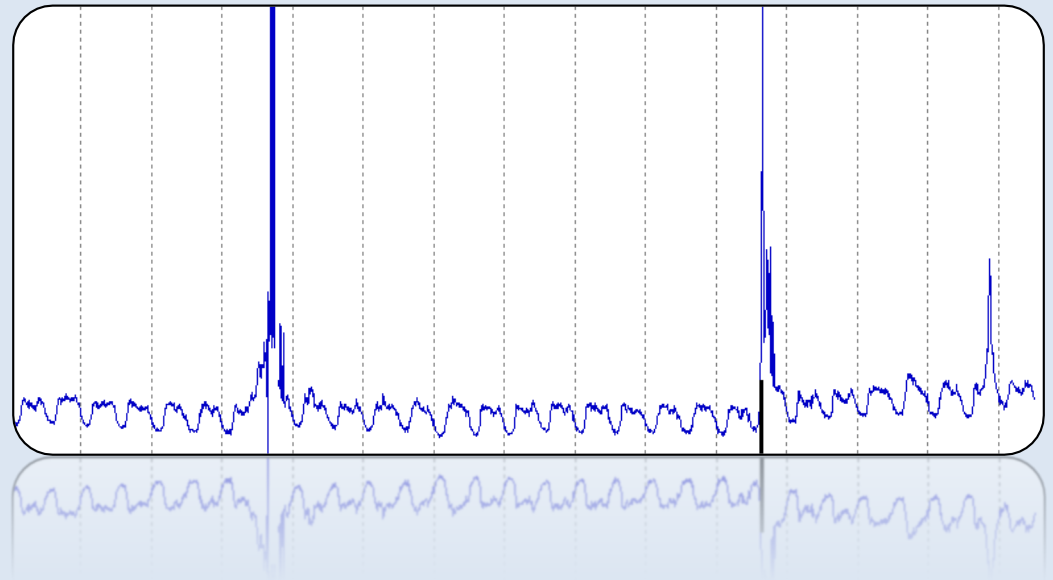


Narragansett Bay Commission CSO Flow Monitoring and Real-Time Web-Based Notification

Russell McGinnis, E.I.T.
Environmental Engineer



NEWEA Webinar:
Diving into Public
Notifications Part II



Presentation Overview

- Introduction
- Collection System Overview
- CSO Abatement Program
- NBC Collection System Overview
- NBC RIPDES Permit
- CSO Flow Monitoring Program
- RIPDES System-Wide Flow Monitoring Improvement Project
- Building a Web-Based Notification System



*Moshassuck River
Interceptor Construction
circa 1897*

NBC Collection System Overview

■ NBC Facilities Overview:

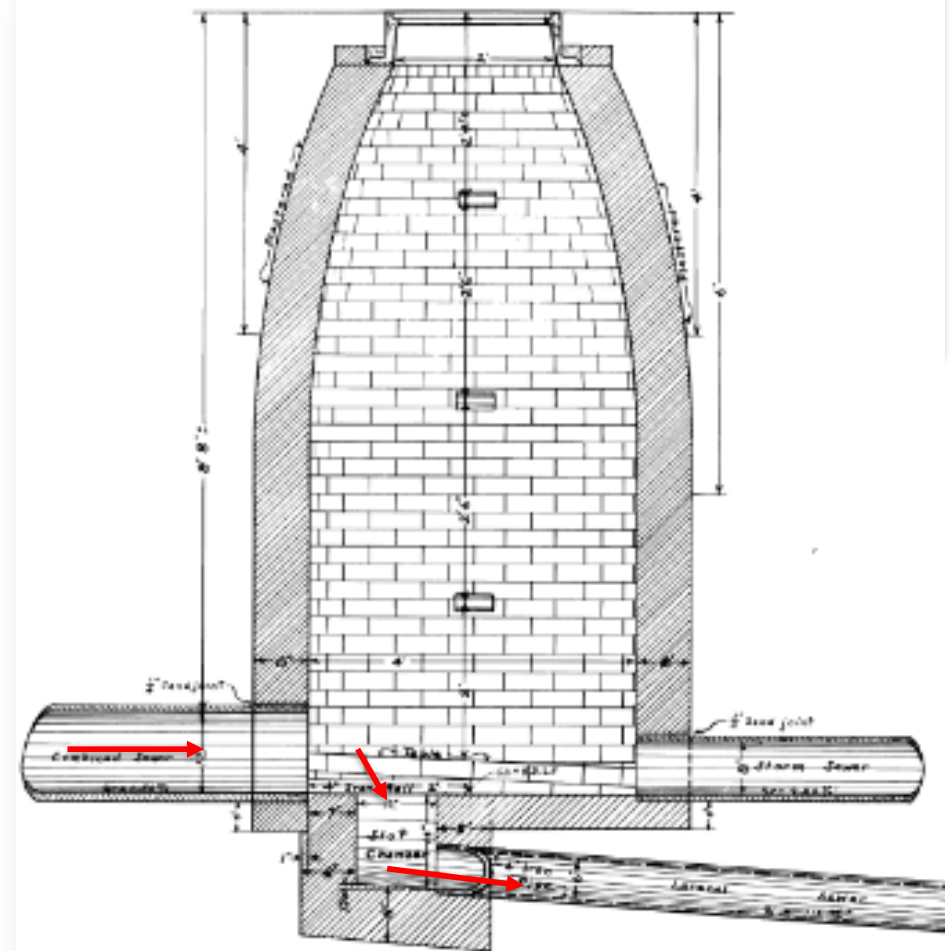
- Two Treatment Facilities
 - » *Fields Point 77MGD-200MGD*
 - » *Bucklin Point 46MGD-116MGD*
- 117 miles of sewers
- 9 pumping stations
- 3-mile-long deep rock tunnel with 8 drop shafts and G&S structures
- 65 permitted outfalls
- 104 Inspected regulators
- 71 CSO sites monitored with Near-Real-Time Equipment
- 29 Slotted Regulators

■ Serve 9 Communities

- Unique because there are a combined 700+ miles of town/city owned sewer pipes in our service area
- 3 Combined System Communities (Providence, Central Falls, Pawtucket)
- 6 Sanitary Only (East Providence, Lincoln, North Providence, Johnston, Smithfield, Cumberland)

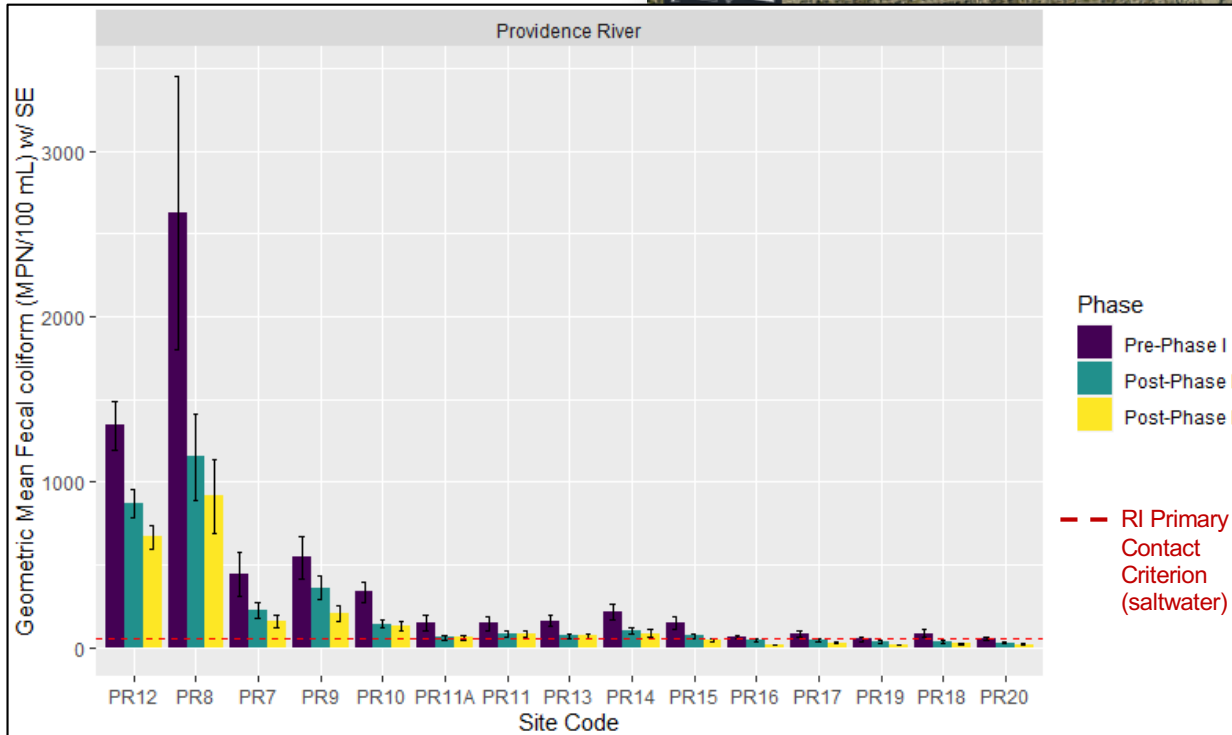
■ NBC has significantly reduced dry-weather overflow events due to our CSO Abatement Program

- 2x/year on avg.
- 29 Slotted Regulators
- Happens mostly due to hydrant flushing or regulator blockages due to debris from city owned sewers



CSO Abatement Program

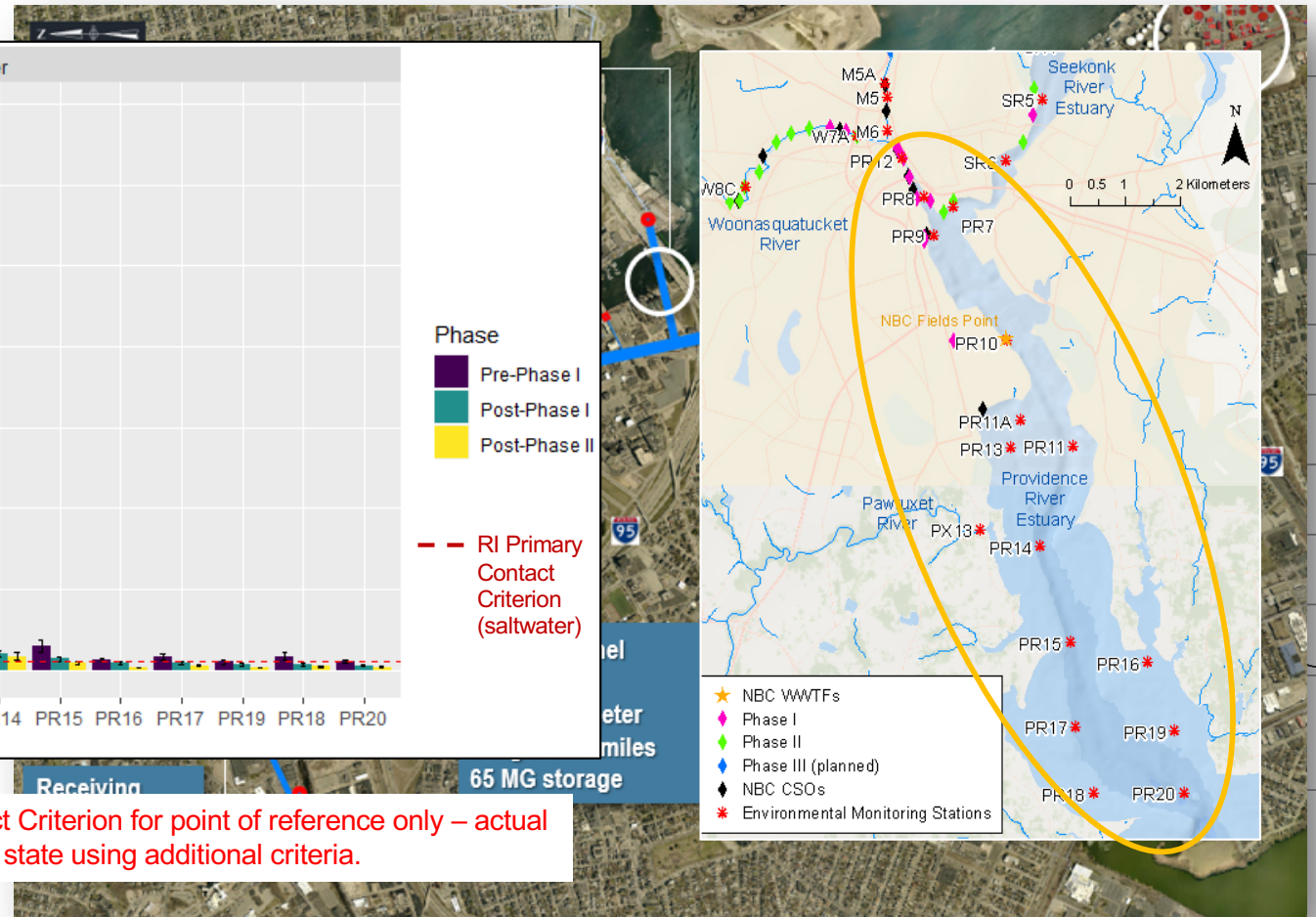
■ Fields Point Tunnel



Model

*Please note - comparison to RI Primary Contact Criterion for point of reference only – actual compliance is determined by the state using additional criteria.

- Comprehensive Flow Monitoring to Calibrate



NBC RIPDES Permit

- **Dry-Weather Overflows are Prohibited**
 - Routine Bacteria Monitoring (Twice a Week Basis)
 - Flow Monitoring at 71 CSOs locations
 - Signage at all Outfalls
 - Implementation of an Effective CMOM
 - Dry-Weather Overflow Must be Reported Immediately, and Begin Corrective Action Immediately
 - A Report Must be Submitted within 5-Days
- **Wet-Weather Overflows are $\leq 4x$ /year for each Phase I/II site based on a modeled typical year design storm**
- **Floatable Control is Mandatory**
- **Public Notification Consent Agreement**
 - *Establish a Working Group (i.e. River Groups)*
 - *June 1, 2019 NBC submitted a feasibility report*
 - *Workgroup comprised of River Groups gave feedback*

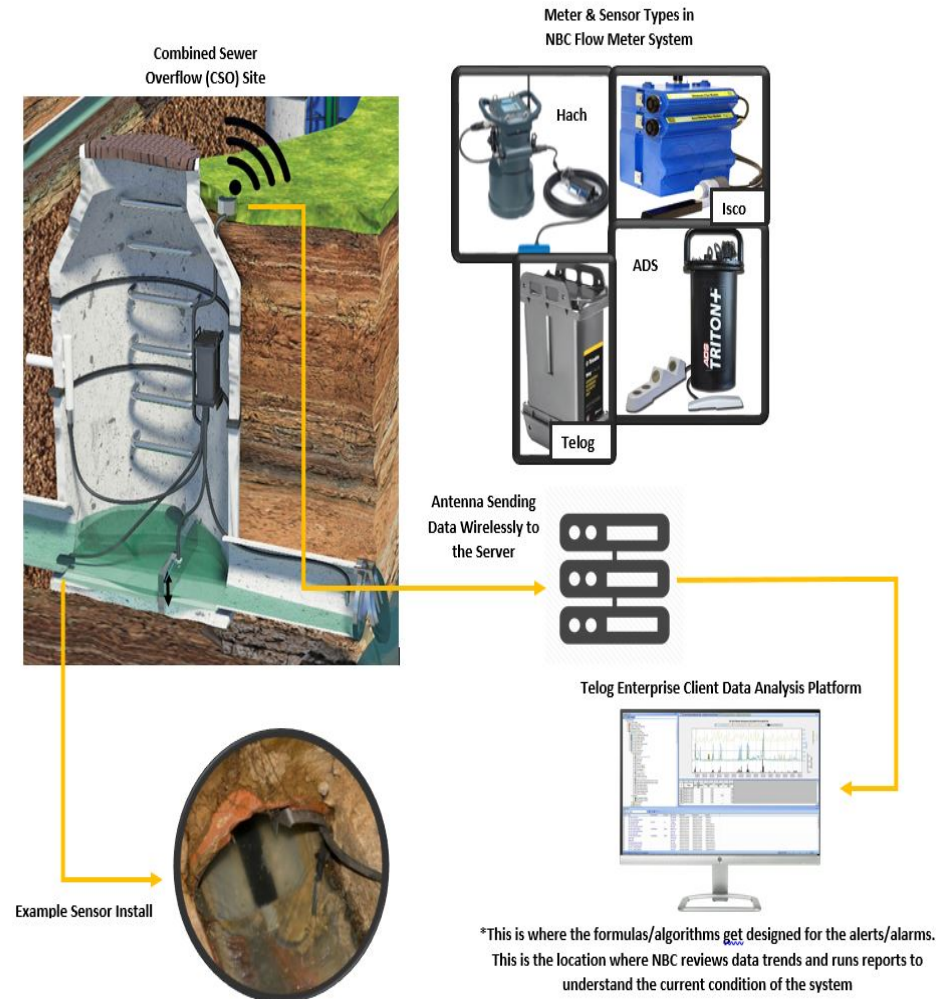
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CSO Flow Monitoring Program

Flow Monitoring Locations:

- 71 Monitored CSOs
 - » 40 Battery Sites
 - » 31 AC Powered Sites
- Rain Gauges
 - 7 Tipping Bucket Gauges
 - » 4 Telog Gauges
 - » 3 Scada Gauges
- Maintenance
 - Flow Service Provider
 - » Services 2x-4x/Month or As Needed
 - » In-House data QA/QC Daily, and In-House Servicing as-needed
- Planning for Expansion in 2021



Maintenance Woes & Inevitable False Alarms

- QA/QC of data is an essential component to a well-run program
- Know your sites and equipment
- Regularly service sites
- 90%+ Up-Time Goal
 - 28 out of 31 days a month
 - Typically beat this on avg.

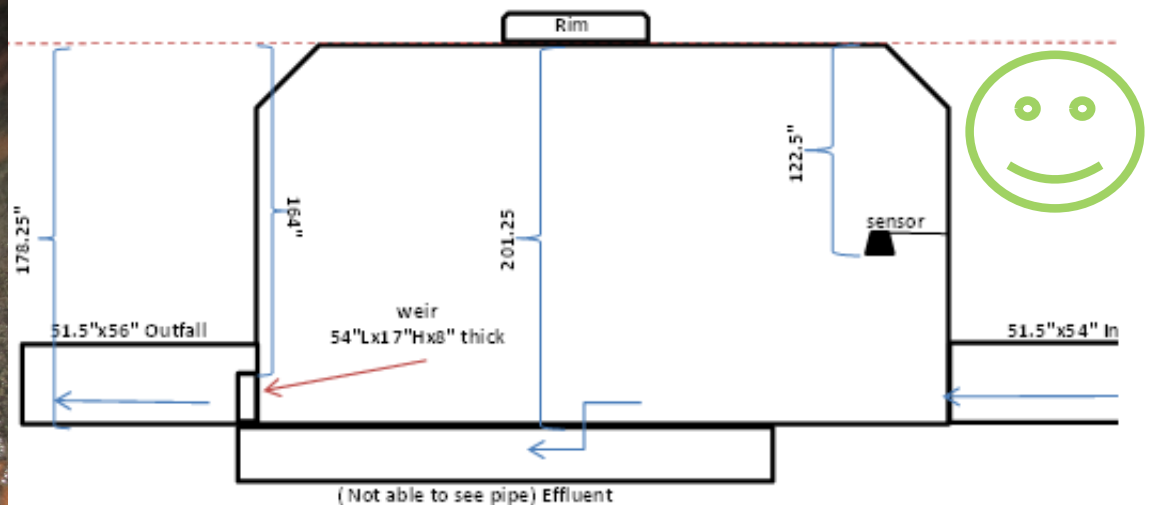


Key Lesson Learned & Paradigm Shift

- Standalone AV sensors on weirs or in dry outfall pipes are not very reliable long-term
- Ultrasonic/radar sensors are the new backbone of the NBC system



Hach AV on Weir Wall



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RIPDES System-Wide Flow Monitoring Project

- **Late 2016** – NBC started planning a three-phase flow monitoring project.
- **September 2018** – RIPDES project commenced with ADS running Phase I of a three Phased Approach to re-evaluate, repair, and maintain it's flow monitoring program.
- **Early 2019** – Began to study other municipalities web-based notification systems
- **June 2019** – NBC submitted Feasibility Report to DEM for a Web-Based Notification System.
- **September 2019** – NBC completed Phase I with ADS to evaluate the Flow Monitoring Program as a whole, including CSO site monitoring approach.

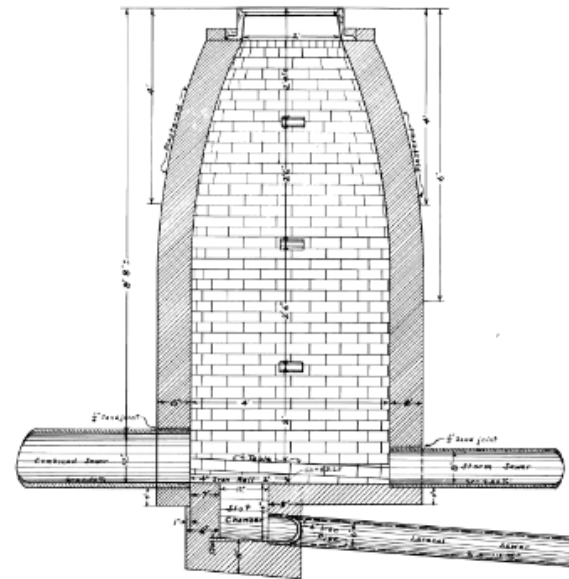
COMPLETED 2019

Phase I (Analysis & Site Inspections)

NEXT UP

Phase II (Installation & Documentation)

Phase III (Management and Maintenance)

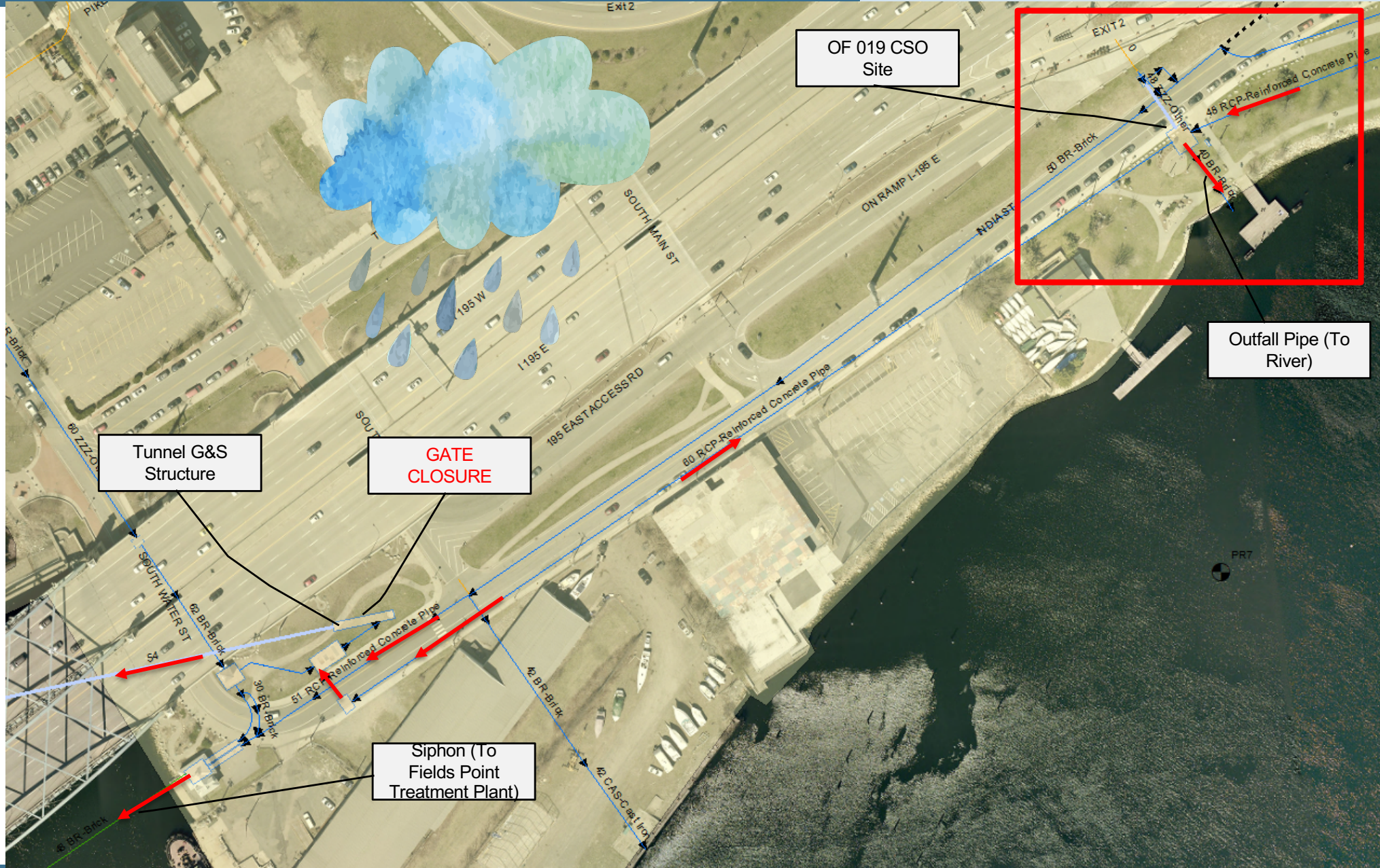


RIPDES Phase I (System Analysis)

Results

- Some locations have hydraulics that are not monitoring friendly
- Planning to add additional rain gauges (backbone of CSO program)
- NBC is satisfied with Telog Acquisition System (looked at many others)
- Expanding our meter network:
 - 13 Tide-Gate Inclometers (Detect Flap Gate Opening)
 - Adding approx. 41 New AV/US Sensors
 - Adding approx. 50 New RU-35's
 - Approx. 5 Isco LaserFlow Sensors
 - Adding new sites to feed data to other NBC programs and initiatives
- Onto Phase II – Implementation and Optimization
 - We plan to continue to work with flow service providers to implement and maintain equipment

CSO Site Monitoring Challenges from Phase I (System Analysis)



Logic for a Real-Time Notification System using Telog Enterprise

■ Dry-Weather Overflow

» *IF(([Rain Events.Combined Rain Event 2 Hours]=0 & [Overflow Event]=1),1,0)*

■ Wet-Weather Overflow

» *IF(([Rain Events.Combined Rain Event 2 Hours]=1 & [Overflow Event]=1),1,0)*

■ Rain Logic

– Rainfall 2 Hours Channel

» *fSQL(dbo.fCalcSum(\$datetime, [Rain-CAPS], 120))*

■ Combined Rain Event 2 Hours Channel

» *IF([Central Ave PS.Rain Event 2 Hours]=1 | [MVI-1.Rain Event 2 Hours] =1 | [Rain DOT.Rain Event 2 Hours] = 1 | [Septic Stat.Rain Event 2 Hours] = 1, 1,0)*

CSO Data Analysis

- Date Must be with Current T
- Important to U
- Time Consum
 - Verifying Data
 - Editing Data
 - Analyzing and C
 - Field Work to C
- Time is Neede

Group: All OverFlow CSO sites		Refresh		Copy					
Wet-Weather Activations for May 2019									
	5/2/2019	5/3/2019	5/4/2019	5/5/2019	5/6/2019	5/7/2019	5/12/2019	5/13/2019	
DOT Gauge									
RAIN TOTAL (IN)	0.02	0.04	0.08	0.37	0.08	0.04	0.52	0.52	
PEAK HOURLY RAINFALL (IN)	0.01	0.02	0.03	0.08	0.05	0.02	0.06	0.17	
Central Ave Gauge									
RAIN TOTAL (IN)	0.02	0.08	0.08	0.52	0.10	0.04	0.74	0.77	
PEAK HOURLY RAINFALL (IN)	0.01	0.05	0.05	0.10	0.06	0.02	0.08	0.23	
Septic Gauge									
RAIN TOTAL (IN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PEAK HOURLY RAINFALL (IN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MVI-1 Gauge									
RAIN TOTAL (IN)	0.00	0.02	0.02	0.22	0.01	0.05	0.00	0.00	
PEAK HOURLY RAINFALL (IN)	0.00	0.01	0.01	0.03	0.01	0.05	0.00	0.00	
NUMBER OF SITES ACTIVATED	1	2	3	2	4	1	5	13	
OF 056 Vandewater								2	
OF 058 Wolcott-Valley									
OF 101 River Samoset									
OF 103 High			1				1	1	
OF 104 Charles									
OF 105 Roosevelt Cross									
OF 106 Facility									
OF 107-1 Richmond Hunt									
OF 201 East Roosevelt							2	3	
OF 202 Roosevelt Japonica									
OF 203 Middle Carnation									
OF 204 Central Middle									
OF 205 Central Front								1	
OF 206 Blackstone Roosevelt									
OF 207 Blackstone Front									
OF 208 Roosevelt Exchange									
OF 209 Exchange Fountain									
OF 210 Main High					1			1	
OF 212 Broadway Main									
OF 213-1 East Pleasant									
OF 213-2 Pleasant Jenks									
OF 214-1 Jenks Pleasant									
OF 214-2 92 East									
OF 215 Division River									
OF 216 School Woodland									
OF 217-1 Merry Thornton								1	
OF 217-2 Taft Tidewater									
OF 218 Bucklin Brook					1		3	2	
OF 220 Moshassuck Esten; North Regulator									
OF 220 Moshassuck Esten; South Regulator									
Pitman IR Meter; Level RAD PR									
Pitman IR Meter; Level RAD TDV; Level RAD SR									
20	OF 019 India Point	Wet Weather Overflow			2019-01-20 12:45:00		2019-01-20 16:30:00		
21	OF 019 India Point	Wet Weather Overflow			2019-01-24 15:45:00		2019-01-24 20:15:00		

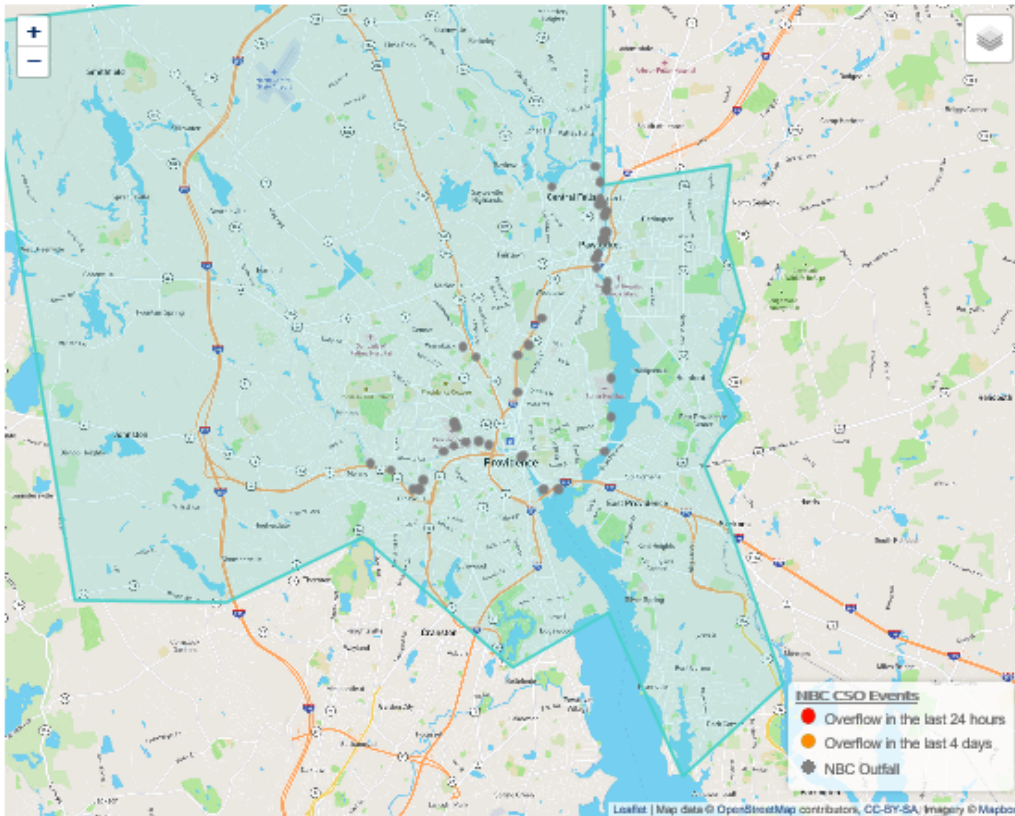
Automated

Public

*Data Shown is for Information Purposes Only (Has Not Been Verified)



Diving Into Our Web-Based System



Last updated: February 22, 2021 10:26 AM

- Currently in Pilot Phase with DEM
- All Wet-Weather and Dry-Weather are shown if meeting the criteria of 24-Hours or 4 Days window.
- We distinguish below the map with “Reported Dry-Weather Overflow Events”
- Confirming the events happens on the back end with our admin tool. Shown on next slide
- All web-based notification systems need to be maintained so public facing map is reliable.

<https://narrabay.com/programs-and-initiatives/combined-sewer-overflow/cso-alarm-map/>

Reported Dry Weather Overflow Events

SHOW 10 ENTRIES

SEARCH

Site Name	Alarm Description	Activation Date	Deactivation Date	Date Verified	Last Updated
No data available in table					

Showing 0 to 0 of 0 entries

Previous Next

Questions or comments? [Please click here to contact us!](#)

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Diving Into Our Web-Based System

Select all Deselect all Verify Selected Delete Selected

SEARCH:

Site Name	Alarm Description	Activation Date	Deactivation Date	Verified	Last Updated
--site filter--	--alarm filter--			<input type="checkbox"/>	2/15/2021 <input type="text"/>
					End Date <input type="text"/>
OF 035_Livingston	OF 035_Livingston.Dry-Weather Overflow Alert Active	December 1, 2020 4:15 AM	December 1, 2020 4:30 AM		February 18, 2021 3:45 PM
OF 035_Livingston	OF 035_Livingston.Dry-Weather Overflow Alert Active	December 1, 2020 5:00 AM	December 1, 2020 5:15 AM		February 18, 2021 3:45 PM

- When we verify an event here, it then populates below the map on the public facing map page shown on previous slide.

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Diving Into Our Web-Based System

Edit Site [X]

SITE DESCRIPTION*
OF 011_Westminster_Memorial

OUTFALL LATITUDE*
41.825405161

OUTFALL LONGITUDE*
-71.408953733

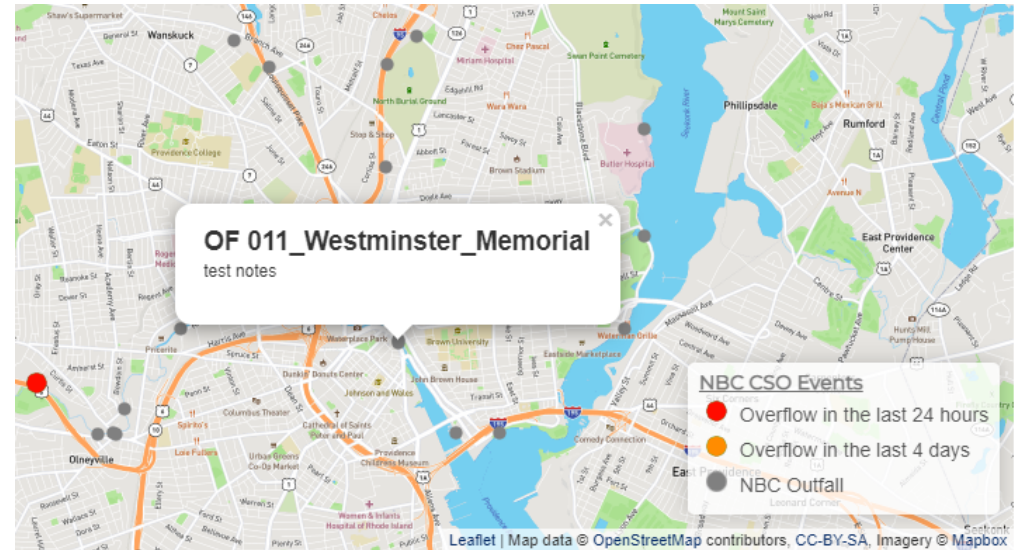
SHOW SITE ON THE MAP

SITE NOTES

UNDER CONSTRUCTION MESSAGE
LEAVE BLANK IF NOT*

Save **Cancel**

Site ID	Visible
273	true
2654	true
173	true
192	true
2559	true
2608	true
276	true
2555	true
2554	true



- We can put site notes that show up on the map

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Diving Into Our Web-Based System

Edit Site [X]

ALARM DESCRIPTION*
OF 023 Pitman Richmond !

REQUIRE VALIDATION

TRACK ALARM

Save Cancel

Alarm Site	Status	Location
OF 011_Westminster_Memorial		Westminster_Memorial
OF 012_Market Square.Dry-Weather Overflow		Market Square.Dry-Weather Overflow
OF 016_South Water St.Dry-Weather Overflow		South Water St.Dry-Weather Overflow
OF 019_India_Point.Dry-Weather Overflow	Alert Active	OF 019_India_Point.Dry-Weather Overflow
OF 023 Pitman Richmond SQ.Dry-Weather Overflow	Alert Active	OF 023 Pitman Richmond SQ.Dry-Weather Overflow

- We require validation for all our Dry-Weather overflow events

Planned Improvements For Official Rollout



Working on refining some bugs in our Telog Alerts & modifying formulas we use



Refining the educational portion to the page



Taking suggestions and comments from users (River Groups)

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