

Sanitary vs. Stormwater Evaluations in the Brandon CSO Basin A Pilot Study

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Brandon Combined Sewer Basin Study Area



Why Do This Study?

Improve understanding of the relative contributions to the combined sewer system to help target future source control actions

- Wastewater
- Stormwater
- Groundwater

Study Questions

- What are the chemical loadings to the CSO basin during storm flow conditions?
- What are the chemical loadings to the CSO basin during wet season and dry season base flow conditions?
- What are the chemical loadings to the CSO basin from stormwater inflow?
- What are the chemical loadings to the CSO basin from infiltration?

Study Questions/Study Design

- What are the chemical loadings to the CSO basin during storm flow conditions?
Targeted 15 flow-weight composite storm samples at 3 locations
- What are the chemical loadings to the CSO basin during wet season and dry season base flow conditions?
Targeted 6 flow-weight composite samples each for wet and dry baseflow at 3 locations
- What are the chemical loadings to the CSO basin from stormwater inflow?
Subtract baseflow results from storm flow results
- What are the chemical loadings to the CSO basin from infiltration?
Subtract dry baseflow results from wet baseflow results

Target Analytes

- Conventional Parameters

TSS, dissolved and total organic carbon,

- Metals

Including: arsenic, copper, cadmium, lead, mercury, silver, zinc

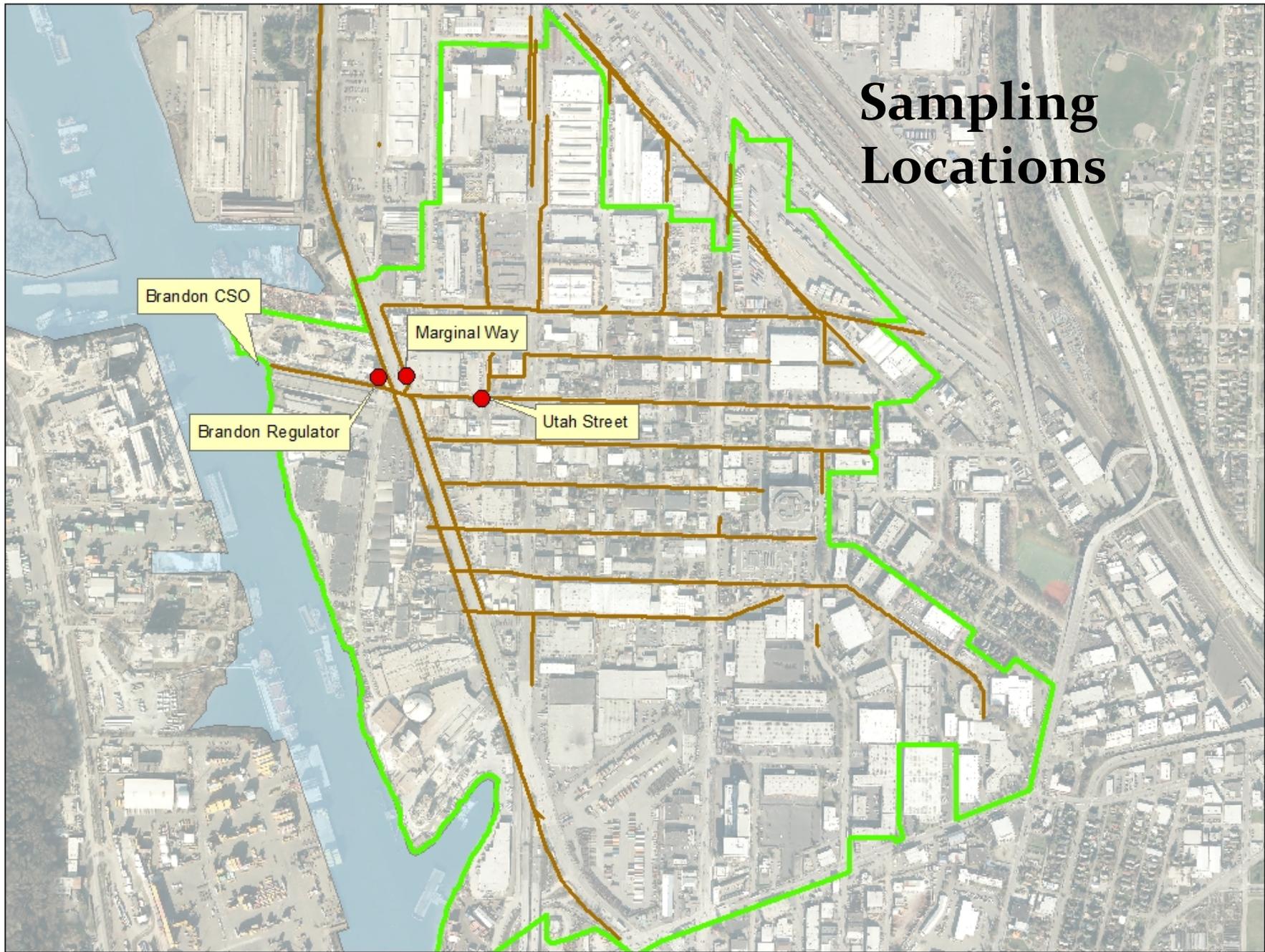
- Organics

PAHs and phthalates

- PCB Congeners and Dioxin/Furans Congeners

Tested on a subset of samples

Sampling Locations



Sampling Methods

- Flow-meters
- ISCO[®] auto-samplers installed inside manhole
- Flow-weighted composites
 - Baseflow: 24 hr sampling period
 - Storm: up to 24 hr sampling period

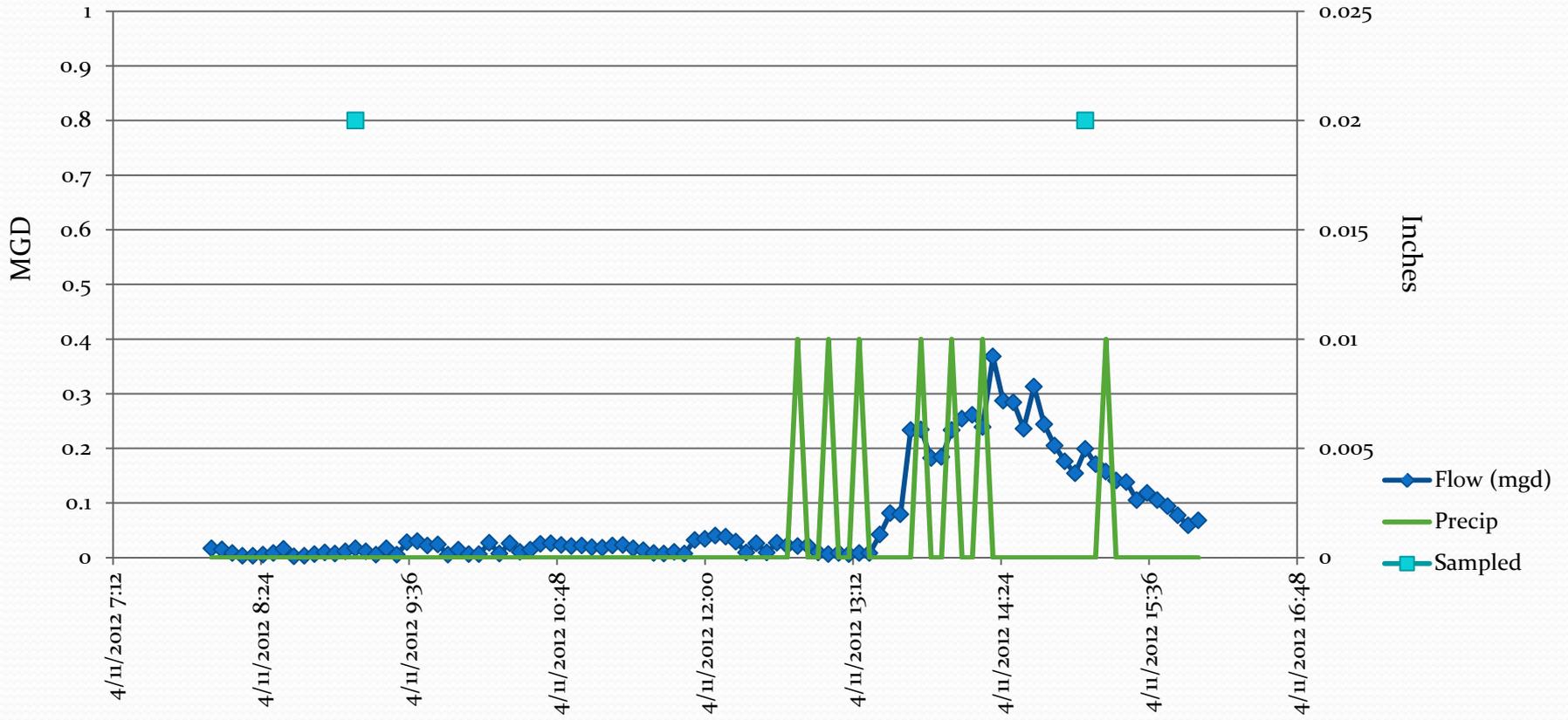
Sample Collected

- 11 Storm Samples From E. Marginal
- 14 Storm Samples From Utah St.
- 15 Storm Samples From the Brandon Regulator Site

- 6 Dry Baseflow Samples from Each Location
- 7 Wet Baseflow Samples from E. Marginal and Utah.
- 6 Wet Baseflow Samples from the Brandon Regulator Site

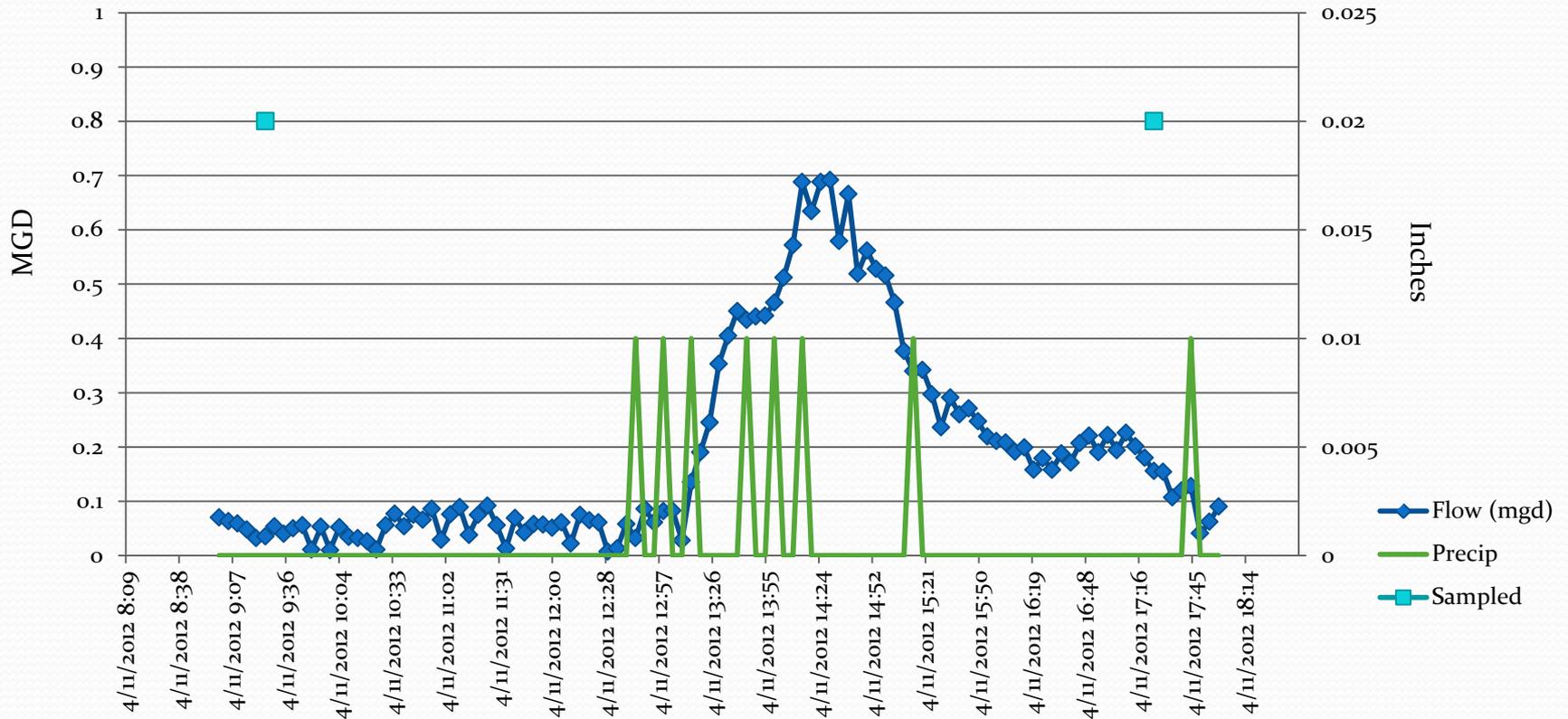
Flow Results

Utah 4_11_2012



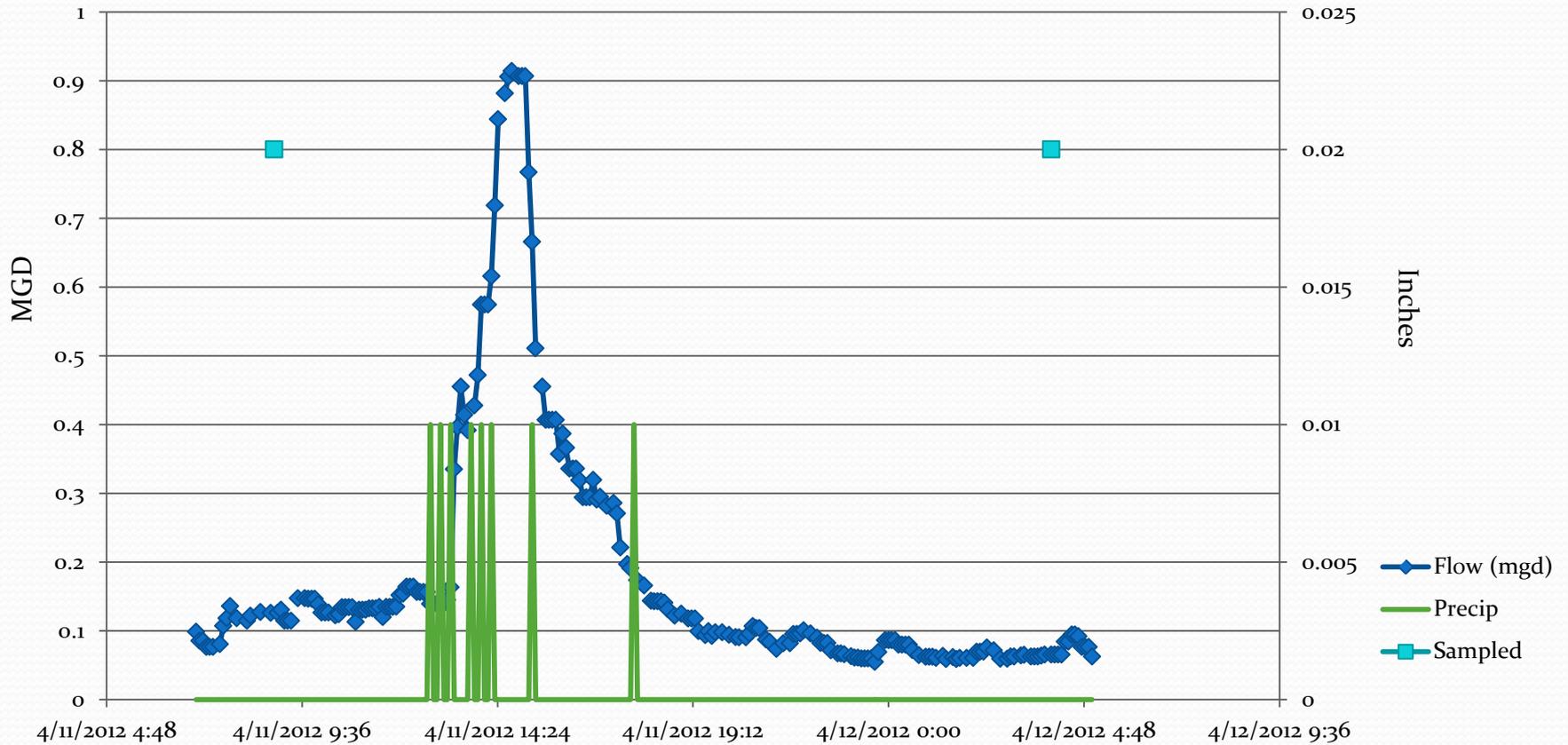
Flow Results

E. Marginal 4_11_2012



Flow Results

Brandon Regulator Site 4_11_2012



Flow Volume Evaluations

- Comparison of Wet vs. Dry Baseflow (t-test)
- Brandon Regulator Station (flow meter equipment failure during dry baseflow)
- E. Marginal. Means: .047 vs .048. not significant ($p=.87$)
- Utah. Means: .010 vs .007 significant at 90% ci ($p=.051$)

This Suggests that Infiltration is Important in the Utah Street Sub-Basin

Preliminary Concentration Comparisons

- TSS
 - Pooled Baseflow (wet and dry) 416 mg/L Compared to Pooled Stormflow 334 mg/L. Not significantly different ($p=0.21$)
 - However E. Marginal Baseflow (658 mg/L) was significantly higher than both Utah (285 mg/L) and the Brandon Regulator Station (296 mg/L) ($p=0.01$)

This Suggests a Significant Contribution of TSS to the Combined System During a Non-Storm Event

- Metals
 - No Significant Differences Between Stormflow and Baseflow for Copper, Mercury, or Zinc

Loading Analysis Methods

- Concentration \times volume of event = mass during sampling event
- Event durations varied from 25.75 to 1.25 hours
- Mass per event was normalized to mass per hour by dividing by sampling event duration
- If possible, develop estimate of annual load based on number of days of dry base, wet base, and storm conditions
 - Limited samples and collected over only 9 month period

Loading Analysis Methods

- What are the chemical loadings to the CSO basin during wet season and dry season base flow conditions?
 - Dry season baseflow mass per hour
 - Wet season baseflow mass per hour
- What are the chemical loadings to the CSO basin from infiltration?
 - Wet season baseflow mass per hour minus dry season baseflow mass per hour = mass per hour due to infiltration
- What are the chemical loadings to the CSO basin from stormwater inflow?
 - Wet season mass per hour minus storm event mass per hour = mass per hour due to stormwater

Schedule

- Loading Calculations: October-November
- Data Analysis: October - December
- Draft Data Report: targeted for 1st quarter 2014

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