ATTACHMENT C

REVISED FLOW AND LOADING TECHNICAL MEMORANDUM

AECOM

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Memorandum

To	Peter Rice, Deputy Director	Page	1 of 68
CC	Terry Desmarais, City Engineer and Paula Anania, Chief Operator		
Subject	Revised Wastewater Flow and Loading Evaluation WWMP Piloting – Phase 2 Initial Piloting Peirce Island WWTF, Portsmouth, New Hampshire		
From	Matthew Formica and Jon Pearson		
Date	August 27, 2012		

INTRODUCTION

As part of the first phase of the Wastewater Master Plan Piloting work, AECOM completed an analysis of data on influent wastewater flows at the Peirce Island WWTF to quantify design dry weather flow rates. Similarly, influent pollutant concentration data were evaluated to project influent dry weather loadings for the proposed plant upgrade. The values determined in this analysis were used as the sizing basis for the proposed secondary treatment system technologies evaluated as part of the Phase 1 Engineering Evaluation. The influent dry weather flow analysis was contained in the Task 1.3 Flow Evaluation Technical Memorandum dated May 23, 2011. The influent dry weather loading analysis was contained in the Load Component of Task 1.3 Flow Evaluation Technical Memorandum dated June 3, 2011. Both of these documents were included in the Task 1.7 Technology Evaluation Final Technical Memorandum dated September 26, 2011.

Since that submittal was prepared, several conditions warrant revision of the projected flows and loadings. First, the City has had several discussions with representatives of the Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NH DES) regarding the projected flows for the upgraded Peirce Island WWTF. Second, during the course of the piloting effort it was noted that the influent wastewater strength was higher than projected. Third, while it is not yet required, the City is now planning to upgrade the Peirce Island WWTF to provide total nitrogen removal. Lastly, the previous projections were an analysis of current wastewater flows and did not contain any allowance for future wastewater flow and load increases due to growth.

This memorandum presents the revised flow and loading projection methodology and results that address these revisions.

SECONDARY TREATMENT REVISED FLOW ANALYSIS – EXISTING CONDITIONS

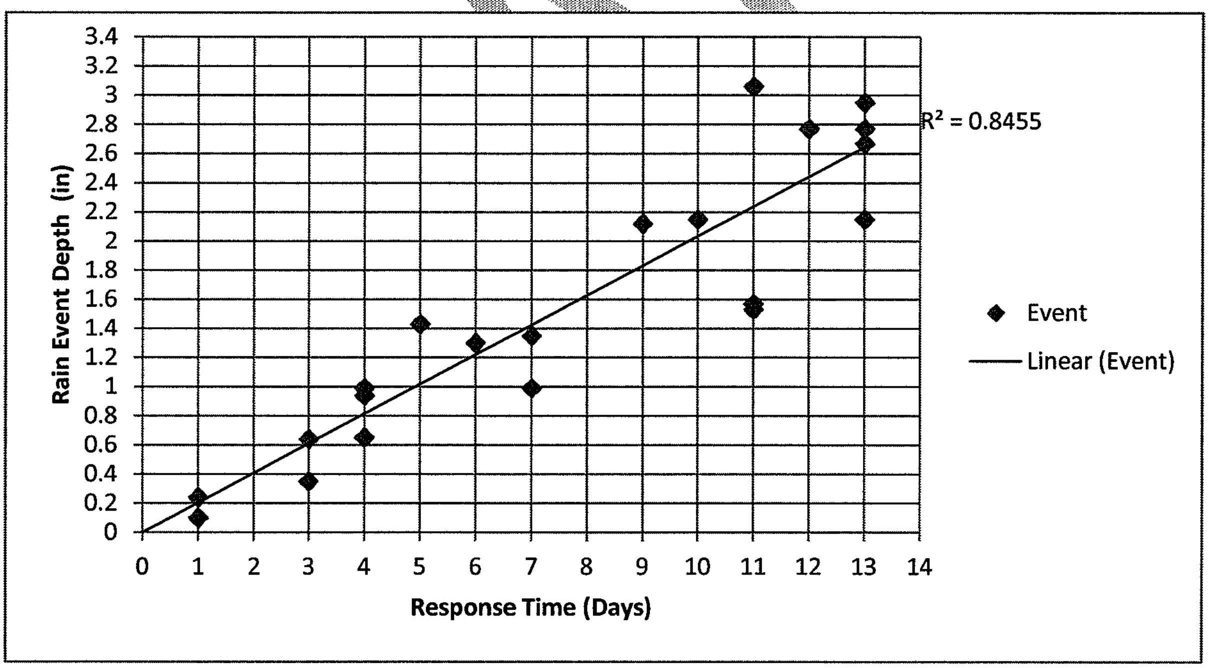
In the Phase 1 Evaluation, AECOM compiled three years (2008, 2009 and 2010) of available flow, precipitation, and temperature data from the following sources:

1. WWTF daily operating data from the City of Portsmouth from official Monthly Operating Reports (MORs)
2. Hourly and daily total precipitation from the City Hall rain gauge (heated) from the City of Portsmouth
3. Daily temperature data from NOAA Station ID 04743/PSM at the Pease International Tradeport Airport
4. Daily snow depth data from NOAA Stations in North Hampton, NH and Greenland, NH

Methodology

To classify days as "wet" or "dry", AECOM developed a set of definitions that were subsequently applied to parse the flow data into a wet classification or dry classification. Days were classified as wet based on precipitation event depth, the system response time resulting from rainfall events, and snow melt during times when snow pack existed. The precipitation based definitions were based on a response curve developed using the flow rate and precipitation data. The response time for selected events was estimated using the flow data, where response time was quantified as the number of days for flow rates to recede to the approximate pre-event flow rate. The response curve that was developed is shown on Figure 1 below. Figure 1 shows a best fit line developed using a linear regression analysis of the data points. As shown, the coefficient of determination for the line, R^2 is approximately 0.85, indicating good agreement between the line and the data.

Figure 1 – Precipitation Response Time



A precipitation event was defined as continuous or intermittent hourly precipitation that is not separated by more than 6 continuous hours. Precipitation separated by 6 or more hours was considered a separate event. The largest precipitation event in the period of record of 6.38-inches occurred from September 6, 2008 through September 7, 2008. This data point was not used in the precipitation response time developed above because it was significantly larger than any other event.

The definitions developed using this methodology are summarized below:

1. Classify any day with precipitation greater than 0.05 inches as wet;
2. Classify the next day following a precipitation day of 0.4 inches or greater as wet;
3. Classify the next 2 days following a precipitation day of 0.6 inches or greater as wet;
4. Classify the next 3 days following a precipitation day of 0.8 inches or greater as wet;
5. Classify the next 4 days following a precipitation day of 1.0 inches or greater as wet;
6. Classify the next 5 days following a precipitation day of 1.2 inches or greater as wet;
7. Classify the next 6 days following a precipitation day of 1.4 inches or greater as wet;
8. Classify the next 7 days following a precipitation day of 1.6 inches or greater as wet;
9. Classify the next 8 days following a precipitation day of 1.8 inches or greater as wet;
10. Classify the next 9 days following a precipitation day of 2.0 inches or greater as wet;
11. Classify the next 10 days following a precipitation day of 2.2 inches or greater as wet;
12. Classify the next 11 days following a precipitation day of 2.4 inches or greater as wet;
13. Classify the next 12 days following a precipitation day of 2.6 inches or greater as wet;
14. Classify any day with existing snow pack and temperature equal to or greater than 32 degrees F as wet;

In the Phase 2 revised evaluation, these definitions were applied to the WWTF influent flow data for an updated period of record of January 1, 2008 through June 30, 2012 to parse the data into wet and dry days. The dry day data set was then used to develop the maximum daily flow for the secondary treatment system. Since the concept for the Peirce Island WWTF upgrade is to size the secondary treatment system for dry weather flows as defined by the definitions above, the dry day data set was examined to identify the largest observed daily flow in the 4.5 year period, which was 7.73 million gallons per day (MGD). This was selected as the maximum daily flow for the secondary treatment system.

The Phase 1 evaluation used the parsed dry day data set to establish the average day dry weather flow. EPA raised a concern with this approach that since wet days were excluded from the analysis, that the average dry day flow was not representative of the annual average daily flow. To determine the annual average daily flow, which considers both wet and dry days, the flow that will be treated in the secondary treatment facilities on days classified as wet needs to be accounted for. For the Phase 2 revised evaluation, this was done by reviewing the full data set and truncating (or capping) the flow to the secondary treatment process on the parsed wet days to the maximum day flow value of 7.73 MGD. If the total measured flow for a wet day was less than 7.73 MGD, then the measured flow on that day was used in the truncated data set. If the total measured flow for a wet day exceeded the 7.73 MGD maximum day flow, the 7.73 MGD flow for the day was used in the truncated data set.

The truncated data set was then used to establish the annual average daily flow and maximum monthly flow for secondary treatment. The annual average daily flow was computed as the average of the parsed dry day flows and the truncated wet day flows. The maximum month flow was computed as the maximum 30 day rolling average of the parsed dry day flows and the truncated wet day flows. The highest value of this data set is the maximum month flow to the secondary process.

Results

Based on the application of the definitions and methodology to the daily flow data for 2008 – mid 2012, Table 1 presents the revised existing condition flow rates.

Table 1 – Existing Condition Flow Rates to Secondary Treatment (January 1, 2008 to June 30, 2012)

Criteria	Flow (MGD)	Peaking Factor (to annual average day)
Parsed Dry Average Day	4.34	
Average Annual Flow [1]	5.23	-
Maximum Month Flow [2]	7.56	**1.44**
Maximum Day Dry Weather Flow [3]	7.73	**1.48**

1. Average of all days in reporting period with wet weather days capped at the maximum parsed dry day flow of 7.73 mgd (see note 3).
2. Maximum value of a 30 day rolling average of all days in reporting period with wet weather days capped at the maximum parsed dry day flow of 7.73 mgd.
3. Maximum daily flow of parsed dry days in 4.5 year reporting period (January 1, 2008 to June 30, 2012).
4. Note values shown in bold were calculated values for this table.

Figures 2, 3, 4, and 5 attached show the average day flow and total daily precipitation for 2008, 2009, 2010, and 2011- 2012 respectively. The figures also indicated for each period the total annual flow volume, the estimated volume that would receive secondary treatment, and the estimated volume that would bypass secondary treatment and receive chemically enhanced primary treatment and disinfection at the existing maximum day flow of 7.73 mgd. Also shown on each figure is the average day dry weather flow indicating the data points used to calculate the values in Table 1. Table 2, attached, shows the full set of data used in the analysis. Figure 6 shows the maximum month rolling average data and the maximum month flow of 7.56 MGD.

SECONDARY TREATMENT REVISED LOADING ANALYSIS – EXISTING CONDITIONS

In the Phase 1 Loading Evaluation, influent concentration data for total suspended solids (TSS) and 5-day biochemical oxygen demand (BOD_5) for 2008-2010 were reviewed and analyzed to project the loadings for the secondary treatment process. During the course of the Phase 2 piloting effort, it was noted that data on the plant influent BOD_5 concentrations from both the WWTF's influent sampling as well as the pilot influent sampling were generally higher than the Phase 1 loading projections. Samples for both data sets were collected from the same location by the plant's influent sampler. The pilot primary clarifier effluent BOD_5 concentrations were also observed to be elevated. No definitive reason for the increase in the influent concentrations could be identified, but in reviewing the WWTF MOR data as shown in Figure 7, the increase is a trend that warranted revising the loading projections. Regarding the elevated pilot primary clarifier effluent BOD_5 concentrations, it is believed that the pilot influent flow stream may have been influenced by the location of plant recycle flows, particularly the belt filter press filtrate, relative to the location of the pilot influent pump. However, the plant MOR data is not believed to experience the same degree of influence. As a result, the loading analysis has been revised to use the most recent MOR data for January 2011- June 2012 as the basis for the loading projection. In light of this trend, it is recommended that during preliminary design of the WWTF upgrade additional sampling be performed on the influent wastewater in a location that is not impacted by the recycle loads. These data should be used during preliminary design to revise sizing (if necessary) and to complete a mass balance for the WWTF. In addition, the Phase 1 Loading Evaluation did not include a projection of the total nitrogen loading to the secondary treatment system, as the treatment level required at that time did not include nitrogen removal.

Methodology

In the Phase 2 revised evaluation, to develop the Peirce Island WWTF influent annual average TSS and BOD_5 loadings, the MOR data for January 2011 - June 2012 was used as the most current and representative data. These loadings were then used to establish the revised loads to the secondary treatment process.

To develop the revised influent loadings, the truncated flow data set developed in the revised flow analysis was used in conjunction with the MOR reported BOD_5 and TSS concentration data to compute truncated daily influent loads. The averages of the truncated daily loads were calculated to establish the annual average day influent loadings for BOD_5 and TSS.

Next, the revised WWTF influent maximum month loading was developed. 30 day rolling averages of the truncated daily BOD_5 and TSS loads for the 18 month data sets were calculated. The highest values of these data sets are the maximum month loadings for BOD_5 and TSS. The maximum month loading peaking factors were then calculated relative to the annual average BOD_5 and TSS loads.

To include nitrogen in the loading projections, available data were reviewed. Since nitrogen in the plant influent is not routinely monitored, the total kjeldahl nitrogen (TKN) data collected during the Wastewater Characterization program between May 13, 2011 and March 2, 2012 was used in projecting the influent TKN loading. The Wastewater Characterization data included both dry and wet days, and the data were parsed into wet and dry day data. The parsed dry day influent TKN concentration data were averaged and the average TKN loading was calculated at the annual average flow of 5.23 MGD. Due to the limited data set, a moving average calculation could not be used to establish the maximum month loading as was done for BOD_5 and TSS. The maximum month TKN loading was based on an assumed TKN load peaking factor of 1.35, which was selected based on the BOD_5 and TSS peaking factors (1.19 and 1.36, respectively). The higher TSS peaking factor was used due to the uncertainty of the TKN peaking factor and the limited data available.

Once the revised influent loadings were established, the revised loadings to the secondary treatment process were developed. As the use of the existing chemically enhanced primary treatment process (CEPT) may or may not be continued, primary effluent loadings were projected for both non-chemically enhanced primary treatment and CEPT. This was done by applying anticipated removal rates to the projected influent loadings.

For BOD_5 and TSS removals in the CEPT process, the removal rates were developed based on the percent removals of these constituents in the MOR data. For BOD_5 and TSS removals in the non-chemically enhanced primary treatment process, the removals were developed based on the observed pilot clarifier performance, text book values, and estimated reduced CEPT removal performance. Due to the wide range in removals for all of these sources, a range of removals were used in projecting the primary effluent loadings.

For TKN removals in the CEPT process, the removal rates were developed based on the percent removals of these constituents in the Wastewater Characterization program data. For TKN removal in the non-chemically enhanced primary treatment process, the removal rates were developed based on the wastewater characterization data, text book values, and estimated reduced CEPT removal performance. Due to the wide range in removals for all of these sources, a range of removals were used in projecting the primary effluent loadings.

Results

Figure 8 presents a plot of the 2011 - 2012 truncated influent BOD_5 and TSS loading data and the computed 30 day moving average of the data. As indicated, the analysis shows a maximum month loading for BOD_5 of 10,271 lb/day, and a maximum month loading of 11,969 lb/day for TSS. Using this information and the methodology outline above, Table 3 presents the revised projected year 2012 design flows and loads to the secondary treatment process. Table 4 attached, presents the 2011-2012 data used in the analysis.

Table 3 – Year 2012 Design Flows and Loads to Secondary

Parameter	Annual Average Day [1]	Max Month PF	Removal Efficiency, %	Max Month [2]
Flow (MGD)	5.23	**1.44**		7.56
Influent TSS (mg/L)	**201**			**190**
Influent TSS (lb/d)	8,792	**1.36**		11,969
Influent BOD_5 (mg/L)	**197**			**163**
Influent BOD_5 (lb/d)	8,610	**1.19**		10,271
Influent TKN (mg/l)	29.5			**27.6**
Influent TKN (lb/d)	**1,289**	1.35		**1,740**
Primary Effluent TSS (mg/L)	**101 - 149**		26% - 50% [5]	**95 - 140**
Primary Effluent TSS (lb/d)	**4,396 – 6,489**			**5,985 – 8,833**
Primary Effluent BOD_5 (mg/L)	**138 - 167**		15% - 30% [5]	**114 - 138**
Primary Effluent BOD_5 (lb/d)	**6,027 - 7,292**			**7,190 -8,700**
Primary Effluent TKN (mg/l)	**26.9 - 28.6**		3% - 9% [6]	**25.1 - 26.8**
Primary Effluent TKN (lb/d)	**1,173 - 1,250**			**1,584 - 1,688**
CEPT Effluent TSS (mg/L)	**52**		**74%** [3]	**49**
CEPT Effluent TSS (lb/d)	2,262			3,079
CEPT Effluent BOD_5 (mg/L)	**122**		**38%** [3]	**101**
CEPT Effluent BOD_5 (lb/d)	5,330			6,359
CEPT Effluent TKN (mg/l)	**24.2**		**18%** [4]	**22.6**
CEPT Effluent TKN (lb/d)	**1,057**			**1,427**

1. Average of all days in reporting period with wet weather days capped at the maximum parsed dry day flow of 7.73 mgd.
2. Maximum month flow is maximum value of a 30 day rolling average of all days in reporting period with wet weather days capped at the maximum parsed dry day flow of 7.73 mgd.
3. Percent removals based on WWTF MOR loading data capped at the maximum parsed dry day flow of 7.73 mgd.
4. Percent removal based on wastewater characterization data (May 13, 2011 to March 3, 2012).
5. Percent removal range of observed pilot data, text book values, and approximately 1/2 of the CEPT removal.
6. Percent removal range of observed wastewater characterization data, text book values and approximately 1/2 of the CEPT removal.
7. Note values shown in bold were calculated values for this table.

SECONDARY TREATMENT REVISED FLOW ANALYSIS – FUTURE CONDITIONS

As noted previously, the Phase 1 Evaluation flow projections were based on an analysis of current wastewater flows and did not contain any allowance for future wastewater flow increases due to growth. Recognizing that growth within the Peirce Island WWTF service area is projected to occur during the 20 year service life of the upgraded plant, the City requested that the revised flows include an allowance for growth.

Methodology

To account for anticipated growth in the Peirce Island WWTF service area, the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update projected the increase in wastewater flows and loadings in both the Peirce Island WWTF service area as well as the Pease Tradeport WWTF service area. In Table 4-3 of the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update, the projected increase in flow for the Peirce Island WWTF service area for the year 2030 was an average daily flow of 0.9 MGD. It is noted that this projected flow contains both sanitary flow and I/I, but since it is generated by future growth, it is assumed to be dry weather flow. Consistent with the Draft Wastewater Master Plan and Long Term Control Plan Update, no reduction in future flow rates to secondary treatment resulting from I/I removal have been factored into the projected flows. While it is recognized that the City's continued efforts at CSO control through targeted separation will reduce I/I flows and affect the volume and frequency of wet weather flows exceeding the secondary treatment capacity, it is also recognized that during the planning period the existing collection system will continue to age and deteriorate, resulting in further I/I. This data was used to project the future average daily flow. To develop the future maximum month and maximum day flows, the corresponding peaking factors developed for the current (year 2012) condition flow rates were applied to the future average daily flow.

Results

Table 5 presents the year 2012 and the year 2032 projected flows to the secondary treatment process developed using the methodology outlined above.

Table 5 – Secondary Treatment Process Design Flow Rates

Criteria	2012 Flow (MGD)	Peaking Factor (to average day)	Projected 20 Year Flow Increase (MGD)	2032 Flow (MGD)
Secondary Treatment Average Annual Flow	5.24		0.9	**6.13**
Secondary Treatment Maximum Month	7.56	1.44	1.30	**8.86**
Secondary Treatment Maximum Day	7.73	1.48	1.33	**9.06**

1. Note values shown in bold were calculated values for this table.

Figures 9, 10, 11, and 12 attached show the average day flow and total daily precipitation for 2008, 2009, 2010, and 2011- 2012 respectively with the total annual flow volume, the estimated volume that would receive secondary treatment, and the estimated volume that would bypass secondary treatment and receive chemically enhanced primary treatment and disinfection at the future maximum day flow of 9.06 MGD.

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SECONDARY TREATMENT REVISED LOADING ANALYSIS – FUTURE CONDITIONS

Similar to the flow projections, the Phase 1 Evaluation loading projections were based on analysis of existing data and did not include any allowance for loading increase due to future growth. With the inclusion of a future flow increase due to growth, the future loading projections need to include an increase in loading due to growth.

Methodology

To account for anticipated growth in the Peirce Island WWTF service area, the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update projected the increase in wastewater loadings in both the Peirce Island WWTF service area as well as the Pease Tradeport WWTF service area. In Table 4-5 of the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update, the projected increase in BOD_5, TSS, and TKN for the Peirce Island WWTF service area between the year 2010 and the year 2030. For the Phase 2 revised evaluation, the increase in BOD and TSS loads in the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update were used. These values were used since the calculated BOD and TSS concentrations with the future flow increase of 0.9 MGD were in the range of the existing BOD and TSS data. For TKN, the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update value for the increased TKN load at the 0.9 MGD flow resulted in an unrealistically high TKN concentration in excess of 90 mg/l. As a result, the projected increase in TKN loading for the year 2032 was based on the 0.9 MGD increase in flow and the current observed TKN concentration of 29.5 mg/l.

Once the revised projected future influent loadings were established, the revised projected future loadings to the secondary treatment process were developed. As the use of the existing chemically enhanced primary treatment process (CEPT) may or may not be continued, primary effluent loadings were projected for both non-chemically enhanced primary treatment and CEPT. This was done by applying anticipated removal rates to the projected influent loadings. The same removal rates for non-chemically enhanced primary treatment and CEPT used for existing conditions were used in projecting the future conditions.

Results

Table 6 presents the year 2012 flows and loads, the additional projected flows and loads for future growth, and the resulting year 2032 projected flows and loads developed using the methodology outlined above. Table 7 shows the projected year 2032 design flows and loads to the secondary treatment process.

Table 6 – Additional WWTF Flows and Loads to Secondary

Parameter	Annual Average Day	Max Month PF	Max Month
Year 2012 Conditions			
Flow (mgd)	5.23	1.44	7.56
Influent TSS (mg/L)	201		190
Influent TSS (lb/d)	8,792	1.36	11,969
Influent BOD$_5$ (mg/L)	197		163
Influent BOD$_5$ (lb/d)	8,610	1.19	10,271
Influent TKN (mg/l)	29.5		27.6
Influent TKN (lb/d)	1,289	1.35	1,740
Projected 20 Year Growth			
Flow (mgd) [1]	0.9	1.44	**1.30**
Influent TSS (mg/L)	184		**174**
Influent TSS (lb/d) [1]	1,384	1.36	**1,884**
Influent BOD$_5$ (mg/L)	180		**148**
Influent BOD$_5$ (lb/d) [1]	1,349	1.19	**1,609**
Influent TKN (mg/l) [2]	29.5		**27.6**
Influent TKN (lb/d)	**222**	1.35	**299**
Projected Year 2032 Conditions			
Flow (mgd)	**6.13**	1.44	**8.86**
Influent TSS (mg/L)	**199**		**187**
Influent TSS (lb/d)	**10,176**	1.36	**13,853**
Influent BOD$_5$ (mg/L)	**195**		**161**
Influent BOD$_5$ (lb/d)	**9,959**	1.19	**11,881**
Influent TKN (mg/l)	**29.5**		**27.6**
Influent TKN (lb/d)	**1,511**	1.35	**2,039**

1. Flow, TSS and BOD loading increase from the June 2010 Draft Wastewater Master Plan and Long Term Control Plan Update.
2. TKN loading increases assume same concentrations as the present at the increased flow projection.
3. Note values shown in bold were calculated values for this table.

Table 7 – Projected Year 2032 Design Flows and Loads to Secondary

Parameter	Annual Average Day	Max Month PF	Removal Efficiency, %	Max Month
Flow (mgd)	6.13	1.44		8.86
Influent TSS (mg/L)	199			187
Influent TSS (lb/d)	10,176	1.36		13,853
Influent BOD_5 (mg/L)	195			161
Influent BOD_5 (lb/d)	9,959	1.19		11,881
Influent TKN (mg/l)	29.5			27.6
Influent TKN (lb/d)	1,511	1.35		2,039
Primary Effluent TSS (mg/L)	**99 - 147**		26% - 50% [3]	**94 - 138**
Primary Effluent TSS (lb/d)	**5,088 – 7,510**			**6,927 – 10,224**
Primary Effluent BOD_5 (mg/L)	**136 - 165**		15% - 30% [3]	**113 - 136**
Primary Effluent BOD_5 (lb/d)	**6,971 – 8,4357**			**8,317 – 10,063**
Primary Effluent TKN (mg/l)	**26.9 - 28.6**		3% - 9% [4]	**25.1 - 26.8**
Primary Effluent TKN (lb/d)	**1,375 – 1,465**			**1,856 – 1,978**
CEPT Effluent TSS (mg/L)	**51**		74% [1]	**48**
CEPT Effluent TSS (lb/d)	**2,618**			**3,564**
CEPT Effluent BOD_5 (mg/L)	**121**		38% [1]	**100**
CEPT Effluent BOD_5 (lb/d)	**6,166**			**7,356**
CEPT Effluent TKN (mg/l)	**24.2**		18% [2]	**22.6**
CEPT Effluent TKN (lb/d)	**1,239**			**1,672**

1. Percent removals based on WWTF MOR loading data capped at the maximum parsed dry flow day of 7.73 mgd.
2. Percent removal based on WWTF characterization data (May 13, 2011 to March 3, 2012).
3. Percent removal range of observed pilot data, text book values, and approximately 1/2 of the CEPT removal.
4. Percent removal range of observed wastewater characterization data, text book values and approximately 1/2 of the CEPT removal.
5. Note values shown in bold were calculated values for this table.

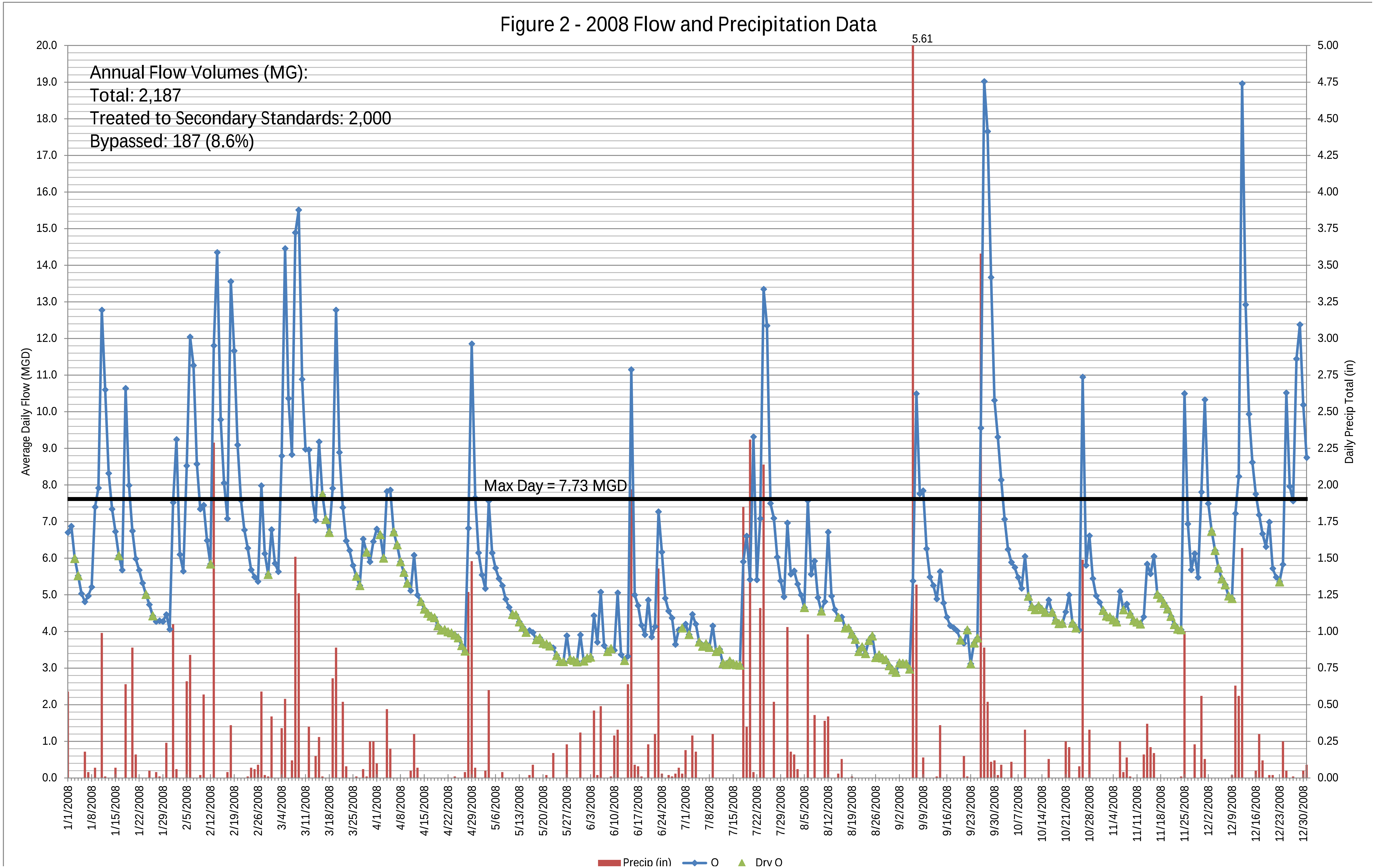


Figure 2 - 2008 Flow and Precipitation Data

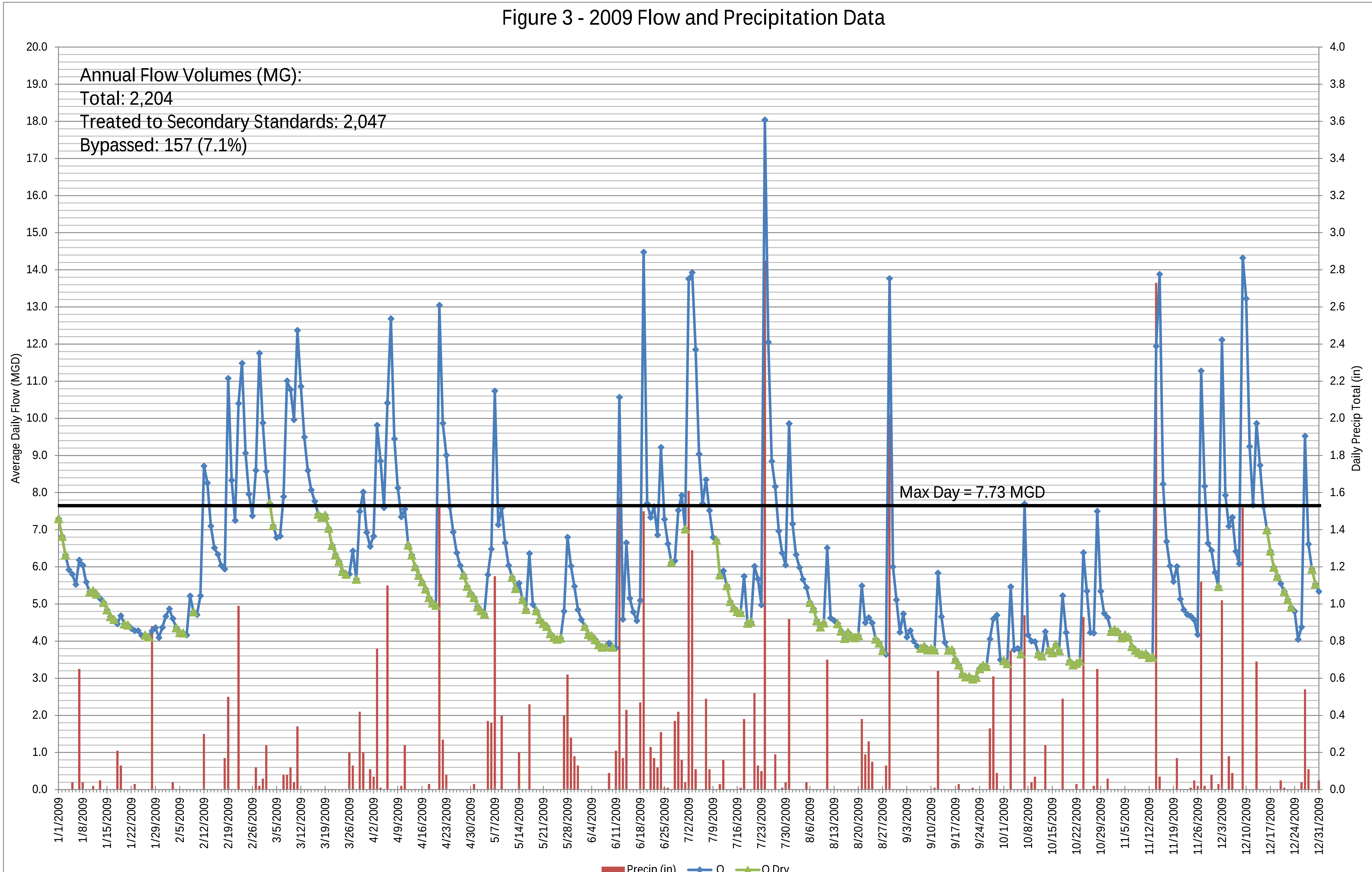


Figure 3 - 2009 Flow and Precipitation Data
Annual Flow Volumes (MG):
Total: 2,204
Treated to Secondary Standards: 2,047
Bypassed: 157 (7.1%)
Max Day = 7.73 MGD
Average Daily Flow (MGD)
Daily Precip Total (in)
Precip (in)
Q
Q Dry

Figure 4 - 2010 Flow and Precipitation Data

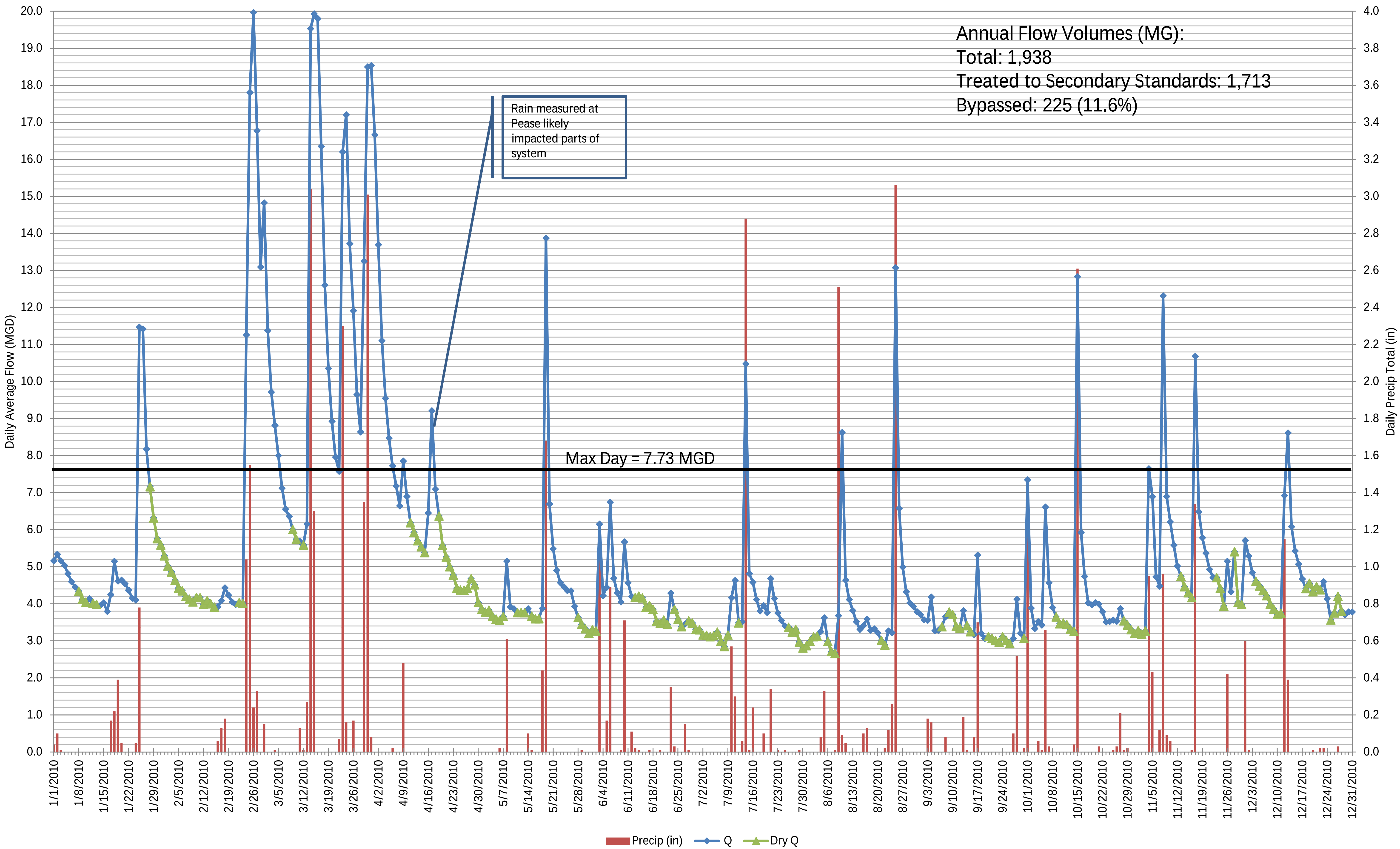
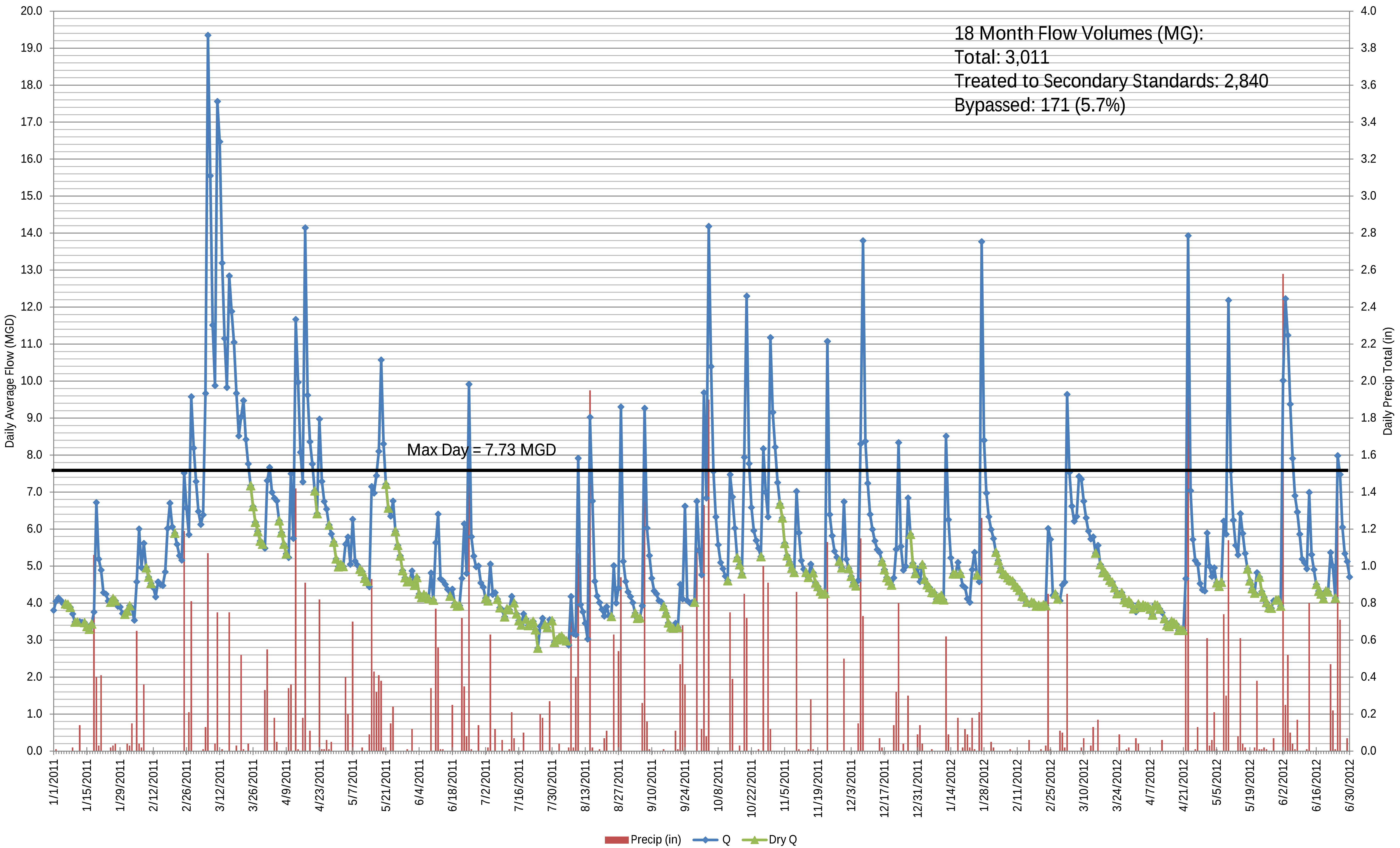


Figure 5 - January 2011 - June 2012 Flow and Precipitation Data



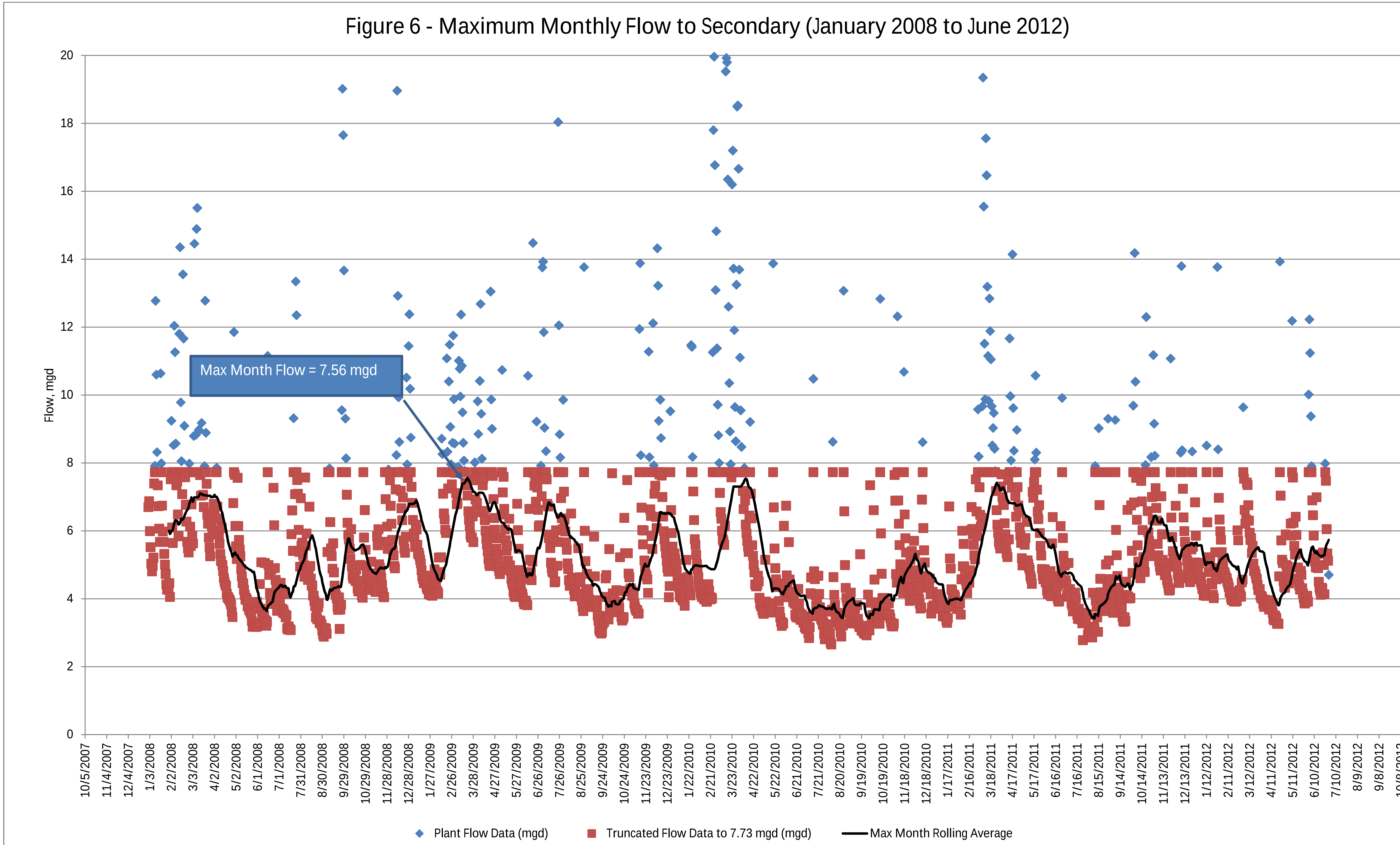


Figure 6 - Maximum Monthly Flow to Secondary (January 2008 to June 2012)
Max Month Flow = 7.56 mgd
Flow, mgd
20
18
16
14
12
10
8
6
4
2
0
10/5/2007
11/4/2007
12/4/2007
1/3/2008
2/2/2008
3/3/2008
4/2/2008
5/2/2008
6/1/2008
7/1/2008
7/31/2008
8/30/2008
9/29/2008
10/29/2008
11/28/2008
12/28/2008
1/27/2009
2/26/2009
3/28/2009
4/27/2009
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6/26/2009
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7/21/2010
8/20/2010
9/19/2010
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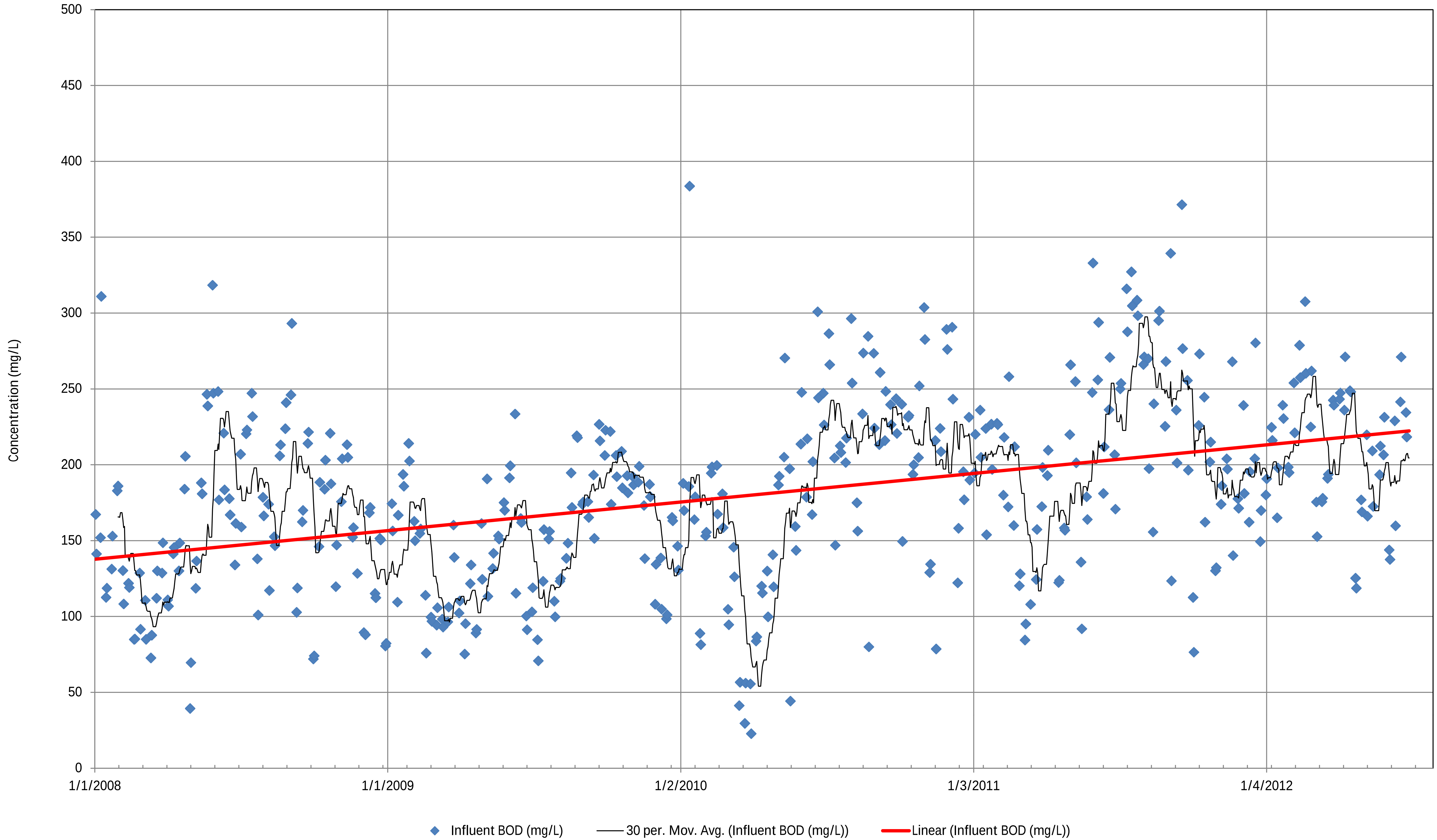
12/18/2010
1/17/2011
2/16/2011
3/18/2011
4/17/2011
5/17/2011
6/16/2011
7/16/2011
8/15/2011
9/14/2011
10/14/2011
11/13/2011
12/13/2011
1/12/2012
2/11/2012
3/12/2012
4/11/2012
5/11/2012
6/10/2012
7/10/2012
8/9/2012
9/8/2012
10/8/2012
Plant Flow Data (mgd)
Truncated Flow Data to 7.73 mgd (mgd)
Max Month Rolling Average

Figure 7 - Peirce Island WWTF Influent BOD Data January 2008 to June 2012



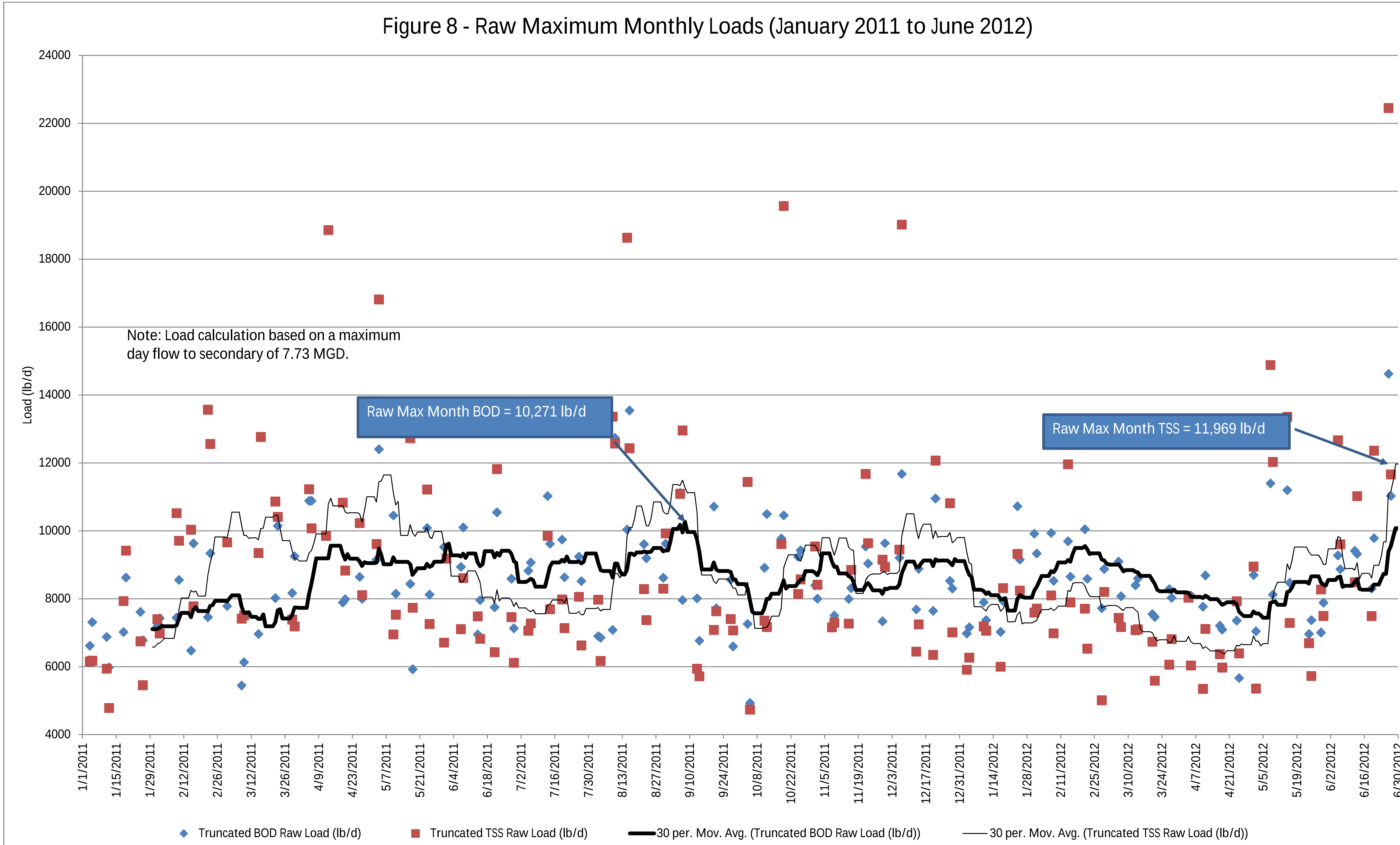
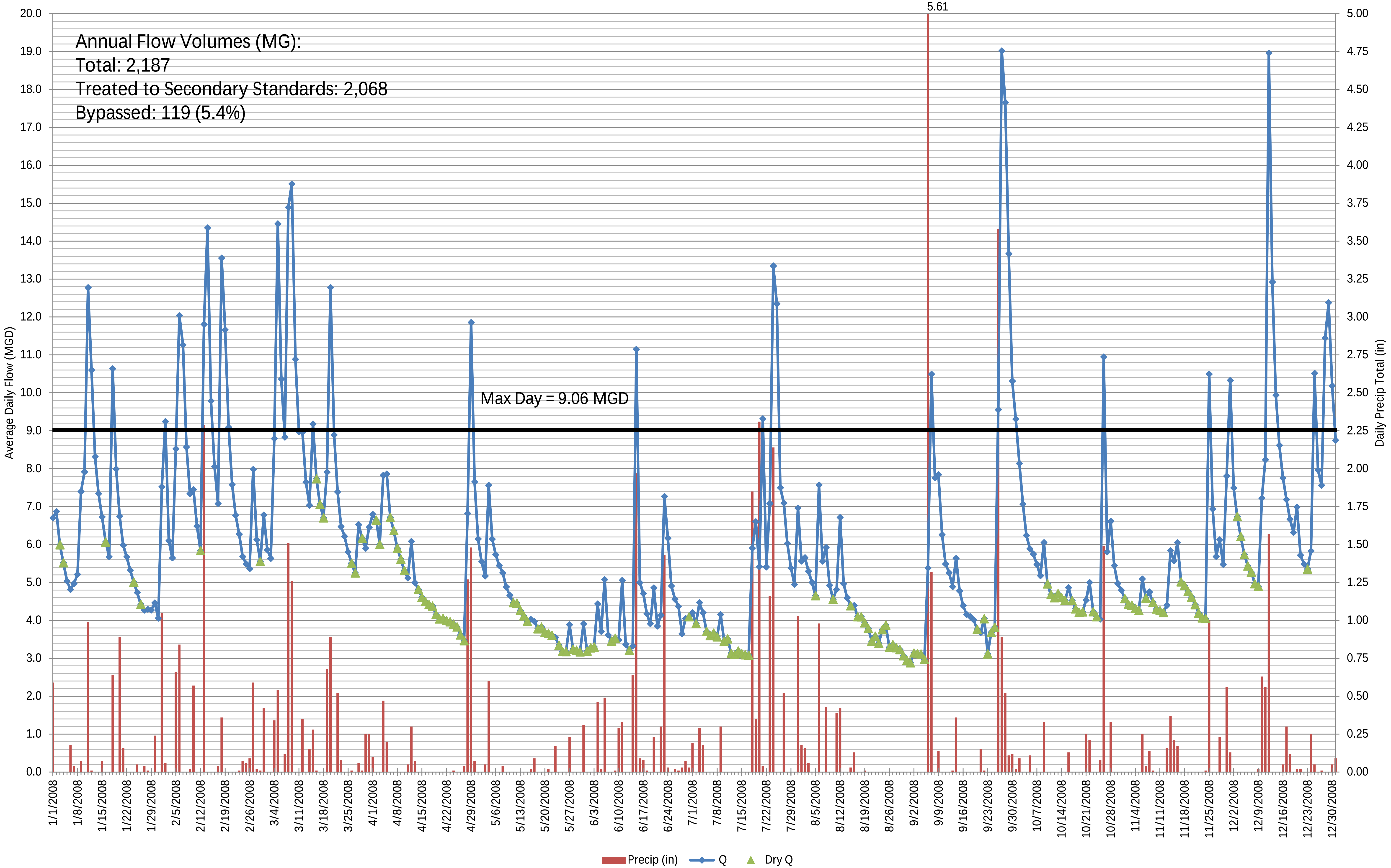


Figure 8 - Raw Maximum Monthly Loads (January 2011 to June 2012)
Load (lb/d)
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
Note: Load calculation based on a maximum day flow to secondary of 7.73 MGD.
Raw Max Month BOD = 10,271 lb/d
Raw Max Month TSS = 11,969 lb/d
1/1/2011
1/15/2011
1/29/2011
2/12/2011
2/26/2011
3/12/2011
3/26/2011
4/9/2011
4/23/2011
5/7/2011
5/21/2011
6/4/2011
6/18/2011
7/2/2011
7/16/2011
7/30/2011
8/13/2011
8/27/2011
9/10/2011
9/24/2011
10/8/2011
10/22/2011
11/5/2011
11/19/2011
12/3/2011
12/17/2011
12/31/2011
1/14/2012
1/28/2012
2/11/2012
2/25/2012
3/10/2012
3/24/2012
4/7/2012
4/21/2012
5/5/2012
5/19/2012
6/2/2012
6/16/2012
6/30/2012
Truncated BOD Raw Load (lb/d)
Truncated TSS Raw Load (lb/d)
30 per. Mov. Avg. (Truncated BOD Raw Load (lb/d))
30 per. Mov. Avg. (Truncated TSS Raw Load (lb/d))

Figure 9 - 2008 Flow and Precipitation Data at Max Day Flow of 9.06 MGD



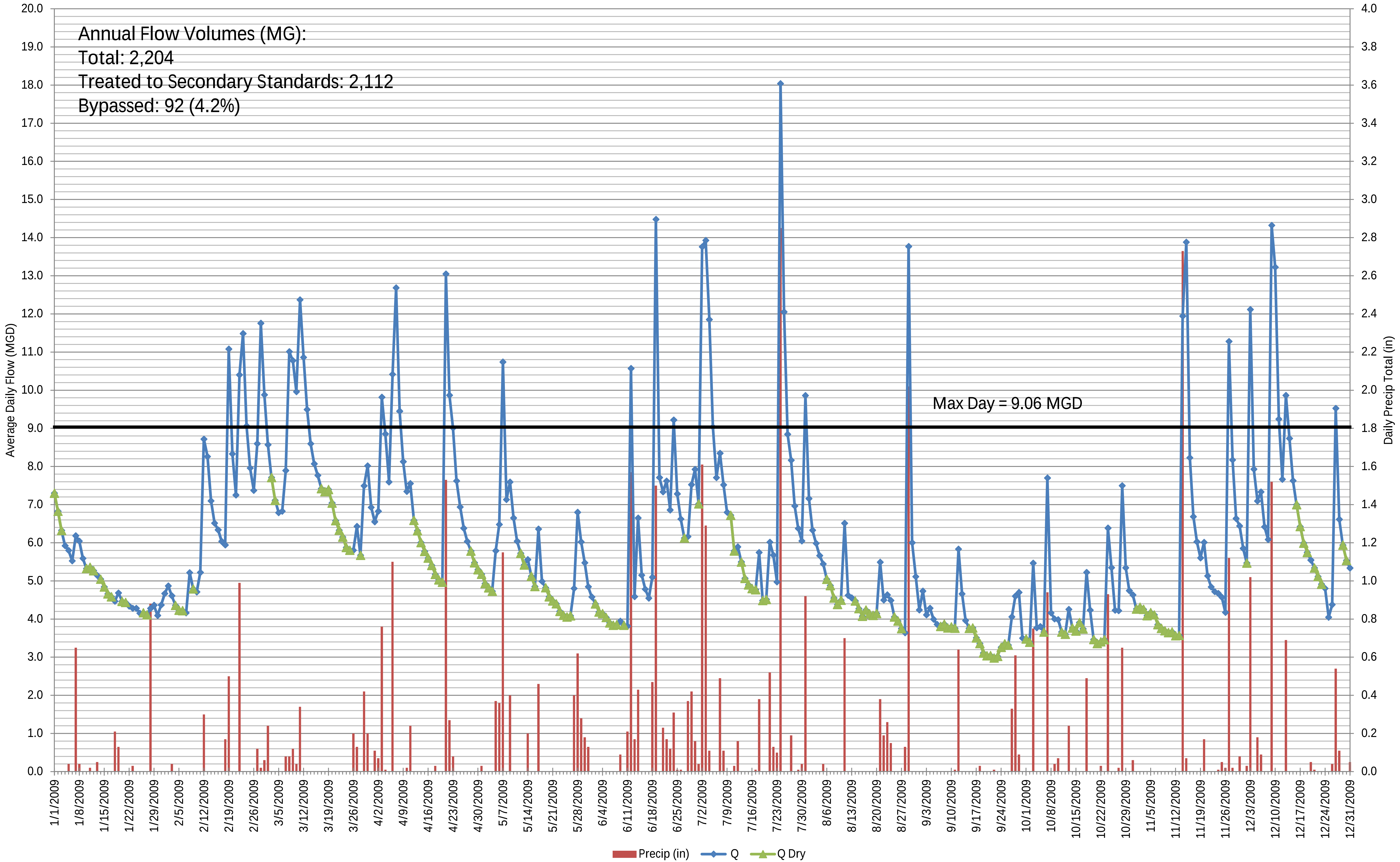


Figure 10 - 2009 Flow and Precipitation Data at Max Day Flow of 9.06 MGD

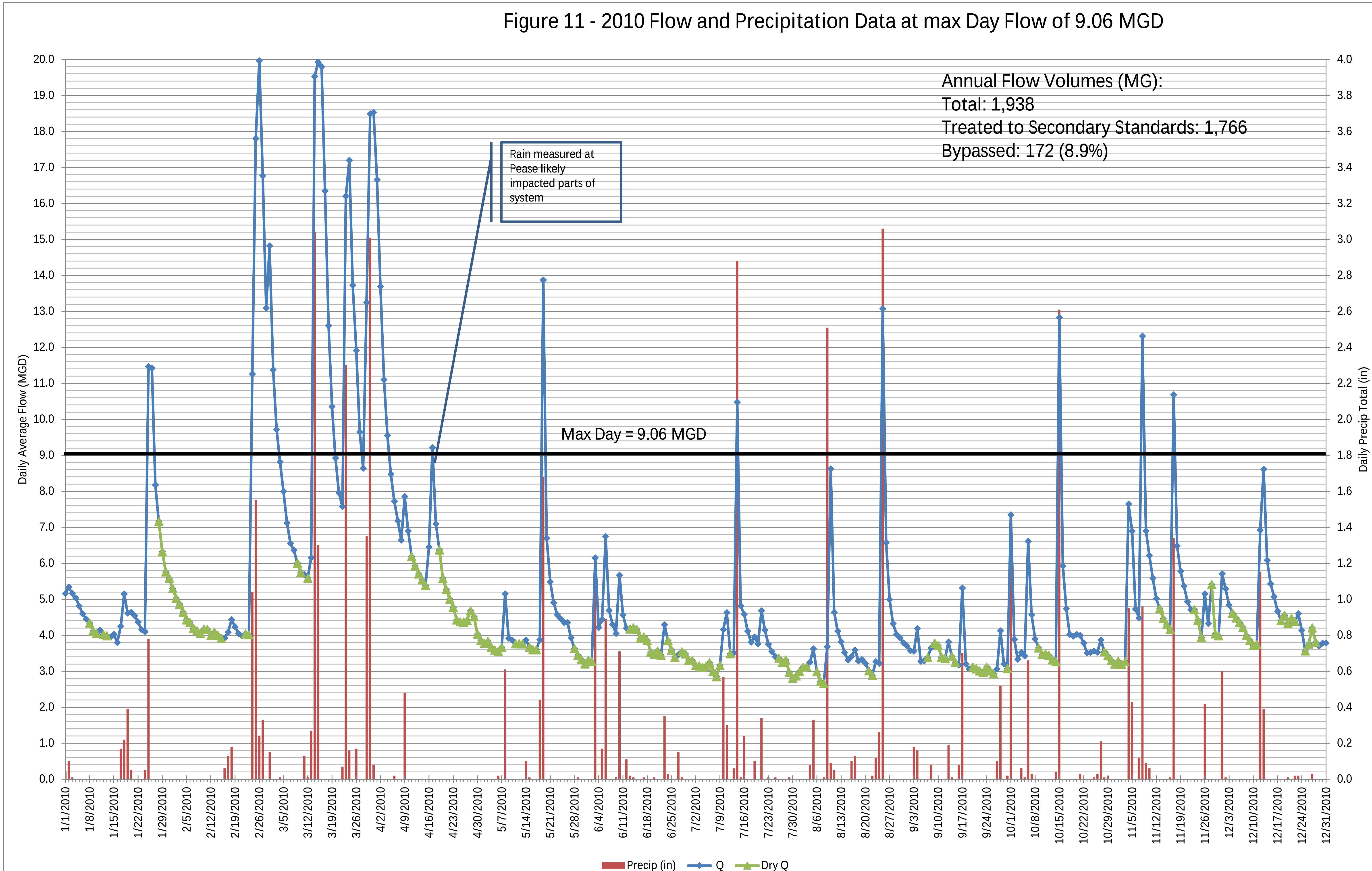


Figure 11 - 2010 Flow and Precipitation Data at max Day Flow of 9.06 MGD
Annual Flow Volumes (MG):
Total: 1,938
Treated to Secondary Standards: 1,766
Bypassed: 172 (8.9%)
Rain measured at Pease likely impacted parts of system
Max Day = 9.06 MGD
Daily Average Flow (MGD)
Daily Precip Total (in)
Precip (in)
Q
Dry Q

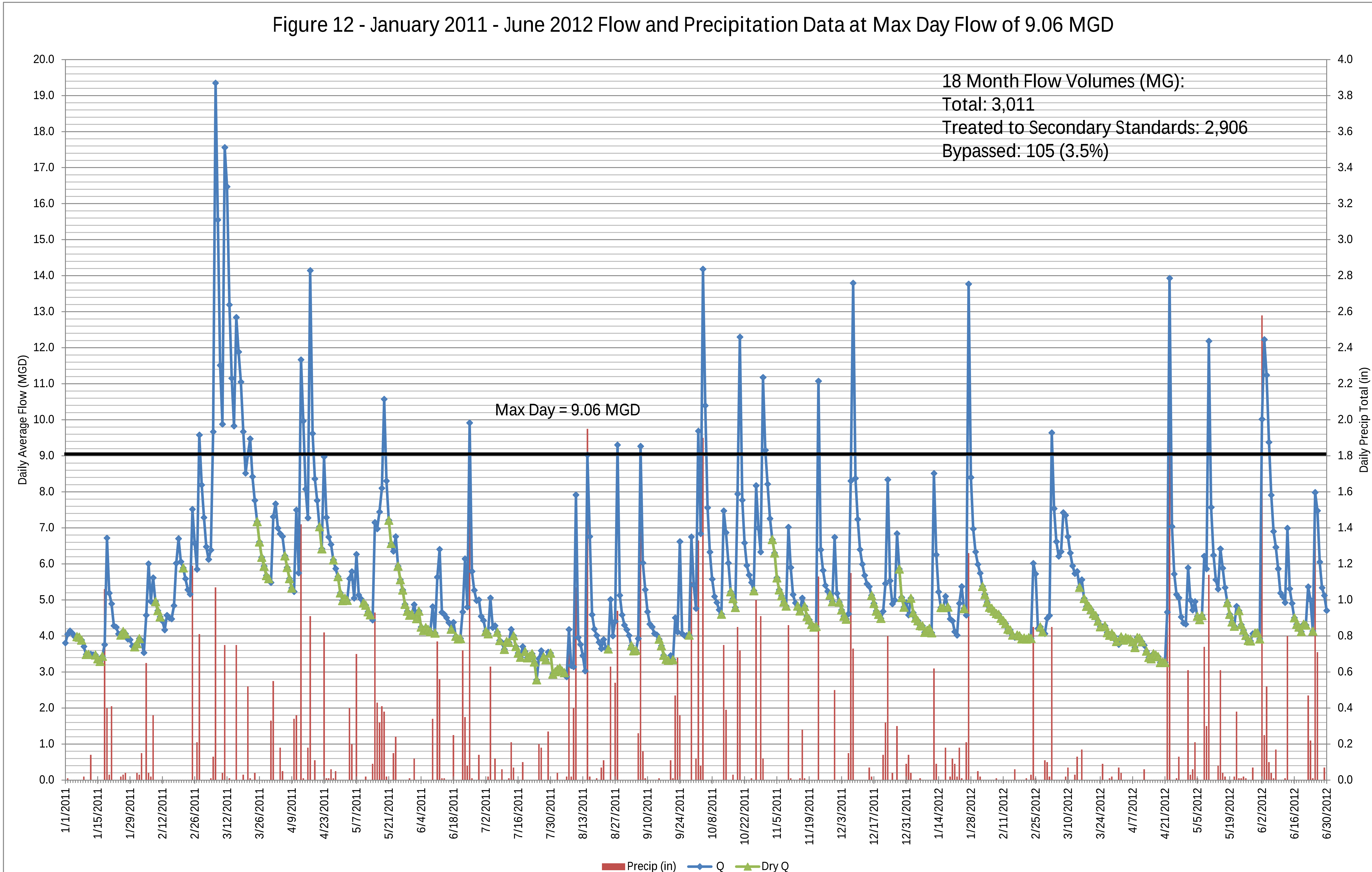


Figure 12 - January 2011 - June 2012 Flow and Precipitation Data at Max Day Flow of 9.06 MGD
18 Month Flow Volumes (MG):
Total: 3,011
Treated to Secondary Standards: 2,906
Bypassed: 105 (3.5%)
Max Day = 9.06 MGD
Daily Average Flow (MGD)
Daily Precip Total (in)
Precip (in)
Q
Dry Q

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
1/1/2008	6.71	0.59		37	6.705		6.71	6.00
1/2/2008	6.88	0.00		31	6.875		6.88	5.91
1/3/2008	6.00	0.00		12		5.995	6.00	5.93
1/4/2008	5.52	0.00		25		5.523	5.52	5.99
1/5/2008	5.04	0.00		34	5.035		5.04	6.01
1/6/2008	4.81	0.18		39	4.812		4.81	6.03
1/7/2008	4.97	0.04		48	4.972		4.97	6.13
1/8/2008	5.21	0.00		60	5.214		5.21	6.22
1/9/2008	7.40	0.07		59	7.399		7.40	6.30
1/10/2008	7.92	0.00		47	7.918		7.73	6.31
1/11/2008	12.78	0.99	5	41	12.777		7.73	6.30
1/12/2008	10.60	0.01	4	47	10.603		7.73	6.29
1/13/2008	8.32	0.00		41	8.32		7.73	6.25
1/14/2008	7.34	0.00	9	37	7.343		7.34	6.19
1/15/2008	6.73	0.07	12	33	6.729		6.73	6.20
1/16/2008	6.07	0.00		31		6.069	6.07	6.23
1/17/2008	5.68	0.00		33	5.678		5.68	6.29
1/18/2008	10.64	0.64		41	10.639		7.73	6.36
1/19/2008	7.99	0.00			7.992		7.73	6.33
1/20/2008	6.75	0.89			6.746		6.75	6.33
1/21/2008	5.98	0.16		22	5.984		5.98	6.37
1/22/2008	5.68	0.00		38	5.677		5.68	6.43
1/23/2008	5.32	0.00		34	5.324		5.32	6.49
1/24/2008	5.01	0.00		30		5.011	5.01	6.54
1/25/2008	4.73	0.05		28	4.734		4.73	6.58
1/26/2008	4.43	0.00		31		4.427	4.43	6.61
1/27/2008	4.27	0.04	7	32	4.272		4.27	6.65
1/28/2008	4.29	0.01	8	38	4.293		4.29	6.68
1/29/2008	4.28	0.00		37	4.275		4.28	6.80
1/30/2008	4.46	0.24		48	4.463		4.46	6.86
1/31/2008	4.06	0.00		34	4.059		4.06	6.90
2/1/2008	7.52	1.05		41	7.523		7.52	6.99
2/2/2008	9.24	0.06		47	9.244		7.73	6.93
2/3/2008	6.10	0.00		40	6.102		6.10	6.86
2/4/2008	5.65	0.00		40	5.646		5.65	6.92
2/5/2008	8.53	0.66	1	37	8.527		7.73	6.99
2/6/2008	12.04	0.84		39	12.043		7.73	6.99
2/7/2008	11.27	0.00	2	32	11.266		7.73	6.99
2/8/2008	8.57	0.00	3	28	8.574		7.73	6.99
2/9/2008	7.34	0.02	4	33	7.344		7.34	6.99
2/10/2008	7.45	0.57	5	36	7.45		7.45	7.00
2/11/2008	6.48	0.00	3	22	6.484		6.48	7.01
2/12/2008	5.84	0.00	3	25		5.843	5.84	7.05

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
2/13/2008	11.81	2.29	8	36	11.807		7.73	7.11
2/14/2008	14.35	0.00	6	36	14.353		7.73	7.09
2/15/2008	9.79	0.00		42	9.787		7.73	7.09
2/16/2008	8.06	0.00		25	8.055		7.73	7.09
2/17/2008	7.08	0.04		37	7.082		7.08	7.06
2/18/2008	13.56	0.36	5	57	13.557		7.73	7.05
2/19/2008	11.67	0.00	1	43	11.665		7.73	7.05
2/20/2008	9.10	0.00		30	9.095		7.73	7.05
2/21/2008	7.58	0.00		27	7.582		7.58	7.05
2/22/2008	6.77	0.00		28	6.772		6.77	7.04
2/23/2008	6.28	0.01	6	32	6.276		6.28	7.03
2/24/2008	5.68	0.07	4	38	5.683		5.68	7.03
2/25/2008	5.49	0.06		39	5.488		5.49	7.04
2/26/2008	5.37	0.09		37	5.365		5.37	7.04
2/27/2008	7.98	0.59	4	37	7.984		7.73	7.03
2/28/2008	6.13	0.02	6	26	6.127		6.13	6.99
2/29/2008	5.56	0.01		25		5.558	5.56	6.99
3/1/2008	6.78	0.42	7	36	6.782		6.78	7.01
3/2/2008	5.86	0.00		36	5.862		5.86	7.00
3/3/2008	5.63	0.00		43	5.634		5.63	7.03
3/4/2008	8.80	0.34		54	8.796		7.73	7.06
3/5/2008	14.46	0.54	2	42	14.46		7.73	7.00
3/6/2008	10.37	0.00	1	39	10.365		7.73	7.00
3/7/2008	8.83	0.12		39	8.831		7.73	7.00
3/8/2008	14.89	1.51	1	39	14.892		7.73	6.97
3/9/2008	15.51	1.26	0	42	15.511		7.73	6.92
3/10/2008	10.89	0.00		33	10.887		7.73	6.86
3/11/2008	8.98	0.00			8.976		7.73	6.79
3/12/2008	8.96	0.35		36	8.962		7.73	6.71
3/13/2008	7.65	0.00			7.646		7.65	6.63
3/14/2008	7.04	0.15		48	7.037		7.04	6.57
3/15/2008	9.18	0.28		38	9.181		7.73	6.50
3/16/2008	7.73	0.01		38		7.734	7.73	6.41
3/17/2008	7.06	0.00		44		7.062	7.06	6.30
3/18/2008	6.71	0.00		41		6.705	6.71	6.22
3/19/2008	7.91	0.68		39	7.91		7.73	6.14
3/20/2008	12.78	0.89	0	41	12.779		7.73	6.03
3/21/2008	8.89	0.00		36	8.891		7.73	5.91
3/22/2008	7.39	0.52		42	7.388		7.39	5.79
3/23/2008	6.48	0.08		40	6.475		6.48	5.68
3/24/2008	6.22	0.00		39	6.216		6.22	5.59
3/25/2008	5.81	0.00		34	5.805		5.81	5.52
3/26/2008	5.51	0.01		55		5.51	5.51	5.46

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
3/27/2008	5.25	0.00		52		5.253	5.25	5.40
3/28/2008	6.53	0.06		39	6.526		6.53	5.35
3/29/2008	6.17	0.01	3			6.166	6.17	5.24
3/30/2008	5.90	0.25			5.902		5.90	5.27
3/31/2008	6.46	0.25		39	6.457		6.46	5.33
4/1/2008	6.80	0.10	0	64	6.799		6.80	5.37
4/2/2008	6.65	0.00	0	47		6.646	6.65	5.34
4/3/2008	6.01	0.00		53		6.005	6.01	5.31
4/4/2008	7.83	0.47	0	41	7.825		7.73	5.28
4/5/2008	7.86	0.20		53	7.863		7.73	5.27
4/6/2008	6.72	0.00		41		6.719	6.72	5.22
4/7/2008	6.37	0.00		45		6.366	6.37	5.19
4/8/2008	5.91	0.00		47		5.905	5.91	5.16
4/9/2008	5.62	0.00		49		5.618	5.62	5.14
4/10/2008	5.32	0.00				5.32	5.32	5.11
4/11/2008	5.12	0.05			5.116		5.12	5.09
4/12/2008	6.09	0.30	0		6.085		6.09	5.07
4/13/2008	5.00	0.07			4.995		5.00	5.01
4/14/2008	4.82	0.00				4.819	4.82	4.99
4/15/2008	4.61	0.00				4.612	4.61	4.97
4/16/2008	4.50	0.00				4.497	4.50	4.95
4/17/2008	4.42	0.00				4.421	4.42	4.93
4/18/2008	4.38	0.00				4.38	4.38	4.91
4/19/2008	4.16	0.00				4.155	4.16	4.89
4/20/2008	4.04	0.00				4.039	4.04	4.88
4/21/2008	4.05	0.00				4.051	4.05	4.87
4/22/2008	3.99	0.00				3.994	3.99	4.86
4/23/2008	3.96	0.00				3.964	3.96	4.85
4/24/2008	3.90	0.01				3.902	3.90	4.83
4/25/2008	3.83	0.00				3.829	3.83	4.81
4/26/2008	3.62	0.00				3.616	3.62	4.79
4/27/2008	3.47	0.04				3.465	3.47	4.78
4/28/2008	6.82	1.27			6.82		6.82	4.79
4/29/2008	11.86	1.48	0		11.856		7.73	4.67
4/30/2008	7.65	0.07			7.654		7.65	4.52
5/1/2008	6.15	0.00		56	6.148		6.15	4.37
5/2/2008	5.55	0.00		49	5.546		5.55	4.30
5/3/2008	5.17	0.05		46	5.172		5.17	4.22
5/4/2008	7.56	0.60		49	7.564		7.56	4.16
5/5/2008	6.15	0.00		64	6.145		6.15	4.01
5/6/2008	5.73	0.00		67	5.734		5.73	3.96
5/7/2008	5.45	0.00		72	5.447		5.45	3.89
5/8/2008	5.25	0.04		78	5.254		5.25	3.88

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
5/9/2008	4.88	0.00		57	4.883		4.88	3.82
5/10/2008	4.66	0.00		59	4.661		4.66	3.77
5/11/2008	4.47	0.00		59		4.467	4.47	3.74
5/12/2008	4.46	0.00		51		4.455	4.46	3.70
5/13/2008	4.26	0.00		69		4.264	4.26	3.72
5/14/2008	4.12	0.00		63		4.12	4.12	3.69
5/15/2008	3.98	0.00		67		3.978	3.98	3.66
5/16/2008	4.03	0.02		62	4.028		4.03	3.64
5/17/2008	3.97	0.09		66	3.972		3.97	3.77
5/18/2008	3.78	0.00		69		3.78	3.78	3.80
5/19/2008	3.83	0.00		59		3.826	3.83	3.83
5/20/2008	3.68	0.00		67		3.682	3.68	3.84
5/21/2008	3.66	0.02		64		3.66	3.66	3.85
5/22/2008	3.61	0.00		60		3.607	3.61	3.89
5/23/2008	3.55	0.17		71	3.553		3.55	3.90
5/24/2008	3.35	0.00		70		3.348	3.35	3.92
5/25/2008	3.18	0.00		72		3.181	3.18	4.05
5/26/2008	3.18	0.00		82		3.177	3.18	4.15
5/27/2008	3.89	0.23		83	3.886		3.89	4.21
5/28/2008	3.24	0.00		67		3.241	3.24	4.23
5/29/2008	3.21	0.00		78		3.214	3.21	4.27
5/30/2008	3.17	0.00		58		3.172	3.17	4.28
5/31/2008	3.91	0.31		70	3.909		3.91	4.31
6/1/2008	3.19	0.00		78		3.194	3.19	4.32
6/2/2008	3.28	0.00		75		3.276	3.28	4.35
6/3/2008	3.30	0.00		82		3.3	3.30	4.37
6/4/2008	4.44	0.46		60	4.436		4.44	4.41
6/5/2008	3.71	0.02		63	3.708		3.71	4.40
6/6/2008	5.08	0.49		56	5.078		5.08	4.40
6/7/2008	3.62	0.00		84	3.616		3.62	4.35
6/8/2008	3.46	0.00		92		3.457	3.46	4.35
6/9/2008	3.53	0.01		84		3.532	3.53	4.36
6/10/2008	3.49	0.29		90	3.488		3.49	4.38
6/11/2008	5.06	0.33		83	5.057		5.06	4.38
6/12/2008	3.37	0.00		78	3.368		3.37	4.33
6/13/2008	3.21	0.00		81		3.211	3.21	4.32
6/14/2008	3.32	0.64		72	3.324		3.32	4.32
6/15/2008	11.15	1.97		59	11.151		7.73	4.31
6/16/2008	5.00	0.09		65	4.998		5.00	4.16
6/17/2008	4.71	0.08		77	4.708		4.71	4.09
6/18/2008	4.17	0.01		70	4.174		4.17	4.04
6/19/2008	3.91	0.00		72	3.912		3.91	4.10
6/20/2008	4.86	0.23		71	4.86		4.86	4.19

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
6/21/2008	3.85	0.00		74	3.851		3.85	4.21
6/22/2008	4.13	0.30		78	4.134		4.13	4.34
6/23/2008	7.27	1.43		70	7.271		7.27	4.38
6/24/2008	6.17	0.03		79	6.168		6.17	4.37
6/25/2008	4.91	0.00		81	4.908		4.91	4.42
6/26/2008	4.56	0.02		78	4.559		4.56	4.52
6/27/2008	4.37	0.01		84	4.37		4.37	4.62
6/28/2008	3.65	0.03		64	3.648		3.65	4.71
6/29/2008	4.05	0.07		71	4.047		4.05	4.79
6/30/2008	4.10	0.03		85		4.097	4.10	4.83
7/1/2008	4.20	0.19		83	4.203		4.20	4.86
7/2/2008	3.92	0.00		82		3.917	3.92	4.95
7/3/2008	4.47	0.29		87	4.47		4.47	5.01
7/4/2008	4.20	0.18		73	4.203		4.20	5.05
7/5/2008	3.71	0.00		71		3.713	3.71	5.08
7/6/2008	3.60	0.00		79		3.598	3.60	5.12
7/7/2008	3.67	0.00		86		3.667	3.67	5.16
7/8/2008	3.57	0.00		90		3.568	3.57	5.29
7/9/2008	4.16	0.30		91	4.155		4.16	5.36
7/10/2008	3.46	0.00		82		3.455	3.46	5.42
7/11/2008	3.52	0.00		78		3.515	3.52	5.46
7/12/2008	3.14	0.00		75		3.136	3.14	5.50
7/13/2008	3.10	0.00		85		3.098	3.10	5.56
7/14/2008	3.19	0.00		80		3.194	3.19	5.68
7/15/2008	3.12	0.00		85		3.124	3.12	5.73
7/16/2008	3.09	0.00		84		3.093	3.09	5.78
7/17/2008	3.08	0.00		84		3.081	3.08	5.83
7/18/2008	5.91	1.85		85	5.906		5.91	5.87
7/19/2008	6.61	0.35		90	6.606		6.61	5.81
7/20/2008	5.42	2.31		74	5.417		5.42	5.73
7/21/2008	9.32	0.04		73	9.318		7.73	5.68
7/22/2008	5.41	0.00		75	5.41		5.41	5.55
7/23/2008	7.08	1.16		70	7.083		7.08	5.48
7/24/2008	13.35	2.14		79	13.347		7.73	5.36
7/25/2008	12.35	0.00		79	12.352		7.73	5.22
7/26/2008	7.50	0.00		83	7.499		7.50	5.09
7/27/2008	7.09	0.52		80	7.093		7.09	4.97
7/28/2008	6.03	0.00		83	6.032		6.03	4.84
7/29/2008	5.38	0.00		83	5.384		5.38	4.75
7/30/2008	4.95	0.00		81	4.948		4.95	4.68
7/31/2008	6.96	1.03		81	6.964		6.96	4.62
8/1/2008	5.57	0.18		78	5.565		5.57	4.49
8/2/2008	5.65	0.16		72	5.654		5.65	4.41

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
8/3/2008	5.30	0.06		76	5.296		5.30	4.31
8/4/2008	5.00	0.00		80	5		5.00	4.24
8/5/2008	4.65	0.00		69		4.654	4.65	4.18
8/6/2008	7.57	0.98		65	7.574		7.57	4.13
8/7/2008	5.56	0.00		69	5.563		5.56	3.98
8/8/2008	5.92	0.43		72	5.924		5.92	3.97
8/9/2008	4.93	0.00		76	4.926		4.93	4.03
8/10/2008	4.56	0.00		75		4.557	4.56	4.12
8/11/2008	4.82	0.39		67	4.817		4.82	4.23
8/12/2008	6.72	0.42		72	6.715		6.72	4.28
8/13/2008	4.97	0.00		78	4.968		4.97	4.24
8/14/2008	4.60	0.00		76	4.596		4.60	4.25
8/15/2008	4.39	0.03		76		4.388	4.39	4.26
8/16/2008	4.40	0.13		76	4.396		4.40	4.30
8/17/2008	4.10	0.00		82		4.099	4.10	4.31
8/18/2008	4.10	0.00		85		4.096	4.10	4.32
8/19/2008	3.94	0.01		72		3.937	3.94	4.32
8/20/2008	3.79	0.00		74		3.787	3.79	4.33
8/21/2008	3.45	0.00		79		3.454	3.45	4.33
8/22/2008	3.58	0.00		81		3.584	3.58	4.35
8/23/2008	3.40	0.00		80		3.397	3.40	4.35
8/24/2008	3.76	0.00		74		3.757	3.76	4.37
8/25/2008	3.88	0.00		84		3.879	3.88	4.35
8/26/2008	3.29	0.00		74		3.291	3.29	4.34
8/27/2008	3.36	0.00		77		3.362	3.36	4.36
8/28/2008	3.28	0.00		74		3.278	3.28	4.51
8/29/2008	3.23	0.00		73		3.231	3.23	4.65
8/30/2008	3.07	0.00		81		3.067	3.07	4.80
8/31/2008	2.95	0.00		80		2.95	2.95	4.96
9/1/2008	2.89	0.00		84		2.885	2.89	5.12
9/2/2008	3.14	0.00		78		3.143	3.14	5.28
9/3/2008	3.13	0.00		75		3.131	3.13	5.43
9/4/2008	3.12	0.00		87		3.117	3.12	5.56
9/5/2008	2.97	0.00		77		2.973	2.97	5.67
9/6/2008	5.38	5.61		77	5.381		5.38	5.77
9/7/2008	10.50	1.32		76	10.495		7.73	5.78
9/8/2008	7.76	0.00		77	7.762		7.73	5.70
9/9/2008	7.85	0.14		72	7.845		7.73	5.62
9/10/2008	6.26	0.00		69	6.262		6.26	5.56
9/11/2008	5.49	0.00		67	5.488		5.49	5.52
9/12/2008	5.26	0.00		65	5.258		5.26	5.49
9/13/2008	4.89	0.01		74	4.89		4.89	5.47
9/14/2008	5.64	0.36		74	5.637		5.64	5.46

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
9/15/2008	4.78	0.00		80	4.779		4.78	5.43
9/16/2008	4.39	0.00		63	4.391		4.39	5.42
9/17/2008	4.16	0.00		66	4.159		4.16	5.44
9/18/2008	4.10	0.00		67	4.101		4.10	5.45
9/19/2008	4.01	0.00		56	4.014		4.01	5.46
9/20/2008	3.77	0.00		63		3.766	3.77	5.46
9/21/2008	3.68	0.15		74	3.677		3.68	5.48
9/22/2008	4.05	0.01		60		4.046	4.05	5.51
9/23/2008	3.12	0.00		60		3.117	3.12	5.54
9/24/2008	3.69	0.00		65		3.686	3.69	5.58
9/25/2008	3.82	0.00		65		3.824	3.82	5.59
9/26/2008	9.56	3.58		63	9.557		7.73	5.60
9/27/2008	19.02	0.89		67	19.021		7.73	5.60
9/28/2008	17.66	0.52		67	17.656		7.73	5.53
9/29/2008	13.67	0.11		71	13.67		7.73	5.49
9/30/2008	10.31	0.12		62	10.313		7.73	5.42
10/1/2008	9.31	0.02		62	9.31		7.73	5.33
10/2/2008	8.14	0.09		62	8.139		7.73	5.23
10/3/2008	7.07	0.00		60	7.066		7.07	5.12
10/4/2008	6.24	0.00		59	6.242		6.24	5.04
10/5/2008	5.89	0.11		61	5.89		5.89	4.97
10/6/2008	5.75	0.00		56	5.749		5.75	4.92
10/7/2008	5.48	0.00		66	5.476		5.48	4.87
10/8/2008	5.18	0.00		68	5.178		5.18	4.86
10/9/2008	6.05	0.33		73	6.054		6.05	4.84
10/10/2008	4.96	0.00		70		4.964	4.96	4.80
10/11/2008	4.68	0.00		68		4.681	4.68	4.78
10/12/2008	4.60	0.00		67		4.597	4.60	4.77
10/13/2008	4.71	0.00		60		4.705	4.71	4.76
10/14/2008	4.60	0.00		63		4.602	4.60	4.74
10/15/2008	4.53	0.00		60		4.529	4.53	4.73
10/16/2008	4.86	0.13		63	4.862		4.86	4.78
10/17/2008	4.52	0.00		60		4.524	4.52	4.80
10/18/2008	4.31	0.00		53		4.307	4.31	4.85
10/19/2008	4.22	0.00		48		4.217	4.22	4.88
10/20/2008	4.23	0.00		59		4.227	4.23	4.90
10/21/2008	4.53	0.25		59	4.534		4.53	4.92
10/22/2008	5.00	0.21		46	5.001		5.00	4.92
10/23/2008	4.23	0.00		50		4.23	4.23	4.90
10/24/2008	4.10	0.00		59		4.097	4.10	4.90
10/25/2008	4.03	0.08		57	4.034		4.03	4.90
10/26/2008	10.95	1.49		65	10.949		7.73	4.90
10/27/2008	5.81	0.00		64	5.808		5.81	4.90

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
10/28/2008	6.61	0.33		54	6.614		6.61	4.94
10/29/2008	5.45	0.00		44	5.446		5.45	4.90
10/30/2008	4.97	0.00		44	4.973		4.97	4.93
10/31/2008	4.80	0.00		61	4.797		4.80	4.94
11/1/2008	4.58	0.00		55		4.576	4.58	5.04
11/2/2008	4.43	0.00		45		4.426	4.43	5.15
11/3/2008	4.40	0.00		48		4.401	4.40	5.25
11/4/2008	4.32	0.00		62		4.321	4.32	5.33
11/5/2008	4.26	0.00		62		4.263	4.26	5.39
11/6/2008	5.09	0.25		59	5.094		5.09	5.44
11/7/2008	4.59	0.04		60		4.592	4.59	5.45
11/8/2008	4.75	0.14		60	4.749		4.75	5.47
11/9/2008	4.48	0.01		57		4.478	4.48	5.48
11/10/2008	4.30	0.00		51		4.302	4.30	5.50
11/11/2008	4.26	0.00		46		4.258	4.26	5.59
11/12/2008	4.21	0.00		47		4.207	4.21	5.71
11/13/2008	4.40	0.16		49	4.399		4.40	5.83
11/14/2008	5.84	0.37		55	5.843		5.84	5.94
11/15/2008	5.58	0.21		66	5.575		5.58	6.00
11/16/2008	6.05	0.17		64	6.052		6.05	6.07
11/17/2008	5.02	0.00		46		5.018	5.02	6.13
11/18/2008	4.92	0.00		39		4.918	4.92	6.20
11/19/2008	4.77	0.00		33		4.768	4.77	6.26
11/20/2008	4.62	0.00		32		4.617	4.62	6.31
11/21/2008	4.41	0.00		33		4.414	4.41	6.39
11/22/2008	4.19	0.00		28		4.191	4.19	6.43
11/23/2008	4.07	0.00		31		4.068	4.07	6.48
11/24/2008	4.05	0.01		42		4.048	4.05	6.52
11/25/2008	10.50	1.00	0	52	10.497		7.73	6.58
11/26/2008	6.94	0.00		44	6.938		6.94	6.58
11/27/2008	5.68	0.00		45	5.684		5.68	6.60
11/28/2008	6.13	0.23		43	6.128		6.13	6.67
11/29/2008	5.48	0.00	0	44	5.476		5.48	6.72
11/30/2008	7.81	0.56		43	7.807		7.73	6.80
12/1/2008	10.33	0.13	0	45	10.331		7.73	6.80
12/2/2008	7.49	0.00		47	7.494		7.49	6.80
12/3/2008	6.74	0.00		43		6.739	6.74	6.79
12/4/2008	6.21	0.00		48		6.213	6.21	6.79
12/5/2008	5.74	0.00		38		5.735	5.74	6.80
12/6/2008	5.44	0.00		34		5.436	5.44	6.80
12/7/2008	5.28	0.00		33		5.275	5.28	6.81
12/8/2008	4.97	0.00		19		4.969	4.97	6.82
12/9/2008	4.90	0.02		51		4.9	4.90	6.86

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
12/10/2008	7.22	0.63		61	7.223		7.22	6.90
12/11/2008	8.24	0.56	0	37	8.235		7.73	6.85
12/12/2008	18.96	1.57		36	18.963		7.73	6.77
12/13/2008	12.92	0.00		27	12.924		7.73	6.69
12/14/2008	9.94	0.00		38	9.938		7.73	6.61
12/15/2008	8.62	0.00		62	8.62		7.73	6.52
12/16/2008	7.75	0.05	0	61	7.753		7.73	6.43
12/17/2008	7.18	0.30	3	28	7.184		7.18	6.33
12/18/2008	6.67	0.12	4	36	6.668		6.67	6.25
12/19/2008	6.32	0.00		26	6.315		6.32	6.18
12/20/2008	6.99	0.02	13	15	6.989		6.99	6.12
12/21/2008	5.72	0.02		24	5.721		5.72	6.04
12/22/2008	5.48	0.00	12	25	5.484		5.48	6.00
12/23/2008	5.36	0.00		25		5.356	5.36	5.96
12/24/2008	5.83	0.25		50	5.831		5.83	5.93
12/25/2008	10.52	0.05		51	10.517		7.73	5.88
12/26/2008	7.96	0.00		33	7.962		7.73	5.76
12/27/2008	7.56	0.01	6	41	7.563		7.56	5.65
12/28/2008	11.45	0.00	4	58	11.446		7.73	5.53
12/29/2008	12.38	0.00		44	12.38		7.73	5.41
12/30/2008	10.19	0.05	1	39	10.189		7.73	5.30
12/31/2008	8.75	0.09		22	8.751		7.73	5.18
1/1/2009	7.30	0.00		13		7.301	7.30	5.06
1/2/2009	6.83	0.00		27		6.828	6.83	4.97
1/3/2009	6.33	0.00		29		6.325	6.33	4.89
1/4/2009	5.92	0.00		33	5.923		5.92	4.85
1/5/2009	5.80	0.04	1	37	5.801		5.80	4.80
1/6/2009	5.53	0.00		33	5.527		5.53	4.75
1/7/2009	6.19	0.65		36	6.185		6.19	4.71
1/8/2009	6.04	0.04		35	6.043		6.04	4.64
1/9/2009	5.59	0.00		26	5.593		5.59	4.58
1/10/2009	5.33	0.00		25		5.326	5.33	4.57
1/11/2009	5.36	0.02		24		5.358	5.36	4.55
1/12/2009	5.27	0.00	10	27		5.269	5.27	4.53
1/13/2009	5.15	0.05		36	5.147		5.15	4.53
1/14/2009	5.05	0.00		31		5.047	5.05	4.62
1/15/2009	4.84	0.00		15		4.843	4.84	4.70
1/16/2009	4.66	0.00		16		4.662	4.66	4.78
1/17/2009	4.59	0.00		18		4.585	4.59	4.84
1/18/2009	4.47	0.21		22	4.467		4.47	4.90
1/19/2009	4.69	0.13	17	30	4.686		4.69	4.95
1/20/2009	4.47	0.00		28		4.466	4.47	4.99
1/21/2009	4.44	0.00		24		4.437	4.44	5.10

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
1/22/2009	4.34	0.00		35	4.342		4.34	5.21
1/23/2009	4.28	0.03		35	4.282		4.28	5.31
1/24/2009	4.28	0.00		39	4.284		4.28	5.42
1/25/2009	4.16	0.00		24			4.16	5.54
1/26/2009	4.17	0.00		22		4.166	4.17	5.66
1/27/2009	4.12	0.00		26		4.115	4.12	5.78
1/28/2009	4.28	0.88		35	4.28		4.28	5.89
1/29/2009	4.36	0.00	16	33	4.363		4.36	6.00
1/30/2009	4.10	0.00		36	4.095		4.10	6.11
1/31/2009	4.37	0.00		27	4.37		4.37	6.23
2/1/2009	4.67	0.00		33	4.67		4.67	6.35
2/2/2009	4.87	0.00		40	4.87		4.87	6.45
2/3/2009	4.61	0.04		35	4.61		4.61	6.52
2/4/2009	4.36	0.00	16	24		4.36	4.36	6.60
2/5/2009	4.23	0.00		15		4.234	4.23	6.68
2/6/2009	4.22	0.00		27		4.222	4.22	6.79
2/7/2009	4.16	0.00		41	4.162		4.16	6.91
2/8/2009	5.22	0.00		50	5.218		5.22	7.03
2/9/2009	4.79	0.00		31		4.792	4.79	7.11
2/10/2009	4.71	0.00		33	4.713		4.71	7.21
2/11/2009	5.22	0.00		55	5.223		5.22	7.31
2/12/2009	8.72	0.30		46	8.719		7.73	7.40
2/13/2009	8.26	0.00		40	8.262		7.73	7.40
2/14/2009	7.10	0.00		38	7.099		7.10	7.40
2/15/2009	6.52	0.00		37	6.515		6.52	7.42
2/16/2009	6.34	0.00		36	6.339		6.34	7.45
2/17/2009	6.04	0.00		35	6.038		6.04	7.48
2/18/2009	5.94	0.17		35	5.942		5.94	7.53
2/19/2009	11.08	0.50		39	11.08		7.73	7.56
2/20/2009	8.33	0.00		28	8.331		7.73	7.52
2/21/2009	7.25	0.00		35	7.252		7.25	7.48
2/22/2009	10.40	0.99		39	10.403		7.73	7.44
2/23/2009	11.49	0.00	10	31	11.486		7.73	7.38
2/24/2009	9.07	0.00		31	9.065		7.73	7.31
2/25/2009	7.96	0.00		34	7.96		7.73	7.25
2/26/2009	7.37	0.00		44	7.374		7.37	7.21
2/27/2009	8.60	0.12		57	8.599		7.73	7.15
2/28/2009	11.76	0.02	5	49	11.756		7.73	7.14
3/1/2009	9.88	0.06		23	9.88		7.73	7.14
3/2/2009	8.57	0.24	15	24	8.572		7.73	7.12
3/3/2009	7.71	0.00		26		7.712	7.71	7.08
3/4/2009	7.11	0.00		29		7.113	7.11	7.05
3/5/2009	6.79	0.00		38	6.79		6.79	7.07

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
3/6/2009	6.83	0.00		48	6.828		6.83	7.10
3/7/2009	7.89	0.08		56	7.894		7.73	7.12
3/8/2009	11.01	0.08		54	11.013		7.73	7.12
3/9/2009	10.78	0.12	2	39	10.777		7.73	7.12
3/10/2009	9.96	0.04		43	9.962		7.73	7.12
3/11/2009	12.37	0.34		50	12.371		7.73	7.12
3/12/2009	10.86	0.00		37	10.862		7.73	7.11
3/13/2009	9.49	0.00		32	9.494		7.73	7.11
3/14/2009	8.60	0.00		51	8.597		7.73	7.07
3/15/2009	8.07	0.00		51	8.071		7.73	7.02
3/16/2009	7.77	0.00		37	7.768		7.73	6.96
3/17/2009	7.42	0.00		43		7.422	7.42	6.90
3/18/2009	7.34	0.00		61		7.342	7.34	6.84
3/19/2009	7.40	0.00		48		7.398	7.40	6.77
3/20/2009	7.04	0.00		37		7.042	7.04	6.70
3/21/2009	6.58	0.00		40		6.581	6.58	6.63
3/22/2009	6.33	0.00		47		6.33	6.33	6.58
3/23/2009	6.15	0.00		31		6.151	6.15	6.63
3/24/2009	5.88	0.00		45		5.879	5.88	6.68
3/25/2009	5.81	0.00		50		5.806	5.81	6.74
3/26/2009	5.81	0.20		49	5.805		5.81	6.80
3/27/2009	6.43	0.13		53	6.43		6.43	6.84
3/28/2009	5.67	0.00		44		5.673	5.67	6.84
3/29/2009	7.49	0.42	0	41	7.494		7.49	6.85
3/30/2009	8.02	0.20		43	8.018		7.73	6.79
3/31/2009	6.93	0.00	0	50	6.929		6.93	6.72
4/1/2009	6.55	0.11		42	6.552		6.55	6.66
4/2/2009	6.83	0.07		56	6.827		6.83	6.62
4/3/2009	9.82	0.76		48	9.817		7.73	6.55
4/4/2009	8.85	0.01		52	8.854		7.73	6.46
4/5/2009	7.60	0.00		57	7.595		7.60	6.36
4/6/2009	10.42	1.10		47	10.417		7.73	6.30
4/7/2009	12.68	0.00	0	50	12.684		7.73	6.25
4/8/2009	9.45	0.00		45	9.45		7.73	6.25
4/9/2009	8.13	0.00		59	8.128		7.73	6.23
4/10/2009	7.35	0.02		63	7.346		7.35	6.23
4/11/2009	7.56	0.24		46	7.555		7.56	6.21
4/12/2009	6.59	0.00	0	43		6.59	6.59	6.16
4/13/2009	6.32	0.00		53		6.317	6.32	6.13
4/14/2009	6.01	0.00		54		6.008	6.01	6.10
4/15/2009	5.78	0.00		41		5.775	5.78	6.08
4/16/2009	5.60	0.00		49		5.601	5.60	6.06
4/17/2009	5.41	0.00		68		5.408	5.41	6.04

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
4/18/2009	5.17	0.03		58		5.172	5.17	6.07
4/19/2009	5.03	0.00		52		5.031	5.03	6.06
4/20/2009	4.97	0.00		49		4.967	4.97	6.05
4/21/2009	13.05	1.53	0	52	13.049		7.73	6.04
4/22/2009	9.87	0.27	0	64	9.869		7.73	5.93
4/23/2009	9.01	0.08	0	56	9.01		7.73	5.82
4/24/2009	7.62	0.00		70	7.623		7.62	5.70
4/25/2009	6.94	0.00		87	6.939		6.94	5.59
4/26/2009	6.38	0.00		82	6.382		6.38	5.49
4/27/2009	6.04	0.00	0	58	6.037		6.04	5.41
4/28/2009	5.78	0.00		93		5.784	5.78	5.37
4/29/2009	5.48	0.00		58		5.478	5.48	5.41
4/30/2009	5.30	0.00		64		5.297	5.30	5.43
5/1/2009	5.18	0.03		69		5.177	5.18	5.43
5/2/2009	4.93	0.00		68		4.932	4.93	5.42
5/3/2009	4.82	0.00		63		4.82	4.82	5.41
5/4/2009	4.73	0.00		67		4.73	4.73	5.39
5/5/2009	5.79	0.37		52	5.791		5.79	5.38
5/6/2009	6.48	0.36		64	6.481		6.48	5.32
5/7/2009	10.74	1.15		58	10.74		7.73	5.24
5/8/2009	7.13	0.00		74	7.134		7.13	5.11
5/9/2009	7.59	0.40		71	7.594		7.59	5.00
5/10/2009	6.65	0.00		66	6.65		6.65	4.88
5/11/2009	6.04	0.00		58	6.042		6.04	4.79
5/12/2009	5.73	0.00		61		5.725	5.73	4.72
5/13/2009	5.42	0.00		67		5.42	5.42	4.65
5/14/2009	5.56	0.20		61	5.56		5.56	4.73
5/15/2009	5.12	0.00		74		5.123	5.12	4.70
5/16/2009	4.86	0.00		58		4.855	4.86	4.75
5/17/2009	6.36	0.46		64	6.361		6.36	4.76
5/18/2009	4.99	0.00		53	4.988		4.99	4.70
5/19/2009	4.82	0.00		63		4.823	4.82	4.69
5/20/2009	4.59	0.00		74		4.586	4.59	4.70
5/21/2009	4.48	0.00		90		4.477	4.48	4.80
5/22/2009	4.40	0.00		89		4.402	4.40	4.91
5/23/2009	4.20	0.00		65		4.203	4.20	5.01
5/24/2009	4.10	0.00		75		4.103	4.10	5.12
5/25/2009	4.06	0.00		76		4.055	4.06	5.22
5/26/2009	4.09	0.00		56		4.086	4.09	5.34
5/27/2009	4.80	0.40		50	4.804		4.80	5.44
5/28/2009	6.80	0.62		48	6.8		6.80	5.50
5/29/2009	6.02	0.28		59	6.023		6.02	5.48
5/30/2009	5.48	0.18		77	5.477		5.48	5.49

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
5/31/2009	4.85	0.13		76	4.848		4.85	5.56
6/1/2009	4.58	0.00		70	4.579		4.58	5.65
6/2/2009	4.40	0.00		76		4.399	4.40	5.73
6/3/2009	4.19	0.00		73		4.186	4.19	5.84
6/4/2009	4.15	0.00		70		4.145	4.15	5.96
6/5/2009	4.04	0.00		64		4.043	4.04	6.08
6/6/2009	3.90	0.00		66		3.903	3.90	6.20
6/7/2009	3.84	0.00		76		3.839	3.84	6.33
6/8/2009	3.86	0.00		71		3.856	3.86	6.46
6/9/2009	3.95	0.09		58	3.946		3.95	6.58
6/10/2009	3.84	0.00		61		3.841	3.84	6.68
6/11/2009	3.81	0.21		59	3.814		3.81	6.77
6/12/2009	10.57	1.57		77	10.57		7.73	6.84
6/13/2009	4.59	0.17		72	4.589		4.59	6.78
6/14/2009	6.65	0.43		59	6.651		6.65	6.81
6/15/2009	5.15	0.00		61	5.152		5.15	6.76
6/16/2009	4.79	0.00		67	4.785		4.79	6.75
6/17/2009	4.55	0.00		75	4.549		4.55	6.75
6/18/2009	5.10	0.47		63	5.098		5.10	6.76
6/19/2009	14.48	1.50		68	14.48		7.73	6.78
6/20/2009	7.71	0.00		76	7.711		7.71	6.67
6/21/2009	7.33	0.23		66	7.334		7.33	6.56
6/22/2009	7.62	0.17		64	7.621		7.62	6.52
6/23/2009	6.86	0.12		66	6.861		6.86	6.45
6/24/2009	9.22	0.31		68	9.221		7.73	6.39
6/25/2009	7.28	0.01		77	7.283		7.28	6.39
6/26/2009	6.62	0.01		83	6.623		6.62	6.41
6/27/2009	6.13	0.00				6.126	6.13	6.44
6/28/2009	6.17	0.37			6.165		6.17	6.50
6/29/2009	7.53	0.42		64	7.525		7.53	6.52
6/30/2009	7.93	0.16		66	7.925		7.73	6.49
7/1/2009	7.02	0.04		60		7.022	7.02	6.43
7/2/2009	13.76	1.61		59	13.761		7.73	6.45
7/3/2009	13.93	1.29		74	13.929		7.73	6.43
7/4/2009	11.85	0.11		78	11.853		7.73	6.39
7/5/2009	9.04	0.00		79	9.037		7.73	6.33
7/6/2009	7.71	0.00		77	7.71		7.71	6.26
7/7/2009	8.35	0.49		60	8.348		7.73	6.18
7/8/2009	7.52	0.11		61	7.52		7.52	6.09
7/9/2009	6.80	0.00		68	6.8		6.80	6.01
7/10/2009	6.72	0.00		76		6.723	6.72	5.93
7/11/2009	5.79	0.03		77		5.787	5.79	5.85
7/12/2009	5.89	0.16		80	5.893		5.89	5.81

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
7/13/2009	5.50	0.00		77		5.498	5.50	5.83
7/14/2009	5.07	0.00		73		5.068	5.07	5.80
7/15/2009	4.90	0.00		79		4.898	4.90	5.79
7/16/2009	4.80	0.00		79		4.801	4.80	5.77
7/17/2009	4.77	0.01		80		4.772	4.77	5.75
7/18/2009	5.75	0.38		80	5.746		5.75	5.73
7/19/2009	4.49	0.00		80		4.487	4.49	5.68
7/20/2009	4.52	0.00		78		4.516	4.52	5.67
7/21/2009	6.02	0.52		66	6.017		6.02	5.65
7/22/2009	5.68	0.13		75	5.678		5.68	5.59
7/23/2009	4.98	0.10		70	4.975		4.98	5.59
7/24/2009	18.04	2.85		67	18.039		7.73	5.57
7/25/2009	12.05	0.00		80	12.053		7.73	5.47
7/26/2009	8.85	0.00		82	8.845		7.73	5.36
7/27/2009	8.16	0.19		85	8.164		7.73	5.24
7/28/2009	6.97	0.00		87	6.966		6.97	5.11
7/29/2009	6.38	0.01		85	6.375		6.38	5.00
7/30/2009	6.05	0.04		84	6.048		6.05	4.91
7/31/2009	9.86	0.92		79	9.86		7.73	4.97
8/1/2009	7.16	0.00		82	7.159		7.16	4.91
8/2/2009	6.33	0.00		74	6.33		6.33	4.84
8/3/2009	5.99	0.00		83	5.986		5.99	4.77
8/4/2009	5.66	0.00		82	5.664		5.66	4.73
8/5/2009	5.45	0.04		86	5.446		5.45	4.68
8/6/2009	5.04	0.00		77		5.044	5.04	4.64
8/7/2009	4.88	0.00		78		4.879	4.88	4.61
8/8/2009	4.55	0.00		74		4.553	4.55	4.57
8/9/2009	4.38	0.00		77		4.384	4.38	4.55
8/10/2009	4.50	0.00		87		4.495	4.50	4.53
8/11/2009	6.51	0.70		79	6.513		6.51	4.51
8/12/2009	4.62	0.00		73	4.622		4.62	4.42
8/13/2009	4.56	0.00		70	4.555		4.56	4.39
8/14/2009	4.48	0.00		82		4.475	4.48	4.43
8/15/2009	4.27	0.00		89		4.274	4.27	4.44
8/16/2009	4.08	0.00		88		4.076	4.08	4.43
8/17/2009	4.24	0.00		90		4.239	4.24	4.41
8/18/2009	4.14	0.00		93		4.14	4.14	4.40
8/19/2009	4.10	0.00		90		4.097	4.10	4.38
8/20/2009	4.15	0.00		80		4.149	4.15	4.35
8/21/2009	5.49	0.38		89	5.492		5.49	4.32
8/22/2009	4.50	0.19		82	4.498		4.50	4.24
8/23/2009	4.64	0.26		86	4.636		4.64	4.19
8/24/2009	4.49	0.15		81	4.49		4.49	4.13

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
8/25/2009	4.06	0.00		79		4.057	4.06	4.08
8/26/2009	3.95	0.00		85		3.951	3.95	4.06
8/27/2009	3.75	0.00		74		3.751	3.75	4.04
8/28/2009	3.64	0.13		68	3.641		3.64	4.02
8/29/2009	13.77	2.02		59	13.769		7.73	4.04
8/30/2009	6.00	0.00		71	6.003		6.00	3.93
8/31/2009	5.11	0.00		71	5.112		5.11	3.89
9/1/2009	4.24	0.00		72	4.24		4.24	3.84
9/2/2009	4.73	0.00		76	4.734		4.73	3.81
9/3/2009	4.11	0.00		78	4.111		4.11	3.77
9/4/2009	4.29	0.00		77	4.287		4.29	3.81
9/5/2009	4.00	0.00		80	3.997		4.00	3.79
9/6/2009	3.86	0.00		65	3.861		3.86	3.79
9/7/2009	3.81	0.00		68		3.81	3.81	3.78
9/8/2009	3.87	0.00		77		3.871	3.87	3.91
9/9/2009	3.77	0.00		70		3.768	3.77	3.92
9/10/2009	3.80	0.00		64		3.799	3.80	3.93
9/11/2009	3.76	0.01		62		3.762	3.76	3.93
9/12/2009	5.84	0.64		62	5.835		5.84	3.93
9/13/2009	4.66	0.00		79	4.662		4.66	3.86
9/14/2009	3.96	0.00		74	3.962		3.96	3.84
9/15/2009	3.76	0.00		75		3.758	3.76	3.84
9/16/2009	3.77	0.00		61		3.769	3.77	3.83
9/17/2009	3.51	0.00		61		3.509	3.51	3.84
9/18/2009	3.36	0.03		72		3.36	3.36	3.85
9/19/2009	3.11	0.00		63		3.11	3.11	3.91
9/20/2009	3.04	0.00		73		3.039	3.04	3.95
9/21/2009	3.05	0.00		70		3.046	3.05	3.96
9/22/2009	2.98	0.01		74		2.981	2.98	3.97
9/23/2009	3.02	0.00		82		3.024	3.02	3.99
9/24/2009	3.26	0.00		77		3.261	3.26	4.00
9/25/2009	3.35	0.00		65		3.352	3.35	4.10
9/26/2009	3.32	0.00		59		3.319	3.32	4.17
9/27/2009	4.06	0.33		64	4.059		4.06	4.20
9/28/2009	4.60	0.61		74	4.602		4.60	4.21
9/29/2009	4.70	0.09		68	4.699		4.70	4.30
9/30/2009	3.50	0.00		60	3.5		3.50	4.32
10/1/2009	3.48	0.00		54		3.479	3.48	4.37
10/2/2009	3.40	0.00		59		3.395	3.40	4.40
10/3/2009	5.47	0.75		62	5.467		5.47	4.43
10/4/2009	3.77	0.00		65	3.773		3.77	4.40
10/5/2009	3.81	0.00		65	3.805		3.81	4.41
10/6/2009	3.66	0.00		65		3.66	3.66	4.42

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
10/7/2009	7.70	0.94		66	7.7		7.70	4.44
10/8/2009	4.16	0.00		61	4.163		4.16	4.32
10/9/2009	4.00	0.04		60	4.003		4.00	4.31
10/10/2009	3.99	0.07		64	3.986		3.99	4.30
10/11/2009	3.66	0.00		58		3.663	3.66	4.29
10/12/2009	3.60	0.00		55		3.603	3.60	4.29
10/13/2009	4.26	0.24		50	4.256		4.26	4.29
10/14/2009	3.77	0.00		51		3.765	3.77	4.27
10/15/2009	3.69	0.00		42		3.689	3.69	4.26
10/16/2009	3.91	0.00		45		3.909	3.91	4.40
10/17/2009	3.74	0.00		50		3.744	3.74	4.52
10/18/2009	5.23	0.49		41	5.226		5.23	4.66
10/19/2009	4.24	0.00		56	4.235		4.24	4.71
10/20/2009	3.47	0.00		63		3.465	3.47	4.77
10/21/2009	3.36	0.00		65		3.36	3.36	4.84
10/22/2009	3.41	0.03		56		3.405	3.41	4.93
10/23/2009	3.46	0.00		46		3.461	3.46	4.98
10/24/2009	6.39	0.93		64	6.386		6.39	5.03
10/25/2009	5.35	0.00		63	5.348		5.35	4.97
10/26/2009	4.23	0.00		59	4.232		4.23	4.95
10/27/2009	4.22	0.02		52	4.219		4.22	4.96
10/28/2009	7.50	0.65		48	7.498		7.50	4.96
10/29/2009	5.34	0.00		51	5.344		5.34	4.97
10/30/2009	4.75	0.00		53	4.746		4.75	5.05
10/31/2009	4.63	0.06		73	4.634		4.63	5.11
11/1/2009	4.27	0.00		60		4.266	4.27	5.17
11/2/2009	4.31	0.00		50		4.312	4.31	5.22
11/3/2009	4.26	0.00		56		4.256	4.26	5.26
11/4/2009	4.09	0.00		49		4.092	4.09	5.38
11/5/2009	4.17	0.00		45		4.173	4.17	5.50
11/6/2009	4.11	0.00		47		4.112	4.11	5.60
11/7/2009	3.86	0.00		48		3.855	3.86	5.70
11/8/2009	3.76	0.00		66		3.758	3.76	5.79
11/9/2009	3.70	0.00		69		3.695	3.70	5.87
11/10/2009	3.65	0.00		65		3.648	3.65	6.00
11/11/2009	3.67	0.00		50		3.668	3.67	6.14
11/12/2009	3.56	0.00		50		3.564	3.56	6.27
11/13/2009	3.57	0.00		49		3.571	3.57	6.41
11/14/2009	11.95	2.73	0	54	11.945		7.73	6.55
11/15/2009	13.88	0.07	0	61	13.883		7.73	6.55
11/16/2009	8.23	0.00		57	8.231		7.73	6.55
11/17/2009	6.69	0.00		50	6.686		6.69	6.52
11/18/2009	6.03	0.00		52	6.027		6.03	6.51

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
11/19/2009	5.61	0.00		60	5.605		5.61	6.51
11/20/2009	6.01	0.17		64	6.012		6.01	6.52
11/21/2009	5.13	0.00		59	5.132		5.13	6.50
11/22/2009	4.84	0.00		48	4.843		4.84	6.51
11/23/2009	4.72	0.00		47	4.718		4.72	6.52
11/24/2009	4.67	0.01	0	50	4.674		4.67	6.52
11/25/2009	4.57	0.05		47	4.574		4.57	6.53
11/26/2009	4.18	0.02	0	47	4.176		4.18	6.51
11/27/2009	11.28	1.12		45	11.28		7.73	6.52
11/28/2009	8.17	0.02	0	49	8.173		7.73	6.52
11/29/2009	6.64	0.00	0	53	6.637		6.64	6.48
11/30/2009	6.44	0.08		48	6.442		6.44	6.46
12/1/2009	5.85	0.00		42	5.853		5.85	6.43
12/2/2009	5.47	0.03		50		5.47	5.47	6.41
12/3/2009	12.12	1.02		68	12.116		7.73	6.40
12/4/2009	7.93	0.00		53	7.931		7.73	6.32
12/5/2009	7.10	0.18		41	7.096		7.10	6.23
12/6/2009	7.33	0.09		35	7.334		7.33	6.17
12/7/2009	6.42	0.00	4	34	6.418		6.42	6.08
12/8/2009	6.09	0.00	2	38	6.087		6.09	6.02
12/9/2009	14.32	1.52	0	45	14.324		7.73	5.97
12/10/2009	13.23	0.00	0	42	13.225		7.73	5.85
12/11/2009	9.24	0.00	0	28	9.243		7.73	5.73
12/12/2009	7.66	0.00	0	31	7.664		7.66	5.61
12/13/2009	9.87	0.69		41	9.865		7.73	5.49
12/14/2009	8.74	0.00		42	8.737		7.73	5.37
12/15/2009	7.63	0.00		46	7.629		7.63	5.24
12/16/2009	7.00	0.00		35		7.001	7.00	5.12
12/17/2009	6.43	0.00		19		6.427	6.43	5.02
12/18/2009	5.99	0.00		26		5.993	5.99	4.94
12/19/2009	5.75	0.00		29		5.748	5.75	4.88
12/20/2009	5.55	0.05	5	24	5.547		5.55	4.86
12/21/2009	5.34	0.01	5	29		5.342	5.34	4.83
12/22/2009	5.12	0.00	5	29		5.117	5.12	4.80
12/23/2009	4.91	0.00	4	22		4.914	4.91	4.78
12/24/2009	4.80	0.00	3	44	4.803		4.80	4.77
12/25/2009	4.05	0.00	3	34	4.048		4.05	4.74
12/26/2009	4.38	0.04	4	43	4.379		4.38	4.75
12/27/2009	9.53	0.54	0	50	9.526		7.73	4.86
12/28/2009	6.61	0.11	0	41	6.614		6.61	4.86
12/29/2009	5.94	0.00	0	29		5.94	5.94	4.89
12/30/2009	5.54	0.00	0	24		5.539	5.54	4.94
12/31/2009	5.34	0.05	1	28	5.339		5.34	4.96

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
1/1/2010	5.16	0.04	1	33	5.16		5.16	4.98
1/2/2010	5.34	0.10	5	27	5.338		5.34	4.99
1/3/2010	5.16	0.01	8	32	5.161		5.16	4.99
1/4/2010	5.04	0.00	7	32	5.039		5.04	4.98
1/5/2010	4.82	0.00	7	33	4.816		4.82	4.98
1/6/2010	4.60	0.00	6	32	4.596		4.60	4.97
1/7/2010	4.46	0.00	5	36	4.455		4.46	4.97
1/8/2010	4.34	0.00	5	25		4.34	4.34	4.96
1/9/2010	4.12	0.00	5	23		4.121	4.12	4.96
1/10/2010	4.05	0.00	4	26		4.051	4.05	4.96
1/11/2010	4.14	0.00	4	33	4.143		4.14	4.96
1/12/2010	4.02	0.00	4	28		4.021	4.02	4.96
1/13/2010	3.99	0.00	3	27		3.986	3.99	4.96
1/14/2010	3.95	0.00	3	32	3.95		3.95	4.96
1/15/2010	4.03	0.00	2	43	4.029		4.03	4.97
1/16/2010	3.80	0.00	2	47	3.796		3.80	4.97
1/17/2010	4.25	0.17	2	38	4.25		4.25	4.97
1/18/2010	5.15	0.22	5	33	5.148		5.15	4.96
1/19/2010	4.62	0.39	8	32	4.615		4.62	4.93
1/20/2010	4.64	0.05		34	4.641		4.64	4.92
1/21/2010	4.54	0.00	10	35	4.543		4.54	4.91
1/22/2010	4.37	0.00	10	34	4.369		4.37	4.89
1/23/2010	4.15	0.00	10	34	4.153		4.15	4.88
1/24/2010	4.10	0.05	9	38	4.103		4.10	4.87
1/25/2010	11.47	0.78	2	51	11.472		7.73	4.87
1/26/2010	11.42	0.00	0	46	11.421		7.73	4.87
1/27/2010	8.18	0.00	0	44	8.179		7.73	4.87
1/28/2010	7.16	0.00	0	35		7.164	7.16	4.87
1/29/2010	6.32	0.00	0	18		6.321	6.32	4.89
1/30/2010	5.76	0.00	0	22		5.76	5.76	4.94
1/31/2010	5.59	0.00	0	28		5.592	5.59	5.00
2/1/2010	5.30	0.00	0	34		5.297	5.30	5.07
2/2/2010	5.02	0.00	0	31		5.024	5.02	5.15
2/3/2010	4.86	0.00	0	31		4.862	4.86	5.24
2/4/2010	4.64	0.00	0	30		4.639	4.64	5.34
2/5/2010	4.43	0.00	0	33		4.429	4.43	5.42
2/6/2010	4.35	0.00	0	24		4.353	4.35	5.49
2/7/2010	4.20	0.00	0	30		4.197	4.20	5.56
2/8/2010	4.13	0.00	0	31		4.126	4.13	5.62
2/9/2010	4.05	0.00	0	41		4.054	4.05	5.68
2/10/2010	4.18	0.00	0	34		4.176	4.18	5.73
2/11/2010	4.17	0.00	0	42		4.169	4.17	5.78
2/12/2010	3.99	0.00	0	39		3.99	3.99	5.84

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
2/13/2010	4.09	0.00	0	39		4.089	4.09	5.97
2/14/2010	4.00	0.00	0	38		4.003	4.00	6.09
2/15/2010	3.92	0.00	0	42		3.915	3.92	6.21
2/16/2010	3.92	0.06	6	36	3.923		3.92	6.34
2/17/2010	4.08	0.13	8	37	4.084		4.08	6.47
2/18/2010	4.43	0.18	6	45	4.433		4.43	6.59
2/19/2010	4.24	0.00	4	39	4.237		4.24	6.70
2/20/2010	4.05	0.00	3	47	4.051		4.05	6.82
2/21/2010	3.98	0.00	2	38	3.984		3.98	6.93
2/22/2010	4.04	0.00	0	45		4.039	4.04	7.06
2/23/2010	4.01	0.00	0	38		4.013	4.01	7.18
2/24/2010	11.26	1.04	0	41	11.262		7.73	7.30
2/25/2010	17.80	1.55	0	43	17.804		7.73	7.30
2/26/2010	19.97	0.24	0	43	19.966		7.73	7.30
2/27/2010	16.77	0.33	1	37	16.772		7.73	7.30
2/28/2010	13.10	0.00	0	38	13.095		7.73	7.30
3/1/2010	14.82	0.15	0	48	14.824		7.73	7.30
3/2/2010	11.38	0.00	0	44	11.378		7.73	7.30
3/3/2010	9.72	0.00	0	37	9.717		7.73	7.30
3/4/2010	8.82	0.01	0	37	8.818		7.73	7.30
3/5/2010	8.00	0.00		48	8.002		7.73	7.30
3/6/2010	7.12	0.00		57	7.121		7.12	7.30
3/7/2010	6.56	0.00		58	6.557		6.56	7.32
3/8/2010	6.36	0.00		57	6.363		6.36	7.36
3/9/2010	6.01	0.00		49		6.007	6.01	7.39
3/10/2010	5.74	0.00		46		5.743	5.74	7.41
3/11/2010	5.69	0.13		44	5.686		5.69	7.48
3/12/2010	5.59	0.01		41		5.592	5.59	7.52
3/13/2010	6.16	0.27		42	6.155		6.16	7.54
3/14/2010	19.53	3.04		40	19.53		7.73	7.53
3/15/2010	19.93	1.30		45	19.927		7.73	7.46
3/16/2010	19.80	0.00		55	19.8		7.73	7.39
3/17/2010	16.35	0.00		65	16.351		7.73	7.31
3/18/2010	12.60	0.00		64	12.603		7.73	7.27
3/19/2010	10.36	0.00		62	10.355		7.73	7.27
3/20/2010	8.93	0.00		71	8.927		7.73	7.25
3/21/2010	7.96	0.00		49	7.963		7.73	7.20
3/22/2010	7.58	0.07		44	7.576		7.58	7.13
3/23/2010	16.20	2.30		43	16.201		7.73	7.05
3/24/2010	17.20	0.16	0	46	17.203		7.73	6.96
3/25/2010	13.73	0.00		62	13.726		7.73	6.87
3/26/2010	11.91	0.17		46	11.913		7.73	6.76
3/27/2010	9.65	0.00		35	9.649		7.73	6.64

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
3/28/2010	8.64	0.00		42	8.642		7.73	6.53
3/29/2010	13.25	1.35		51	13.25		7.73	6.42
3/30/2010	18.50	3.01		48	18.495		7.73	6.32
3/31/2010	18.53	0.08		48	18.532		7.73	6.21
4/1/2010	16.66	0.00		61	16.663		7.73	6.09
4/2/2010	13.70	0.00		61	13.695		7.73	5.96
4/3/2010	11.11	0.00		72	11.106		7.73	5.83
4/4/2010	9.55	0.00		76	9.55		7.73	5.70
4/5/2010	8.47	0.00		68	8.474		7.73	5.56
4/6/2010	7.73	0.02		65	7.726		7.73	5.42
4/7/2010	7.18	0.00	0	87	7.18		7.18	5.29
4/8/2010	6.64	0.00		59	6.644		6.64	5.17
4/9/2010	7.86	0.48		50	7.855		7.73	5.12
4/10/2010	6.90	0.00	0	58	6.898		6.90	4.99
4/11/2010	6.19	0.00		67		6.19	6.19	4.89
4/12/2010	5.93	0.00		58		5.925	5.93	4.81
4/13/2010	5.71	0.00	0	52		5.705	5.71	4.74
4/14/2010	5.54	0.00		65		5.542	5.54	4.67
4/15/2010	5.39	0.00		56		5.386	5.39	4.62
4/16/2010	6.45	0.00		43	6.453		6.45	4.56
4/17/2010	9.21	0.00	0	40	9.211		7.73	4.47
4/18/2010	7.10	0.00	0	50	7.098		7.10	4.33
4/19/2010	6.37	0.00	0	60		6.373	6.37	4.22
4/20/2010	5.58	0.00		68		5.58	5.58	4.27
4/21/2010	5.27	0.00		68		5.268	5.27	4.30
4/22/2010	5.01	0.00		69		5.005	5.01	4.31
4/23/2010	4.78	0.00		60		4.778	4.78	4.31
4/24/2010	4.43	0.00		63		4.427	4.43	4.30
4/25/2010	4.37	0.00		60		4.374	4.37	4.30
4/26/2010	4.37	0.00		58		4.368	4.37	4.30
4/27/2010	4.41	0.00		48		4.414	4.41	4.30
4/28/2010	4.68	0.00		45		4.681	4.68	4.28
4/29/2010	4.52	0.00	0	57		4.516	4.52	4.25
4/30/2010	4.03	0.00		72		4.034	4.03	4.21
5/1/2010	3.86	0.00		74		3.855	3.86	4.19
5/2/2010	3.78	0.00		76		3.779	3.78	4.17
5/3/2010	3.83	0.00		82		3.832	3.83	4.15
5/4/2010	3.67	0.00		80		3.666	3.67	4.13
5/5/2010	3.59	0.00		77		3.589	3.59	4.22
5/6/2010	3.56	0.02		75		3.558	3.56	4.24
5/7/2010	3.66	0.00		68		3.662	3.66	4.27
5/8/2010	5.15	0.61		54	5.152		5.15	4.37
5/9/2010	3.92	0.00		52	3.919		3.92	4.35

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
5/10/2010	3.87	0.00		56	3.865		3.87	4.37
5/11/2010	3.77	0.00		56		3.766	3.77	4.37
5/12/2010	3.76	0.00		57		3.764	3.76	4.44
5/13/2010	3.76	0.00		68		3.76	3.76	4.46
5/14/2010	3.87	0.10		64	3.866		3.87	4.48
5/15/2010	3.67	0.01		68		3.671	3.67	4.49
5/16/2010	3.60	0.00		73		3.6	3.60	4.51
5/17/2010	3.60	0.00		72		3.6	3.60	4.52
5/18/2010	3.88	0.44		64	3.876		3.88	4.53
5/19/2010	13.87	1.68		56	13.874		7.73	4.54
5/20/2010	6.70	0.00		82	6.695		6.70	4.41
5/21/2010	5.49	0.00		67	5.485		5.49	4.30
5/22/2010	4.91	0.00		66	4.905		4.91	4.24
5/23/2010	4.57	0.00		66	4.574		4.57	4.19
5/24/2010	4.46	0.00		80	4.463		4.46	4.15
5/25/2010	4.36	0.00		87	4.357		4.36	4.15
5/26/2010	4.35	0.00		92	4.35		4.35	4.13
5/27/2010	3.94	0.00		74	3.935		3.94	4.11
5/28/2010	3.63	0.00		70		3.632	3.63	4.09
5/29/2010	3.45	0.01		79		3.446	3.45	4.08
5/30/2010	3.33	0.00		78		3.327	3.33	4.08
5/31/2010	3.21	0.00		68		3.207	3.21	4.09
6/1/2010	3.31	0.00		81		3.306	3.31	4.09
6/2/2010	3.27	0.00		68		3.27	3.27	4.09
6/3/2010	6.15	1.21		84	6.151		6.15	4.09
6/4/2010	4.22	0.00		78	4.218		4.22	3.99
6/5/2010	4.44	0.17		85	4.442		4.44	3.95
6/6/2010	6.74	0.89		71	6.744		6.74	3.91
6/7/2010	4.69	0.00		73	4.691		4.69	3.79
6/8/2010	4.30	0.00		69	4.298		4.30	3.74
6/9/2010	4.05	0.01		71	4.05		4.05	3.69
6/10/2010	5.67	0.71		56	5.671		5.67	3.66
6/11/2010	4.57	0.00		68	4.57		4.57	3.61
6/12/2010	4.20	0.11		65	4.199		4.20	3.61
6/13/2010	4.18	0.02		61		4.175	4.18	3.59
6/14/2010	4.21	0.01		72		4.208	4.21	3.56
6/15/2010	4.16	0.00		77		4.163	4.16	3.68
6/16/2010	3.91	0.00		71		3.91	3.91	3.70
6/17/2010	3.96	0.01		70		3.955	3.96	3.73
6/18/2010	3.86	0.00		87		3.855	3.86	3.73
6/19/2010	3.53	0.00		86		3.533	3.53	3.73
6/20/2010	3.47	0.01		87		3.471	3.47	3.74
6/21/2010	3.56	0.00		86		3.564	3.56	3.75

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
6/22/2010	3.45	0.00		79		3.449	3.45	3.79
6/23/2010	4.29	0.35		80	4.292		4.29	3.81
6/24/2010	3.85	0.03		87		3.851	3.85	3.80
6/25/2010	3.59	0.00		82		3.591	3.59	3.79
6/26/2010	3.38	0.00		81		3.384	3.38	3.78
6/27/2010	3.46	0.15		75	3.457		3.46	3.78
6/28/2010	3.55	0.01		88		3.545	3.55	3.77
6/29/2010	3.48	0.00		87		3.483	3.48	3.76
6/30/2010	3.31	0.00		76		3.31	3.31	3.75
7/1/2010	3.30	0.00		73		3.301	3.30	3.73
7/2/2010	3.16	0.00		76		3.163	3.16	3.72
7/3/2010	3.15	0.00		88		3.15	3.15	3.71
7/4/2010	3.11	0.00		93		3.113	3.11	3.71
7/5/2010	3.15	0.00		91		3.146	3.15	3.71
7/6/2010	3.24	0.00		97		3.238	3.24	3.71
7/7/2010	2.99	0.00		85		2.992	2.99	3.73
7/8/2010	2.85	0.00		84		2.848	2.85	3.73
7/9/2010	3.16	0.00		87		3.161	3.16	3.72
7/10/2010	4.17	0.57		84	4.165		4.17	3.70
7/11/2010	4.63	0.30		81	4.633		4.63	3.69
7/12/2010	3.49	0.00		82		3.487	3.49	3.79
7/13/2010	3.51	0.06		84	3.514		3.51	3.83
7/14/2010	10.48	2.88		74	10.479		7.73	3.85
7/15/2010	4.81	0.01		81	4.814		4.81	3.72
7/16/2010	4.58	0.24		82	4.582		4.58	3.68
7/17/2010	4.12	0.00		91	4.116		4.12	3.63
7/18/2010	3.81	0.00		89	3.808		3.81	3.61
7/19/2010	3.95	0.10		86	3.952		3.95	3.60
7/20/2010	3.76	0.00		79	3.763		3.76	3.58
7/21/2010	4.68	0.34		83	4.682		4.68	3.57
7/22/2010	4.14	0.00		82	4.144		4.14	3.52
7/23/2010	3.75	0.01		80	3.753		3.75	3.48
7/24/2010	3.55	0.00		79	3.551		3.55	3.45
7/25/2010	3.40	0.01		87	3.402		3.40	3.44
7/26/2010	3.37	0.00		82		3.368	3.37	3.44
7/27/2010	3.24	0.00		88		3.241	3.24	3.58
7/28/2010	3.31	0.00		89		3.312	3.31	3.69
7/29/2010	2.97	0.01		89		2.968	2.97	3.75
7/30/2010	2.81	0.00		79		2.812	2.81	3.79
7/31/2010	2.87	0.00		72		2.87	2.87	3.83
8/1/2010	2.99	0.00		76		2.991	2.99	3.87
8/2/2010	3.11	0.00		78		3.112	3.11	3.90
8/3/2010	3.13	0.00		85		3.129	3.13	3.92

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
8/4/2010	3.25	0.08		92	3.251		3.25	3.93
8/5/2010	3.62	0.33		85	3.623		3.62	3.94
8/6/2010	2.99	0.00		85		2.985	2.99	3.96
8/7/2010	2.71	0.00		74		2.712	2.71	3.97
8/8/2010	2.66	0.01		85		2.658	2.66	3.99
8/9/2010	3.68	2.51		92	3.681		3.68	4.01
8/10/2010	8.63	0.09		86	8.625		7.73	4.01
8/11/2010	4.64	0.05		78	4.641		4.64	3.88
8/12/2010	4.12	0.00		73	4.117		4.12	3.85
8/13/2010	3.82	0.00		74	3.819		3.82	3.83
8/14/2010	3.52	0.00		78	3.519		3.52	3.81
8/15/2010	3.31	0.00		77	3.31		3.31	3.82
8/16/2010	3.42	0.10		78	3.415		3.42	3.82
8/17/2010	3.59	0.13		85	3.59		3.59	3.82
8/18/2010	3.29	0.00		82	3.286		3.29	3.80
8/19/2010	3.33	0.00		80	3.326		3.33	3.87
8/20/2010	3.22	0.00		81	3.218		3.22	3.87
8/21/2010	3.01	0.00		75		3.014	3.01	3.86
8/22/2010	2.89	0.02		70		2.89	2.89	3.87
8/23/2010	3.27	0.12		66	3.267		3.27	3.87
8/24/2010	3.22	0.26		68	3.22		3.22	3.86
8/25/2010	13.07	3.06		64	13.073		7.73	3.85
8/26/2010	6.58	0.00		83	6.577		6.58	3.70
8/27/2010	4.99	0.00		76	4.994		4.99	3.58
8/28/2010	4.33	0.00		82	4.325		4.33	3.51
8/29/2010	4.03	0.00		92	4.026		4.03	3.47
8/30/2010	3.93	0.00		90	3.93		3.93	3.47
8/31/2010	3.79	0.00		94	3.789		3.79	3.45
9/1/2010	3.71	0.00		92	3.709		3.71	3.43
9/2/2010	3.57	0.00		94	3.568		3.57	3.55
9/3/2010	3.56	0.18		84	3.558		3.56	3.56
9/4/2010	4.18	0.16		82	4.184		4.18	3.55
9/5/2010	3.28	0.00		73	3.276		3.28	3.53
9/6/2010	3.29	0.00		77	3.289		3.29	3.53
9/7/2010	3.38	0.00		84		3.383	3.38	3.64
9/8/2010	3.65	0.08		82	3.651		3.65	3.68
9/9/2010	3.78	0.00		73		3.781	3.78	3.69
9/10/2010	3.71	0.00		71		3.713	3.71	3.69
9/11/2010	3.39	0.00		69		3.393	3.39	3.68
9/12/2010	3.35	0.00		63		3.352	3.35	3.68
9/13/2010	3.82	0.19		65	3.815		3.82	3.69
9/14/2010	3.41	0.01		73		3.411	3.41	3.67
9/15/2010	3.25	0.00		67		3.249	3.25	3.66

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
9/16/2010	3.17	0.08		67	3.171		3.17	3.81
9/17/2010	5.31	0.70		66	5.314		5.31	3.91
9/18/2010	3.20	0.00		67	3.2		3.20	3.89
9/19/2010	3.07	0.00		70	3.065		3.07	3.91
9/20/2010	3.12	0.00		70		3.121	3.12	3.94
9/21/2010	3.07	0.00		70		3.068	3.07	3.97
9/22/2010	3.01	0.00		84		3.012	3.01	4.00
9/23/2010	2.97	0.00		69		2.971	2.97	4.03
9/24/2010	3.12	0.00		86		3.118	3.12	4.05
9/25/2010	3.01	0.00		86		3.012	3.01	4.06
9/26/2010	2.93	0.00		63		2.928	2.93	4.08
9/27/2010	3.06	0.10		58	3.063		3.06	4.10
9/28/2010	4.13	0.52		74	4.125		4.13	4.13
9/29/2010	3.21	0.00		81	3.207		3.21	4.11
9/30/2010	3.08	0.02		74		3.076	3.08	4.12
10/1/2010	7.35	1.38		77	7.347		7.35	4.12
10/2/2010	3.89	0.00	0	64	3.886		3.89	3.98
10/3/2010	3.33	0.00		58	3.333		3.33	3.96
10/4/2010	3.53	0.06		59	3.526		3.53	3.96
10/5/2010	3.43	0.01		60	3.427		3.43	3.95
10/6/2010	6.61	0.66		57	6.612		6.61	4.09
10/7/2010	4.57	0.03	0	63	4.57		4.57	4.10
10/8/2010	3.90	0.00		73	3.901		3.90	4.11
10/9/2010	3.65	0.00		58		3.649	3.65	4.13
10/10/2010	3.46	0.00		65		3.462	3.46	4.26
10/11/2010	3.48	0.00		65		3.484	3.48	4.38
10/12/2010	3.44	0.00		61		3.438	3.44	4.47
10/13/2010	3.32	0.00		60		3.317	3.32	4.54
10/14/2010	3.27	0.04		59		3.266	3.27	4.60
10/15/2010	12.83	2.61	0	59	12.834		7.73	4.65
10/16/2010	5.93	0.00		57	5.927		5.93	4.54
10/17/2010	4.74	0.00		63	4.739		4.74	4.48
10/18/2010	4.02	0.00		57	4.024		4.02	4.46
10/19/2010	3.98	0.00		57	3.975		3.98	4.59
10/20/2010	4.03	0.00		60	4.028		4.03	4.67
10/21/2010	4.00	0.03		57	3.995		4.00	4.73
10/22/2010	3.79	0.00		45	3.788		3.79	4.77
10/23/2010	3.51	0.00		53	3.508		3.51	4.81
10/24/2010	3.52	0.00		45	3.523		3.52	4.85
10/25/2010	3.56	0.01		55	3.56		3.56	4.89
10/26/2010	3.53	0.03	0	67	3.53		3.53	4.92
10/27/2010	3.87	0.21		72	3.869		3.87	4.93
10/28/2010	3.54	0.01	0	72		3.544	3.54	4.98

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
10/29/2010	3.43	0.02		55		3.431	3.43	5.00
10/30/2010	3.30	0.00		54		3.304	3.30	5.07
10/31/2010	3.20	0.00		53		3.203	3.20	5.09
11/1/2010	3.28	0.00		50		3.28	3.28	5.12
11/2/2010	3.19	0.00		48		3.186	3.19	5.20
11/3/2010	3.27	0.00		47		3.268	3.27	5.27
11/4/2010	7.65	0.95		50	7.649		7.65	5.32
11/5/2010	6.89	0.43	0	59	6.893		6.89	5.22
11/6/2010	4.73	0.00		47	4.73		4.73	5.14
11/7/2010	4.48	0.12		44	4.478		4.48	5.13
11/8/2010	12.32	0.96	0	48	12.317		7.73	5.12
11/9/2010	6.90	0.09	0	54	6.899		6.90	5.00
11/10/2010	6.21	0.06		49	6.213		6.21	4.90
11/11/2010	5.58	0.00	0	54	5.584		5.58	4.81
11/12/2010	5.02	0.00		59	5.02		5.02	4.75
11/13/2010	4.74	0.00		65		4.742	4.74	4.81
11/14/2010	4.47	0.00		49		4.465	4.47	4.91
11/15/2010	4.30	0.00		51		4.3	4.30	4.97
11/16/2010	4.17	0.01	0	52		4.168	4.17	5.01
11/17/2010	10.68	1.34	0	61	10.684		7.73	5.04
11/18/2010	6.49	0.00	0	51	6.486		6.49	4.93
11/19/2010	5.78	0.00		43	5.784		5.78	4.86
11/20/2010	5.37	0.00		52	5.366		5.37	4.82
11/21/2010	4.93	0.00		37	4.932		4.93	4.79
11/22/2010	4.71	0.00		47	4.711		4.71	4.77
11/23/2010	4.71	0.00	0	49		4.711	4.71	4.76
11/24/2010	4.42	0.00		46		4.419	4.42	4.76
11/25/2010	3.94	0.00		38		3.941	3.94	4.75
11/26/2010	5.15	0.42	0	40	5.149		5.15	4.74
11/27/2010	4.33	0.00		42	4.327		4.33	4.69
11/28/2010	5.41	0.00		44		5.409	5.41	4.69
11/29/2010	4.04	0.00		44		4.037	4.04	4.63
11/30/2010	3.99	0.00		47		3.986	3.99	4.62
12/1/2010	5.71	0.60		51	5.71		5.71	4.62
12/2/2010	5.29	0.01		51	5.292		5.29	4.55
12/3/2010	4.84	0.00		40	4.842		4.84	4.50
12/4/2010	4.62	0.00		40		4.615	4.62	4.48
12/5/2010	4.49	0.00		32		4.485	4.49	4.46
12/6/2010	4.36	0.00		32		4.357	4.36	4.45
12/7/2010	4.22	0.00		34		4.221	4.22	4.43
12/8/2010	3.99	0.00		31		3.994	3.99	4.43
12/9/2010	3.86	0.00		27		3.861	3.86	4.42
12/10/2010	3.72	0.00		25		3.716	3.72	4.43

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
12/11/2010	3.75	0.00		44		3.746	3.75	4.43
12/12/2010	6.92	1.15		52	6.923		6.92	4.42
12/13/2010	8.62	0.39		52	8.615		7.73	4.30
12/14/2010	6.08	0.00		37	6.084		6.08	4.16
12/15/2010	5.43	0.00		21	5.429		5.43	4.07
12/16/2010	5.07	0.00		30	5.072		5.07	4.01
12/17/2010	4.67	0.00		34	4.671		4.67	3.95
12/18/2010	4.41	0.00		36		4.41	4.41	3.91
12/19/2010	4.56	0.00		35		4.558	4.56	3.87
12/20/2010	4.33	0.01	0	30		4.329	4.33	3.85
12/21/2010	4.47	0.00	0	43		4.471	4.47	3.93
12/22/2010	4.38	0.02	0	35		4.381	4.38	3.95
12/23/2010	4.60	0.02	1	40	4.6		4.60	3.97
12/24/2010	4.14	0.00	1	38	4.136		4.14	3.96
12/25/2010	3.57	0.00	1	30		3.566	3.57	3.96
12/26/2010	3.76	0.00	1	26		3.756	3.76	3.98
12/27/2010	4.21	0.03	8	31		4.207	4.21	3.99
12/28/2010	3.81	0.00	8	31		3.808	3.81	3.98
12/29/2010	3.71	0.00	8	37	3.705		3.71	3.99
12/30/2010	3.78	0.00	7	42	3.782		3.78	4.00
12/31/2010	3.78	0.00	7	50	3.781		3.78	4.00
1/1/2011	3.81	0	6	59.5	3.807		3.81	4.55
1/2/2011	4.05	0.01	2	44.8	4.049		4.05	4.50
1/3/2011	4.14	0	2	38.8	4.141		4.14	4.48
1/4/2011	4.08	0	1	36.7	4.078		4.08	4.46
1/5/2011	3.98	0	1	36.1	3.983		3.98	4.45
1/6/2011	3.99	0	1	30.7		3.985	3.99	4.43
1/7/2011	3.97	0	1	30.9		3.967	3.97	4.43
1/8/2011	3.89	0	1	31.8		3.888	3.89	4.42
1/9/2011	3.71	0.02	2	34.5	3.709		3.71	4.43
1/10/2011	3.49	0	1	31.1		3.489	3.49	4.43
1/11/2011	3.49	0	1	29.5		3.493	3.49	4.42
1/12/2011	3.50	0.14	16	31.8	3.499		3.50	4.30
1/13/2011	3.48	0	17	32	3.481		3.48	4.16
1/14/2011	3.48	0	15	25.7		3.476	3.48	4.07
1/15/2011	3.37	0	16	27.5		3.368	3.37	4.01
1/16/2011	3.30	0	16	31.5		3.295	3.30	3.95
1/17/2011	3.44	0	15	22.3		3.439	3.44	3.91
1/18/2011	3.76	1.06	19	29.8	3.76		3.76	3.87
1/19/2011	6.72	0.4	17	37.6	6.721		6.72	3.85
1/20/2011	5.19	0.03	16	32.2	5.191		5.19	3.93
1/21/2011	4.89	0.41	23	26.4	4.894		4.89	3.95
1/22/2011	4.29	0	22	23.2	4.285		4.29	3.97

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
1/23/2011	4.25	0	22	22.5	4.245		4.25	3.96
1/24/2011	4.06	0	21	9.5	4.059		4.06	3.96
1/25/2011	4.03	0.02	23	19.8		4.025	4.03	3.98
1/26/2011	4.13	0.03	23	25.7		4.126	4.13	3.99
1/27/2011	4.06	0.04	27	30.6		4.062	4.06	3.98
1/28/2011	3.92	0	26	38.3	3.916		3.92	3.99
1/29/2011	3.90	0	26	36.3	3.897		3.90	4.00
1/30/2011	3.72	0	26	32.5	3.721		3.72	4.00
1/31/2011	3.70	0	26	23.2		3.701	3.70	4.00
2/1/2011	3.79	0.04	30	17.2		3.79	3.79	4.00
2/2/2011	3.93	0.03	35	19.6		3.93	3.93	3.99
2/3/2011	3.87	0.15	35	30.2	3.87		3.87	3.98
2/4/2011	3.54	0	34	34.9	3.536		3.54	3.98
2/5/2011	4.58	0.65	32	33.8	4.578		4.58	3.96
2/6/2011	6.01	0.04	29	37.6	6.007		6.01	3.98
2/7/2011	4.96	0.02	27	43.9	4.961		4.96	4.05
2/8/2011	5.62	0.36	26	36.3	5.618		5.62	4.08
2/9/2011	4.96	0	26	30.2		4.957	4.96	4.15
2/10/2011	4.70	0	25	25.9		4.704	4.70	4.20
2/11/2011	4.53	0	25	28.2		4.531	4.53	4.24
2/12/2011	4.42	0	24	35.8	4.417		4.42	4.27
2/13/2011	4.17	0	23	32.9	4.17		4.17	4.30
2/14/2011	4.58	0	20	53.4	4.575		4.58	4.33
2/15/2011	4.51	0	19	40.6	4.506		4.51	4.37
2/16/2011	4.47	0	100	42.4	4.474		4.47	4.41
2/17/2011	4.84	0	16	51.1	4.843		4.84	4.44
2/18/2011	6.02	0	14	57.6	6.02		6.02	4.48
2/19/2011	6.70	0	13	54.3	6.703		6.70	4.45
2/20/2011	6.06	0	13	32	6.061		6.06	4.50
2/21/2011	5.89	0	14	27.1		5.891	5.89	4.54
2/22/2011	5.59	0	13	34.2	5.591		5.59	4.60
2/23/2011	5.28	0	12	37.6	5.284		5.28	4.64
2/24/2011	5.16	0	11	39.9	5.16		5.16	4.68
2/25/2011	7.52	1.19	10	37.8	7.519		7.52	4.72
2/26/2011	6.57	0	9	32.5	6.573		6.57	4.83
2/27/2011	5.85	0.21	15	28.6	5.853		5.85	4.92
2/28/2011	9.58	0.81	11	37.9	9.58		7.73	4.98
3/1/2011	8.19	0	10	36.9	8.193		7.73	5.11
3/2/2011	7.29	0	9	43.7	7.287		7.29	5.24
3/3/2011	6.48	0	9	29.3	6.478		6.48	5.36
3/4/2011	6.13	0	9	34.3	6.127		6.13	5.45
3/5/2011	6.39	0.01	9	52.3	6.388		6.39	5.53
3/6/2011	9.67	0.13	8	56.8	9.669		7.73	5.61

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
3/7/2011	19.35	1.07	7	47.8	19.349		7.73	5.75
3/8/2011	15.55	0	6	43.7	15.552		7.73	5.85
3/9/2011	11.51	0	6	34.5	11.514		7.73	5.91
3/10/2011	9.88	0.04	5	38.5	9.88		7.73	6.00
3/11/2011	17.56	0.75	5	45.7	17.561		7.73	6.07
3/12/2011	16.47	0	3	44.4	16.471		7.73	6.17
3/13/2011	13.19	0.01	2	44.4	13.193		7.73	6.27
3/14/2011	11.15	0	1	39.6	11.154		7.73	6.37
3/15/2011	9.83	0	0	43.3	9.83		7.73	6.48
3/16/2011	12.85	0.75	0	35.6	12.845		7.73	6.60
3/17/2011	11.89	0	0	52.9	11.886		7.73	6.71
3/18/2011	11.05	0	0	63.7	11.052		7.73	6.82
3/19/2011	9.67	0.03	0	53.4	9.672		7.73	6.92
3/20/2011	8.52	0	0	43	8.519		7.73	7.02
3/21/2011	9.03	0.52	0	38.7	9.033		7.73	7.08
3/22/2011	9.47	0.01	0	41.4	9.474		7.73	7.11
3/23/2011	8.42	0	0	39	8.422		7.73	7.17
3/24/2011	7.76	0.04	0	37.8	7.764		7.73	7.23
3/25/2011	7.17	0	0	40.3		7.174	7.17	7.30
3/26/2011	6.61	0		36		6.612	6.61	7.36
3/27/2011	6.19	0		39.6		6.186	6.19	7.41
3/28/2011	5.94	0		42.6		5.941	5.94	7.37
3/29/2011	5.68	0		43.9		5.679	5.68	7.35
3/30/2011	5.59	0		51.8		5.594	5.59	7.34
3/31/2011	5.48	0.33		46.8	5.484		5.48	7.27
4/1/2011	7.31	0.55	3	37.2	7.31		7.31	7.19
4/2/2011	7.67	0	0	48.7	7.668		7.67	7.19
4/3/2011	7.00	0	0	50.9	6.995		7.00	7.23
4/4/2011	6.84	0.18		45.3	6.838		6.84	7.26
4/5/2011	6.77	0.05		56.1	6.765		6.77	7.28
4/6/2011	6.23	0		49.5		6.227	6.23	7.25
4/7/2011	5.90	0		48.2		5.904	5.90	7.20
4/8/2011	5.59	0		50.7		5.594	5.59	7.14
4/9/2011	5.33	0		61.3		5.333	5.33	7.06
4/10/2011	5.23	0.34		62.8	5.231		5.23	6.98
4/11/2011	7.50	0.36		74.5	7.499		7.50	6.90
4/12/2011	5.75	0		70.7	5.75		5.75	6.89
4/13/2011	11.67	1.42		50.7	11.669		7.73	6.83
4/14/2011	9.97	0.01		62.1	9.969		7.73	6.83
4/15/2011	8.08	0		50.7	8.077		7.73	6.83
4/16/2011	7.28	0.18		43.3	7.278		7.28	6.83
4/17/2011	14.15	0.91		60.1	14.145		7.73	6.81
4/18/2011	9.62	0		57.4	9.62		7.73	6.81

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
4/19/2011	8.36	0.11		55.9	8.362		7.73	6.81
4/20/2011	7.76	0		44.1	7.762		7.73	6.81
4/21/2011	7.04	0		52		7.035	7.04	6.81
4/22/2011	6.42	0		54.3		6.42	6.42	6.79
4/23/2011	8.98	0.82		44.8	8.975		7.73	6.75
4/24/2011	7.29	0.01		68.4	7.29		7.29	6.75
4/25/2011	6.75	0.01		59.5	6.749		6.75	6.75
4/26/2011	6.54	0.06		55.6	6.542		6.54	6.75
4/27/2011	6.11	0.01		67.1		6.112	6.11	6.77
4/28/2011	5.87	0.05		75.6	5.87		5.87	6.77
4/29/2011	5.65	0		72.3		5.65	5.65	6.78
4/30/2011	5.20	0		64		5.197	5.20	6.78
5/1/2011	4.98	0		57.2		4.984	4.98	6.77
5/2/2011	5.05	0		62.2		5.051	5.05	6.69
5/3/2011	4.99	0		65.5		4.99	4.99	6.61
5/4/2011	5.59	0.4		57.6	5.593		5.59	6.54
5/5/2011	5.79	0.2		54.7	5.789		5.79	6.50
5/6/2011	5.05	0		69.6	5.051		5.05	6.46
5/7/2011	6.27	0.7		70.2	6.268		6.27	6.43
5/8/2011	5.14	0		60.8	5.136		5.14	6.44
5/9/2011	5.03	0		66.9	5.027		5.03	6.42
5/10/2011	4.92	0		60.6		4.917	4.92	6.41
5/11/2011	4.86	0.02		66.4		4.855	4.86	6.40
5/12/2011	4.67	0		64.9		4.672	4.67	6.31
5/13/2011	4.59	0		64		4.59	4.59	6.28
5/14/2011	4.44	0.09		54.1	4.444		4.44	6.17
5/15/2011	7.15	0.93		55.2	7.151		7.15	6.06
5/16/2011	6.98	0.43		50.9	6.976		6.98	6.04
5/17/2011	7.45	0.32		49.6	7.445		7.45	6.03
5/18/2011	8.10	0.41		51.8	8.103		7.73	6.02
5/19/2011	10.58	0.38		66.2	10.575		7.73	6.02
5/20/2011	8.30	0.02		60.6	8.304		7.73	6.02
5/21/2011	7.21	0		67.6		7.214	7.21	6.02
5/22/2011	6.57	0		54.3		6.569	6.57	6.03
5/23/2011	6.35	0.15		53.6	6.35		6.35	6.04
5/24/2011	6.76	0.24		80.8	6.759		6.76	5.99
5/25/2011	5.94	0		71.8		5.94	5.94	5.97
5/26/2011	5.56	0		75		5.561	5.56	5.94
5/27/2011	5.28	0		84		5.278	5.28	5.91
5/28/2011	4.88	0		68.4		4.881	4.88	5.88
5/29/2011	4.69	0		85.8		4.689	4.69	5.85
5/30/2011	4.58	0.01		87.4		4.577	4.58	5.82
5/31/2011	4.61	0		78.3		4.61	4.61	5.80

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
6/1/2011	4.87	0.12		86.4	4.872		4.87	5.79
6/2/2011	4.49	0		77.4		4.485	4.49	5.78
6/3/2011	4.69	0		68.2		4.694	4.69	5.76
6/4/2011	4.25	0		64.9		4.249	4.25	5.73
6/5/2011	4.15	0		66.4		4.152	4.15	5.68
6/6/2011	4.24	0		74.8		4.235	4.24	5.65
6/7/2011	4.19	0		80.4		4.187	4.19	5.58
6/8/2011	4.12	0		85.1		4.121	4.12	5.55
6/9/2011	4.82	0.34		90.5	4.816		4.82	5.52
6/10/2011	4.08	0		74.7		4.081	4.08	5.52
6/11/2011	5.64	0.77		63.9	5.635		5.64	5.49
6/12/2011	6.41	0.56		57	6.407		6.41	5.53
6/13/2011	4.66	0.01		64.4	4.658		4.66	5.59
6/14/2011	4.60	0.01		57.6	4.601		4.60	5.59
6/15/2011	4.51	0		73.6	4.506		4.51	5.51
6/16/2011	4.37	0		64.6	4.372		4.37	5.43
6/17/2011	4.19	0		78.6		4.19	4.19	5.32
6/18/2011	4.38	0.25		83.3	4.38		4.38	5.20
6/19/2011	3.99	0		77.9		3.993	3.99	5.09
6/20/2011	3.92	0		78.4		3.92	3.92	4.97
6/21/2011	3.93	0		81.5		3.933	3.93	4.86
6/22/2011	4.67	0.72		77.5	4.669		4.67	4.77
6/23/2011	6.14	0.35		61.9	6.143		6.14	4.72
6/24/2011	4.80	0.08		58.6	4.802		4.80	4.69
6/25/2011	9.92	1.5		64.9	9.917		7.73	4.66
6/26/2011	5.79	0.01		76.5	5.794		5.79	4.73
6/27/2011	5.27	0		80.8	5.27		5.27	4.75
6/28/2011	4.98	0		81	4.983		4.98	4.76
6/29/2011	5.01	0.14		82.6	5.006		5.01	4.77
6/30/2011	4.55	0		76.3	4.547		4.55	4.78
7/1/2011	4.43	0		78.8	4.433		4.43	4.78
7/2/2011	4.14	0		77.2		4.135	4.14	4.77
7/3/2011	4.06	0.02		78.3		4.062	4.06	4.75
7/4/2011	5.06	0.63		88.2	5.058		5.06	4.73
7/5/2011	4.23	0		87.4	4.233		4.23	4.76
7/6/2011	4.29	0.12		89.2	4.286		4.29	4.76
7/7/2011	4.11	0		82		4.108	4.11	4.77
7/8/2011	3.88	0		78.4		3.876	3.88	4.76
7/9/2011	3.82	0.06		81.1	3.815		3.82	4.75
7/10/2011	3.63	0		84.2		3.631	3.63	4.72
7/11/2011	3.85	0		91.2		3.847	3.85	4.71
7/12/2011	3.82	0.01		90.7		3.824	3.82	4.65
7/13/2011	4.18	0.21		86.9	4.183		4.18	4.56

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
7/14/2011	4.01	0.07		74.5		4.009	4.01	4.54
7/15/2011	3.71	0		78.3		3.711	3.71	4.52
7/16/2011	3.53	0		86.4		3.527	3.53	4.50
7/17/2011	3.41	0		90		3.41	3.41	4.47
7/18/2011	3.71	0.1		84	3.708		3.71	4.44
7/19/2011	3.57	0		86.5		3.57	3.57	4.42
7/20/2011	3.40	0		89.4		3.396	3.40	4.41
7/21/2011	3.45	0		93		3.447	3.45	4.39
7/22/2011	3.51	0		97.3		3.507	3.51	4.37
7/23/2011	3.28	0		93.9		3.279	3.28	4.34
7/24/2011	2.78	0		86.7		2.784	2.78	4.24
7/25/2011	3.37	0.2		76.1	3.373		3.37	4.17
7/26/2011	3.59	0.18		79.2	3.592		3.59	4.03
7/27/2011	3.43	0		81.5		3.425	3.43	3.95
7/28/2011	3.34	0		78.4		3.343	3.34	3.89
7/29/2011	3.55	0.27		73.9	3.553		3.55	3.84
7/30/2011	3.53	0		84.9		3.526	3.53	3.79
7/31/2011	2.95	0		86.9		2.945	2.95	3.76
8/1/2011	3.01	0		86.5		3.01	3.01	3.71
8/2/2011	3.08	0.04		84.6		3.078	3.08	3.67
8/3/2011	3.11	0		75.9		3.109	3.11	3.64
8/4/2011	3.03	0		78.4		3.031	3.03	3.57
8/5/2011	2.98	0		76.5		2.982	2.98	3.53
8/6/2011	2.87	0.02		82	2.865		2.87	3.49
8/7/2011	4.18	0.71		77.9	4.181		4.18	3.45
8/8/2011	3.18	0.02		82.6	3.178		3.18	3.46
8/9/2011	3.15	0.4		77	3.145		3.15	3.43
8/10/2011	7.92	1.07		71.8	7.917		7.73	3.42
8/11/2011	3.96	0		79	3.959		3.96	3.55
8/12/2011	3.76	0		80.2	3.764		3.76	3.55
8/13/2011	3.46	0		82	3.456		3.46	3.54
8/14/2011	3.03	0		75.2	3.029		3.03	3.52
8/15/2011	9.03	1.95		68.7	9.026		7.73	3.50
8/16/2011	6.76	0.02		72.3	6.761		6.76	3.64
8/17/2011	4.59	0		84.2	4.591		4.59	3.75
8/18/2011	4.19	0		86.4	4.192		4.19	3.78
8/19/2011	4.02	0.01		86.9	4.015		4.02	3.80
8/20/2011	3.83	0		86.2	3.827		3.83	3.82
8/21/2011	3.65	0.07		86	3.65		3.65	3.83
8/22/2011	3.90	0.11		75.7	3.904		3.90	3.84
8/23/2011	3.66	0		75.6	3.66		3.66	3.86
8/24/2011	3.64	0		80.8		3.64	3.64	3.89
8/25/2011	5.01	0.63		81.1	5.012		5.01	3.90

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
8/26/2011	4.00	0		86.4	4.002		4.00	3.94
8/27/2011	4.41	0.54		82.2	4.405		4.41	3.96
8/28/2011	9.31	0.94		71.2	9.305		7.73	4.00
8/29/2011	5.13	0		78.4	5.13		5.13	4.14
8/30/2011	4.58	0		79.9	4.584		4.58	4.19
8/31/2011	4.30	0		81.5	4.304		4.30	4.25
9/1/2011	4.18	0		75.6	4.178		4.18	4.29
9/2/2011	4.01	0		72.3	4.013		4.01	4.32
9/3/2011	3.73	0		85.6		3.732	3.73	4.35
9/4/2011	3.59	0		86.7		3.591	3.59	4.38
9/5/2011	3.60	0		84.9		3.604	3.60	4.40
9/6/2011	3.93	0.26		76.3	3.929		3.93	4.42
9/7/2011	9.27	1.71		61.2	9.267		7.73	4.41
9/8/2011	6.03	0.16		67.8	6.03		6.03	4.57
9/9/2011	5.29	0.01		80.2	5.285		5.29	4.66
9/10/2011	4.67	0		70.9	4.673		4.67	4.58
9/11/2011	4.33	0		69.4	4.332		4.33	4.61
9/12/2011	4.25	0		83.3	4.252		4.25	4.62
9/13/2011	4.07	0		82.8	4.069		4.07	4.65
9/14/2011	4.03	0		82.6	4.033		4.03	4.69
9/15/2011	3.91	0.01		73.4		3.912	3.91	4.56
9/16/2011	3.73	0		62.6		3.729	3.73	4.47
9/17/2011	3.47	0		66		3.466	3.47	4.44
9/18/2011	3.36	0		67.8		3.355	3.36	4.41
9/19/2011	3.33	0		68		3.327	3.33	4.39
9/20/2011	3.46	0.11		65.5	3.459		3.46	4.38
9/21/2011	3.35	0.01		74.8		3.346	3.35	4.37
9/22/2011	4.51	0.47		69.4	4.506		4.51	4.35
9/23/2011	4.12	0.68		69.8	4.115		4.12	4.38
9/24/2011	6.62	0.36		78.4	6.62		6.62	4.39
9/25/2011	4.07	0		80.4	4.066		4.07	4.45
9/26/2011	4.01	0		82.6	4.011		4.01	4.45
9/27/2011	4.02	0		76.5	4.016		4.02	4.44
9/28/2011	4.03	0		72		4.026	4.03	4.31
9/29/2011	6.75	1.1		65.5	6.752		6.75	4.28
9/30/2011	5.42	0		77	5.417		5.42	4.35
10/1/2011	4.76	0.12		66.2	4.764		4.76	4.39
10/2/2011	9.69	1.33		64	9.69		7.73	4.41
10/3/2011	6.84	0.08		68.5	6.839		6.84	4.53
10/4/2011	14.18	1.9		58.6	14.184		7.73	4.63
10/5/2011	10.40	0		60.6	10.395		7.73	4.77
10/6/2011	7.56	0		58.3	7.562		7.56	4.91
10/7/2011	6.33	0		62.2	6.33		6.33	5.03

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
10/8/2011	5.58	0		75	5.577		5.58	4.98
10/9/2011	5.10	0		79.7	5.098		5.10	4.97
10/10/2011	4.93	0		80.6	4.93		4.93	4.96
10/11/2011	4.73	0		66.4	4.729		4.73	4.97
10/12/2011	4.61	0		59.4		4.608	4.61	4.98
10/13/2011	7.48	0.75		60.8	7.475		7.48	5.00
10/14/2011	6.87	0.39		64	6.871		6.87	5.11
10/15/2011	6.03	0		65.1	6.026		6.03	5.20
10/16/2011	5.23	0		63.1		5.228	5.23	5.27
10/17/2011	5.04	0.03		62.2		5.037	5.04	5.32
10/18/2011	4.79	0		61.9		4.792	4.79	5.38
10/19/2011	7.94	0.85		56.1	7.943		7.73	5.42
10/20/2011	12.30	0.72		67.5	12.299		7.73	5.57
10/21/2011	7.77	0		62.4	7.773		7.73	5.71
10/22/2011	6.59	0		59.9	6.585		6.59	5.86
10/23/2011	5.96	0		55.4	5.958		5.96	5.93
10/24/2011	5.69	0		59	5.694		5.69	5.99
10/25/2011	5.49	0.01		57	5.485		5.49	5.96
10/26/2011	5.26	0		50		5.258	5.26	6.01
10/27/2011	8.18	1		46	8.175		7.73	6.05
10/28/2011	7.00	0		45.5	6.999		7.00	6.17
10/29/2011	6.33	0.91	1	42.6	6.331		6.33	6.27
10/30/2011	11.18	0.12	4	44.1	11.179		7.73	6.26
10/31/2011	9.16	0	3	53.4	9.159		7.73	6.33
11/1/2011	8.22	0	1	52.5	8.216		7.73	6.43
11/2/2011	7.26	0	0	54.9	7.259		7.26	6.43
11/3/2011	6.68	0	0	58.3		6.678	6.68	6.45
11/4/2011	6.30	0		52.7		6.304	6.30	6.41
11/5/2011	5.62	0		52		5.616	5.62	6.36
11/6/2011	5.28	0		58.3		5.282	5.28	6.30
11/7/2011	5.11	0		62.1		5.113	5.11	6.26
11/8/2011	4.95	0		66.9		4.947	4.95	6.25
11/9/2011	4.83	0		67.5		4.832	4.83	6.24
11/10/2011	7.02	0.86		63.9	7.023		7.02	6.24
11/11/2011	5.90	0.01		55.4	5.901		5.90	6.32
11/12/2011	5.15	0		53.1	5.149		5.15	6.36
11/13/2011	4.92	0		62.2	4.918		4.92	6.28
11/14/2011	4.83	0		66.2		4.833	4.83	6.22
11/15/2011	4.70	0.01		64.2		4.699	4.70	6.18
11/16/2011	5.06	0.28		58.6	5.055		5.06	6.16
11/17/2011	4.82	0.01		53.2		4.824	4.82	6.16
11/18/2011	4.55	0		44.2		4.548	4.55	6.16
11/19/2011	4.45	0		54		4.451	4.45	6.06

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
11/20/2011	4.32	0		64.4		4.322	4.32	5.95
11/21/2011	4.25	0		58.8		4.247	4.25	5.83
11/22/2011	4.27	0		44.8		4.268	4.27	5.75
11/23/2011	11.08	1.13		42.1	11.076		7.73	5.70
11/24/2011	6.39	0		40.6	6.394		6.39	5.77
11/25/2011	5.82	0		58.5	5.821		5.82	5.80
11/26/2011	5.40	0		58.6	5.402		5.40	5.82
11/27/2011	5.24	0		52.9	5.244		5.24	5.74
11/28/2011	5.14	0		62.8		5.143	5.14	5.68
11/29/2011	4.95	0		58.1		4.954	4.95	5.64
11/30/2011	6.74	0.5		57.2	6.742		6.74	5.55
12/1/2011	5.18	0		48.7	5.184		5.18	5.51
12/2/2011	4.94	0		50.2		4.942	4.94	5.43
12/3/2011	4.72	0		44.6		4.724	4.72	5.35
12/4/2011	4.55	0		51.4		4.549	4.55	5.29
12/5/2011	4.47	0		58.6		4.469	4.47	5.23
12/6/2011	4.62	0.15		64.6	4.615		4.62	5.19
12/7/2011	8.31	1.15		57	8.305		7.73	5.17
12/8/2011	13.80	0.73		42.3	13.798		7.73	5.26
12/9/2011	8.38	0		48.7	8.376		7.73	5.35
12/10/2011	7.24	0		43	7.241		7.24	5.44
12/11/2011	6.40	0		37.2	6.398		6.40	5.45
12/12/2011	6.00	0		48.9	5.995		6.00	5.47
12/13/2011	5.68	0		42.1	5.682		5.68	5.50
12/14/2011	5.45	0		41	5.448		5.45	5.52
12/15/2011	5.37	0.07		35.1	5.372		5.37	5.54
12/16/2011	5.13	0.02		48.7		5.128	5.13	5.57
12/17/2011	4.90	0		43.5		4.904	4.90	5.57
12/18/2011	4.69	0		36.1		4.694	4.69	5.57
12/19/2011	4.60	0		32.5		4.601	4.60	5.58
12/20/2011	4.49	0		37.9		4.491	4.49	5.58
12/21/2011	4.68	0.14	0	43.7	4.684		4.68	5.59
12/22/2011	5.46	0.32		51.8	5.456		5.46	5.60
12/23/2011	8.34	0.8		33.1	8.339		7.73	5.64
12/24/2011	5.53	0		33.3	5.533		5.53	5.64
12/25/2011	4.89	0.04	0	35.4	4.891		4.89	5.61
12/26/2011	5.00	0	0	50.5	4.996		5.00	5.58
12/27/2011	6.84	0.3		45.1	6.843		6.84	5.57
12/28/2011	5.86	0		34.7		5.859	5.86	5.62
12/29/2011	5.07	0		23.9		5.072	5.07	5.64
12/30/2011	4.80	0		36.1		4.801	4.80	5.65
12/31/2011	4.93	0.09	0	39.7	4.932		4.93	5.58
1/1/2012	4.58	0.14		45.3	4.581		4.58	5.57

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
1/2/2012	5.05	0.04		41.2		5.049	5.05	5.56
1/3/2012	4.65	0		38.3		4.647	4.65	5.57
1/4/2012	4.50	0		43.2		4.5	4.50	5.58
1/5/2012	4.42	0		35.1		4.424	4.42	5.58
1/6/2012	4.29	0.01	0	36.5		4.294	4.29	5.57
1/7/2012	4.28	0		42.3		4.281	4.28	5.46
1/8/2012	4.10	0		31.8		4.103	4.10	5.34
1/9/2012	4.16	0		20.1		4.161	4.16	5.22
1/10/2012	4.21	0		27.9		4.214	4.21	5.12
1/11/2012	4.09	0		43.5		4.09	4.09	5.05
1/12/2012	8.51	0.62	1	44.6	8.514		7.73	4.98
1/13/2012	6.26	0.09	0	27.5	6.256		6.26	5.05
1/14/2012	5.22	0	0	30.7	5.223		5.22	5.08
1/15/2012	4.79	0	0	22.1		4.791	4.79	5.07
1/16/2012	4.79	0		30.6		4.787	4.79	5.06
1/17/2012	5.10	0.18		34.9	5.102		5.10	5.06
1/18/2012	4.80	0		50.5		4.804	4.80	5.07
1/19/2012	4.47	0.02		41.7	4.473		4.47	5.08
1/20/2012	4.42	0.12	1	41	4.42		4.42	5.08
1/21/2012	4.12	0.09	2	42.1	4.119		4.12	5.07
1/22/2012	4.02	0.02	2	48.2	4.022		4.02	5.02
1/23/2012	4.91	0.18	1	41.7	4.905		4.91	4.90
1/24/2012	5.37	0.01	0	35.1	5.373		5.37	4.88
1/25/2012	4.76	0		35.4		4.761	4.76	4.90
1/26/2012	4.58	0.21		45	4.576		4.58	4.89
1/27/2012	13.77	1.26	0	46.6	13.771		7.73	4.81
1/28/2012	8.40	0		36.5	8.402		7.73	4.87
1/29/2012	6.98	0		36.5	6.975		6.98	4.96
1/30/2012	6.34	0		35.8	6.335		6.34	5.04
1/31/2012	5.99	0.05	0	50	5.99		5.99	5.08
2/1/2012	5.74	0.02		43.2	5.743		5.74	5.13
2/2/2012	5.38	0		38.1		5.378	5.38	5.15
2/3/2012	5.15	0		44.4		5.153	5.15	5.18
2/4/2012	4.94	0		50.9		4.941	4.94	5.20
2/5/2012	4.80	0		40.5		4.799	4.80	5.22
2/6/2012	4.77	0		33.1		4.771	4.77	5.23
2/7/2012	4.69	0		39.2		4.691	4.69	5.25
2/8/2012	4.63	0.01		41.4		4.625	4.63	5.27
2/9/2012	4.60	0		39.4		4.604	4.60	5.28
2/10/2012	4.50	0		46.4		4.495	4.50	5.30
2/11/2012	4.43	0	0	49.6		4.43	4.43	5.31
2/12/2012	4.35	0		43.9		4.347	4.35	5.20
2/13/2012	4.19	0		42.4		4.193	4.19	5.14

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
2/14/2012	4.17	0		41.2		4.169	4.17	5.10
2/15/2012	4.03	0		39.7		4.028	4.03	5.08
2/16/2012	3.96	0.06		52.7	3.963		3.96	5.06
2/17/2012	4.03	0		47.8		4.027	4.03	5.02
2/18/2012	4.01	0		41.4		4.008	4.01	4.99
2/19/2012	3.92	0		40.3		3.921	3.92	4.98
2/20/2012	3.95	0		36.9		3.946	3.95	4.96
2/21/2012	3.92	0.01		44.1		3.917	3.92	4.95
2/22/2012	3.96	0	0	41.4		3.956	3.96	4.95
2/23/2012	3.94	0.03		34		3.935	3.94	4.92
2/24/2012	6.02	0.85		33.1	6.019		6.02	4.87
2/25/2012	5.72	0.01		29.5	5.724		5.72	4.91
2/26/2012	4.21	0		42.4	4.209		4.21	4.95
2/27/2012	4.25	0		43.9		4.254	4.25	4.83
2/28/2012	4.12	0		33.4		4.115	4.12	4.72
2/29/2012	4.06	0.11	1	35.8	4.064		4.06	4.62
3/1/2012	4.49	0.1	10	57.4	4.489		4.49	4.55
3/2/2012	4.57	0.02	9	68.7	4.567		4.57	4.50
3/3/2012	9.64	0.85	9	61.5	9.641		7.73	4.46
3/4/2012	7.54	0	9	38.5	7.538		7.54	4.54
3/5/2012	6.62	0	9	58.3	6.62		6.62	4.62
3/6/2012	6.21	0	8	68.9	6.214		6.21	4.67
3/7/2012	6.34	0	7	72	6.341		6.34	4.72
3/8/2012	7.43	0	6	55.2	7.425		7.43	4.77
3/9/2012	7.35	0.02	6	41.4	7.351		7.35	4.86
3/10/2012	6.76	0.07	5	41.2	6.757		6.76	4.95
3/11/2012	6.31	0	5	54.3	6.305		6.31	5.03
3/12/2012	5.95	0	3	78.1	5.947		5.95	5.09
3/13/2012	5.73	0.03	2	75	5.734		5.73	5.14
3/14/2012	5.79	0.13	1	78.6	5.792		5.79	5.18
3/15/2012	5.35	0	0	84.6		5.351	5.35	5.24
3/16/2012	5.56	0.17	0	79.9	5.562		5.56	5.27
3/17/2012	5.04	0	0	70		5.043	5.04	5.33
3/18/2012	4.82	0	0	62.8		4.823	4.82	5.36
3/19/2012	4.83	0	0	46.2		4.828	4.83	5.39
3/20/2012	4.74	0	0	44.2		4.737	4.74	5.42
3/21/2012	4.62	0	0	47.7		4.62	4.62	5.44
3/22/2012	4.57	0	0	47.7		4.57	4.57	5.47
3/23/2012	4.42	0	0	44.8		4.415	4.42	5.49
3/24/2012	4.26	0	0	47.7		4.257	4.26	5.50
3/25/2012	4.26	0.09	0	45.7	4.26		4.26	5.51
3/26/2012	4.29	0		52		4.286	4.29	5.45
3/27/2012	4.10	0		52.3		4.095	4.10	5.41

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
3/28/2012	4.02	0.01		57		4.023	4.02	5.40
3/29/2012	4.07	0.02		57.7		4.074	4.07	5.40
3/30/2012	3.99	0		49.5		3.991	3.99	5.39
3/31/2012	3.85	0		51.6		3.85	3.85	5.39
4/1/2012	3.76	0.07	3	49.6	3.764		3.76	5.37
4/2/2012	3.98	0.04	0	47.3		3.98	3.98	5.34
4/3/2012	3.89	0	0	53.6		3.887	3.89	5.22
4/4/2012	3.96	0		57.2		3.956	3.96	5.10
4/5/2012	3.92	0		57.4		3.923	3.92	5.01
4/6/2012	3.91	0		55.6		3.912	3.91	4.93
4/7/2012	3.84	0		63.7		3.839	3.84	4.85
4/8/2012	3.68	0		69.8		3.683	3.68	4.73
4/9/2012	3.96	0		77.5		3.958	3.96	4.61
4/10/2012	3.95	0		82		3.945	3.95	4.52
4/11/2012	3.84	0		79.2		3.841	3.84	4.44
4/12/2012	3.74	0.06		66.7	3.744		3.74	4.37
4/13/2012	3.58	0		59		3.581	3.58	4.30
4/14/2012	3.41	0		75.9		3.406	3.41	4.23
4/15/2012	3.37	0		73.6		3.367	3.37	4.16
4/16/2012	3.51	0		65.7		3.511	3.51	4.09
4/17/2012	3.47	0		54.9		3.472	3.47	4.04
4/18/2012	3.43	0		58.5		3.428	3.43	3.99
4/19/2012	3.27	0		60.4		3.266	3.27	3.95
4/20/2012	3.28	0		59		3.279	3.28	3.90
4/21/2012	3.26	0		53.4		3.263	3.26	3.85
4/22/2012	4.66	0.93		55.6	4.663		4.66	3.81
4/23/2012	13.93	2.19		54.9	13.931		7.73	3.82
4/24/2012	7.04	0		56.1	7.04		7.04	3.93
4/25/2012	5.72	0		48.4	5.721		5.72	4.03
4/26/2012	5.15	0.01		52.3	5.152		5.15	4.07
4/27/2012	5.06	0.13		53.2	5.059		5.06	4.11
4/28/2012	4.53	0		56.3	4.53		4.53	4.14
4/29/2012	4.36	0		61.5	4.358		4.36	4.16
4/30/2012	4.33	0		58.3	4.328		4.33	4.17
5/1/2012	5.90	0.61		65.8	5.896		5.90	4.19
5/2/2012	5.00	0.03		53.8	4.998		5.00	4.26
5/3/2012	4.72	0.06		60.4	4.719		4.72	4.29
5/4/2012	4.95	0.21		62.8	4.954		4.95	4.32
5/5/2012	4.55	0.01		62.2		4.549	4.55	4.35
5/6/2012	4.46	0		75.2		4.455	4.46	4.37
5/7/2012	4.57	0		79.5		4.568	4.57	4.39
5/8/2012	6.22	0.74		71.6	6.218		6.22	4.42
5/9/2012	5.86	0.3		70.5	5.863		5.86	4.50

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
5/10/2012	12.19	1.14		71.4	12.186		7.73	4.56
5/11/2012	7.57	0		67.3	7.572		7.57	4.69
5/12/2012	6.24	0		67.6	6.243		6.24	4.81
5/13/2012	5.56	0		74.3	5.562		5.56	4.90
5/14/2012	5.30	0.08		78.6	5.303		5.30	4.96
5/15/2012	6.42	0.61		69.3	6.419		6.42	5.03
5/16/2012	5.88	0.04		67.8	5.884		5.88	5.13
5/17/2012	5.34	0.02		76.8	5.344		5.34	5.21
5/18/2012	4.93	0		72		4.926	4.93	5.27
5/19/2012	4.60	0		69.8		4.603	4.60	5.32
5/20/2012	4.39	0		86.7		4.39	4.39	5.36
5/21/2012	4.27	0.02		76.3		4.272	4.27	5.40
5/22/2012	4.83	0.38		72.5	4.825		4.83	5.43
5/23/2012	4.71	0.01		62.2		4.705	4.71	5.44
5/24/2012	4.32	0.01		77		4.315	4.32	5.34
5/25/2012	4.16	0.02		80.4		4.161	4.16	5.25
5/26/2012	4.02	0.01		69.3		4.017	4.02	5.20
5/27/2012	3.88	0		59		3.878	3.88	5.16
5/28/2012	3.86	0		58.1		3.862	3.86	5.12
5/29/2012	4.07	0.07		53.4	4.066		4.07	5.10
5/30/2012	4.09	0		56.7		4.086	4.09	5.09
5/31/2012	4.09	0		64.6		4.091	4.09	5.08
6/1/2012	3.92	0		64.6		3.919	3.92	5.02
6/2/2012	10.02	2.58		76.1	10.017		7.73	4.98
6/3/2012	12.23	0.25		79.3	12.229		7.73	5.08
6/4/2012	11.24	0.52		79.2	11.24		7.73	5.18
6/5/2012	9.38	0.1		70.3	9.378		7.73	5.28
6/6/2012	7.91	0.04		75.2	7.91		7.73	5.39
6/7/2012	6.90	0.01		66.9	6.902		6.90	5.50
6/8/2012	6.46	0.17		74.7	6.464		6.46	5.52
6/9/2012	5.87	0		72.9	5.865		5.87	5.54
6/10/2012	5.19	0		67.5	5.192		5.19	5.48
6/11/2012	5.09	0		65.7	5.093		5.09	5.40
6/12/2012	4.93	0.01		66.6	4.928		4.93	5.36
6/13/2012	6.99	0.8		77.5	6.993		6.99	5.34
6/14/2012	5.31	0		94.1	5.311		5.31	5.40
6/15/2012	4.91	0		93.6	4.906		4.91	5.36
6/16/2012	4.51	0		90.5		4.505	4.51	5.33
6/17/2012	4.33	0		80.2		4.325	4.33	5.30
6/18/2012	4.25	0		82.6		4.249	4.25	5.28
6/19/2012	4.12	0		72.9		4.12	4.12	5.27
6/20/2012	4.33	0		67.3		4.328	4.33	5.26
6/21/2012	4.30	0		72.5		4.304	4.30	5.26

Table 2
Flow and Precipitation Data

Date	Daily Flow (MGD)	City Hall Precip (in)	NOAA Snow Pack Depth (in)	NOAA Max of Dry Bulb Temp (F)	Parsed Wet Weather Daily Flow (MGD)	Parsed Dry Weather Daily Flow (MGD)	Truncated Flow Data to 7.73 mgd (mgd)	Truncated Flow 30 day rolling ave, mgd
6/22/2012	5.37	0.47		81.9	5.366		5.37	5.24
6/23/2012	5.00	0.22		86	4.998		5.00	5.26
6/24/2012	4.14	0.01		86.4		4.136	4.14	5.29
6/25/2012	7.99	1.54			7.985		7.73	5.29
6/26/2012	7.48	0.71			7.478		7.48	5.41
6/27/2012	6.05	0			6.054		6.05	5.53
6/28/2012	5.34	0			5.339		5.34	5.60
6/29/2012	5.13	0.07			5.125		5.13	5.64
6/30/2012	4.71	0					4.71	5.68
Average	5.69						5.23	
Max	19.97	5.61				7.73	7.73	7.56

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
1/1/2011	3.81										
1/2/2011	4.05										
1/3/2011	4.14										
1/4/2011	4.08	181	6156			195	6618	126	4299		
1/5/2011	3.98	186	6179			220	7311	140	4647	6156	6618
1/6/2011	3.99									6167	6965
1/7/2011	3.97									6167	6965
1/8/2011	3.89									6167	6965
1/9/2011	3.71									6167	6965
1/10/2011	3.49									6167	6965
1/11/2011	3.49	204	5943			236	6878	139	4046	6167	6965
1/12/2011	3.50	164	4786			205	5982	133	3890	6092	6936
1/13/2011	3.48									5766	6697
1/14/2011	3.48									5766	6697
1/15/2011	3.37									5766	6697
1/16/2011	3.30									5766	6697
1/17/2011	3.44									5766	6697
1/18/2011	3.76	253	7934			224	7021	136	4274	5766	6697
1/19/2011	6.72	168	9417			154	8627	92	5146	6199	6762
1/20/2011	5.19									6736	7073
1/21/2011	4.89									6736	7073
1/22/2011	4.29									6736	7073
1/23/2011	4.25									6736	7073
1/24/2011	4.06									6736	7073
1/25/2011	4.03	201	6747			227	7613	173	5804	6736	7073
1/26/2011	4.13	159	5454			197	6779	133	4573	6737	7150
1/27/2011	4.06									6577	7104
1/28/2011	3.92									6577	7104
1/29/2011	3.90									6577	7104
1/30/2011	3.72									6577	7104
1/31/2011	3.70									6577	7104
2/1/2011	3.79	234	7396			227	7188	140	4416	6577	7104
2/2/2011	3.93	213	6981			227	7424	131	4281	6668	7113
2/3/2011	3.87									6699	7144
2/4/2011	3.54									6760	7203
2/5/2011	4.58									6832	7189
2/6/2011	6.01									6832	7189
2/7/2011	4.96									6832	7189
2/8/2011	5.62									6832	7189
2/9/2011	4.96	255	10521			180	7441	106	4366	6832	7189
2/10/2011	4.70	248	9710			218	8556	138	5430	7242	7217
2/11/2011	4.53									7661	7404
2/12/2011	4.42									8020	7581
2/13/2011	4.17									8020	7581
2/14/2011	4.58									8020	7581
2/15/2011	4.51	267	10034			172	6475	135	5055	8020	7581
2/16/2011	4.47	209	7780			258	9631	154	5742	8244	7458
2/17/2011	4.84									8197	7675
2/18/2011	6.02									8227	7748
2/19/2011	6.70									8078	7638
2/20/2011	6.06									8078	7638
2/21/2011	5.89									8078	7638
2/22/2011	5.59	291	13569			160	7461	103	4784	8078	7638
2/23/2011	5.28	285	12560			212	9338	116	5103	8688	7619
2/24/2011	5.16									9075	7791
2/25/2011	7.52									9334	7810
2/26/2011	6.57									9819	7939
2/27/2011	5.85									9819	7939
2/28/2011	7.73									9819	7939
3/1/2011	7.73									9819	7939
3/2/2011	7.29	159	9663			128	7785	63	3798	9819	7939
3/3/2011	6.48									9802	7922
3/4/2011	6.13									10102	8014
3/5/2011	6.39									10548	8098
3/6/2011	7.73									10548	8098
3/7/2011	7.73									10548	8098
3/8/2011	7.73	115	7414			85	5448	52	3333	10548	8098
3/9/2011	7.73	117	7511			95	6131	56	3610	10156	7767
3/10/2011	7.73									9862	7585

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
3/11/2011	7.73									9862	7585
3/12/2011	7.73									9780	7603
3/13/2011	7.73									9790	7467
3/14/2011	7.73									9790	7467
3/15/2011	7.73	145	9348			108	6963	56	3630	9790	7467
3/16/2011	7.73	198	12765							9735	7404
3/17/2011	7.73									10071	7404
3/18/2011	7.73									10076	7536
3/19/2011	7.73									10404	7187
3/20/2011	7.73									10404	7187
3/21/2011	7.73									10404	7187
3/22/2011	7.73	169	10863			124	8020	73	4693	10404	7187
3/23/2011	7.73	162	10412			157	10147	65	4165	10461	7306
3/24/2011	7.73									10456	7662
3/25/2011	7.17									10067	7690
3/26/2011	6.61									9711	7416
3/27/2011	6.19									9711	7416
3/28/2011	5.94									9711	7416
3/29/2011	5.68	156	7389			173	8170	97	4585	9711	7416
3/30/2011	5.59	154	7185			198	9251	133	6224	9420	7523
3/31/2011	5.48									9172	7739
4/1/2011	7.31									9172	7739
4/2/2011	7.67									9111	7733
4/3/2011	7.00									9111	7733
4/4/2011	6.84									9111	7733
4/5/2011	6.77	199	11228			193	10883	86	4858	9111	7733
4/6/2011	6.23	194	10075			210	10885	94	4897	9346	8127
4/7/2011	5.90									9419	8433
4/8/2011	5.59									9642	8806
4/9/2011	5.33									9908	9189
4/10/2011	5.23									9908	9189
4/11/2011	7.50									9908	9189
4/12/2011	5.75	206	9855							9908	9189
4/13/2011	7.73	293	18857							9902	9189
4/14/2011	7.73									10797	9189
4/15/2011	7.73									10959	9560
4/16/2011	7.28									10733	9560
4/17/2011	7.73									10733	9560
4/18/2011	7.73									10733	9560
4/19/2011	7.73	168	10831			122	7891	59	3797	10733	9560
4/20/2011	7.73	137	8832			124	7988	84	5402	10744	9321
4/21/2011	7.04									10552	9154
4/22/2011	6.42									10518	9317
4/23/2011	7.73									10531	9178
4/24/2011	7.29									10531	9178
4/25/2011	6.75									10531	9178
4/26/2011	6.54	188	10230			158	8642	77	4218	10531	9178
4/27/2011	6.11	159	8105			157	7998	90	4572	10498	9102
4/28/2011	5.87									10259	8964
4/29/2011	5.65									10577	9077
4/30/2011	5.20									11002	9048
5/1/2011	4.98									11002	9048
5/2/2011	5.05									11002	9048
5/3/2011	4.99	231	9613			220	9151	118	4890	11002	9048
5/4/2011	5.59	361	16816			266	12403	134	6241	10847	9063
5/5/2011	5.79									11444	9480
5/6/2011	5.05									11468	9280
5/7/2011	6.27									11642	9012
5/8/2011	5.14									11642	9012
5/9/2011	5.03									11642	9012
5/10/2011	4.92	170	6951			255	10453	149	6127	11642	9012
5/11/2011	4.86	186	7531			201	8151	112	4527	11121	9218
5/12/2011	4.67									10762	9085
5/13/2011	4.59									10863	9085
5/14/2011	4.44									9864	9085
5/15/2011	7.15									9864	9085
5/16/2011	6.98									9864	9085
5/17/2011	7.45	205	12729			136	8438	65	4055	9864	9085
5/18/2011	7.73	120	7736			92	5925	59	3797	10182	9013
5/19/2011	7.73									9937	8704

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
5/20/2011	7.73									9838	8794
5/21/2011	7.21									9964	8895
5/22/2011	6.57									9964	8895
5/23/2011	6.35									9964	8895
5/24/2011	6.76	199	11218			179	10085	106	5947	9964	8895
5/25/2011	5.94	147	7258			164	8124	88	4355	10103	9027
5/26/2011	5.56									9819	8937
5/27/2011	5.28									9773	8970
5/28/2011	4.88									9981	9091
5/29/2011	4.69									9981	9091
5/30/2011	4.58									9981	9091
5/31/2011	4.61	175	6709			248	9523	135	5206	9981	9091
6/1/2011	4.87	226	9183			333	13531	171	6932	9618	9139
6/2/2011	4.49									9574	9578
6/3/2011	4.69									9570	9626
6/4/2011	4.25									8664	9279
6/5/2011	4.15									8664	9279
6/6/2011	4.24									8664	9279
6/7/2011	4.19	204	7106			256	8939	162	5640	8664	9279
6/8/2011	4.12	251	8609			294	10101	171	5877	8491	9241
6/9/2011	4.82									8503	9327
6/10/2011	4.08									8675	9202
6/11/2011	5.64									8818	9333
6/12/2011	6.41									8818	9333
6/13/2011	4.66									8818	9333
6/14/2011	4.60	195	7483			181	6949	121	4643	8818	9333
6/15/2011	4.51	182	6821			212	7959	133	5006	8670	9068
6/16/2011	4.37									8485	8958
6/17/2011	4.19									8014	9015
6/18/2011	4.38									8048	9402
6/19/2011	3.99									8048	9402
6/20/2011	3.92									8048	9402
6/21/2011	3.93	196	6429			236	7751	146	4779	8048	9402
6/22/2011	4.67	304	11818			271	10545	145	5658	7868	9218
6/23/2011	6.14									8263	9351
6/24/2011	4.80									7935	9269
6/25/2011	7.73									8020	9412
6/26/2011	5.79									8020	9412
6/27/2011	5.27									8020	9412
6/28/2011	4.98	180	7460			207	8590	144	5972	8020	9412
6/29/2011	5.01	147	6116			171	7131	148	6175	7958	9321
6/30/2011	4.55									7773	9102
7/1/2011	4.43									7892	9055
7/2/2011	4.14									7730	8496
7/3/2011	4.06									7730	8496
7/4/2011	5.06									7730	8496
7/5/2011	4.23	200	7061	82	2895	250	8826	151	5338	7730	8496
7/6/2011	4.29	204	7274	28	1001	254	9069	135	4833	7656	8532
7/7/2011	4.11									7618	8586
7/8/2011	3.88									7675	8547
7/9/2011	3.82									7558	8352
7/10/2011	3.63									7558	8352
7/11/2011	3.85									7558	8352
7/12/2011	3.82									7558	8352
7/13/2011	4.18	283	9855	72	2512	316	11024	187	6534	7558	8352
7/14/2011	4.01	230	7690	72	2407	288	9619	191	6386	7813	8649
7/15/2011	3.71									7836	8946
7/16/2011	3.53									7963	9069
7/17/2011	3.41									7963	9069
7/18/2011	3.71									7963	9069
7/19/2011	3.57	268	7979	105	3111	327	9742	194	5782	7963	9069
7/20/2011	3.40	252	7137	78	2209	305	8633	202	5710	7965	9144
7/21/2011	3.45									7882	9093
7/22/2011	3.51									8043	9242
7/23/2011	3.28									7572	9079
7/24/2011	2.78									7572	9079
7/25/2011	3.37									7572	9079
7/26/2011	3.59	269	8059	67	1992	309	9242	165	4943	7572	9079
7/27/2011	3.43	232	6627	67	1914	298	8521	189	5407	7626	9097
7/28/2011	3.34									7526	9040

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
7/29/2011	3.55									7533	9090
7/30/2011	3.53									7710	9334
7/31/2011	2.95									7710	9334
8/1/2011	3.01									7710	9334
8/2/2011	3.08									7710	9334
8/3/2011	3.11	308	7973	88	2282	266	6900	150	3882	7710	9334
8/4/2011	3.03	244	6168	80	2022	271	6856	144	3627	7740	9064
8/5/2011	2.98									7640	8845
8/6/2011	2.87									7686	8817
8/7/2011	4.18									7686	8817
8/8/2011	3.18									7686	8817
8/9/2011	3.15	510	13364	95	2492	270	7082	171	4493	7686	8817
8/10/2011	7.73	195	12571	58	3739	198	12732	122	7846	8317	8624
8/11/2011	3.96									8742	9035
8/12/2011	3.76									8742	9035
8/13/2011	3.46									8619	8814
8/14/2011	3.03									8735	8713
8/15/2011	7.73	289	18631	55	3514	156	10038	108	6937	8735	8713
8/16/2011	6.76	221	12433	54	3045	240	13544	114	6422	9834	8861
8/17/2011	4.59									10094	9329
8/18/2011	4.19									10094	9329
8/19/2011	4.02									10329	9283
8/20/2011	3.83									10728	9364
8/21/2011	3.65									10728	9364
8/22/2011	3.90	255	8286	74	2393	295	9608	158	5154	10728	9364
8/23/2011	3.66	242	7372	73	2213	301	9197	210	6404	10457	9391
8/24/2011	3.64									10148	9372
8/25/2011	5.01									10148	9372
8/26/2011	4.00									10381	9386
8/27/2011	4.41									10850	9495
8/28/2011	7.73									10850	9495
8/29/2011	5.13									10850	9495
8/30/2011	4.58	217	8296	68	2600	225	8617	173	6625	10850	9495
8/31/2011	4.30	277	9925	102	3661	268	9624	167	5998	10566	9397
9/1/2011	4.18									10502	9420
9/2/2011	4.01									10502	9420
9/3/2011	3.73									10783	9700
9/4/2011	3.59									11360	10055
9/5/2011	3.60									11360	10055
9/6/2011	3.93	339	11092	63	2048	339	11121	171	5587	11360	10055
9/7/2011	7.73	201	12958	58	3739	124	7962	88	5673	11330	10174
9/8/2011	6.03									11493	9953
9/9/2011	5.29									11285	10271
9/10/2011	4.67									11124	9964
9/11/2011	4.33									11124	9964
9/12/2011	4.25									11124	9964
9/13/2011	4.07	175	5939	50	1697	236	8012	164	5579	11124	9964
9/14/2011	4.03	170	5718	54	1816	201	6767	156	5261	10548	9747
9/15/2011	3.91									9113	9384
9/16/2011	3.73									8698	8864
9/17/2011	3.47									8698	8864
9/18/2011	3.36									8698	8864
9/19/2011	3.33									8698	8864
9/20/2011	3.46	246	7082	68	1962	372	10717	186	5366	8698	8864
9/21/2011	3.35	274	7632	44	1214	277	7719	179	4998	8519	9070
9/22/2011	4.51									8446	8860
9/23/2011	4.12									8580	8817
9/24/2011	6.62									8580	8817
9/25/2011	4.07									8580	8817
9/26/2011	4.01									8580	8817
9/27/2011	4.02	221	7402	76	2546	256	8561	177	5918	8580	8817
9/28/2011	4.03	211	7068			197	6598	160	5359	8449	8789
9/29/2011	6.75									8311	8570
9/30/2011	5.42									8313	8565
10/1/2011	4.76									8111	8432
10/2/2011	7.73									8111	8432
10/3/2011	6.84									8111	8432
10/4/2011	7.73	178	11443	58	3739	113	7259	73	4674	8111	8432
10/5/2011	7.73	74	4738	18	1160	77	4932	49	3152	8482	8302
10/6/2011	7.56									8107	7965

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
10/7/2011	6.33									7776	7614
10/8/2011	5.58									7128	7571
10/9/2011	5.10									7128	7571
10/10/2011	4.93									7128	7571
10/11/2011	4.73	187	7356	72	2840	226	8913	132	5206	7128	7571
10/12/2011	4.61	187	7167	43	1633	273	10495	147	5661	7153	7720
10/13/2011	7.48									7155	7997
10/14/2011	6.87									7290	7996
10/15/2011	6.03									7486	8149
10/16/2011	5.23									7486	8149
10/17/2011	5.04									7486	8149
10/18/2011	4.79	241	9612	49	1958	245	9776	143	5703	7486	8149
10/19/2011	7.73	304	19566	60	3868	162	10457	76	4893	7722	8330
10/20/2011	7.73									8907	8543
10/21/2011	7.73									9109	8301
10/22/2011	6.59									9294	8374
10/23/2011	5.96									9294	8374
10/24/2011	5.69									9294	8374
10/25/2011	5.49	178	8143	46	2104	202	9236	133	6066	9294	8374
10/26/2011	5.26	196	8573	42	1842	215	9428	137	5990	9166	8470
10/27/2011	7.73									9107	8565
10/28/2011	7.00									9296	8566
10/29/2011	6.33									9575	8812
10/30/2011	7.73									9575	8812
10/31/2011	7.73									9575	8812
11/1/2011	7.73	148	9541	37	2353	130	8394	92	5944	9575	8812
11/2/2011	7.26	139	8415	23	1392	132	8003	101	6133	9571	8766
11/3/2011	6.68									9455	8689
11/4/2011	6.30									9235	8848
11/5/2011	5.62									9797	9338
11/6/2011	5.28									9797	9338
11/7/2011	5.11									9797	9338
11/8/2011	4.95	174	7158	65	2682	174	7179	114	4687	9797	9338
11/9/2011	4.83	181	7294	55	2216	186	7504	128	5174	9503	9098
11/10/2011	7.02									9282	8938
11/11/2011	5.90									9497	8941
11/12/2011	5.15									9788	8747
11/13/2011	4.92									9788	8747
11/14/2011	4.83									9788	8747
11/15/2011	4.70	186	7270	49	1920	204	7995	109	4280	9788	8747
11/16/2011	5.06	210	8853	49	2066	197	8314	101	4254	9508	8663
11/17/2011	4.82									9443	8628
11/18/2011	4.55									9424	8501
11/19/2011	4.45									8156	8257
11/20/2011	4.32									8156	8257
11/21/2011	4.25									8156	8257
11/22/2011	4.27	328	11675	49	1744	268	9539	161	5745	8156	8257
11/23/2011	7.73	150	9638	51	3288	140	9038	95	6112	8547	8399
11/24/2011	6.39									8656	8463
11/25/2011	5.82									8713	8377
11/26/2011	5.40									8731	8246
11/27/2011	5.24									8731	8246
11/28/2011	5.14									8731	8246
11/29/2011	4.95	222	9152	50	2066	178	7338	88	3632	8731	8246
11/30/2011	6.74	159	8940	60	3374	171	9638	112	6309	8777	8145
12/1/2011	5.18									8794	8294
12/2/2011	4.94									8711	8283
12/3/2011	4.72									8748	8318
12/4/2011	4.55									8748	8318
12/5/2011	4.47									8748	8318
12/6/2011	4.62	246	9449	38	1443	239	9207	139	5365	8748	8318
12/7/2011	7.73	295	19018	62	3997	181	11675	131	8452	8826	8417
12/8/2011	7.73									9845	8743
12/9/2011	7.73									10143	8916
12/10/2011	7.24									10499	9093
12/11/2011	6.40									10499	9093
12/12/2011	6.00									10499	9093
12/13/2011	5.68	136	6445	31	1469	162	7686	100	4744	10499	9093
12/14/2011	5.45	160	7247	35	1590	196	8883	135	6111	10049	8937
12/15/2011	5.37									9769	8931

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
12/16/2011	5.13									10046	9035
12/17/2011	4.90									10196	9126
12/18/2011	4.69									10196	9126
12/19/2011	4.60									10196	9126
12/20/2011	4.49	170	6349	37	1386	204	7645	131	4895	10196	9126
12/21/2011	4.68	309	12071	46	1777	280	10954	168	6555	9768	8961
12/22/2011	5.46									9998	9160
12/23/2011	7.73									9812	9118
12/24/2011	5.53									9834	9128
12/25/2011	4.89									9834	9128
12/26/2011	5.00									9834	9128
12/27/2011	6.84	190	10815	32	1826	149	8526	117	6700	9834	9128
12/28/2011	5.86	144	7012	38	1832	170	8302	131	6396	9943	9061
12/29/2011	5.07									9650	8985
12/30/2011	4.80									9705	9168
12/31/2011	4.93									9801	9110
1/1/2012	4.58									9801	9110
1/2/2012	5.05									9801	9110
1/3/2012	4.65	153	5910	54	2093	180	6980	130	5027	9801	9110
1/4/2012	4.50	167	6268	37	1389	191	7161	140	5243	9368	8873
1/5/2012	4.42									9058	8702
1/6/2012	4.29									9015	8646
1/7/2012	4.28									7765	8267
1/8/2012	4.10									7765	8267
1/9/2012	4.16									7765	8267
1/10/2012	4.21	205	7187	63	2214	225	7897	166	5834	7765	8267
1/11/2012	4.09	207	7061	38	1296	216	7371	128	4380	7700	8226
1/12/2012	7.73									7636	8140
1/13/2012	6.26									7769	8191
1/14/2012	5.22									7834	8104
1/15/2012	4.79									7834	8104
1/16/2012	4.79									7834	8104
1/17/2012	5.10	141	6000	55	2319	165	7025	113	4795	7834	8104
1/18/2012	4.80	208	8314	69	2744	198	7933	136	5429	7630	7985
1/19/2012	4.47									7699	7979
1/20/2012	4.42									7849	8017
1/21/2012	4.12									7321	7649
1/22/2012	4.02									7321	7649
1/23/2012	4.91									7321	7649
1/24/2012	5.37	208	9321	65	2890	239	10723	109	4871	7321	7649
1/25/2012	4.76	208	8239	41	1628	231	9152	149	5920	7543	7991
1/26/2012	4.58									7613	8107
1/27/2012	7.73									7257	8061
1/28/2012	7.73									7287	8030
1/29/2012	6.98									7287	8030
1/30/2012	6.34									7287	8030
1/31/2012	5.99	152	7593	55	2748	199	9916	117	5860	7287	8030
2/1/2012	5.74	161	7711	45	2131	195	9335	138	6600	7321	8240
2/2/2012	5.38									7360	8349
2/3/2012	5.15									7521	8502
2/4/2012	4.94									7678	8669
2/5/2012	4.80									7678	8669
2/6/2012	4.77									7678	8669
2/7/2012	4.69	207	8098	56	2171	254	9937	156	6095	7678	8669
2/8/2012	4.63	181	6982	56	2141	221	8528	130	5030	7725	8810
2/9/2012	4.60									7651	8782
2/10/2012	4.50									7702	8880
2/11/2012	4.43									7782	9069
2/12/2012	4.35									7782	9069
2/13/2012	4.19									7782	9069
2/14/2012	4.17	344	11961	73	2538	279	9694	120	4162	7782	9069
2/15/2012	4.03	235	7894	55	1848	258	8650	121	4058	8247	9138
2/16/2012	3.96									8211	9089
2/17/2012	4.03									8457	9319
2/18/2012	4.01									8475	9492
2/19/2012	3.92									8475	9492
2/20/2012	3.95									8475	9492
2/21/2012	3.92	236	7710	78	2548	308	10049	186	6079	8475	9492
2/22/2012	3.96	198	6533	52	1699	260	8588	183	6028	8390	9554
2/23/2012	3.94									8204	9457

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
2/24/2012	6.02									8080	9317
2/25/2012	5.72									8060	9337
2/26/2012	4.21									8060	9337
2/27/2012	4.25									8060	9337
2/28/2012	4.12	146	5011	53	1802	225	7722	150	5144	8060	9337
2/29/2012	4.06	242	8202	57	1915	262	8877	152	5152	7721	9158
3/1/2012	4.49									7770	9130
3/2/2012	4.57									7789	9042
3/3/2012	7.73									7799	9006
3/4/2012	7.54									7799	9006
3/5/2012	6.62									7799	9006
3/6/2012	6.21	144	7437	56	2902	176	9095	132	6825	7799	9006
3/7/2012	6.34	136	7166	55	2882	153	8075	110	5796	7759	9016
3/8/2012	7.43									7699	8922
3/9/2012	7.35									7655	8809
3/10/2012	6.76									7739	8844
3/11/2012	6.31									7739	8844
3/12/2012	5.95									7739	8844
3/13/2012	5.73	148	7078	30	1435	176	8397	142	6786	7739	8844
3/14/2012	5.79	147	7101	45	2174	178	8598	127	6149	7666	8794
3/15/2012	5.35									7609	8775
3/16/2012	5.56									7126	8672
3/17/2012	5.04									7030	8675
3/18/2012	4.82									7030	8675
3/19/2012	4.83									7030	8675
3/20/2012	4.74	171	6736	59	2331	191	7550	129	5088	7030	8675
3/21/2012	4.62	145	5587	52	2004	194	7463	141	5421	6997	8550
3/22/2012	4.57									6856	8441
3/23/2012	4.42									6761	8263
3/24/2012	4.26									6790	8222
3/25/2012	4.26									6790	8222
3/26/2012	4.29									6790	8222
3/27/2012	4.10	178	6062	62	2100	243	8285	182	6219	6790	8222
3/28/2012	4.02	203	6811	83	2768	239	8029	130	4348	6709	8229
3/29/2012	4.07									6719	8209
3/30/2012	3.99									6909	8263
3/31/2012	3.85									6747	8187
4/1/2012	3.76									6747	8187
4/2/2012	3.98									6747	8187
4/3/2012	3.89									6747	8187
4/4/2012	3.96	244	8034	53	1749	243	8027	154	5081	6747	8187
4/5/2012	3.92	185	6036	50	1620	247	8094	194	6337	6890	8169
4/6/2012	3.91									6734	8058
4/7/2012	3.84									6681	8056
4/8/2012	3.68									6681	8056
4/9/2012	3.96									6681	8056
4/10/2012	3.95	163	5346	53	1744	236	7768	196	6439	6681	8056
4/11/2012	3.84	222	7112	52	1666	271	8688	223	7147	6532	8024
4/12/2012	3.74									6590	8090
4/13/2012	3.58									6536	8056
4/14/2012	3.41									6466	7988
4/15/2012	3.37									6466	7988
4/16/2012	3.51									6466	7988
4/17/2012	3.47	220	6370	52	1506	249	7207	205	5924	6466	7988
4/18/2012	3.43	209	5975	47	1344	248	7093	158	4511	6455	7901
4/19/2012	3.27									6407	7820
4/20/2012	3.28									6370	7851
4/21/2012	3.26									6468	7899
4/22/2012	4.66									6468	7899
4/23/2012	7.73									6468	7899
4/24/2012	7.04	135	7926	30	1761	125	7357	72	4251	6468	7899
4/25/2012	5.72	134	6394	37	1765	119	5664	83	3970	6630	7839
4/26/2012	5.15									6607	7621
4/27/2012	5.06									6667	7547
4/28/2012	4.53									6649	7487
4/29/2012	4.36									6649	7487
4/30/2012	4.33									6649	7487
5/1/2012	5.90	182	8949	68	3319	177	8699	114	5591	6649	7487
5/2/2012	5.00	129	5356	31	1292	169	7044	130	5398	6905	7622

Date	Truncated Flow Data to 7.73 mgd (mgd)	Influent TSS (mg/L)	Influent TSS Truncated at 7.73 mgd (lb/d)	Effluent TSS (mg/L)	Effluent TSS Truncated at 7.73 mgd (lb/d)	Influent BOD (mg/L)	Influent BOD Truncated at 7.73 mgd (lb/d)	Effluent BOD (mg/L)	Effluent BOD Truncated at 7.73 mgd (lb/d)	30 Day Rolling Ave Truncated Influent TSS Loading (lb/d)	30 Day Rolling Ave Truncated Influent BOD Loading (lb/d)
5/3/2012	4.72			40	1574			130	5116	6750	7564
5/4/2012	4.95									6750	7564
5/5/2012	4.55									6607	7513
5/6/2012	4.46									6679	7440
5/7/2012	4.57									6679	7440
5/8/2012	6.22	287	14883	99	5108	220	11398	143	7416	6679	7440
5/9/2012	5.86	246	12029	60	2934	166	8122	107	5208	7590	7880
5/10/2012	7.73									8034	7904
5/11/2012	7.57									8333	7919
5/12/2012	6.24									8485	7823
5/13/2012	5.56									8485	7823
5/14/2012	5.30									8485	7823
5/15/2012	6.42	250	13357	55	2918	209	11199	119	6365	8485	7823
5/16/2012	5.88	149	7287	30	1448	173	8470	126	6188	9027	8198
5/17/2012	5.34									8853	8225
5/18/2012	4.93									9129	8338
5/19/2012	4.60									9523	8494
5/20/2012	4.39									9523	8494
5/21/2012	4.27									9523	8494
5/22/2012	4.83									9523	8494
5/23/2012	4.71									9523	8494
5/24/2012	4.32	186	6694	42	1511	194	6964	130	4682	9523	8494
5/25/2012	4.16	165	5726	29	989	212	7371	137	4765	9369	8445
5/26/2012	4.02									9285	8658
5/27/2012	3.88									9285	8658
5/28/2012	3.86									9285	8658
5/29/2012	4.07	244	8274	46	1560	207	7006	142	4798	9285	8658
5/30/2012	4.09	220	7497	50	1704	231	7885	177	6028	9173	8475
5/31/2012	4.09									9005	8416
6/1/2012	3.92									9011	8384
6/2/2012	7.73									9468	8552
6/3/2012	7.73									9468	8552
6/4/2012	7.73									9468	8552
6/5/2012	7.73	197	12668	71	4577	144	9277	97	6260	9468	8552
6/6/2012	7.73	149	9606	49	3159	138	8871	97	6273	9824	8632
6/7/2012	6.90									9802	8656
6/8/2012	6.46									9237	8352
6/9/2012	5.87									8889	8380
6/10/2012	5.19									8889	8380
6/11/2012	5.09									8889	8380
6/12/2012	4.93	207	8487	70	2877	229	9412	167	6855	8889	8380
6/13/2012	6.99	189	11023	40	2333	160	9320	98	5692	8844	8495
6/14/2012	5.31									9062	8577
6/15/2012	4.91									8585	8286
6/16/2012	4.51									8747	8263
6/17/2012	4.33									8747	8263
6/18/2012	4.25									8747	8263
6/19/2012	4.12	218	7491	54	1855	242	8298	123	4213	8747	8263
6/20/2012	4.33	343	12363	42	1516	271	9785	126	4537	8607	8267
6/21/2012	4.30									8983	8419
6/22/2012	5.37									8983	8419
6/23/2012	5.00									8983	8419
6/24/2012	4.14									9237	8581
6/25/2012	7.73									9676	8732
6/26/2012	7.48	360	22452	55	3430	235	14625	109	6785	9676	8732
6/27/2012	6.05	231	11663	53	2676	218	11027	99	5014	11096	9387
6/28/2012	5.34									11152	9551
6/29/2012	5.13									11472	9833
6/30/2012	4.71									11969	10077
Average		207	8792	55	2262	210	8610	131	5330		
Max										11969	10271

ATTACHMENT D

FINAL WASTEWATER CHARACTERIZATION DATA

WWMP Pilot
Wastewater Characterization Data
Peirce Island WWTF, Portsmouth, NH

Sample ID	Average	Min	Max	Std Dev	Count	13-May	20-May	27-May	3-Jun	10-Jun	17-Jun	24-Jun	1-Jul	8-Jul	15-Jul
Week ID Number						1	2	3	4	5	6	7	8	9	10
Average Flow (MGD)	5.61	3.03	13.80	2.26	43.00	4.67	10.57	5.56	4.48	4.82	4.37	6.14	4.55	4.108	4.009
Precipitation (in)	0.20	0.00	1.10	0.31	42.00	0.00	0.38	0.00	0.00	0.34	0.00	0.35	0.00	0.00	0.07
Raw Temp (deg C)	16.55	11.00	22.10	3.66	42.00	14.9	14.6	16.6	16	18.9	19.2	18.3	20.2	19.3	20.3
Raw pH	6.67	5.92	7.21	0.25	42.00	6.28	6.68	5.92	6.58	6.76	6.61	6.71	6.4	6.65	6.31
Raw Alkalinity (mg/L as $CaCO_3$)	146.86	93.00	210.00	28.22	42.00	150	110	160	160	170	150	160	180	180	170
Raw FOG (mg/L)	28.42	9.00	78.00	14.89	43.00	35	10	35	25	61	57	44	78	19	48
Raw TSS (mg/L)	202.43	78.00	450.00	80.06	42.00	190	80	140	130	350	160	160	160	200	200
Raw VSS (mg/L)	175.48	68.00	300.00	58.39	42.00	180	73	120	120	270	150	140	140	170	190
VSS:TSS	0.88	0.64	1.00	0.15	42.00	0.95	0.91	0.86	0.92	0.77	0.94	0.88	0.88	0.85	0.95
Raw BOD_{XX} (mg/L)	167.10	56.00	260.00	50.74	42.00	130	87	200	140	160	190	140	130	200	240
Raw BOD_{GF} (mg/L) sBOD	95.33	21.00	170.00	36.53	42.00	100	38	120	100	110	110	93	99	150	140
Particulate BOD (mg/L)	71.76	11.00	150.00	35.17	42.00	30	49	80	40	50	80	47	31	50	100
sBOD:BOD	0.57	0.22	0.88	0.17	42.00	0.77	0.44	0.60	0.71	0.69	0.58	0.66	0.76	0.75	0.58
Raw COD_{XX} (mg/L)	401.19	140.00	660.00	128.35	42.00	420	200	350	370	570	400	370	420	520	590
Raw COD_{GF} (mg/L) sCOD	169.00	43.00	290.00	56.80	42.00	210	86	200	200	220	210	160	180	270	290
Particulate COD (mg/L)	238.59	46.00	450.00	103.13	41.00	210	114	150	170	350	190	210	240	250	300
Raw COD_{XM} (mg/L)	136.02	50.00	370.00	56.73	42.00	150	67	150	140	150	150	110	140	200	220
Raw Floc COD (mg/L)	106.48	49.00	200.00	36.17	42.00	130	56	120	130	130	130	96	110	160	200
Colloidal COD (mg/L)	64.32	25.00	110.00	25.00	41.00	80	30	80	70	90	80	64	70	110	90
COD:BOD	2.46	0.78	3.56	0.70	42.00	3.23	2.30	1.75	2.64	3.56	2.11	2.64	3.23	2.60	2.46
Raw TKN (mg/L-N)	27.14	11.00	42.00	7.15	42.00	27	13	23	26	31	30	30	28	37	36
Raw NH_3-N (mg/L-N)	14.20	5.70	27.00	4.96	42.00	14	6.7	13	15	15	16	15	15	18	22
NH3-N:TKN (typ 0.66)	0.52	0.36	0.72	0.11	42.00	0.52	0.52	0.57	0.58	0.48	0.53	0.50	0.54	0.49	0.61
Raw NO_x-N (mg/L-N)	<0.5	<0.5	<0.5	0.00	7.00	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	N/A	N/A
Raw TP (mg/L-P)	9.70	4.20	13.00	3.24	7.00	8.5	4.2	12	9.5	13	7.7	13	N/A	N/A	N/A
Raw PO_4-P (mg/L-P)	3.99	1.60	6.00	1.34	7.00	3.8	1.6	4.5	4	6	3.4	4.6	N/A	N/A	N/A
PO4-P:TP	0.41	0.35	0.46	0.04	7.00	0.45	0.38	0.38	0.42	0.46	0.44	0.35	N/A	N/A	N/A
CEPT Temp (deg C)	16.25	9.20	21.40	3.86	42.00	14.8	14.2	15.6	15.7	18.3	18	18.5	18.6	19.3	20.8
CEPT DO (mg/L)	2.64	0.10	9.60	2.62	32.00	<0.1	5.7	<0.1	0.2	<1	0.2	0.1	0.2	0.2	<0.1
CEPT pH	6.67	6.38	7.08	0.15	42.00	6.38	6.52	6.52	6.5	6.53	6.6	6.58	6.62	6.61	6.74
CEPT Alkalinity (mg/L as CaCO3)	138.50	90.00	190.00	23.56	42.00	150	110	140	150	160	150	130	160	160	170
CEPT FOG (mg/L)	8.84	5.00	16.00	3.90	37.00	8	5	8	7	10	6	9	7	9	13
CEPT TSS (mg/L)	59.33	33.00	90.00	11.93	42.00	60	48	54	63	69	53	49	60	65	77
CEPT VSS (mg/L)	49.43	28.00	75.00	10.61	42.00	58	48	44	58	57	42	30	48	51	74
VSS:TSS	0.84	0.61	1.00	0.15	42.00	0.97	1.00	0.81	0.92	0.83	0.79	0.61	0.80	0.78	0.96
CEPT BOD_{XX} (mg/L)	107.69	15.00	160.00	35.03	42.00	100	46	100	120	140	110	87	100	130	160
CEPT BOD_{GF} (mg/L) sBOD	88.74	25.00	160.00	31.36	42.00	100	34	90	71	100	90	56	92	120	140
Particulate BOD (mg/L)	18.95	-38.00	59.00	16.52	42.00	0	12	10	49	40	20	31	8	10	20
sBOD:BOD	0.88	0.41	3.53	0.45	42.00	1.00	0.74	0.90	0.59	0.71	0.82	0.64	0.92	0.92	0.88
CEPT COD_{XX} (mg/L)	200.24	100.00	320.00	51.68	42.00	250	110	210	230	270	240	210	230	250	320
CEPT COD_{GF} (mg/L) sCOD	157.93	67.00	270.00	46.89	42.00	210	85	140	180	210	220	180	190	200	270
Particulate COD (mg/L)	42.31	-20.00	70.00	18.27	42.00	40	25	70	50	60	20	30	40	50	50
CEPT COD_{XM} (mg/L)	123.64	61.00	190.00	32.19	42.00	140	61	100	120	150	160	140	130	150	180
CEPT Floc COD (mg/L) or sCOD	107.79	54.00	180.00	30.42	42.00	130	54	91	110	140	150	120	120	130	180
Colloidal COD (mg/L)	50.14	-3.00	90.00	19.97	42.00	80	31	49	70	70	70	60	70	70	90
COD:BOD	2.09	1.18	9.33	1.25	42.00	2.50	2.39	2.10	1.92	1.93	2.18	2.41	2.30	1.92	2.00
CEPT TKN (mg/L-N)	22.26	10.00	36.00	6.27	42.00	27	12	19	23	25	26	23	25	28	32
CEPT NH_3-N (mg/L-N)	14.19	5.20	26.00	4.85	42.00	15	6.8	12	14	16	17	14	16	16	22
NH3-N:TKN	0.63	0.45	0.92	0.13	42.00	0.56	0.57	0.63	0.61	0.64	0.65	0.61	0.64	0.57	0.69
CEPT NO_x-N (mg/L-N)	<0.5	<0.5	<0.5	0.00	7.00	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/A	N/A	N/A
CEPT TP (mg/L-P)	8.96	5.30	13.00	2.39	7.00	9.2	5.3	10	7.8	13	7.7	9.7	N/A	N/A	N/A
CEPT PO_4-P (mg/L-P)	3.49	1.30	6.60	1.57	7.00	3.3	1.3	3	3.4	6.6	3.2	3.6	N/A	N/A	N/A
PO4-P:TP	0.38	0.25	0.51	0.09	7.00	0.36	0.25	0.30	0.44	0.51	0.42	0.37	N/A	N/A	N/A

Legend:
XX - raw blended sample
GF - glass fiber filtered (1.2µm)
XM - membrane filtered (0.45µm)
Floc -flocculated and membrane filtered (0.45µm)
Date - date of collection
Average Flow (MGD) and Precipitation (in) is data for day 24 hour composite sample began
N/A - Sampling and analysis for parameter was discontinued
NC - Not Calculated Due to Data Inconsistency
Bold/shaded entries are calculated
Note: Limited Data on 11/25/11 Due to Holiday

WWMP Pilot
Wastewater Characterization Data
Peirce Island WWTF, Portsmouth, NH

Sample ID	22-Jul	29-Jul	5-Aug	12-Aug	19-Aug	26-Aug	2-Sep	9-Sep	16-Sep	23-Sep	30-Sep	7-Oct	14-Oct	21-Oct	28-Oct
Week ID Number	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Average Flow (MGD)	3.507	3.344	3.031	3.959	4.192	5.012	4.178	6.03	3.912	4.506	6.752	7.562	7.475	12.299	8.175
Precipitation (in)	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.16	0.10	0.29	1.10	0.00	0.75	0.72	1.00
Raw Temp (deg C)	21.2	21.1	20.5	21.5	21.3	22.1	20.2	20.5	19.2	21.2	19.4	17.7	18.8	17.1	16.3
Raw pH	6.83	6.66	6.58	6.68	6.5	6.64	6.62	6.78	6.77	6.17	6.62	6.66	6.82	6.62	6.63
Raw Alkalinity (mg/L as $CaCO_3$)	190	180	210	170	180	140	170	140	170	160	120	140	100	120	100
Raw FOG (mg/L)	37	19	14	40	24	31	23	21	24	41	14	28	31	9	16
Raw TSS (mg/L)	240	220	240	200	220	390	310	160	190	180	450	99	180	95	180
Raw VSS (mg/L)	220	200	220	180	190	300	280	150	180	160	290	86	140	83	160
VSS:TSS	0.92	0.91	0.92	0.90	0.86	0.77	0.90	0.94	0.95	0.89	0.64	0.87	0.78	0.87	0.89
Raw BOD_{XX} (mg/L)	190	240	260	160	190	180	210	140	220	190	130	94	79	56	100
Raw BOD_{GF} (mg/L) sBOD	130	170	140	95	96	97	160	90	130	110	66	21	42	45	43
Particulate BOD (mg/L)	60	70	120	65	94	83	50	50	90	80	64	73	37	11	57
sBOD:BOD	0.68	0.71	0.54	0.59	0.51	0.54	0.76	0.64	0.59	0.58	0.51	0.22	0.53	0.80	0.43
Raw COD_{XX} (mg/L)	460	530	550	400	440	620	660	310	400	390	450	280	210	180	140
Raw COD_{GF} (mg/L) sCOD	210	260	230	210	200	170	230	150	210	190	110	110	80	77	94
Particulate COD (mg/L)	250	270	320	190	240	450	430	160	190	200	340	170	130	103	46
Raw COD_{XM} (mg/L)	160	200	180	160	150	130	190	120	150	150	86	80	50	55	77
Raw Floc COD (mg/L)	130	160	150	130	120	100	160	98	130	110	80	70	50	52	59
Colloidal COD (mg/L)	80	100	80	80	80	70	70	52	80	80	30	40	30	25	35
COD:BOD	2.42	2.21	2.12	2.50	2.32	3.44	3.14	2.21	1.82	2.05	3.46	2.98	2.66	3.21	1.40
Raw TKN (mg/L-N)	41	40	42	33	32	33	35	22	29	29	25	19	20	16	17
Raw NH_3-N (mg/L-N)	24	26	27	17	18	15	18	12	21	16	9.6	9.6	9.1	6.2	9.1
NH3-N:TKN (typ 0.66)	0.59	0.65	0.64	0.52	0.56	0.45	0.51	0.55	0.72	0.55	0.38	0.51	0.46	0.39	0.54
Raw NO_x-N (mg/L-N)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw TP (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw PO_4-P (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT Temp (deg C)	21.4	21.1	20.9	21.2	21.1	20.8	20.9	19.3	19.2	21.2	19.6	17.9	19.2	17.7	15.9
CEPT DO (mg/L)	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.2	<0.1	0.2	0.9	1.7	1.6	3.7	1.4	4.3
CEPT pH	6.62	6.55	6.48	6.55	6.46	6.58	6.62	6.68	6.67	6.67	6.74	6.72	6.74	6.62	6.81
CEPT Alkalinity (mg/L as CaCO3)	180	170	190	160	160	130	160	130	170	150	120	120	110	110	100
CEPT FOG (mg/L)	14	10	16	9	10	10	11	6	9	11	5	5	13	<5	<5
CEPT TSS (mg/L)	71	66	87	71	68	70	64	46	79	54	62	33	47	45	64
CEPT VSS (mg/L)	57	49	67	57	58	58	48	41	73	43	42	28	37	39	50
VSS:TSS	0.80	0.74	0.77	0.80	0.85	0.83	0.75	0.89	0.92	0.80	0.68	0.85	0.79	0.87	0.78
CEPT BOD_{XX} (mg/L)	160	160	140	120	130	120	150	88	160	120	98	32	68	49	15
CEPT BOD_{GF} (mg/L) sBOD	130	160	130	110	96	89	150	78	130	100	80	25	62	46	53
Particulate BOD (mg/L)	30	0	10	10	34	31	0	10	30	20	18	7	6	3	-38
sBOD:BOD	0.81	1.00	0.93	0.92	0.74	0.74	1.00	0.89	0.81	0.83	0.82	0.78	0.91	0.94	3.53
CEPT COD_{XX} (mg/L)	260	260	250	220	200	240	260	160	230	230	200	120	140	110	140
CEPT COD_{GF} (mg/L) sCOD	210	220	210	190	170	180	200	130	190	170	140	100	100	81	100
Particulate COD (mg/L)	50	40	40	30	30	60	60	30	40	60	60	20	40	29	40
CEPT COD_{XM} (mg/L)	150	170	160	140	130	130	160	98	150	130	110	90	90	65	83
CEPT Floc COD (mg/L) or sCOD	140	150	140	130	110	120	140	81	130	110	100	70	70	54	68
Colloidal COD (mg/L)	70	70	70	60	60	60	60	49	60	60	40	30	30	27	32
COD:BOD	1.63	1.63	1.79	1.83	1.54	2.00	1.73	1.82	1.44	1.92	2.04	3.75	2.06	2.24	9.33
CEPT TKN (mg/L-N)	35	36	35	28	25	24	27	17	26	25	20	15	16	13	15
CEPT NH_3-N (mg/L-N)	24	25	26	17	17	16	18	12	23	16	12	7.4	11	5.9	9
NH3-N:TKN	0.69	0.69	0.74	0.61	0.68	0.67	0.67	0.71	0.88	0.64	0.60	0.49	0.69	0.45	0.60
CEPT NO_x-N (mg/L-N)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT TP (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT PO_4-P (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend:
XX - raw blended sample
GF - glass fiber filtered (1.2µm)
XM - membrane filtered (0.45µm)
Floc -flocculated and membrane fil
Date - date of collection
Average Flow (MGD) and Precipita
N/A - Sampling and analysis for pa
NC - Not Calculated Due to Data In
Bold/shaded entries are calculatec
Note: Limited Data on 11/25/11 Due t

WWMP Pilot
Wastewater Characterization Data
Peirce Island WWTF, Portsmouth, NH

Sample ID	4-Nov	11-Nov	18-Nov	25-Nov	2-Dec	9-Dec	16-Dec	23-Dec	30-Dec	6-Jan	13-Jan	20-Jan	27-Jan	3-Feb	10-Feb
Week ID Number	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Average Flow (MGD)	6.678	7.023	4.824	6.394	5.184	13.798	5.372	5.456	5.072	4.424	8.514	4.473	4.576	5.378	4.604
Precipitation (in)	0	0.86	0		0	0.73	0.07	0.32	0	0	0.09	0	0.21	0	0
Raw Temp (deg C)	16.5	15.9	14.5		14.6	13.6	14.7	13.2	11	11.7	11.6	11.9	11.8	11.3	11.8
Raw pH	6.83	6.78	6.77		7.21	7.04	6.84	5.99	6.91	6.9	6.95	6.86	6.92	6.76	6.68
Raw Alkalinity (mg/L as $CaCO_3$)	150	110	140		130	110	140	120	130	150	93	150	95	140	150
Raw FOG (mg/L)	14	13	26	10	34	9	24	44	22	25	17	30	13	18	29
Raw TSS (mg/L)	130	310	190		240	78	160	300	150	180	310	140	280	150	170
Raw VSS (mg/L)	110	230	170		240	68	160	270	130	170	250	130	230	130	160
VSS:TSS	0.85	0.74	0.89		1.00	0.87	1.00	0.90	0.87	0.94	0.81	0.93	0.82	0.87	0.94
Raw BOD_{XX} (mg/L)	120	120	180		170	62	190	250	150	170	170	180	210	230	230
Raw BOD_{GF} (mg/L) sBOD	78	55	92		89	43	71	100	43	93	52	130	63	110	110
Particulate BOD (mg/L)	42	65	88		81	19	119	150	107	77	118	50	147	120	120
sBOD:BOD	0.65	0.46	0.51		0.52	0.69	0.37	0.40	0.29	0.55	0.31	0.72	0.30	0.48	0.48
Raw COD_{XX} (mg/L)	260	410	360		350	170	410	540	370	370	390	140	530	410	420
Raw COD_{GF} (mg/L) sCOD	120	120	130		130	88	140	190	150	180	43	170	110	160	180
Particulate COD (mg/L)	140	290	230		220	82	270	350	220	190	347	NC	420	250	240
Raw COD_{XM} (mg/L)	90	90	110		110	63	110	160	140	150	56	370	89	120	120
Raw Floc COD (mg/L)	65	68	89		90	49	89	130	100	110	54	110	67	92	78
Colloidal COD (mg/L)	55	52	41		40	39	51	60	50	70	NC	60	43	68	102
COD:BOD	2.17	3.42	2.00		2.06	2.74	2.16	2.16	2.47	2.18	2.29	0.78	2.52	1.78	1.83
Raw TKN (mg/L-N)	20	23	28		25	11	25	28	22	29	19	27	24	23	31
Raw NH_3-N (mg/L-N)	11	9.2	13		13	5.7	12	13	12	15	7.3	14	8.7	12	15
NH3-N:TKN (typ 0.66)	0.55	0.40	0.46		0.52	0.52	0.48	0.46	0.55	0.52	0.38	0.52	0.36	0.52	0.48
Raw NO_x-N (mg/L-N)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw TP (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw PO_4-P (mg/L-P)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT Temp (deg C)	15.9	14.8	14.6		14.8	14.3	14.8	14.5	10.6	10.8	10.1	10.5	11.4	11.8	10.4
CEPT DO (mg/L)	2.7	4.5	0.2		9.6	7	3.4	3.6	3.1	6.2	5.9	2	9	1	3.8
CEPT pH	6.52	6.59	6.74		7.08	7.02	6.94	6.54	6.79	6.81	6.81	6.92	6.85	6.67	6.75
CEPT Alkalinity (mg/L as CaCO3)	140	110	130		130	97	130	120	120	140	90	140	120	130	140
CEPT FOG (mg/L)	7	<5	10	<5	8	<5	6	<5	6	6	9	10	9	9	9
CEPT TSS (mg/L)	48	66	49		51	40	48	90	60	60	58	57	57	49	51
CEPT VSS (mg/L)	40	53	47		47	31	48	75	49	55	49	44	44	41	48
VSS:TSS	0.83	0.80	0.96		0.92	0.78	1.00	0.83	0.82	0.92	0.84	0.77	0.77	0.84	0.94
CEPT BOD_{XX} (mg/L)	110	85	110		100	48	110	100	100	110	87	110	100	120	120
CEPT BOD_{GF} (mg/L) sBOD	69	61	85		79	39	83	90	89	96	56	100	83	99	85
Particulate BOD (mg/L)	41	24	25		21	9	27	10	11	14	31	10	17	21	35
sBOD:BOD	0.63	0.72	0.77		0.79	0.81	0.75	0.90	0.89	0.87	0.64	0.91	0.83	0.83	0.71
CEPT COD_{XX} (mg/L)	150	170	200		190	100	160	220	210	190	110	130	200	170	200
CEPT COD_{GF} (mg/L) sCOD	110	110	130		140	67	120	170	140	170	70	150	140	130	160
Particulate COD (mg/L)	40	60	70		50	33	40	50	70	20	40	-20	60	40	40
CEPT COD_{XM} (mg/L)	83	90	91		100	62	110	140	120	140	90	190	110	110	130
CEPT Floc COD (mg/L) or sCOD	71	72	78		90	55	86	120	110	120	73	110	99	95	110
Colloidal COD (mg/L)	39	38	52		50	12	34	50	30	50	-3	40	41	35	50
COD:BOD	1.36	2.00	1.82		1.90	2.08	1.45	2.20	2.10	1.73	1.26	1.18	2.00	1.42	1.67
CEPT TKN (mg/L-N)	17	16	21		20	10	20	22	13	24	14	23	21	18	25
CEPT NH_3-N (mg/L-N)	10	9.3	13		12	5.2	12	13	12	16	8.2	14	12	11	15
NH3-N:TKN	0.59	0.58	0.62		0.60	0.52	0.60	0.59	0.92	0.67	0.59	0.61	0.57	0.61	0.60
CEPT NO_x-N (mg/L-N)	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT TP (mg/L-P)	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CEPT PO_4-P (mg/L-P)	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Legend:
XX - raw blended sample
GF - glass fiber filtered (1.2µm)
XM - membrane filtered (0.45µm)
Floc -flocculated and membrane fil
Date - date of collection
Average Flow (MGD) and Precipita
N/A - Sampling and analysis for pa
NC - Not Calculated Due to Data In
Bold/shaded entries are calculatec
Note: Limited Data on 11/25/11 Due t

WWMP Pilot
Wastewater Characterization Data
Peirce Island WWTF, Portsmouth, NH

Sample ID	17-Feb	24-Feb	2-Mar
Week ID Number	41	42	43
Average Flow (MGD)	3.963	3.935	4.489
Precipitation (in)	0.06	0.03	0.1
Raw Temp (deg C)	12.2	11.1	11.1
Raw pH	6.81	6.6	6.85
Raw Alkalinity (mg/L as $CaCO_3$)	150	190	140
Raw FOG (mg/L)	32	34	44
Raw TSS (mg/L)	210	190	190
Raw VSS (mg/L)	190	170	170
VSS:TSS	0.90	0.89	0.89
Raw BOD_{XX} (mg/L)	160	170	200
Raw BOD_{GF} (mg/L) sBOD	110	150	120
Particulate BOD (mg/L)	50	20	80
sBOD:BOD	0.69	0.88	0.60
Raw COD_{XX} (mg/L)	490	470	530
Raw COD_{GF} (mg/L) sCOD	210	200	220
Particulate COD (mg/L)	280	270	310
Raw COD_{XM} (mg/L)	180	170	170
Raw Floc COD (mg/L)	130	140	150
Colloidal COD (mg/L)	80	60	70
COD:BOD	3.06	2.76	2.65
Raw TKN (mg/L-N)	32	34	25
Raw NH_3-N (mg/L-N)	17	17	14
NH3-N:TKN (typ 0.66)	0.53	0.50	0.56
Raw NO_x-N (mg/L-N)	N/A	N/A	N/A
Raw TP (mg/L-P)	N/A	N/A	N/A
Raw PO_4-P (mg/L-P)	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A
CEPT Temp (deg C)	11.8	10.8	9.2
CEPT DO (mg/L)	0.3	0.8	0.6
CEPT pH	6.66	6.66	6.53
CEPT Alkalinity (mg/L as CaCO3)	140	170	130
CEPT FOG (mg/L)	11	9	7
CEPT TSS (mg/L)	58	70	55
CEPT VSS (mg/L)	55	46	47
VSS:TSS	0.95	0.66	0.85
CEPT BOD_{XX} (mg/L)	100	160	150
CEPT BOD_{GF} (mg/L) sBOD	41	120	120
Particulate BOD (mg/L)	59	40	30
sBOD:BOD	0.41	0.75	0.80
CEPT COD_{XX} (mg/L)	230	190	250
CEPT COD_{GF} (mg/L) sCOD	170	170	210
Particulate COD (mg/L)	60	20	40
CEPT COD_{XM} (mg/L)	140	140	160
CEPT Floc COD (mg/L) or sCOD	120	130	150
Colloidal COD (mg/L)	50	40	60
COD:BOD	2.30	1.19	1.67
CEPT TKN (mg/L-N)	24	28	22
CEPT NH_3-N (mg/L-N)	15	16	14
NH3-N:TKN	0.63	0.57	0.64
CEPT NO_x-N (mg/L-N)	N/A	N/A	N/A
CEPT TP (mg/L-P)	N/A	N/A	N/A
CEPT PO_4-P (mg/L-P)	N/A	N/A	N/A
PO4-P:TP	N/A	N/A	N/A

Legend:
XX - raw blended sample
GF - glass fiber filtered (1.2µm)
XM - membrane filtered (0.45µm)
Floc -flocculated and membrane fil
Date - date of collection
Average Flow (MGD) and Precipita
N/A - Sampling and analysis for pa
NC - Not Calculated Due to Data In
Bold/shaded entries are calculatec
Note: Limited Data on 11/25/11 Due t

ATTACHMENT E

2007 NPDES PERMIT

NPDES Permit No. NH0100234

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"),

The City of Portsmouth

is authorized to discharge from the Wastewater Treatment Plant located at

Peirce Island
Portsmouth, New Hampshire

and from Combined Sewer Overflows located at

010A & 010B (Parrot Avenue), 012 (Marcy Street), 013 (Deer Street)

to receiving water(s) named

Piscataqua River and South Mill Pond (to the Piscataqua River)

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on the first day of the calendar month following 60 days after signature.

This permit and the authorization to discharge shall expires at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on January 18, 1985.

This permit consists of 15 pages in Part I including effluent limitations, monitoring requirements; Whole Effluent Toxicity Protocol in Attachment A (7 pages); 1 page in Attachment B; Sludge Compliance Guidance (48 pages); and 25 pages in Part II including General Conditions and Definitions.

Signed this 10th day of APRIL, 2007

/S/ SIGNATURE ON FILE

Stephen S. Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency (EPA)
Boston, Massachusetts

NPDES Permit No. NH0100234

PART I.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge from outfall serial number 001 (treated wastewater effluent) to the Piscataqua River. Such discharge shall be limited and monitored by the permittee as specified below. Samples taken in compliance with the monitoring requirements specified below shall be taken at a location that is representative of the discharge.

Effluent Characteristic	Discharge Limitations			Monitoring Requirements	
	Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Flow[1], MGD	Report	---	Report	Continuous	Recorder
BOD_5, Effluent[2], mg/l (lbs/day)	30 (1201)	45 (1801)	50 (2002)	2/Week	24-Hour Composite
BOD_5, Influent[2], mg/l	Report	---	---	2/Month	24-Hour Composite
TSS, Effluent[2], mg/l (lbs/day)	30 (1201)	45 (1801)	50 (2002)	2/Week	24-Hour Composite
TSS, Influent[2], mg/l	Report	---	---	2/Month	24-Hour Composite
pH Range[3], Standard Units	6.0 - 8.0			1/Day	Grab
Total Residual Chlorine[4, 5], mg/l	0.33	---	0.57	Continuous	Recorder
Fecal Coliform[3, 4, 6], %	---	---	Report[6]	1/Day	Grab
Fecal Coliform[3, 4, 6], MPN/100 ml	14	---	---	1/Day	Grab
Enterococci Bacteria[4, 7], Colonies/100 ml	Report	---	Report	2/Week	Grab

See pages 4 and 5 for explanation of superscripts

Part I.A.1, Continued

Effluent Characteristic		Monitoring Requirements	
	Maximum Daily	Measurement Frequency	Sample Type
Whole Effluent Toxicity[8, 9], LC_{50}, % Effluent	100	1/Quarter	24-Hour Composite
Ammonia Nitrogen as Nitrogen[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Aluminum[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Cadmium[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Chromium[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Copper[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Lead[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Nickel[10]; mg/l	Report	1/Quarter	24-Hour Composite
Total Recoverable Zinc[10]; mg/l	Report	1/Quarter	24-Hour Composite

See pages 4, 5 and 6 for explanation of superscripts

PART I.

EXPLANATION OF SUPERSCRIPTS TO PART I.A.1:

[1]The effluent flow shall be continuously measured and recorded using a flow meter and totalizer.

[2]The influent concentrations of both BOD_5 and TSS shall be monitored at a minimum of two times per month (2/month) for outfall 001 using a 24-Hour composite sample. The influent 24-Hour composite sample should be initiated prior to the 24-Hour composite sample required for effluent monitoring. The effluent concentrations of both BOD_5 and TSS shall be monitored at a minimum of two times per week (2/week) for outfall 001 using a 24-Hour composite sample. The start of the effluent 24-Hour composite sample shall take into account the resident time of the treatment works. A monthly average shall be calculated for both influent and effluent and reported for each.

[3]State certification requirement.

[4]Samples for Fecal Coliform bacteria, Enterococci bacteria and Total Residual Chlorine shall be collected concurrently.

[5] Total Residual Chlorine shall be measured using any one of the following three methods listed in 40 Code of Federal Regulations (CFR) Part 136:

a. Amperometric direct.
b. DPD–FAS.
c. Spectrophotometric, DPD.

[6]Fecal Coliform shall be tested using test method 9221 C and E found in Standard Methods for the Examination of Water and Wastewater, 18th or subsequent Edition(s), as approved in 40 CFR Part 136.

The Average Monthly value for Fecal Coliform shall be determined by calculating the geometric mean using the daily sample results. Not more than 10 percent of the collected samples shall exceed a Most Probable Number (MPN) of 43 per 100 ml for a 5-tube decimal dilution test. Furthermore, all Fecal Coliform data collected must be submitted with the monthly Discharge Monitoring Reports (DMRs).

The permittee is required to report two (2) statistics each month. One is the geometric mean Fecal Coliform value expressed in terms of “MPN per 100 ml” (reported as average monthly), and the other is the “percentage” of collected samples that exceeds a MPN of 43 per 100 milliliters for the 5-tube decimal dilution test referenced immediately above (reported as maximum daily). The latter statistic will be used to judge compliance with that part of the limit that reads “Not more than 10 percent of the collected samples shall exceed a MPN of 43 per 100 milliliters for a 5-tube decimal dilution test.” referenced above.

[7]Enterococci shall be tested using an EPA approved test method (see 40 C.F.R. Part 136, Table 1A).

[8]The permittee shall conduct acute survival toxicity testing on effluent samples following the protocol in Attachment A (dated September1996). The two species for these tests are *Menidia beryllina* and *Mysidopsis bahia*. Toxicity test samples shall be collected and tests completed four (4) times per year during the calendar quarters ending March 31st, June 30th, September 30th and December 31st. Toxicity test results are to be reported by the 15th day of the month following the end of that quarter tested.

[9]"LC50" is defined as the concentration of wastewater that causes mortality to 50 percent (%) of the test organisms. The "100 %" is defined as a sample which is composed of 100 % effluent (See A.1. on page 3 of Part I and Attachment A of Part I). Therefore, a 100 % limit means that a sample of 100 % effluent (no dilution) shall cause no greater than a 50 % mortality in that effluent sample.

[10]For each Whole Effluent Toxicity test the permittee shall report on the appropriate DMR, the concentrations of the Ammonia Nitrogen as Nitrogen, and Total Recoverable Aluminum, Cadmium, Chromium, Copper, Lead, Nickel and Zinc found in the 100 percent effluent sample. All these aforementioned chemical parameters shall be determined to at least the MLs shown in Attachment A on page A-8, or as amended. Also the permittee should note that all chemical parameter results must still be reported in the appropriate toxicity report. This permit shall be modified, or alternatively, revoked and reissued to incorporate additional toxicity testing requirements, including chemical specific limits, if the results of these toxicity tests indicate that the discharge causes an exceedance of any water-quality criterion. Results from these toxicity tests are considered "New Information" and the permit may be modified as provided in 40 CFR §122.62(a)(2).

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

2. The discharge shall not cause or contribute to a violation of the water quality standards of the receiving water.

3. The permittee’s treatment facility shall maintain a minimum of 85 percent removal of both BOD_5 and TSS when discharging thru outfall 001. The percent removal shall be based on a comparison of average monthly influent concentration versus average monthly effluent concentration.

4. The discharge shall be adequately treated to insure that the surface water remains free from pollutants in concentrations or combinations that settle to form harmful deposits, float as foam, debris, scum or other visible pollutants. It shall be adequately treated to insure that the surface waters remain free from pollutants which produce odor, color, taste or turbidity in the receiving waters which is not naturally occurring, and would render it unsuitable for its designated uses.

5. The permittee shall not discharge into the receiving water any pollutant or combination of pollutants in toxic amounts.

6. All Publicly Owned Treatment Works (POTWs) must provide adequate notice to both EPA and the NHDES-WD of the following:

   a. Any new introduction of pollutants into the POTW from an indirect discharger in a primary industry category (See 40 CFR Part 122, Appendix A as amended) discharging process water; and

   b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

   c. For purposes of this paragraph, adequate notice shall include information on:

      (1) The quantity and quality of effluent introduced into the POTW, and;

      (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

7. Limitations for Industrial Users

   a. A user may not introduce into a POTW any pollutant(s) which cause Pass Through or Interference with the operation or performance of the treatment works. The terms "user", "pass through" and "interference" are defined in 40 CFR Section 403.3.

   b. The permittee shall submit to EPA-New England and NHDES-WD the name of any Industrial User (IU) subject to Categorical Pretreatment Standards under 40 CFR §403.6 and 40 CFR Chapter I, Subchapter N (Parts 405-415, 417-436, 439-440, 443, 446-447, 454-455, 457-461, 463-469, and 471 as amended) **<u>who commences discharge to the POTW after the effective date of this permit.</u>** This reporting requirement also applies to any other IU that discharges an average of 25,000 gallons per day or more of process wastewater into the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater);

contributes a process wastewater which makes up five (5) percent or more of the average dry-weather hydraulic or organic capacity of the POTW; or is designated as such by the Control Authority as defined in 40 CFR §403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR §403.8(f)(6)].

c. In the event that the permittee receives reports (baseline monitoring reports, 90-day compliance reports, periodic reports on continued compliance, etc.) from industrial users subject to Categorical Pretreatment Standards under 40 CFR §403.6 and 40 CFR Chapter I, Subchapter N, (Parts 405-415, 417-436, 439-440, 443, 446-447, 454-455, 457-461, 463-469, and 471 as amended) the permittee shall forward all copies of these reports within ninety (90) days of their receipt to EPA-New England and NHDES-WD.

8. When the effluent discharged for a period of 3 consecutive months exceeds 80 percent of the 4.8 MGD design flow (3.84 MGD), the permittee shall submit to the permitting authorities a projection of loadings up to the time when the design capacity of the treatment facility will be reached, and a program for maintaining satisfactory treatment levels consistent with approved water quality management plans. Before the design flow will be reached, or whenever treatment necessary to achieve permit limits cannot be assured, the permittee may be required to submit plans for facility improvements.

B. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal & state laws and regulations that apply to sewage sludge use and disposal practices and with the CWA Section 405(d) technical standards.

2. The permittee shall comply with the more stringent of either the state (Env-Ws 800) or federal (40 CFR Part 503) requirements.

3. The requirements and technical standards of 40 CFR Part 503 apply to facilities which perform one or more of the following use or disposal practices.

   a. Land application - the use of sewage sludge to condition or fertilize the soil.

   b. Surface disposal - the placement of sewage sludge in a sludge only landfill.

   c. Placement of sludge in a municipal solid waste landfill (See 40 CFR Section 503.4).

   d. Sewage sludge incineration in a sludge only incinerator.

4. The 40 CFR Part 503 conditions do not apply to facilities which place sludge within a municipal solid waste landfill. These conditions do not apply to facilities which do not dispose of sewage sludge during the life of the permit, but rather treat the sludge (lagoons, reed beds), or are otherwise excluded under 40 CFR Section 503.6.

5. The permittee shall use and comply with the attached Sludge Compliance Guidance document to determine appropriate conditions. Appropriate conditions contain the following elements.

   General requirements
   Pollutant limitations
   Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   Management practices
   Record keeping
   Monitoring
   Reporting

   Depending upon the quality of material produced by a facility all conditions may not apply to the facility.

6. The permittee shall monitor the pollutant concentrations, pathogen reduction and vector attraction reduction for the permittee's chosen sewage sludge use or disposal practices at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year.

less than 290	1/Year
290 to less than 1,500	1/Quarter
1,500 to less than 15,000	6/Year
15,000 plus	1/Month

7. The permittee shall sample the sewage sludge using the procedures detailed in 40 CFR Section 503.8.

8. The permittee shall submit an annual report containing the information specified in the attached Sludge Compliance Guidance document. Reports are **due annually by February 19th**. Reports shall be submitted to both addresses (EPA-New England and NHDES-WD) contained in the reporting section of the permit.

C. COMBINED SEWER OVERFLOW CONDITIONS

1. Effluent Limitations

a. During wet-weather periods, the permittee is authorized to discharge storm water/wastewater from combined sewer overflows (CSOs) to receiving waters (see Attachment B), subject to the following effluent limitations.

(1) The discharges may not cause or contribute to violations of Federal or State water-quality standards.

(2) The discharges shall receive treatment at a level providing Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT) to control and abate conventional pollutants and Best Available Technology Economically Achievable (BAT) to control and abate non-conventional and toxic pollutants. The EPA-New England has made a Best Professional Judgement (BPJ) determination that BPT, BCT and BAT for CSOs include the implementation of the nine Minimum Technology-Based Limitations (MTBLs) specified below otherwise know as Nine Minimum Controls (NMC):

(a) Proper operation and regular maintenance programs for the sewer system and the combined sewer overflow points;

(b) Maximum use of the collection system for storage;

(c) Review and modification of industrial pretreatment program requirements to assure CSO impacts are minimized;

(d) Maximization of flow to the POTW for treatment;

(e) Prohibition of dry-weather overflows from CSOs;

(f) Control of solid and floatable materials in CSO discharges;

(g) Pollution prevention programs that focus on contaminant reduction activities;

(h) Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts; and

(i) Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

(3) The Permittee must implement the activities identified in its nine minimum controls documentation titled “Report on Nine Minimum

Control Measures" dated May 1995, submitted on May 8, 1995, and any amendments thereto.

2. Unauthorized Discharges

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from those outfalls listed in **Attachment B** of this permit. Discharges of wastewater from any other point source not described elsewhere in this permit are not authorized under this permit. Dry-weather overflows are prohibited (NMC at **Part C.1.a.(2)(e)**). All dry-weather sanitary and/or industrial discharges from any CSO must be reported to EPA-New England and the State within 24 hours in accordance with the reporting requirements for plant bypass (See Paragraph D.1.e of Part II of this permit).

3. Records and Reporting

The permittee shall quantify and record all CSO discharges from outfalls listed in **Attachment B** of this permit. Quantification may be performed either through direct measurement or through an estimation technique. When an estimation technique is used, such as an updated version of the SWMM model already developed for the City's Long-Term Control Plan (LTCP), the permittee shall make reasonable efforts (e.g., gaging, measurements, visual observations, tell-tale monitorings, etc.) to verify the validity of the estimation technique. If the SWMM model is used, it must be updated to reflect current conditions in the City's collection and treatment systems used for CSO abatement. The following information must be recorded for each combined sewer outfall for each discharge event:

- Estimated date of discharge;
- Estimated duration (hours) of discharge;
- Estimated volume (gallons) of discharge; and
- Precipitation data from the City of Portsmouth gage (daily (24-hour) intervals and one-hour intervals). Cumulative precipitation per discharge event shall be calculated.

The permittee shall maintain all records of discharges for at least five (5) years after the effective date of this permit.

Annually, no later than January 15th, the permittee shall submit a written certification to EPA-New England and the State which states that all the discharges from combined sewer outfalls were recorded, and all other appropriate reports and records maintained for the previous calendar year. A summary of modifications (if any) to the approved NMC program which have been evaluated, and a description of those which will be implemented during the upcoming year shall be included with the annual certification.

4. Reopener/Additional CSO Control Measures

This permit may be modified or reissued upon the completion of a long-term CSO control plan. Such modification may include performance standards for the selected controls, post construction water quality assessment program, monitoring for compliance with water quality standards, and a reopener clause to be used in the event that the selected CSO controls fail to meet water quality standards. Section 301(b)(1)(C) requires that a permit include limits that may be necessary to protect Federal and State water quality standards.

D. SPECIAL CONDITIONS

1. Whole Effluent Toxicity Test Frequency Adjustment

The permittee may submit a written request to the EPA requesting a reduction in the frequency (to not less than twice per year) of the toxicity testing requirements contained in Part I.A.1 of this permit, after completion of a minimum of four (4) successive toxicity tests as required in Part I.A.1. All toxicity tests must be valid tests and must demonstrate compliance with the whole effluent toxicity limits as specified in Part I.A.1 of this permit. Until written notice is received by certified mail from the EPA indicating that a reduction in the Whole Effluent Testing requirement has been allowed, the permittee is required to continue testing at the frequency specified in the permit.

The permittee shall also provide a copy of any such request for a frequency adjustment to the Conservation Law Foundation, 27 North Main Street, Concord, NH 03301-4930.

EPA reserves the right to return to the original toxicity testing schedule if subsequent testing results warrant it. Notification of any such requirement will be provided to the permittee by certified mail.

2. pH Limit Adjustment

The permittee may submit a written request to the EPA requesting a change in the permitted pH limit range to be not less restrictive than 6.0 to 9.0 Standard Units. The permittee's written request must include the State's approval letter containing an original signature (no copies). The State's letter shall state that the permittee has demonstrated to the State's satisfaction that as long as discharges to the receiving water from a specific outfall are within a specific numeric pH range the naturally occurring receiving water pH will be unaltered. That letter must specify for each outfall the associated numeric pH limit range. Until written notice is received by certified mail from the EPA indicating the pH limit range has been changed, the permittee is required to meet the permitted pH limit range in the respective permit.

E. MONITORING AND REPORTING CONDITIONS

Monitoring results shall be summarized for each calendar month and reported on separate Discharge Monitoring Report Form(s) (DMRs) postmarked no later than the 15th day of the month following the completed reporting period.

Signed and Dated original DMRs and all other reports or notifications required herein or in **Part II**, shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency
Water Technical Unit (SEW)
P.O. Box 8127
Boston, Massachusetts 02114-8127

Duplicate signed copies of all reports required above shall be submitted to the State at:

New Hampshire Department of Environmental Services
Water Division
Wastewater Engineering Bureau
P.O. Box 95
Concord, New Hampshire 03302-0095

Any verbal reports, if required in **Parts I** and/or **II** of this permit, shall be made to both EPA-New England and to NHDES-WD.

F. STATE PERMIT CONDITIONS

1. The permittee shall comply with the following conditions which are included as State Certification requirements.

   a. The pH range of 6.0-8.0 Standard Units (S.U.) must be achieved in the final effluent unless the permittee can demonstrate to NHDES-WD: (1) that the range should be widened due to naturally occurring conditions in the receiving water or (2) that the naturally occurring receiving water pH is not significantly altered by the permittee's discharge. The scope of any demonstration project must receive prior approval from NHDES-WD. In no case, shall the above procedure result in pH limits outside of the range of 6.0 to 9.0 S.U., which is the federal effluent limitation guideline regulation for pH for secondary treatment and is found in 40 CFR §133.102(c).

   b. Pursuant to State Law NH RSA 485-A:13 and the New Hampshire Code of Administrative Rules, Env-Wq 703.07(a) and Env-Ws 904.10 the following submissions shall be made to the NHDES-WD by a municipality proposing to accept into its POTW (including sewers and interceptors):

(1) An "Application for Sewer Connection Permit" for any proposal to construct or modify any of the following:

(a) Any extension of a collector or interceptor, whether public or private, regardless of flow;

(b) Any wastewater connection or other discharge in excess of 5,000 gpd;

(c) Any wastewater connection or other discharge to a wastewater treatment facility operating in excess of 80 percent design flow capacity for 3 consecutive months;

(d) Any industrial wastewater connection or change in existing discharge of industrial wastewater, regardless of quality or quantity; and

(e) Any sewage pumping station greater than 50 gpm or serving more than one building.

(2) An "Industrial Wastewater Discharge Request Application" for new or increased loadings of industrial waste, in accordance with Env-Ws 904.10.

c. The permittee shall not at any time, either alone or in conjunction with any person or persons, cause directly or indirectly the discharge of waste into said receiving water unless it has been treated in such a manner as will not lower the legislated water quality classification or interfere with the uses assigned to said water by the New Hampshire Legislature (RSA 485-A:12).

d. Any modifications of the Permittee's Sewer Use Ordinance, including local limitations on pollutant concentrations, shall be submitted to the NHDES-WD for approval prior to adoption by the permittee.

e. Within 90 days of the effective date of this permit, the permittee shall submit to NHDES-WD a copy of its current sewer use ordinance if it has been revised since any previously approved submittal.

f. Within 120 days of the effective date of this permit, the permittee shall submit to NHDES-WD a current list of all industries discharging industrial waste to the municipal wastewater treatment plant. As a minimum, the list shall indicate the name and address of each industry, along with the following information: telephone number, contact person, products manufactured, industrial processes used, existing level of pretreatment, and list of existing industrial discharge permits with effective dates.

2. This NPDES Discharge Permit is issued by the EPA-New England under Federal and State law. Upon final issuance by the EPA-New England, the NHDES-WD may adopt this permit, including all terms and conditions, as a State permit pursuant to RSA 485-A:13.

   Each Agency shall have the independent right to enforce the terms and conditions of this Permit. Any modification, suspension or revocation of this Permit shall be effective only with respect to the Agency taking such action, and shall not affect the validity or status of the Permit as issued by the other Agency, unless and until each Agency has concurred in writing with such modification, suspension or revocation.

3. If chlorine is used for disinfection, a recorder which shall continuously record the chlorine residual prior to dechlorination shall be provided. The minimum, maximum and average daily residual chlorine values, measured prior to dechlorination, shall be submitted with monthly Discharge Monitoring Reports. Charts from the recorder, showing the continuous chlorine residual shall be maintained by the permittee for a period no less than (5) years.

4. The Portsmouth Wastewater Treatment Facility is responsible for immediately notifying the New Hampshire Department of Environmental Services, Watershed Management Bureau, Shellfish Section of possible high bacteria/virus loading events from the facility or its sewage collection infrastructure. Such events include:

   a. Any lapse or interruption of normal operation of the WWTF disinfection system, or other event that results in discharge of sewage from the WWTF or sewer infrastructure (pump stations, sewer lines, manholes, combined sewer overflows, etc.) that has not undergone full treatment as specified in the NPDES permit, or

   b. Daily flows in excess of the facility's average daily design flow of 4.8 MGD, or

   c. Daily post-disinfection effluent sample result of 43 fecal coliform/100ml or greater.

   Notification shall also be made for instances where NPDES-required bacteria sampling is not completed, or where the results of such sampling are invalid.

   Notification to the NHDES Shellfish Program shall be made using the program's 24-hour pager. Upon initial notification of a possible high bacteria/virus loading event, NHDES Shellfish Program staff will determine the most suitable interval for continued notification and updates on an event-by-event basis.

G. REOPENER CLAUSE

1. This permit may be modified in the event that a Total Maximum Daily Load (TMDL) is developed for the receiving water resulting in the need for new permit limits for this discharge.

ATTACHMENT F

UPDATED EQUIPMENT/TECHNOLOGY SIZING COST PROPOSALS

KRÜGER

August 24, 2012

Matt Formica
AECOM
701 Edgewater Drive
Wakefield, MA 01880

Re: Total Nitrogen Removal BIOSTYR®
Pierce Island, WWTF, Portsmouth, NH
Kruger Project No: 5700129101

Dear Mr. Formica,

Enclosed is the BIOSTYR revised proposal for the WWMP - Phase II Engineering Evaluation of the Pierce Island WWTF per the AECOM Memorandum dated August 2nd and subsequent e-mails.

The BIOSTYR system has been designed to treat a max month flow of 8.86 MGD of primary clarifier effluent (not CEPT) and produce a final effluent with the BOD and TSS less than 30 mg/l, an ammonia concentration of less than 1 mg/l and a TN of 8 mg/l.

Two BIOSTYR options have been provided. Option 1 is for a typical secondary BIOSTYR wherein the BOD is removed and the ammonia nitrified in the same stage followed by a second denitrification stage. Option 2 is for three stage BIOSTYR system consisting of a stage for carbon removal, then a nitrification stage and lastly a denitrification stage. With both options methanol was used as the supplemental carbon to drive denitrification.

Also included with this proposal are estimates of the power consumption and maintenance hours for the key pieces of equipment. Layout drawings of both options are being prepared by our Mechanical Group and will be forwarded to you as soon as it done.

Kruger appreciates the opportunity to provide this proposal to AECOM. If you have any questions on the proposed designs or need further information, please contact our local representative, Henry Albro with F.R. Mahony or our Regional Sales Manager, Ken Krupa (540-389-5092; ken.krupa@veoliawater.com).

Respectfully,
I. Kruger Inc.

Sent via email

Tripp Waymack
Application Engineer
Biological Treatment Systems

ATT

cc: MAD, KMK, DOF, LFO, project file (Kruger)
Henry Albro (F.R. Mahony)

BIOSTYR Proposal for

Portsmouth, NH

Kruger Project No.: 5700129101

KRÜGER

Matt Formica
AECOM
701 Edgewater Drive
Wakefield, MA 01880

August 24, 2012

I. Kruger Inc.
401 Harrison Oaks Blvd.
Suite 100
Cary, NC 27513

VEOLIA WATER
Solutions & Technologies

KRÜGER

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Proposal History

Revision	Date	Process Eng.	Comments
0	9/7/10	DOF	Initial, budgetary proposal.
1	9/22/10	DOF	Revised peak flow, system layout
2	6/22/11	DOF, JH	Initial, budgetary proposal.
3	6/21/12	DOF	Two-stage option
4	8/20/12	DOF, LFO	Revised influent design basis.
5	8/24/12	DOF, LFO	Revised design to include full recirculation on BW waste.

VEOLIA WATER
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1. Company Introduction

I. Kruger Inc. (Kruger) is a water and wastewater solutions provider specializing in advanced and differentiating technologies. Kruger provides complete processes and systems ranging from biological nutrient removal to mobile surface water treatment. The ACTIFLO® Microsand Ballasted Clarifier, BIOCON® Dryer, BIOSTYR® Biological Aerated Filter (BAF), NEOSEP™ MBR and HYDROTECH Discfilters are just a few of the innovative technologies offered by Kruger. Kruger is a subsidiary of Veolia Water Solutions and Technologies (VWS), a world leader in engineering and technological solutions in water treatment for industrial companies and municipal authorities.

VWS, present throughout the world, develops a global approach responding to specific needs of customers at each of their production facilities. This has allowed VWS to become the world leader in design, project management, and execution of projects for water and wastewater treatment plants. The company also creates dedicated technology solutions to meet its customer's needs. Its unique portfolio of differentiating technologies, developed by the group's R&D centers, ensures unsurpassed innovation and control of each treatment line for public organizations and industries. Furthermore, a whole range of associated services is offered on each site to guarantee the technical efficiency and life expectancy of the installed solutions. VWS continually extends and enriches its offer, to guarantee expertise and competence at every step of the projects it undertakes.

Kruger prides itself for being a customer focused organization that provides solutions to challenges faced by municipalities and not just another equipment supplier. To achieve this, Kruger has gathered a force of process experts, trained sales staff, and project managers that share our vision and priorities.

2. Energy Focus

Kruger, along with Veolia Water Solutions & Technologies (VWS) is actively pursuing a strategy to deliver sustainable and innovative technologies and solutions.

We offer our customers integrated solutions which include resource-efficient technology to improve operations, reduce costs, achieve sustainability goals, decrease dependency on limited resource, and comply with current and anticipated regulations.

Veolia's investments in R&D outpace that of our competition. Our focus is on delivering

- neutral or positive energy solutions
- migration toward green chemicals or zero chemical consumption
- water-footprint-efficient technologies with high recovery rates

Our carbon footprint reduction program drives innovation, accelerates adoption and development of clean technologies, and offers our customers sustainable solutions.

Kruger is benchmarking its technologies and solutions by working with our customers and performing total carbon cost analysis over the lifetime of the installation. By committing to the innovative development of clean and sustainable technologies and solutions worldwide, Kruger and VWS will continue to maximize the financial benefits for every customer.

3. Process Description

The BIOSTYR system is an up-flow submerged fixed-film filter that biologically treats carbonaceous and nitrogenous wastes (CBOD, NH_4-N, NO_3-N) and removes insoluble pollutants (TSS) through the filtering mechanism of the process. One distinguishing characteristic of the BIOSTYR process is that a complete treatment facility is composed of individual filter units. Adding BIOSTYR filters to an existing facility allows for incremental expansion.

The BIOSTYR process can be designed to accomplish BOD removal, nitrification, and/or denitrification. As shown in Figure 1, the influent wastewater is first pumped to a common inlet feed channel above the BIOSTYR cells where it flows down to the individual cells by gravity. Upon entering the BIOSTYR cells, the wastewater is forced upwards through the filter media. The media contained in the cells is composed of specially manufactured high-density polystyrene beads covered by active biomass. This active biomass provides biological treatment to the wastewater as it flows through the cells. Ceiling plates with regularly spaced nozzles are used to retain the filter media. The nozzles allow the treated water to enter a common water reservoir above the filters, which in turn is used to provide water during backwash sequences.

The first treatment stage is designed for carbon removal and nitrification only. A process air grid is placed below the filter media so that the entire filter bed is aerobic. BOD is oxidized by the biomass in the lower section of the filter. As the wastewater continues up the filter, additional BOD is consumed. When the BOD:TKN ratio falls below a certain limiting level, nitrification occurs, thereby converting the ammonia to nitrate.

A denitrification filter follows the first treatment stage. In this system, an air grid is placed below the filter media that is used during backwash only so that the filter bed is anoxic. Methanol is added to the influent as an additional carbon source to fuel the biological reaction. As wastewater passes through the filter, denitrification occurs, thereby converting nitrate to nitrogen gas.

Growth of biomass and the retention of suspended solids in the filter media make periodic backwashing necessary. The BIOSTYR process is designed for a backwash interval of 24 hours or more. The backwash sequence is performed automatically and is triggered either when a preset time limit has expired or when the head loss across the filter exceeds a pre-determined setpoint. Water from the common treated water reservoir flows down through the filter by gravity, thereby expanding the media bed. The air grid located below the media is used to supply scouring air during the backwash sequence. This grid is composed of perforated stainless steel piping that allows air to be injected into the filters.

Like other filtration processes, high TSS and BOD concentrations in the influent waste stream can increase the rate of clogging. If the influent waste stream contains high levels of TSS or BOD, it is desirable to install clarification to partially treat the wastewater.

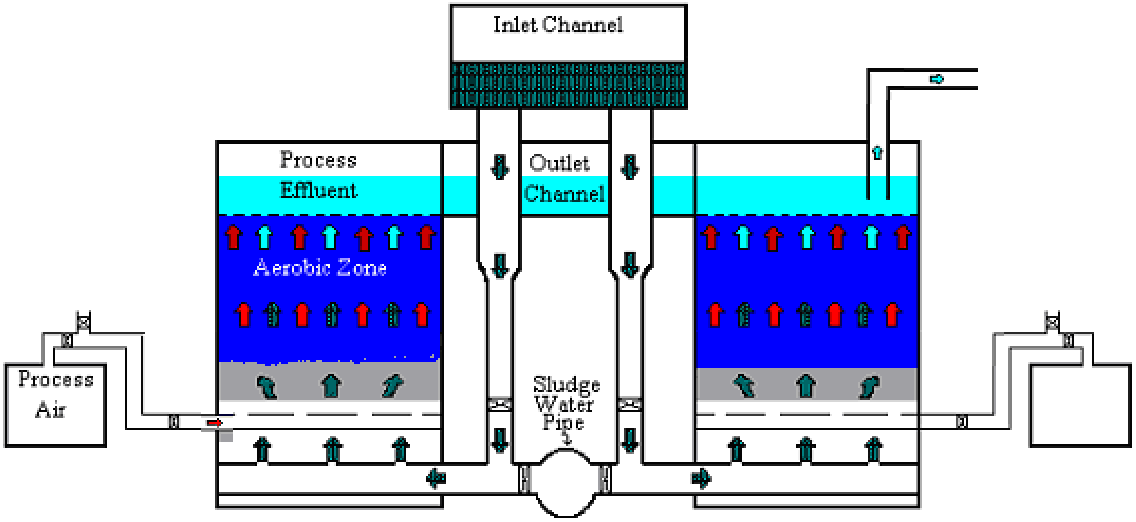

Figure 1 - BIOSTYR System for BOD Removal, Nitrification and Denitrification

The BIOSTYR process provides several significant improvements over other fixed film systems. First, using a floating media bed in conjunction with an up-flow system ensures that the nozzles used to retain the media are only in contact with treated water. This prevents the nozzles from clogging and provides easy access for nozzle maintenance or replacement.

Second, the counter-current backwashing sequence ensures efficient removal of accumulated solids. During backwashing sequences, the downward flow expands the filter media and utilizes gravity to aid in flushing solids from the bottom of the filter. Additionally, the backwash water is supplied from a common reservoir above the filter cells, eliminating the costs associated with backwash pumping. Finally, used backwash water is collected in drainpipes at the bottom of the filters. It is not exposed to the atmosphere, so the potential for odor problems is dramatically reduced.

4. Design Summary

The design assumes that the raw influent wastewater is biodegradable, no toxic compounds are present, sufficient alkalinity is available to avoid pH depressions, that the COD/BOD ratio is between 1.7 and 2.3, and that none of the equipment provided would be used in a classified area (e.g. Class 1, Division 1 or Class 1, Division 2) except for methanol feed equipment.

Secondary BIOSTYR cells do not require dedicated influent screens. Kruger recommends the site have 10 mm fine screening, bar or mesh screens, which could occur upstream of the filters, for instance at the plant headworks. Kruger understands that the effluent from primary clarifiers will feed the first stage by pumping; the effluent from this stage will flow through the remaining stage(s) by gravity.

The BAF influent design basis is summarized in Tables 1a through 1c. The target effluent criteria for the BIOSTYR system are listed in Table 2. The process designs are summarized in Tables 3 and 4.

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Table 1a: Primary Effluent Flows and Characteristics

Parameter	Units	Value
Flow, Peak	mgd	9.06
Flow, Max. Month	mgd	8.86
BOD_5, Max. Month	mg/L	129
TSS, Max. Month	mg/L	122
TKN, Max. Month	mg/L	25.1
Min. Temperature	^oC	10

Table 1b: BIOSTYR Option 1 Influent Design Basis (Includes Recirculation of BIOSTYR Backwash Wastewater)

Parameter	Units	Value
Flow, Peak	mgd	13.39
Flow, Max. Month	mgd	10.91
BOD_5, Max. Month	mg/L	169*
TSS, Max. Month	mg/L	177*
TKN, Max. Month	mg/L	27.0*
Min. Temperature	^oC	10

*Assumes 35% TSS removal in the primary clarifiers.

Table 1c: BIOSTYR Option 2 Influent Design Basis (Includes Recirculation of BIOSTYR Backwash Wastewater)

Parameter	Units	Value
Flow, Peak	mgd	15.69
Flow, Max. Month	mgd	11.56
BOD_5, Max. Month	mg/L	155*
TSS, Max. Month	mg/L	163*
TKN, Max. Month	mg/L	27.8*
Min. Temperature	^oC	10

*Assumes 35% TSS removal in the primary clarifiers.

Table 2: BIOSTYR Effluent Achieved – Monthly Average

Parameter	Units	Value
$CBOD_5$	mg/L	≤ 30
TSS	mg/L	≤ 30
NH_3-N	mg/L	≤ 1
TN	mg/L	≤ 8*

*Kruger has assumed that the amount of refractory organic nitrogen present in the BIOSTYR influent is ≤ 1.5 mg/L.

Table 3: Option 1 BIOSTYR Process Design Summary

Parameter	Units	Secondary N Stage	DN Stage
Size of Cells	ft^2	1,268	304
Number of Cells	-	7	4
Size of Media	mm	4.5	4.5
Height of Media	ft	9.84	6.56
Hydraulic, Peak (N-1 Cells in Filtration)	$m^3/m^2/hr$ gpm/ft^2	2.6* 1.06*	18.7* 7.65*
Hydraulic, Max. Month (All Cells in Filtration)	$m^3/m^2/hr$ gpm/ft^2	1.8* 0.74*	10.1* 4.13*
BOD_5, Max. Month	$kg/m^3/d$ $lb/1000\ ft^3/d$	2.47* 154.2*	- -
TSS, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	2.59* 161.7*	- -
NH_3-N, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	0.19* 11.9*	- -
NO_3-N, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	- -	1.19* 83.0*
Methanol Consumption, Max. Month	lb/d	-	1,560
Backwash Interval, Max. Month	hrs.	24	24
Backwash Wastewater Production, Max. Month	gpd	1,633,500	149,200
Sludge Production, Max. Month	lb/d	10,752	2,463
Total Process Air, Max. Month	scfm	5,154	-
Backwash Air / Cell	scfm	832	199

* Includes recirculation of BIOSTYR backwash wastewater.

Table 4: Option 2 BIOSTYR Process Design Summary

Parameter	Units	Secondary C Stage	Tertiary N Stage	DN Stage
Size of Cells	ft^2	940	468	304
Number of Cells	-	8	6	4
Size of Media	mm	5.0	3.6	5.0
Height of Media	ft	9.84	11.48	6.56
Hydraulic, Peak (N-1 Cells in Filtration)	$m^3/m^2/hr$ gpm/ft^2	4.1* 1.68*	11.4* 4.66*	21.9* 8.96*
Hydraulic, Max. Month (All Cells in Filtration)	$m^3/m^2/hr$ gpm/ft^2	2.6* 1.06*	5.6* 2.19*	10.1* 4.13*
BOD_5, Max. Month	$kg/m^3/d$ $lb/1000\ ft^3/d$	3.23* 201.7*	- -	- -
TSS, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	3.41* 212.9*	- -	- -
NH_3-N, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	- -	0.52* 32.5*	- -
NO_3-N, Max. Month	$kg/m^3/d$ $lb/1000ft^3/d$	- -	- -	1.65* 89.3*
Methanol Consumption, Max. Month	lb/d	-	-	1,899
Backwash Interval, Max. Month	hrs.	24	48	24
Backwash Wastewater Production, Max. Month	gpd	2,213,500	301,200	149,300
Sludge Production, Max. Month	lb/d	11,219	2,009	1,819
Total Process Air, Max. Month	scfm	3,143	1,065	-
Backwash Air / Cell	scfm	617	307	199

* Includes recirculation of BIOSTYR backwash wastewater.

Table 5: BIOSTYR System Concrete Estimate

Category	Option 1 Volume (cubic yards)	Option 2 Volume (cubic yards)
Slabs on Grade	1,516	1,803
Elevated Slabs	488	540
Walls	1,547	2,330
Support Columns	90	85
Support Beams	60	82
Total	3,701	4,840

Pollutant loading rates for the designs are based on conditions provided. The pollutant loading dictates the size of the design for all aerobic treatment stages. The hydraulic loading dictates the size of the design for the DN stage for Option 1 and the nitrate loading dictates the size of the design for the DN stage for Option 2.

A plant layout is included at the end of the proposal. The footprint for the system proposed is roughly 183 ft x 124 ft for Option 1 and 223 ft x 129 ft for Option 2.

The main costs for the BIOSTYR system will be for feed pumping, methanol addition, and aeration.

BIOSTYR feed pumping energy will depend on the discharge head on the pump station. Although we do not have information about the site to detail pumping head, we can state that the elevation difference from the bottom of a cell to the feed channel is roughly 30-35 ft.

Aeration demands are summarized in Tables 3 and 4. Process air will be supplied to each cell with a dedicated blower of the rotary lobe type. The discharge pressure will typically range from 10.0 to 12.0 psig for media bed depths of 9.84 feet and 12.0 to 14.0 psig for media bed depths of 11.48 feet, but will depend on the final design.

Backwash water volumes are summarized in Tables 3 and 4.

Methanol consumption demands are summarized in Tables 3 and 4.

During backwash, the used backwash water is detained in a waste backwash mud well and then pumped to a facility where it will be treated. The water from each backwash would need to be pumped from the waste backwash mud well over a period of 90 to 120 minutes. The used backwash water can be handled by recycling it to the primary treatment works. Sludge production estimates are provided in Tables 3 and 4.

During backwash, the used backwash water is detained in a waste backwash mud well and There is no annual media replacement cost. The media will compress slightly (5-10%), mostly during the first year of operation. During media installation, additional media is installed to compensate for this initial compression.

5. Scope of Supply

Kruger is pleased to present our scope of supply which includes process engineering design, equipment procurement, and field services required for the proposed treatment system, as related to the equipment specified. The work will be performed to Kruger's high standards under the direction of a Project Manager. All matters related to the design, installation, or performance of the system shall be communicated through the Kruger representative giving the Engineer and Owner ready access to Kruger's extensive capabilities.

Process and Design Engineering
Kruger can provide process engineering and design support for the system as follows:

- Design submittal for the Engineer's review and approval. Submittal included process sizing criteria, hydraulic profile, preliminary BIOSTYR building layout, detailed cell layout, and details of cell internals.
- Shop drawing submittal for Engineer's review and approval. Includes detailed equipment information for all equipment supplied by Kruger.
- Equipment installation instructions for all equipment supplied by Kruger.

Field Services
Kruger will furnish a Service Engineer as specified at the time of start-up to inspect the installation of the completed system, place the system in initial operation, and to instruct operating personnel on the proper use of the equipment. Specifically, Kruger will provide:

- A minimum of 30 man-days field support during the construction and start-up of the facility. Included in this period is time for training Owner's staff in the proper operation and maintenance of the BIOSTYR facility.

Equipment Supply
Kruger will supply the following equipment associated with the system:

- Mechanical Equipment – Secondary C Stage (OPTION 2)
    - Precast reinforced concrete nozzle slabs for all BIOSTYR cells.
    - One (1) nozzle slab manways per cell.
    - Nozzles and gaskets for all cells. Installed by Contractor.
    - One (1) stainless steel pipe gallery manway per cell.
    - One (1) stainless steel sight glass per cell. Sight glasses are cast in the concrete pipe gallery wall of the BIOSTYR cells.
    - Pressure port inserts, two (2) per cell.
    - Sample ports for profile sampling, two (2) cells equipped with 3 ports each.
    - 5.0 mm media to fill all cells to the depth indicated in Table 4. Media installation is included.

- One (1) process/backwash aeration grid per cell, including inlet header, purge header, lateral distribution lines, couplings, wall brackets, floor stand support structure, and wall inserts. Piping is stainless steel. Anchor bolts provided by Contractor.
- Aeration blower packages, one (1) per cell plus one (1) full-installed spare. Positive displacement rotary lobe style blowers or centralized aeration blower station consisting of multiple blowers and a PLC-based control system.
- One (1) set of feed/backwash pipes or channel cover plates per cell. Anchor bolts provided by Contractor.
- Sludge pumps to transfer backwash wastewater from the waste backwash storage, including necessary check and isolation valves.
- All automatic process valves for the BIOSTYR system. Process valves are primarily butterfly valves. Actuators are primarily dual-acting pneumatic.
- Influent flow distribution orifice slide-plate and frame for each BIOSTYR cell influent box.
- Aluminum slide gates in the BIOSTYR cell effluent channel.

- Mechanical Equipment – Tertiary N Stage (OPTION 2)
  - Precast reinforced concrete nozzle slabs for all BIOSTYR cells.
  - One (1) nozzle slab manways per cell.
  - Nozzles and gaskets for all cells. Installed by Contractor.
  - One (1) stainless steel pipe gallery manway per cell.
  - One (1) stainless steel sight glass per cell. Sight glasses are cast in the concrete pipe gallery wall of the BIOSTYR cells.
  - Pressure port inserts, two (2) per cell.
  - Sample ports for profile sampling, two (2) cells equipped with 3 ports each.
  - 3.6 mm media to fill all cells to the depth indicated in Table 4. Media installation is included.
  - One (1) process/backwash aeration grid per cell, including inlet header, purge header, lateral distribution lines, couplings, wall brackets, floor stand support structure, and wall inserts. Piping is stainless steel. Anchor bolts provided by Contractor.
  - Aeration blower packages, one (1) per cell plus one (1) fully-installed spare. Positive displacement rotary lobe style blowers or centralized aeration blower station consisting of multiple blowers and a PLC-based control system.
  - One (1) set of feed/backwash pipes or channel cover plates per cell. Anchor bolts provided by Contractor.
  - Sludge pumps to transfer backwash wastewater from the waste backwash storage, including necessary check and isolation valves.
  - All automatic process valves for the BIOSTYR system. Process valves are primarily butterfly valves. Actuators are primarily dual-acting pneumatic.
  - Influent flow distribution orifice slide-plate and frame for each BIOSTYR cell influent box.
  - Aluminum slide gates in the BIOSTYR cell effluent channel.

- Mechanical Equipment – Secondary N Stage (OPTION 1)
  - Precast reinforced concrete nozzle slabs for all BIOSTYR cells.
  - One (1) nozzle slab manways per cell.
  - Nozzles and gaskets for all cells. Installed by Contractor.
  - One (1) stainless steel pipe gallery manway per cell.
  - One (1) stainless steel sight glass per cell. Sight glasses are cast in the concrete pipe gallery wall of the BIOSTYR cells.
  - Pressure port inserts, two (2) per cell.
  - Sample ports for profile sampling, two (2) cells equipped with 3 ports each.
  - 4.5 mm media to fill all cells to the depth indicated in Table 3. Media installation is included.
  - One (1) process/backwash aeration grid per cell, including inlet header, purge header, lateral distribution lines, couplings, wall brackets, floor stand support structure, and wall inserts. Piping is stainless steel. Anchor bolts provided by Contractor.
  - Aeration blower packages, one (1) per cell plus one (1) fully-installed spare. Positive displacement rotary lobe style blowers or centralized aeration blower station consisting of multiple blowers and a PLC-based control system.
  - One (1) set of feed/backwash pipes or channel cover plates per cell. Anchor bolts provided by Contractor.
  - Sludge pumps to transfer backwash wastewater from the waste backwash storage, including necessary check and isolation valves.
  - All automatic process valves for the BIOSTYR system. Process valves are primarily butterfly valves. Actuators are primarily dual-acting pneumatic.
  - Influent flow distribution orifice slide-plate and frame for each BIOSTYR cell influent box.
  - Aluminum slide gates in the BIOSTYR cell effluent channel.
- Mechanical Equipment – DN Stage (OPTIONS 1& 2)
  - Precast reinforced concrete nozzle slabs for all BIOSTYR cells.
  - One (1) nozzle slab manways per cell.
  - Nozzles and gaskets for all cells. Installed by Contractor.
  - One (1) stainless steel pipe gallery manway per cell.
  - One (1) stainless steel sight glass per cell. Sight glasses are cast in the concrete pipe gallery wall of the BIOSTYR cells.
  - Pressure port inserts, two (2) per cell.
  - Sample ports for profile sampling, two (2) cells equipped with 3 ports each.
  - 4.5 or 5.0 mm media to fill all cells to the depths indicated in Tables 3 and 4. Media installation is included.

   - One (1) backwash aeration grid per cell, including inlet header, purge header, lateral distribution lines, couplings, wall brackets, floor stand support structure, and wall inserts. Piping is stainless steel. Anchor bolts provided by Contractor.
   - Backwash aeration blower station; consisting of two (2) positive displacement rotary lobe type backwash blowers.
   - One (1) set of feed/backwash pipes or channel cover plates per cell. Anchor bolts provided by Contractor.
   - All automatic process valves for the BIOSTYR system. Process valves are primarily wafer-style butterfly valves. Actuators are primarily dual acting pneumatic.
   - Aluminum slide gates in the BIOSTYR cell effluent channel.
- Instrumentation and Control System

  The instrumentation and control system is proposed as detailed herein to meet the functional requirements of the proposed systems. The complete system will include detailed engineering submittals comprised of product data sheets, panel layouts, wiring diagrams, and field installation instructions. The complete system will be comprised of the following:

   - One (1) instrument air system to provide compressed air for pneumatic actuators. System includes backup/duplex compressor, receiving tank, refrigerated air dryer, controller, regulator, and necessary filters.
   - Process instrumentation. Includes DO meters, ammonia analyzers (influent and effluent), nitrate analyzers (influent and effluent), pressure instruments, pH instruments, temperature instruments, and level instruments.
   - PLC-based control system. Includes control cabinet, programming, and customized SCADA system.

Contractor's Scope of Supply

The contractor's scope of supply for the BIOSTYR system should include, but is not limited to, the following items:

- Concrete construction of the BIOSTYR cells, including assembly of the nozzle decks using the prefabricated, modular slabs.
- All piping, up to the walls of the BIOSTYR cells.
- Anchor bolts for all equipment installation.
- Installation of nozzles in the nozzle slabs.
- Feed pump station for the BIOSTYR (*can be included in Kruger's scope upon request*).
- Mechanical structures such as handrails, stairways, and platforms.
- Methanol feed system for the DN stage; including the required storage, containment, and dilution equipment.
- Motor starters, VFDs, field wiring and terminations, junction boxes, flow measurement instruments.

- All electrical and mechanical hardware with the exception of the equipment that is identified above.
- HVAC for the building pipe gallery, equipment rooms, and control room.

6. Design Options

In addition to the proposed system as detailed herein, Kruger is able to further incorporate our process and controls expertise into wastewater treatment plants, allowing municipalities to meet stringent effluent requirements and future plant upgrades. Kruger is able to offer our instrumentation and controls expertise to build upon the proposed system by incorporating a customized **plant-wide SCADA system** or designing a **Motor Control Center (MCC),** providing municipalities a single source responsibility for plant controls. Please contact Kruger if the above options are of interest to be included in the current proposed system or future upgrades.

7. Pricing, Payment Terms, and Schedule

Pricing

The price for the BIOSTYR system, as defined herein, including process and design engineering, field services, and equipment supply will follow under separate cover.

Please note that the pricing is expressly contingent upon the items in this proposal and are subject to I. Kruger Inc. Standard Terms of Sale detailed herein.

This pricing is FOB shipping point, with freight allowed to the job site. This pricing does not include any sales or use taxes. In addition, pricing is valid for ninety (90) days from the date of issue and is subject to negotiation of a mutually acceptable contract.

Terms of Payment

The terms of payment are as follows:

- 10% on receipt of fully executed contract
- 15% on submittal of shop drawings
- 75% on the delivery of equipment to the site

Payment shall not be contingent upon receipt of funds by the Contractor from the Owner. There shall be no retention in payments due to I. Kruger Inc. All other terms per our Standard Terms of Sale are attached.

All payment terms are net 30 days from the date of invoice. Final payment not to exceed 120 days from delivery of equipment.

Schedule

- Shop drawings will be submitted within 6-8 weeks of receipt of an executed contract by all parties.
- All equipment will be delivered within 18-20 weeks after receipt of written approval of the shop drawings.
- Installation manuals will be furnished upon delivery of equipment.
- Operation and Maintenance Manuals will be submitted within 90 days after receipt of approved shop drawings.

8. I. Kruger Inc. Standard Terms of Sale

1. Applicable Terms. These terms govern the purchase and sale of the equipment and related services, if any (collectively, "Equipment"), referred to in Seller's purchase order, quotation, proposal or acknowledgment, as the case may be ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. Payment. Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation provides otherwise, freight, storage, insurance and all taxes, duties or other governmental charges relating to the Equipment shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval.

3. Delivery. Delivery of the Equipment shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, Delivery terms are F.O.B. Seller's facility.

4. Ownership of Materials. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Equipment. Buyer shall not disclose any such material to third parties without Seller's prior written consent.

5. Changes. Seller shall not implement any changes in the scope of work described in Seller's Documentation unless Buyer and Seller agree in writing to the details of the change and any resulting price, schedule or other contractual modifications. This includes any changes necessitated by a change in applicable law occurring after the effective date of any contract including these terms.

6. Warranty. Subject to the following sentence, Seller warrants to Buyer that the Equipment shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship. The foregoing warranty shall not apply to any Equipment that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. If Buyer gives Seller prompt written notice of breach of this warranty within 18 months from delivery or 1 year from beneficial use, whichever occurs first (the "Warranty Period"), Seller shall, at its sole option and as Buyer's sole remedy, repair or replace the subject parts or refund the purchase price therefore. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Equipment in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller). THE WARRANTIES SET FORTH IN THIS SECTION ARE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO SECTION 10 BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

7. Indemnity. Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

8. Force Majeure. Neither Seller nor Buyer shall have any liability for any breach (except for breach of payment obligations) caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, delay of carriers, failure of normal sources of supply, act of government or any other cause beyond such party's reasonable control.

9. Cancellation. If Buyer cancels or suspends its order for any reason other than Seller's breach, Buyer shall promptly pay Seller for work performed prior to cancellation or suspension and any other direct costs incurred by Seller as a result of such cancellation or suspension.

10. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE EQUIPMENT SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE EQUIPMENT. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

11. Miscellaneous. If these terms are issued in connection with a government contract, they shall be deemed to include those federal acquisition regulations that are required by law to be included. These terms, together with any quotation, purchase order or acknowledgement issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. Buyer may not assign or permit any other transfer of the Agreement without Seller's prior written consent. The Agreement shall be governed by the laws of the State of North Carolina without regard to its conflict of laws provisions.

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Attachment I

Energy Consumption Estimate

Attachment II

O&M Estimates

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 2-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

	Units	2ry Nit. Stage AA Load	Denit. Stage AA Load	Comments
General Info				
Total Numbers of Cells	-	8	4	
Cells Filtering	-	6	3	
Cells in Idle	-	2	1	
Blowers				
Blowers in Operation	-	6	1	
Hours In Operation Per Day	hrs/d	22.00	1.00	
Maintenance Interval	hrs	4,000	4,000	Assumed
Time Required For Maintenance	hrs	1.0	1.0	Assumed
Annual Manpower Requirement	hrs/yr	12.0	0.1	
Intrumentation				
Time Required For Maintenance	hrs/month	1.0	1.0	Assumed
Annual Manpower Requirement	hrs/yr	12.0	12.0	
Instrument Air Compressor				
Compressors in Operation	-	2	0	
Hours In Operation Per Day	hrs	12.00	0.00	
Maintenance Interval	hrs	4,000	4,000	Assumed
Time Required For Maintenance	hrs	1.0	0.0	Assumed
Total Daily Energy Consumption	kW-hrs	2.2	0.0	

Sum of Annual Manpower Subtotals	hrs/yr	26.2	12.1
Total Annual Maintenance Time	**38.3**		

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 3-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

	Units	2ry Carbon Stage AA Load	3ryN Stage AA Load	Denit. Stage AA Load	Comments
General Info					
Total Numbers of Cells	-	8	6	4	
Cells Filtering	-	6	4	3	
Cells in Idle	-	2	2	1	
Blowers					
Blowers in Operation	-	6	4	1	
Hours In Operation Per Day	hrs/d	22.00	22.67	1.00	
Maintenance Interval	hrs	4,000	4,000	4,000	Assumed
Time Required For Maintenance	hrs	1.0	1.0	1.0	Assumed
Annual Manpower Requirement	hrs/yr	12.0	8.3	0.1	
Instrumentation					
Time Required For Maintenance	hrs/month	1.0	1.0	1.0	Assumed
Annual Manpower Requirement	hrs/yr	12.0	12.0	12.0	
Instrument Air Compressor					
Compressors in Operation	-	2	0	0	
Hours In Operation Per Day	hrs	12.00	0.00	0.00	
Maintenance Interval	hrs	4,000	4,000	4,000	Assumed
Time Required For Maintenance	hrs	1.0	0.0	0.0	Assumed
Total Daily Energy Consumption	kW-hrs	2.2	0.0	0.0	

Sum of Annual Manpower Subtotals	hrs/yr	26.2	20.3	12.1
Total Annual Maintenance Time	**58.6**			

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 2-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

	Units	2ry Nit. Stage AA Load	Denit. Stage AA Load	Comments
General Info				
Total Numbers of Cells	-	8	4	
Cells Filtering	-	6	3	
Cells in Idle	-	2	1	
Process Air				
Aeration Design Point	scfm	506	0	
Pressure Design Point	psi	13.0	0	
Blower Motor Power	bhp	32.9	0	
Motor Efficiency	-	0.885	0	Assumed
Electrical Power Draw	hp	37.2	0.0	
Electrical Power Draw	kW	27.7	0.0	
Hours Per Day	hrs	22.00	23.00	
Daily Per Blower Energy per cell	kW-hrs	610	0	
Total Daily Energy Consumption	kW-hrs	3,661	0	
Feed Pumps				
Influent Flow	MGD	6.13	0.00	
BW Return Flow	MGD	1.78	0.00	
Pump Design Flow Rate	gpm	5,493	0	
Height of BIOSTYR Building	ft	30	30	Assumed
Headloss	ft	5	5	Assumed
Elevation of Pump station	ft	0	0	Assumed
Pump Design Discharge Head	ft	35.0	35.0	Assumed
Hydraulic Power	whp	48.5	0.0	
Pump Efficiency	-	0.7	0.7	Assumed
Motor Efficiency	-	0.885	0.885	Assumed
Power Input to the pump	hp	69.4	0.0	
Power Input to the motor	hp	78.4	0.0	
Electrical Power Draw	hp	69.4	0.0	
Electrical Power Draw	kW	51.7	0.0	
Hours Per Day	hrs	24	0	
Daily Energy Consumption	kW-hrs	1,242	0	
Mudwell Pumps				
Cell Section Area	ft^2	1,268	304	
Media Depth	ft	9.84	6.56	
Backwash volume	-	2.5	2.5	
Duration of Backwash Return	min	90	90	
Backwash Flow per cell per backwash	gallons	233,322	37,292	

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 2-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

Pump Design Flow Rate	gpm	2,592	414	
Pump Design Discharge Head	ft	30.0	30.0	Assumed
Hydraulic Power	whp	19.6	3.1	
Pump Efficiency	-	0.7	0.7	Assumed
Motor Efficiency	-	0.885	0.788	Assumed
Power Input to the pump	hp	28.1	4.5	
Power Input to the motor	hp	31.7	5.7	
Electrical Power Draw	kW	23.7	4.2	
Hours Per Day	hrs	9.0	4.5	
Daily Energy Consumption	kW-hrs	213	19	
Instrument Air Compressor				
Aeration Design Point	scfm	57	0	
Pressure Design Point	psi	125	0	
Motor Efficiency	-	0.84	0	Assumed
Electrical Power Draw	hp	5.0	5.0	
Electrical Power Draw	kW	3.7	3.7	
Hours Per Day	hrs	12.00	0.00	
Daily Per Blower Energy	kW-hrs	45	0	
Total Daily Energy Consumption	kW-hrs	537	0	

Sum of Daily Energy Subtotals	kW-hrs/d	5,652	19	
Number Operating Days per Year	d	365	365	
Electrical Rate	$/kW-hr	0.08	0.08	Assumed
Annual Energy Cost		$165,051	$558	
Total Annual Energy Cost	**$165,609**			

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 3-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

	Units	2ry Carbon Stage AA Load	3ry Nit. Stage AA Load	Denit. Stage AA Load	Comments
General Info					
Total Numbers of Cells	-	8	6	4	
Cells Filtering	-	6	4	3	
Cells in Idle	-	2	2	1	
Process Air					
Aeration Design Point	scfm	292	187	0	
Pressure Design Point	psi	11.0	13.0	0.0	
Blower Motor Power	bhp	21.6	14.6	0	
Motor Efficiency	-	0.885	0.855	0	Assumed
Electrical Power Draw	hp	24.4	17.1	0.0	
Electrical Power Draw	kW	18.2	12.7	0.0	
Hours Per Day	hrs	22.00	23.33	23.00	
Daily Per Blower Energy per cell	kW-hrs	401	297	0	
Total Daily Energy Consumption	kW-hrs	2,403	1,189	0	
Feed Pumps					
Influent Flow	MGD	6.13	0.00	0.00	
BW Return Flow	MGD	2.66	0.00	0.00	
Pump Design Flow Rate	gpm	6,104	0	0	
Height of BIOSTYR Building	ft	30	30	30	Assumed
Headloss	ft	5	5	5	Assumed
Elevation of Pumpstation	ft	0	0	0	Assumed
Pump Design Discharge Head	ft	35.0	35.0	35.0	Assumed
Hydraulic Power	whp	54.0	0.0	0.0	
Pump Efficiency	-	0.7	0.7	0.7	Assumed
Motor Efficiency	-	0.885	0.885	0.885	Assumed
Power Input to the pump	hp	77.1	0.0	0.0	
Power Input to the motor	hp	87.1	0.0	0.0	
Electrical Power Draw	hp	77.1		0.0	
Electrical Power Draw	kW	57.5		0.0	
Hours Per Day	hrs	24			
Daily Energy Consumption	kW-hrs	1,380	0	0	
Mudwell Pumps					
Cell Section Area	ft^2	940	468	304	
Media Depth	ft	9.84	11.48	6.56	
Backwash volume	-	4.0	2.5	2.5	
Duration of Backwash Return	min	90	90	90	
Backwash Flow per cell per backwash	gallons	276,748	100,468	37,292	
Pump Design Flow Rate	gpm	3,075	1,116	414	
Pump Design Discharge Head	ft	30.0	30.0	30.0	Assumed
Hydraulic Power	whp	23.3	8.5	3.1	

JOB NAME: PORTSMOUTH, NH
TYPE OF PROPOSAL: PRELIMINARY, 3-STAGE BIOSTYR, PC EFFLUENT
CALCULATED BY: DOF
DATE: 8/23/2012
PROJECT NUMBER 5700129101

Pump Efficiency	-	0.7	0.7	0.7	Assumed
Motor Efficiency	-	0.855	0.840	0.788	Assumed
Power Input to the pump	hp	33.3	12.1	4.5	
Power Input to the motor	hp	38.9	14.4	5.7	
Electrical Power Draw	kW	29.0	10.7	4.2	
Hours Per Day	hrs	9.0	3.0	4.5	
Daily Energy Consumption	kW-hrs	261	32	19	
Instrument Air Compressor					
Aeration Design Point	scfm	57	0	0	
Pressure Design Point	psi	125	0	0	
Motor Efficiency	-	0.84	0	0	Assumed
Electrical Power Draw	hp	5.0	5.0	5.0	
Electrical Power Draw	kW	3.7	3.7	3.7	
Hours Per Day	hrs	12.00	0.00	0.00	
Daily Per Blower Energy	kW-hrs	45	0	0	
Total Daily Energy Consumption	kW-hrs	537	0	0	

Sum of Daily Energy Subtotals	kW-hrs/d	4,582	1,221	19	
Number Operating Days per Year	d	365	365	365	
Electrical Rate	$/kW-hr	0.08	0.08	0.08	Assumed
Annual Energy Cost		$133,787	$35,657	$558	
Total Annual Energy Cost	**$170,002**				

KRÜGER

September 19, 2012

Matt Formica
AECOM
701 Edgewater Drive
Wakefield, MA 01880

Re: Total Nitrogen Removal BIOSTYR® and MULTIFLO Pricing
Pierce Island WWTF, Portsmouth, New Hampshire
Kruger Project No: 5700129101

Dear Mr. Formica,

The intent of this letter is to provide pricing in conjunction with the BIOSTYR proposals previously submitted for the WWMP - Phase II Engineering Evaluation of the Pierce Island WWTF per the AECOM Memorandum. This includes pricing for our revised PCE treatment options (proposal dated August 24), our CEPT options (proposal dated September 5) and our recent MULTIFLO options which are applicable to the PCE treatment options (proposal dated September 14).

The pricing that follows is based on the scope of supply, terms and conditions contained within each of the respective proposals. This pricing is certainly subject to change based on further development of the BAF system design and most importantly more in-depth considerations of the BAF backwash wastewater return and the resulting primary clarifier performance.

PCE TREATMENT	
Option 1 (2 stage BIOSTYR)	$6,670,000
Option 1 (MULTIFLO)	$970,000
Option 2 (3 stage BIOSTYR)	$7,995,000
Option 2 (MULTIFLO)	$1,150,000
CEPT	
Option 1 (2 stage BIOSTYR)	$5,070,000
Option 2 (3 stage BIOSTYR)	$5,760,000

Kruger appreciates the opportunity to provide this information to AECOM. If you have any questions or need further information, please do not hesitate to contact our local representative, Henry Albro with F.R. Mahony, our Regional Sales Manager, Ken Krupa (540-389-5092; ken.krupa@veoliawater.com).

Respectfully,
I. Kruger Inc.

Mark Drake, PE, LEED AP
Product Manager, Biological Processes and MBRs
Mark.Drake@veoliawater.com

cc: RAW, KMK, DOF, LFO, project file (Kruger)
Henry Albro (F.R. Mahony)

VEOLIA WATER
Solutions & Technologies

Conceptual Proposal for the BioMag^{TM} Upgrade

at the

City of Portsmouth, NH
Pierce Island Wastewater Treatment Facility

Submitted to:

AECOM
701 Edgewater Drive
Wakefield, MA 01880

Request for Proposal Background

The city of Portsmouth owns and operates the Pierce Island Wastewater Treatment Facility (WWTF). The existing facility utilizes influent screening, primary clarification, and disinfection prior to discharging the treated effluent. The city is in need of providing secondary treatment prior to discharge. With a very restricted site, the city is considering installing BioMag to provide the required treatment, while maintaining within the current site constraints.

In response, Siemens Industry, Inc. is pleased to provide this conceptual proposal. This proposal is a conceptual response that addresses the provision of upgrading with a secondary treatment train utilizing an MLE configuration with BioMag. It describes the scope of supply for design, engineering, equipment, services and provisions required for a mutually agreeable solution for the City. We look forward to participating in the design and development process to ensure that the City implements the highest performing and most cost effective solution.

BioMag System Overview

BioMag is a proven technology that can achieve low effluent suspended solids, BOD, nitrogen, and phosphorus concentrations in a compact footprint through the enhancement of activated sludge-based biological treatment processes. BioMag is best applied in plants needing additional capacity and/or enhanced nutrient removal. Its primary advantage in most cases is that it can deliver these benefits within existing tankage, thereby providing major savings in installation costs.

The key to BioMag's advantages is its ability to speed secondary settling rates and so secure reliable control of the secondary process and secondary clarifier sludge blankets. This in turn enables the biological treatment system to operate at elevated mixed liquor suspended solids concentrations, which can either enable the processing of higher flows, or if capacity is not an issue, the reconfiguration of current tanks to support the achievement of strict nitrogen discharge limits.

The BioMag Process

BioMag is an enhanced biological wastewater treatment process that uses magnetite to increase the specific gravity of biological floc. Magnetite is Fe_3O_4, a fully inert form of iron ore with a specific gravity of 5.2 and a strong affinity for biological solids. Magnetite substantially increases the settling rate of the biomass. Increasing the specific gravity and settling rate of the biological floc provides the opportunity to increase the mixed liquor concentration, while still maintaining adequate settling and thickening in the secondary clarifiers.

As shown in Figure 1 virgin and recovered magnetite are blended with the RAS in the Ballast Mix Tank. The ballasted biosolids then flow to the main process, where the solids settle out and thicken during the settle phase. Waste sludge (WAS) is pumped through a Shear Mill and then to the Recovery Magnet, where the ballast is recovered and re-blended with the biosolids in the Ballast Feed Tank. The excess biological solids (minus the magnetite) are wasted to the sludge processing.

Benefits BioMag™

BioMag™ has several benefits over existing biological treatment processes. These benefits include:

- Increased secondary settling and thickening rates, resulting in increased treatment capacity and reliability.
- Ability to operate activated sludge systems at high mixed liquor suspended solids (MLSS) concentrations, thereby increasing treatment capacity.
- Higher MLSS concentrations result in longer sludge ages and increased nitrification efficiency. It also frees up tankage for use as anoxic and/or anaerobic zones.
- Enhanced removal of suspended solids, nitrogen and phosphorus.
- Enhanced control over secondary sludge blankets.
- Elimination of the need for costly, maintenance-intensive membranes. More specifically, without BioMag many plants would have to either add more aeration tanks and secondary clarifiers, or upgrade to a costly MBR system.
- Increased capacity at appreciably reduced lifecycle cost, compared to competing technologies.
- Enhanced thickening of waste activated sludge.
- Significantly reduced footprint of overall biological treatment processes.

Siemens has demonstrated the nutrient removal efficacy of BioMag at full scale at multiple plants, including to levels consistent with the permit requirements for the Pierce Island WWTF. The most recent demonstration was the BioMag pilot on Pierce Island, where elevated clarifier loading rates and enhanced nitrogen removal were demonstrated. All total nitrogen (TN) samples analyzed by the contract lab were under 8 mg/l, demonstrating exceptional TN removal in a Modified Ludzack-Ettinger (MLE) configuration, without the requirement for polymer addition.

Overall Design Basis

The design basis and assumptions for the upgrade of the plant are listed below. We are basing our design on an MLE configuration, with two parallel, rectangular bioreactors and two parallel, rectangular clarifiers. Both options fit inside the existing filter building interior wall dimensions. Siemens is providing tank sizing information for two options; with and without polymer addition to the secondary clarifiers. Fine bubble aeration with supplemental mechanical mixing in the bioreactor is proposed.

- The BioMag upgrade will utilize an MLE configuration for the main process;
- The new 2032 secondary treatment design flow rates are shown in Table 1;
- The primary effluent loading characteristics under design conditions are shown in Table 2;
- The final effluent performance requirements are shown in Table 3;
- **Option A:** The size of the proposed Bioreactor and Secondary Clarifier, without polymer addition, is shown in Table 4. This results in a total Bioreactor footprint of 164 ft by 63 ft, for a total volume of 1.78 MG. The total clarifier surface area is 6,000 sf, resulting in an avg day design SOR of 1,200 gpd/sf and an avg day SLR of 55 lb/day-sf at 75% RAS;
- **Option B:** The size of the proposed Bioreactor and Secondary Clarifier, with 1 mg/l polymer addition, is shown in Table 5. This results in a total Bioreactor footprint of 127 ft by 63 ft, for a total volume of 1.38 MG. The total clarifier surface area is 6,000 sf, resulting in an avg day design SOR of 1,200 gpd/sf and an avg day SLR of 67 lb/day-sf at 75% RAS;

- The target MLSS concentration is 3,700 mg/l without polymer, and 4,500 mg/l with polymer, not including the weight of magnetite.
- Siemens has significant experience to demonstrate that no deoxygenation zone would be needed to consistently meet the 8 mg/l TN limit. BioMag facilitates simultaneous nitrification-denitrification such that, when coupled with DO control, we are able to consistently achieve TN < 5 mg/l in our three MLE installations. Similar results have been achieved in BioMag piloting efforts with MLE configurations. We are assuming that DO control will be provided as part of this upgrade, and therefore no deoxygenation zone is needed. In the unlikely event that DO control is not provided, Siemens would recommend installing a deoxygenation tank or zone equal to 1.5 percent of the total bioreactor volume. This would result in a total deox volume of 26,700 gallons for Option A (no polymer), and 20,700 gallons for Option B (with polymer).

Table 1: Design Flow Rates

Parameter	Design Conditions (MGD)
Average Day Flow	6.13
Max Month Design Flow	8.86
Peak Day Flow	9.06

Table 2: Design Loading Characteristics

Parameter	Average Day Loading (lbs/d)	Max Month Design Loading (lbs/d)
BOD	7,967	9,505
TSS	6,615	9,004
TKN	1,375	1,856

Table 3: New Effluent Performance Requirements

Parameter	Monthly Average
BOD	30
TSS	30
TN	8.0

Table 4: Bioreactor & Secondary Clarifier Sizes (Without Polymer Addition)

NUMBER OF TANKS	LENGTH (FT)	WIDTH (FT)	SWD (FT)
Aeration Basins (3 trains of the following)			
Anoxic	49	21	23
Aerobic	115	21	23
Secondary Clarifiers			
3	100	20	15

Table 5: Bioreactor & Secondary Clarifier Sizes (With 1 mg/l Polymer Addition)

NUMBER OF TANKS	LENGTH (FT)	WIDTH (FT)	SWD (FT)
Aeration Basins (3 trains of the following)			
Anoxic	38	21	23
Aerobic	89	21	23
Secondary Clarifiers			
3	100	20	15

BioMag Solution

The BioMag Solution provides the design, engineering, equipment, and services that are associated with the provision of a BioMag system that provides for the infusion, recovery, suspension and management of magnetite throughout the activated sludge process. The objective of the BioMag system is to:

- ✓ Provide rapid and reliable settling and removal of solids at enhanced clarifier loading rates in the plant's secondary process;
- ✓ Enable increased MLSS concentrations for reduced footprint with year-round nitrogen removal,

Figure 1 shows the proposed process flow diagram.
Figure 2 shows the temporary BioMag mechanical equipment layout.

Pretreatment & Screening

Trash and non-biodegradable solids, such as hair, lint, grit and plastics may foul or reduce the efficiency of magnetite recovery if allowed to pass into the Bioreactor. Siemens assumes the continued use of the primary clarifiers to protect the magnetite recovery system.

Magnetite Feed

A 25 ton magnetite storage silo is intended for the magnetite delivery system. A pneumatic, automatic feeder will feed virgin magnetite into the system. Up to 200 gpm of RAS will be diverted to the magnetite mix tank, where virgin magnetite and recovered magnetite will be fed and blended with the biosolids. The impregnated biosolids will then be pumped back to the main process bioreactors.

Sludge Return and Wasting

A portion of secondary sludge will be wasted to the magnetite recovery system, where it will flow through the shear mill, and then onto the magnetic recovery drum. The wasting rate will depend on the influent characteristics, surface wasting, reactor design and operator preference. The anticipated WAS rate to the recovery system is on the order of 19 to 50 gpm.

Power, Utility and Consumable Requirements

The equipment preliminary motor list, with all connected and operating motor horsepower, is shown in Table 6. Consumables are listed in Table 7.

Table 6: Preliminary Motor List

EQUIPMENT	QUANTITY	CONNECTED HORSEPOWER	DUTY	OPERATING HORSEPOWER	USAGE
Shear Mills	2	80	40%	32	24/7
Magnetic Recovery Drums	3	9	40%	3.6	24/7
Ballast Tank Mixer	1	5	80%	4	24/7
BioMag Ballasted RAS Return Pumps	3	22.5	40%	9	24/7
WAS Wasting Pumps	2	10	50%	5	24/7
Misc Instruments and Chemical Feed	1	2	100%	2	24/7
Compressor and Dryer	2	20	25%	5	24/7
			Total	**60.6**	HP
			Total	**45**	KW

Table 7: Consumables

CONSUMABLE	PER DAY	PER YEAR
Polymer	0 lbs	--
Magnetite	400 lbs	73 tons
Maintenance Labor		264 hours

Control Equipment

Siemens will provide a Programmable Logic Controller (PLC) with an Operator Interface Terminal (OIT) to monitor and manage all critical process operations. In the event of a system or equipment problem requiring operator attention, the PLC can either alert the operator or shut the system down. A separate power panel provided by others will include all motor starters and drives for the BioMag Process.

SIEMENS

Industry

Figure 1: BioMag Process Flow Diagram

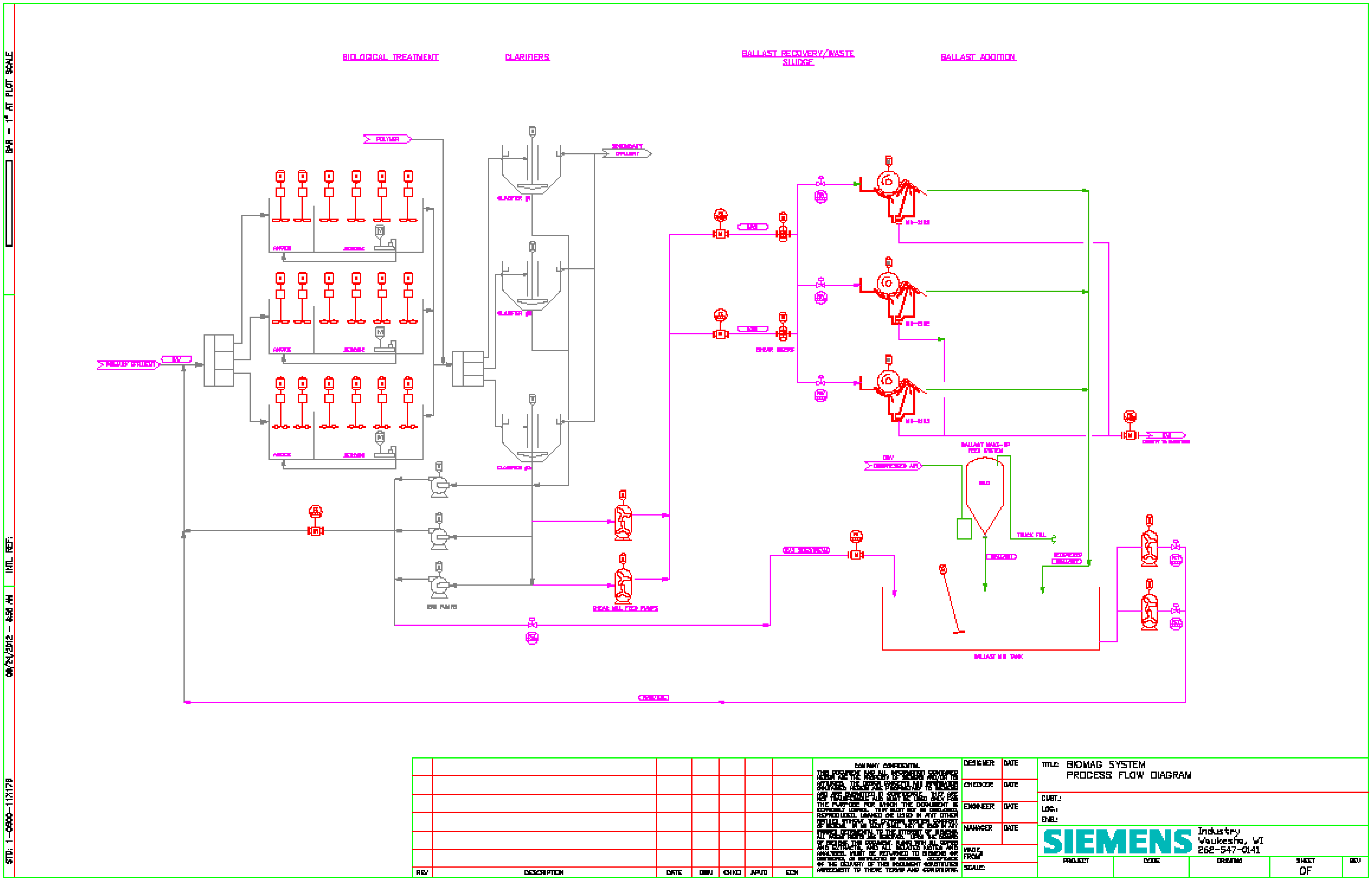
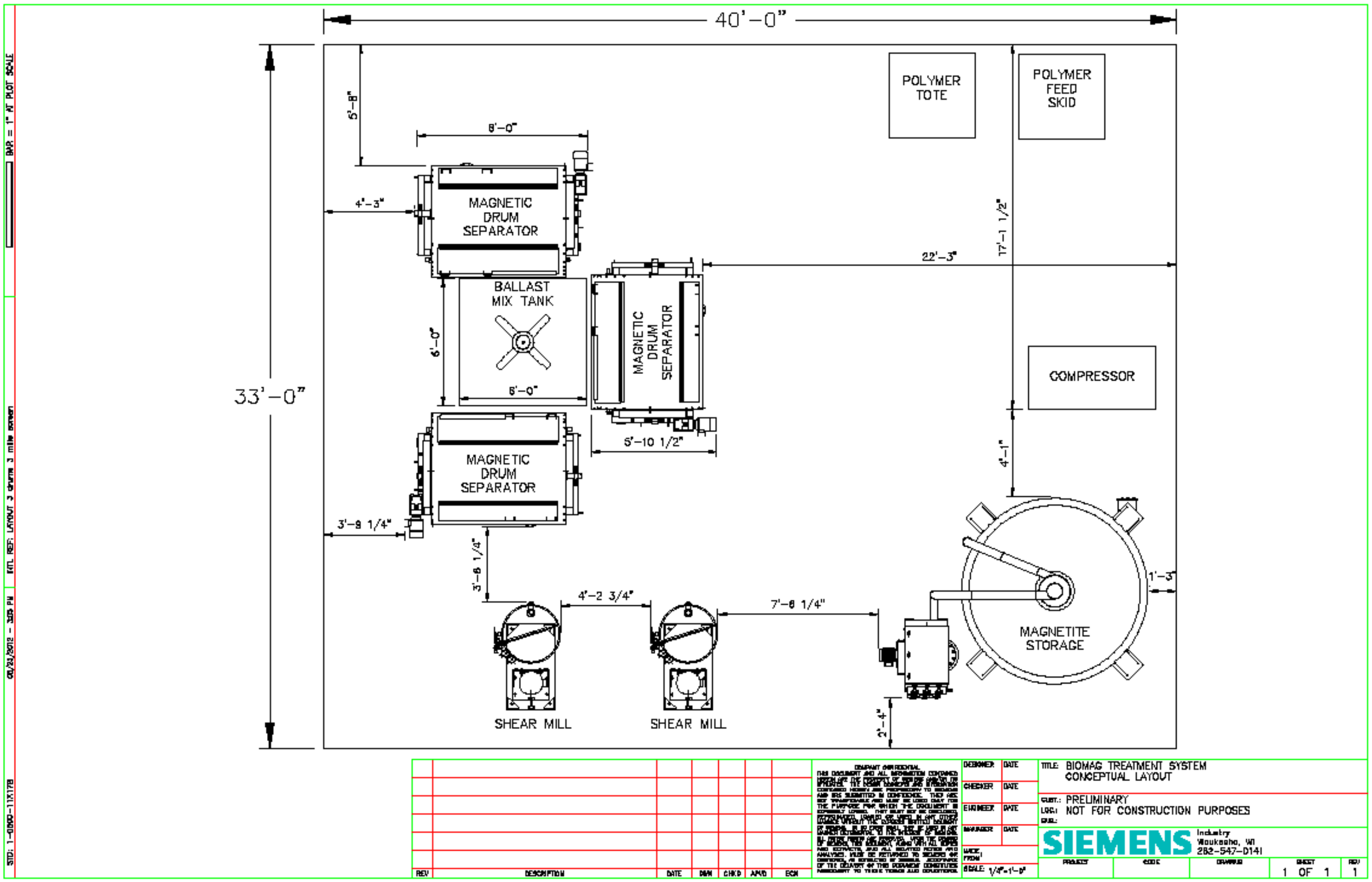


Figure 2: BioMag Equipment Layout



Scope of Supply and Services

The overall scope of supply for the BioMag Solution is shown below in Table 8.

Responsibility for the design, approval and equipment procurement for the solution is shown in Table 9.

Siemens services provided for engineering support, installation oversight and commissioning, and start-up and performance testing as shown in Table 10.

Siemens will provide standard industry warrantees on all equipment provided.

Table 8: Overall Scope of Supply

Overall Scope of Supply for BioMag Solution	**Supplied by Siemens**	**Supplied by Others**
Engineering and Permitting		
Permitting and regulatory approval		√
Geotechnical engineering		√
Civil engineering		√
Structural engineering		√
Architecture		√
Heating, Ventilation, and AC		√
Fire Protection		√
Electrical		√
Equipment <u>outside</u> of that supplied by Siemens		
Process engineering		√
Mechanical engineering		√
Controls engineering – integration to plant SCADA or plant alarm system		√
BioMag Supplied Equipment (See Table 9)		
Process engineering	√	
Mechanical engineering	√	
Structural engineering –Siemens supplied equipment only	√	
Controls engineering	√	
Construction		
Bidding		√
Construction oversight	Limited	√
Bonds, Taxes, regulatory, and permitting fees		√
Site Work *Site preparation and demolition, earthwork, pavement, site piping, site utilities, site lighting, landscaping, site drainage, and related work*		√
Concrete Work *Concrete tanks, foundations, substructures, and related work*		√
Buildings *Substructure, equipment foundations, superstructure, windows & doors, material handling, fire protection, chemical unloading stations, safety equipment, and related work*		√
Metals *Platforms and miscellaneous metals, and related work*		√
Painting		

Overall Scope of Supply for BioMag Solution	Supplied by Siemens	Supplied by Others
BioMag equipment – shop finish	√	
All other equipment, materials, and piping		√
Equipment, instruments, and electrical work outside of that supplied by Siemens		
Furnish		√
Installation		√
Commissioning, startup, and testing		√
Equipment, instruments, control panels, and power panels (if applicable) supplied by Siemens		
Procurement and furnish	√	
Receiving, offloading, storage, and maintenance while in storage		√
Installation		√
Anchor bolts and foundations (including design)		√
Commissioning, startup, and testing	√	
Laboratory analyses for performance testing		√
Piping and Plumbing		√
Piping and isolation valves		√
Hardware and gaskets at Siemens/Customer interfaces		√
Heat tracing and insulation (as needed)		√
Plumbing		√
Sanitation		√
Hoists, monorails and cranes		√
Instrumentation and Controls		
BioMag control system integration	√	
Plant control system (e.g., SCADA) integration		√
Electrical		
Electrical service		√
Lighting, secondary electrical distribution		√
Utilities and Chemicals		
Influent piping to BioMag		√
Effluent piping from BioMag		√
Sludge piping from BioMag		√
Sludge storage and processing		√
Plant water		√
Chemical feed pumps and storage tanks		√
Treatment chemicals		√

Table 9: Equipment Provision

`	Quantity	Description	AECOM	SIEMENS	Others
Bioreactors	3	Flow through aeration tank and secondary clarifier	Design	Agree	Supply
In-Basin Aeration	LOT	In-basin Fine Bubble Diffusers and Air piping to Liquid surface	Design	Approve	Supply
Supplemental Mixing	18	Bioreactor (6) DDM Style 10 HP and (2) DDM 20 Hp mixers to maintain off-bottom suspension	Approve	Design/Supply	
Secondary Clarifiers	3	Internal Chain & Flight Sludge Collectors100'x25'x15'swd	Design	Approve	Supply
Ballast Storage & Feed System					
Ballast Mix Tank	1	1,200 gallon	Design	Approve	Supply
Ballast Tank Mixer	1	Top mount	Approve	Design/Supply	
Magnetite Storage	1	25 Ton Silo	Approve	Design/Supply	
Magnetite dry feeder	1	Stinger w/ eductor funnel and dust filtration	Approve	Design/Supply	
Air compressor / Desiccant dryer	1	Dual Compressor and dryer with sound enclosure	Approve	Design/Supply	
Ballast Recovery System					
Magnetic Drum Separator w/ WAS Sump	3	36" diam x 48"L	Approve	Design/Supply	
Shear Mill	2	40 Hp Stainless Steel	Approve	Design/Supply	
Pumps – Ballasted RAS Return	3 (2D,1S)	Positive Displacement	Approve	Design/Supply	
Pumps – WAS	2 (1D,1S)	Positive Displacement	Approve	Design/Supply	
Flow Control Valves	3	Ballast Recovery Flow Control	Approve	Design/Supply	
Flow control valve	1	ballast mix tank	Approve	Design/Supply	
Flow Meter – RAS	1	Magnetic flow meter	Approve	Design/Supply	
Flow Meter –Ballast mix tank	1	Magnetic flow meter	Approve	Design/Supply	
Flow Meter – from WAS feed pumps to shear mill	2	magnetic flow meter	Approve	Design/Supply	

`	Quantity	Description	AECOM	SIEMENS	Others
Flow Meter – Waste sludge discharge pumps	1	magnetic flow meter	Approve	Design/Supply	
Instrumentation					
LDO probes	3	Aeration Basins	Approve	Design/Supply	
Sludge Blanket Sensors	3	Secondary Clarifiers	Approve	Design/Supply	
Level Switch – mix tank	1	Float switch	Approve	Design/Supply	
Level Sensor	1	Pressure Transducer	Approve	Design/Supply	
Level switch – recovery drum	6	Tuning fork	Approve	Design/Supply	
Plant water shutoff valve and solenoid	1		Approve	Design/Supply	
Flow Switch	1	Ballast Feed System	Approve	Design/Supply	
High Level Switch	1	Storage Silo	Approve	Design/Supply	
High Moisture Sensor	1	Ballast Feed System	Approve	Design/Supply	
High Temp Switches	2	Shear Mills	Approve	Design/Supply	
Diaphragm seals	2	Shear Mills	Approve	Design/Supply	
Misc. Gauges	7	Shear Mills & WAS Pumps	Approve	Design/Supply	
Pressure Switches	3		Approve	Design/Supply	
Control System Hardware					
Control Panel	1	PLC controls	Approve	Design/Supply	
Chemical Feed Systems					
Alkalinity storage Tank			Design	Agree	Supply
Alkalinity feed pumps			Design	Agree	Supply
Polymer Feed system	1	Emulsion Polymer	Approve	Design/Supply	

`	Quantity	Description	AECOM	SIEMENS	Others
Polymer water supply	1	@ 40-60 psi	Design	Agree	Supply
Magnetite – 1st Charge	1			Supply	
Spares		Spare Shear Mill head, Seal kit per pump model, Standard insturment spares		Supply	

Table 10: Siemens Services

Services	
Engineering support	✓ Review of design and bid documents ✓ Participation in design meetings ✓ Submission of sketches, plans and other design phase documentation ✓ Shop drawings for the BioMag equipment within Siemens' scope.
Installation Oversight, Start-up & Training	✓ Services of a representative for up to 24, 8 hour days ✓ Recommend necessary adjustments and test equipment. ✓ Verify proper installation of the BioMag and ancillary systems prior to startup.

Commercial Terms

Pricing

Item	Price
BioMag System	$ 2,500,000

Validity

The scope of supply and pricing are based on SIEMENS standard equipment selection, standard terms of sale and warranty terms as described herein. Any variations from these standards may affect this budgetary quotation. Additionally, please note that this budgetary quotation is for review and informational purposes only and does not constitute an offer for acceptance.

These prices are for the scope of supply identified in Tables 7, 8 and 9

Freight and Taxes

All pricing are FOB, Factory - Full Freight Allowed. All taxes and duties are for the account of the purchaser.

World water works

Clean Water and Energy from Wastewater

DATE: 18 September, 2012
TO: Matt Formica, Jon Pearson - AECOM
FROM: Chandler Johnson – World Water Works
CC: Rob Trzepacz & Mike Caso – Technology Sales Associates
Dan Dair & Mark Fosshage – World Water Works
RE: Portsmouth, NH WWTP Design Evaluation – Primary Effluent – Rev 2

Matt & Jon,

Per your request for an updated design evaluation for the Town of Portsmouth, NH, please find our design conditions for meeting the following requirements:

a) BOD and TSS of 30 mg/L & Total Nitrogen of 8 mg/L on a 30 day monthly average
b) Maximum % fill of 45%
c) Three process trains with three DAF units

In this evaluation we looked at re-using the existing foundation structure with the interior dimensions of 69 ft wide x 169 ft long with a SWD of 21 ft.

We must make note the maximum % fill of 45% based on the piloting mixing patter is not truly a valid claim for lower the overall % fill of the system. There are MBBR treatment systems in operation which I designed (South Adam County, CO, Yucaipa, CA) which have 60% fill fractions in both anoxic and aerobic reactors and the design of the aeration system and mixers for those full scale plants operate with the aerobic zones being completely mixed and in the anoxic zones a small layer of media on top of the reactor which slowly moves and is integrated back into the cell over time. These systems meet and exceed their performance requirements and since Portsmouth WWTP is so space constraint, we would recommend having a higher % fill fraction than 45% which in the end will save space on this site.

We have provided 4 design conditions based on using an MLE configuration and Non-MLE configuration (2 based on using the maximum % fill criteria of 45% and 2 based on using our normal sizing criteria). As you will see in the design, the MBBR treatment system for the Non-MLE configuration can fit within the existing structure while for the MLE configuration, the Post DN and Post Aeration tanks would need to be placed outside the existing structure. As we have recommended DAF's for the solids separation system, there will still need to be a pumping system for either design consideration since the DAF's need to be placed outside the existing structure.

After you have a chance to review this design, we would like to offer a conference call to discuss our design approach and answer any questions / comments you may have. We look forward to our continued discussion on this project.

Regards,

Chandler Johnson
World Water Works

4000 SW 113th St. ~ Oklahoma City, OK 73173 ~ 1-(405)-ANAMMOX

Flow

Average Design Flow Rate	6.13 MGD
Maximum Month Design Flow Rate	8.86 MGD
Max Day Flow Rate	9.06 MGD
Peak Flow Rate for Sieve Design Only	26.6 MGD – MLE Design
	9.06 MGD – Non-MLE Design

Design Conditions for Average Month

Parameters	System Design Influent	Estimated Effluent
Primary Eff. BOD	156 mg/L (7,981 lb/day)	<30 mg/L
Primary Eff. TSS	129 mg/L (6,600 lb/day)	<30 mg/L
Total Nitrogen	26.9 mg/L (1,376 lb/day)	< 8 mg/L
TKN	26.9 mg/L (1,376 lb/day)	
NH_3-N		< 1 mg/L
NO_3-N		< 4 mg/L
pH (Pre-EQ)	6.0 - 8.0 S.U.	6.0 – 8.0 S.U.
Temp	10 - 20 Deg C	N/A

Design Conditions for Maximum Month

Parameters	System Design Influent	Estimated Effluent
Primary Eff. BOD	129 mg/L (9,538 lb/day)	<30 mg/L
Primary Eff. TSS	122 mg/L (9,021 /day)	<30 mg/L
Total Nitrogen	25.1 mg/L (1,856 lb/day)	< 8 mg/L
TKN	25.1 mg/L (1,856 lb/day)	
NH_3-N		< 1 mg/L
NO_3-N		< 4 mg/L
pH (Pre-EQ)	6.0 - 8.0 S.U.	6.0 – 8.0 S.U.
Temp	10 - 20 Deg C	N/A

Based on re-using the existing foundation as the tankage limits, we have generated a design using 3 process trains of multiple reactors in series to achieve the above results.

In the designs using a maximum fill fraction of 45%, you will see that the Non-MLE approach is able to fit the aerobic portion of the MBBR volume within the foundation boundaries and the post denitrification & post aeration reactors & the DAF units would need to be placed outside. For the MLE approach the 2nd nitrification reactor, post denitrification and post aeration tanks along with the DAF units will need to be placed outside the existing building foundation.

In the designs using our standard % fill fractions, you will see the Non-MLE approach can fit all the reactors inside the existing footprint. For the MLE approach, the post denitrification and post aeration reactor are outside the existing footprint.

MBBR Basin Design – Primary Clarifier with MLE – Maximum % Fill at 45%

Total tank volume	**317,520 ft^3**
Tank volume in Existing Structure	**219,618 ft^3**
Number of process trains	3
Number of reactors per train	7 (4 inside existing building / 3 outside)
Pre-Denitrification #1 Reactor	21 ft wide x 37 ft long x 21 ft SWD
Pre-Denitrification #2 Reactor	21 ft wide x 37 ft long x 21 ft SWD
BOD Reactor	21 ft wide x 39 ft long x 21 ft SWD
Nitrification #1 Reactor	21 ft wide x 53 ft long x 21 ft SWD
Nitrification #2 Reactor	21 ft wide x 49 ft long x 21 ft SWD
Post Denitrification Reactor	21 ft wide x 15 ft long x 21 ft SWD
Post Aeration Reactor	21 ft wide x 10 ft long x 21 ft SWD
Total Media volume required	3,811 m^3 (134,566 ft^3)
Effective Surface Area Provided	2,477,150 m^2 (26,663,821 ft^2)
% Fill	45% / 42% / 42% / 45% / 33% / 25%
MAXIMUM MONTH LOADING	
Effluent TSS from MBBR	146 mg/L (10,771 lb/day)
Estimated Sludge volume from DAF	31,814 gpd of 3.5% sludge
Estimated Air Flow required for MBBR	4,950 SCFM at 9.5 psig discharge pressure
Methanol Required	181 gpd
% Internal Recycle	200% (17.72 MGD)
AVERAGE MONTH LOADING	
Effluent TSS from MBBR	164 mg/L (8,407 lb/day)
Estimated Sludge volume from DAF	25,280 gpd of 3.5% sludge
Estimated Air Flow required for MBBR	3,856 SCFM at 9.5 psig discharge pressure
Methanol Required	118.5 gpd
% Internal Recycle	225% (13.8 MGD)

MBBR Basin Design – Primary Clarifier with NO MLE – Maximum % Fill at 45%

Total tank volume	**281,799 ft^3**
Tank volume in Existing Structure	**218,295 ft^3**
Number of process trains	3
Number of reactors per train	7 (5 inside existing building; 2 outside)
BOD #1 Reactor	21 ft wide x 31 ft long x 21 ft SWD
BOD #2 Reactor	21 ft wide x 31 ft long x 21 ft SWD
Nitrification #1 Reactor	21 ft wide x 41 ft long x 21 ft SWD
Nitrification #2 Reactor	21 ft wide x 41 ft long x 21 ft SWD
Nitrification #3 Reactor	21 ft wide x 21 ft long x 21 ft SWD
Post Denitrification Reactor	21 ft wide x 38 ft long x 21 ft SWD
Post Aeration Reactor	21 ft wide x 10 ft long x 21 ft SWD
Total Media volume required	3,381 m^3 (119,383 ft^3)
Effective Surface Area Provided	2,197,650 m^2 (23,655,308 ft^2)
% Fill	44%/ 44%/ 43%/ 43%/ 42%/ 43%/ 25%
MAXIMUM MONTH LOADING	
Effluent TSS from MBBR	158 mg/L (11,691 lb/day)
Estimated Sludge volume from DAF	34,967 gpd of 3.5% sludge
Estimated Air Flow required for MBBR	6,306 SCFM at 9.5 psig discharge pressure
Methanol Required	600 gpd
AVERAGE MONTH LOADING	
Effluent TSS from MBBR	177 mg/L (9,043 lb/day)
Estimated Sludge volume from DAF	27,460 gpd of 3.5% sludge
Estimated Air Flow required for MBBR	5,124 SCFM at 9.5 psig discharge pressure
Methanol Required	408 gpd

SOLIDS SEPARATION USING DISSOLVED AIR FLOTATION

Based on using three (3) process trains for the MBBR treatment system, we are recommending 3 – RSP-6L DAF systems with peak flows of 2,500 gpm per DAF. Peak flow per process train is currently designed at 9.1 MGD / 3 = 2,106 gpm.

Dimensions of the RSP-6L are 11.5 ft wide x 20.3 ft long x 15.5 ft tall.

For the MLE Design Option, having the post denitrification & post aeration reactors at a side water depth of 21 ft, allows for gravity flow to each of these DAF systems.

For the NON-MLE Design Option, having the last nitrification reactor, post denitrification reactor & post aeration reactor at a side water depth of 21 ft, allows for gravity flow to each of these DAF systems.

MBBR Basin Design – Primary Clarifier with MLE – Standard Design % fill

Total tank volume	**253,693 ft^3**
Tank volume in Existing Structure	**219,618 ft^3**
Number of process trains	3
Number of reactors per train	6 (4 inside existing building / 2 outside)
Pre-Denitrification Reactor #1	21 ft wide x 62 ft long x 21 ft SWD
BOD Reactor	21 ft wide x 29 ft long x 21 ft SWD
Nitrification #1 Reactor	21 ft wide x 47 ft long x 21 ft SWD
Nitrification #2 Reactor	21 ft wide x 28 ft long x 21 ft SWD
Post Denitrification Reactor	21 ft wide x 15 ft long x 21 ft SWD
Post Aeration Reactor	21 ft wide x 10 ft long x 21 ft SWD
Total Media volume required	3,763 m^3 (132,871 ft^3)
Effective Surface Area Provided	2,445,950 m^2 (26,327,986 ft^2)
% Fill	54% / 56% / 58.4% / 56% / 33% / 25%

MBBR Basin Design – Primary Clarifier with NO MLE – Standard Design % Fill

Total tank volume	**218,295 ft^3**
Tank volume in Existing Structure	**218,295 ft^3**
Number of process trains	3
Number of reactors per train	6 (6 inside existing building)
BOD #1 Reactor	21 ft wide x 22.5 ft long x 21 ft SWD
BOD #2 Reactor	21 ft wide x 22.5 ft long x 21 ft SWD
Nitrification #1 Reactor	21 ft wide x 61 ft long x 21 ft SWD
Nitrification #2 Reactor	21 ft wide x 11 ft long x 21 ft SWD
Post Denitrification Reactor	21 ft wide x 38 ft long x 21 ft SWD
Post Aeration Reactor	21 ft wide x 10 ft long x 21 ft SWD
Total Media volume required	3,339 m^3 (118,324 ft^3)
Effective Surface Area Provided	2,178,150 m^2 (23,445,411 ft^2)
% Fill	61% / 61% / 61% / 53% / 43% / 25%

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PRIMARY CLARIFIER – WITH MLE CONFIGURATION SCOPE OF SUPPLY

ITEM	QUANTITY	DESCRIPTION
1	9	**Aeration Grid - #1** – 8 ft wide x 18 ft long; **4** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
2	9	**Aeration Grid - #2** – 8 ft wide x 18 ft long; **4** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
3	9	**Aeration Grid - #3** – 7 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
4	3	**Aeration Grid - #4** – 4 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
5	18	4 inch SCH 10S 304L SS Drop pipe
6	12	3 inch SCH 10S 304L SS Drop pipe
	LOT	Aeration Grid Supports and hardware for installation
8	3,811	m^3 of biomedia at 650 m^2/m^3
9	72	Circular Media retention screens for aerobic reactors (1, 2, 3)
10	15	Circular Media retention screens for post aerobic reactor
11	LOT	Flat Panel Media retention screens for Denitrification reactors
12	LOT	Sieve Supports for all reactors
13	18	9 HP mixers for the Denitrification and Nitrification #2 cells
14	3	RSP-6L DAF Systems with M80 Nikuni Air System (40 HP motor on each DAF unit)
15	LOT	Freight of all equipment to jobsite
16	LOT	Design / Engineering / Project Management
17	LOT	Field Services (field inspection, start up and training)

ESTIMATED COST: $7,050,000 USD

ITEMS BY OTHERS:

- Conversion of tanks into MBBR in the dimensions listed above
- Blowers
- Pump station from Nitrification / Post DN reactor to either Post DN reactor / DAF depending on configuration used.
- Unloading and installation of above equipment
- Methanol / Polymer feed systems and storage tanks
- Internal Recycle pumps for MLE configuration
- Interconnecting piping and wall sleeves for sieve connections & aeration piping
- Taxes / Duties

PRIMARY CLARIFIER – WITH NO MLE CONFIGURATION SCOPE OF SUPPLY

ITEM	QUANTITY	DESCRIPTION
1	9	**Aeration Grid - #1** – 7 ft wide x 18 ft long; **4** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
2	9	**Aeration Grid - #2** – 7 ft wide x 18 ft long; **4** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
3	9	**Aeration Grid - #3** – 7 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
4	9	**Aeration Grid - #4** – 7 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
5	6	**Aeration Grid - #5** – 4 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
6	3	**Aeration Grid - #5** – 4 ft wide x 18 ft long; **3** inch SCH 10S 304L SS manifold **1** inch SCH 5S 304L SS diffusers
	18	4 inch SCH 10S 304L SS Drop pipe
8	27	3 inch SCH 10S 304L SS Drop pipe
9	LOT	Aeration Grid Supports and hardware for installation
10	3,381	m^3 of biomedia at 650 m^2/m^3
11	70	Circular Media retention screens for all aerobic reactors
12	LOT	Flat Panel Media retention screens for post-denitrification reactor
13	LOT	Sieve Supports for all reactors
14	9	9 HP mixers for the Post Denitrification and Nitrification #2 cells
15	3	RSP-6L DAF Systems with M80 Nikuni Air System (40 HP motor on each DAF unit)
16	LOT	Freight of all equipment to jobsite
17	LOT	Design / Engineering / Project Management
18	LOT	Field Services (field inspection, start up and training)

ESTIMATED COST: $5,680,000 USD

ITEMS BY OTHERS:

- Conversion of tanks into MBBR in the dimensions listed above
- Blowers
- Pump station from Nitrification / Post DN reactor to either Post DN reactor / DAF depending on configuration used.
- Unloading and installation of above equipment
- Methanol / Polymer feed systems and storage tanks
- Interconnecting piping and wall sleeves for sieve connections & aeration piping
- Taxes / Duties

Estimated O&M of the MBBR & DAF Treatment system

Items with routine maintenance will be the rotating equipment (mixers, blowers and internal recycle pumps) used for the MBBR treatment system. Chemical pumps (polymer / methanol feed) will also have routine maintenance on them and the specific manufacturer should be consulted for what their maintenance is.

To date the number of MBBR installations using this particular aeration grid and sieve design have not shown any maintenance requirements in system now in service for greater than 10 years. We feel there is minimal overall operator maintenance required on these items. The biomedia used also has been aggressively tested in laboratory tests showing minimal wear on the biomedia, thus we also do not feel this will require any significant operator maintenance

Mixer manufacturer recommends inspection of the mixer after the first 3 months of operation and then every 4,300 hours of operation (6 months of continuous service) and requires the following:

- Gear oil inspection and replacement
- Motor casing inspection for leakage
- Propeller, lip seal and wear busing inspection for wear
- Pipe guide assembly inspection and tighten bolts

On the DAF system the following items need inspection / replacement 1 x / year

- Inspect Sludge Rake motor and grease 2 x per year
- Wear plates on sludge rake system – replace 1 x per year
- Inspect sludge rake sprockets, paddles, wipers, chain and rollers
- Inspect Nikuni Mechanical 1 per month, replace when needed
- Replace Nikuni Impeller – 1 every 3 – 5 years
- Sludge pump (depends on type used – AOD / progressive cavity)
- Inspect chemical feed pumps (daily) for any leaks and calibration 1 / month

Estimated chemical / electrical consumption on an average annual basis:

- **No MLE Configuration**
    - 4,635 SCFM / 266 bHP / 198 kW / 1,734,480 kW per year
    - Mixers for MBBR – 60.3 kW with 2 operated on VFD's / 528,228 kW/year.
    - 408 gpd of methanol
    - Pumping capacity for pumping Post Aeration Effluent to DAF for solids separation (9.09 MGD)
    - 1 – 2 ppm Polymer; 5 – 10 gpd (at S.G = 1.2)
    - Nikuni pump / 30 kW / 262,800 kW per year
    - Sludge rake / 2.2 kW – operated up to 20% of time during day. 3,854 kW/year

- **MLE Configuration**
    - 3,622 SCFM / 205 bHP / 153 kW / 1,339,667 kW per year
    - Mixers for MBBR – 120.6 kW with 2 operated on VFD's / 1,056,45 kW/year.
    - Pumping capacity for Internal Recycle (13.8 MGD)
    - 118.5 gpd of methanol
    - Pumping capacity for pumping Nitrification #2 Reactor to Post Denitrification Reactor (9.09 MGD)
    - 1 – 2 ppm Polymer; 5 – 10 gpd (at S.G = 1.2)
    - Nikuni pump / 30 kW / 262,800 kW per year
    - Sludge rake / 2.2 kW – operated up to 20% of time during day. 3,854 kW/year

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ATTACHMENT G

OPINION OF COSTS

Opinion of Cost - BAF

Secondary Treatment with TN of 8 mg/L at Peirce Island Site (6.13 MGD)

PEIRCE ISLAND CAPITAL COST ESTIMATE									
SOURCE	ITEM	QUANTITY	UNIT		UNIT PRICE		AMOUNT		Subtotal
Portions of "Compliance Strategy Cost Estimate Biomag Secondary Treatment" contained in Appendix D of the Final Submission WWMP, November 15, 2010	**Headworks**								
	Structure	2500	SF	$	300	$	750,000		
	Equipment:								
	Odor Control	1	EA	$	60,000	$	87,000		
	Bar Screens	2	EA	$	250,000	$	725,000		
	Screenings Washer & Compactor	2	EA	$	50,000	$	145,000		
	Grit Pumps	3	EA	$	35,000	$	152,250		
	Vortex Grit Removal	2	EA	$	75,000	$	217,500		
	Grit Classifier & Washer	2	EA	$	40,000	$	116,000		
								$	2,192,750
	Sanitary Disinfection								
	Equipment:								
	Pump System	1	EA	$	100,000	$	100,000		
	UV Disinfection	1	EA	$	200,000	$	200,000		
								$	300,000
	Biosolids Processing								
	Structure								
	Rehab Existing Process Building	1	EA	$	350,000	$	350,000		
	Equipment:								
	Carbon Odor Control	1	EA	$	60,000	$	87,000		
	Dewatering Screw Press	2	EA	$	400,000	$	1,160,000		
	Conveyors	2	EA	$	50,000	$	145,000		
								$	1,742,000
	Additional Structures and Modifications								
	Structure								
	PE Splitter - Upstream - Rehab Existing	1	EA	$	500,000	$	500,000		
	PE Splitter - Downstream	2200	SF	$	300	$	660,000		
								$	1,160,000
	SUBTOTAL							**$**	**5,394,750**
	Yard Piping (12%)							$	647,370
	Electrical (22%)							$	1,186,845
	Instrumentation and Controls (6%)							$	323,685
	Site Work and Landscaping (7%)							$	377,633
	SUBTOTAL							**$**	**7,930,283**
	Island Construction Premium (3%)							$	237,908
	Engineering (20%)							$	1,586,057
	Contingency (30%)							$	2,379,085
	SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2010 DOLLARS)							**$**	**12,133,332**
	ESCALATED SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2012 DOLLARS)							**$**	**12,981,436**
	ESCALATED SUBTOTAL FROM WASTEWTAER MASTER PLAN ESTIMATES (APRIL 2016 DOLLARS)							**$**	**14,026,850**

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
AECOM WWMP Pilot - Phase 2 Initial Piloting, September 2012	**Secondary Pump Station (Fine Screens and Lift Station)**					
	Site Work and Landscaping	1	LS	$ 391,000	$ 391,000	
	Structure	1	LS	$ 774,000	$ 774,000	
	Process Piping and Appurtenances	1	LS	$ 332,000	$ 332,000	
	Equipment:					
	Odor Control	1	EA	$ 132,000	$ 132,000	
	Fine Screens, Washer and Compactor and Container	2	EA	$ 374,500	$ 749,000	
	Secondary Influent Pumps	3	EA	$ 80,667	$ 242,000	
	HVAC/Plumbing	1	LS	$ 26,000	$ 26,000	
	Instrumentation and Controls	1	LS	$ 98,000	$ 98,000	
	Electrical	1	LS	$ 140,000	$ 140,000	
						$ 2,884,000
	Demolish Filter Building including Main Electrical Facilities					
	Demolition	1	LS	$ 1,392,000	$ 1,392,000	
	Site Work and Landscaping	1	LS	$ 201,000	$ 201,000	
						$ 1,593,000
	1st and 2nd Stage BAF, Mudwells and Control Building					
	Site Work and Landscaping	1	LS	$ 815,000	$ 815,000	
	Yard Piping	1	LS	$ 961,000	$ 961,000	
	Structure	1	LS	$ 6,822,000	$ 6,822,000	
	Process Piping and Appurtenances	1	LS	$ 1,214,000	$ 1,214,000	
	Equipment:					
	BAF Vendor (Kruger)	1	LS	$ 10,299,000	$ 10,299,000	
	HVAC/Plumbing	1	LS	$ 40,000	$ 40,000	
	Instrumentation and Controls	1	LS	$ 958,000	$ 958,000	
	Electrical	1	LS	$ 410,000	$ 410,000	
						$ 21,519,000
	Gravity Thickener, Sludge Storage Tank and Control Building					
	Site Work and Landscaping	1	LS	$ 251,000	$ 251,000	
	Structure	1	LS	$ 752,000	$ 752,000	
	Process Piping and Appurtenances	1	LS	$ 86,000	$ 86,000	
	Equipment:				$ -	
	Thickened Sludge Transfer Pumps	2	EA	$ 37,500	$ 75,000	
	Gravity Thickener Mechanism	1	EA	$ 115,000	$ 115,000	
	Dewatering Feed Pumps	2	EA	$ 17,000	$ 34,000	
	Grinders	2	EA	$ 33,000	$ 66,000	
	Sludge Mix Blowers	2	EA	$ 58,000	$ 116,000	
	Aeration Diffusers	1	LS	$ 55,000	$ 55,000	
	Odor Control	1	LS	$ 132,000	$ 132,000	
	HVAC/Plumbing	1	LS	$ 68,000	$ 68,000	
	Instrumentation and Controls	1	LS	$ 45,000	$ 45,000	
	Electrical	1	LS	$ 106,000	$ 106,000	
						$ 1,901,000
	Alkalinity Feed					
	Site Work and Landscaping	1	LS	$ 8,000	$ 8,000	
	Structure	1	LS	$ 176,000	$ 176,000	
	Process Piping and Appurtenances	1	LS	$ 25,000	$ 25,000	
	Equipment:					
	Hose Pumps	2	EA	$ 15,500	$ 31,000	
	Vertical Tanks	2	EA	$ 15,500	$ 31,000	
	HVAC/Plumbing	1	LS	$ 14,000	$ 14,000	
	Instrumentation and Controls	1	LS	$ 20,000	$ 20,000	
	Electrical	1	LS	$ 26,000	$ 26,000	
						$ 331,000
	Supplemental Carbon Addition					
	Site Work and Landscaping	1	LS	$ 7,000	$ 7,000	
	Structure	1	LS	$ 62,000	$ 62,000	
	Process Piping and Appurtenances	1	LS	$ 71,000	$ 71,000	
	Equipment:					
	Storage Tanks	1	LS	$ 88,000	$ 88,000	
	Metering Pumps	3	EA	$ 13,000	$ 39,000	
	Instrumentation and Controls	1	LS	$ 41,000	$ 41,000	
	Electrical	1	LS	$ 57,000	$ 57,000	
						$ 365,000
	Main Electrical Building and Standby Generator					
	Demolition	1	LS	$ 5,000	$ 5,000	
	Site Work and Landscaping	1	LS	$ 21,000	$ 21,000	
	Electrical Conduit	1	LS	$ 219,000	$ 219,000	
	Structure	1	LS	$ 171,000	$ 171,000	
	Equipment:					
	Electrical (Switchboard, MCB, ATS)	1	EA	$ 190,000	$ 190,000	
	Standby Generator	1	EA	$ 684,000	$ 684,000	
						$ 1,290,000
	SUBTOTAL					**$ 29,883,000**
	Island Construction Premium (3%)					$ 896,490
	Engineering and Contingency (40%)					$ 11,953,200
	SUBTOTAL FROM AECOM (2012 DOLLARS)					**$ 42,732,690**
	ESCALATED SUBTOTAL FROM AECOM (APRIL 2016 DOLLARS)					**$ 46,175,000**

OPINION OF CONSTRUCTION COST	**$ 60,201,850**
OPINION OF PROJECT COST (Rounded)	**$ 60,500,000**

Opinion of Cost - Conventional Activated Sludge & BioMag

Secondary Treatment with TN of 8 mg/L at Peirce Island Site (6.13 MGD)

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
Portions of "Compliance Strategy Cost Estimate Biomag Secondary Treatment" contained in Appendix D of the Final Submission WWMP, November 15, 2010	**Headworks**					
	Structure	2500	SF	$ 300	$ 750,000	
	Equipment:					
	Odor Control	1	EA	$ 60,000	$ 87,000	
	Bar Screens	2	EA	$ 250,000	$ 725,000	
	Screenings Washer & Compactor	2	EA	$ 50,000	$ 145,000	
	Grit Pumps	3	EA	$ 35,000	$ 152,250	
	Vortex Grit Removal	2	EA	$ 75,000	$ 217,500	
	Grit Classifier & Washer	2	EA	$ 40,000	$ 116,000	
						$ 2,192,750
	Sanitary Disinfection					
	Equipment:					
	Pump System	1	EA	$ 100,000	$ 100,000	
	UV Disinfection	1	EA	$ 200,000	$ 200,000	
						$ 300,000
	Biosolids Processing					
	Structure					
	Rehab Existing Process Building	1	EA	$ 350,000	$ 350,000	
	Equipment:					
	Carbon Odor Control	1	EA	$ 60,000	$ 87,000	
	Rotary Drum Thickener	2	EA	$ 150,000	$ 435,000	
	Dewatering Screw Press	2	EA	$ 400,000	$ 1,160,000	
	Conveyors	2	EA	$ 50,000	$ 145,000	
						$ 2,177,000
	Additional Structures and Modifications					
	Structure					
	PE Splitter - Upstream - Rehab Existing	1	EA	$ 500,000	$ 500,000	
	PE Splitter - Downstream	2200	SF	$ 300	$ 660,000	
						$ 1,160,000
	SUBTOTAL					**$ 5,829,750**
	Yard Piping (12%)					$ 699,570
	Electrical (22%)					$ 1,282,545
	Instrumentation and Controls (6%)					$ 349,785
	Site Work and Landscaping (7%)					$ 408,083
	SUBTOTAL					**$ 8,569,733**
	Island Construction Premium (3%)					$ 257,092
	Engineering (20%)					$ 1,713,947
	Contingency (30%)					$ 2,570,920
	SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2010 DOLLARS)					**$ 13,111,691**
	ESCALATED SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2012 DOLLARS)					**$ 14,028,180**
	ESCALATED SUBTOTAL FROM WASTEWTAER MASTER PLAN ESTIMATES (APRIL 2016 DOLLARS)					**$ 15,157,890**

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
AECOM WWMP Pilot - Phase 2 Initial Piloting, September 2012	**Secondary Influent Pumping Station and Blower Building**					
	Site Work and Landscaping	1	LS	$ 391,000	$ 391,000	
	Yard Piping	1	LS	$ 231,000	$ 231,000	
	Structure	1	LS	$ 739,000	$ 739,000	
	Process Piping and Appurtenances	1	LS	$ 268,000	$ 268,000	
	Equipment:					
	Influent Pumps	3	EA	$ 80,667	$ 242,000	
	Aeration Tank Blowers	3	EA	$ 343,667	$ 1,031,000	
	Odor Control	1	EA	$ 132,000	$ 132,000	
	HVAC/Plumbing	1	LS	$ 47,000	$ 47,000	
	Instrumentation and Controls	1	LS	$ 127,000	$ 127,000	
	Electrical	1	LS	$ 182,000	$ 182,000	
						$ 3,390,000
	Demolish Filter Building including Main Electrical Facilities					
	Demolition	1	LS	$ 1,392,000	$ 1,392,000	
	Site Work and Landscaping	1	LS	$ 201,000	$ 201,000	
						$ 1,593,000
	Bioreactors					
	Site Work and Landscaping	1	LS	$ 42,000	$ 42,000	
	Structure	1	LS	$ 2,705,000	$ 2,705,000	
	Process Piping and Appurtenances	1	LS	$ 1,219,000	$ 1,219,000	
	Equipment:					
	Deoxygenation Zone Mixing	3	EA	$ 32,333	$ 97,000	
	Internal Recycle Pumps	6	EA	$ 17,167	$ 103,000	
	Fine Bubble Aeration	1	LS	$ 119,000	$ 119,000	
	Instrumentation and Controls	1	LS	$ 92,000	$ 92,000	
	Electrical	1	LS	$ 132,000	$ 132,000	
						$ 4,509,000
	Clarifiers					
	Site Work and Landscaping	1	LS	$ 54,000	$ 54,000	
	Structure	1	LS	$ 1,867,000	$ 1,867,000	
	Process Piping and Appurtenances	1	LS	$ 1,039,000	$ 1,039,000	
	Equipment:					
	Clarifier Mechanisms	3	EA	$ 77,333	$ 232,000	
	Instrumentation and Controls	1	LS	$ 16,000	$ 16,000	
	Electrical	1	LS	$ 23,000	$ 23,000	
						$ 3,231,000
	RAS and WAS Pump Station					
	Site Work and Landscaping	1	LS	$ 137,000	$ 137,000	
	Yard Piping	1	LS	$ 113,000	$ 113,000	
	Structure	1	LS	$ 1,106,000	$ 1,106,000	
	Process Piping and Appurtenances	1	LS	$ 705,000	$ 705,000	
	Equipment:					
	Scum Pumps	3	EA	$ 12,667	$ 38,000	
	HVAC/Plumbing	1	LS	$ 26,000	$ 26,000	
	Instrumentation and Controls	1	LS	$ 62,000	$ 62,000	
	Electrical	1	LS	$ 88,000	$ 88,000	
						$ 2,275,000
	Magnetite Recovery and Feed Building					
	Site Work and Landscaping	1	LS	$ 163,000	$ 163,000	
	Structure	1	LS	$ 1,055,000	$ 1,055,000	
	Process Piping and Appurtenances	1	LS	$ 204,000	$ 204,000	
	Equipment:					
	Magnetite Recovery and Feed Equipment (CWT)	1	EA	$ 3,880,000	$ 3,880,000	
	Recovered ballast make-up tank	1	EA	$ 24,000	$ 24,000	
	WAS Pumps	2	EA	$ 36,500	$ 73,000	
	Polymer System	1	EA	$ 55,000	$ 55,000	
	HVAC/Plumbing	1	LS	$ 40,000	$ 40,000	
	Instrumentation and Controls	1	LS	$ 47,000	$ 47,000	
	Electrical	1	LS	$ 847,000	$ 847,000	
						$ 6,388,000

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
AECOM WWMP Pilot - Phase 2 Initial Piloting, September 2012	**Alkalinity Feed**					
	Site Work and Landscaping	1	LS	$ 8,000	$ 8,000	
	Structure	1	LS	$ 176,000	$ 176,000	
	Process Piping and Appurtenances	1	LS	$ 25,000	$ 25,000	
	Equipment:					
	Hose Pumps	2	EA	$ 15,500	$ 31,000	
	Vertical Tanks	2	EA	$ 15,500	$ 31,000	
	HVAC/Plumbing	1	LS	$ 14,000	$ 14,000	
	Instrumentation and Controls	1	LS	$ 20,000	$ 20,000	
	Electrical	1	LS	$ 26,000	$ 26,000	
						$ 331,000
	Sludge and TWAS Storage Tank					
	Site Work and Landscaping	1	LS	$ 274,000	$ 274,000	
	Structure	1	LS	$ 813,000	$ 813,000	
	Process Piping and Appurtenances	1	LS	$ 119,000	$ 119,000	
	Equipment:				$ -	
	Thickener Feed	2	EA	$ 33,000	$ 66,000	
	Dewatering Feed	2	EA	$ 17,000	$ 34,000	
	Grinder	2	EA	$ 33,000	$ 66,000	
	Odor Control	1	LS	$ 132,000	$ 132,000	
	Mixer	1	EA	$ 18,000	$ 18,000	
	Aeration Blowers	3	EA	$ 38,667	$ 116,000	
	Aeration Diffusers	1	EA	$ 31,000	$ 31,000	
	HVAC/Plumbing	1	LS	$ 116,000	$ 116,000	
	Instrumentation and Controls	1	LS	$ 50,000	$ 50,000	
	Electrical	1	LS	$ 145,000	$ 145,000	
						$ 1,980,000
	TWAS Sump					
	Structure	1	LS	$ 16,000	$ 16,000	
	Process Piping and Appurtenances	1	LS	$ 17,000	$ 17,000	
	Equipment:				$ -	
	Thickened Sludge Transfer Pump	2	EA	$ 29,000	$ 58,000	
	Instrumentation and Controls	1	LS	$ 16,000	$ 16,000	
	Electrical	1	LS	$ 19,000	$ 19,000	
						$ 126,000
	Main Electrical Building and Standby Generator					
	Demolition	1	LS	$ 5,000	$ 5,000	
	Site Work and Landscaping	1	LS	$ 21,000	$ 21,000	
	Electrical Conduit	1	LS	$ 219,000	$ 219,000	
	Structure	1	LS	$ 171,000	$ 171,000	
	Equipment:					
	Electrical (Switchboard, MCB, ATS)	1	EA	$ 190,000	$ 190,000	
	Standby Generator	1	EA	$ 684,000	$ 684,000	
						$ 1,290,000
	SUBTOTAL					**$ 25,113,000**
	Island Construction Premium (3%)					$ 753,390
	Engineering and Contingency (40%)					$ 10,045,200
	SUBTOTAL FROM AECOM (2012 DOLLARS)					**$ 35,911,590**
	ESCALATED SUBTOTAL FROM AECOM (APRIL 2016 DOLLARS)					**$ 38,804,000**

OPINION OF CONSTRUCTION COST	**$ 53,961,890**
OPINION OF PROJECT COST (Rounded)	**$ 54,000,000**

Opinion of Cost - MBBR & DAF
Secondary Treatment with TN of 8 mg/L at Peirce Island Site (6.13 MGD)

PEIRCE ISLAND CAPITAL COST ESTIMATE								
SOURCE	**ITEM**	**QUANTITY**	**UNIT**		**UNIT PRICE**	**AMOUNT**		**Subtotal**
Portions of "Compliance Strategy Cost Estimate Biomag Secondary Treatment" contained in Appendix D of the Final Submission WWMP, November 15, 2010	**Headworks**							
	Structure	2500	SF	$	300	$ 750,000		
	Equipment:							
	Odor Control	1	EA	$	60,000	$ 87,000		
	Bar Screens	2	EA	$	250,000	$ 725,000		
	Screenings Washer & Compactor	2	EA	$	50,000	$ 145,000		
	Grit Pumps	3	EA	$	35,000	$ 152,250		
	Vortex Grit Removal	2	EA	$	75,000	$ 217,500		
	Grit Classifier & Washer	2	EA	$	40,000	$ 116,000		
							$	2,192,750
	Sanitary Disinfection							
	Equipment:							
	Pump System	1	EA	$	100,000	$ 100,000		
	UV Disinfection	1	EA	$	200,000	$ 200,000		
							$	300,000
	Biosolids Processing							
	Structure							
	Rehab Existing Process Building	1	EA	$	350,000	$ 350,000		
	Equipment:							
	Carbon Odor Control	1	EA	$	60,000	$ 87,000		
	Rotary Drum Thickener	2	EA	$	150,000	$ 435,000		
	Dewatering Screw Press	2	EA	$	400,000	$ 1,160,000		
	Conveyors	2	EA	$	50,000	$ 145,000		
							$	2,177,000
	Additional Structures and Modifications							
	Structure							
	PE Splitter - Upstream - Rehab Existing	1	EA	$	500,000	$ 500,000		
	PE Splitter - Downstream	2200	SF	$	300	$ 660,000		
							$	1,160,000
	SUBTOTAL						**$**	**5,829,750**
	Yard Piping (12%)						$	699,570
	Electrical (22%)						$	1,282,545
	Instrumentation and Controls (6%)						$	349,785
	Site Work and Landscaping (7%)						$	408,083
	SUBTOTAL						**$**	**8,569,733**
	Island Construction Premium (3%)						$	257,092
	Engineering (20%)						$	1,713,947
	Contingency (30%)						$	2,570,920
	SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2010 DOLLARS)						**$**	**13,111,691**
	ESCALATED SUBTOTAL FROM WASTEWATER MASTER PLAN ESTIMATES (2012 DOLLARS)						**$**	**14,028,180**
	ESCALATED SUBTOTAL FROM WASTEWTAER MASTER PLAN ESTIMATES (APRIL 2016 DOLLARS)						**$**	**15,157,890**

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
AECOM WWMP Pilot - Phase 2 Initial Piloting, September 2012	**Secondary Pump Station (Fine Screens and Lift Station)**					
	Site Work and Landscaping	1	LS	$ 391,000	$ 391,000	
	Structure	1	LS	$ 774,000	$ 774,000	
	Process Piping and Appurtenances	1	LS	$ 332,000	$ 332,000	
	Equipment:					
	Odor Control	1	EA	$ 132,000	$ 132,000	
	Fine Screens, Washer and Compactor and Container	2	EA	$ 374,500	$ 749,000	
	Secondary Influent Pumps	3	EA	$ 80,667	$ 242,000	
	HVAC/Plumbing	1	LS	$ 26,000	$ 26,000	
	Instrumentation and Controls	1	LS	$ 98,000	$ 98,000	
	Electrical	1	LS	$ 140,000	$ 140,000	
						$ 2,884,000
	Demolish Filter Building including Main Electrical Facilities					
	Demolition	1	LS	$ 1,392,000	$ 1,392,000	
	Site Work and Landscaping	1	LS	$ 201,000	$ 201,000	
						$ 1,593,000
	MBBR Basins					
	Site Work and Landscaping	1	LS	$ 408,000	$ 408,000	
	Structure	1	LS	$ 3,320,000	$ 3,320,000	
	Process Piping and Appurtenances	1	LS	$ 1,216,000	$ 1,216,000	
	Equipment, Elec, Inst. Included with DAF					
						$ 4,944,000
	DAF Settling Tanks					
	Site Work and Landscaping	1	LS	$ 41,000	$ 41,000.00	
	Structure	1	LS	$ 611,000	$ 611,000.00	
	Process Piping and Appurtenances	1	LS	$ 550,000	$ 550,000.00	
	Equipment:					
	MBBR & DAF Vendor (WWW)	1	EA	$ 8,725,000	$ 8,725,000	
	Polymer System	3	EA	$ 47,333	$ 142,000.00	
	Waste Sludge Pumps	2	EA	$ 63,000	$ 126,000.00	
	Odor Control	1	EA	$ 132,000	$ 132,000.00	
	HVAC/Plumbing	1	LS	$ 40,000	$ 40,000	
	Instrumentation and Controls	1	LS	$ 234,000	$ 234,000.00	
	Electrical	1	LS	$ 375,000	$ 375,000.00	
						$ 10,976,000.00
	Blower Building					
	Site Work and Landscaping	1	LS	$ 16,000	$ 16,000	
	Structure	1	LS	$ 425,000	$ 425,000	
	Process Piping and Appurtenances	1	LS	$ 290,000	$ 290,000	
	Equipment:				$ -	
	Blowers	3	EA	$ 343,667	$ 1,031,000	
	HVAC/Plumbing	1	LS	$ 35,000	$ 35,000	
	Instrumentation and Controls	1	LS	$ 95,000	$ 95,000	
	Electrical	1	LS	$ 136,000	$ 136,000	
						$ 2,028,000
	Sludge and TWAS Storage Tank					
	Site Work and Landscaping	1	LS	$ 274,000	$ 274,000	
	Structure	1	LS	$ 813,000	$ 813,000	
	Process Piping and Appurtenances	1	LS	$ 119,000	$ 119,000	
	Equipment:				$ -	
	Thickener Feed	2	EA	$ 33,000	$ 66,000	
	Dewatering Feed	2	EA	$ 17,000	$ 34,000	
	Grinders	2	EA	$ 33,000	$ 66,000	
	Odor Control	1	LS	$ 132,000	$ 132,000	
	Mixer	1	EA	$ 18,000	$ 18,000	
	Aeration Blowers	3	EA	$ 38,667	$ 116,000	
	Aeration Diffusers	1	EA	$ 31,000	$ 31,000	
	HVAC/Plumbing	1	LS	$ 116,000	$ 116,000	
	Instrumentation and Controls	1	LS	$ 50,000	$ 50,000	
	Electrical	1	LS	$ 145,000	$ 145,000	
						$ 1,980,000

PEIRCE ISLAND CAPITAL COST ESTIMATE

SOURCE	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT	Subtotal
AECOM WWMP Pilot - Phase 2 Initial Piloting, September 2012	**TWAS Sump**					
	Structure	1	LS	$ 16,000	$ 16,000	
	Process Piping and Appurtenances	1	LS	$ 17,000	$ 17,000	
	Equipment:				$ -	
	Thickened Sludge Transfer Pump	2	EA	$ 29,000	$ 58,000	
	Instrumentation and Controls	1	LS	$ 16,000	$ 16,000	
	Electrical	1	LS	$ 19,000	$ 19,000	
						$ 126,000
	Alkalinity Feed					
	Site Work and Landscaping	1	LS	$ 8,000	$ 8,000	
	Structure	1	LS	$ 176,000	$ 176,000	
	Process Piping and Appurtenances	1	LS	$ 25,000	$ 25,000	
	Equipment:					
	Hose Pumps	2	EA	$ 15,500	$ 31,000	
	Vertical Tanks	2	EA	$ 15,500	$ 31,000	
	HVAC/Plumbing	1	LS	$ 14,000	$ 14,000	
	Instrumentation and Controls	1	LS	$ 20,000	$ 20,000	
	Electrical	1	LS	$ 26,000	$ 26,000	
						$ 331,000
	Supplemental Carbon Addition					
	Site Work and Landscaping	1	LS	$ 11,000	$ 11,000	
	Structure	1	LS	$ 90,000	$ 90,000	
	Process Piping and Appurtenances	1	LS	$ 71,000	$ 71,000	
	Equipment:					
	Storage Tanks	2	EA	$ 54,500	$ 109,000	
	Metering Pumps	3	EA	$ 13,000	$ 39,000	
	Instrumentation and Controls	1	LS	$ 41,000	$ 41,000	
	Electrical	1	LS	$ 57,000	$ 57,000	
						$ 418,000
	Main Electrical Building and Standby Generator					
	Demolition	1	LS	$ 5,000	$ 5,000	
	Site Work and Landscaping	1	LS	$ 21,000	$ 21,000	
	Electrical Conduit	1	LS	$ 219,000	$ 219,000	
	Structure	1	LS	$ 171,000	$ 171,000	
	Equipment:					
	Electrical (Switchboard, MCB, ATS)	1	EA	$ 190,000	$ 190,000	
	Standby Generator	1	EA	$ 684,000	$ 684,000	
						$ 1,290,000
	SUBTOTAL					**$ 26,570,000**
	Island Construction Premium (3%)					$ 797,100
	Engineering and Contingency (40%)					$ 10,628,000
	SUBTOTAL FROM AECOM (2012 DOLLARS)					**$ 37,995,100**
	ESCALATED SUBTOTAL FROM AECOM (APRIL 2016 DOLLARS)					**$ 41,055,000**
	OPINION OF CONSTRUCTION COST					**$ 56,212,890**
	OPINION OF PROJECT COST (Rounded)					**$ 56,500,000**

ATTACHMENT H

BLANK OPERATOR EVALUATION QUESTIONNAIRE

Evaluation of Prospective Treatment Processes Under Consideration for Peirce Island WWTF

Operator Name: ________________________________ Date: ______________

Process Configuration at Time of Evaluation (check boxes):

Process	Configuration	
	TN<8	TN<3
BioMag/Clarifier		
MBBR/DAF		
BAF#1+#2		

Evaluate each process based on your observations and experience.

1. Sampling and analysis requirements - Rank the relative number of sites needed to evaluate the process, the frequency of the sampling, and the difficulty of the analysis procedure.

Rating
- 5 - Highly Advantageous: Few Tests, fairly simple measurements with immediate results
- 4 - Advantageous:
- 3 - Neutral, Not Advantageous:
- 2 - Not Advantageous
- 1 - Not Desirable: Many tests, multiple sites, complex analyses without immediate results

You may use the following table to assist you in ranking each process

Process	Number of sites and Samples	Types of Tests	Complexity of Tests	Time between Sample and Result	Overall Ranking
BioMag/Clarifier					
MBBR/DAF					
BAF#1+#2					

Please provide any additional comments:

2. Number and complexity of sub-systems – Rank the relative complexity of the treatment process as a whole, perhaps by identifying the number of sub-systems, and the complexity of each sub-system.

Rating 5 - Highly Advantageous: 0 - 1 fairly simple additional sub-systems to operate and maintain
4 - Advantageous:
3 - Neutral, Not Advantageous:
2 - Not Advantageous:
1 - Not Desirable: 5 or more fairly complex additional sub-systems to operate and maintain

You may use the following table to assist you in ranking each process

Process	Number of additional systems	Complexity of systems	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

3. Access for troubleshooting process – Rank the process for difficulty that you would have in troubleshooting operational or performance issues with the system.

Rating

- 5 - Highly Advantageous: Major process components are easily accessible and problems with the components are easily identified.
- 4 - Advantageous: Major process components can be accessed, and problems can be identified with proper training
- 3 - Neutral, Not Advantageous: Most major process components can be accessed, and problems can be identified by other treatment plant staff
- 2 - Not Advantageous: Some major process components cannot be accessed, or problem identification requires special help from consultants or Vendor
- 1 - Not Desirable: There is no access to the treatment system or major process components, and no method to evaluate problems.

You may use the following table to assist you in ranking each process

Process	Potential areas to access process	Ease of identifying process issues	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

4. Appearance and cleanliness – Rank the appearance and cleanliness of the process

Rating

- 5 - Highly Advantageous: The process is neat and clean, all wastewater tanks are enclosed, and there are no requirements for monthly cleaning.
- 4 - Advantageous: The process is neat and clean, some wastewater tanks are enclosed, and there are few requirements for monthly cleaning.
- 3 - Neutral, Not Advantageous: The process is somewhat neat and clean, few wastewater tanks are enclosed, and there are few requirements for weekly cleaning.
- 2 - Not Advantageous: The process is not neat and clean, few wastewater tanks are enclosed, and there are few requirements for weekly cleaning
- 1 - Not Desirable: The process is not neat and clean, none of the wastewater tanks are enclosed, and there are requirements for weekly cleaning

You may use the following table to assist you in ranking each process

Process	Potential areas to clean	Likely Frequency of Cleaning	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

5. Maintenance requirements - Rank the relative maintenance requirements of the system as a whole, perhaps by identifying the number of component systems, and the maintenance requirements of each system.

Rating 5 - Highly Advantageous: There are no component systems requiring maintenance
4 - Advantageous: There are few component systems requiring simple maintenance
3 - Neutral, Not Advantageous: Some of the component systems require maintenance
2 - Not Advantageous: Many of the components require maintenance
1 - Not Desirable: Many of the components require extensive maintenance

You may use the following table to assist you in ranking each process

Process	Number of additional systems	Maintenance Requirements	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

6. Ability to automate system – Rank each system on the degree of automatic or manual operation required.

Rating

- 5 - Highly Advantageous: All of the components are or can be extensively automated
- 4 - Advantageous: Many of the components are automated
- 3 - Neutral, Not Advantageous: Some of the component systems are automated
- 2 - Not Advantageous: There are few systems that are automated
- 1 - Not Desirable: All systems are to be manually operated, with no option for automatic operation.

You may use the following table to assist you in ranking each process

Process	Number of additional systems	Possible automation Requirements	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

7. Requirement for online analyzers – Rank each process for the number and type of online analyzers required (Note some functions now being carried-out on a manual basis may increase the number of analyzers in a full-scale operation)

Rating

- 5 - Highly Advantageous: The process requires no online analyzers.
- 4 - Advantageous: The process requires few online analyzers which are simple to calibrate and clean
- 3 - Neutral, Not Advantageous: The process requires few online analyzers which are difficult to access, or require calibration regularly
- 2 - Not Advantageous: The process requires many online analyzers which are difficult to keep in calibration
- 1 - Not Desirable: The process requires many online analyzers which are difficult to keep in calibration, and are used for automation of one or more key processes

You may use the following table to assist you in ranking each process

Process	Potential number and type of analyzers	Difficulty to calibrate and maintain	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

8. Health and Safety Issues – Rank each process for the health and safety issues

Rating

- 5 - Highly Advantageous: The process has few hazards
- 4 - Advantageous:
- 3 - Neutral, Not Advantageous:
- 2 - Not Advantageous:
- 1 - Not Desirable: The process has many hazards

You may use the following table to assist you in ranking each process

Process	Potential areas of hazard	Nature of hazard	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

9. Requirement for proprietary or special order equipment, materials or chemicals – Rank each process for the need for proprietary or special order equipment, materials or chemicals

Rating

- 5 - Highly Advantageous: The process has no requirements for proprietary or special order equipment, special materials or chemicals, or the equipment, materials or chemicals are readily available
- 4 - Advantageous:
- 3 - Neutral, Not Advantageous:
- 2 - Not Advantageous:
- 1 - Not Desirable: A key component of the process is proprietary or not readily available from a local source.

You may use the following table to assist you in ranking each process

Process	Chemicals or materials required	Source, location and availability	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

10. Anticipated level (both man-hours and training) of labor for operation - Rank each system on the anticipated number of hours for training and operation.

Rating

- 5 - Highly Advantageous: Proposed treatment system will require minimal operator training and will require the least amount of operator attention.
- 4 - Advantageous:
- 3 - Neutral, Not Advantageous:
- 2 - Not Advantageous:
- 1 - Not Desirable: Proposed treatment system will require significant operator training and will require the greatest amount of operator attention

You may use the following table to assist you in ranking each process

Process	Anticipated Operator Training Needs	Anticipated Operator Attention Required	Overall Ranking
BioMag/Clarifier			
MBBR/DAF			
BAF#1+#2			

Please provide any additional comments:

ATTACHMENT I

EPA JULY 31, 2012 LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

July 31, 2012

Mr. John P. Bohenko, City Manager
Office of City Manager
Portsmouth City Hall
1 Junkins Avenue
Portsmouth, New Hampshire 03801

Dear Mr. Bohenko:

I am writing this letter to update you on the EPA's progress in drafting the National Pollutant Discharge Elimination System (NPDES) permit for Portsmouth's Peirce Island treatment plant and to specifically inform you of our current thinking regarding the limit on total nitrogen.

Regarding overall progress on the draft permit, members of my staff made a site visit to the wastewater treatment plant on May 17th to tour the wastewater treatment plant and the pilot plants, and to gather information necessary to complete the draft permit. Following the visit the City provided additional information in a timely manner. Drafting of the permit and fact sheet has proceeded relatively quickly and we expect to have a working draft completed within the next month, and we hope to public notice the draft permit by the end of the summer.

As you are aware, we currently expect that the draft permit will include a monthly average total nitrogen limit of 8 mg/l. It is our understanding from you that a limit of 8 mg/l is within the expected capability of the technologies being evaluated to provide secondary treatment at Peirce Island.

I trust you will share this information with relevant city officials. If you have any questions, please contact Carl DeLoi of our Wetlands and Information Branch at (617) 918-1581 or have the City's technical staff call Brian Pitt, Chief of our Municipal Permits Section at (617) 918-1875.

Sincerely yours,

H. Curtis Spalding
Regional Administrator

cc: Mayor Eric Spear
Thomas Burack, NHDES Commissioner

City of Portsmouth

Wastewater Master Plan