

Comprehensive Sampling Program in Support of a Large NJ LTCP



**2016 NEWEA/NYWEA
Joint Spring Conference**

June 6, 2016



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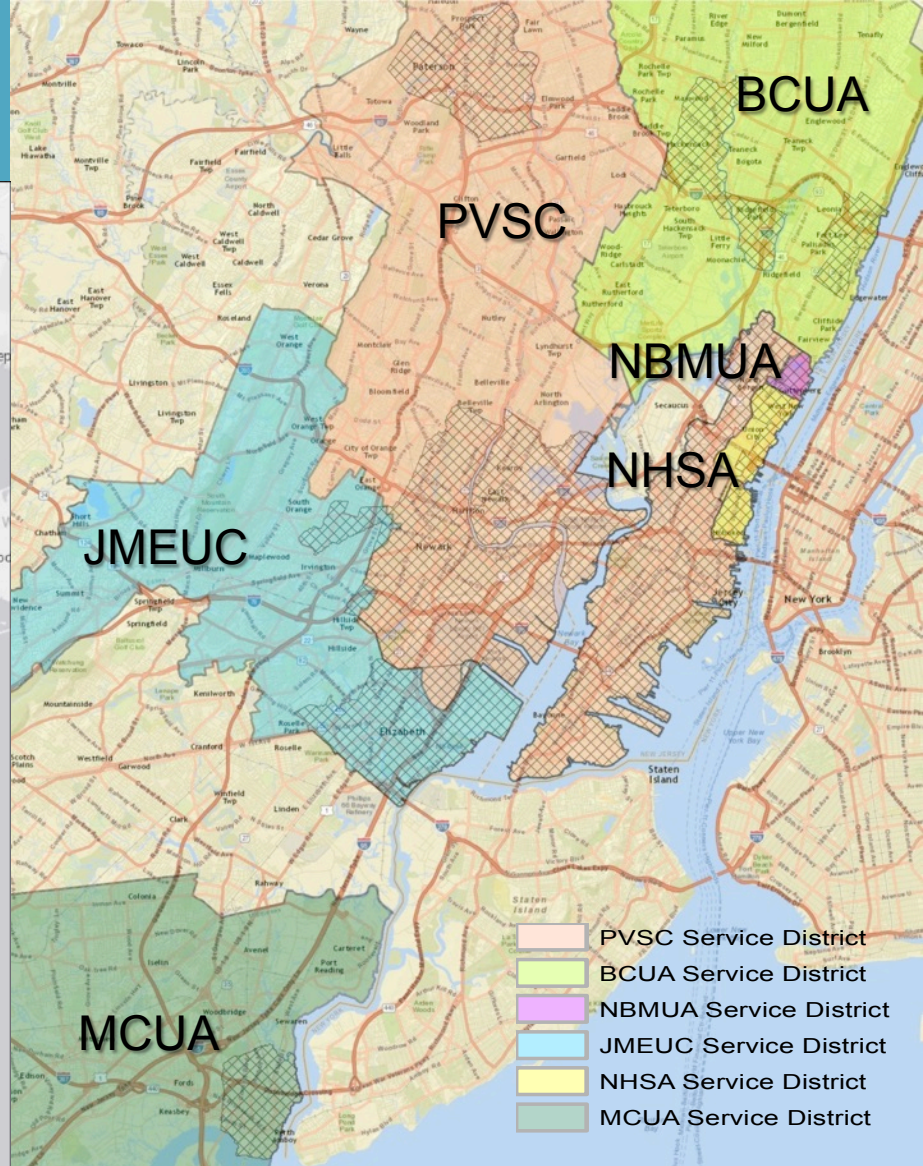
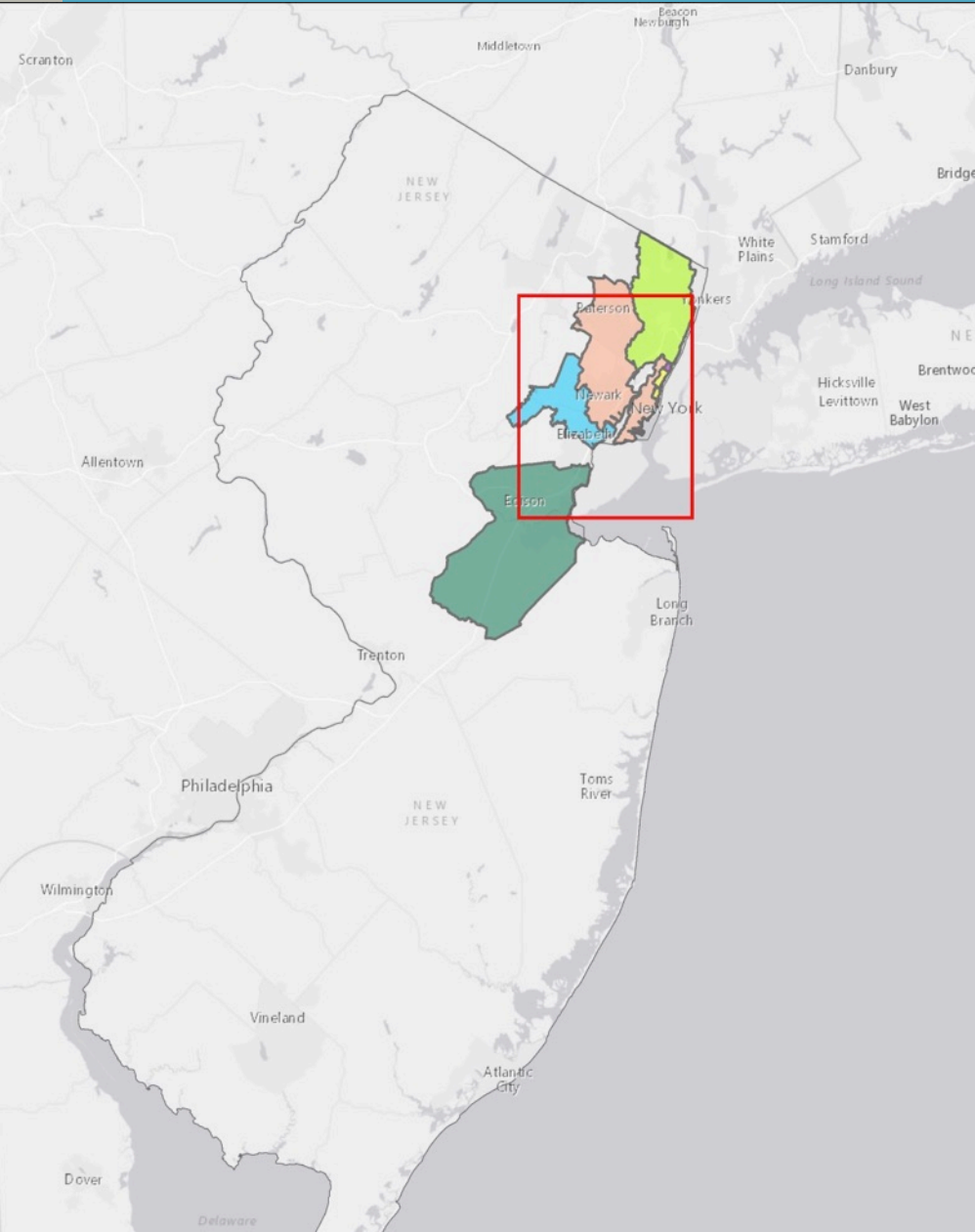
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Project Update

Introduction – NJCSO Group

Central Sewage Treatment Facility	Hydraulically Connected CSO Municipalities and Permittees
Passaic Valley Sewage Commission (PVSC)	Paterson City, Newark City, Kearny Town, Harrison Town, East Newark Borough, Bayonne MUA, Jersey City, North Bergen MUA
Bergen County Utility Authority (BCUA)	Ridgefield Park, Fort Lee City, Hackensack City
Joint Meeting of Essex and Union Counties (JMEUC)	Elizabeth City
North Bergen Municipal Utility Authority (NBMUA) – Woodcliff Plant	North Bergen Township, Guttenberg Town
North Hudson Sewage Authority (NHSA) – River Road STP	Weehawken, West New York, Union City
North Hudson Sewage Authority (NHSA) – Adams Street STP	Hoboken, Union City
Middlesex County Utilities Authority (MCUA)	Perth Amboy

Introduction – NJCSO Group



 CSO Community 

Introduction – NJDEP CSO Permit

- Part IV.D.3.c
 - In accordance with Section G.9., the permittee shall submit an approvable baseline **Compliance Monitoring Program (CMP) Work Plan**: within 6 months from the effective date of the permit (EDP). (Activity #: DSW090003 - Effective: 7/1/2015)
- Part IV.G.9
 - Compliance Monitoring Program (CMP)
 - Establish baseline
 - Verify existing conditions, effectiveness of CSO controls, compliance

Introduction – Goals and Objectives

- Fulfill the CSO Permit ambient monitoring requirements
- Establish existing ambient water quality conditions for pathogens
- Calibrate and validate a pathogen water quality model
- Foster appropriate regulatory decisions based on current water quality measurements.
- Support the goals of the LTCPs

Basic Approach to Baseline Monitoring - Overview

1. Existing program to continue with no changes
2. Baseline Compliance sampling to be done for one year
 - a. NJHDG main stream locations
 - b. Additional baseline locations
 - c. Source measurements
 - d. Began in April
3. WQ Modeling sampling adds:
 1. Intensive multiple day event sampling
 2. Other measurements

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Overview of Existing Sampling Program

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Overview of NJHDG Ambient Water Quality Monitoring Program

- Initiated late 2003
- 34 Active Monitoring Sites throughout NJ portion of NY/NJ Harbor Estuary
- <http://www.nj.gov/pvsc/what/njhdg/>

The New Jersey Harbor Dischargers Group 2010 Water Quality Report



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PROTECTING PUBLIC HEALTH AND THE ENVIRONMENT

Governor Chris Christie • Lt. Governor Kim Guadagno
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Collection System
PVSC & NJCSO
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Awards
Plant Tour

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Ambient Water Quality Monitoring Program

The New Jersey Harbor Dischargers Group (NJHDG) is a consortium of nine (9) sewerage agencies, representing eleven (11) wastewater treatment plants in northeastern New Jersey, which all discharge their treated effluents to the waters of the New York/New Jersey Harbor Estuary. The NJHDG was formed in 1992 to jointly fund studies related to the water quality of the NY/NJ Harbor Estuary.

In 2003, the NJHDG initiated a Long-Term Ambient Water Quality Monitoring Program for the NJ portion of the NY/NJ Harbor Estuary. The main objective of the NJHDG program is to develop a comprehensive database on the existing water quality of the NY/NJ Harbor by routinely and extensively monitoring the waters of the Passaic River, Hackensack River, Newark Bay, Arthur Kill, Raritan River, Raritan Bay, and the Hudson River.

Thirty-three (33) locations throughout the region are monitored for a list of eighteen (18) conventional chemical water quality parameters, including temperature, pH, dissolved oxygen (DO), salinity, solids, nutrients, and bacteria. Monitoring is performed at each station weekly from May through September and monthly from October through April. All resources for the monitoring program, including sampling personnel and laboratory analyses, are provided by the NJHDG member agencies.

See the attached link for further water quality information:

[2010 New Jersey Harbor Dischargers Group \(NJHDG\) Water Quality Report \[pdf 7.79MB\]](#)

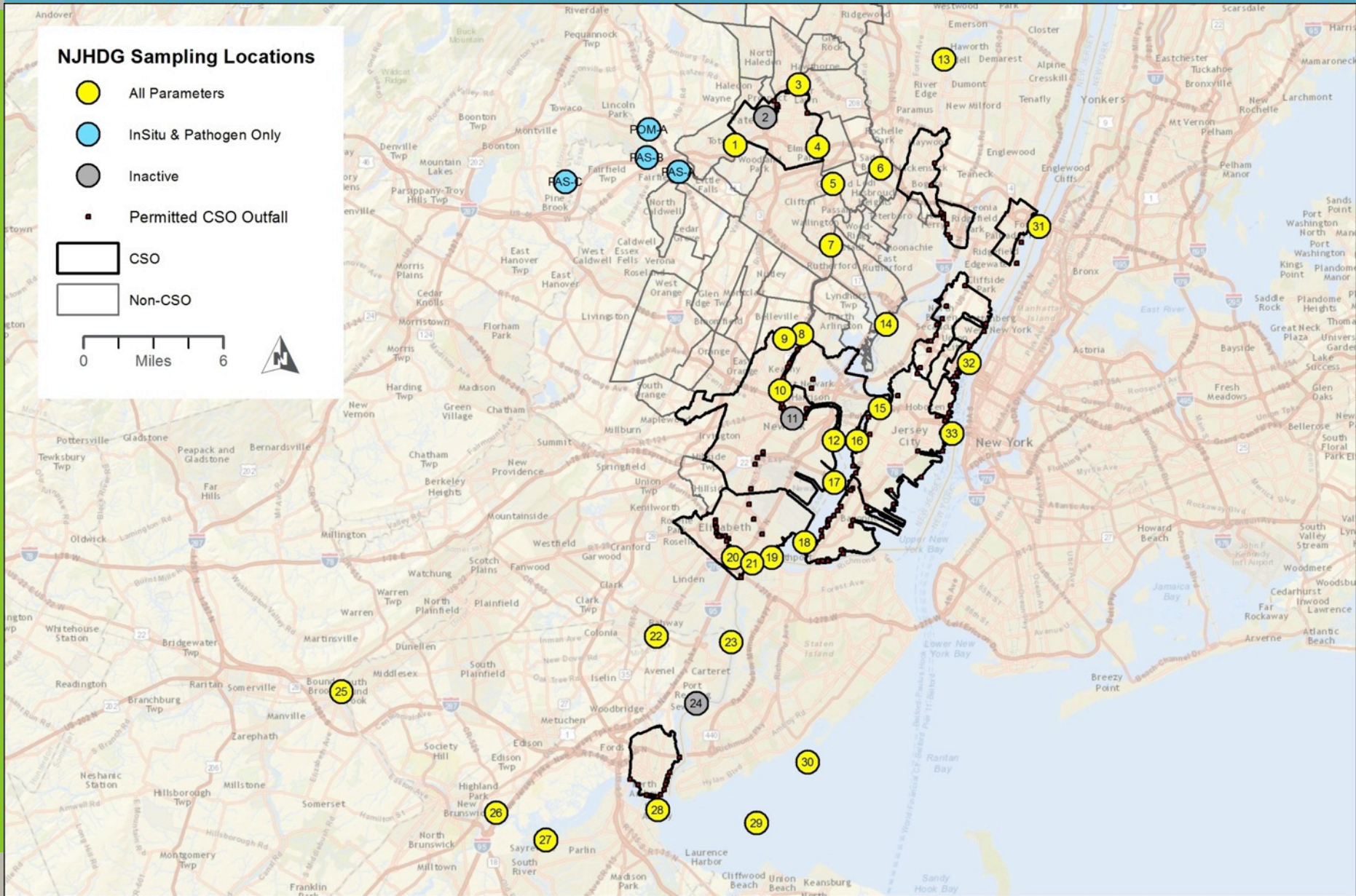
NJHDG Locations

NJHDG Sampling Locations

- All Parameters
- InSitu & Pathogen Only
- Inactive
- Permitted CSO Outfall

CSO
Non-CSO

0 Miles 6





- Ambient water quality for conventional pollutants
- Document seasonal changes
- Document improvements resulting from implementation of pollution control programs
- Validate water quality model results
- Foster appropriate regulatory decisions based on current water quality measurements
- Collectively utilize the agencies' resources to best meet water quality objectives for the Harbor

NJHDG Sampling Frequency

- Spring – 4 “Events”
 - Bi-weekly
 - May-June
- Summer – 12 “Events”
 - July – September
 - Weekly
- Winter – 7 “Events”
 - Monthly
 - October – April
 - Weather Permitting



NJHDG Pollutant Parameters

- Temperature
- pH
- Salinity
- Dissolved Oxygen (DO)
- Secchi Depth (boat sites only)
- Fecal coliform Bacteria
- Enterococcus Bacteria (2007)
- E.coli Bacteria (2011 – Fresh Water only)
- Chlorophyll-a (2007)
- Total Suspended Solids (TSS)
- Total Kjeldahl Nitrogen (TKN)
- Ammonia-Nitrogen ($\text{NH}_3\text{-N}$)
- Nitrate-Nitrogen ($\text{NO}_3\text{-N}$)
- Nitrite-Nitrogen ($\text{NO}_2\text{-N}$)
- Total Phosphorus (TP)
- Orthophosphate (OP)
- Dissolved Organic Carbon (DOC)

NJHDG Sampling Methodology

- Grab samples taken at each location
- Sample for all parameters at each site
 - Exception: E.coli only in freshwaters
- Shallow sites (bridge / landside sites) are sampled mid-depth at mid-river
- Remaining deep water sites (Depth > 15 feet) are sampled at 1 meter below surface and 1 meter above substrate

NJHDG Sampling Schedule

- Schedule developed 3-months in advance
 - Schedule altered in AM as needed for small craft warnings
- Full cycle of sampling
 - Winter/Spring
 - One crew
 - On boat 4 days
 - In truck 3 days
 - Summer
 - Two crews
 - One boat crew – 4 days
 - One truck crew – 3 days

Typical NJHDG Sampling Schedule

NJHDG Harbor Sample Schedule

August 2015

August 2015						
Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September 2015						
Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Aug 3 Boat - Nwk Bay/AK 17-19, 21, 23 PVSC xMobile Lab - Pathogens ONLY Upstream sites + 3 - PVSC	4 Boat - Raritan 26-30 PVSC xMobile Lab - North 1, 4-6 - PVSC xSite 20 - JMEUC	5 ~-Sonde Calibration Boat - Hudson 31-33 JMEUC xMobile Lab - South 7-10 - PVSC xSite 25 - MCUA	6 Continuous Harbor DO Project	7 NO SAMPLING Post-deployment QA Procedures
10 Boat - Nwk Bay/AK 17-19, 21, 23 PVSC xMobile Lab - Pathogens ONLY Upstream sites + 3 - PVSC	11 Boat - Raritan 26-30 RVSA xMobile Lab - North 1, 4-6 - PVSC xSite 22 - RVSA	12 Boat - Hudson 31-33 PVSC xMobile Lab - South 7-10 - PVSC xSite 13 - PVSC	13 Boat - Passaic/Hack 12, 14-16 PVSC	14 NO SAMPLING
17 Boat - Nwk Bay/AK 17-19, 21, 23 PVSC xMobile Lab - Pathogens ONLY Upstream sites + 3 - PVSC	18 Boat - Hudson 31-33 PVSC xMobile Lab - North 1, 4-6 - PVSC	19 Boat - Raritan 26-30 PVSC xMobile Lab - South 7-10 - PVSC xSite 20 - JMEUC	20 Boat - Passaic/Hack 12, 14-16 JMEUC xSite 25 - MCUA	21 NO SAMPLING
24 Boat - Passaic/Hack 12, 14-16 PVSC xMobile Lab - Pathogens ONLY Upstream sites + 3 - PVSC	25 Boat - Hudson 31-33 RVSA xMobile Lab - North 1, 4-6 - PVSC xSite 22 - RVSA	26 ~-Sonde Calibration Boat - Raritan 26-30 PVSC xMobile Lab - South 7-10 - PVSC xSite 13 - PVSC	27 Continuous Harbor DO Project	28 NO SAMPLING Post-deployment QA Procedures
31 Boat - Nwk Bay/AK 17-19, 21, 23 PVSC xMobile Lab - Pathogens ONLY Upstream sites + 3 - PVSC	Sep 1	2	3	4

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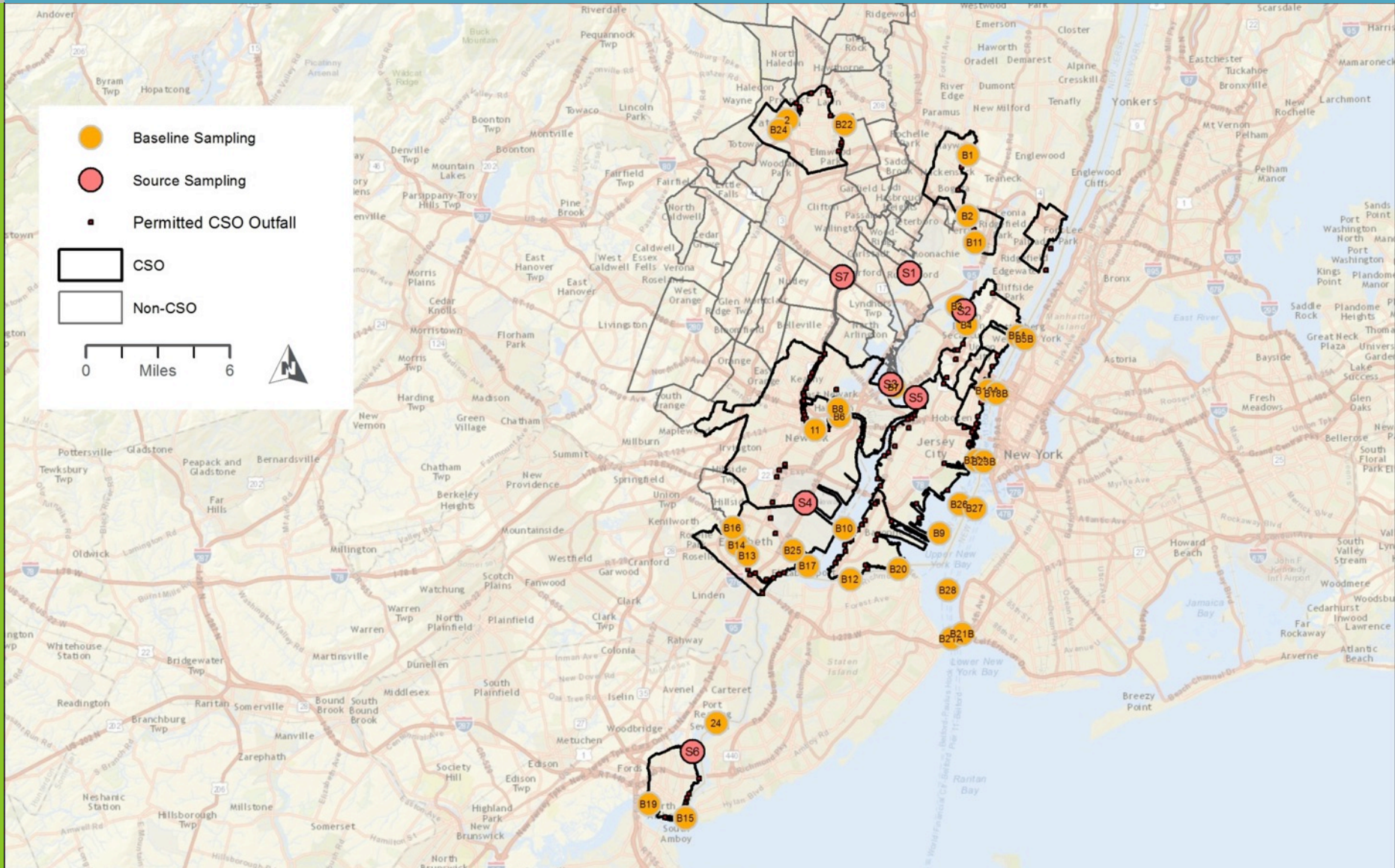
Baseline Compliance Monitoring Sampling Plan

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Baseline Compliance Monitoring Sampling Plan

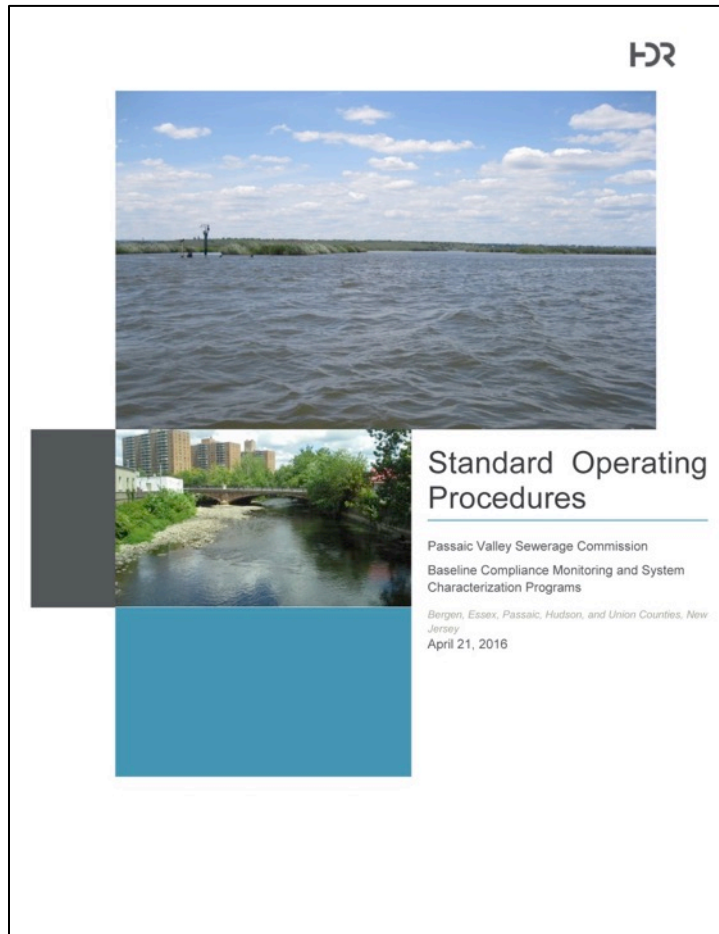
- **76 Stations (Near surface and mid-depth)**
 - 34 NJHDG stations will continue
 - 35 New “Baseline” stations
 - 32 new locations + 3 reactivated NJHDG stations (2, 11, 24)
 - 7 New “Source” stations
 - Source and Baseline to be sampled by contractor
- **1 Year Duration**
- **23 Sampling Events**
 - Schedule matches NJHDG program
 - Exceeds 15-event minimum required by NJDEP
 - Assures 10 days of wet weather impacts will be captured
- **Focus on Pathogens**
 - NJHDG ongoing program as noted previously
 - New Baseline and Source locations
 - Laboratory: fecal coliform, enterococcus, E. coli (freshwater only)
 - Field: dissolved oxygen, salinity, temperature, pH, turbidity, secchi

Baseline Compliance Monitoring Sampling Plan

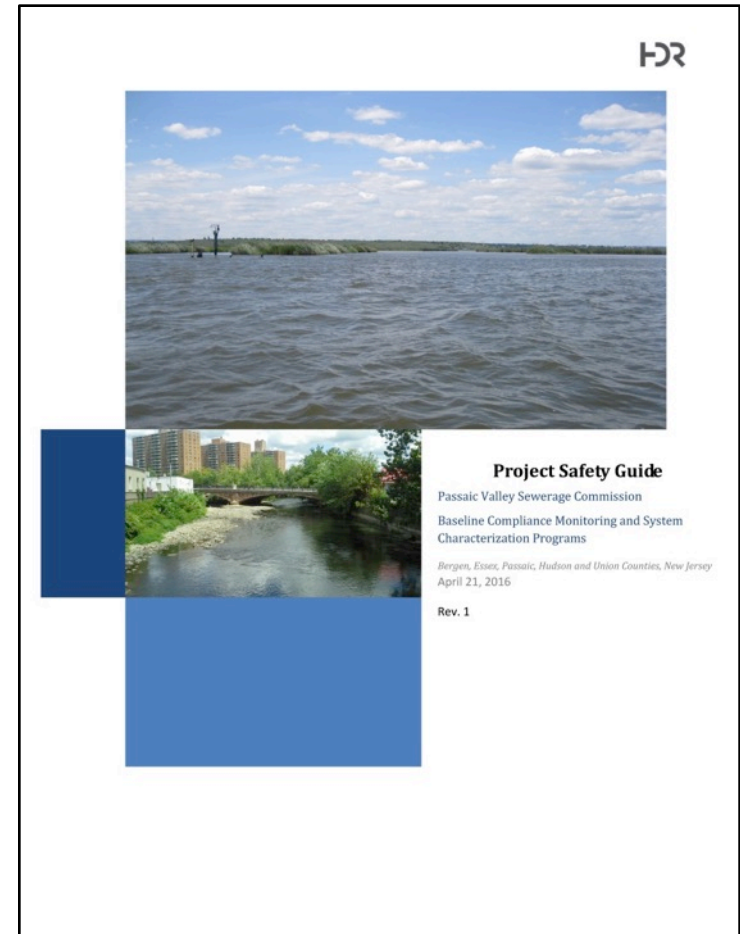


Baseline Compliance Monitoring Sampling Plan SOP and HASP

SOP



HASP



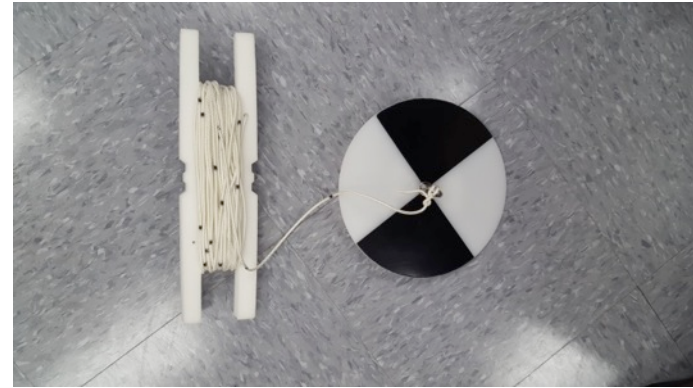
Baseline Compliance Monitoring Sampling Plan

Sampling Kit

pH



Secchi
Depth



Turbidity



Van Dorn
Sampler
(open)



Temp.
DO
Cond.



Van Dorn
Sampler
(closed)



Baseline Compliance Monitoring Sampling Plan

Field Data Collection - iFormBuilder

The screenshot shows a mobile application interface for 'PVSC WQ Datasheet'. It features a green header with the title and a home icon. Below the header, there are several sections: 'Sample Information' with a 'Samples *' button; 'Field Parameters' with input fields for 'Sample Depth (in)', 'Temp (C)', 'DO (mg/L)', 'Salinity (ppt)', 'pH', 'Turbidity (NTU)', 'Secchi Depth (in)', and another 'Turbidity (NTU)' field. Each input field has a right-pointing chevron. The interface is clean and user-friendly, designed for field data collection.

- Phone/Tablet-Based
- Quality-controlled data input
 - Date, time, lat/lon stamp
 - Required fields
 - Drop downs, pick lists
 - Context-sensitive
 - Input validation
 - Realtime QC
- Data safety and convenience
 - Asynchronous
 - Cloud-based
 - Tag pix and voice memos
 - Migrates to database

Event Type *

Baseline	Wet Event
----------	-----------

Stratum *

Surface	Mid
---------	-----

Sampling Type *

Waterside (Boat)	Landside (Truck)
------------------	------------------

Sample Type *

Normal	Duplicate	Triple Wash	Field Blank
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Photo

Voice Notes

Crew Chief Signature

Observed Tidal Current

Ebb	SFB	Flood	SEB
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Weather/Sky

Cloudy/Overcast	Mostly Cloudy	Partly Cloudy	Mostly Clear	Clear
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Meters:

Temp/DO/Sal Meter

pH Meter

Turbidity Meter

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Modeling Monitoring Plan

4

Model Required Sampling Plan – Goals

- Demonstration Approach: Modeling
 - Supplement routine data with specific rain events
 - Quantify load-response relationships
 - Pathogen die-off (consecutive day sampling)
 - Physical measurements
- Modeling
 - Routine and event sampling data will be used in a continuous simulation model skill assessment (re-calibration)
 - Validation

Proposed Wet Weather Sampling for Modeling Requirements

- Goal is 3 significant (>0.5 inch) rainfall events
 - 3-days dry weather before an intensive event
 - 3-days of consecutive sampling
 - Up to 6 rainfall events may be required
 - Trial/shakedown event
 - False starts
 - Smaller events or localized events
 - 2 passes per day (AM & PM)
 - Routine Baseline sampling by NJHDG continues during consecutive day sampling
 - Contractor crews focus on intensive sampling only

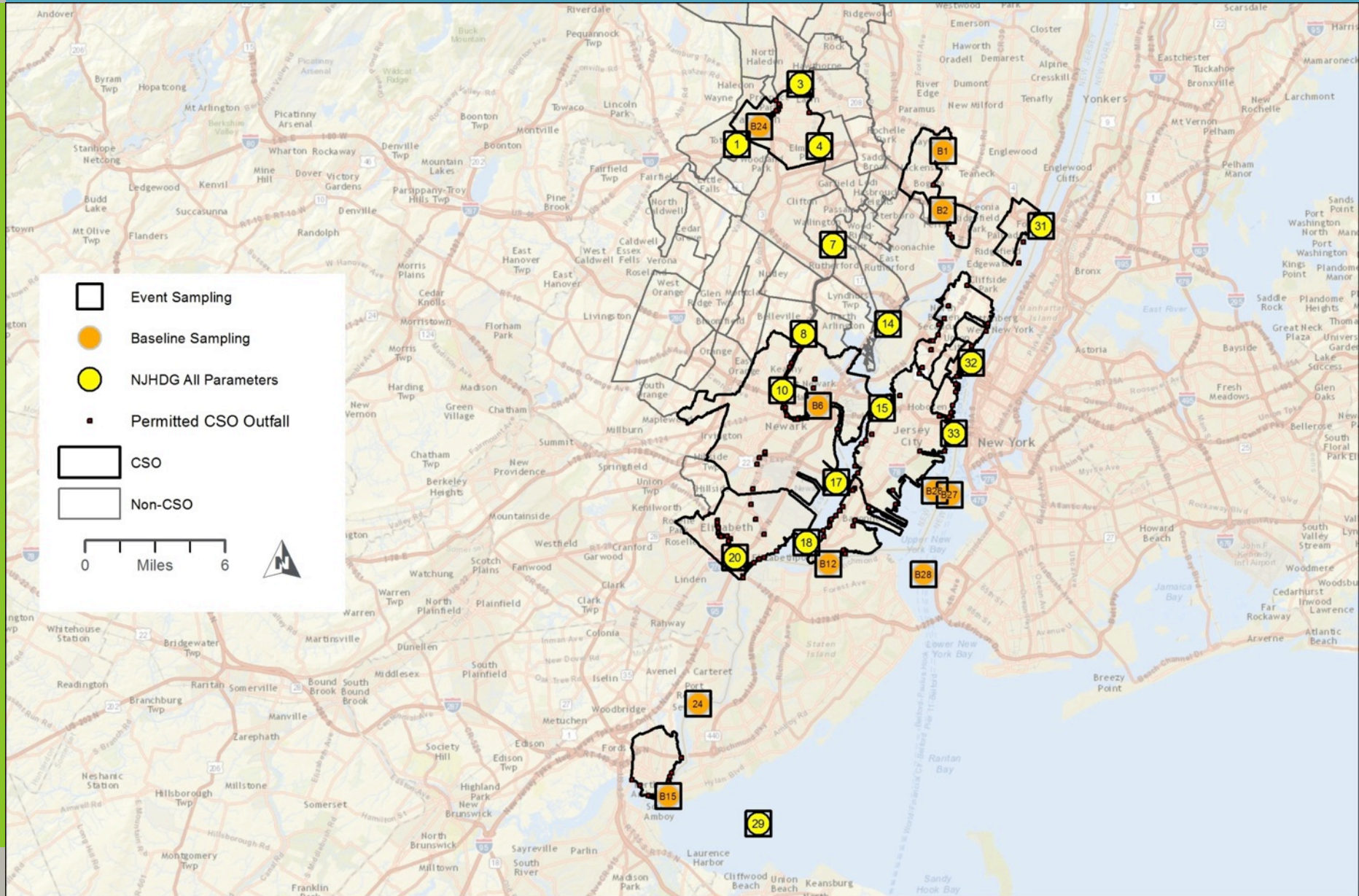
Proposed Sampling for Modeling Requirements

- 25 Receiving Water Stations
 - 10 BCM stations
 - 15 NJHDG stations
 - 3 three-day significant (Rainfall > 0.5 inches) intensive sampling events for receiving water locations
- Parameters
 - FC, entero, E. Coli (FW)
 - DO, Temp, Sal

Proposed Sampling for Modeling Requirements

- Physical Measurements
 - Tide (from NOAA tide gauges)
 - River flow (from USGS flow gauges)
 - ADCPs (see WQ Modeling presentation)
 - None required
 - Historical data available

Proposed Model Requirements Sampling



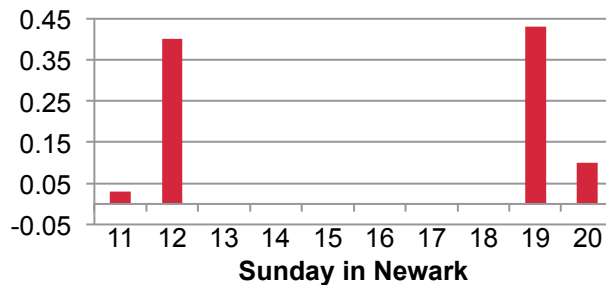
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Project Update

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Update

- Approach and sampling locations approved by NJDEP
- Contractor Selected
 - CDM Smith, Greely & Hansen, HDR
- Analytical laboratory selected
 - Eurofins QC
 - East Rutherford, NJ
 - Horsham, PA
- Three rounds of sampling completed
- First Wet Weather Sampling Event TODAY!



Questions

- Timothy.Groninger@hdrinc.com
- Francisco.brilhante@hdrinc.com



Baseline Compliance Monitoring Sampling Plan

Sampling Approach

- Establish Sampling Zones
 - Supplement NJHDG boat sampling crew – sample 3-4 days per week
 - Supplement NJHDG landside sampling crew
- Schedule
 - Alter sampling days and locations as needed based on forecast to get a mix of wet and dry samples
 - Wet sample – defined as **day of rain** or **day after rain** for this program

Baseline Compliance Monitoring Sampling Plan

Data to establish existing conditions

- 23 times over the year
- Once per sampling date
- Calculate baseline water quality
- Sort into wet and dry conditions
 - Unlikely to have “non-CSO” wet events
- Will also provide for data to perform a continuous simulation water quality model assessment