Portsmouth WWMP - Phase 2 Initial Piloting
April 1, 2013

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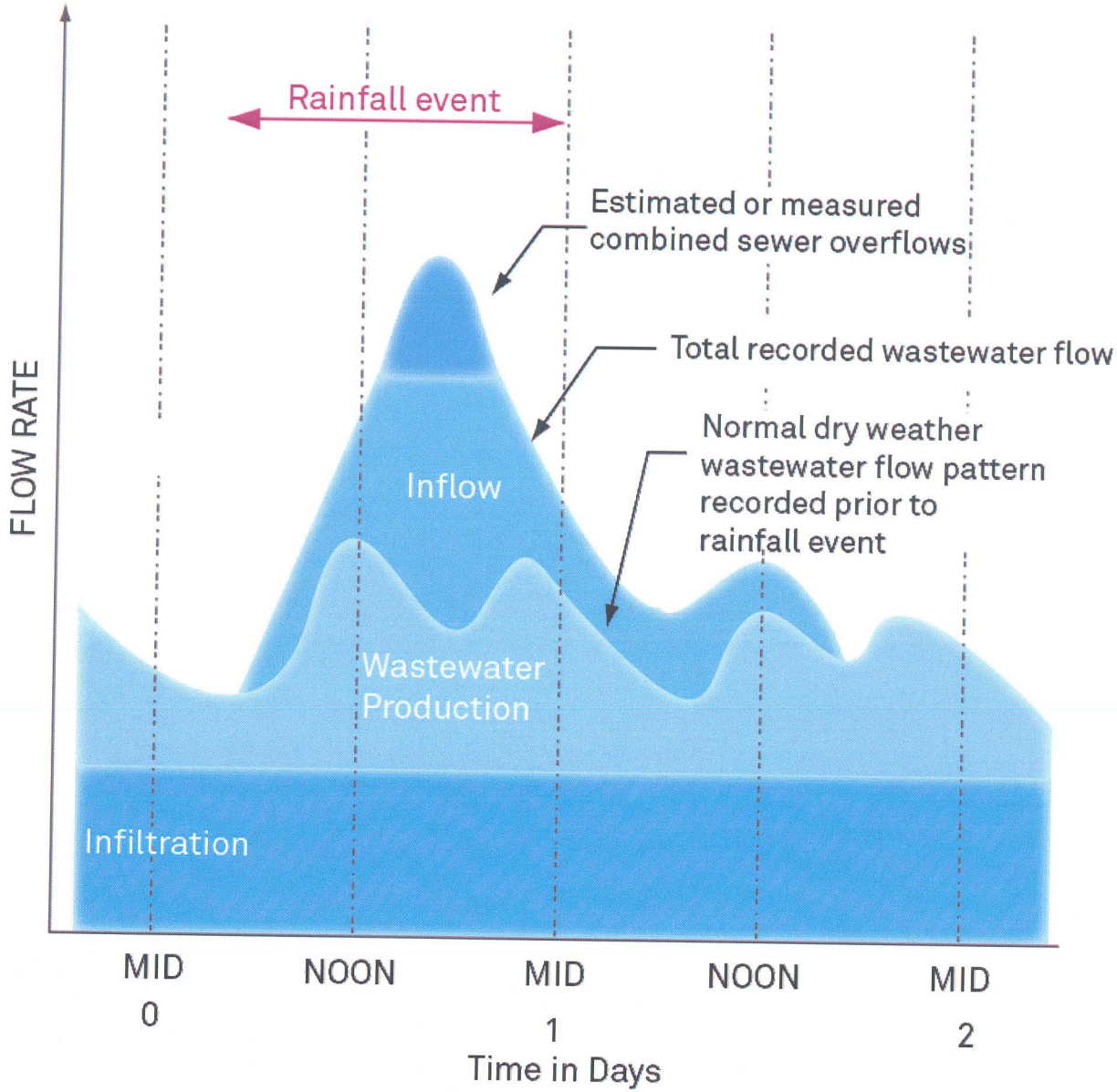
City of Portsmouth Wastewater Division

Wastewater Master Plan – Phase 2 Initial Piloting

Piloting, Permit & Consent Decree Discussion

April 1, 2013

Dry Day Definition



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Flow Data Set Parsing

- Reviewed 2008, 2009, 2010 Influent Flow, Precipitation, and Temperature Data
- Identified Selected Storm Events with Varying Total Precipitation and Duration
- Reviewed Continuous Flow Data for Selected Storm Events to Determine System Response Time for Flow to Recede to Pre-Storm Event flow Rate
- Precipitation Event Defined as Continuous or Intermittent Precipitation Not Separated by More Than 6 Hours

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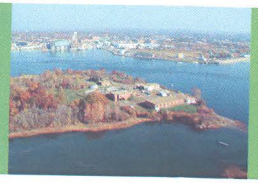
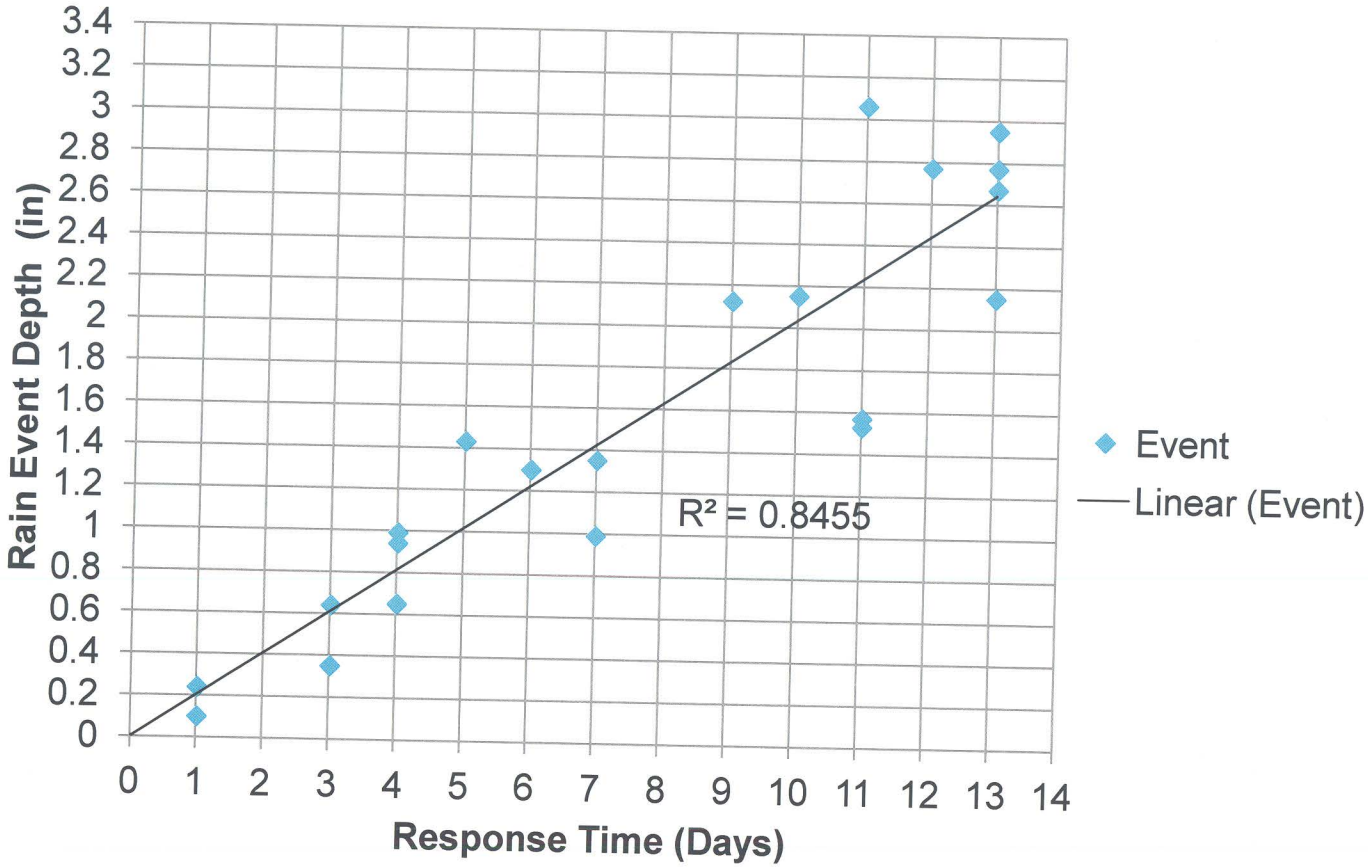
Flow Data Set Parsing



System Response To Precipitation



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Flow Data Set Parsing

Wet Day Definitions

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

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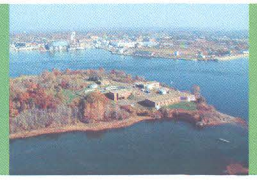
Flow Data Set Parsing



- Apply Wet Day Definitions to WWTF Flow Data for January 1, 2008-June 30, 2012
- Parse Data into Wet and Dry Days
- Identify Highest Dry Day Flow in Dry Day Data Set = Maximum Daily Flow for Secondary Treatment (7.73 mgd)
- Compute Average Daily Flow using Dry Day Flows and Wet Day Flows Truncated at 7.73 mgd
- Compute Maximum Month Flow as 30 day Rolling Average of Average Daily Flow Data Set

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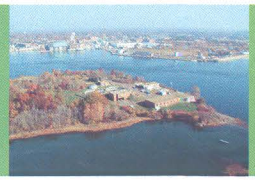
Existing Condition Flow Rates



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

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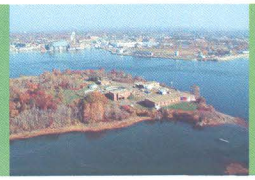
Future Condition Flow Rates



- Added Allowance for Future Growth in the Next 20 Years to Existing Condition Flow Rates to Establish Future 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 1.33 9.06	1.48	1.33	**9.06**

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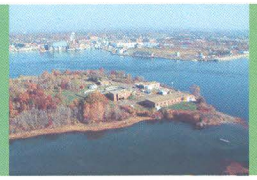
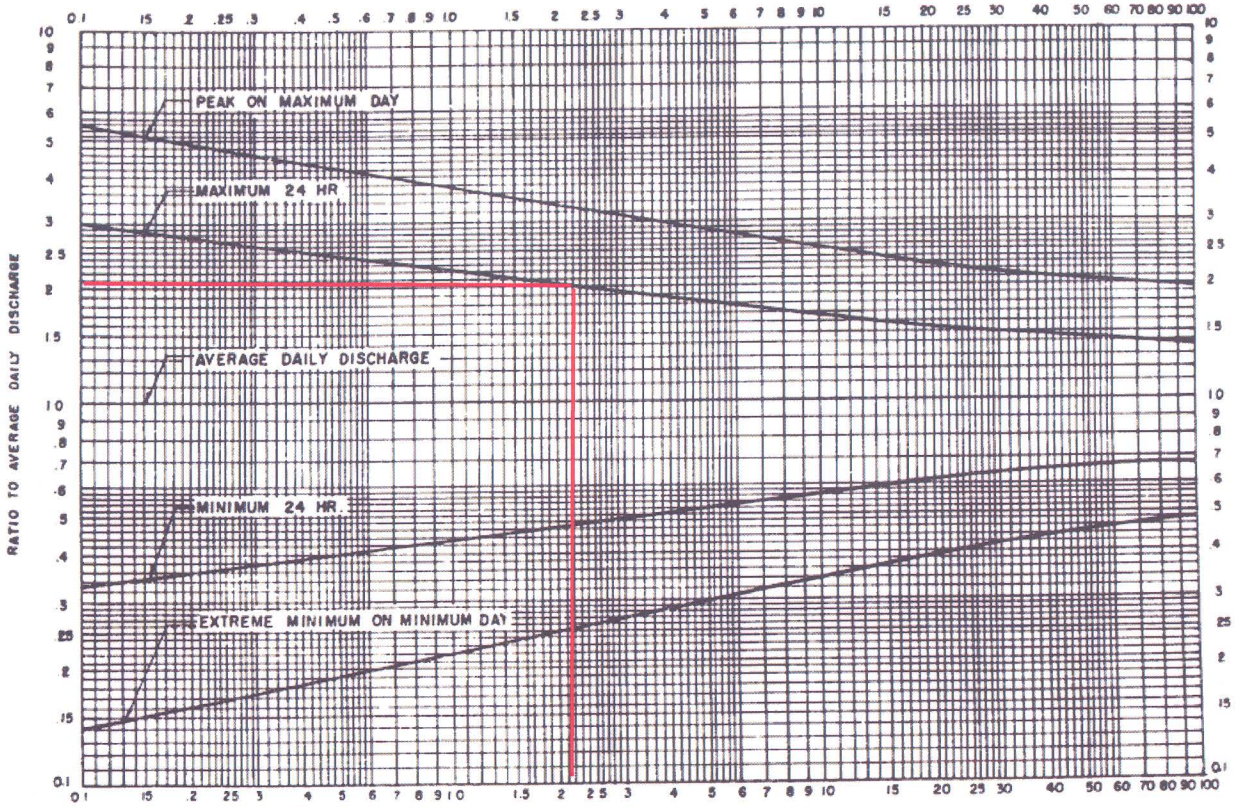
Future Condition Flow Rates



- Check 1 – TR-16 Method
  - Current Average Dry Weather Sanitary Flow: 2.16 mgd
  - Current Max Day Sanitary Flow: 4.32 mgd



RELATION OF EXTREME DISCHARGES ON MAXIMUM AND MINIMUM DAYS TO THE AVERAGE DAILY DISCHARGE OF DOMESTIC SEWAGE
(FROM MOP9 "SEWER DESIGN & CONSTRUCTION") ASCE & WPCF

Max Day Peaking Factor: 2.0

Source: TR-16, 2011

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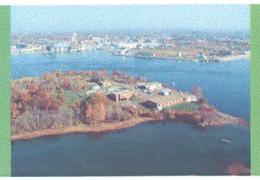
Future Condition Flow Rates



- Check 1 - TR-16 Method (cont'd)
  - Future Flow Allowance: 0.9 mgd
    - Assume 70% Sanitary
      - Future Sanitary Flow: 0.63 mgd
      - Future I/I: 0.27 mgd
  - Future Max Day Sanitary Flow: 1.26 mgd
  - I/I Allowance
    - 1,200 in-mile of pipe in collection system
    - I/I allowance: 500 gpd/in-mile
    - I/I: 0.6 mgd
  - Projected Max Day Flow: 4.32 + 1.26 + 0.27 + 0.6 = 6.45 mgd

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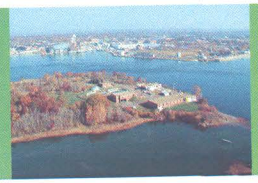
Future Condition Flow Rates



- Check 2 - Use Actual I/I
  - Current Max Day Sanitary Flow: 4.32 mgd
  - Future Max Day Sanitary Flow: 1.26 mgd
  - Actual I/I: 2.28 mgd (source: DMRs and Water Billing)
  - Future I/I: 0.27 mgd

  - Projected Max Day Flow: 4.32 + 1.26 + 2.28 + 0.27 = 8.13 mgd

5.7 total ae long term
2.28 sewage
3.5 I/I (due to CSOs ~~[illegible]~~ runoff, included

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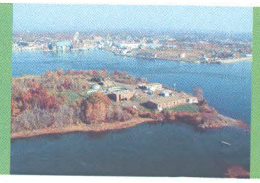
Future Condition Volumetric Analysis



Annual Flow Volumes with Max. Day Flow to Secondary of 9.06 MGD

Year	City Hall Annual Precipitation (inches)	Days with 0.05" or more of precipitation	Annual Flow Volume (MG)	Days with flow greater than 9.06 mgd	Sum of flow greater than 9.06 mgd (MG)	Bypass Volume Percentage
2008	66.6	122	2,187	41	120	5.5%
2009	48.54	100	2,204	38	93	4.2%
2010	49.49	79	1,938	35	172	8.9%
2011	51.68	99	2,071	32	85	4.1%
2012	40.39	93	1,671	11	32	1.9%
Total	**256.7**	**493**	**10,072**	**157**	**501**	**5.0%**

2013 - limited data, promising trend

entire year?

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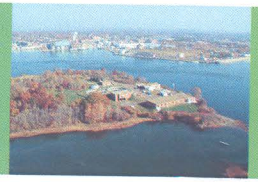
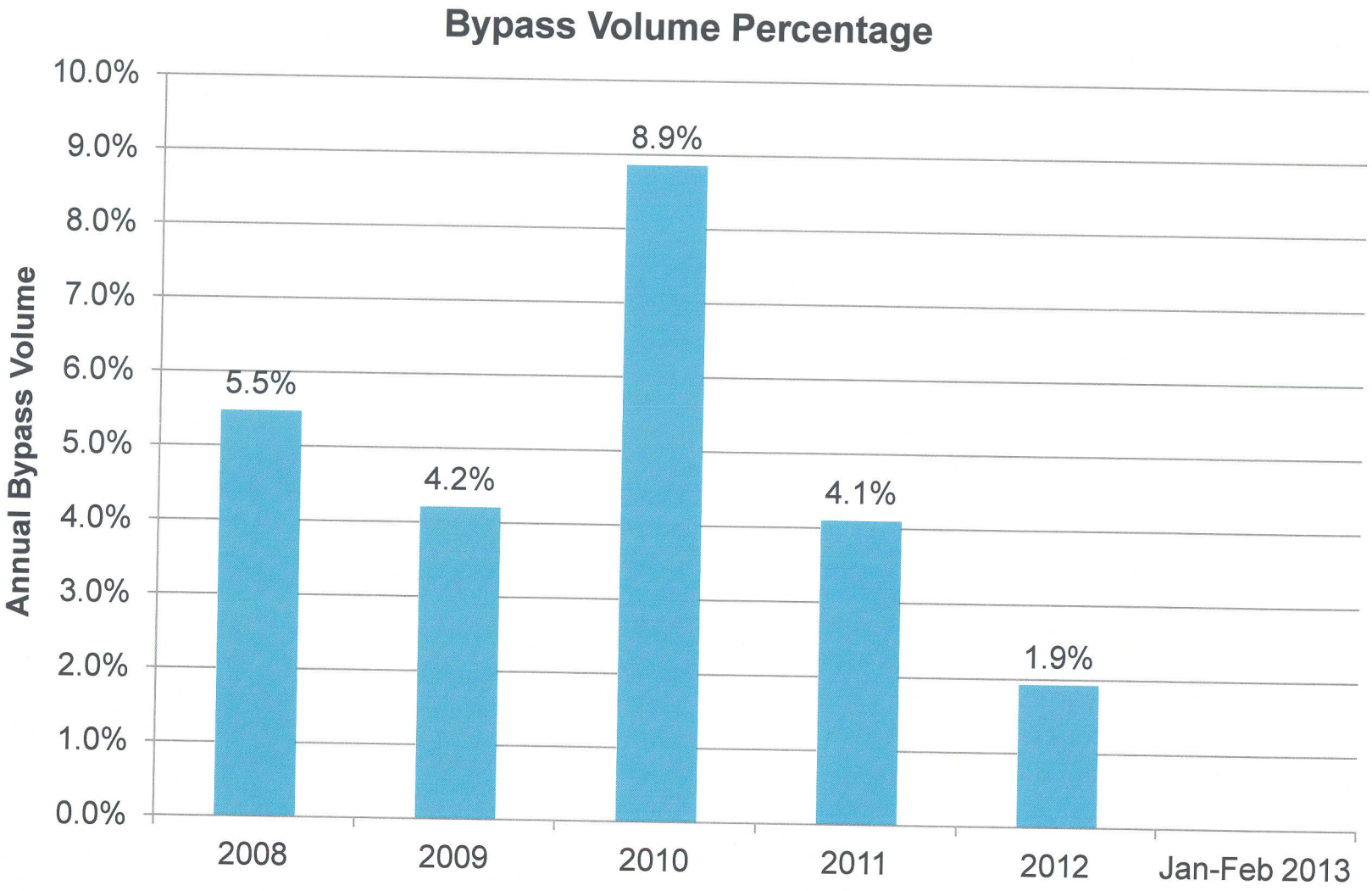
Future Condition Volumetric Analysis





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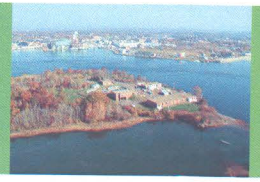
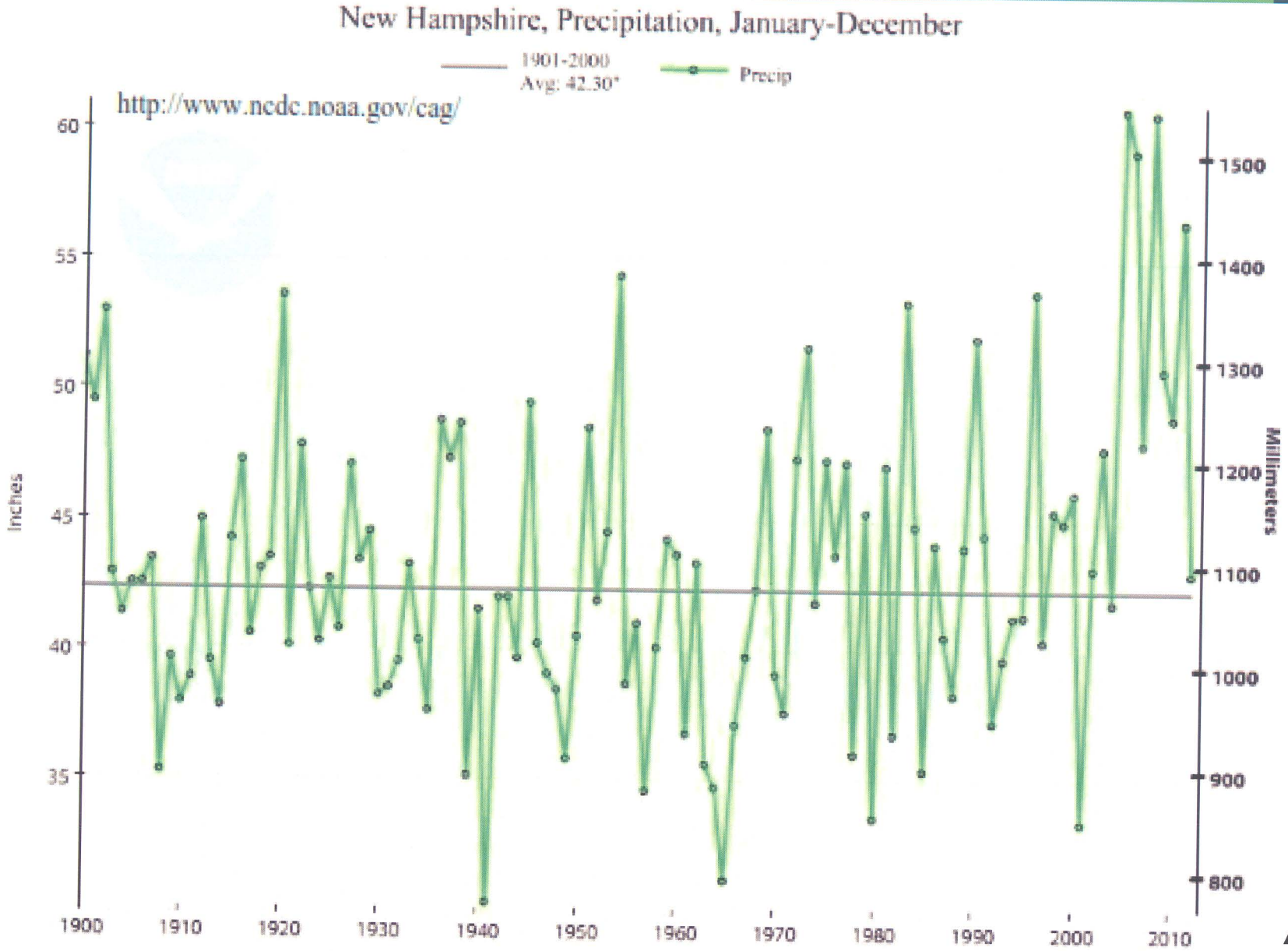
Annual Precipitation





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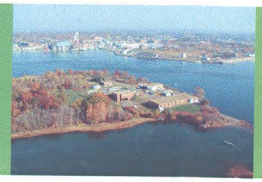
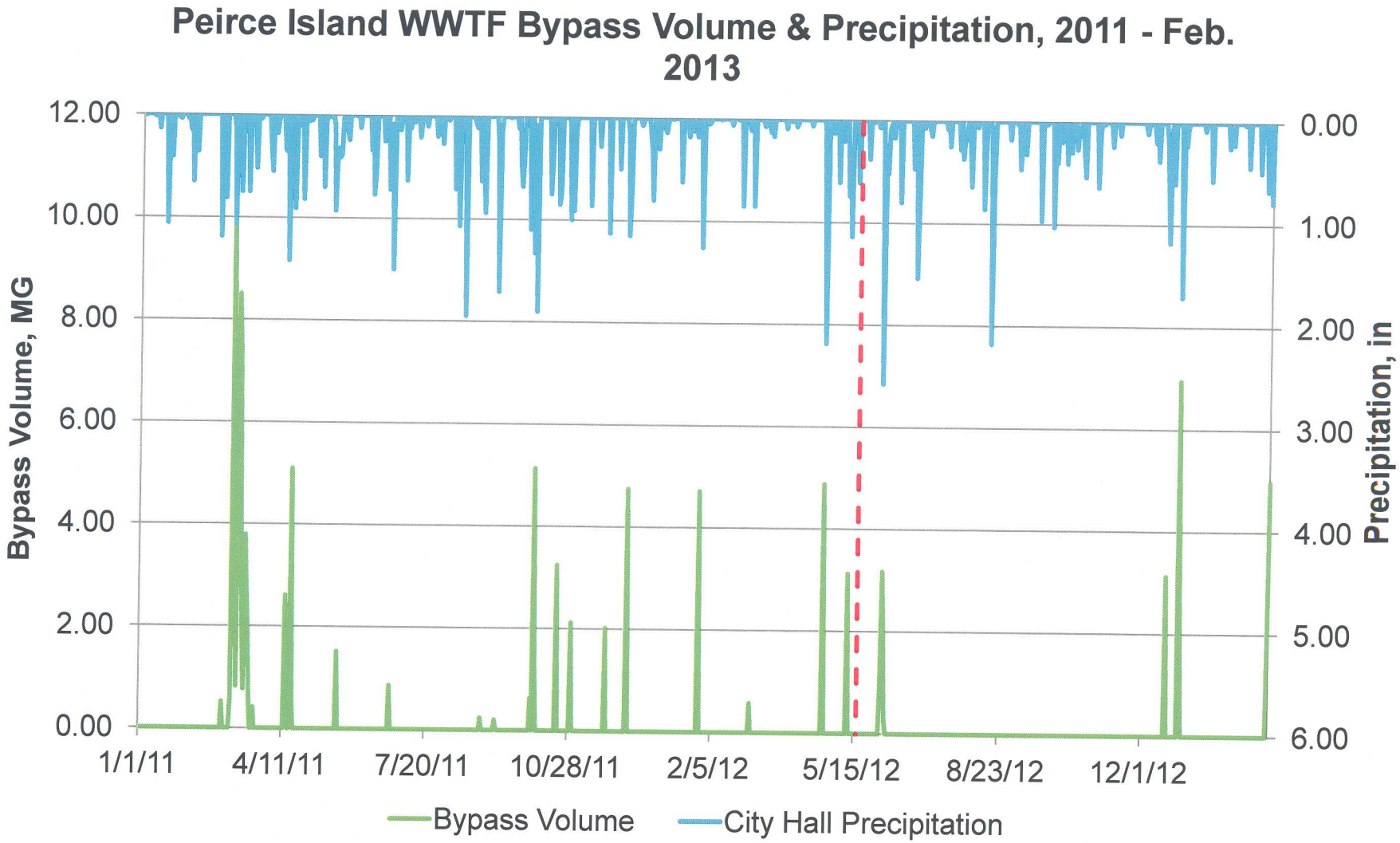
Future Condition Volumetric Analysis





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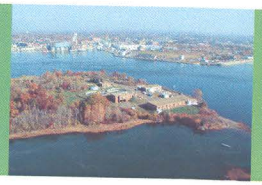
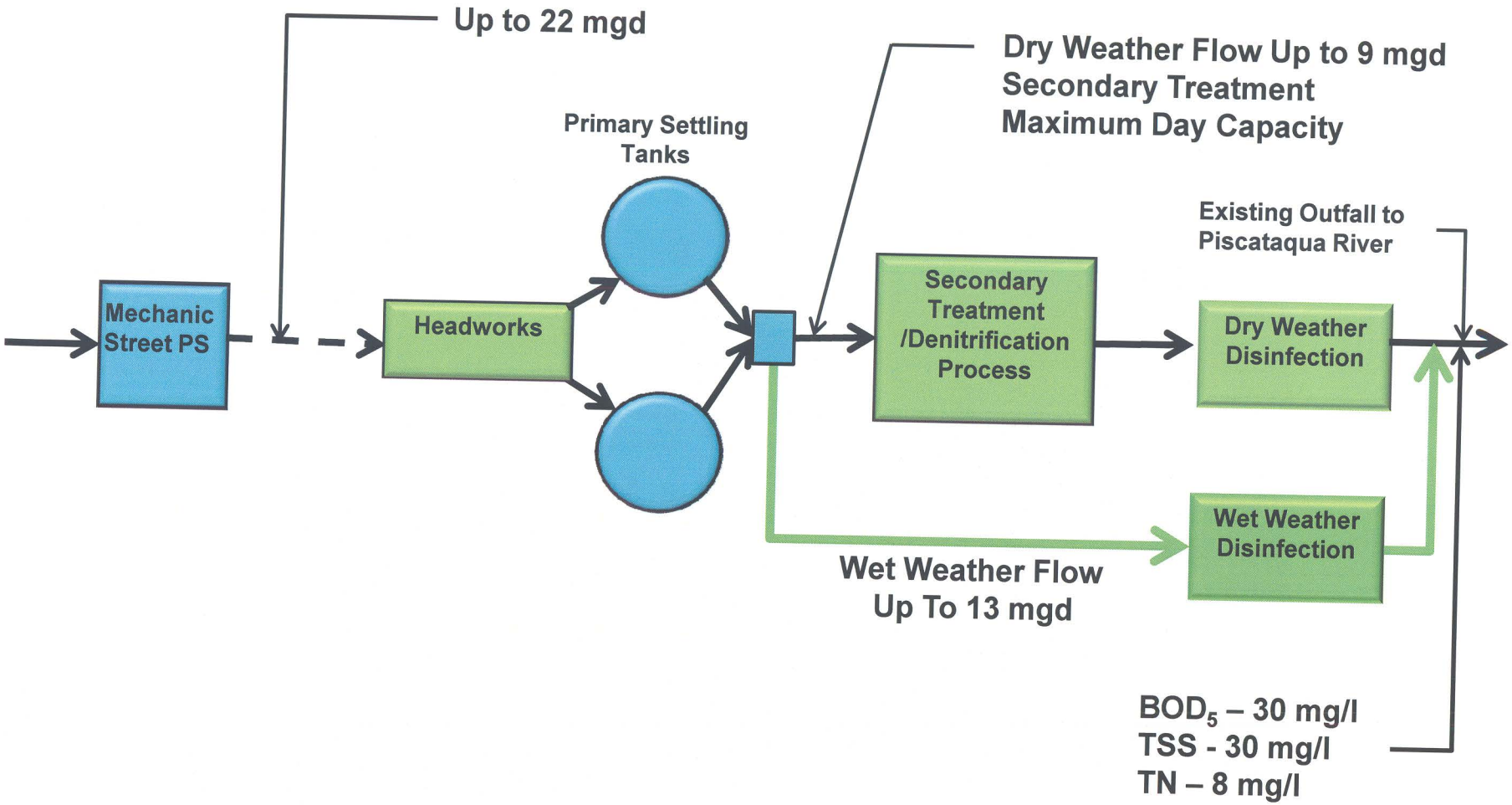
Revised Flows and Loads



Upgrade Concept



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