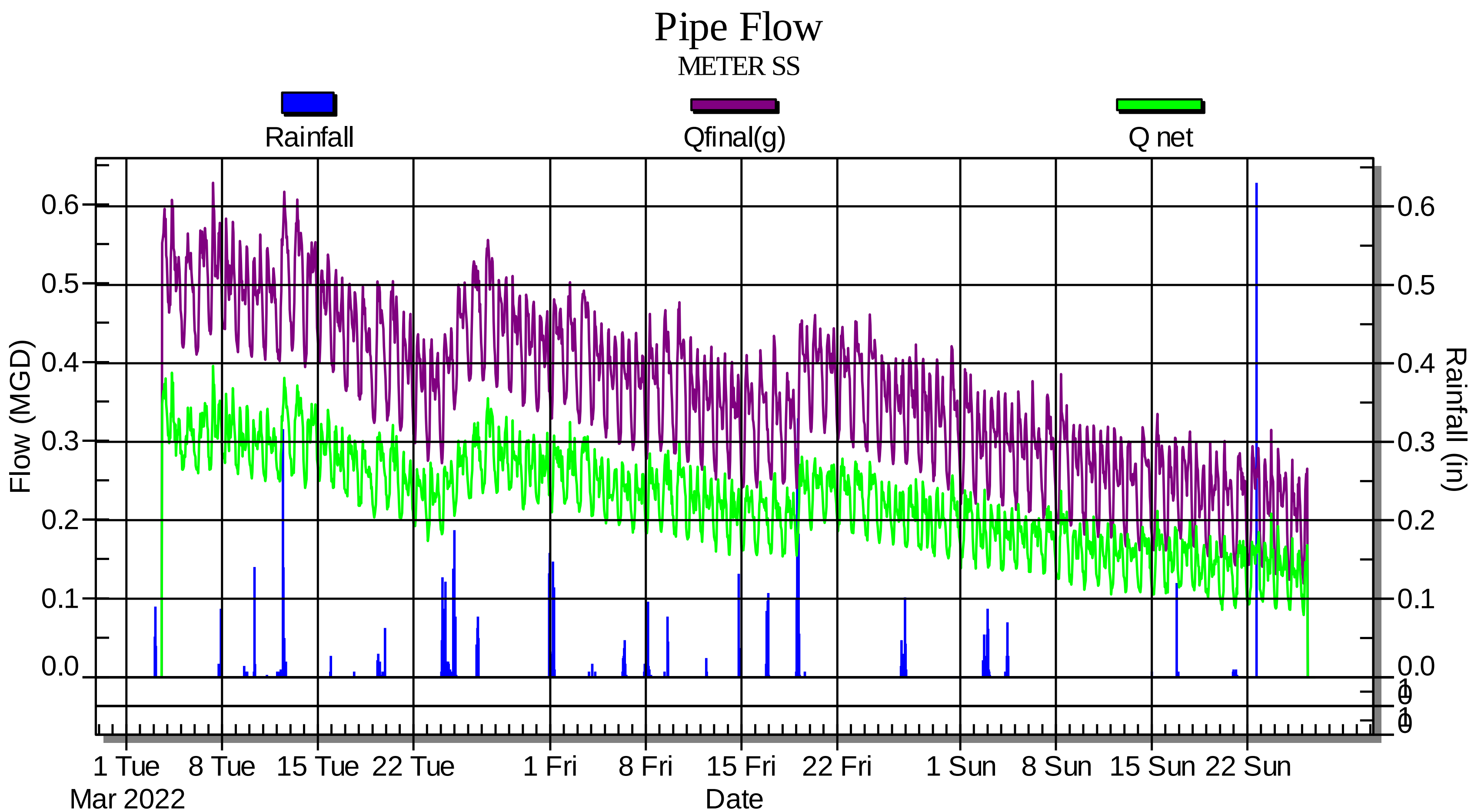
METER PP2



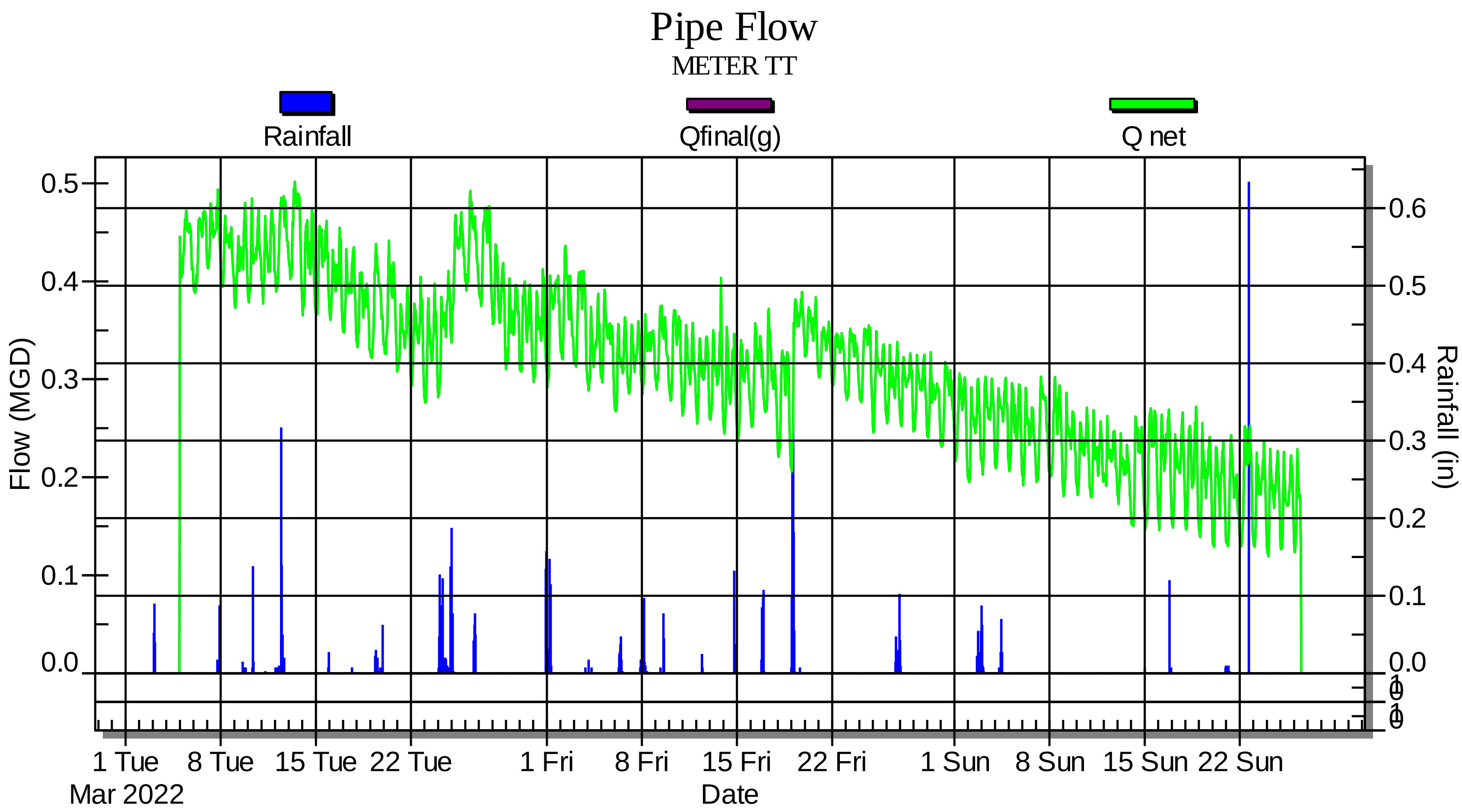
Pipe Flow

METER RR





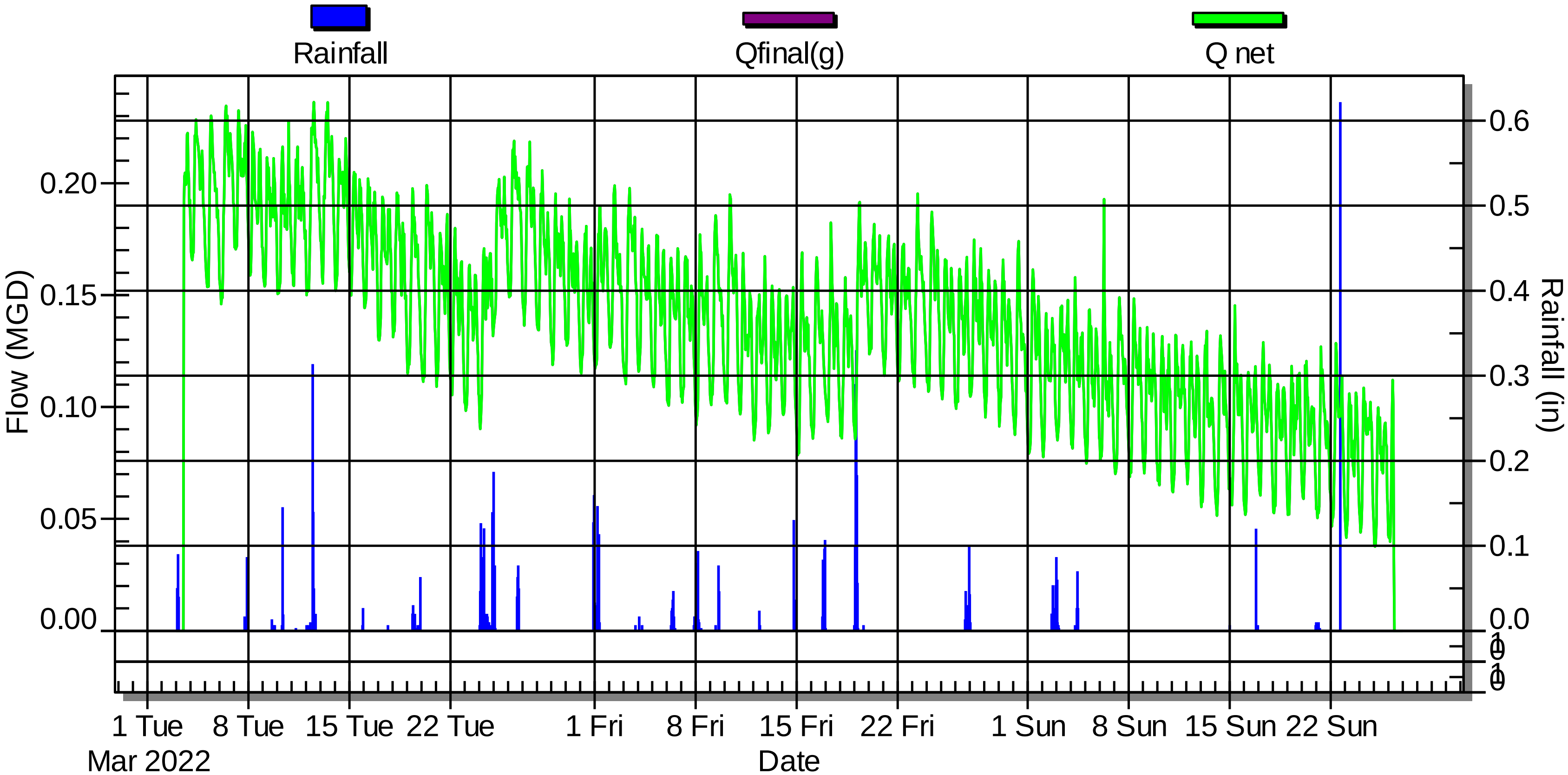
Pipe Flow
METER SS
Rainfall
Qfinal(g)
Q net
Flow (MGD)
Rainfall (in)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

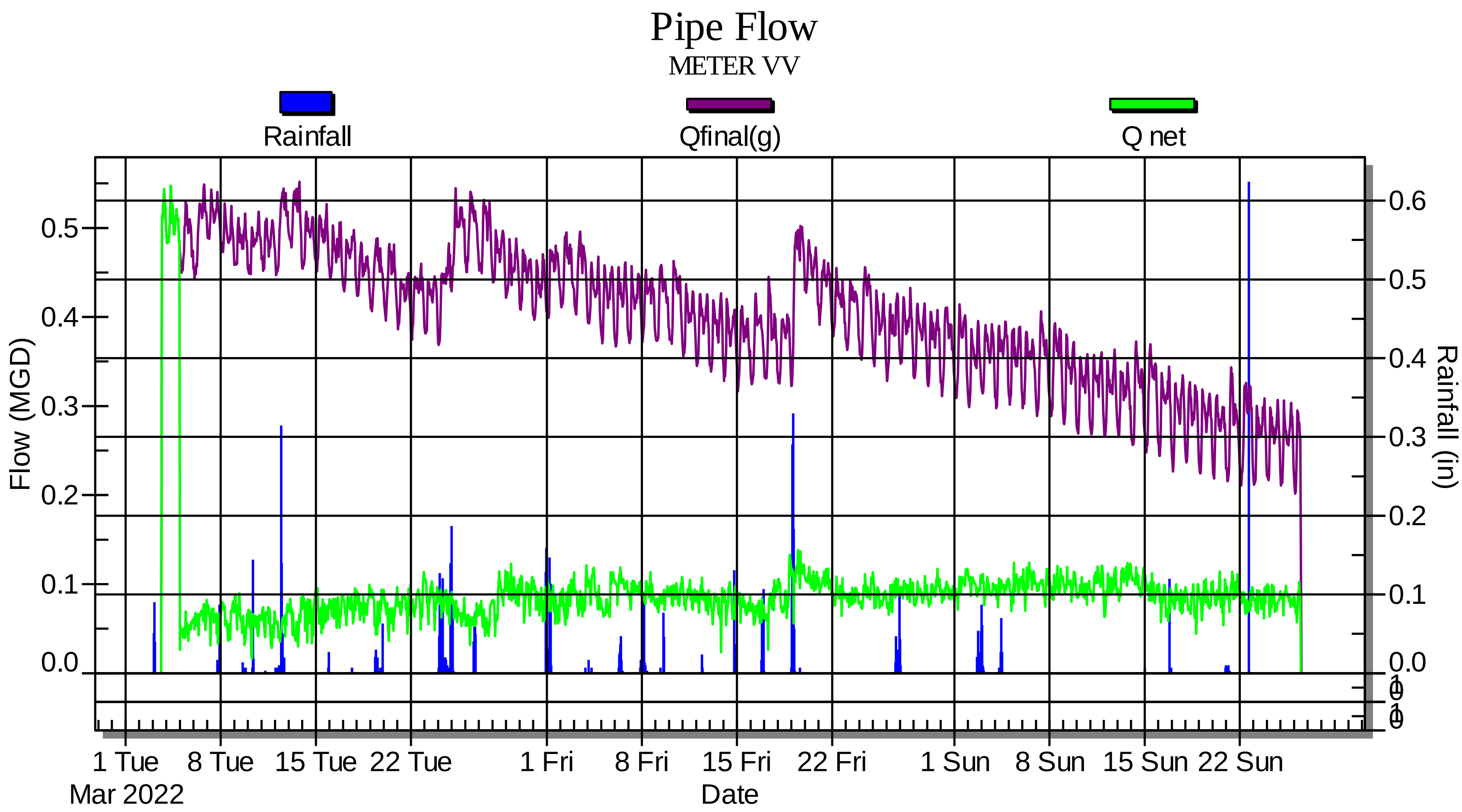


Pipe Flow
METER TT
Rainfall
Qfinal(g)
Q net
Flow (MGD)
Rainfall (in)
0.5
0.4
0.3
0.2
0.1
0.0
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

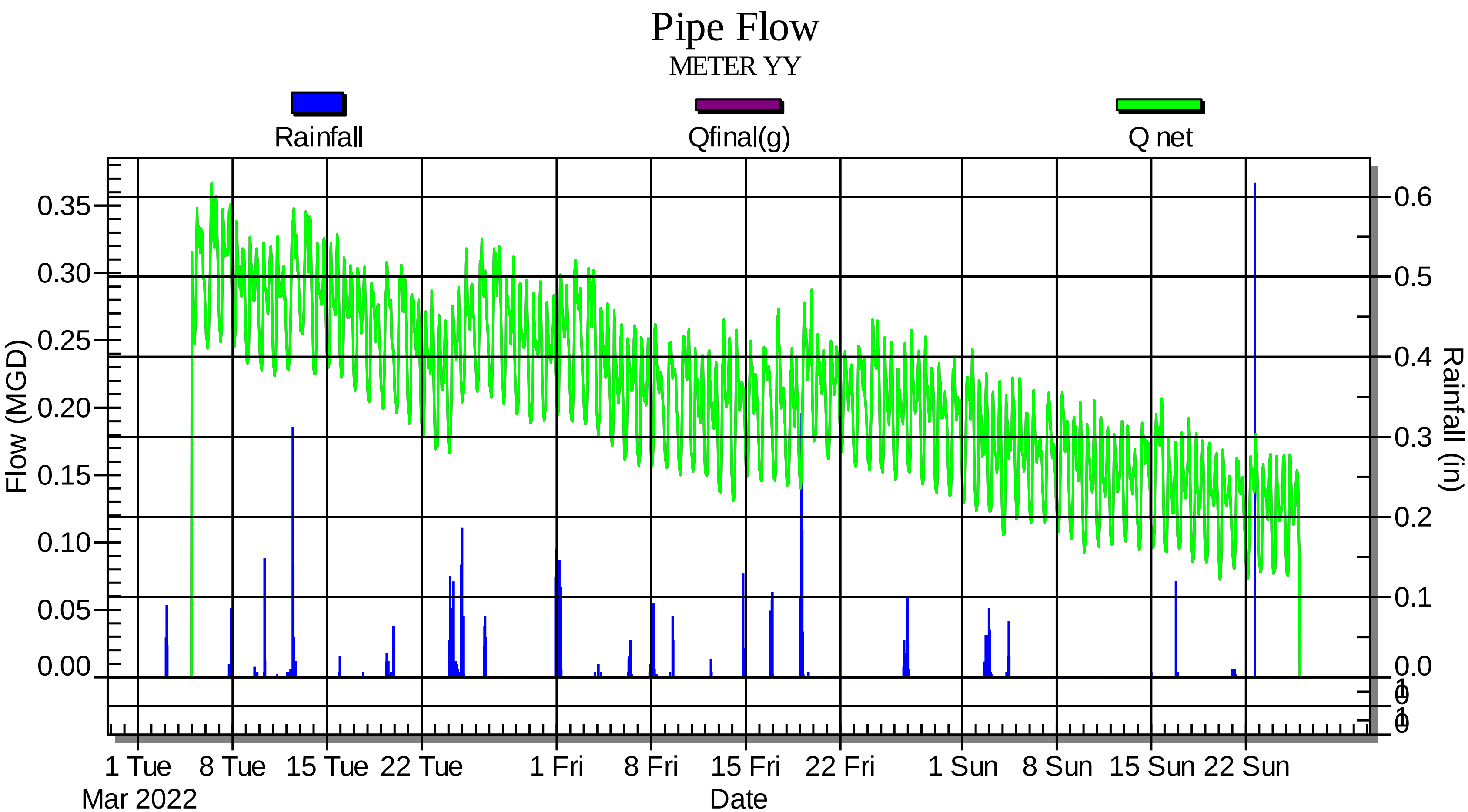
Pipe Flow

METER UU





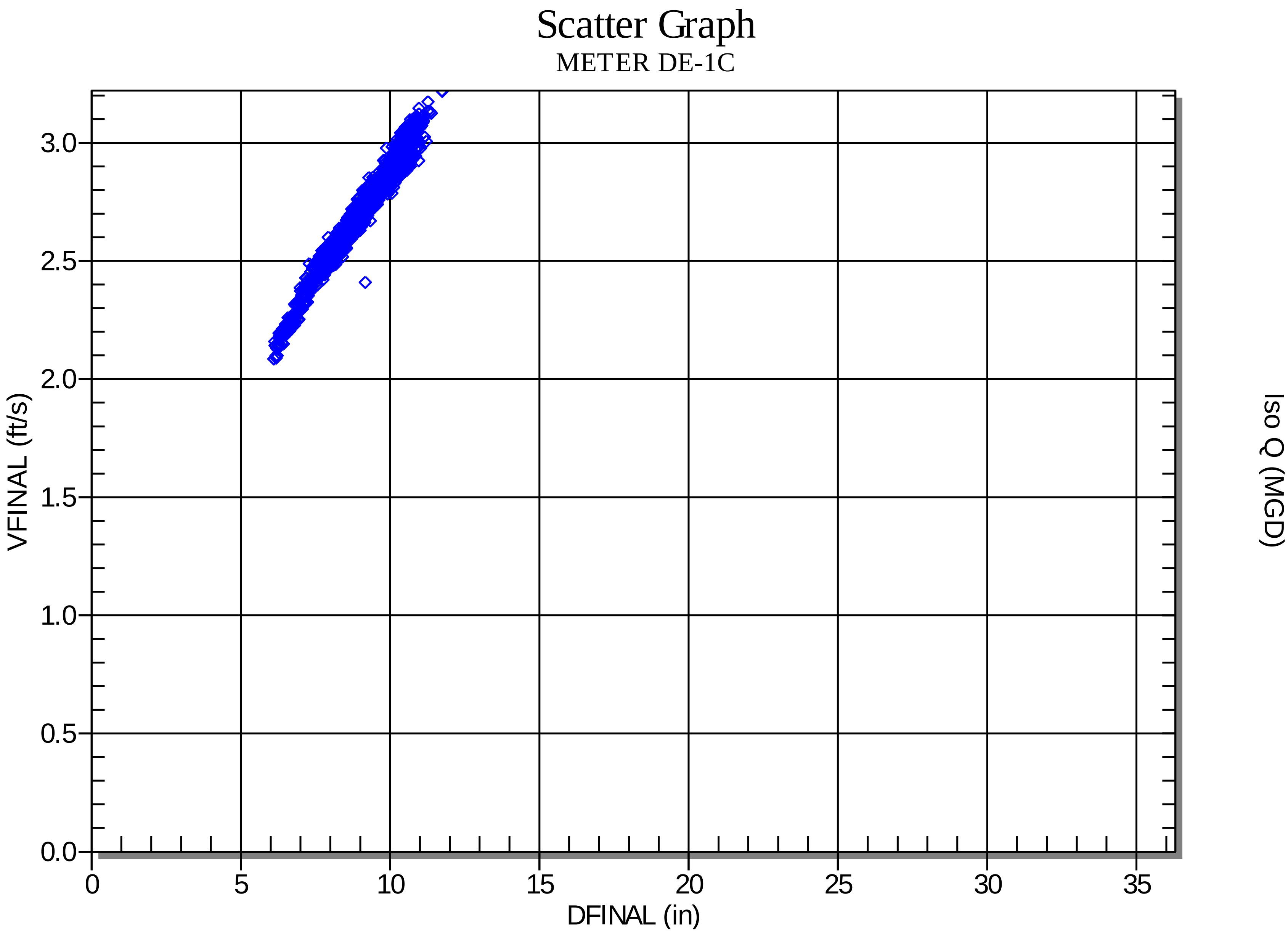
Pipe Flow
METER VV
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.0
0.1
0.2
0.3
0.4
0.5
Rainfall (in)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1 Tue
Mar 2022
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Date



Pipe Flow
METER YY
Rainfall
Qfinal(g)
Q net
Flow (MGD)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Rainfall (in)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1
0
1
0
1 Tue
8 Tue
15 Tue
22 Tue
1 Fri
8 Fri
15 Fri
22 Fri
1 Sun
8 Sun
15 Sun
22 Sun
Mar 2022
Date

APPENDIX B

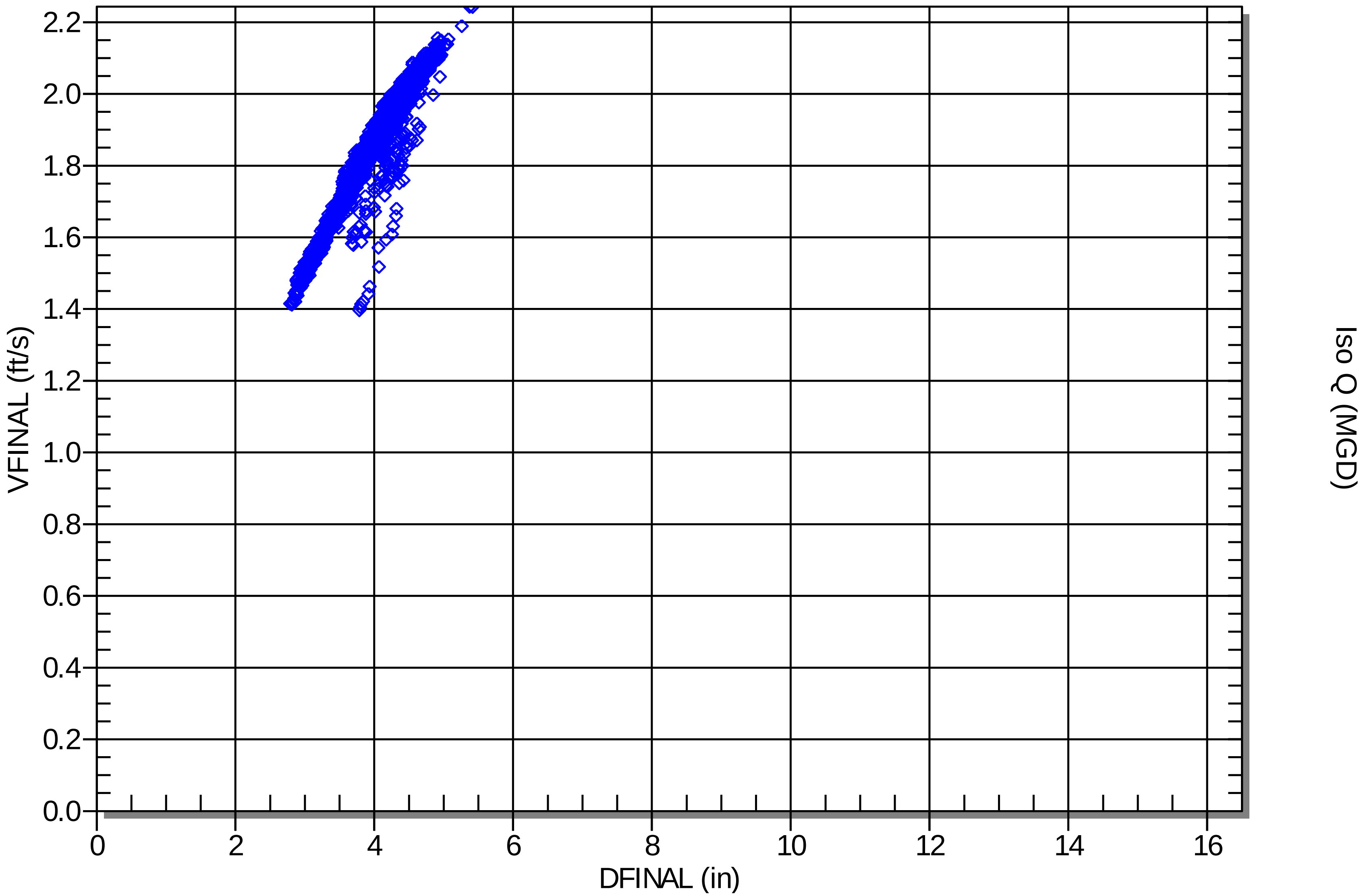
SCATTER GRAPHS



Scatter Graph
METER DE-1C
VFINAL (ft/s)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
30
35
DFINAL (in)
Iso Q (MGD)

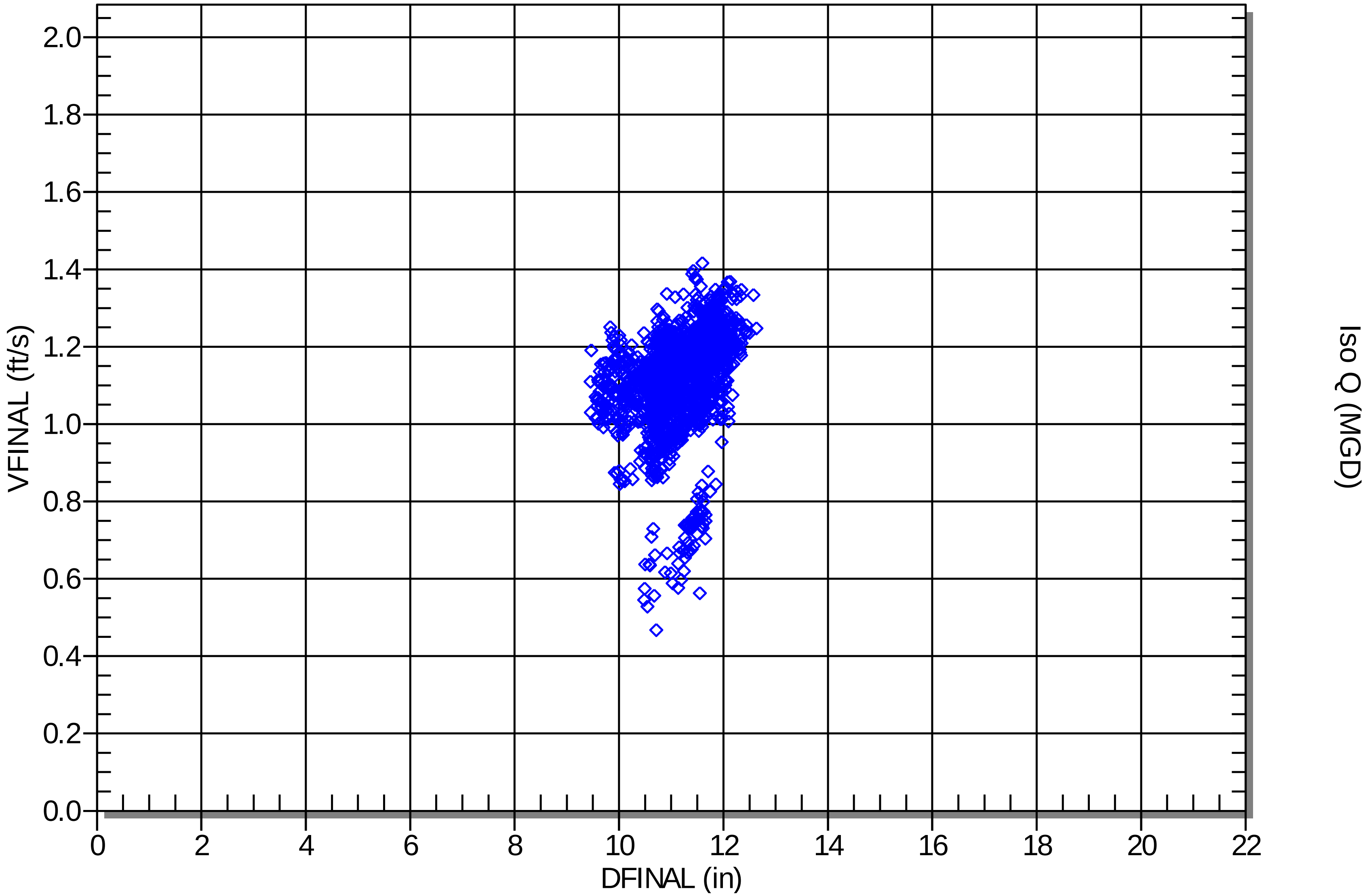
Scatter Graph

METER DE-2C



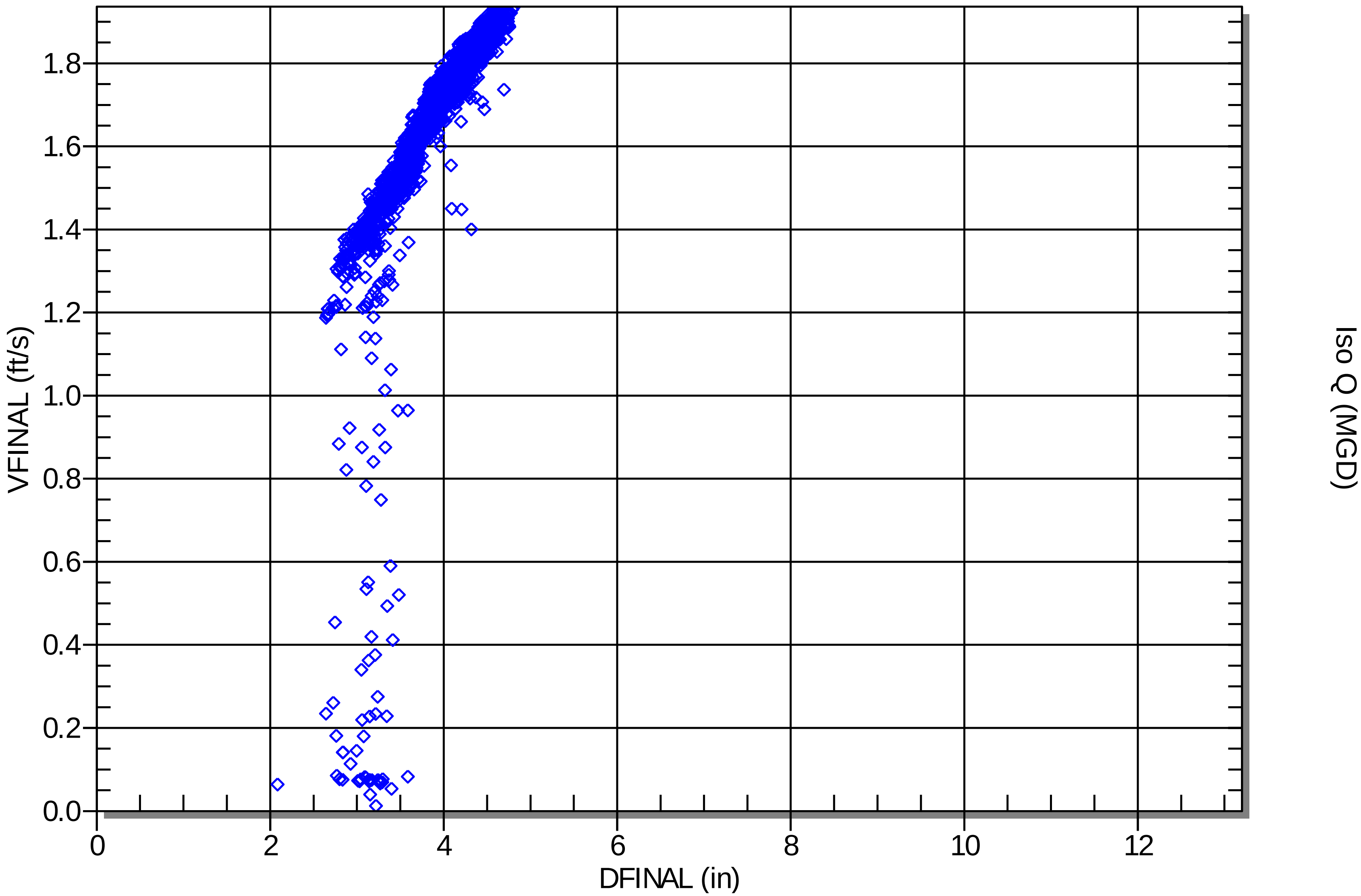
Scatter Graph

METER DE-5C



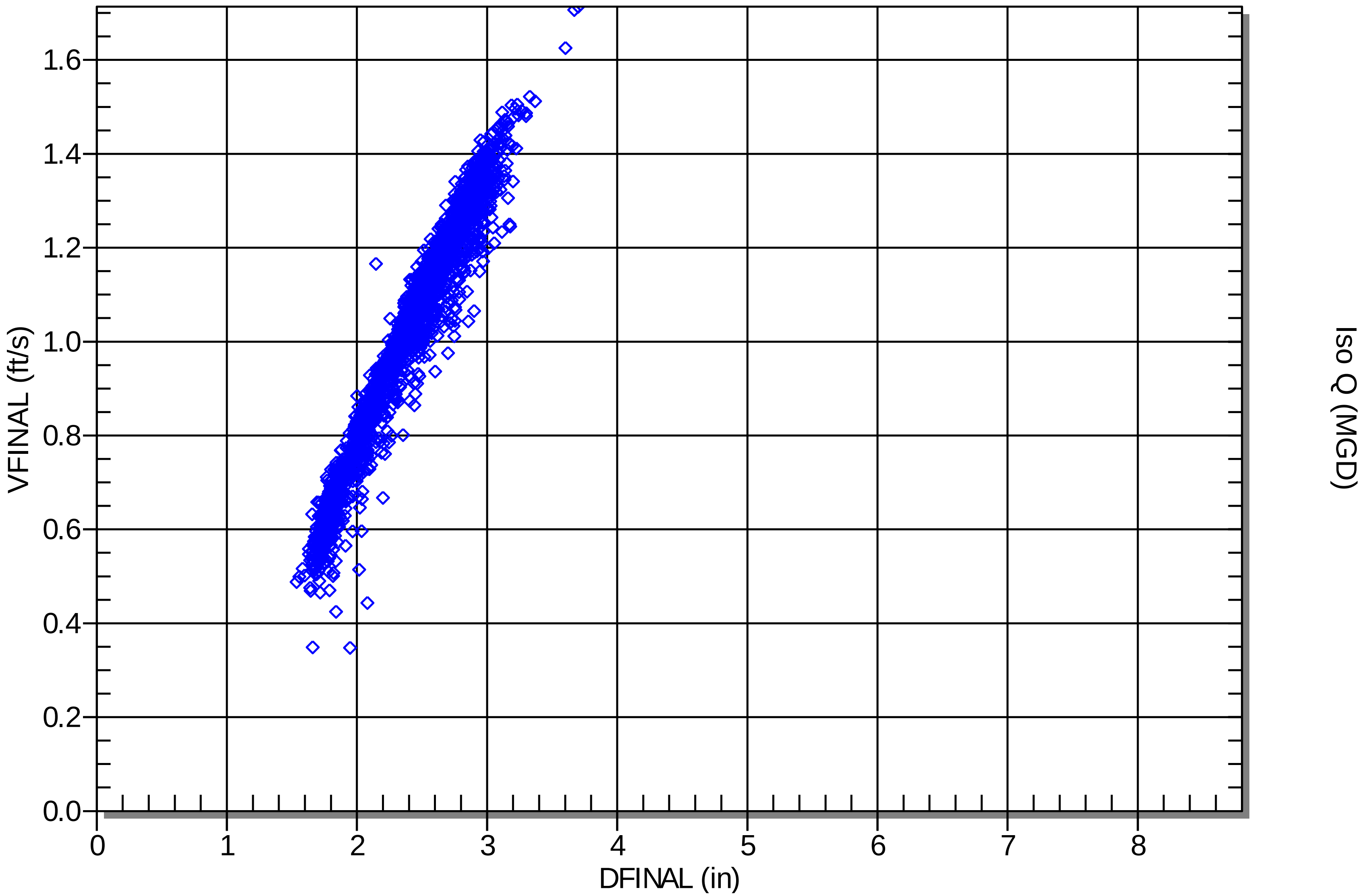
Scatter Graph

METER DE-7C



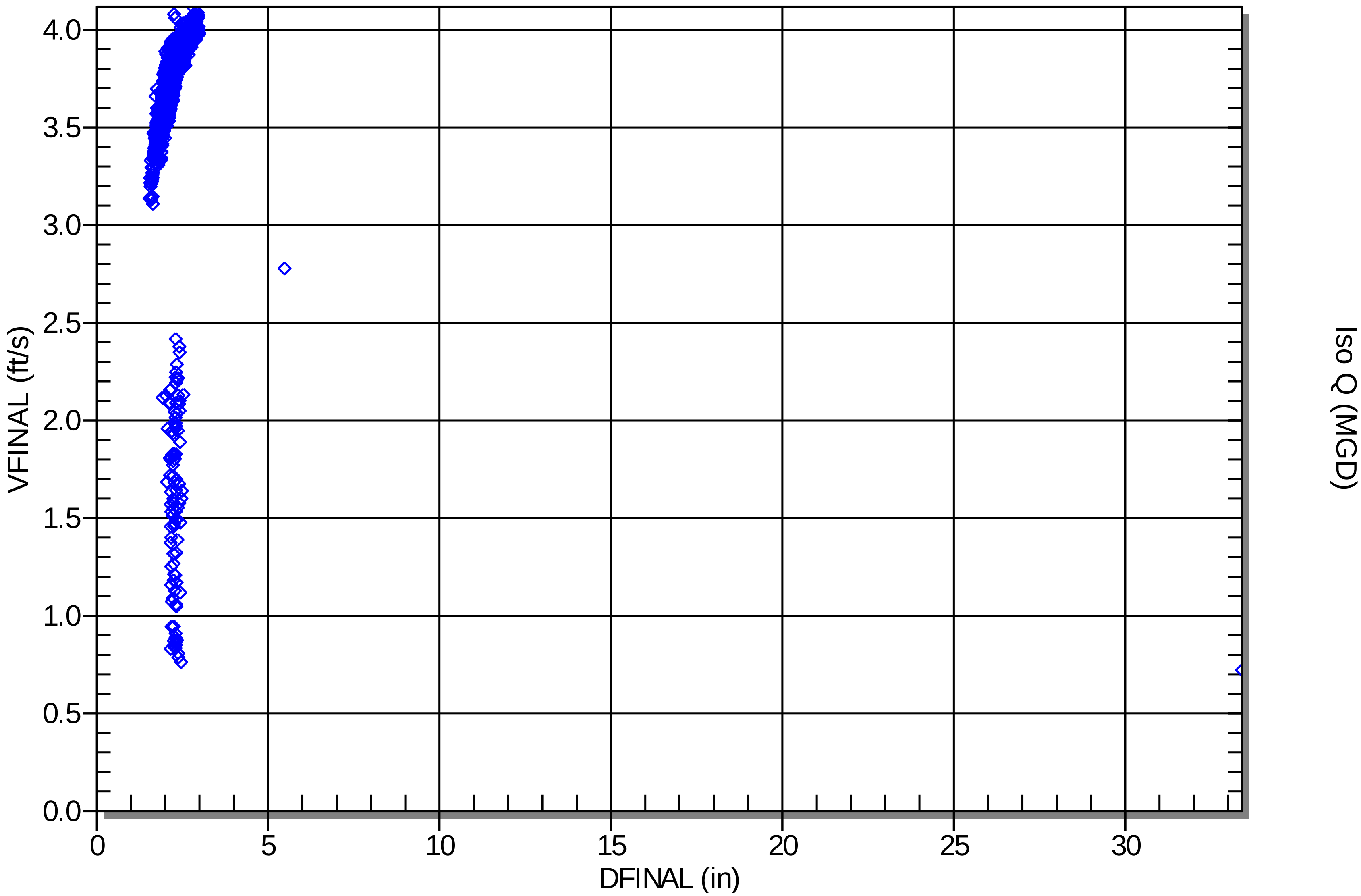
Scatter Graph

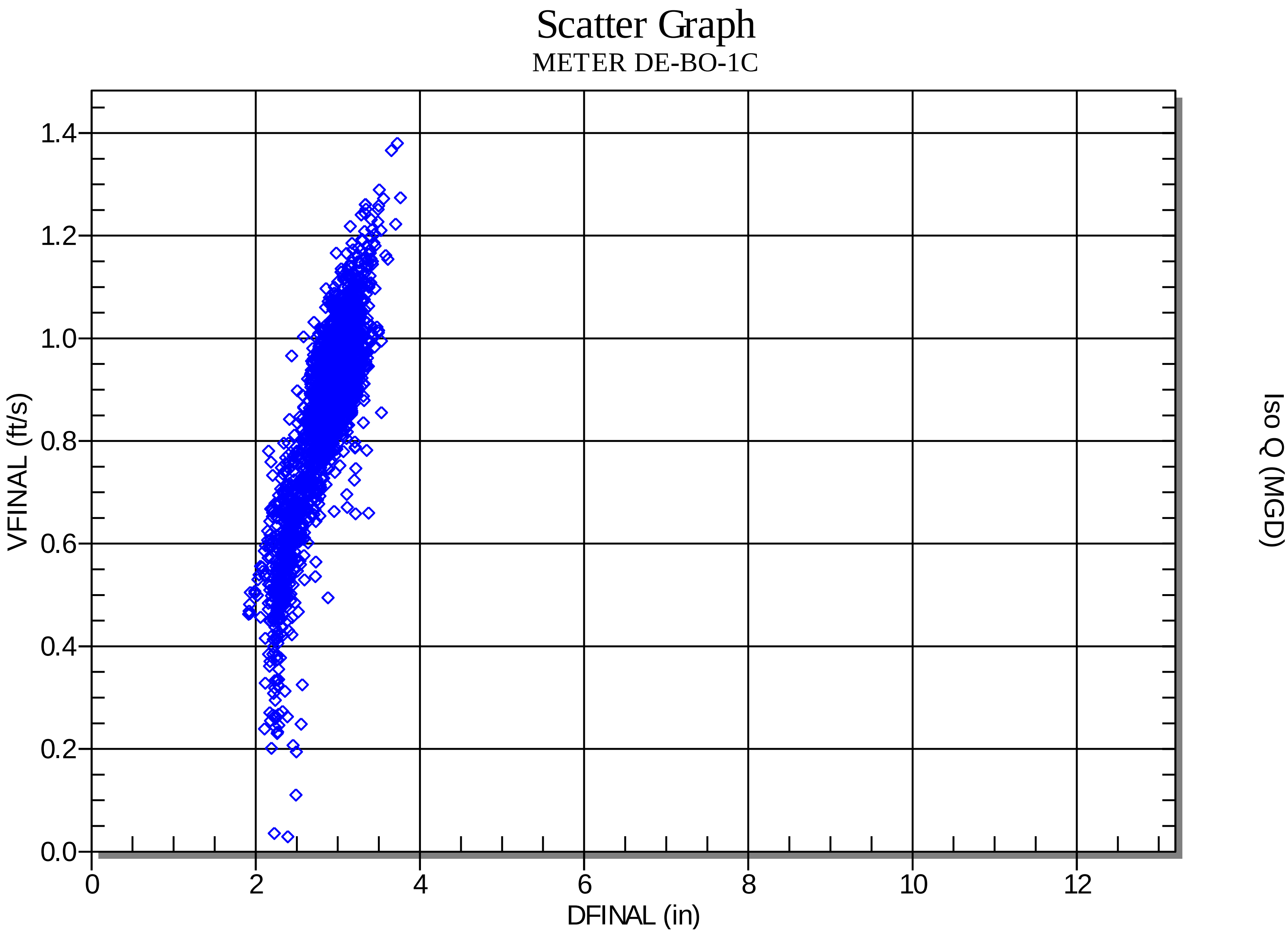
METER DE-9C



Scatter Graph

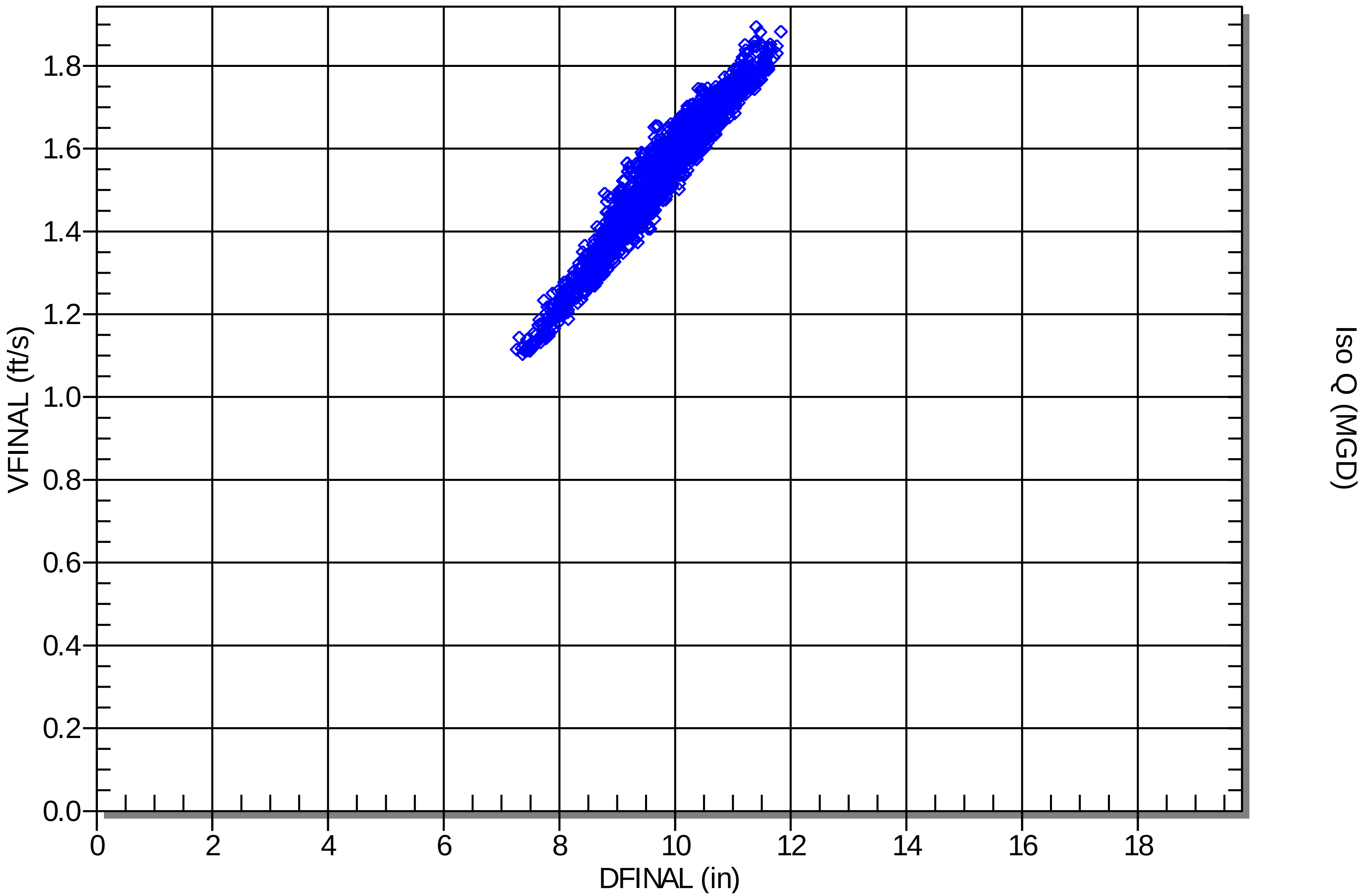
METER DE-10C




Scatter Graph
METER DE-BO-1C
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
2
4
6
8
10
12

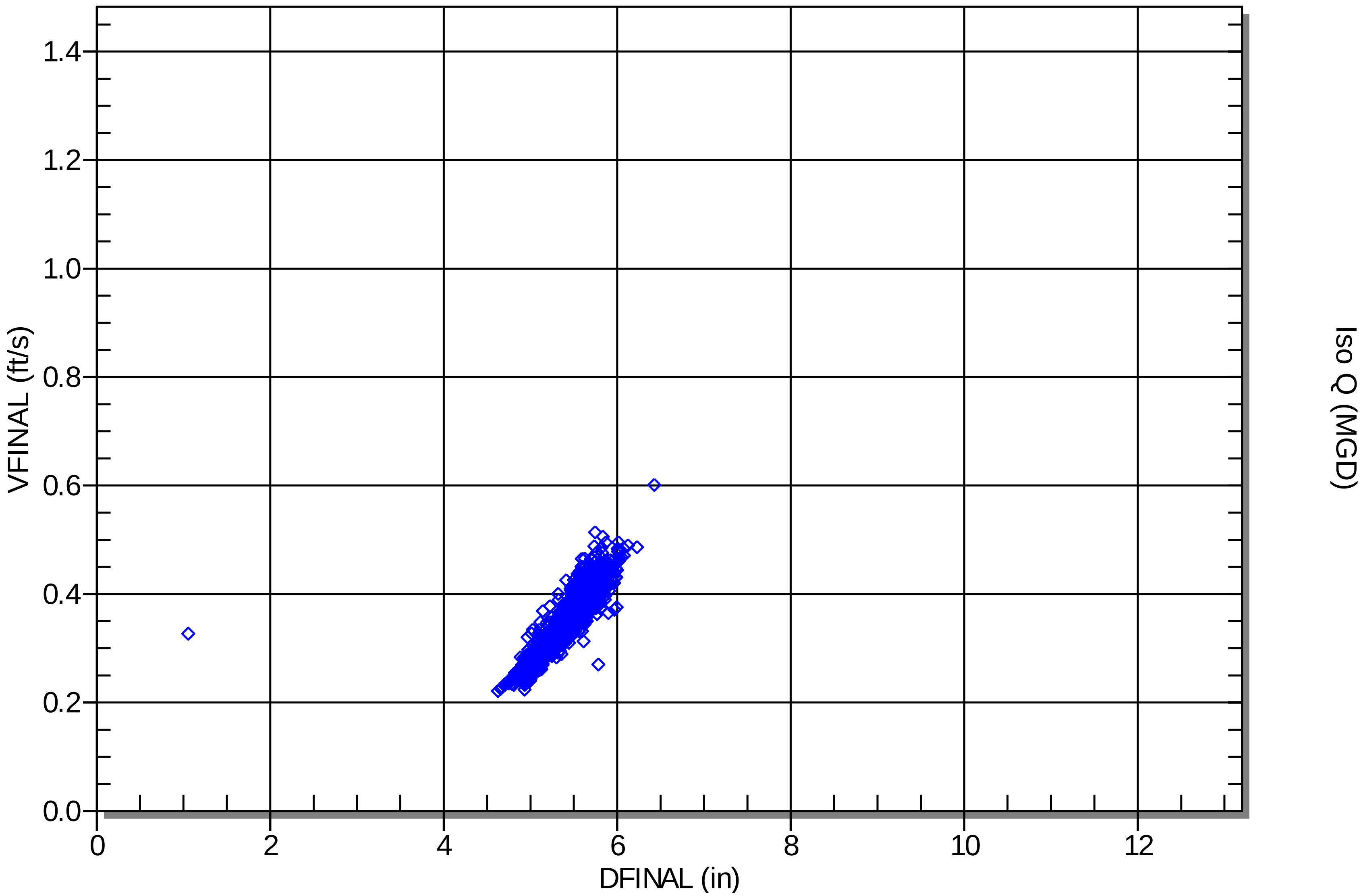
Scatter Graph

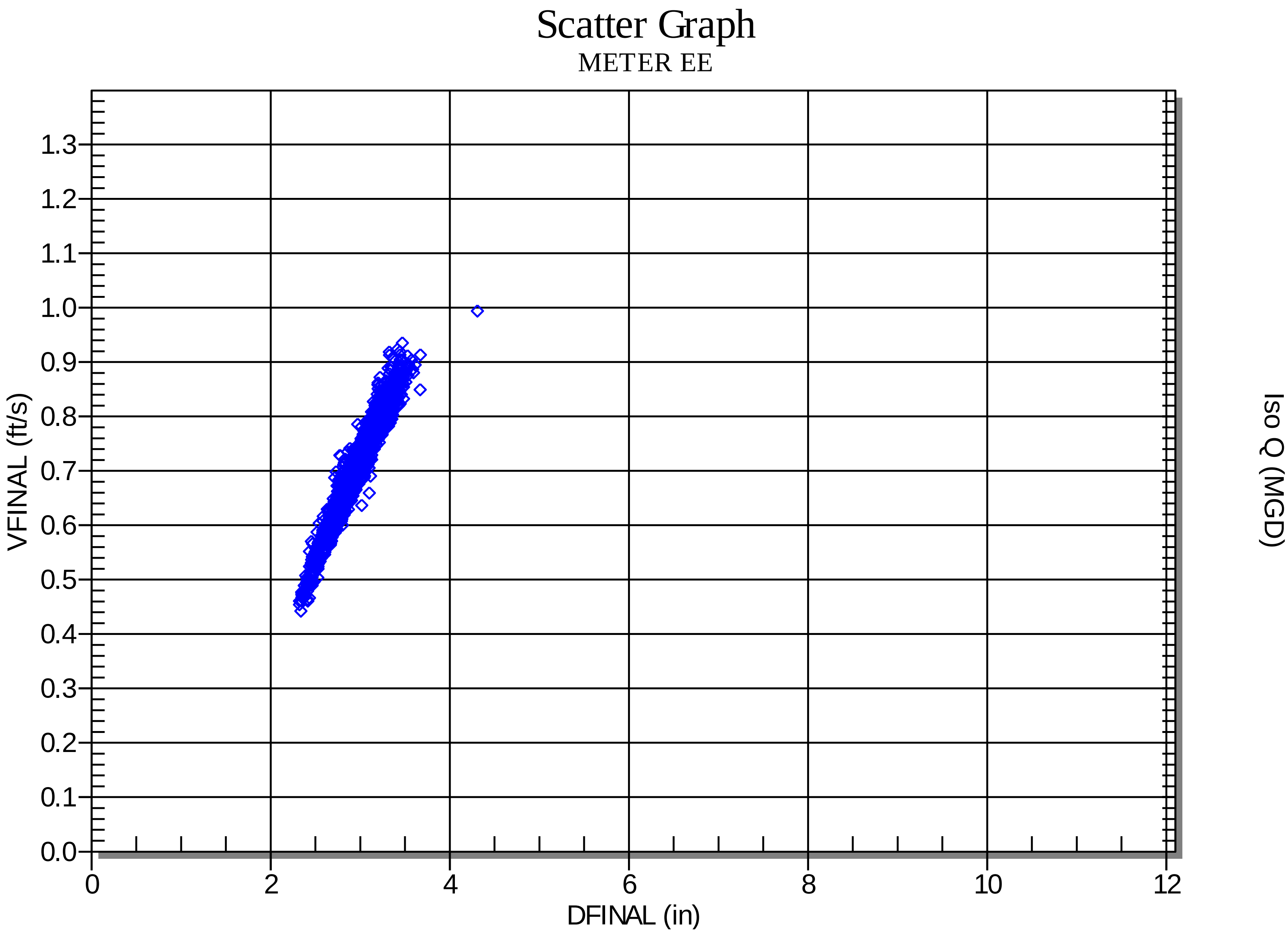
METER DE-CT-1



Scatter Graph

METER CC

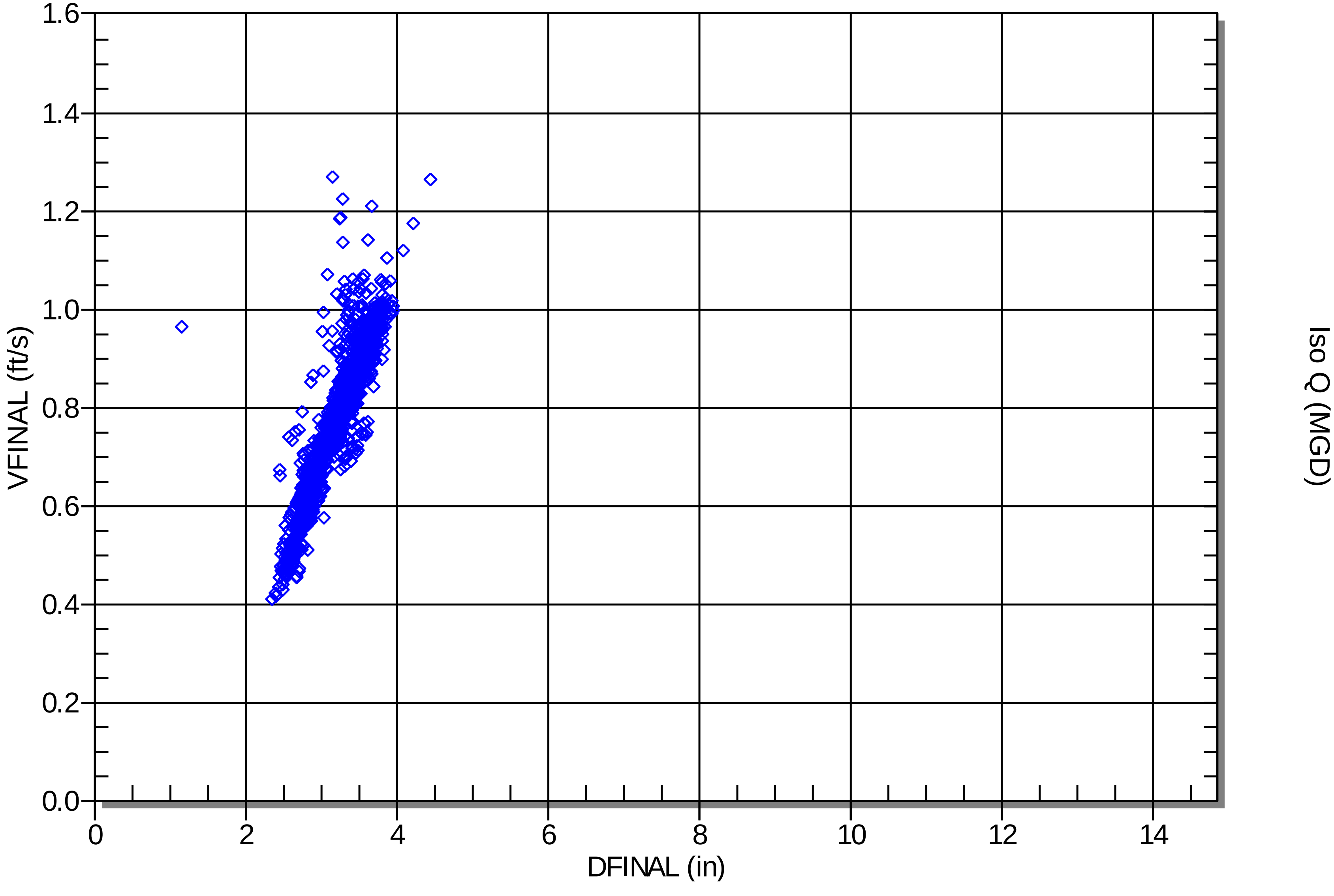




Scatter Graph
METER EE
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
0
2
4
6
8
10
12

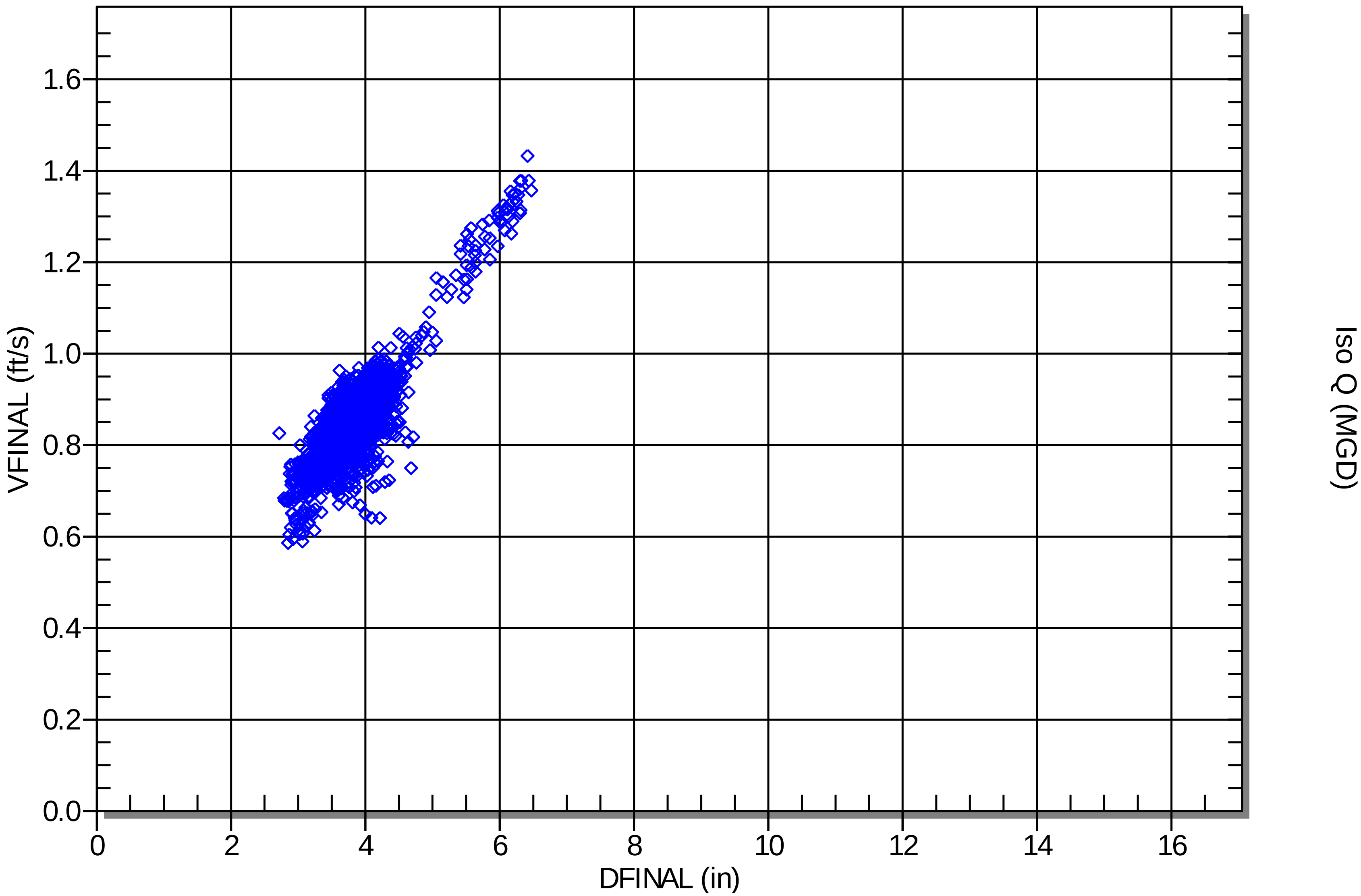
Scatter Graph

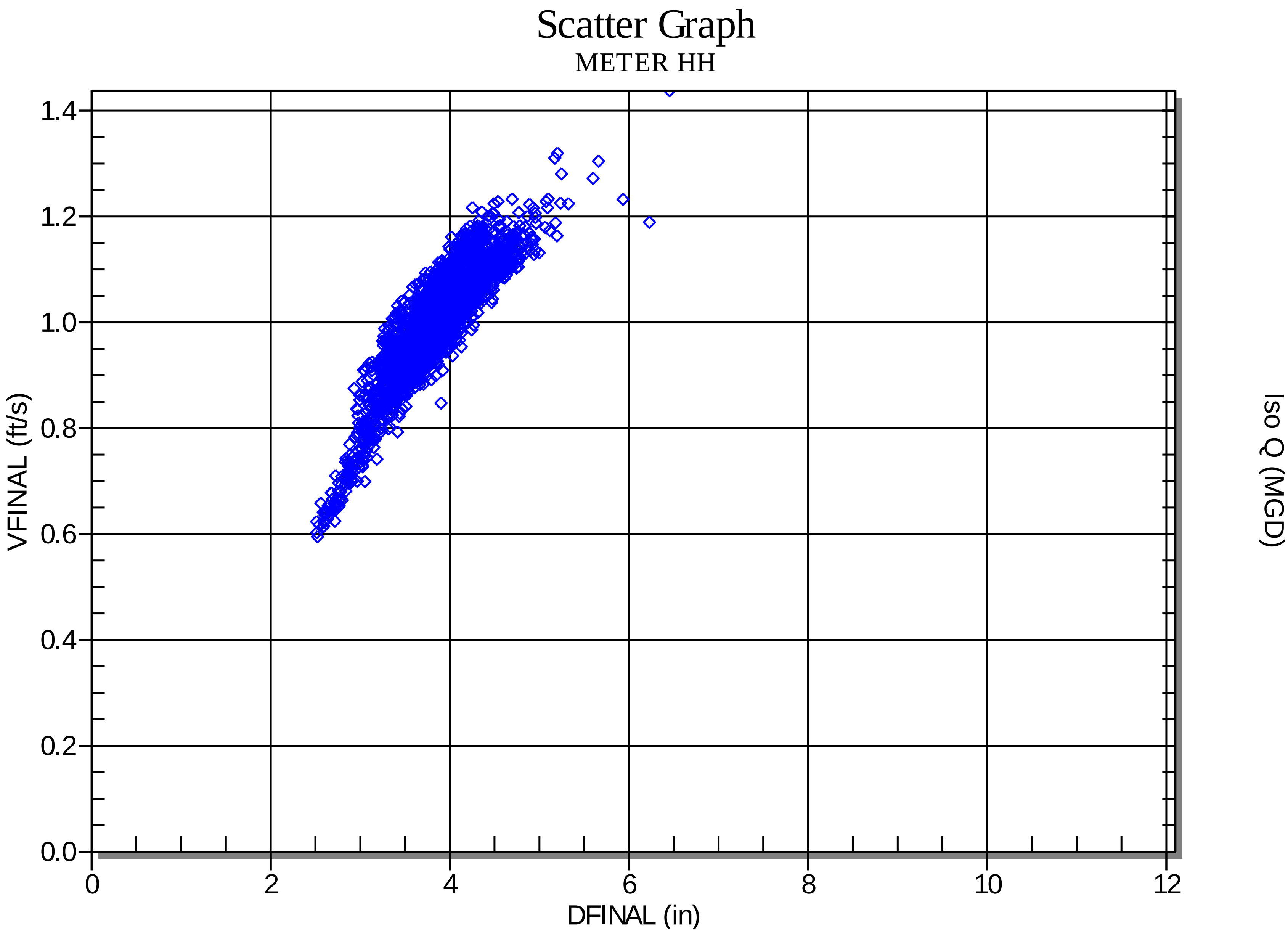
METER FF

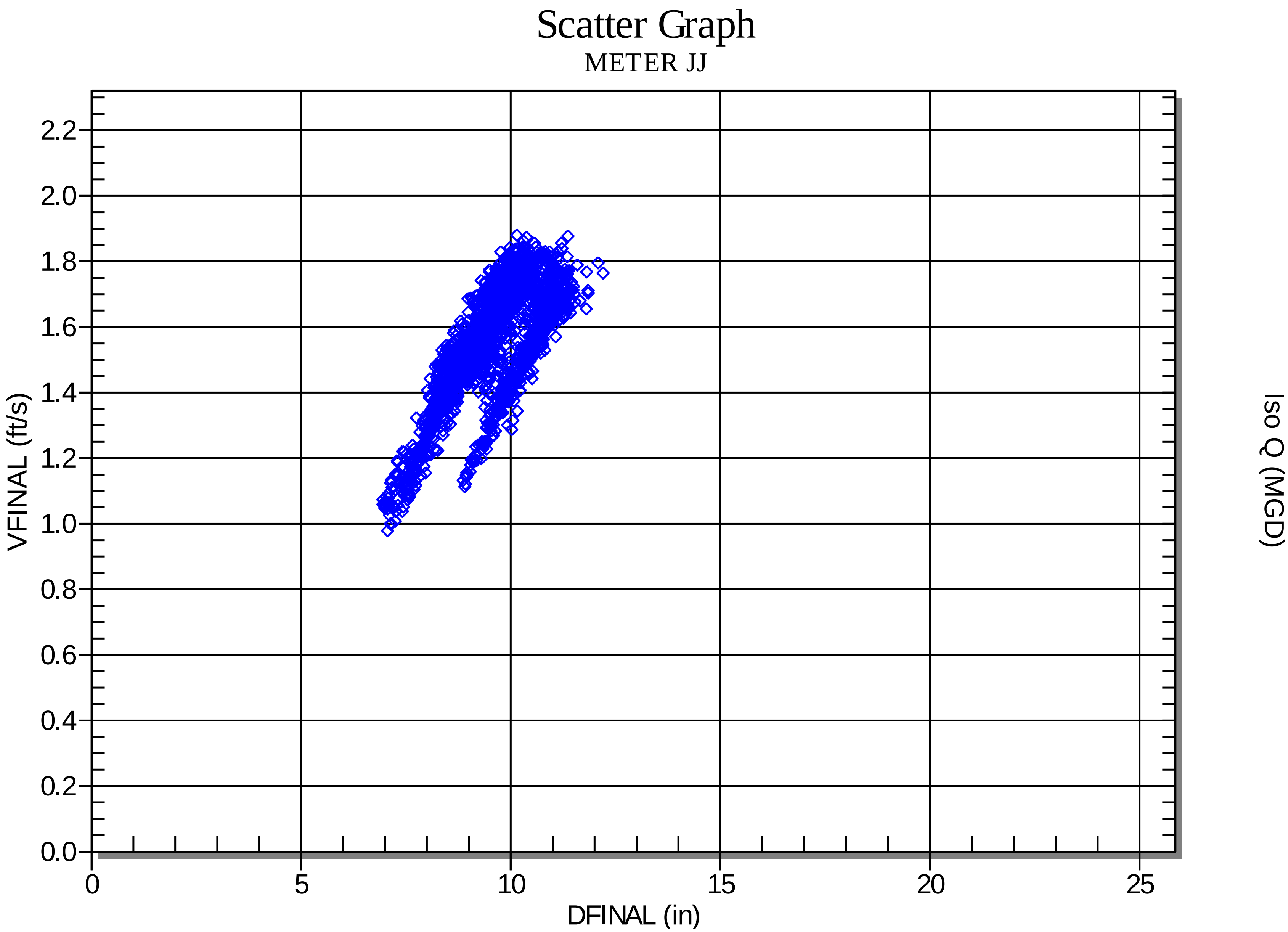


Scatter Graph

METER GG



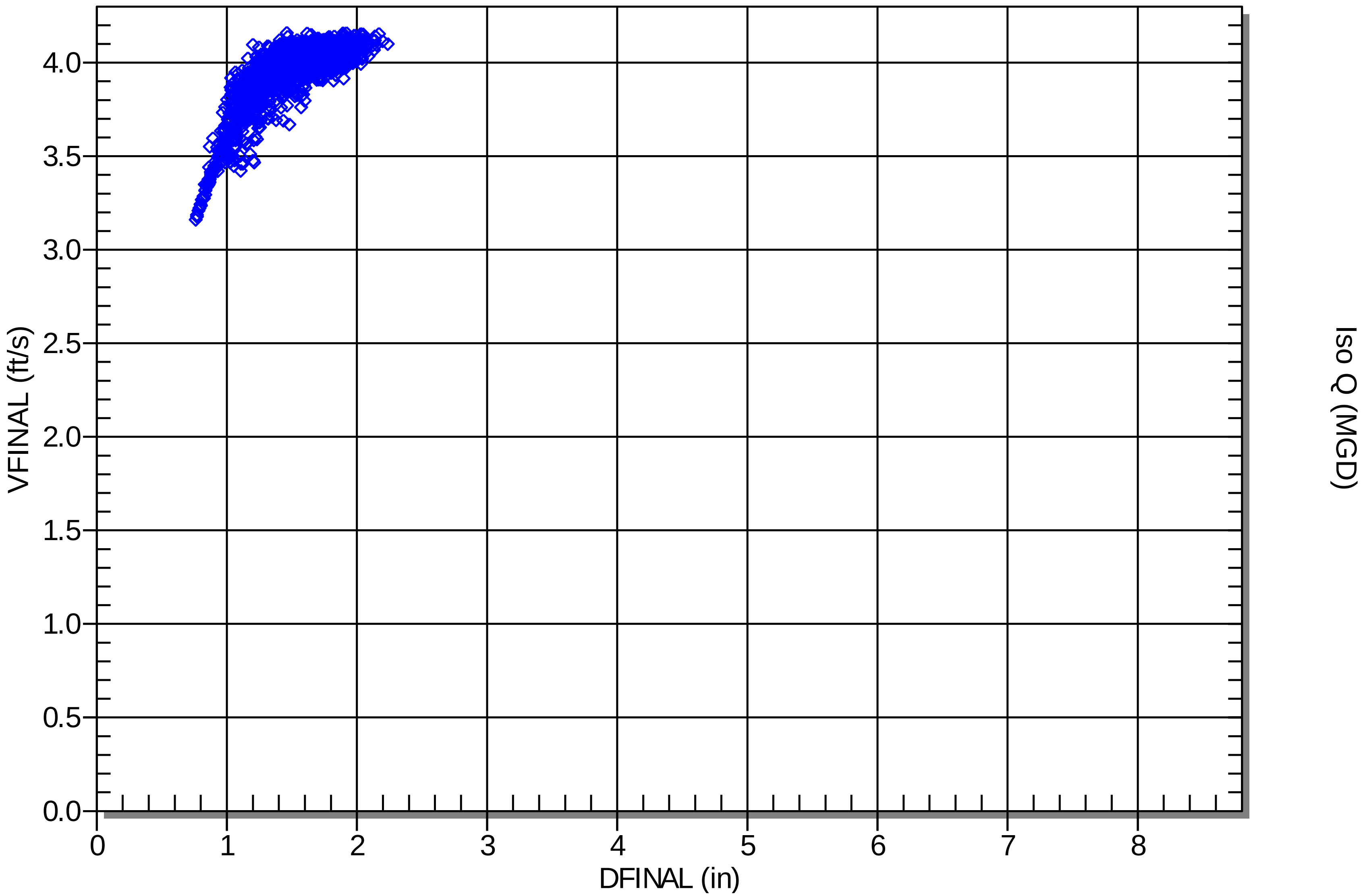

Scatter Graph
METER HH
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
2
4
6
8
10
12



Scatter Graph
METER JJ
VFINAL (ft/s)
DFINAL (in)
Iso Q (MGD)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
0
5
10
15
20
25

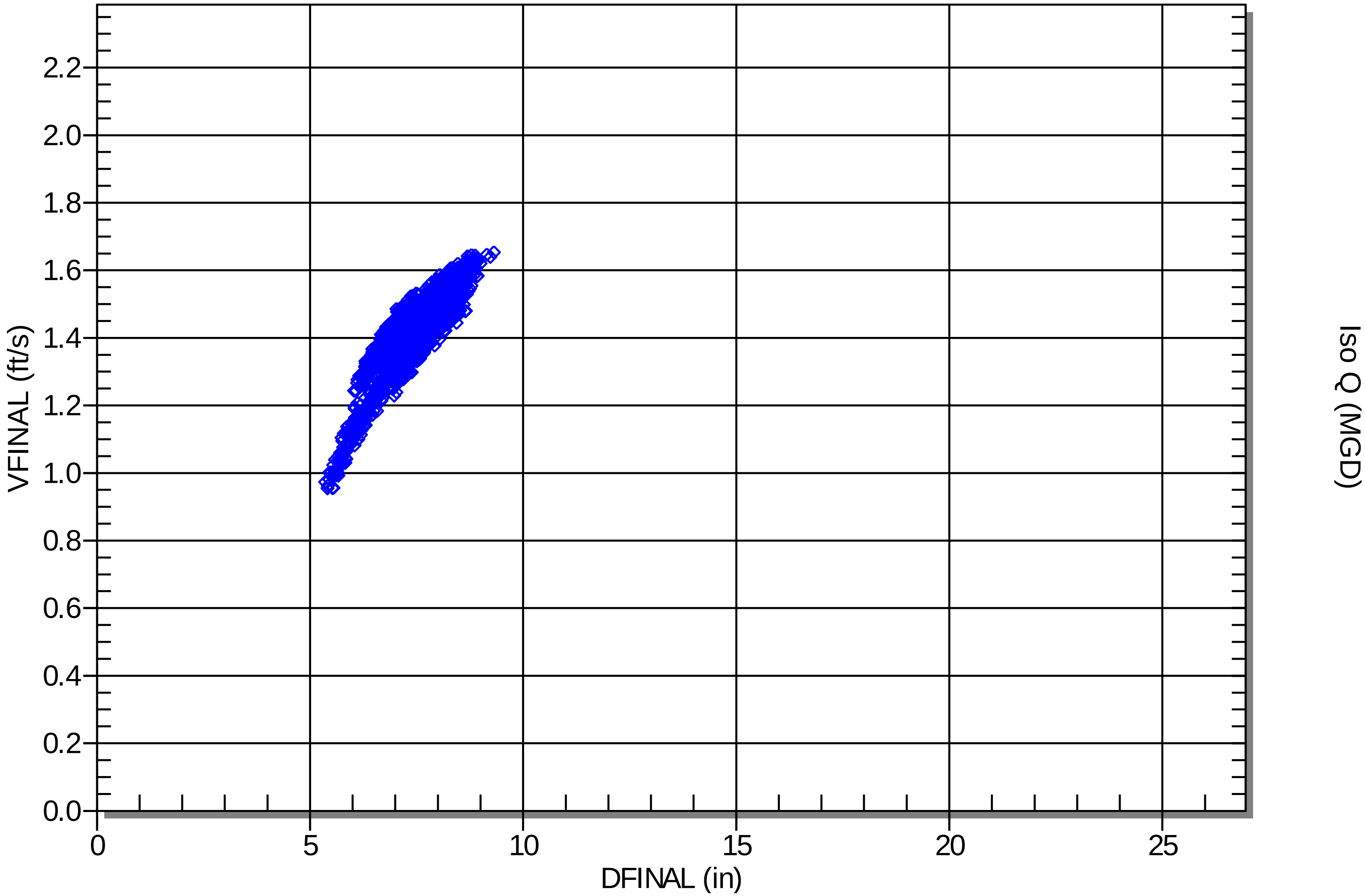
Scatter Graph

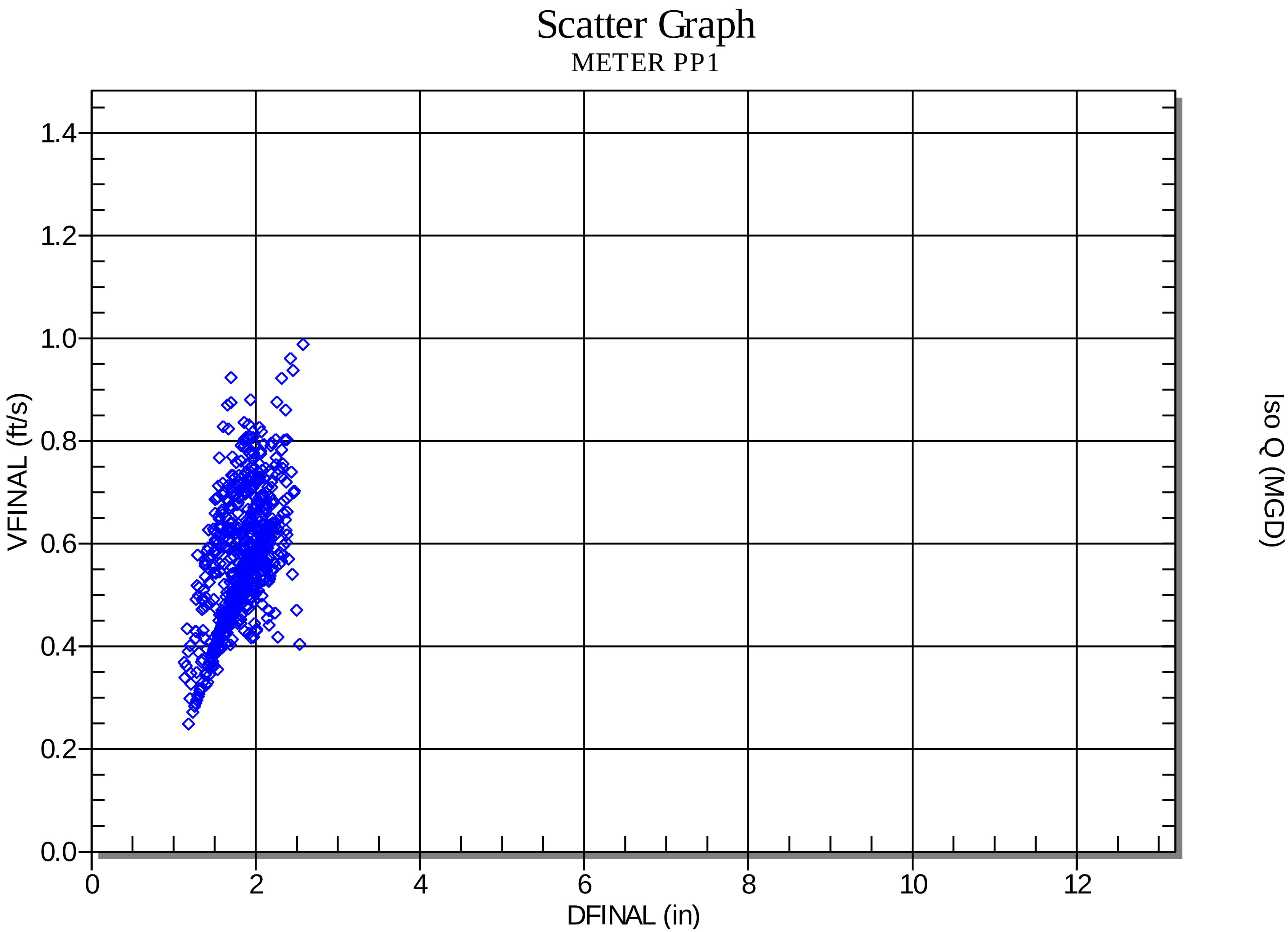
METER LL



Scatter Graph

METER OO

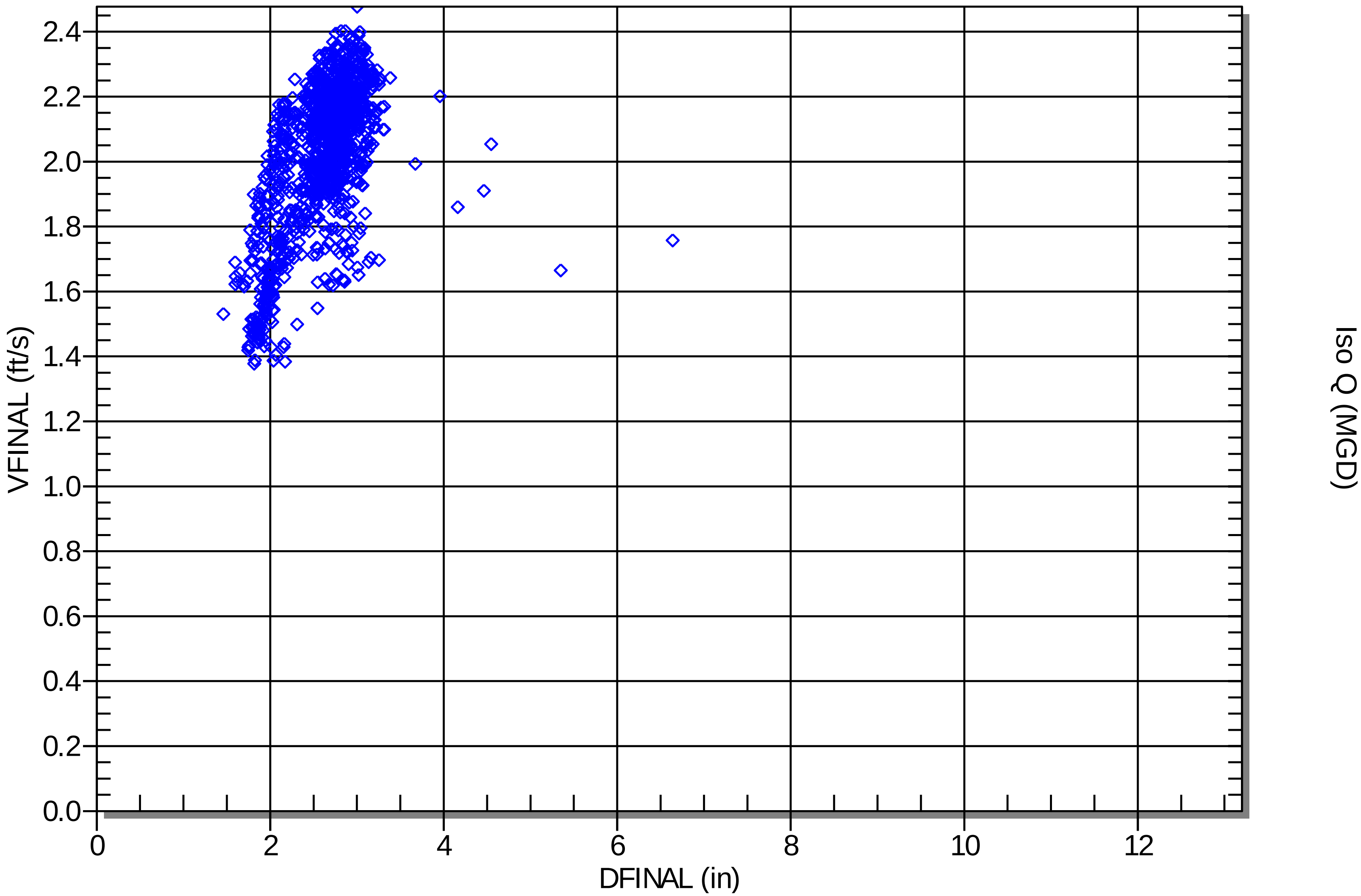




Scatter Graph
METER PP1
VFINAL (ft/s)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
0
2
4
6
8
10
12
DFINAL (in)
Iso Q (MGD)

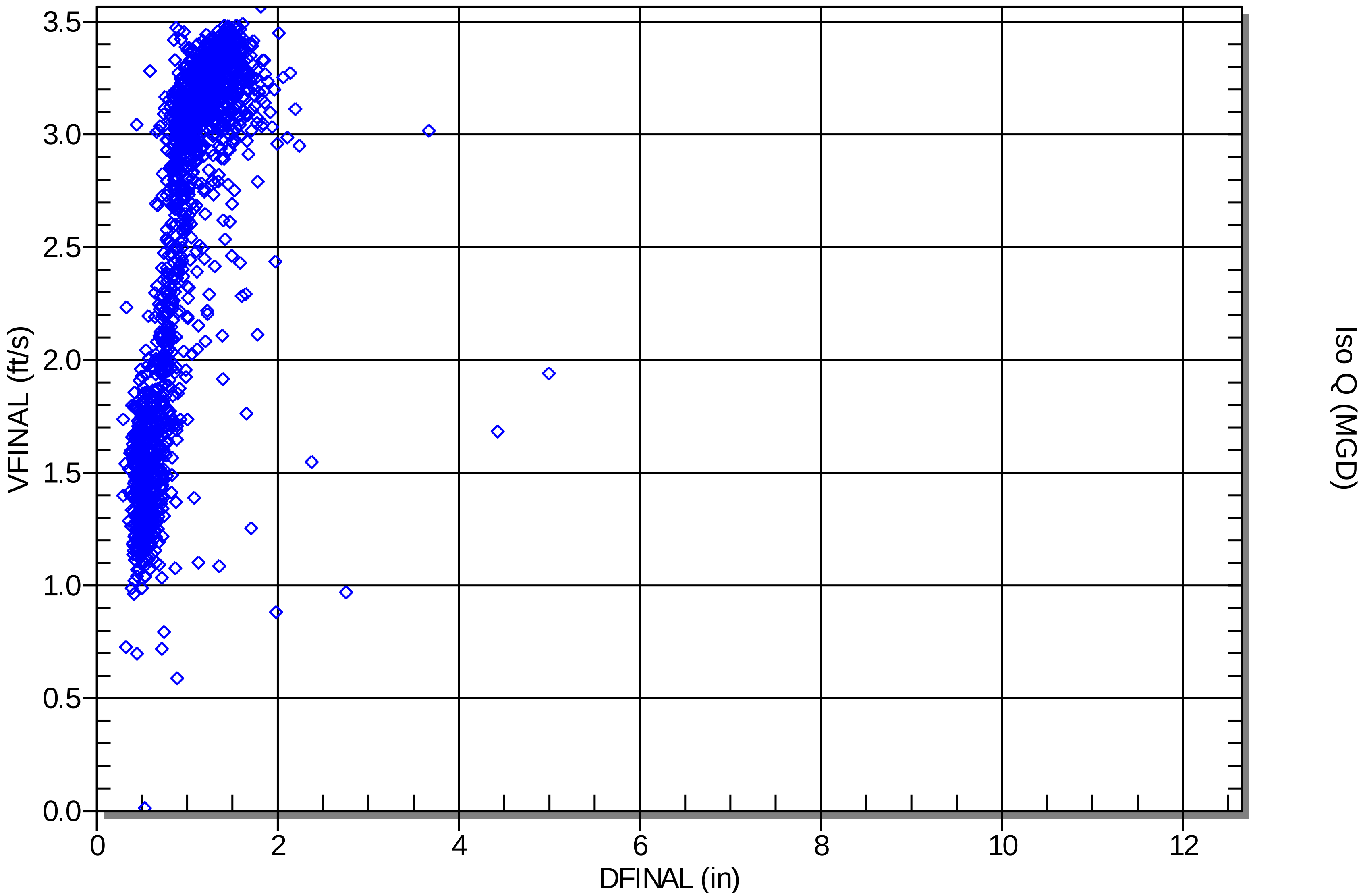
Scatter Graph

METER PP1 NEW



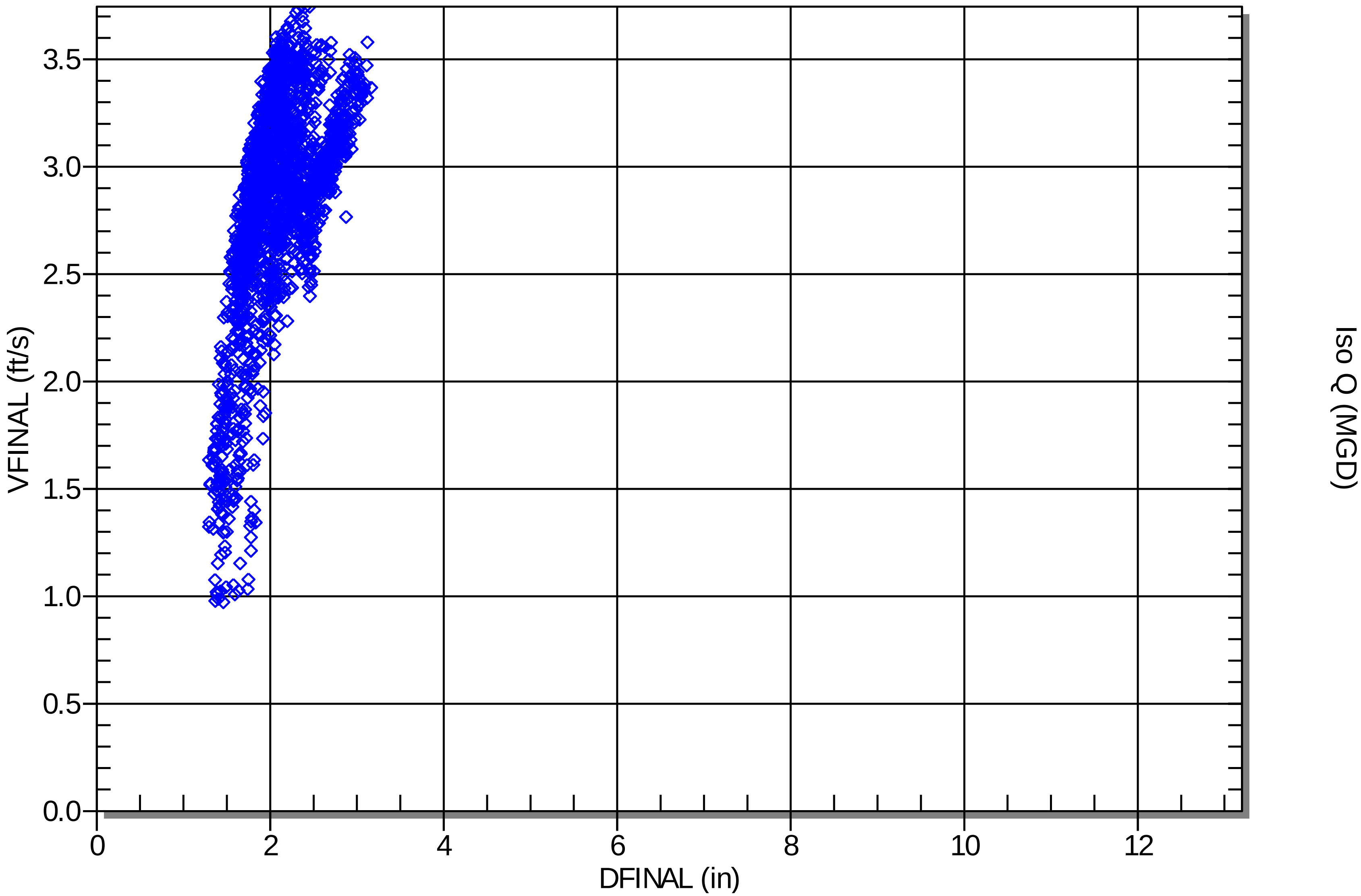
Scatter Graph

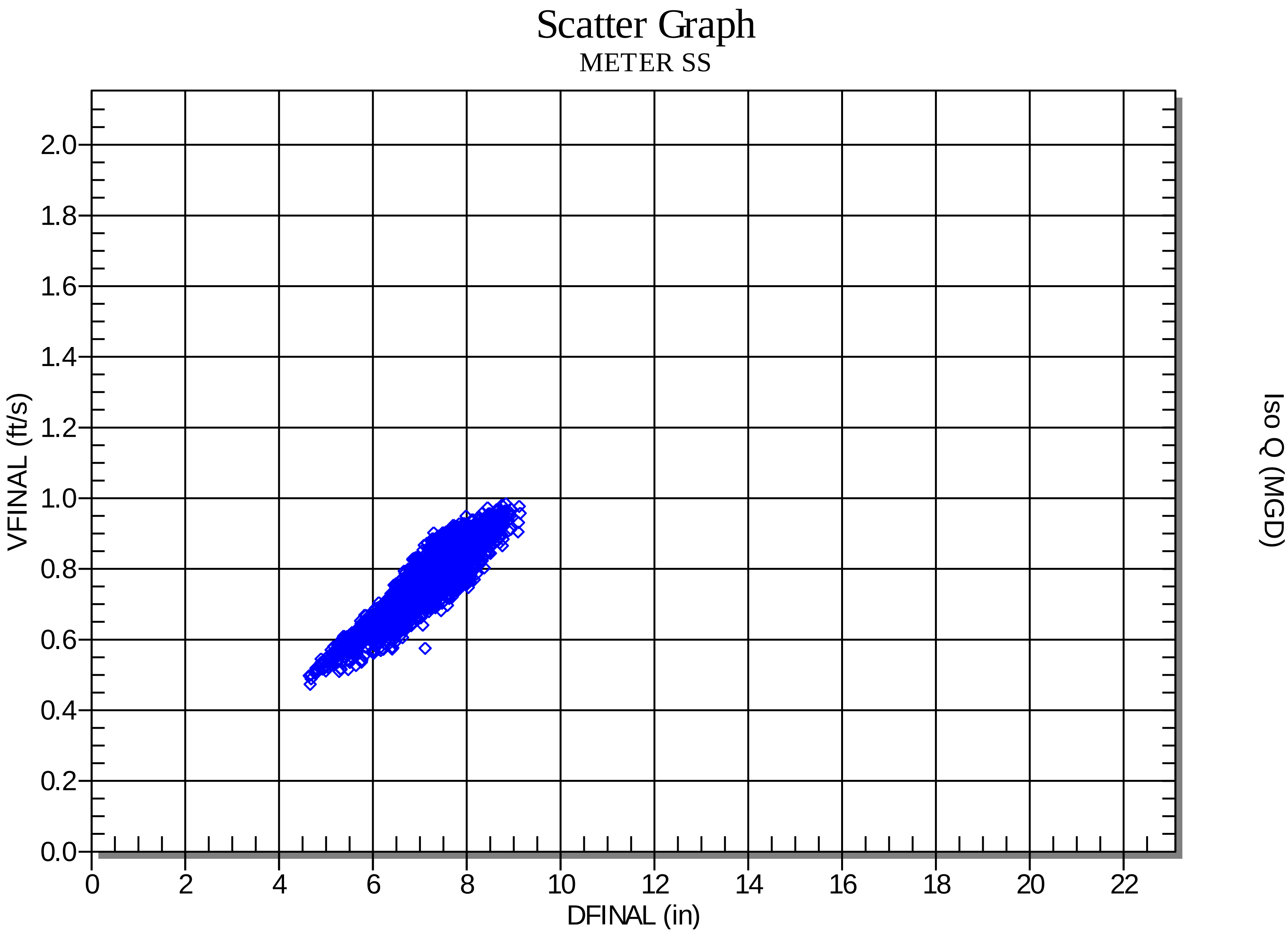
METER PP2



Scatter Graph

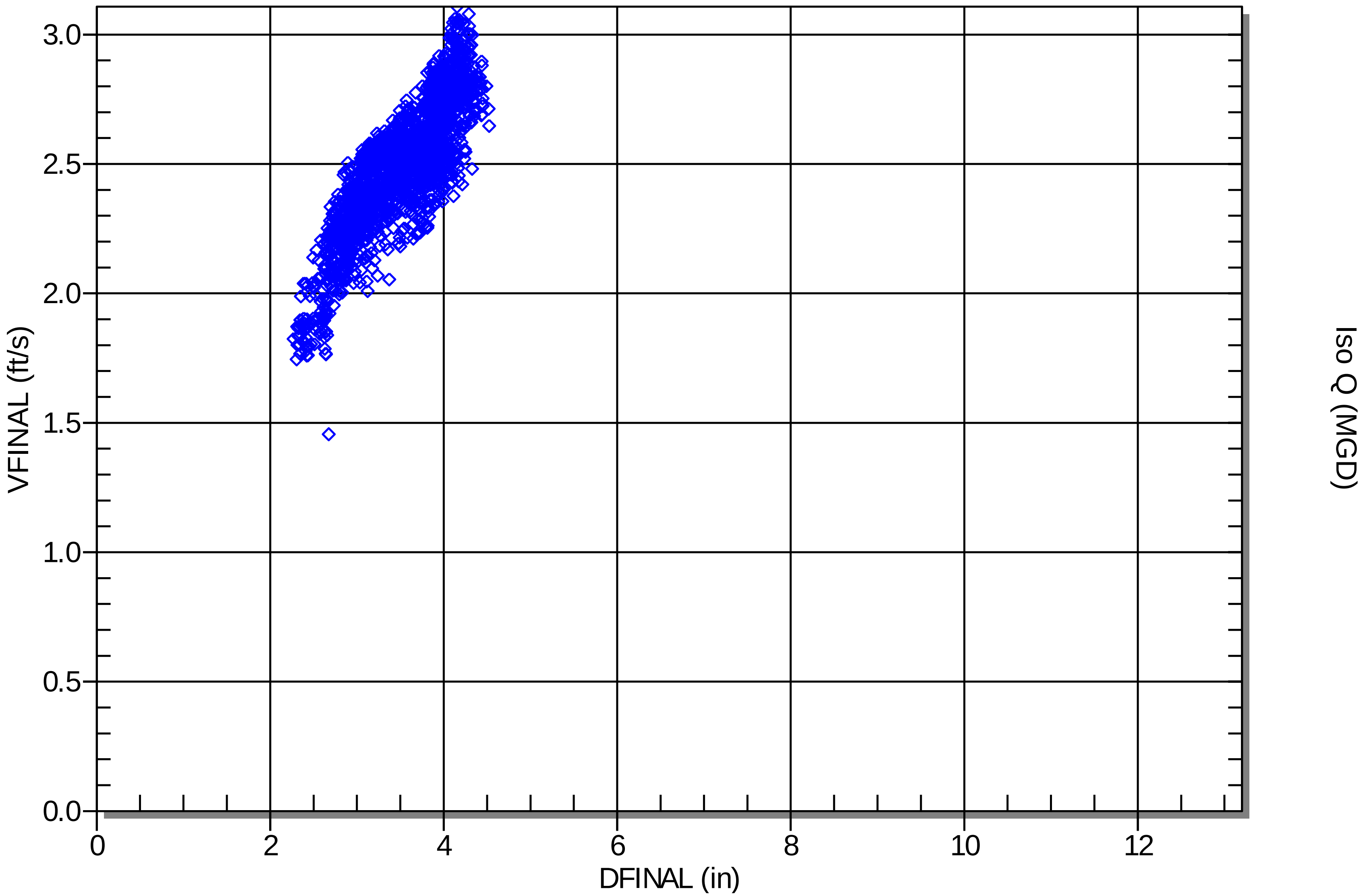
METER RR

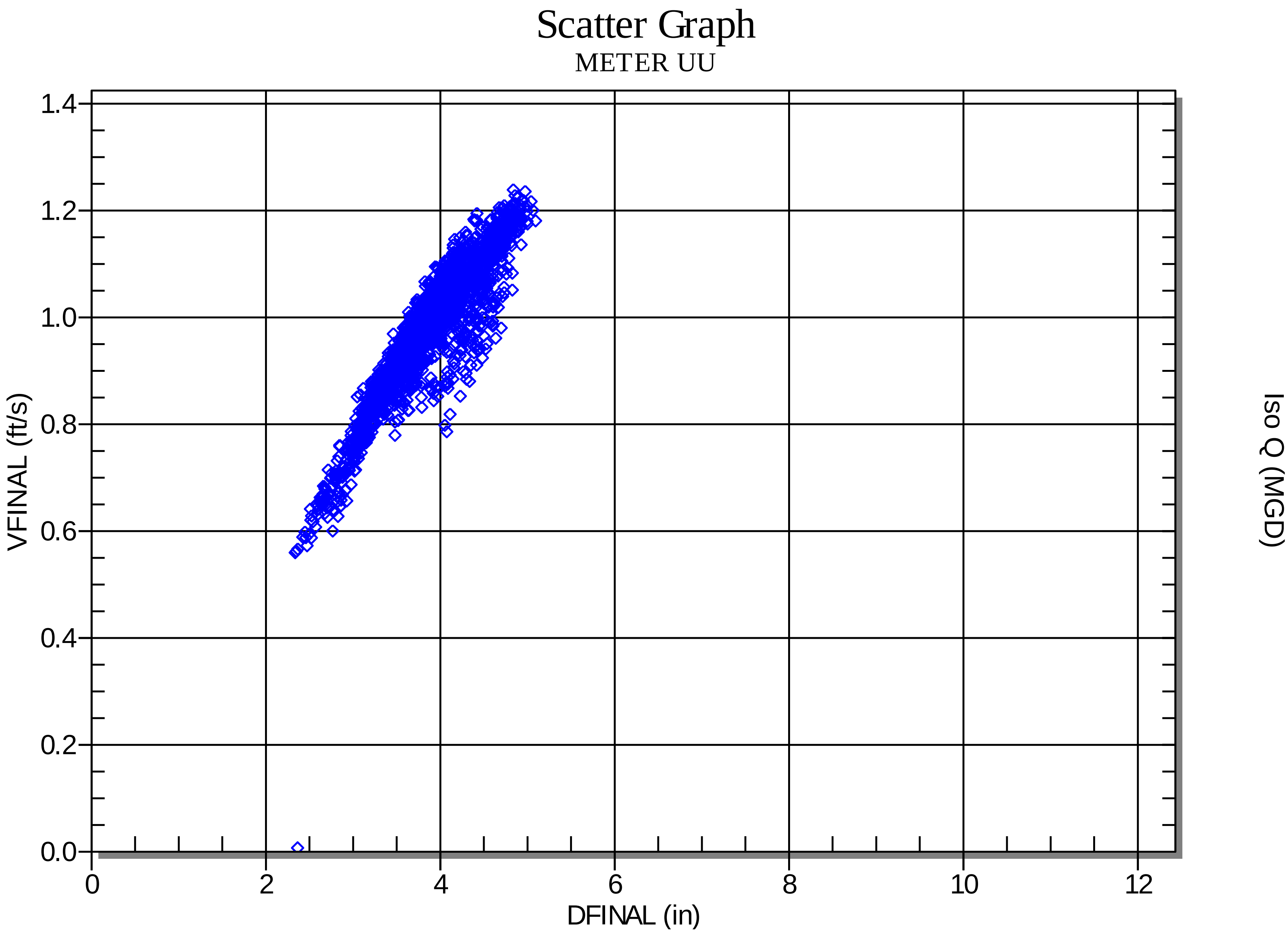



Scatter Graph
METER SS
VFINAL (ft/s)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
10
12
14
16
18
20
22
DFINAL (in)
Iso Q (MGD)

Scatter Graph

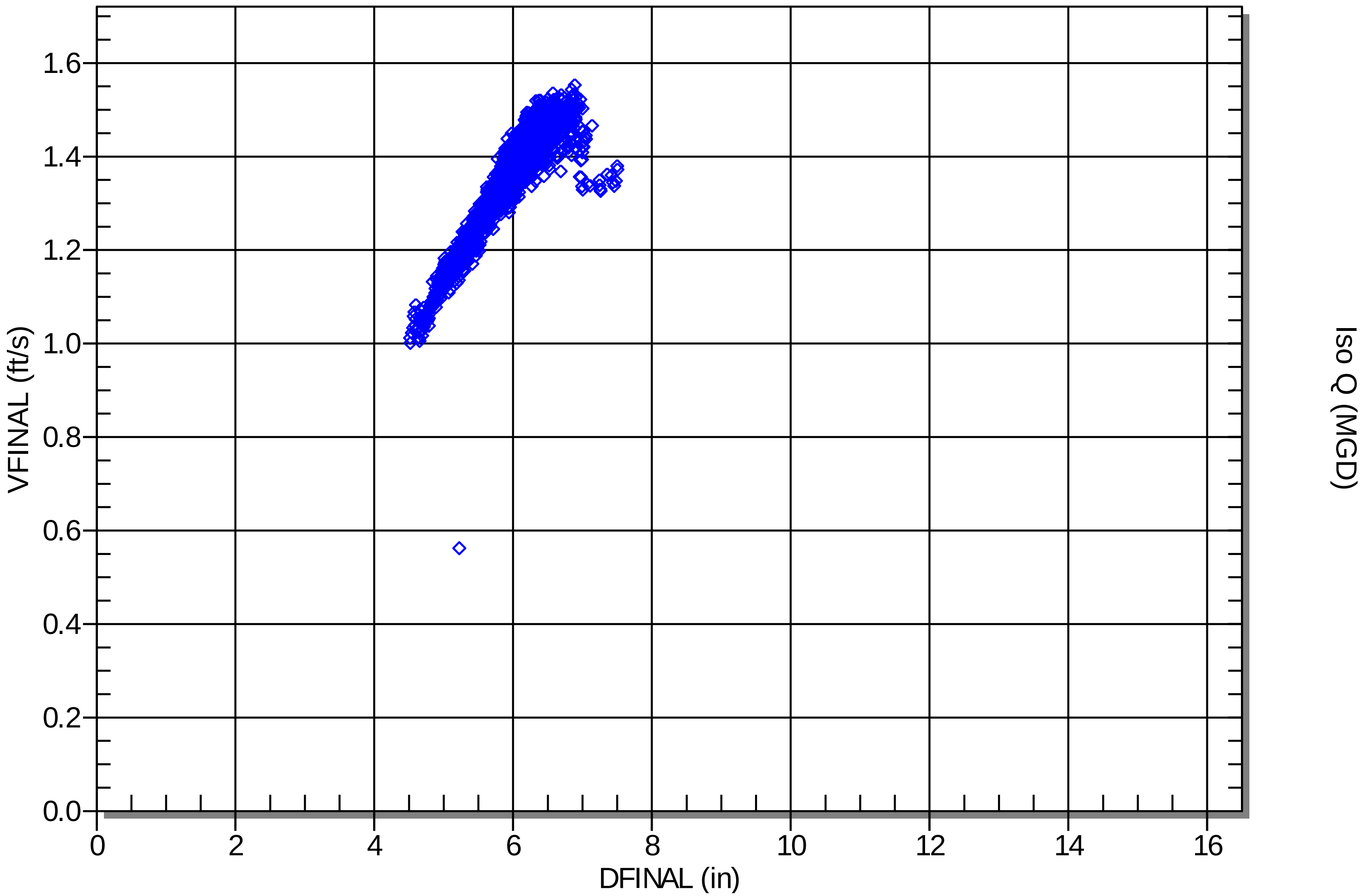
METER TT

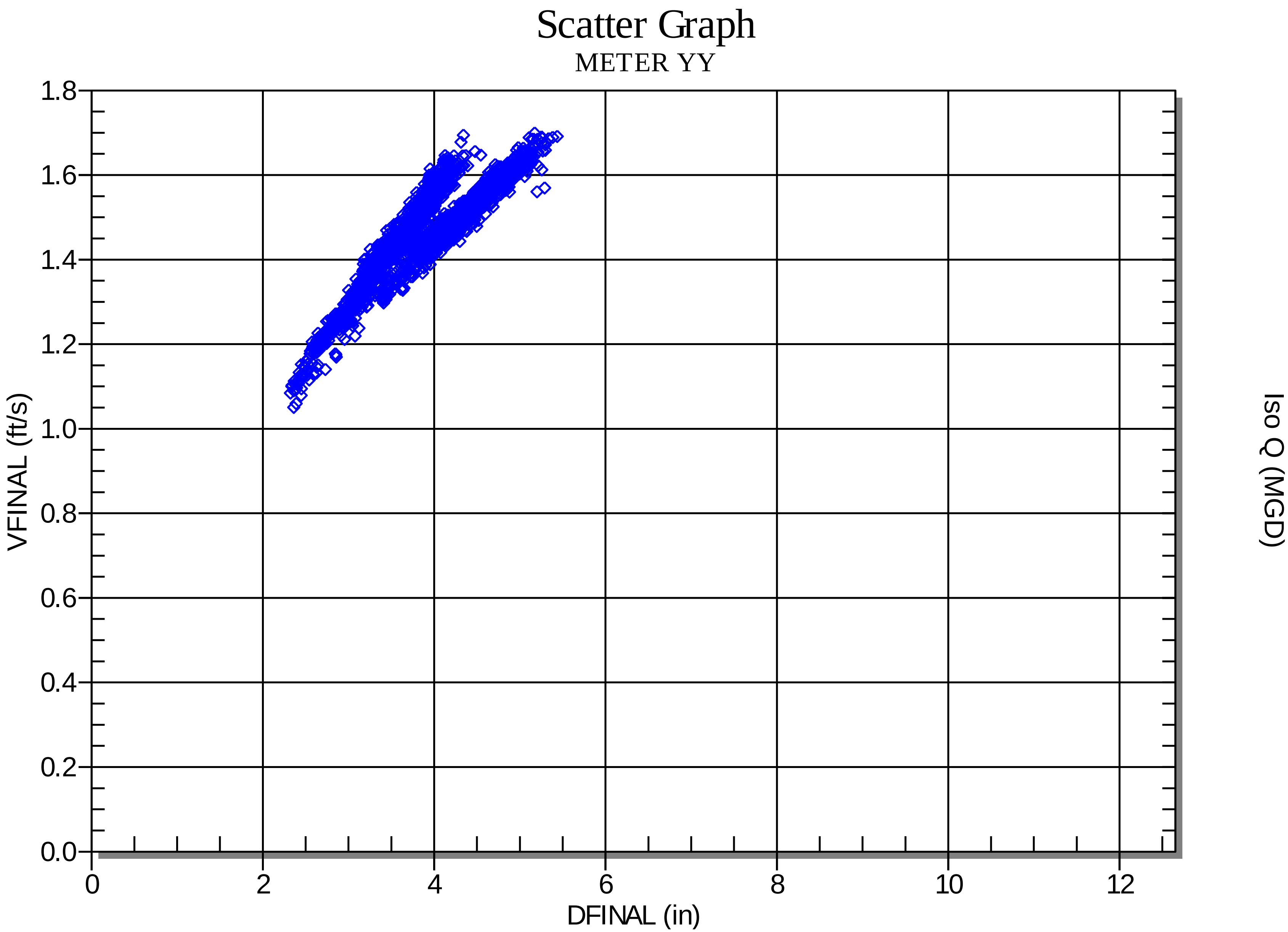



Scatter Graph
METER UU
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
VFINAL (ft/s)
0
2
4
6
8
10
12
DFINAL (in)
Iso Q (MGD)

Scatter Graph

METER VV





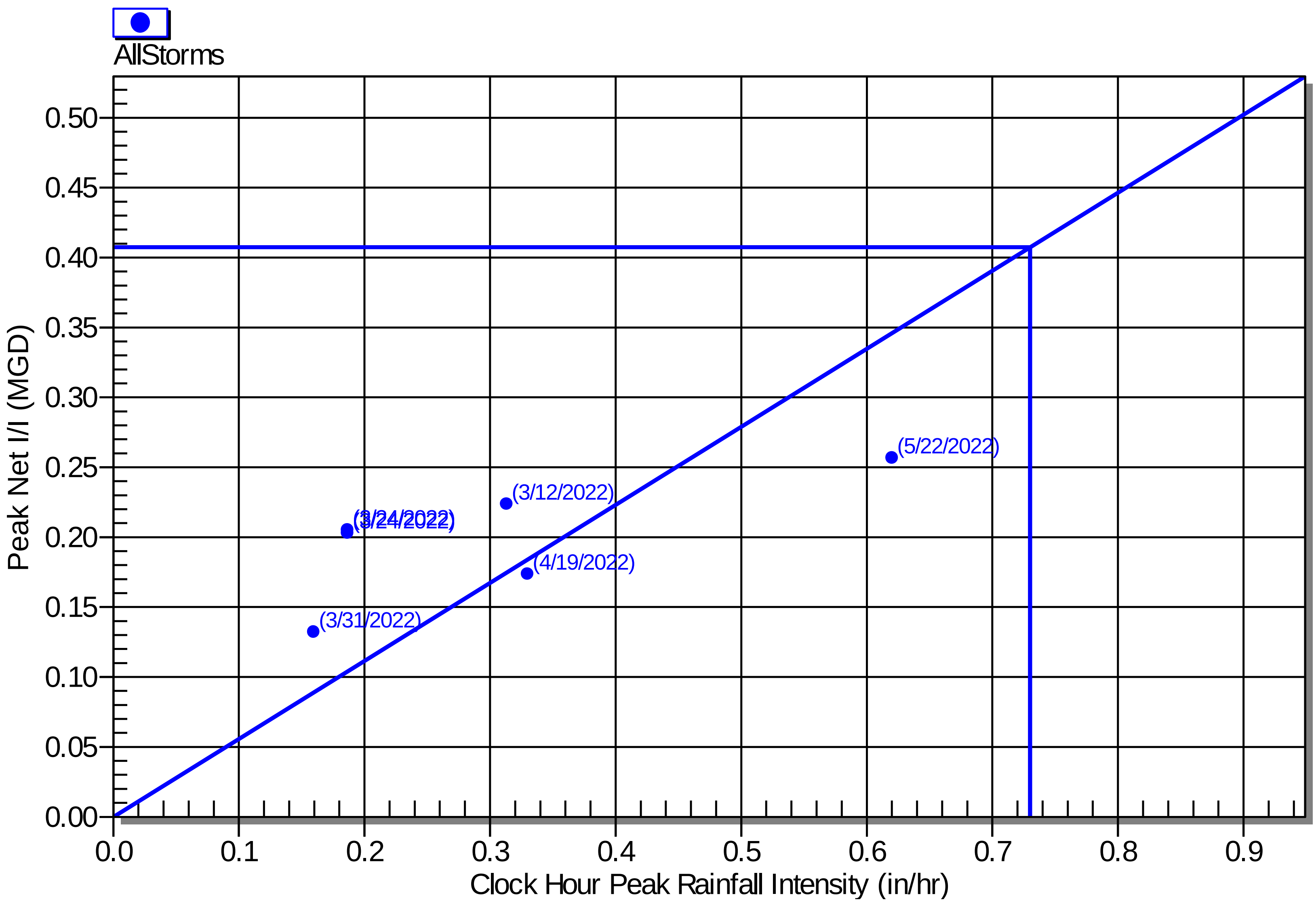
Scatter Graph
METER YY
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
VFINAL (ft/s)
0
2
4
6
8
10
12
DFINAL (in)
Iso Q (MGD)

APPENDIX C

LINEAR REGRESSION

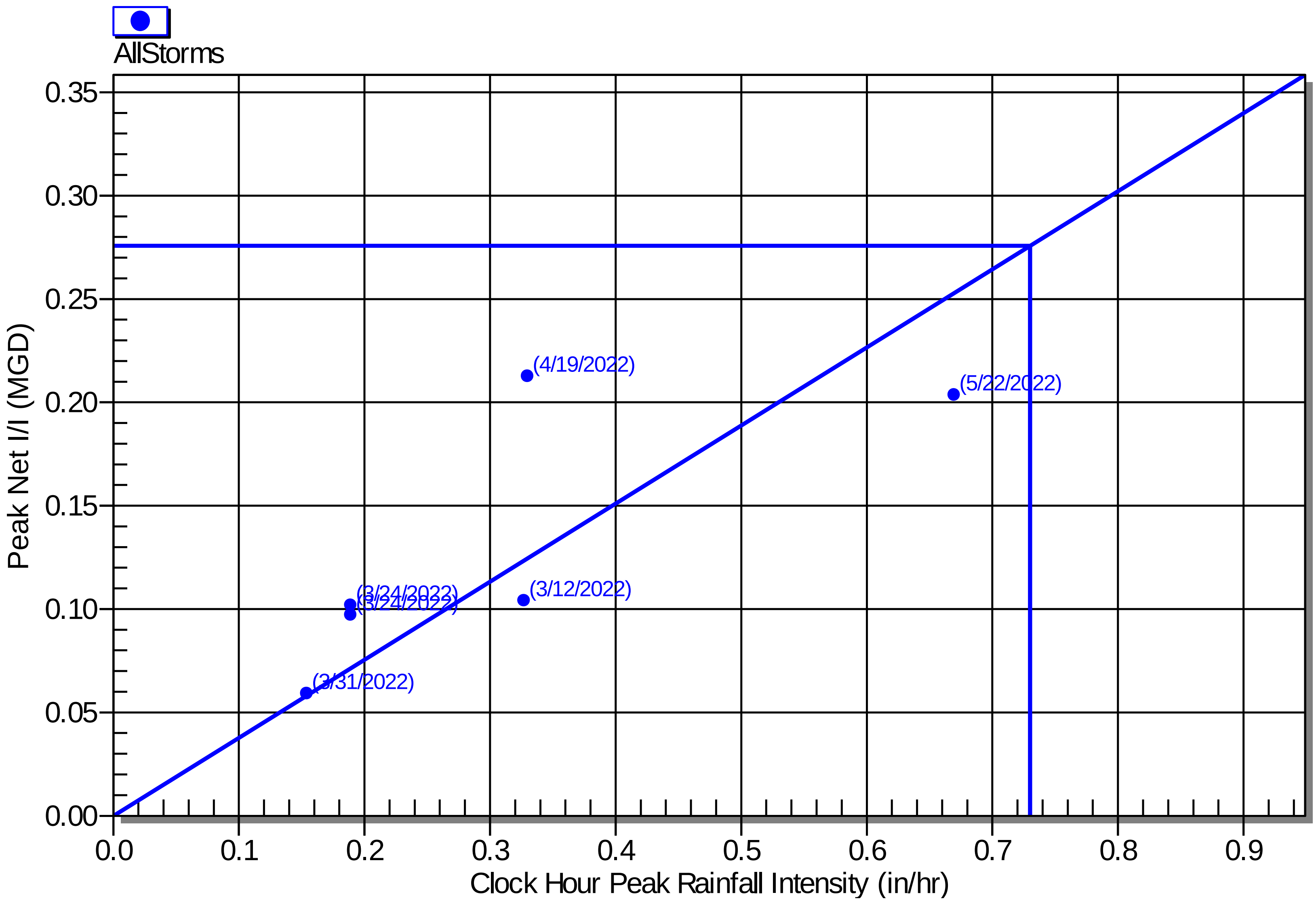
Q vs i - METER DE-1C

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



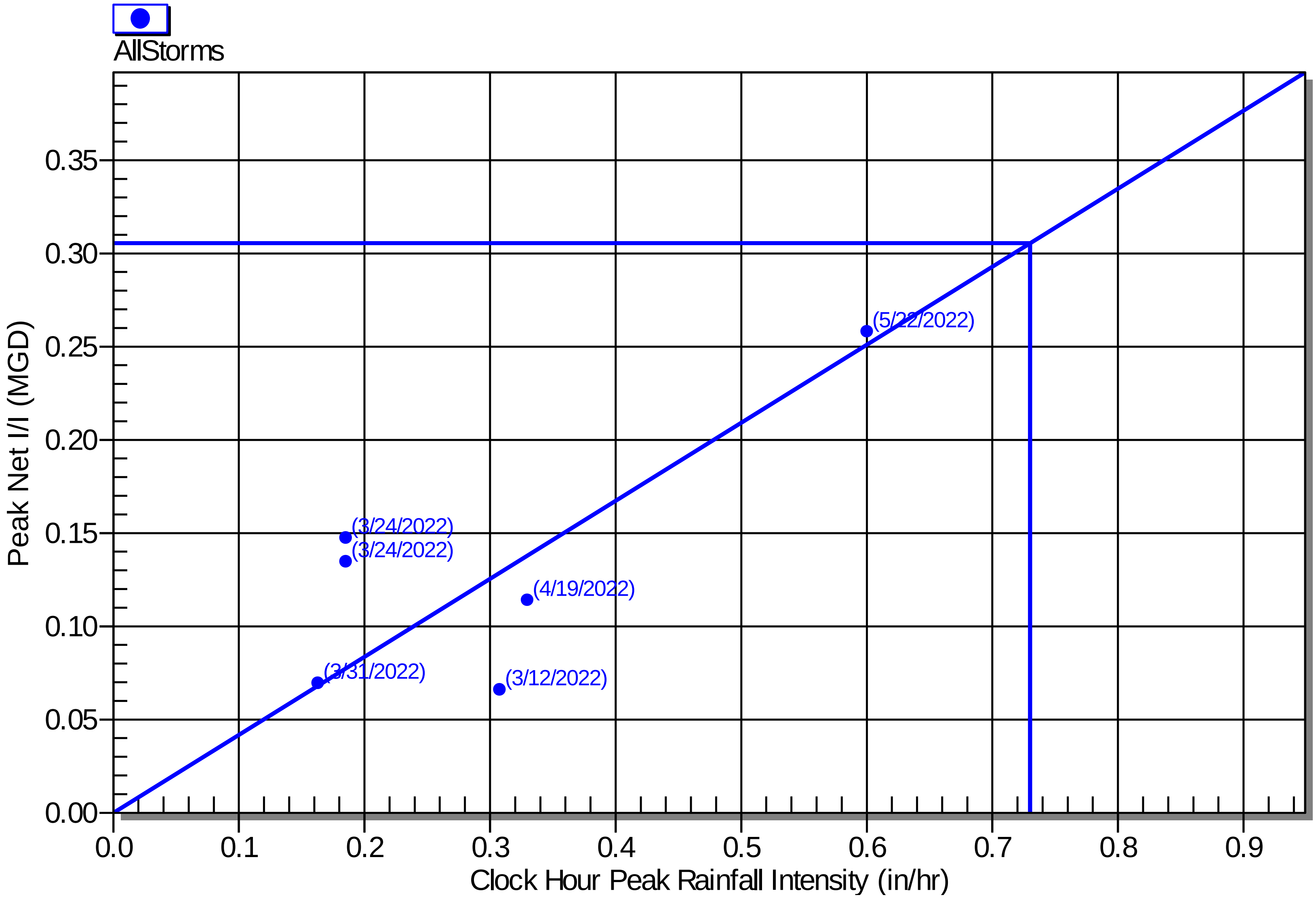
Q vs i - METER DE-2C

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



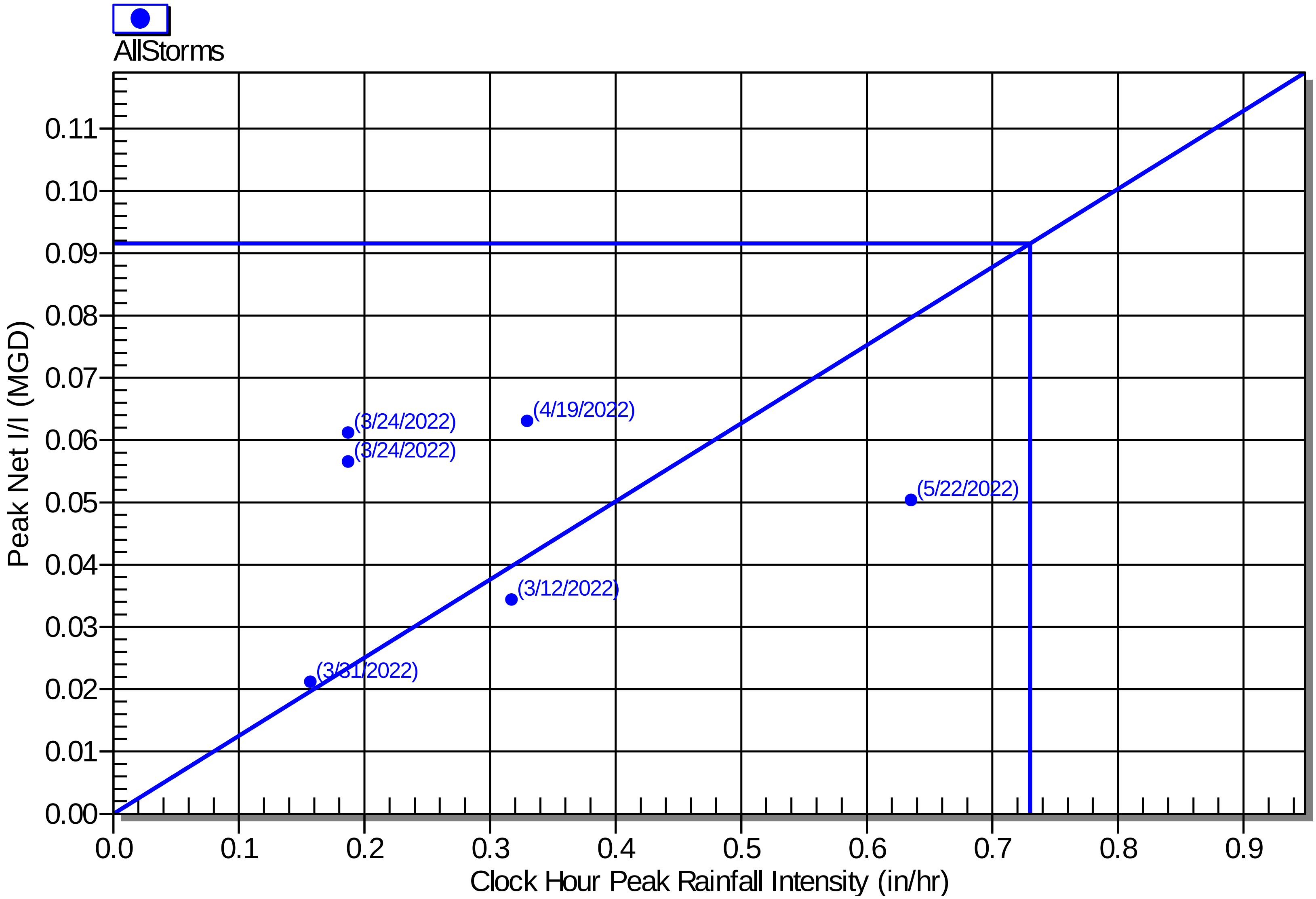
Q vs i - METER DE-5C

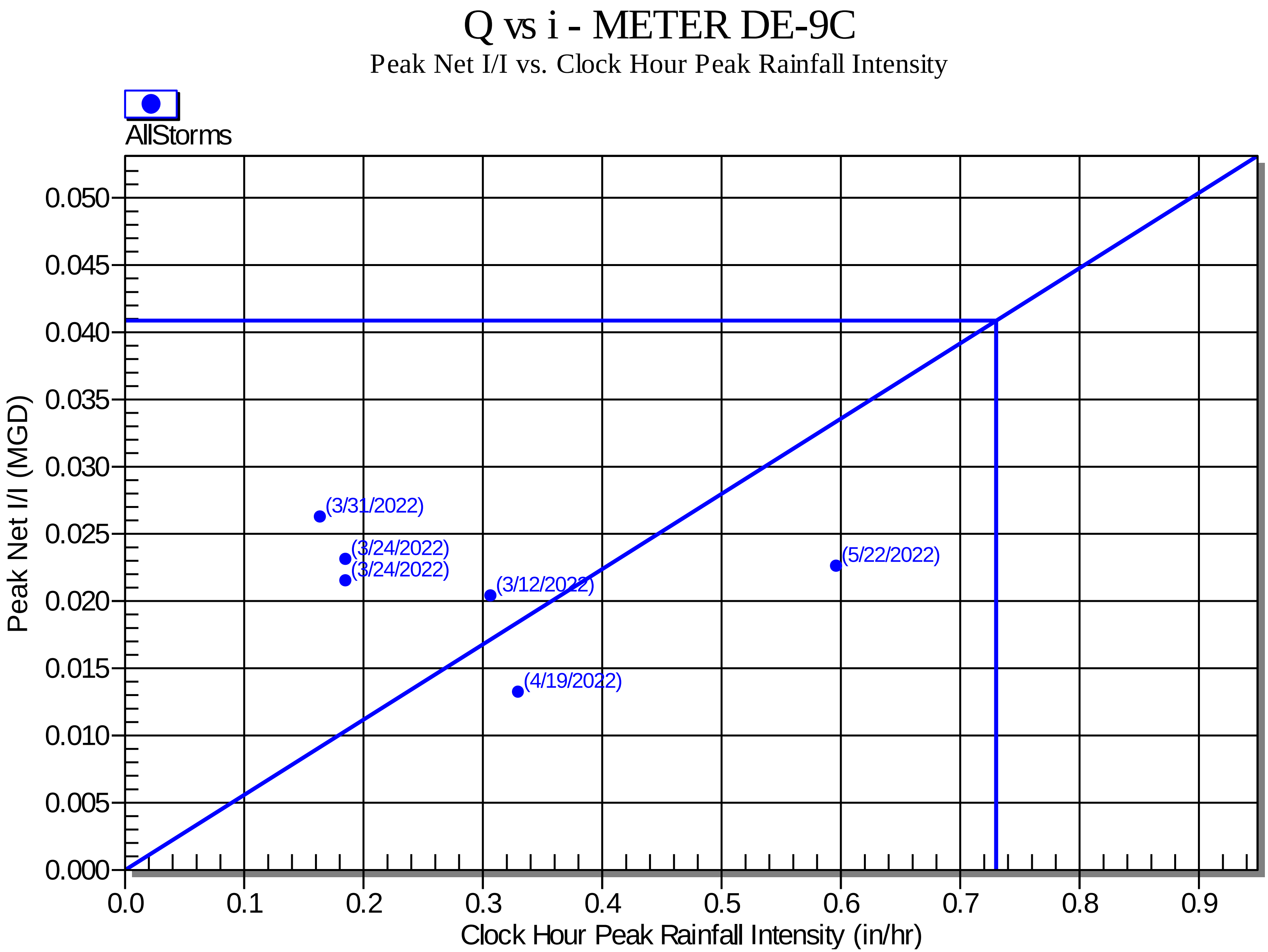
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



Q vs i - METER DE-7C

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity

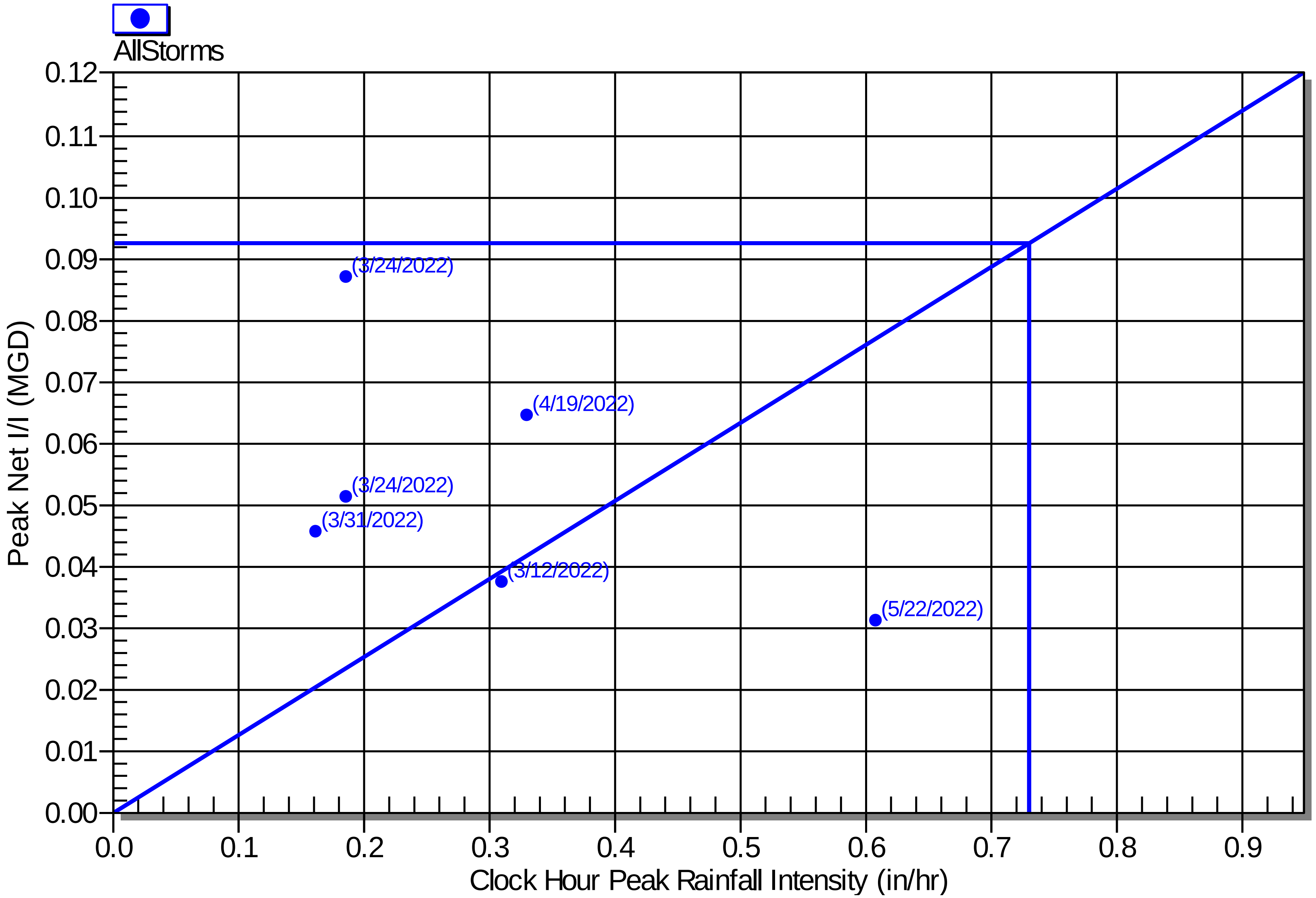




Q vs i - METER DE-9C
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
(3/31/2022)
(3/24/2022)
(3/24/2022)
(3/12/2022)
(5/22/2022)
(4/19/2022)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)

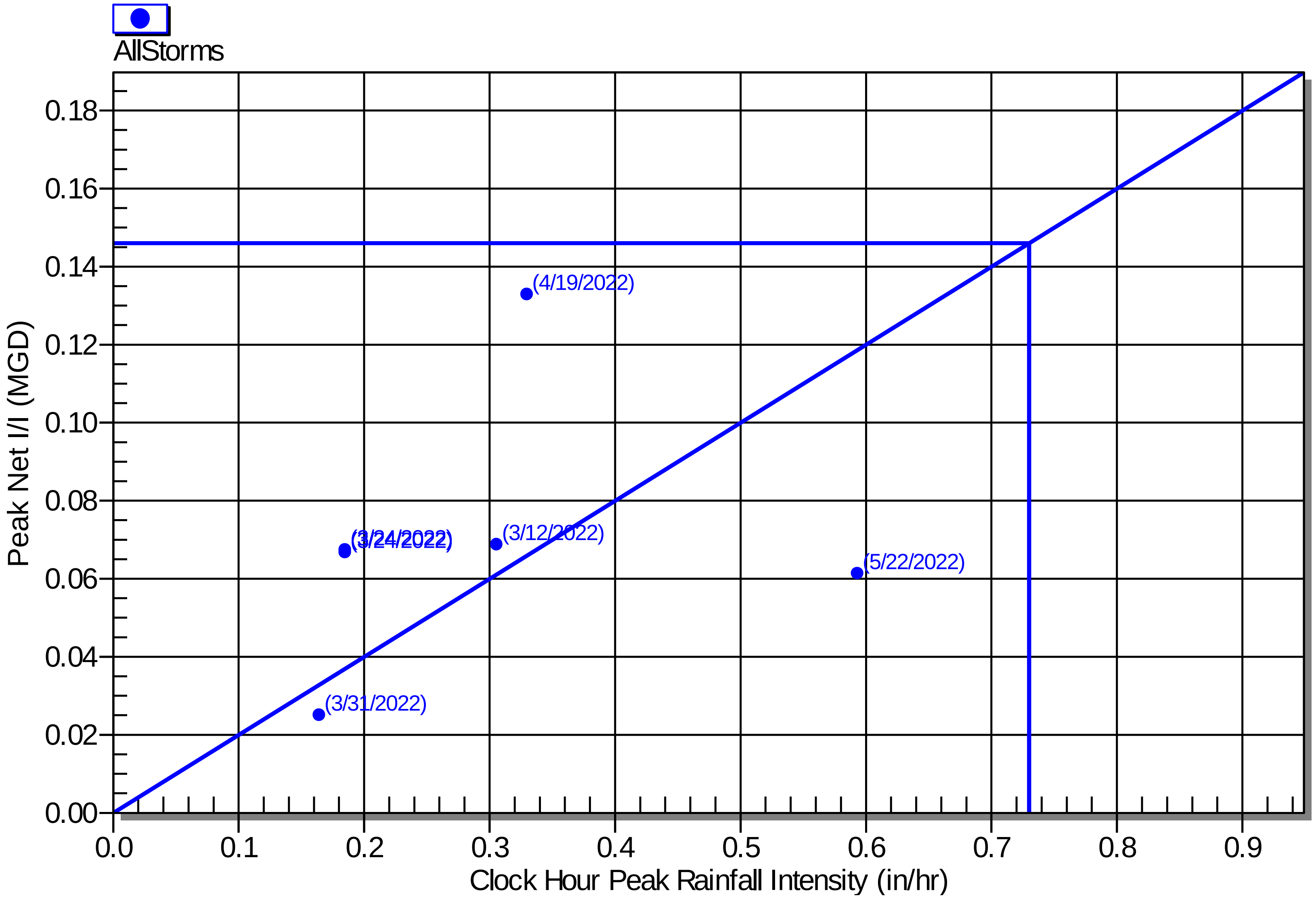
Q vs i - METER DE-10C

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



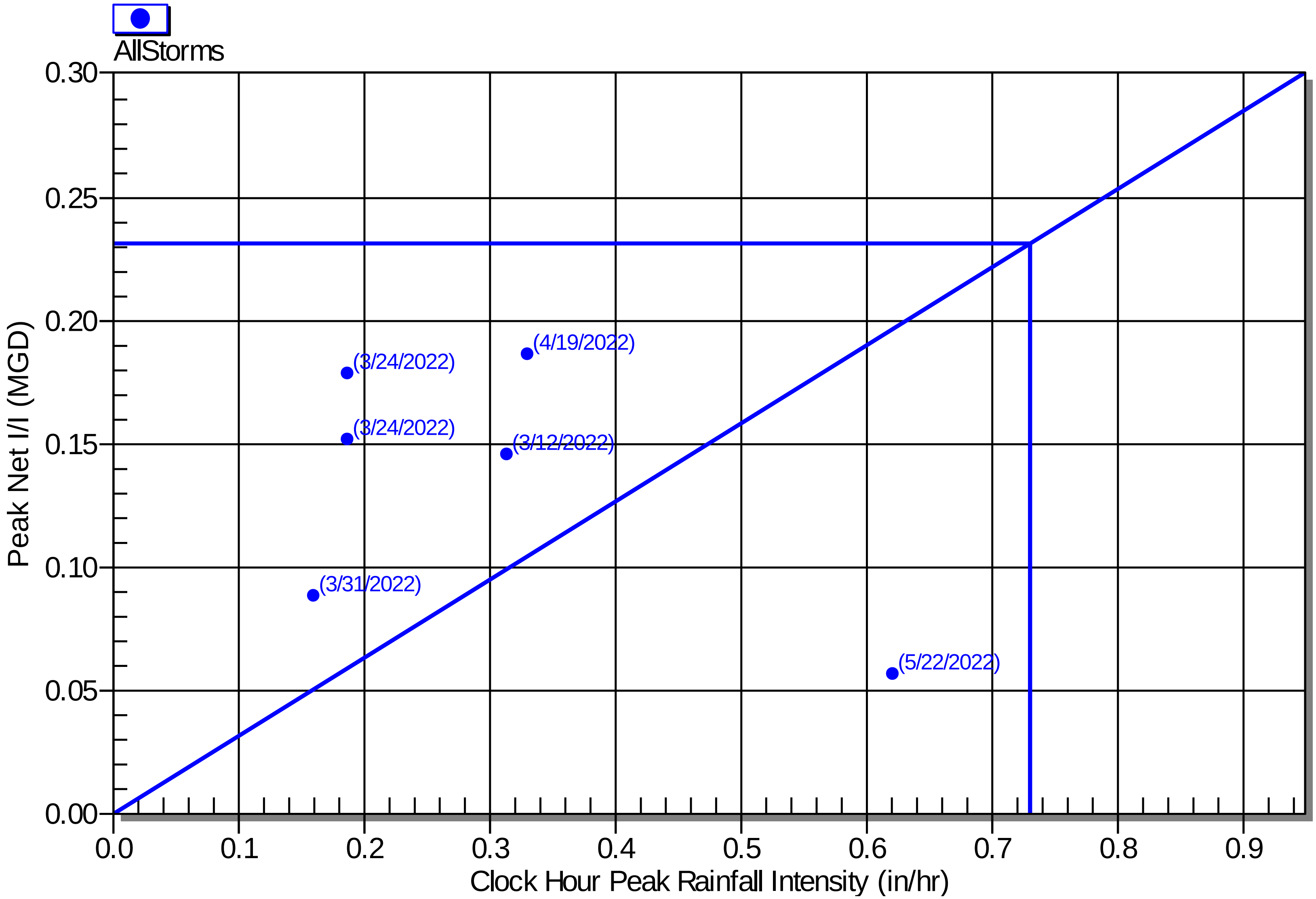
Q vs i - METER DE-BO-1C

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



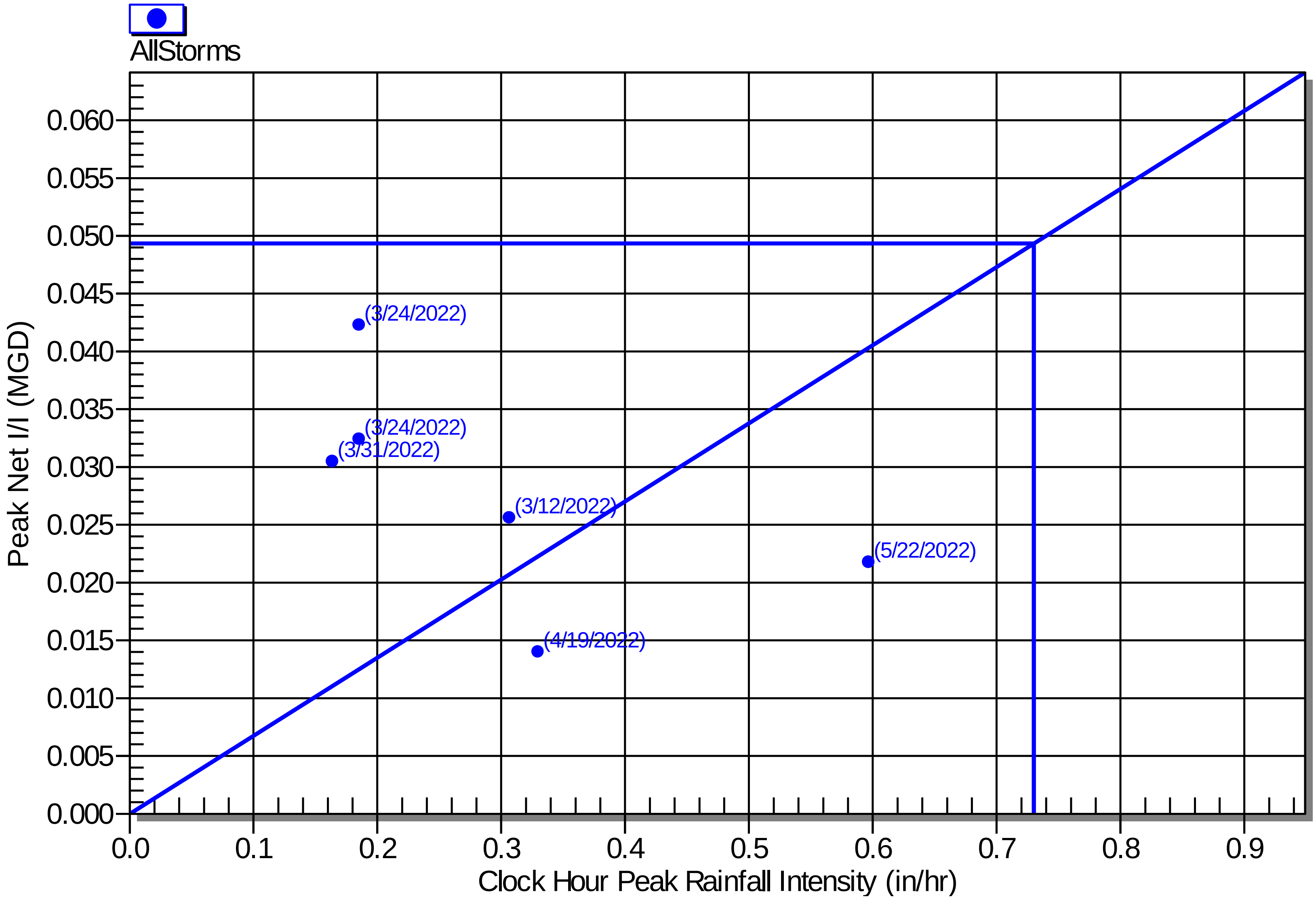
Q vs i - METER DE-CT-1

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



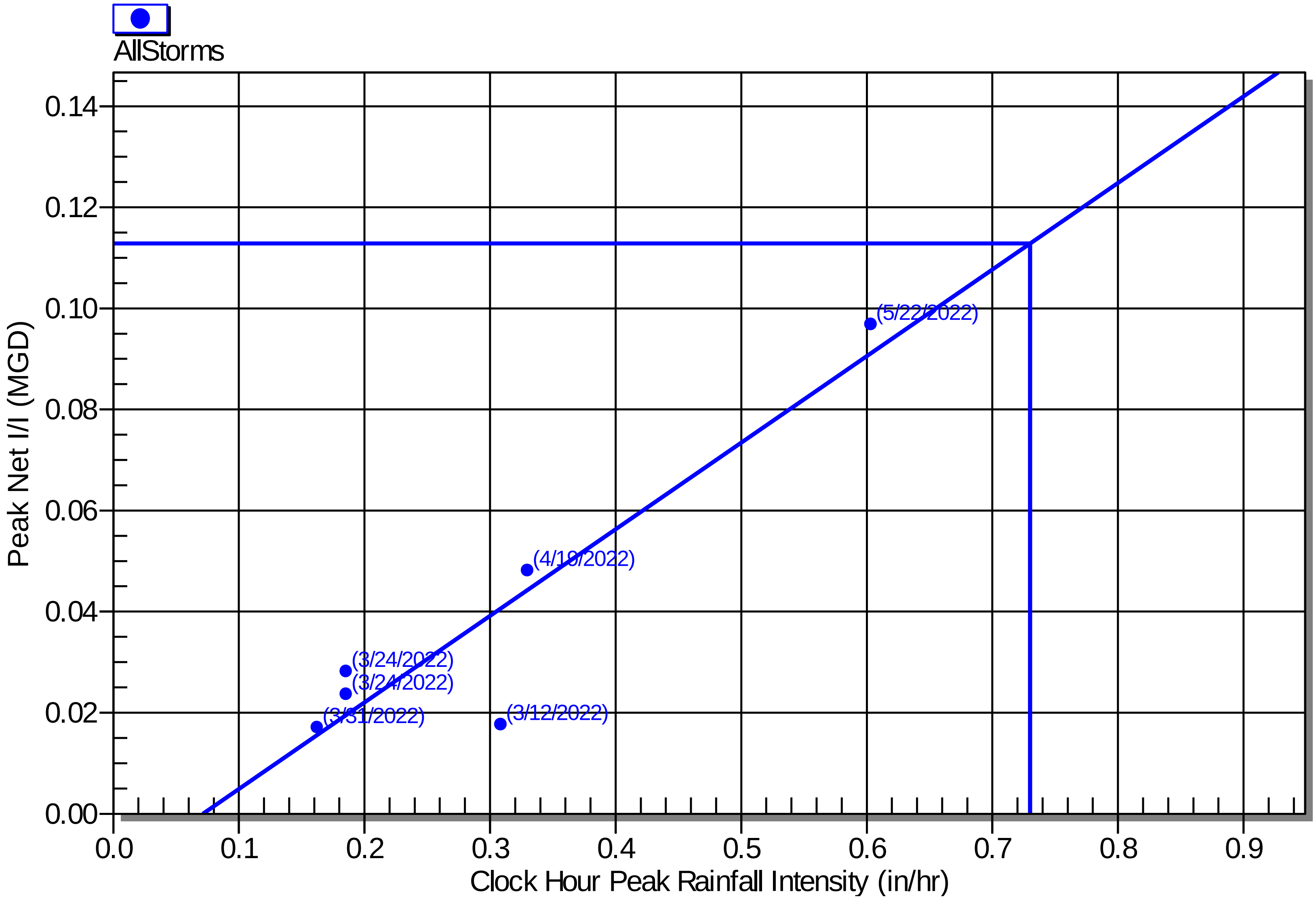
Q vs i - METER CC

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



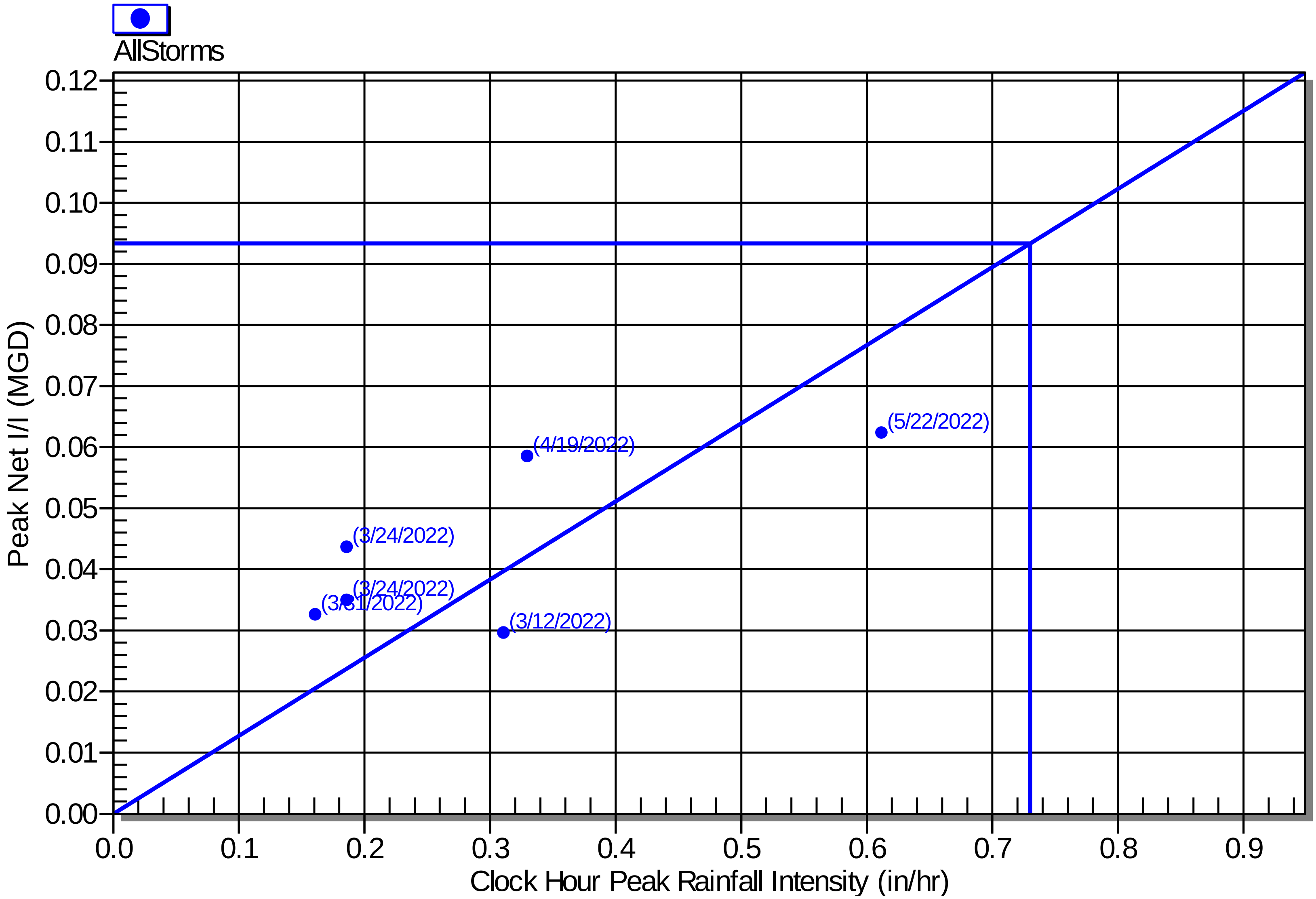
Q vs i - METER EE

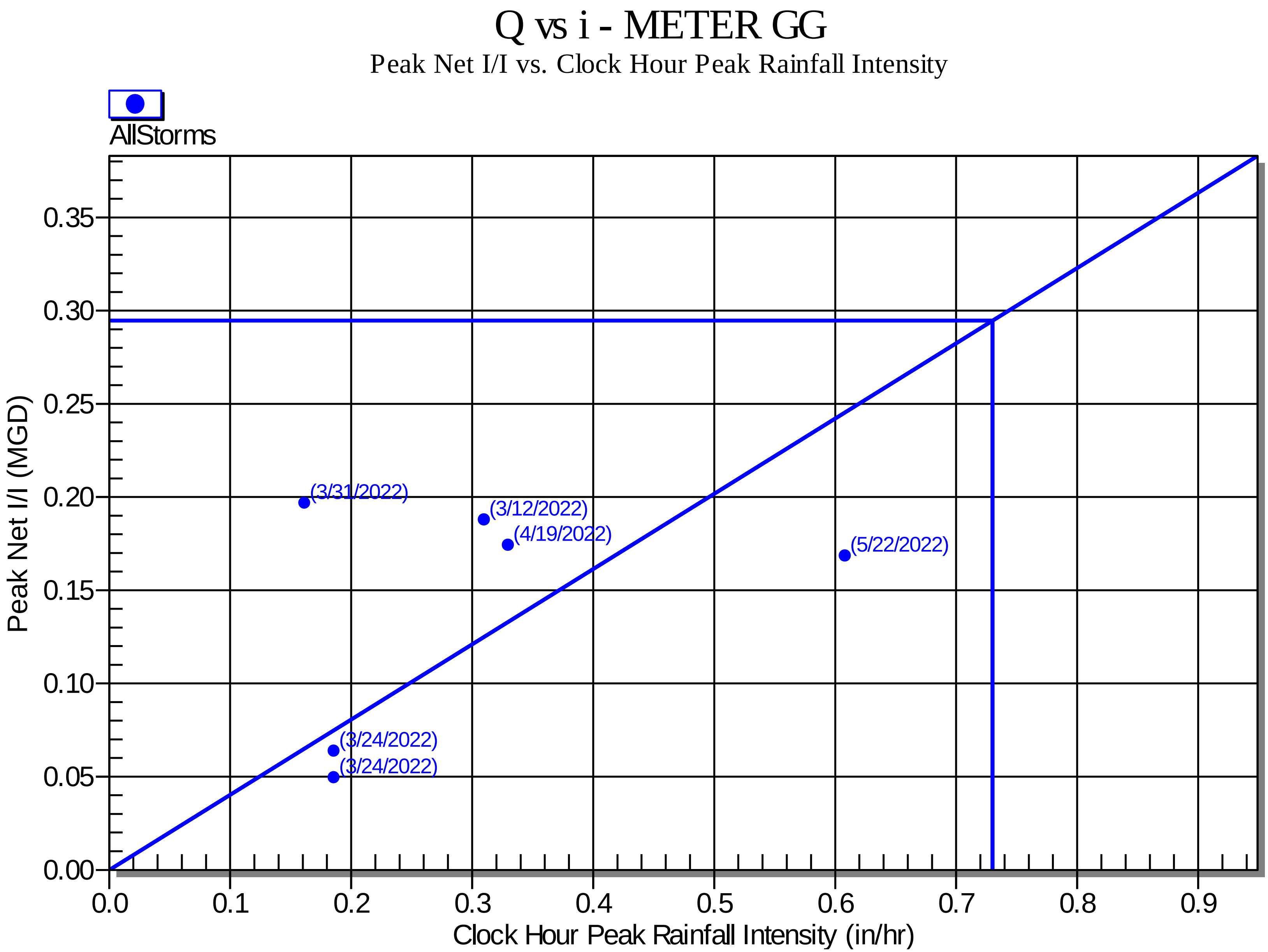
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity

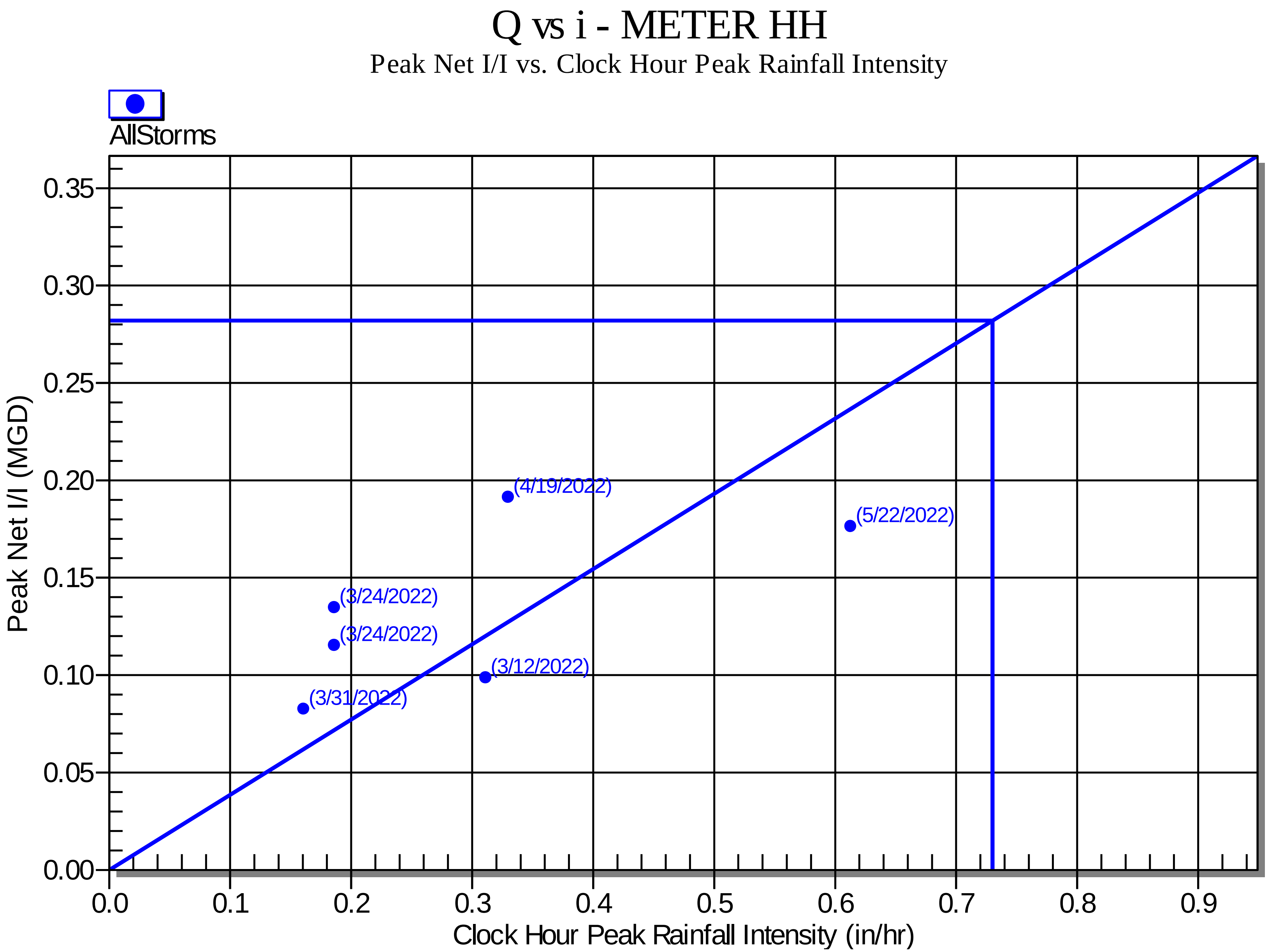


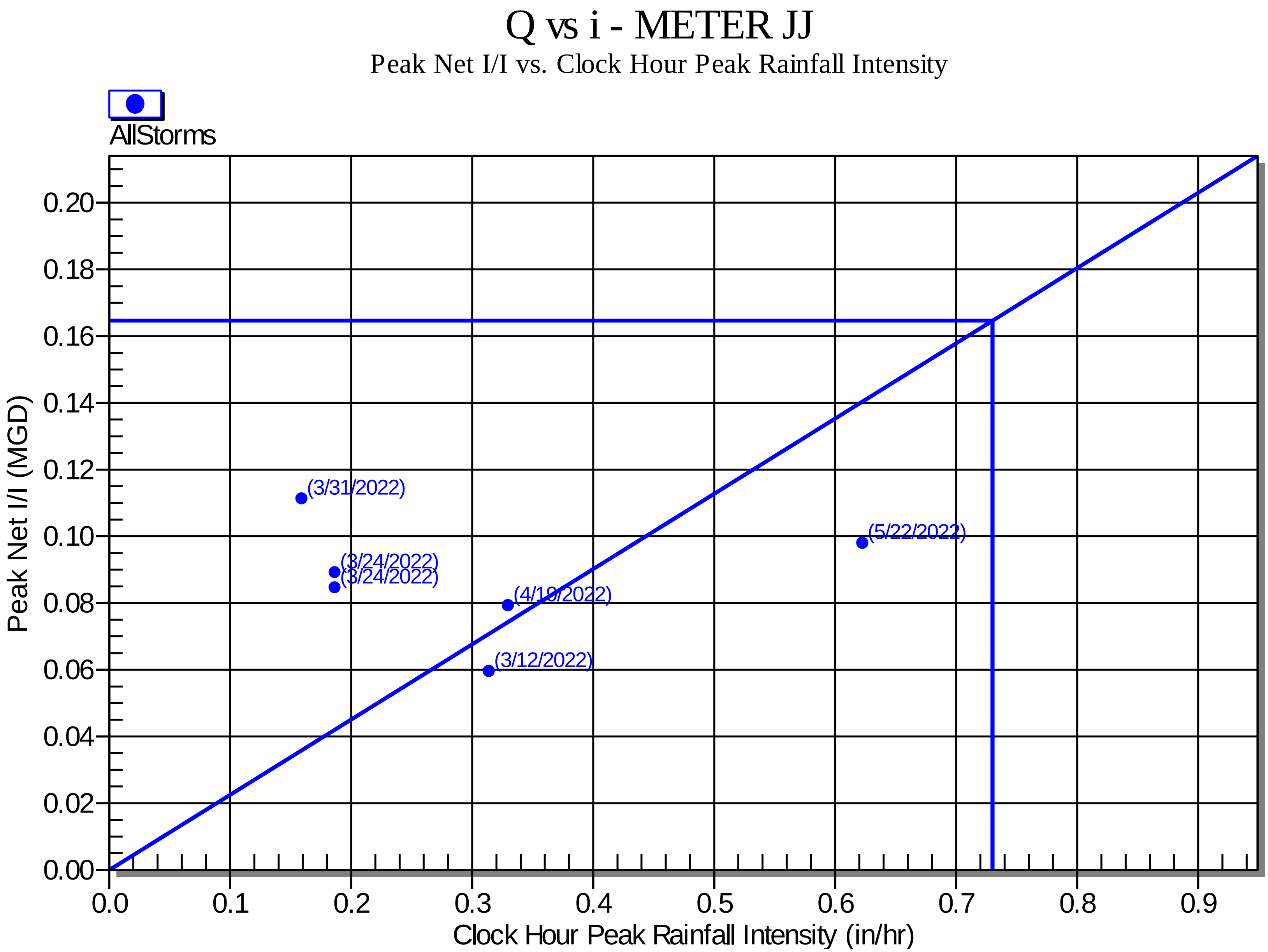
Q vs i - METER FF

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



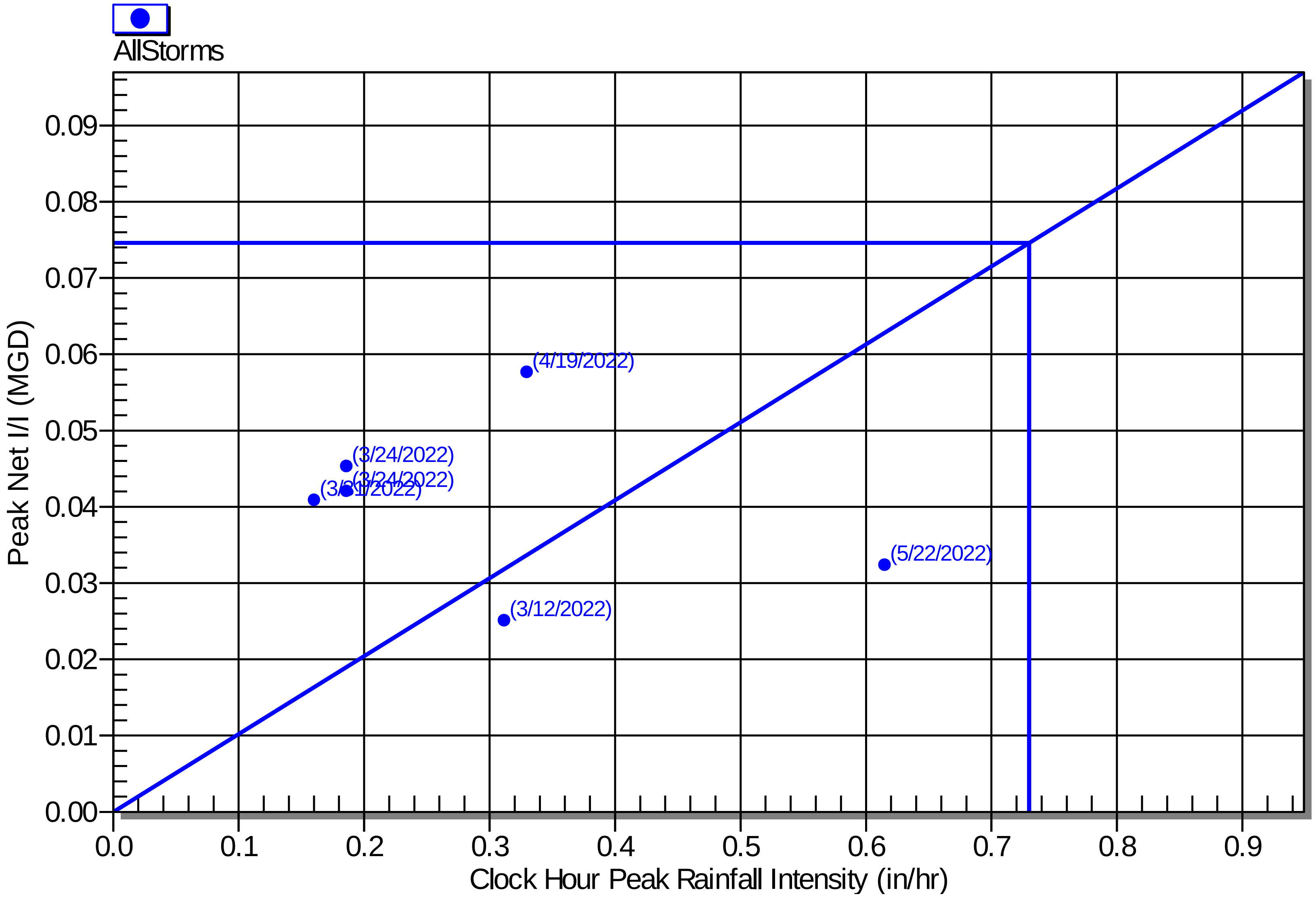

Q vs i - METER GG
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)
(3/31/2022)
(3/12/2022)
(4/19/2022)
(5/22/2022)
(3/24/2022)
(3/24/2022)

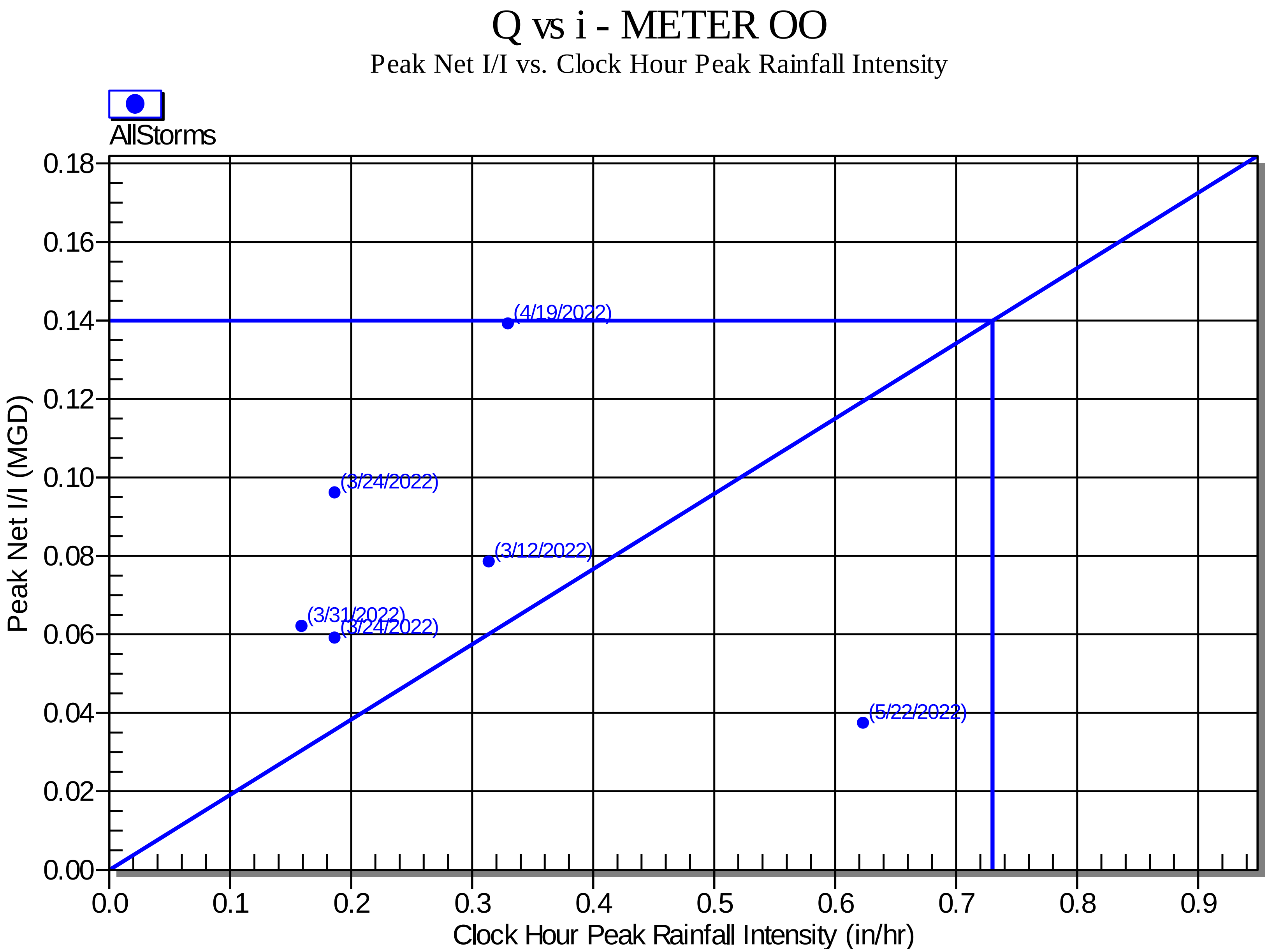

Q vs i - METER HH
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Peak Net I/I (MGD)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)
(4/19/2022)
(5/22/2022)
(3/24/2022)
(3/24/2022)
(3/12/2022)
(3/31/2022)


Q vs i - METER JJ
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
0.20
(3/31/2022)
(3/24/2022)
(3/24/2022)
(4/19/2022)
(3/12/2022)
(5/22/2022)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)

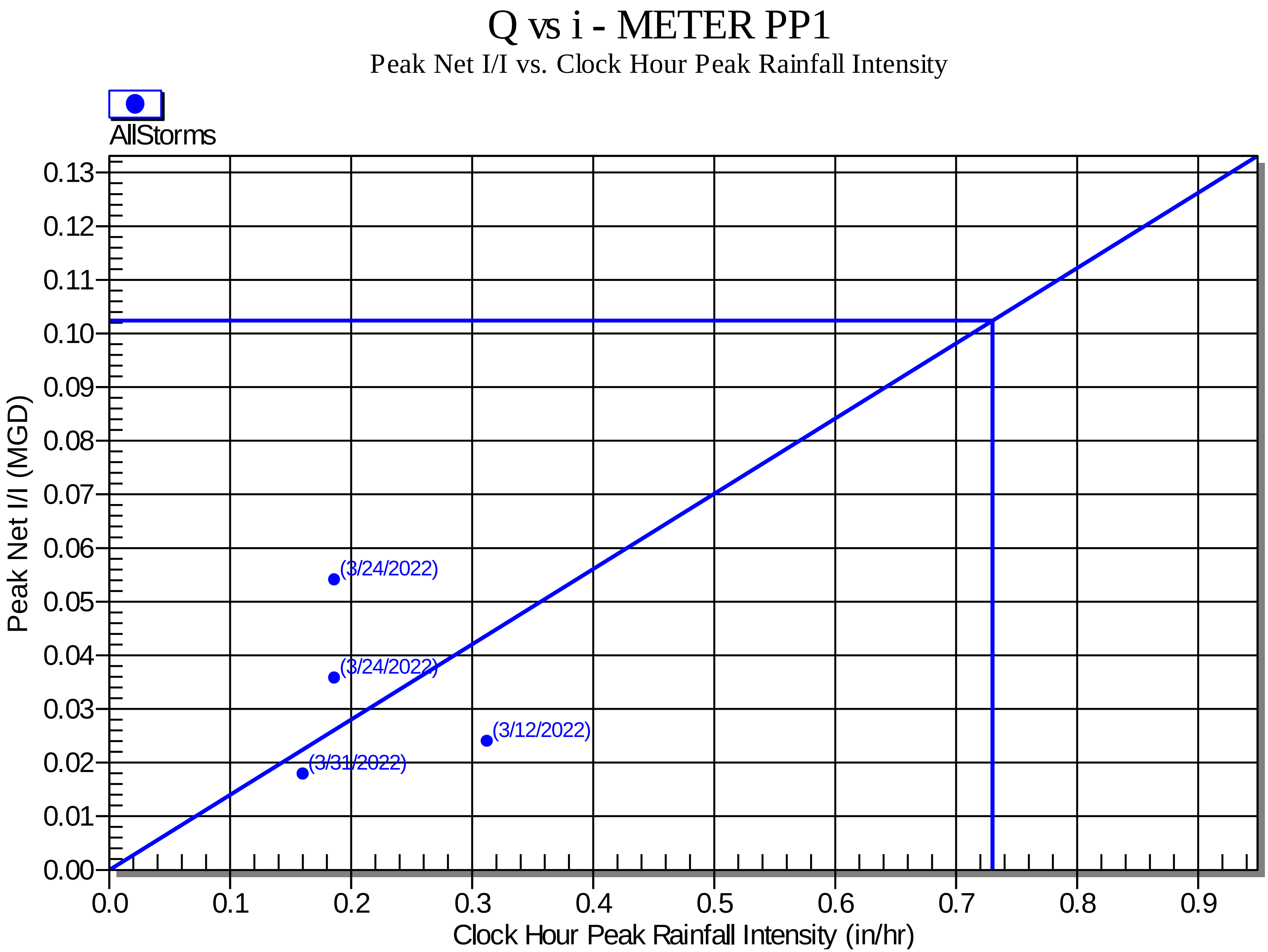
Q vs i - METER LL

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity





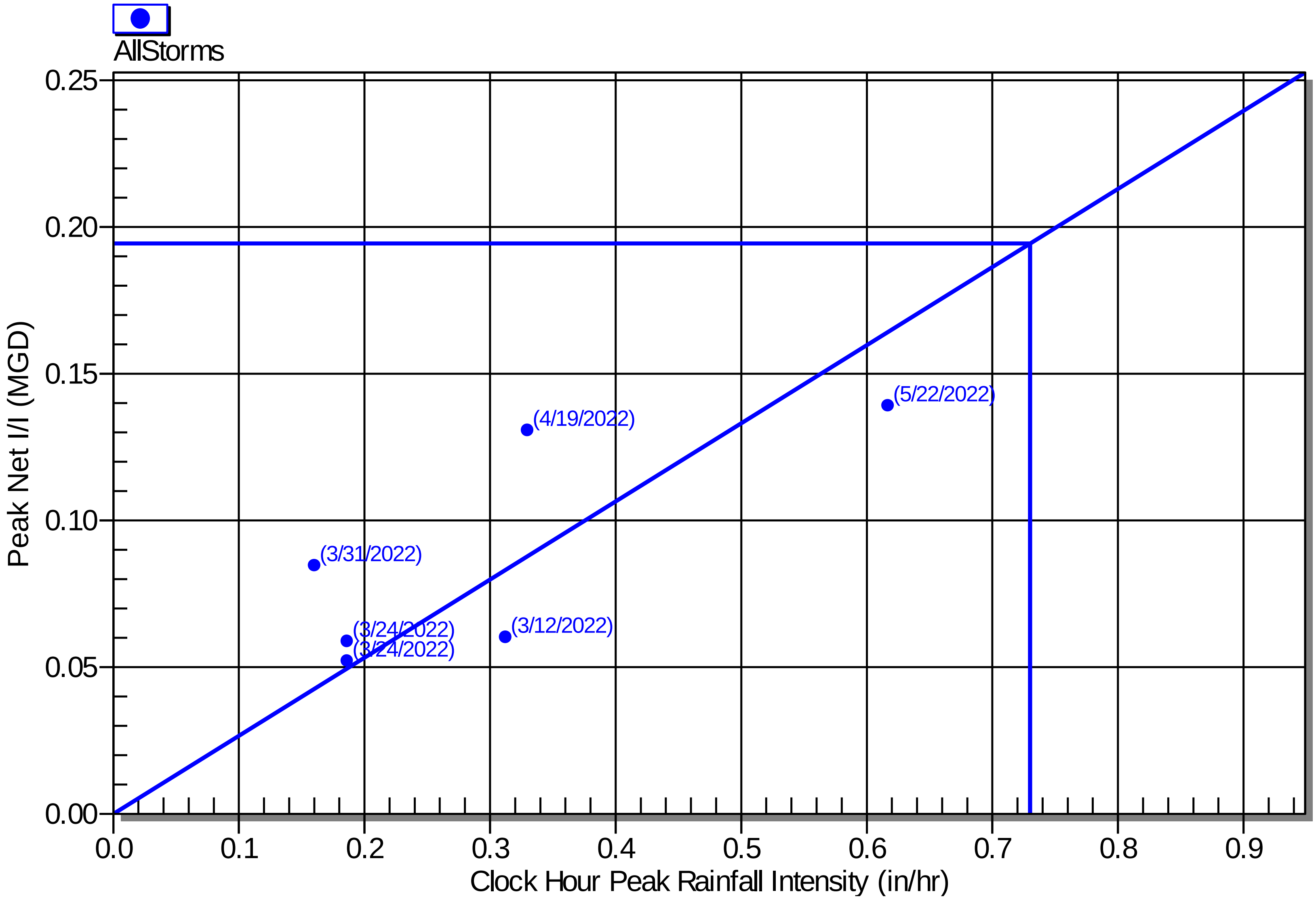
Q vs i - METER OO
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)
(4/19/2022)
(3/24/2022)
(3/12/2022)
(3/31/2022)
(3/24/2022)
(5/22/2022)

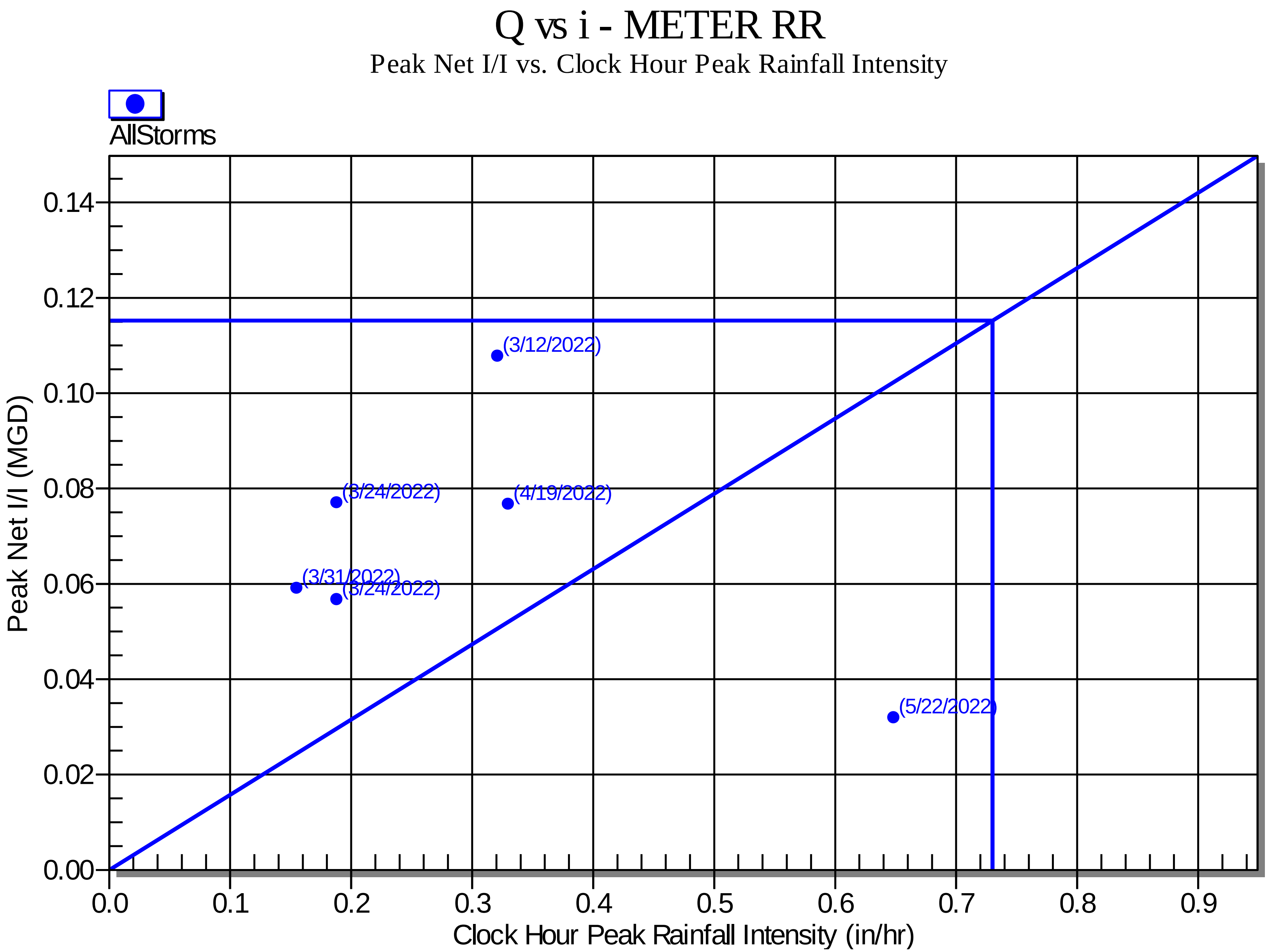


Q vs i - METER PP1
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
(3/24/2022)
(3/24/2022)
(3/12/2022)
(3/31/2022)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)

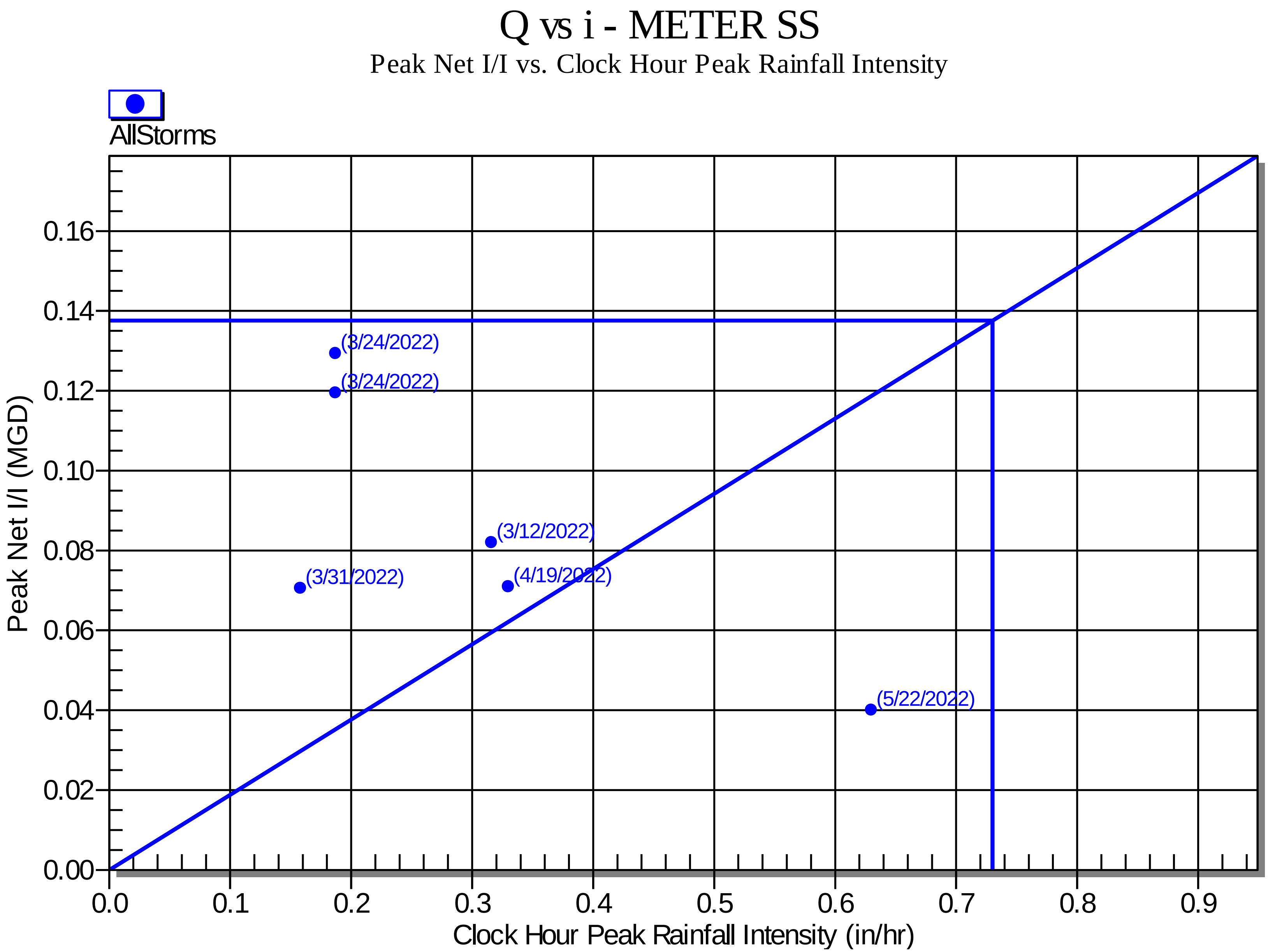
Q vs i - METER PP2

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



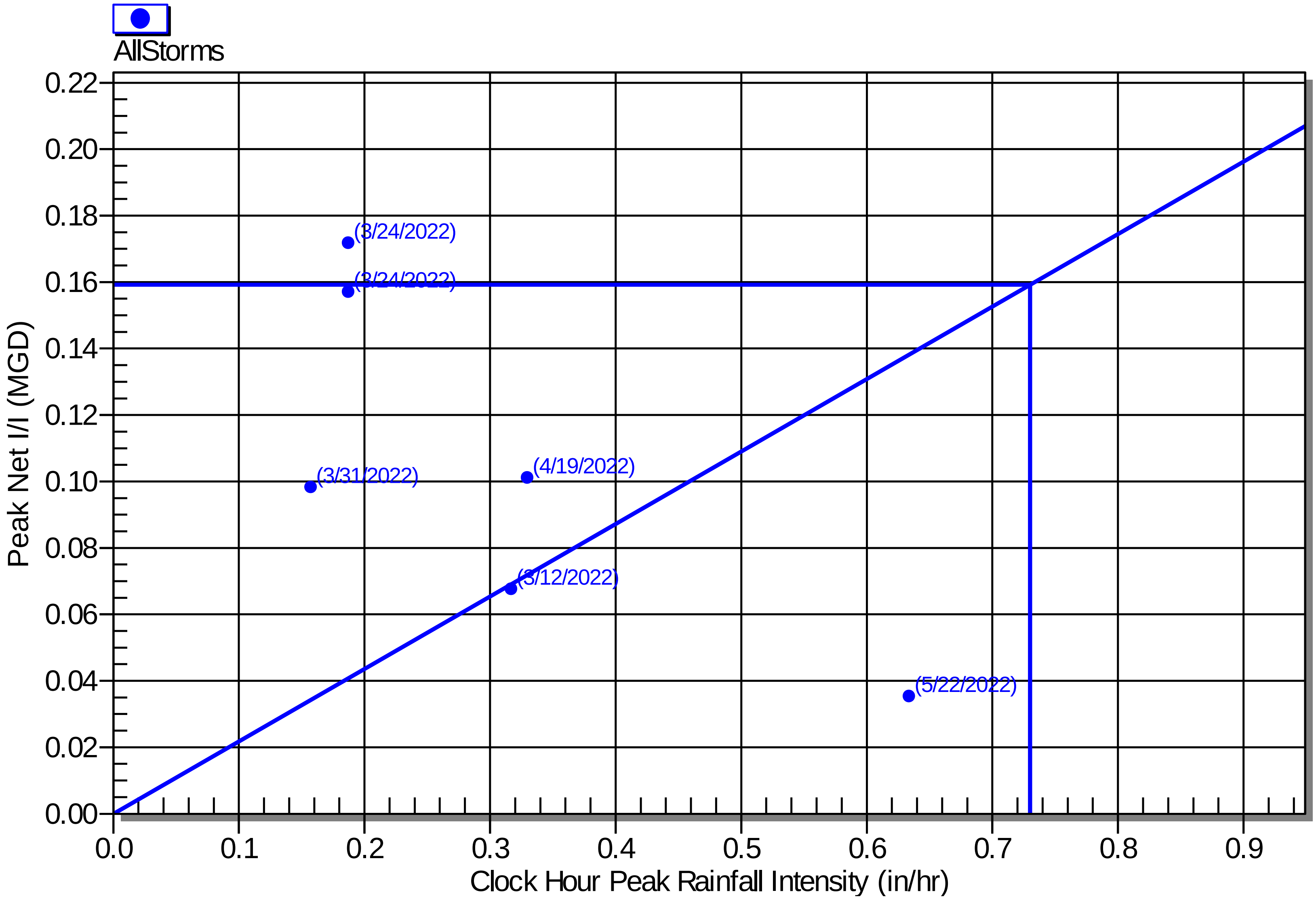


Q vs i - METER RR
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)
(3/12/2022)
(3/24/2022)
(4/19/2022)
(3/31/2022)
(3/24/2022)
(5/22/2022)


Q vs i - METER SS
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
(3/24/2022)
(3/24/2022)
(3/12/2022)
(3/31/2022)
(4/19/2022)
(5/22/2022)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)

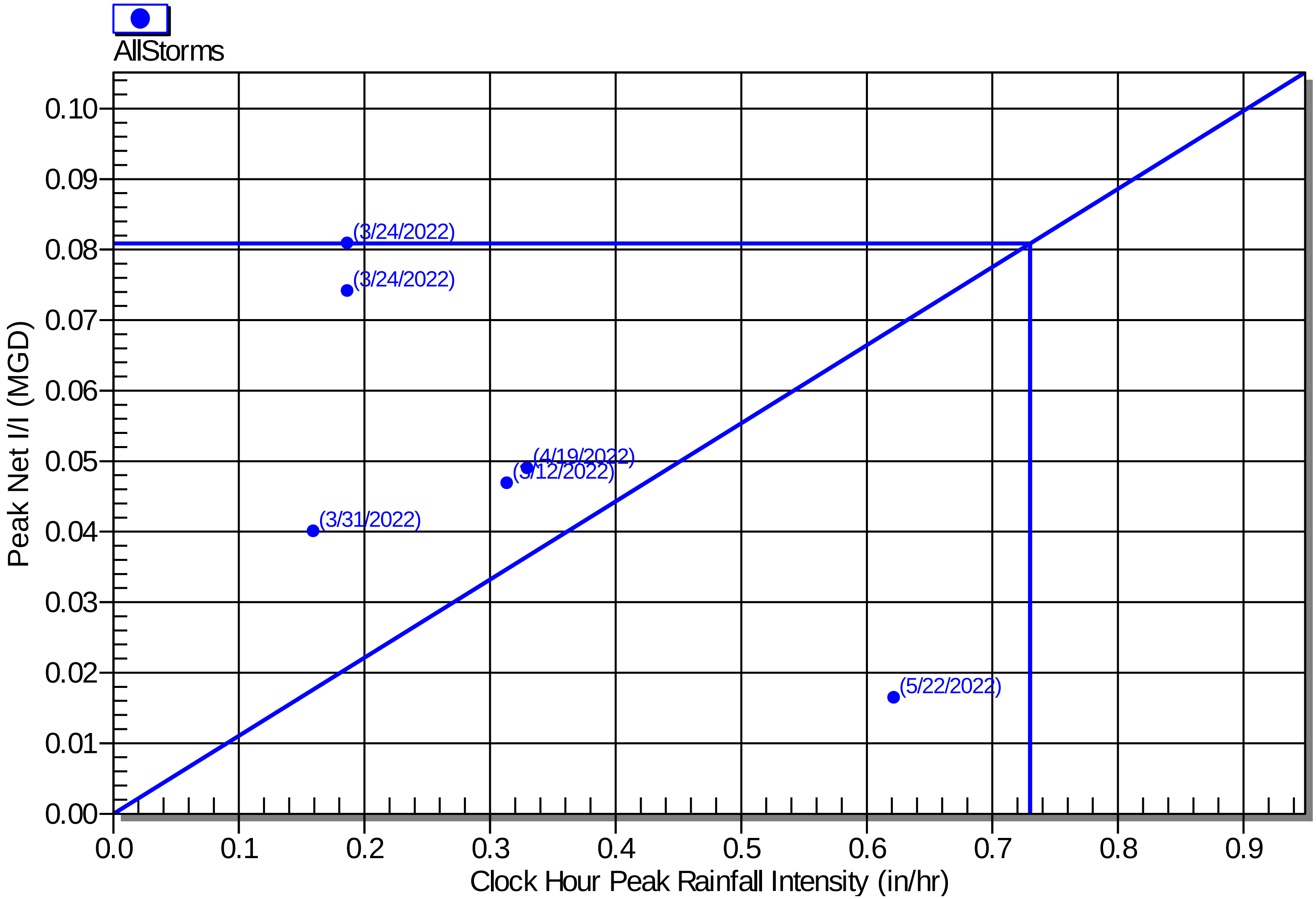
Q vs i - METER TT

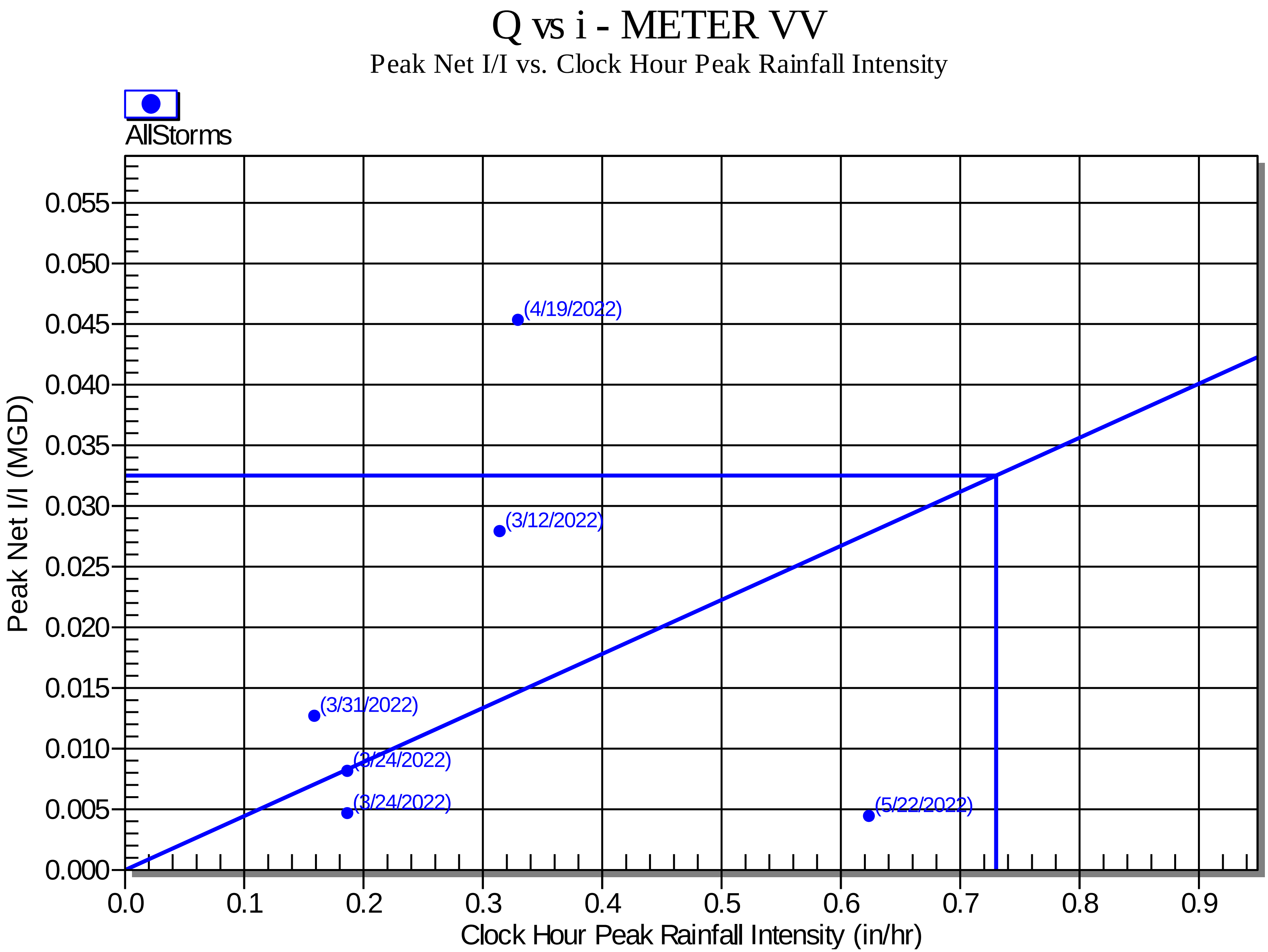
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity



Q vs i - METER UU

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity





Q vs i - METER VV
Peak Net I/I vs. Clock Hour Peak Rainfall Intensity
AllStorms
Peak Net I/I (MGD)
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
0.045
0.050
0.055
(4/19/2022)
(3/12/2022)
(3/31/2022)
(3/24/2022)
(3/24/2022)
(5/22/2022)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Clock Hour Peak Rainfall Intensity (in/hr)

Q vs i - METER YY

Peak Net I/I vs. Clock Hour Peak Rainfall Intensity