Supplemental CSO Team - Session 4

PVSC Service Area

North Bergen MUA Service Area (Woodcliff Treatment Plant)

Long Term Control Plan

July 11, 2017

CLEAN WATERWAYS

Healthy Neighborhoods

Agenda

- Introduction and Recap
- Update on NJ CSO Program (NJDEP)
- NJ Surface Water Quality Standards (NJDEP)
- Hydrologic and Hydraulic Models
- Adjourn

CLEAN WATERWAYS
Healthy Neighborhoods

Introduction and Recap

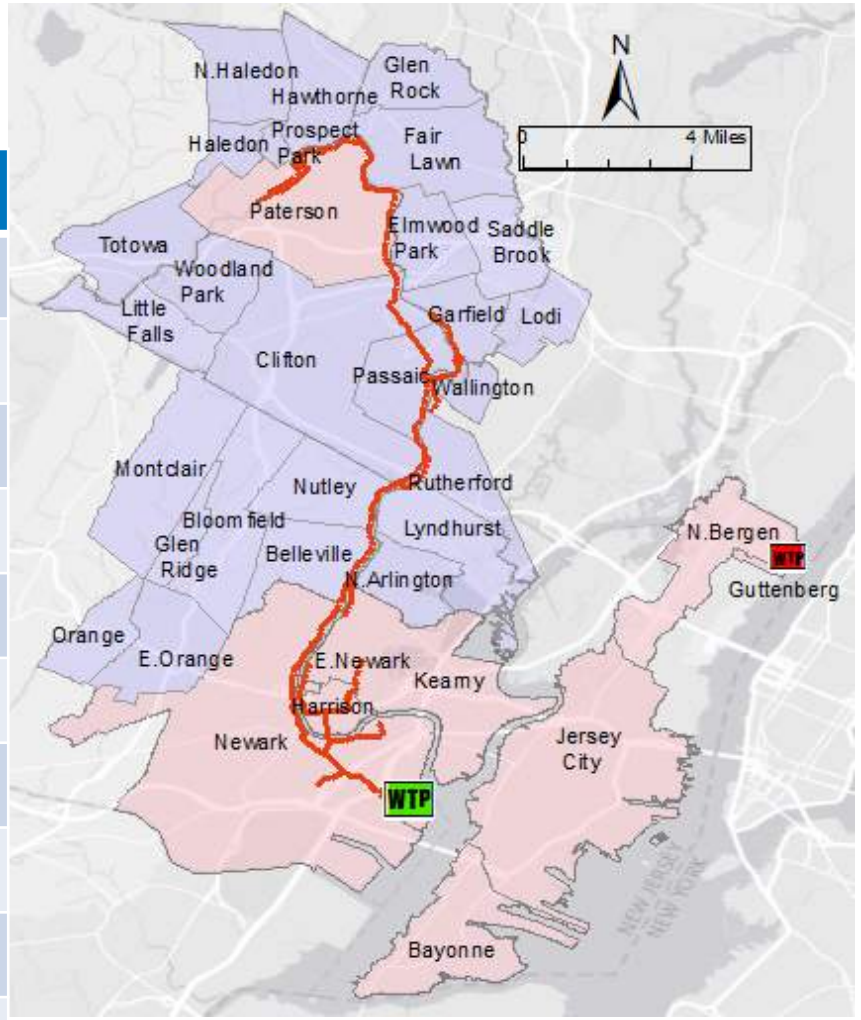
CLEAN WATERWAYS
Healthy Neighborhoods

Supplemental CSO Team Members

Member	Organization		Member	Organization
Matt Dorans	Bayonne Chamber of Commerce		Sandra Meola	Paterson Smart
David P. Donnelly	Jersey City Redevelopment Agency		Ruben Gomez	City of Paterson Economic Development
Nicole Miller	Newark DIG		Sheri Ferreira	Greater Paterson Chamber of Commerce
Molly Greenberg	Ironbound Community Corporation		Betty Jane Boros	New Jersey Business & Industrial Association
Robin Dougherty	Newark Greater Conservancy/Newark Business Partnership		Debbie Mans	NY/NJ Baykeeper
Jorge Santos	Newark Community Economic Development Corporation		Meiyin Wu, Ph.D	Montclair State University - Passaic River Institute
Christopher Pianese	Township of North Bergen		Christopher C. Obropta, Ph.D	Rutgers University - Cooperative Extension Water Resources
Janet Castro	Hudson Regional Health Commission Town of North Bergen		Captain Bill Sheehan	Hackensack Riverkeeper
Thomas Stampe	North Bergen "Sustainable Jersey" group		Harvey Morginstin	Passaic River Boat Club & Passaic River Superfund CAG
Nancy Kontos	Bunker Hill Special Improvement District		Laurie Howard	Passaic River Coalition
Alison Cucco	Jersey City Environmental Commission		Ben Delisle	Passaic River Rowing Association

Permittees

Permittee	Municipality	WWTP	CSOs
Bayonne MUA	Bayonne	PVSC	30
Borough of East Newark	East Newark		1
Town of Harrison	Harrison		7
Jersey City MUA	Jersey City		21
Town of Kearny	Kearny		5
City of Newark	Newark		18
North Bergen MUA	North Bergen		7
City of Paterson	Paterson		23
PVSC	-		0
Town of Guttenberg	Guttenberg	Woodcliff	1
North Bergen MUA*	North Bergen		1
	Total		114



** North Bergen MUA conveys flows to both PVSC and Woodcliff WWTPs*

CLEAN WATERWAYS
Healthy Neighborhoods

Overview of Progress To Date (Current Permit)

- Advisory/Warning Signs Posted Near Outfalls
- CSO Notification System *(http://njcso.hdrgateway.com)*
- CSO Monthly Discharge Monitoring Reporting (DMRs)
- Work Plans/QAPPs Submitted to NJDEP
  - Baseline Compliance Monitoring Program QAPP – Approved
  - System Characterization and Landside Modeling Program QAPP – Approved
  - Pathogen Water Quality Model QAPP - Approved
  - Other Existing System Characterization Documents - Approved
- Monthly Meetings Amongst the Permittees
- Evaluation of Previous Models and Further Model Development
- Completed Flow Monitoring Program
- Actively Updating Hydrologic and Hydraulic Collection System Models
- Actively Performing Water Quality Monitoring and Model Development

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Healthy Neighborhoods

NJDEP Presentations

CLEAN WATERWAYS
Healthy Neighborhoods

Update on New Jersey's CSO Program

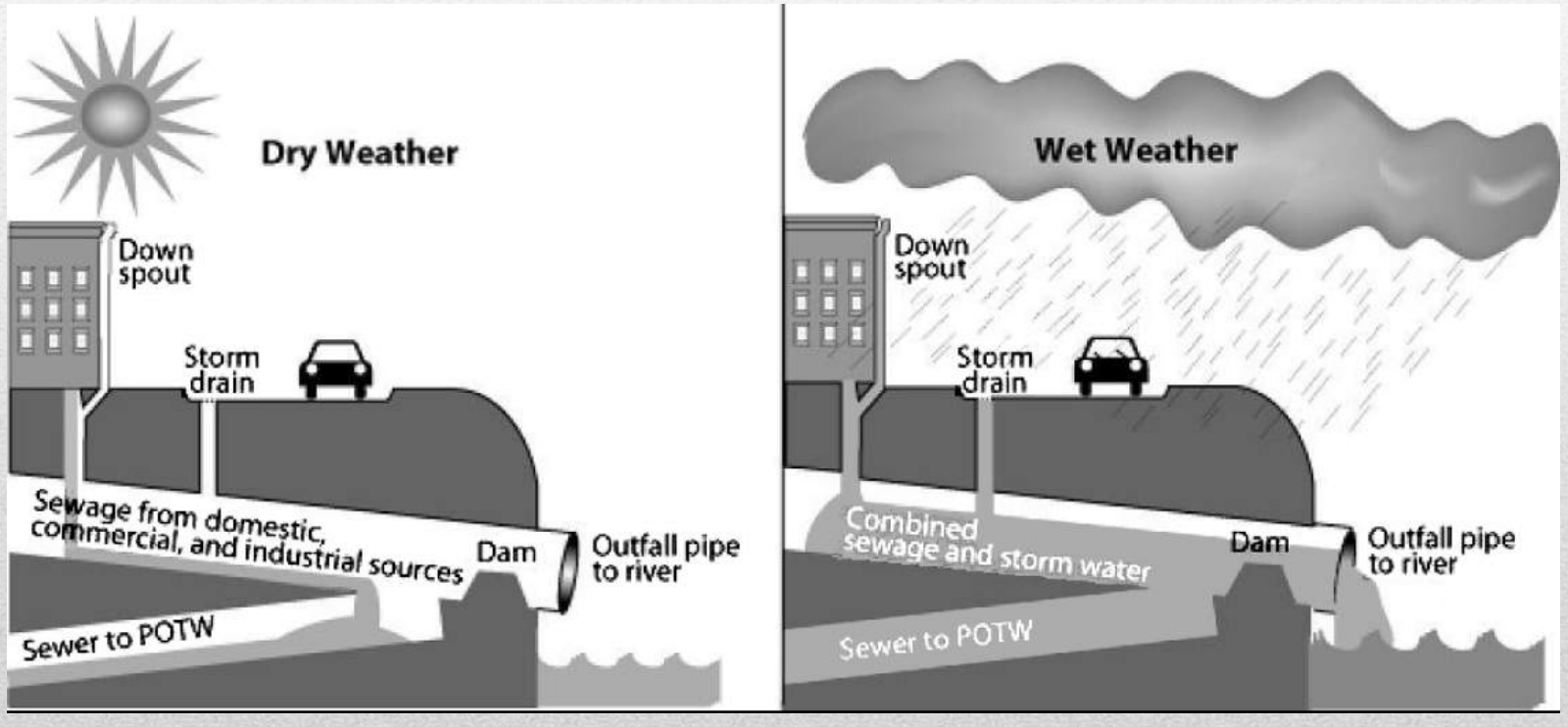
July 11, 2017

Susan Rosenwinkel, Section Chief

Bureau of Surface Water Permitting, NJDEP

Susan.rosenwinkel@dep.nj.gov

What is a Combined Sewer Overflow (CSO)?



A New Day!

July 1, 2015

- 25 Individual NJPDES CSO Permits were issued which require an ambitious, cascading schedule.
- Permits were issued by hydraulically connected system to ensure a more cohesive long term control plan.
- All 9 systems chose to **work together** to develop a long term control plan (LTCP).
- Permits build off the previous general permits but require submission of a robust LTCP.

Upcoming Submissions

Monthly DMRs – every month and electronically

Quarterly Progress Reports – every quarter (template available)

System Characterization Report – **7/1/18**

Compliance Monitoring Program (ambient sampling) – **7/1/18**

Public Participation Report – **7/1/18**

Consideration of Sensitive Areas – **7/1/18**

Development and Evaluation of Alternatives – 7/1/19

Selection and Implementation of the LTCP – 6/1/20

PVSC and North Bergen Woodcliff System

- **PVSC** (0)
  - East Newark (1)
  - Harrison (7)
  - Bayonne (28)
  - Kearny (5)
  - Paterson (23)
  - Jersey City (21)
  - Newark (18)
  - N Bergen MUA (9)

North Bergen Woodcliff (1)

- Guttenberg (1)

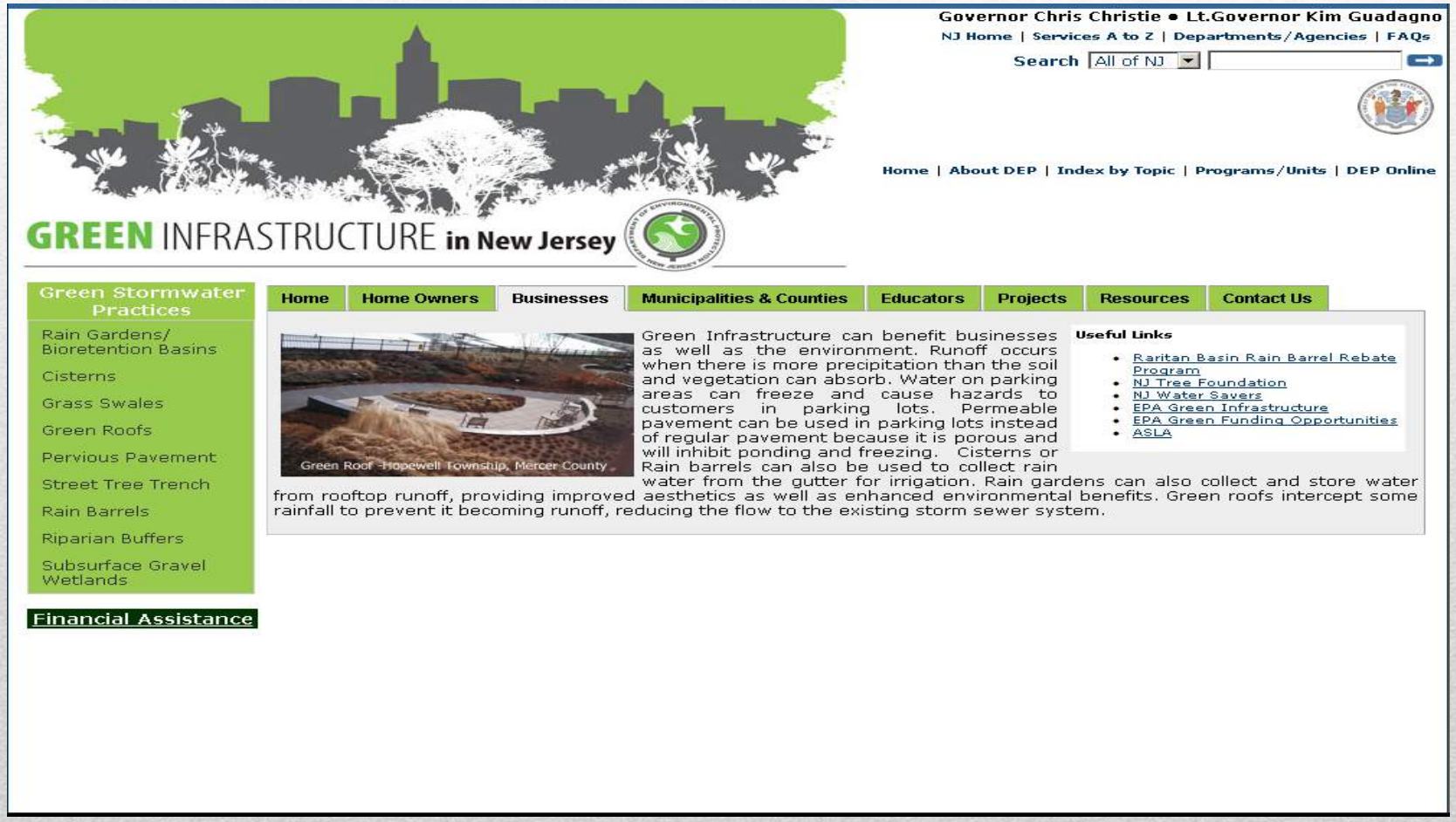
Evaluation of CSO Control Alternatives

- **7 Strategies Required to Be Evaluated**
  - Green Infrastructure
  - Sewer Separation
  - Increased Storage
  - POTW Expansion
  - Inflow/Infiltration Reduction
  - Treatment at the CSO outfall
  - Bypass of POTW Secondary Treatment

- **Alternatives analysis must include reasonable assessment of cost and performance**

CSO Alternatives: Green Infrastructure

www.nj.gov/dep/gi/index.html



CSO Alternatives: Storage

- Off-line storage—Retention basins/tunnels to store wet weather flow for subsequent treatment
- On-site storage at WWTP to manage excess wet weather flow

CSO Alternatives: Treatment Technologies

- Supplemental treatment
- Plant modifications
- Disinfection
- Screening
- Satellite treatment

Final Selection of CSO Control Alternatives

Shall be based on:

- Protection of **Water Quality Standards**
- Designated uses
- Cost-effectiveness of controls
- Financial capability
- Control priorities
- Site specific conditions
- Public input
- Other considerations

Thank you for your attention.

NEW JERSEY
SURFACE WATER QUALITY STANDARDS
FOR THE SUPPLEMENTAL CSO TEAM

Biswarup (Roop) Guha
Division of Water Monitoring and Standards
New Jersey Department of Environmental Protection
July 2017

Overview of the definition of water quality “standards” and “criteria”

Water Quality Standards and Criteria

"Surface Water Quality Standards" (SWQS) means the rules, in this chapter, **N.J.A.C. 7:9B**, which set forth, **designated uses**, use **classifications**, and water quality **criteria** for the State's waters based upon such uses, **and** the Department's **policies** concerning these uses, classifications and criteria.

"Criteria" means those elements of the Surface Water Quality Standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When the criteria are met, water quality will generally protect the designated use.

Surface Water Quality Standards (SWQS)

Classifications Based on uses

- Aquatic life –natural and established biota
- Water Supply - Drinking water
- Recreation – Primary, Secondary
- Shellfish harvesting
- Agricultural and Industrial supplies, Navigation and any other reasonable use

Water quality criteria protect uses

- Aquatic life – Short and long-term exposures
- Human Health - Fish Consumption + Drinking Water
- Recreation

Policies

- General and Technical
- Antidegradation
- Mixing zone

Numeric

- Frequency
- Duration
- Magnitude

Narrative

Qualitative benchmark to protect water quality

Based on science – Economic and technological feasibility not taken into account

Criteria

Protect designated use of the waterbody and limit respective pollutant

Overview of the water quality classifications of each water body

SWQS - Waterbody Classification

Freshwaters

- FW1
- PL
- **FW2**

- Trout Production (TP)
- Trout Maintenance (TM)
- **Non-Trout (NT)**

Uses determined through Use Attainability Analysis (UAA)

- Recreation (Pathogens)
- Aquatic life (Dissolved Oxygen)

- **SE1** (Fishable & swimmable)
- **SE2** (Secondary contact, maintenance and migration of fish)
- **SE3** (Secondary contact and migration of fish)

Designated Uses for Waterbody Classifications

FW2

- Maintenance, migration and propagation of the natural and established biota;
- Primary contact recreation;
- Industrial and agricultural water supply;
- Public potable water supply after conventional filtration treatment
- Any other reasonable uses.

SE1

- **Shellfish harvesting** in accordance with N.J.A.C. 7:12;
- Maintenance, migration and **propagation** of the natural and established biota;
- **Primary contact recreation**; and
- Any other reasonable uses.

SE2

- Maintenance, migration and **propagation** of the natural and established biota;
- Migration of diadromous fish;
- Maintenance of wildlife;
- **Secondary contact recreation**; and
- Any other reasonable uses.

SE3

- **Secondary contact recreation**;
- Maintenance and migration of fish populations;
- Migration of diadromous fish;
- Maintenance of wildlife; and
- Any other reasonable uses.

Overview of Classification in the NY/NJ Harbor

Arthur Kill – SE2, SE3
Kill Van Kull – SE3
Newark Bay – SE3
Hackensack River

- SE1 (Oradell Dam to Overpeck Cr)
- SE2 (Overpeck Cr to Rt 1 and 9 crossing)
- SE3 (Downstream of Rt 1 and 9 crossing)

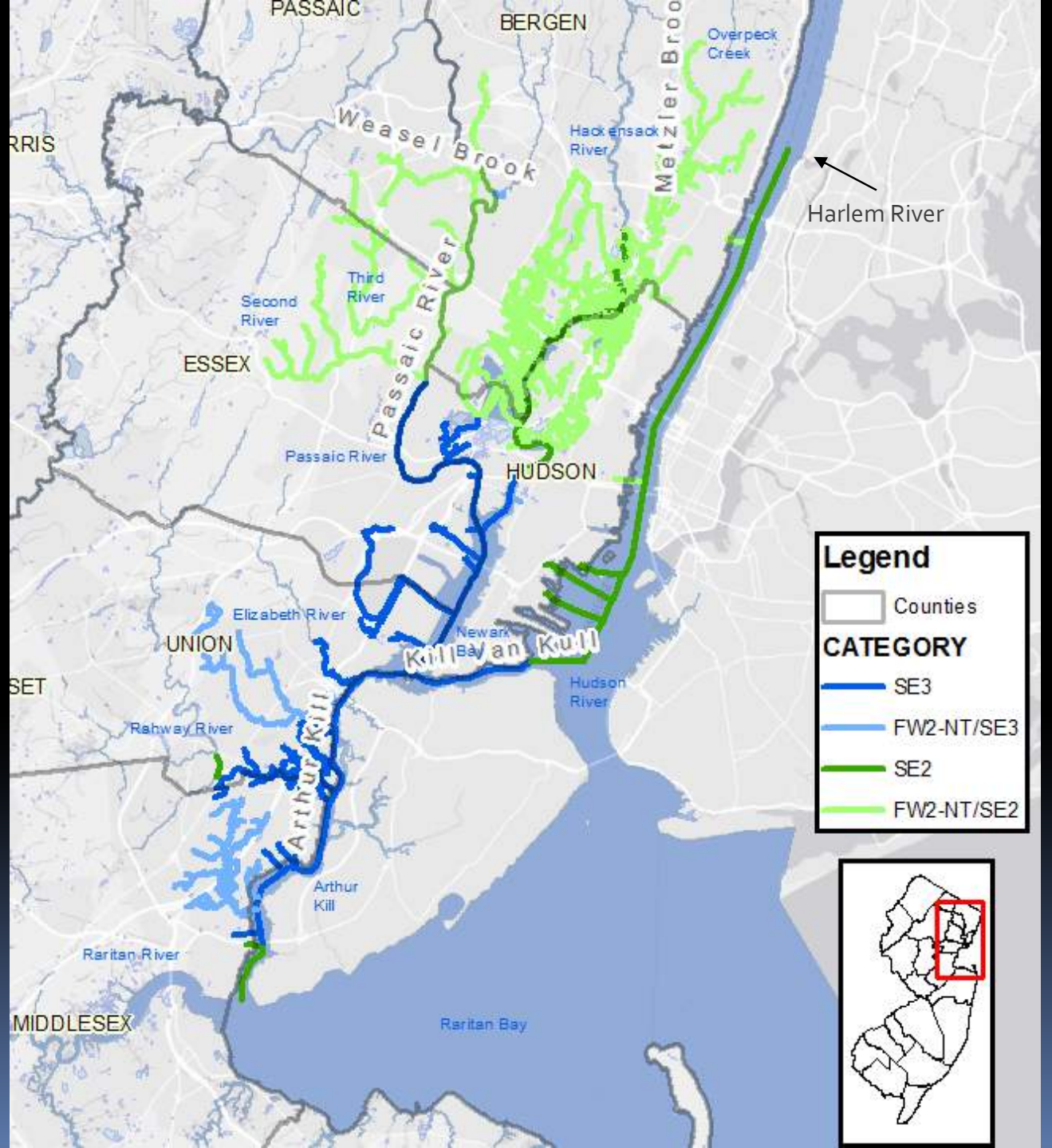
Passaic River

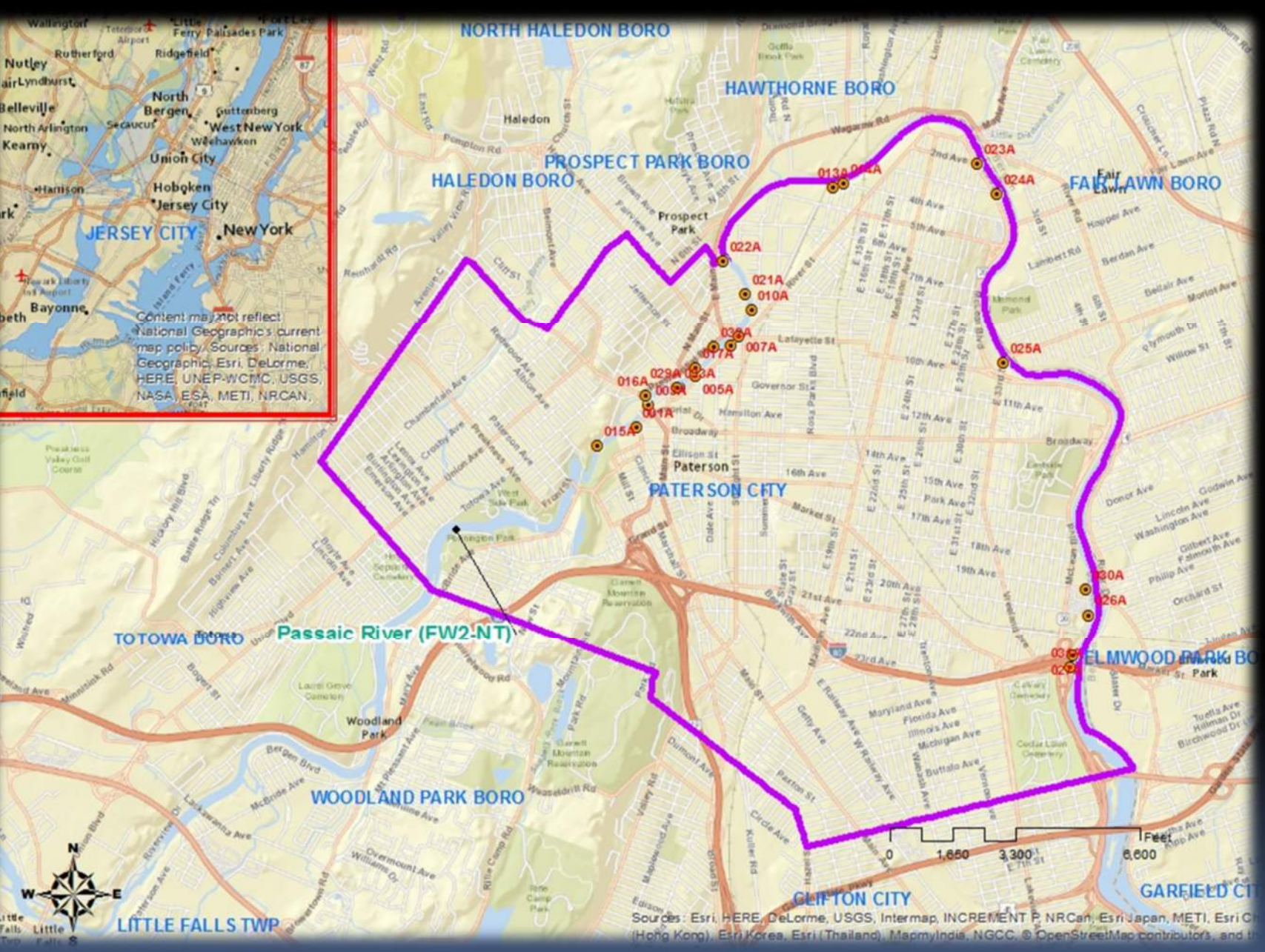
- FW2-NT (Paterson, Osborn Pond to Dundee Lk dam)
- FW2-NT/SE2 (Dundee Lk dam to Second R)
- SE3 (Confluence with Second River to mouth)

Hudson River

- SE1 (North of Harlem River Conf.)
- SE2 (South of Harlem River Conf.)

Regulations - http://www.nj.gov/dep/rules/rules/njac7_9b.pdf
GIS Layers- http://www.nj.gov/dep/gis/listall.html





Paterson

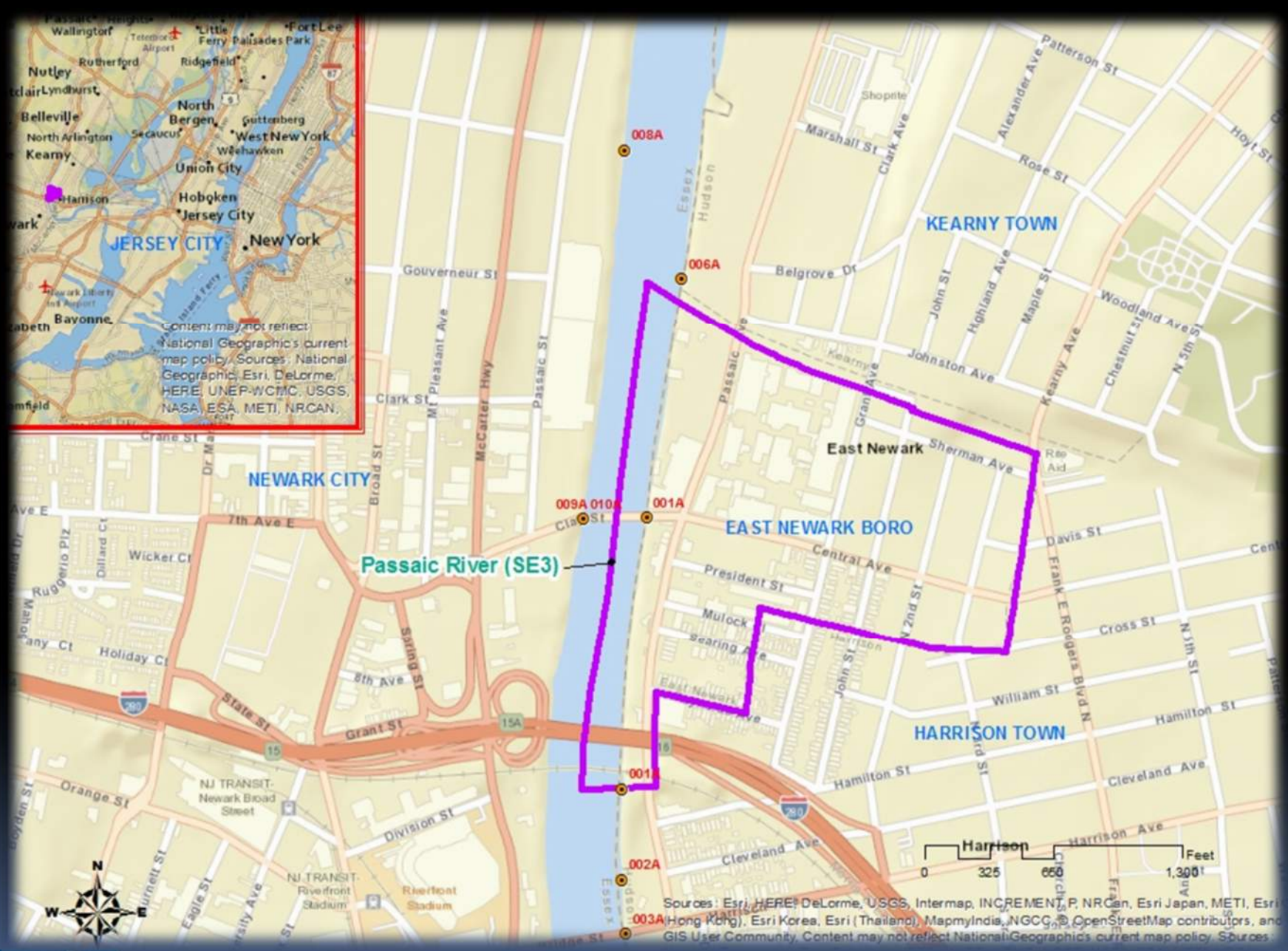
Receiving Water (Classification)

Passaic River (FW2-NT)

Harrison

Receiving Water (Classification)

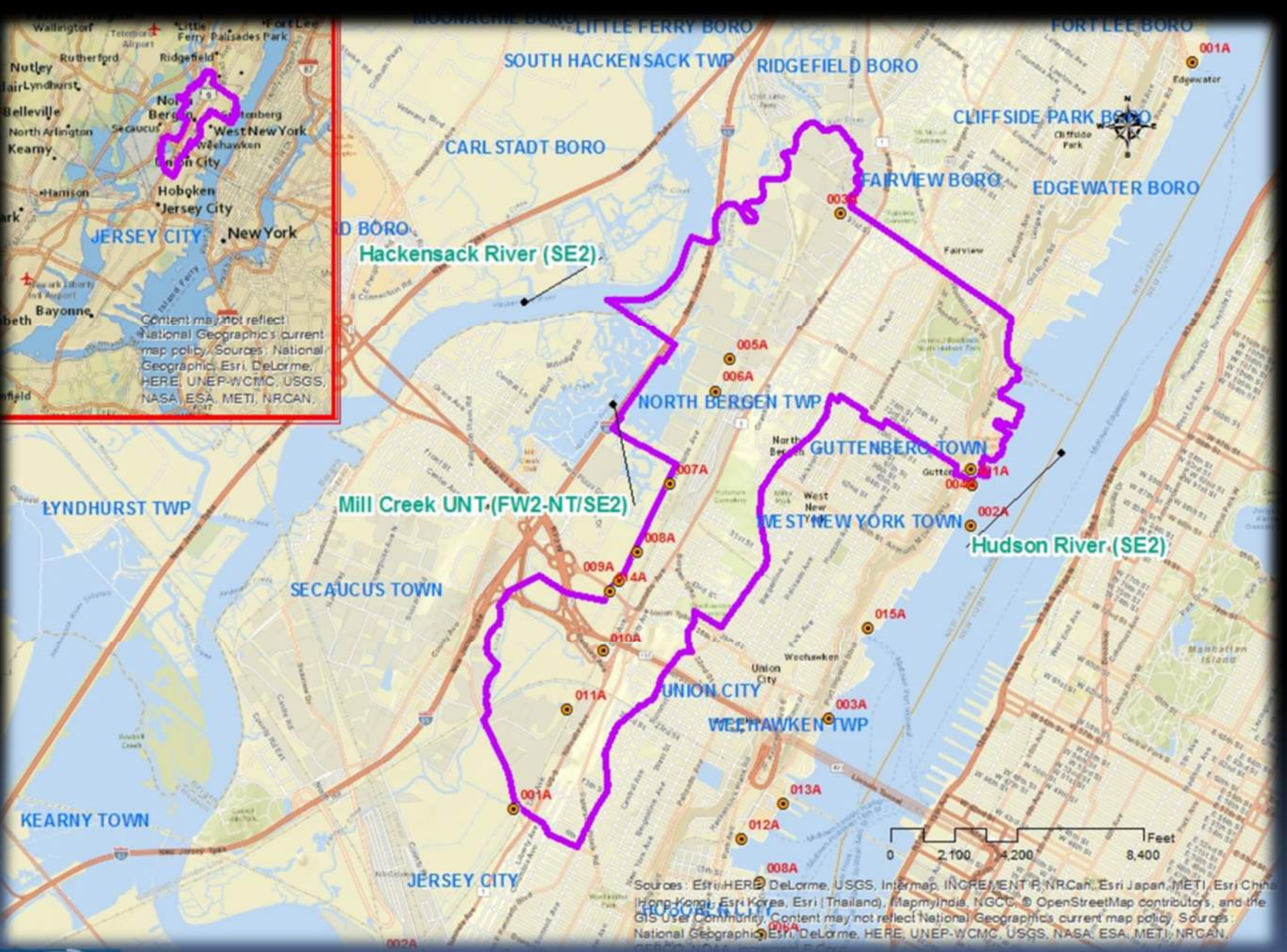
Passaic River (SE3)



East Newark Borough

Receiving Water (Classification)

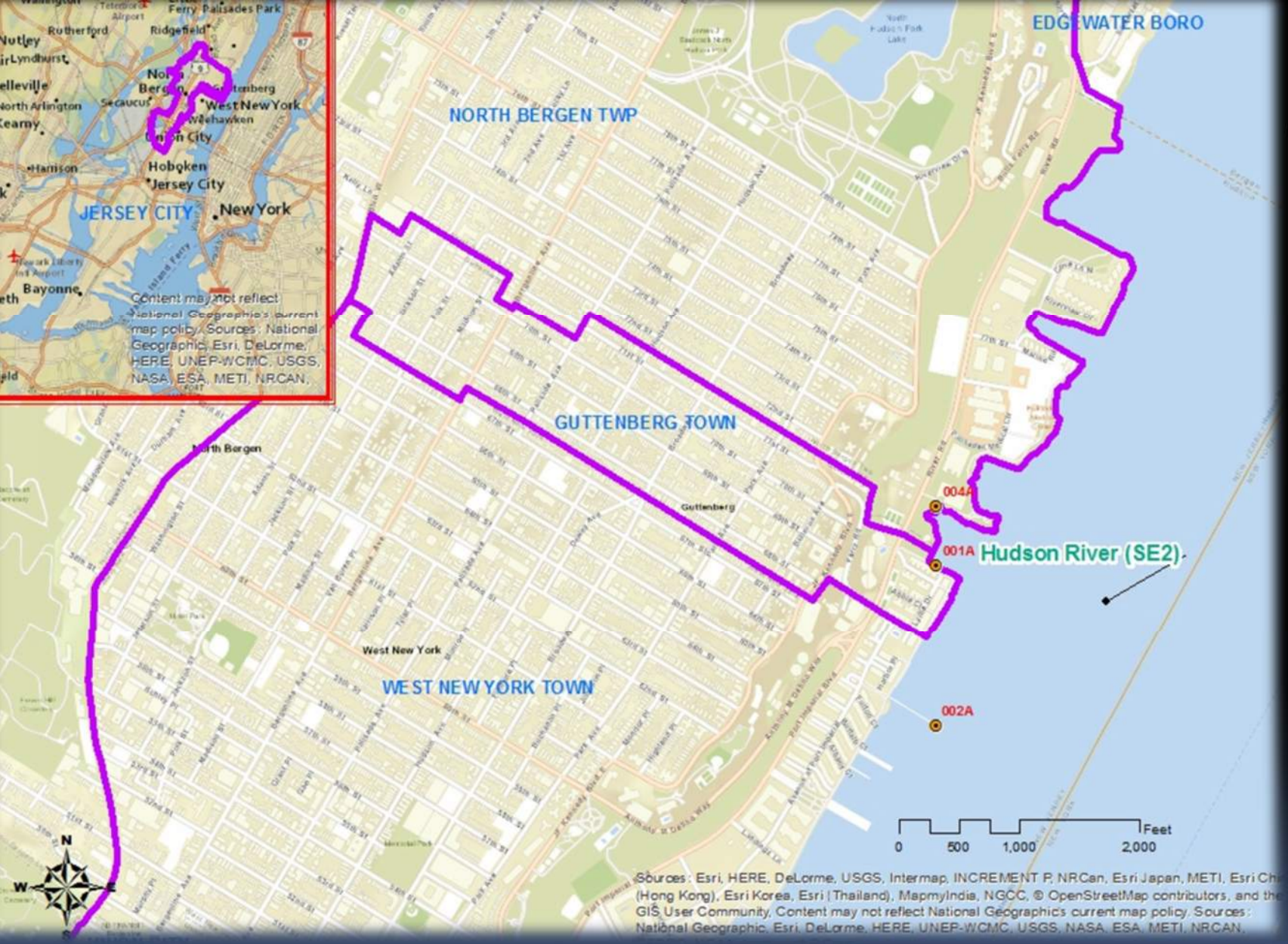
Passaic River (SE3)



North Bergen

Receiving Water (Classification)

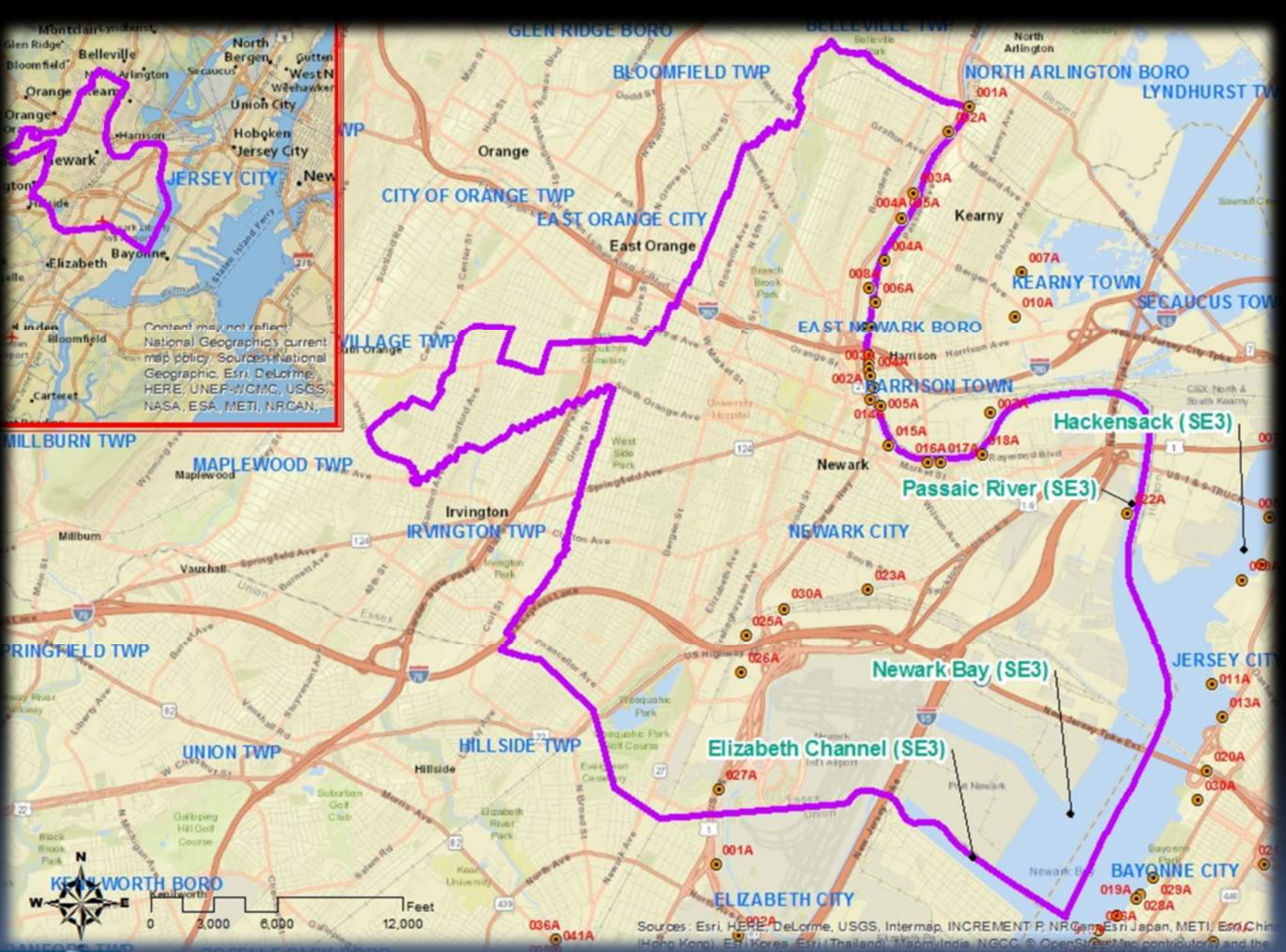
- Hackensack River (SE2)
- Mill Creek (SE3)
- Hudson River (SE2)



North Bergen - Woodcliff, Guttenberg

Receiving Water (Classification)

Hudson River (SE2)



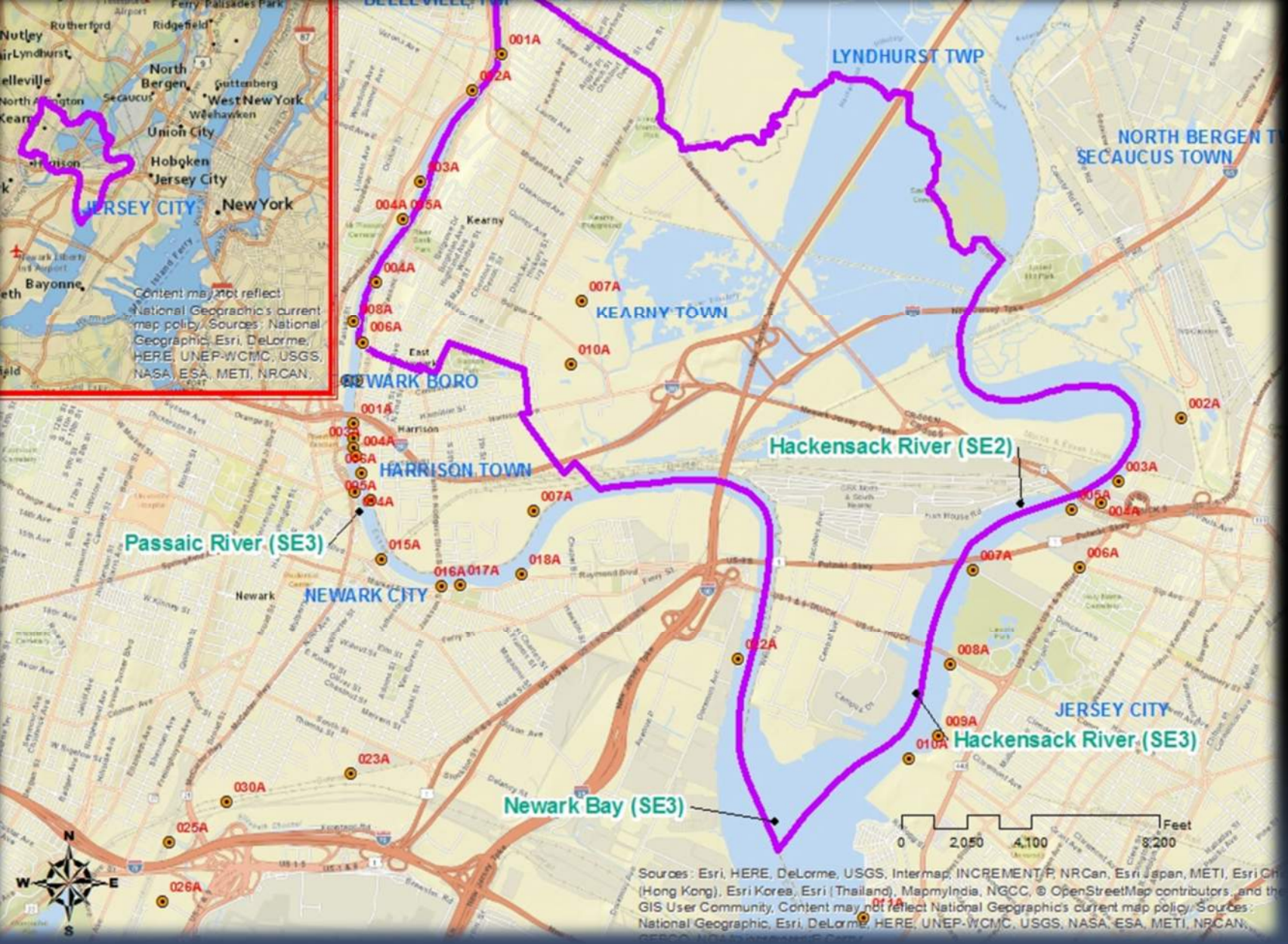
Newark City

Receiving Water (Classification)

Newark Bay (SE3)

Elizabeth Channel (SE3)

Passaic River (SE3)



Kearny

Receiving Water (Classification)

Newark Bay (SE3)

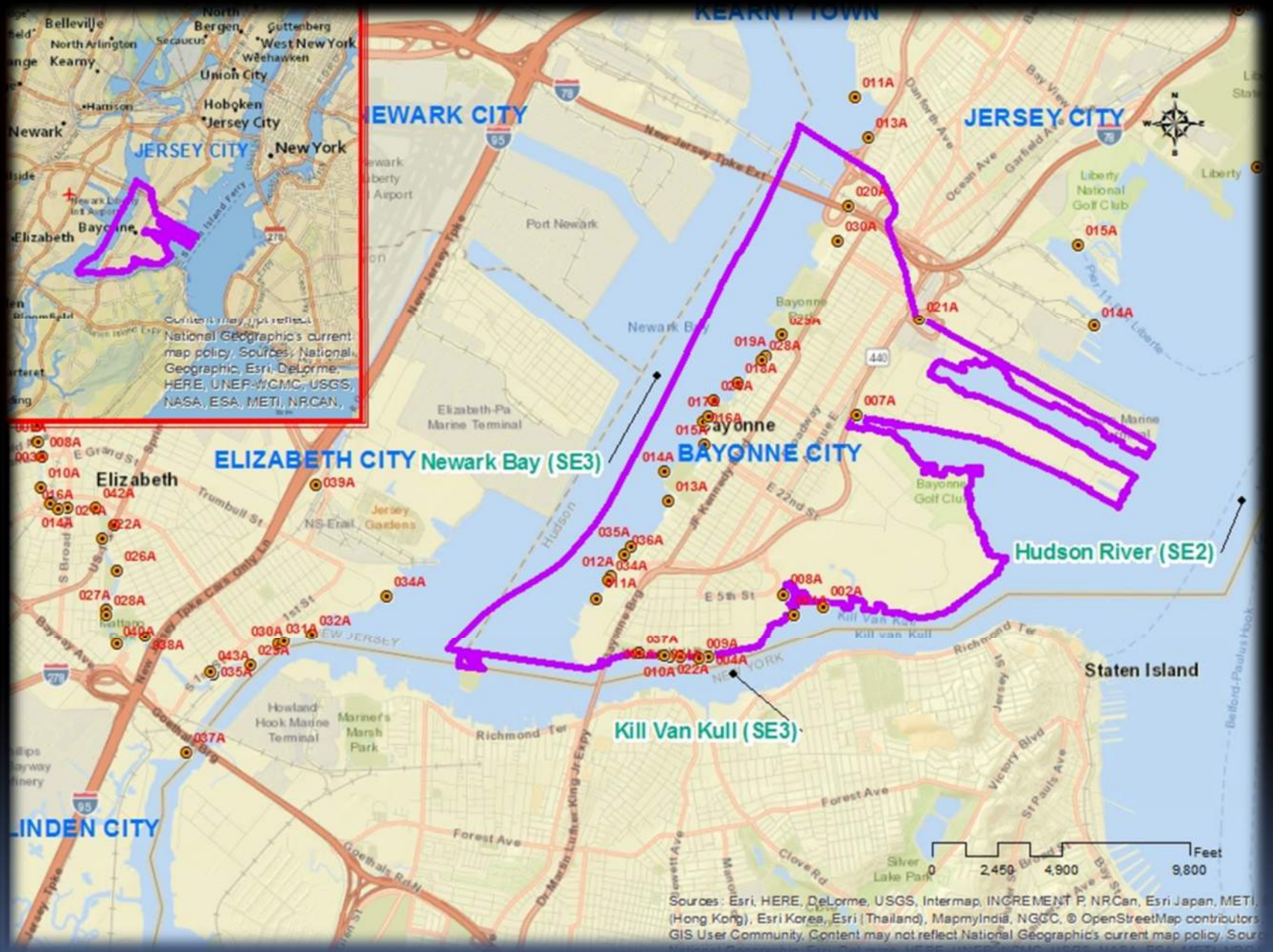
Hackensack River (SE3)

Passaic River (SE3)

Jersey City

Receiving Water (Classification)

- Newark Bay (SE3)
- Hackensack River (SE2 ,SE3)
- Hudson River (SE2)



Bayonne

Receiving Water (Classification)

Kill Van Kull (SE3)
Newark Bay (SE3)
Hudson River (SE2)

Perth Amboy

Receiving Water (Classification)

Arthur Kill (SE2, SE3)
Raritan Bay (SE1)

Overview of the criteria that apply in each water body

Surface Water Quality Standards

Bacterial quality (Counts/100 ml) - N.J.A.C. 7:9B-1.14(d)1

Classifications SE2 and SE3 - Based on 1985 Use Attainability Analysis (UAA)

UAA

- Structured scientific assessment of the factors affecting the attainment of uses specified in Section 101(a)(2) of the Clean Water Act (the so called "fishable/swimmable" uses).
- Must be conducted for any water body when a state or authorized tribe designates uses that do not include uses specified in section **101(a)2 of the CWA or** when designating sub-categories of these uses that require less stringent criteria than previously applicable.

Factors considered (40 CFR 131.10(g))

- ❑ Naturally occurring pollutant concentrations
- ❑ Natural, ephemeral, intermittent or low flow conditions
- ❑ Human caused conditions or sources of pollution that cannot be remedied or would cause more environmental damage to correct
- ❑ Dams, diversions or other types of hydrologic modifications and it is not feasible to restore the water body to its original condition
- ❑ Physical conditions such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like
- ❑ Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Explanation of what is a geometric mean

What is a geometric mean

Geometric mean is the average of n positive numbers obtained by taking the n^{th} root of the product of the numbers.

or

Geometric mean is a type of average, which indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum).

Geometric Mean of 1, 3, 9, 27 and 81

$= \sqrt[5]{(1 \times 3 \times 9 \times 27 \times 81)} = 9$ (arithmetic mean = 24)

Comparison with NY State standards in shared water bodies

Surface Water Quality Standards
Comparison of NJ and NY Recreational Criteria in Shared Waters

	New Jersey		New York	
Indicator	Enterococcus	Fecal Coliform	Fecal Coliform	Total Coliform
Designated uses	Primary contact recreation (SE1)	Secondary contact recreation (SE2 and SE3)	I (*Raritan Bay, Arthur Kill*), SB (*Raritan Bay, Lower New York Bay West Portion*) and SD (*Arthur Kill, Newark Bay, Kill Van Kill*) - Primary and secondary contact recreation, although other factors may limit the use for this purpose.	
Geometric Mean	35 / 100 ml	770 / 100 ml (SE2) 1,500 / 100ml (SE3)	200 / 100 ml	NA
Single Sample Max.	104 / 100 ml	NA	NA	NA
Monthly Median	NA	NA	NA	2,400 / 100 ml
20% samples	NA	NA	NA	5,000/100 ml
Sampling frequency	5 samples in 30 days		Minimum of 5 samples	
Averaging period				
Applicability	Year-round		Seasonal	

Overview of the status of changing the pathogens standards

Primary Contact Recreational Criteria Anticipated Revisions (Saline Waters – SE1 and SC)

Indicator - Enterococcus	NJ Current	Anticipated
Geometric mean	35 / 100 ml	30 / 100 ml
Single Sample Maximum	104 / 100 ml	N/A
Statistical Threshold Value (STV)	N/A	110 / 100 ml
No. of Samples	Minimum 5 in 30 days	Not specified
Averaging period	Seasonal	90 days*
Applicability	A n n u a l	

Primary Contact Recreational Criteria (Contd.) Anticipated Revisions (Fresh Waters – FW2)

Indicator – E. Coli	NJ Current	Anticipated
Geometric mean	126 / 100 ml	100 / 100 ml
Single Sample Maximum	235 / 100 ml	N/A
Statistical Threshold Value (STV)	N/A	320 / 100 ml
Sampling frequency	Minimum 5 in 30 days	Not be specified in SWQS – Will be included in the Methods Document
Averaging period	Seasonal	90 days*
Applicability	A n n u a l	

Questions

Point of Contacts:
Roop Guha: (609) 292-1592 biswarup.guha@dep.nj.gov
Susan Rosenwinkel: (609) 984-4441 Susan.Rosenwinkel@dep.nj.gov

New Jersey Department of Environmental Protection (NJDEP)

Hydrologic and Hydraulic Models

CLEAN WATERWAYS
Healthy Neighborhoods

Why Use a Model?

- To help decision makers for planning, design and operation of collection system
- Tool to simulate future conditions
- Evaluate CSO control alternatives
- Simulate changes to water quality in response to changes of CSO controls

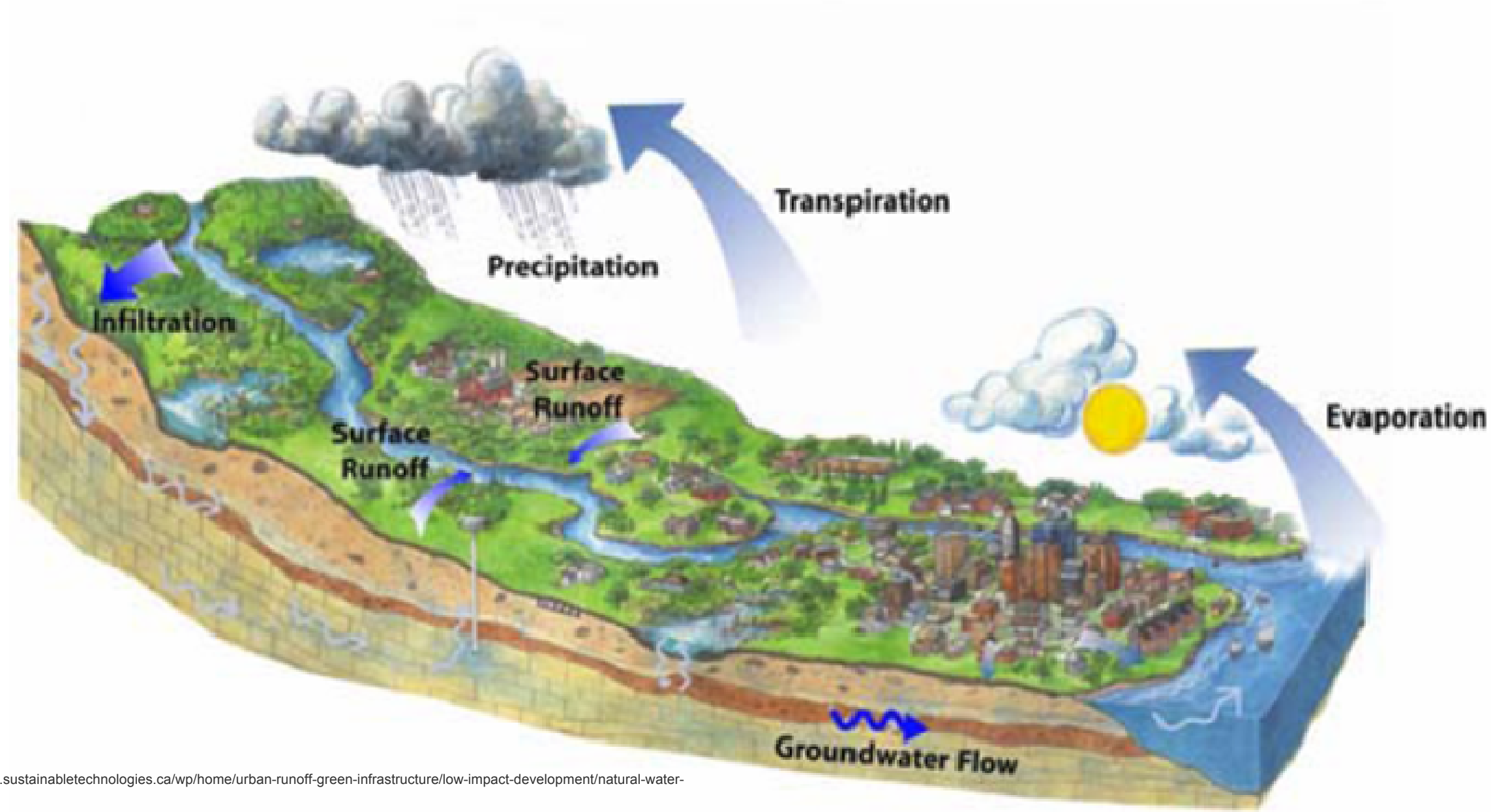
CLEAN WATERWAYS
Healthy Neighborhoods

U.S. EPA CSO Policy requirements for the Long Term Control Plan define the role of modeling

EPA CSO Control Policy (II.C.1; pg. 15): The permittee should adequately characterize through monitoring, modeling, and other means as appropriate, for a range of storm events, the response of its sewer system to wet weather events including the number, location and frequency of CSOs, volume, concentration and mass of pollutants discharged and the impacts of the CSOs on the receiving waters and their designated uses.

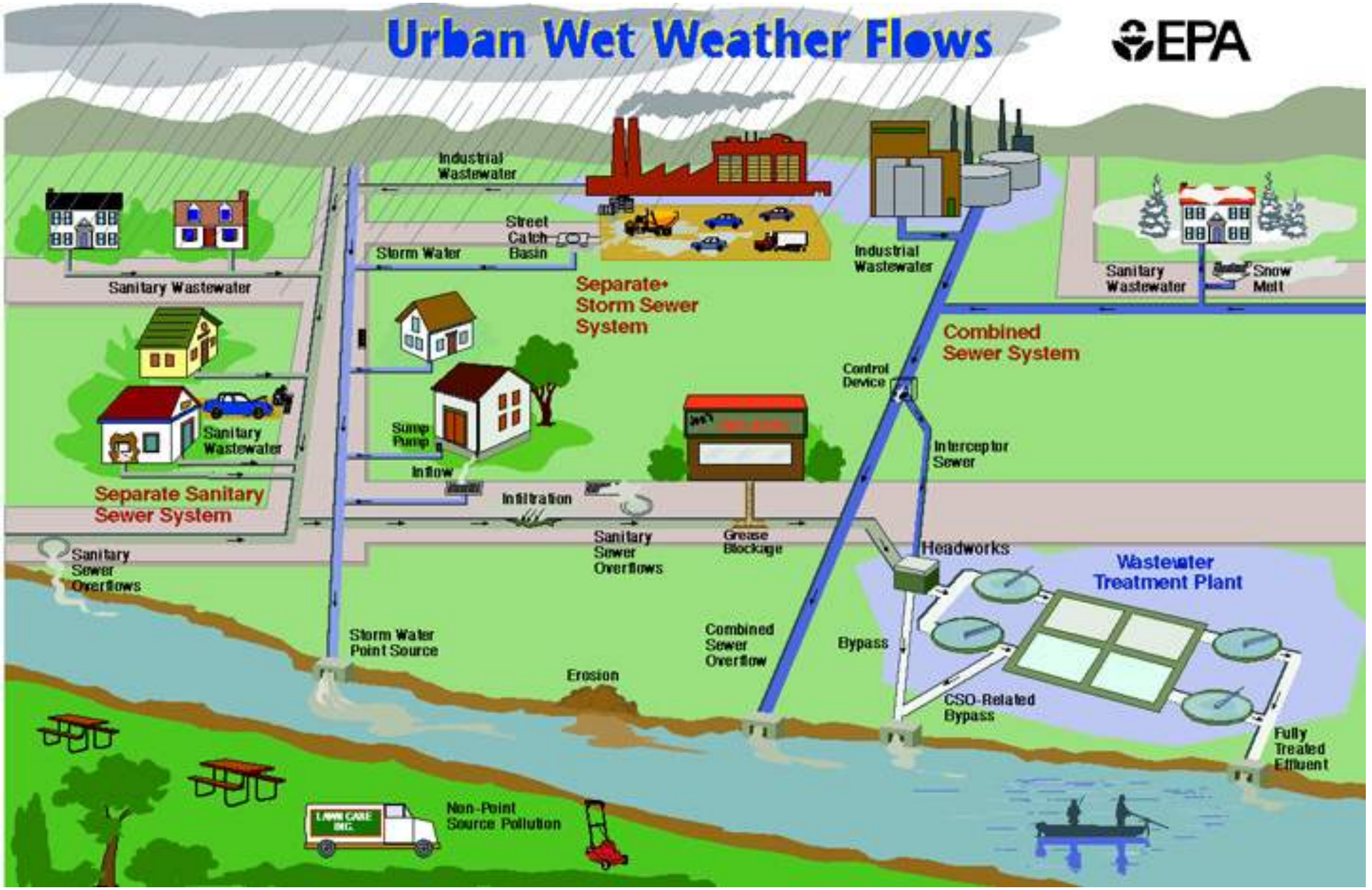
CLEAN WATERWAYS
Healthy Neighborhoods

Hydrologic Modeling

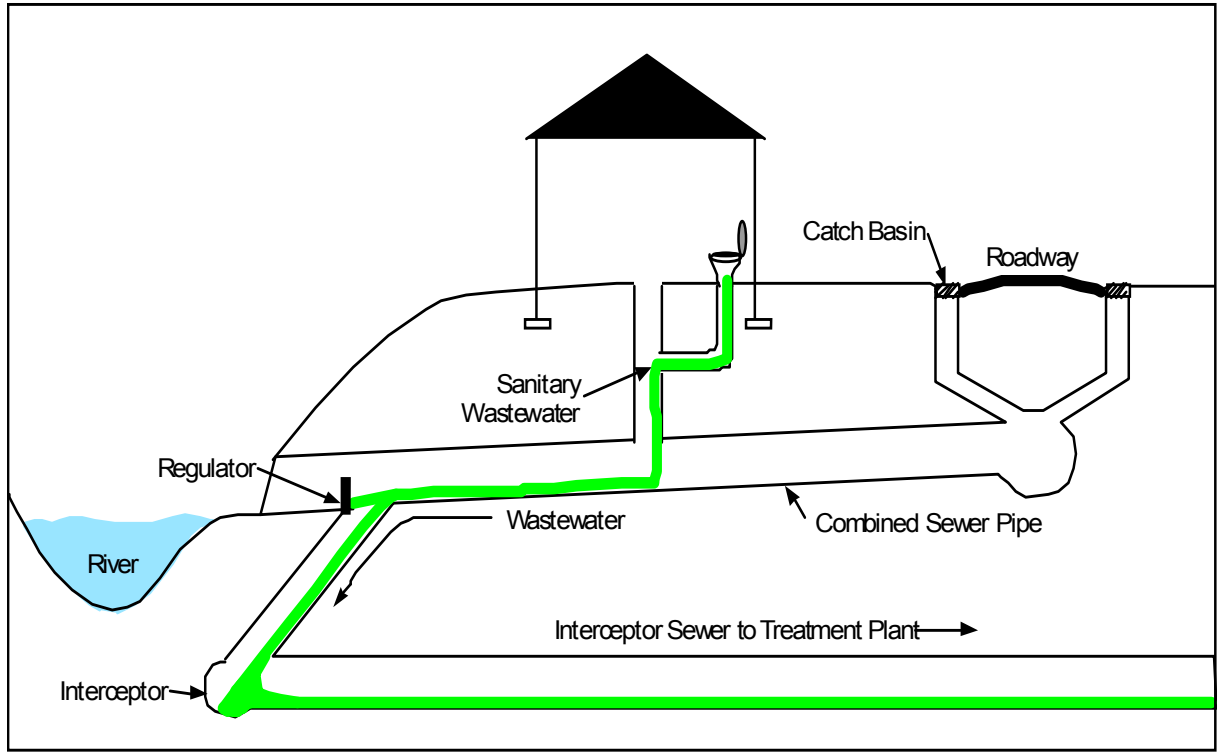


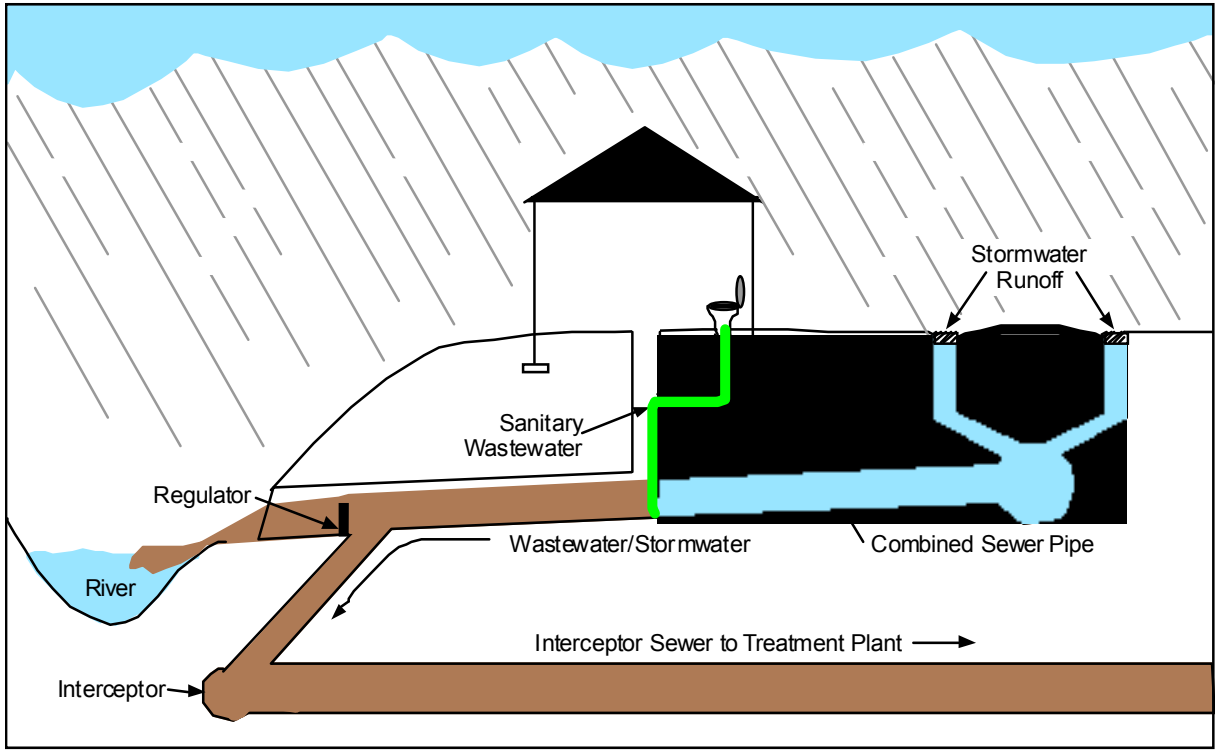
http://www.sustainabletechnologies.ca/wp/home/urban-runoff-green-infrastructure/low-impact-development/natural-water-balance/

Sewer System Model – Hydraulics

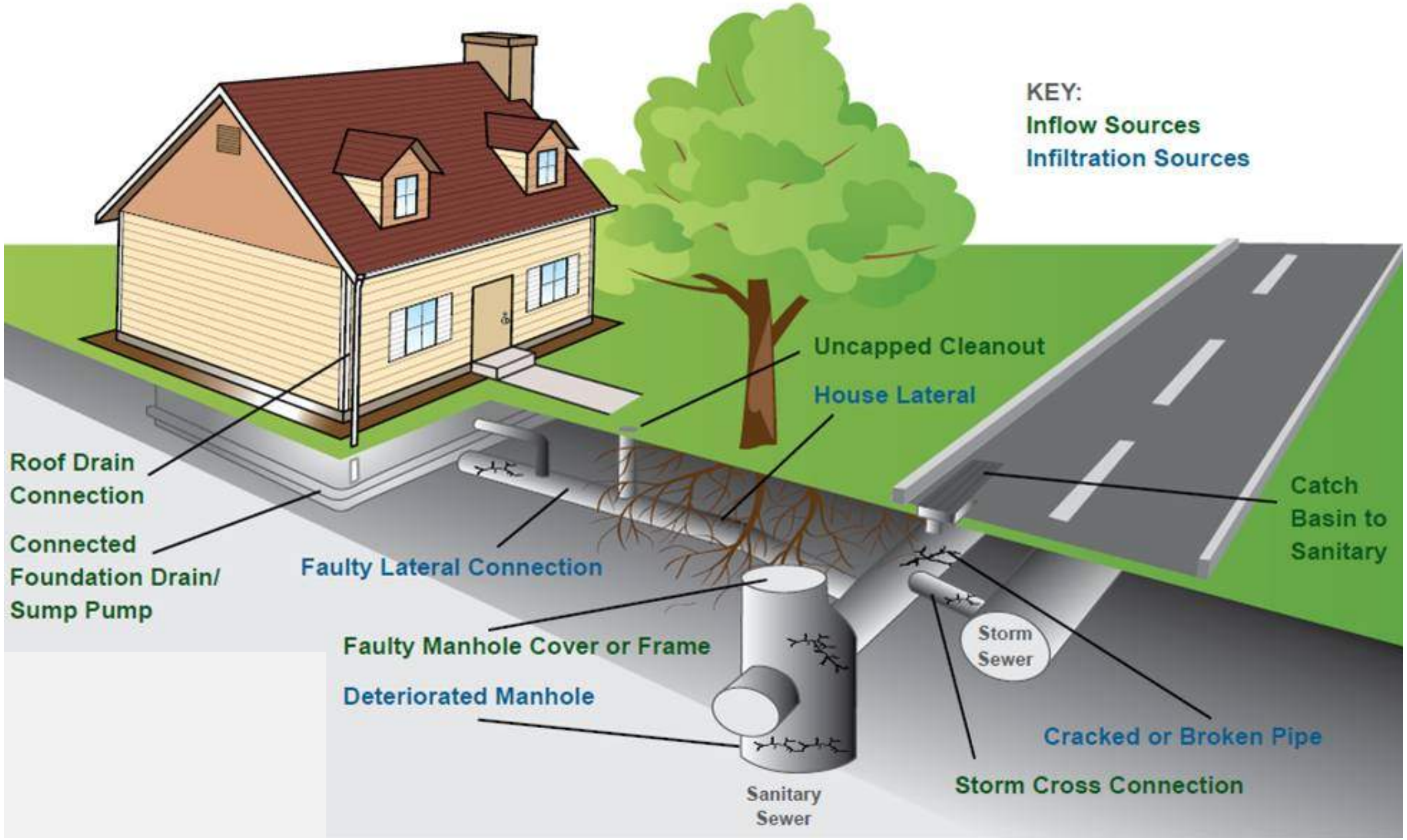


Combined Sewer System Modeling



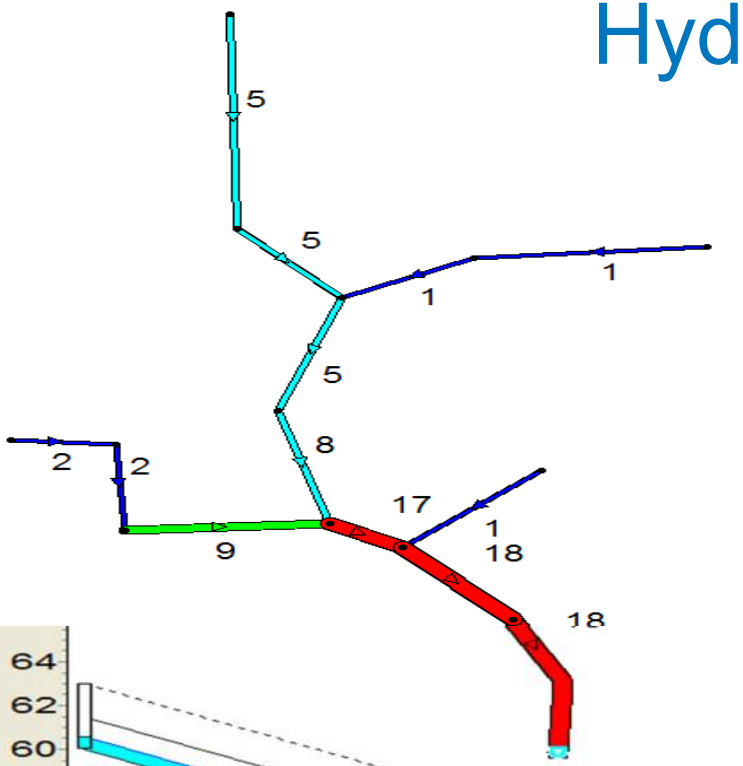


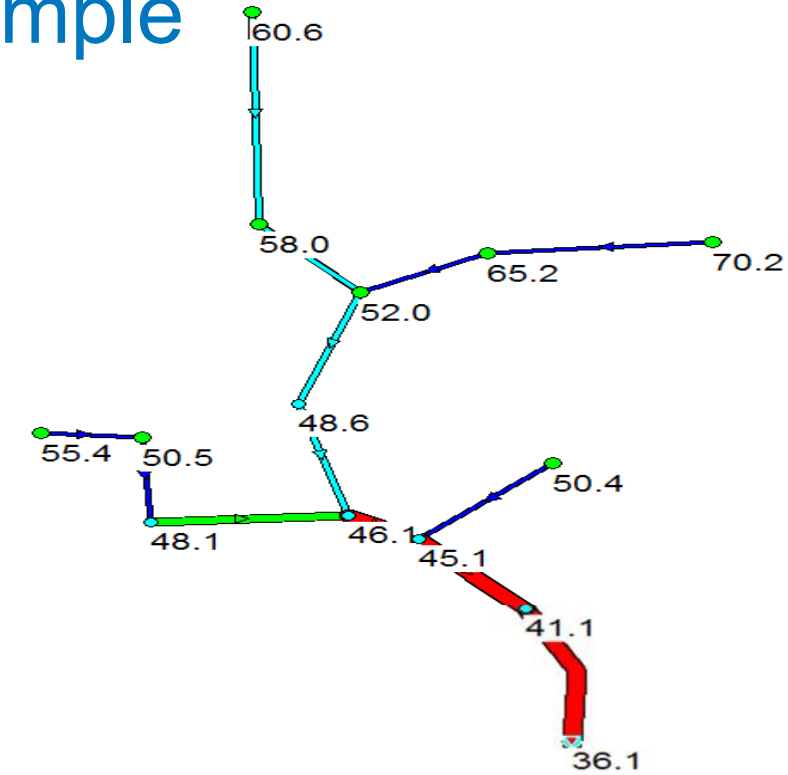
Sewer System Component - Rainfall Driven Inflow and Infiltration (RDII)

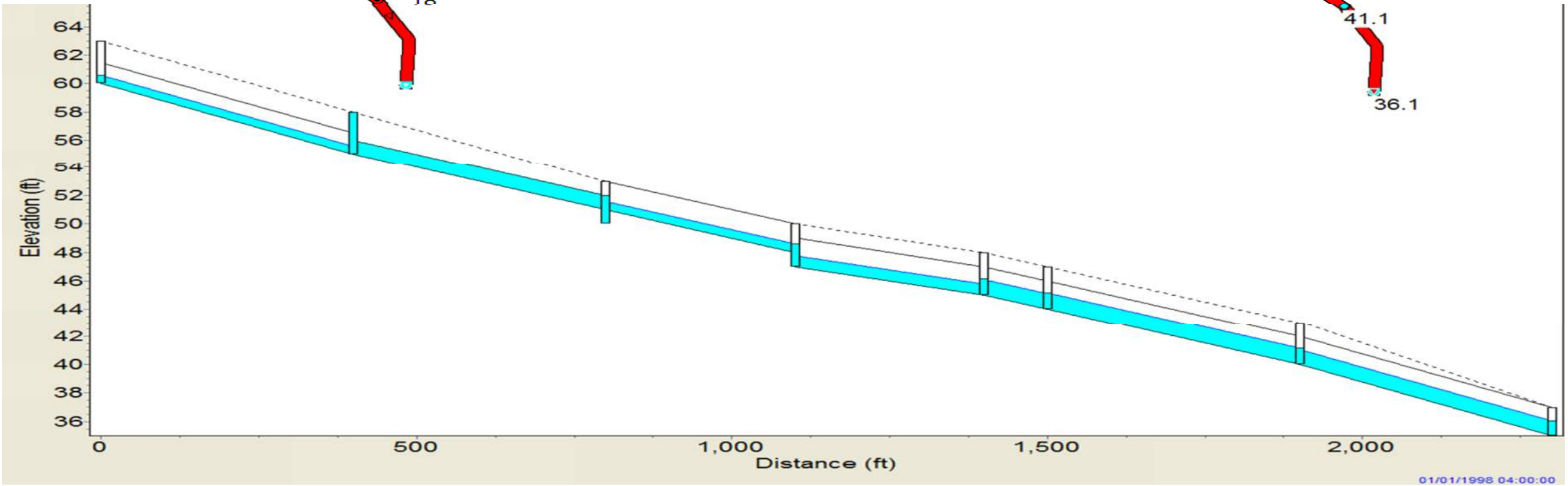


http://www.ci.brookfield.wi.us/758/PPII-Reduction-Program

Hydraulic Modeling Example (SWMM)







NJDEP CSO Permit Requirements

Modeling is used extensively to support several of the NJDEP CSO Permit requirements:

- System Characterization Report – due July 1, 2018
- Development and Evaluation of Alternatives Report – due July 1, 2019
- Selection and Implementation of Alternatives Report (in the Final LTCP) – due June 1, 2020

CLEAN WATERWAYS
Healthy Neighborhoods

How models support these requirements

- Characterization of combined sewer system performance – frequency, duration and volume of outfall-specific CSO discharges
- Generate landside pollutant loads as input to receiving waterbody water quality models
- Size CSO control facilities
- Final balancing and integration of selected control approaches/facilities in LTCP

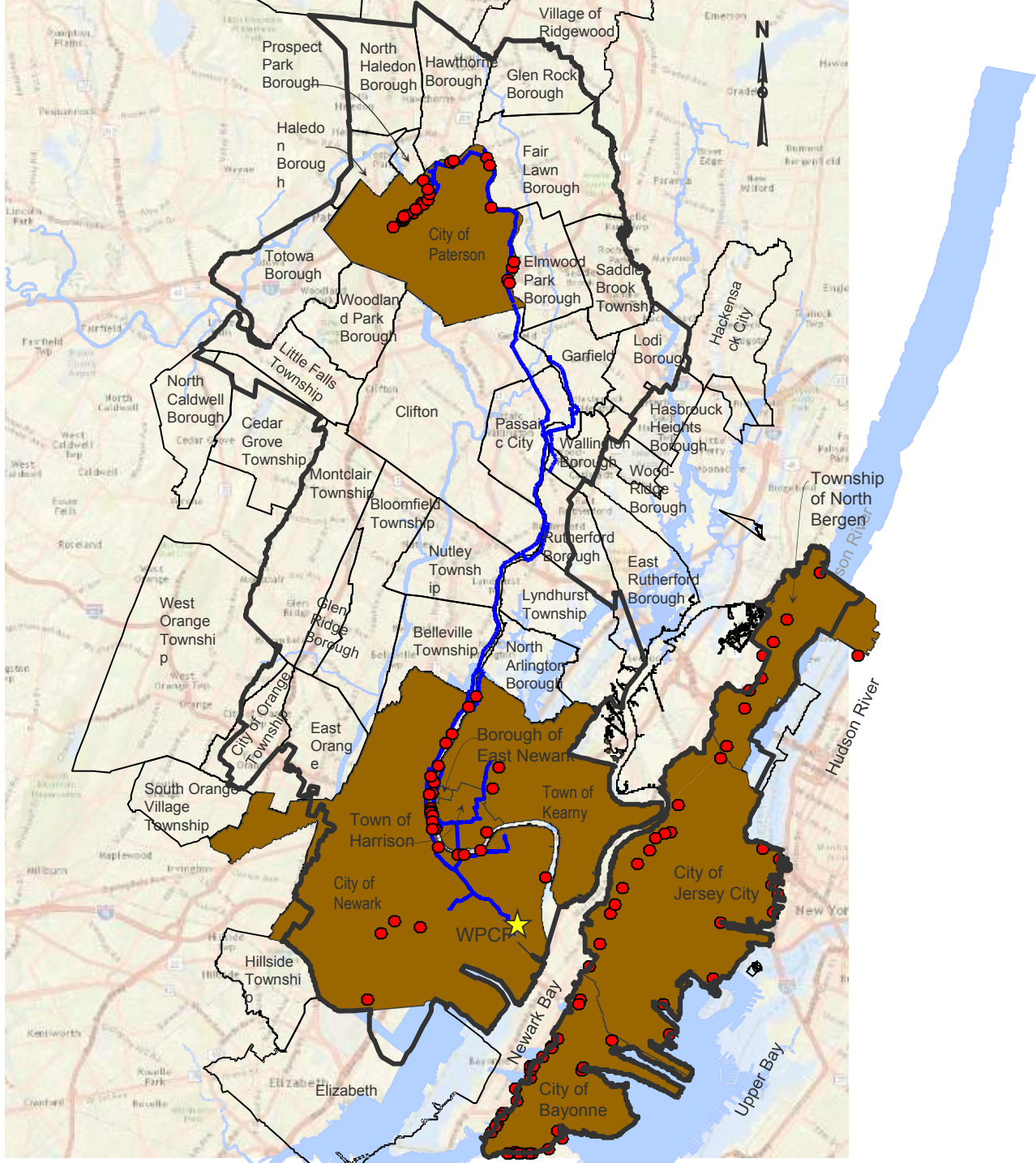
CLEAN WATERWAYS
Healthy Neighborhoods

PVSC Service Area

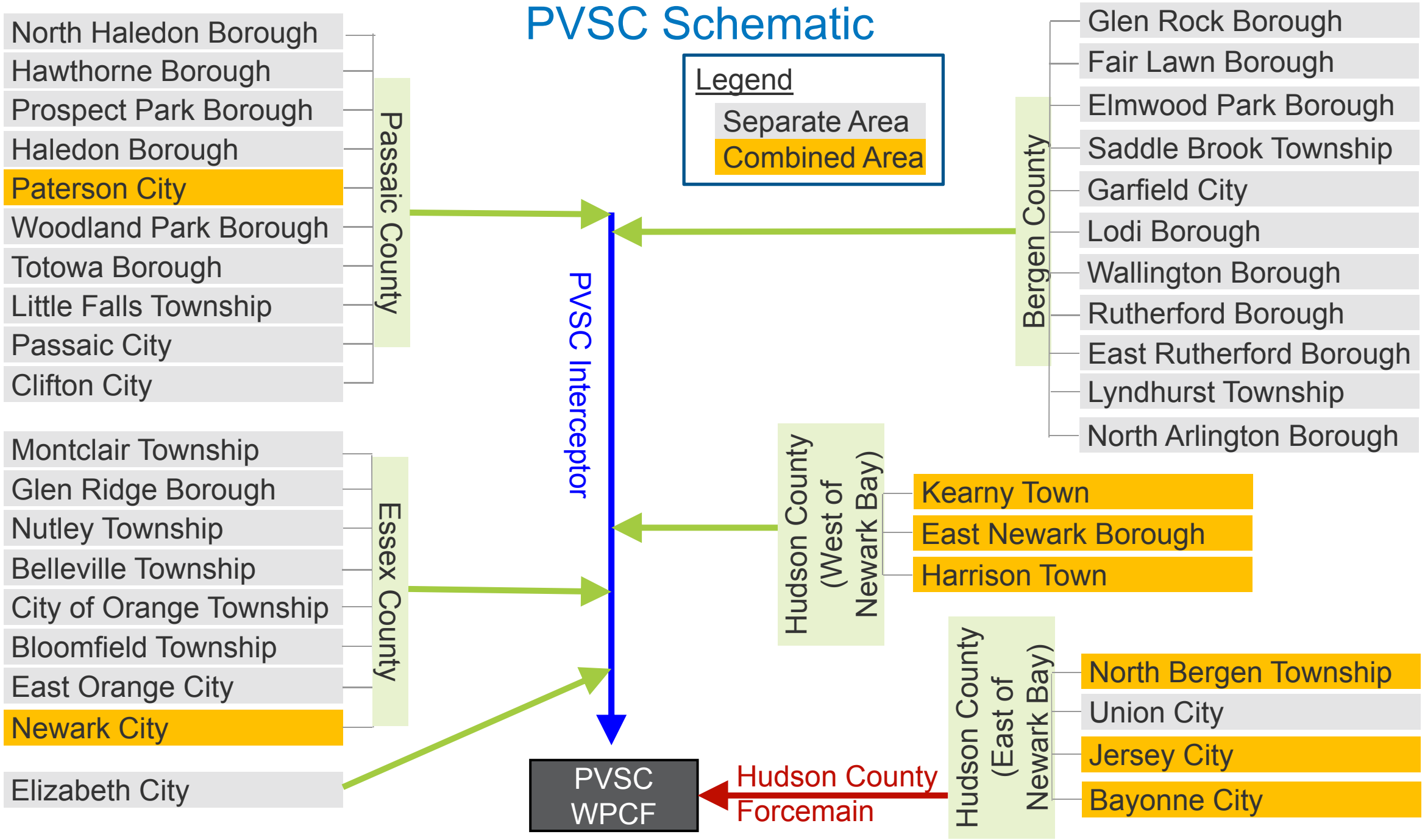
Legend

- PVSC Service Area
- CSO Communities
- Separated Communities
- PVSC WPCF (Water Pollution Control Facility)
- PVSC Interceptor / Sewer
- CSO Outfall

0 1.25 2.5 5 Miles

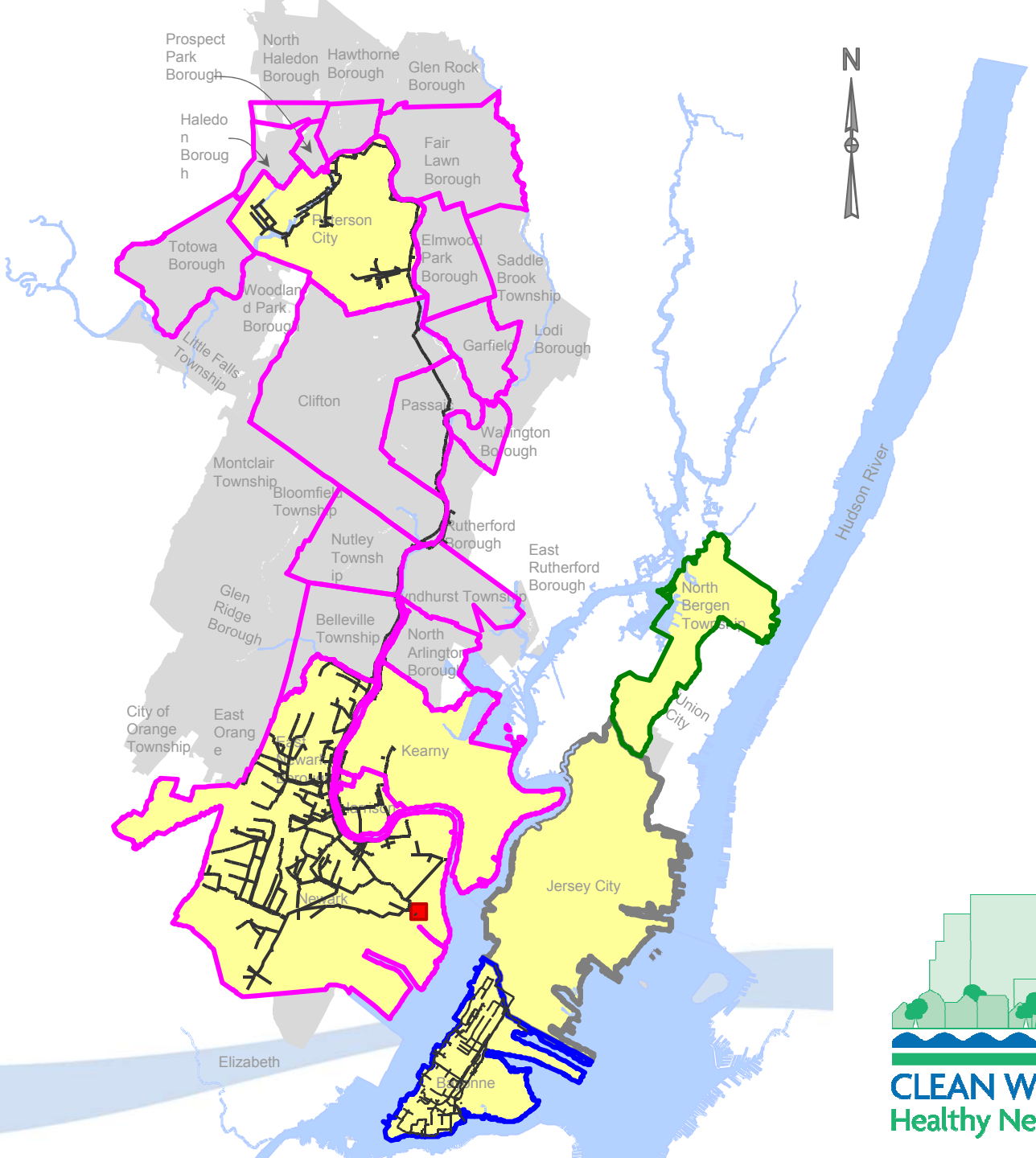


PVSC Schematic



Existing Models

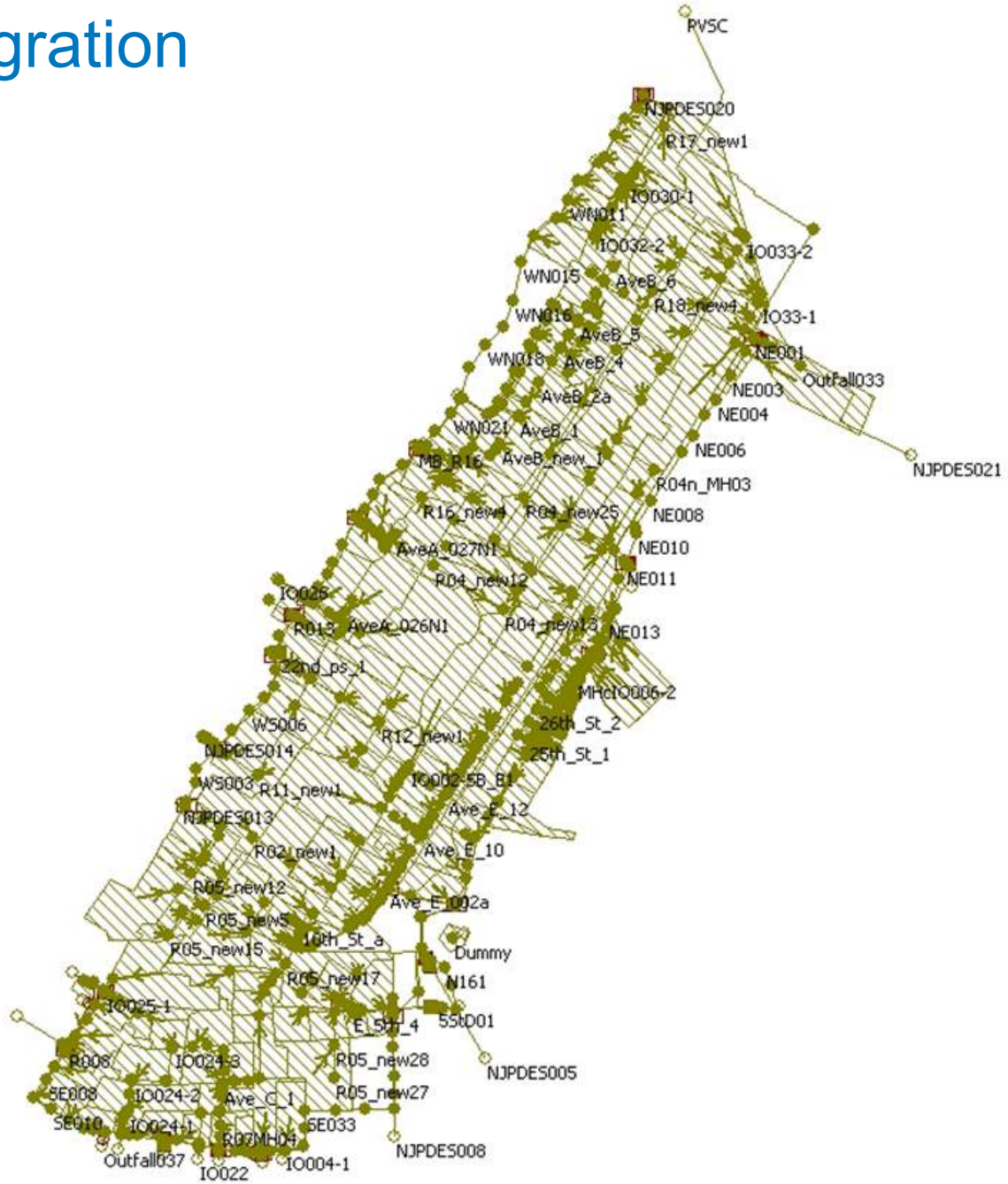
- PVSC Model (InfoWorks CS)
- Bayonne Model (InfoWorks CS)
- North Bergen Model (PCSWMM)
- Jersey City Model (XPSWMM)



CLEAN WATERWAYS
Healthy Neighborhoods

Bayonne Model Integration

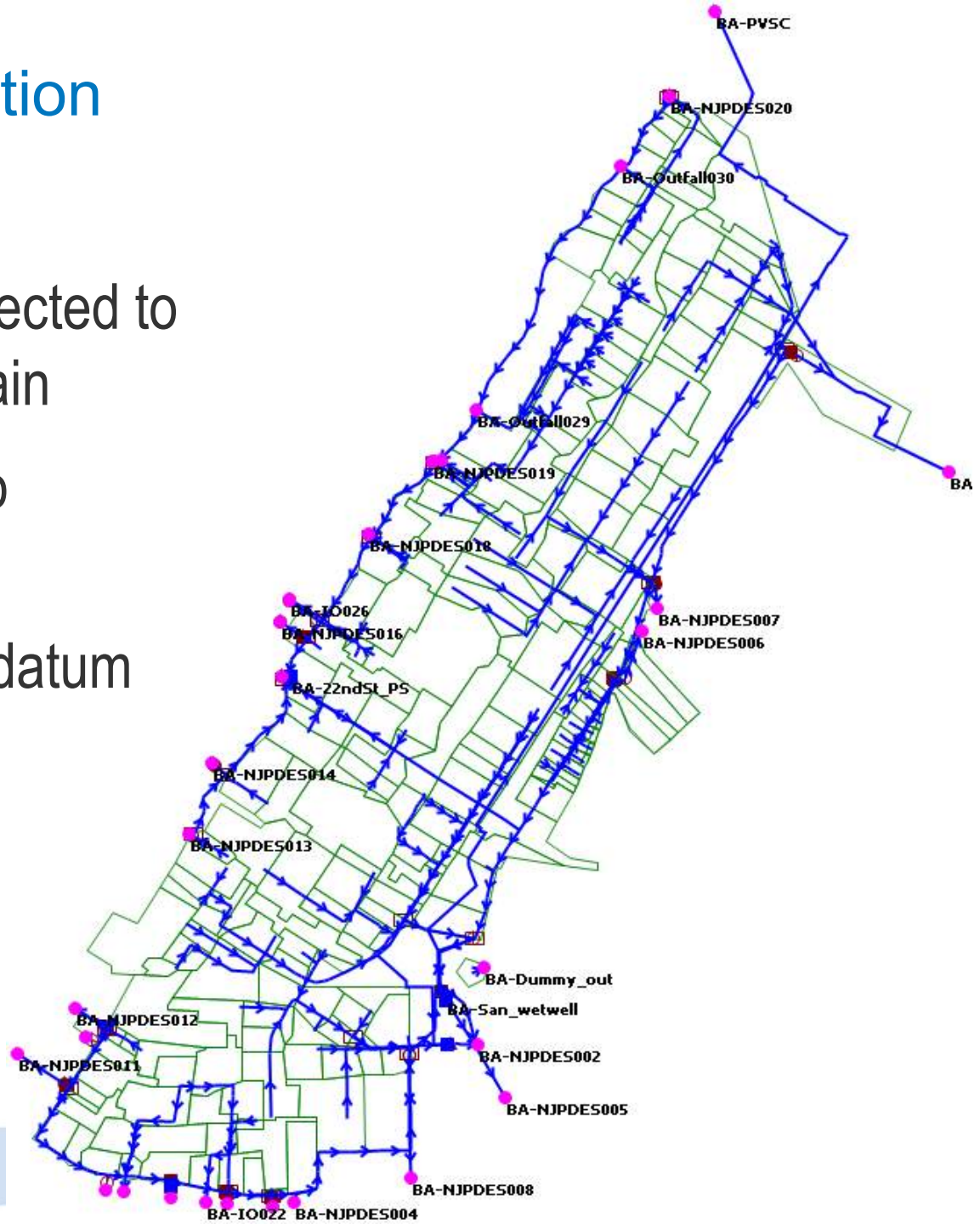
- Existing model
  - Developed by HDR
  - InfoWorks



CLEAN WATERWAYS
Healthy Neighborhoods

Bayonne Model Integration

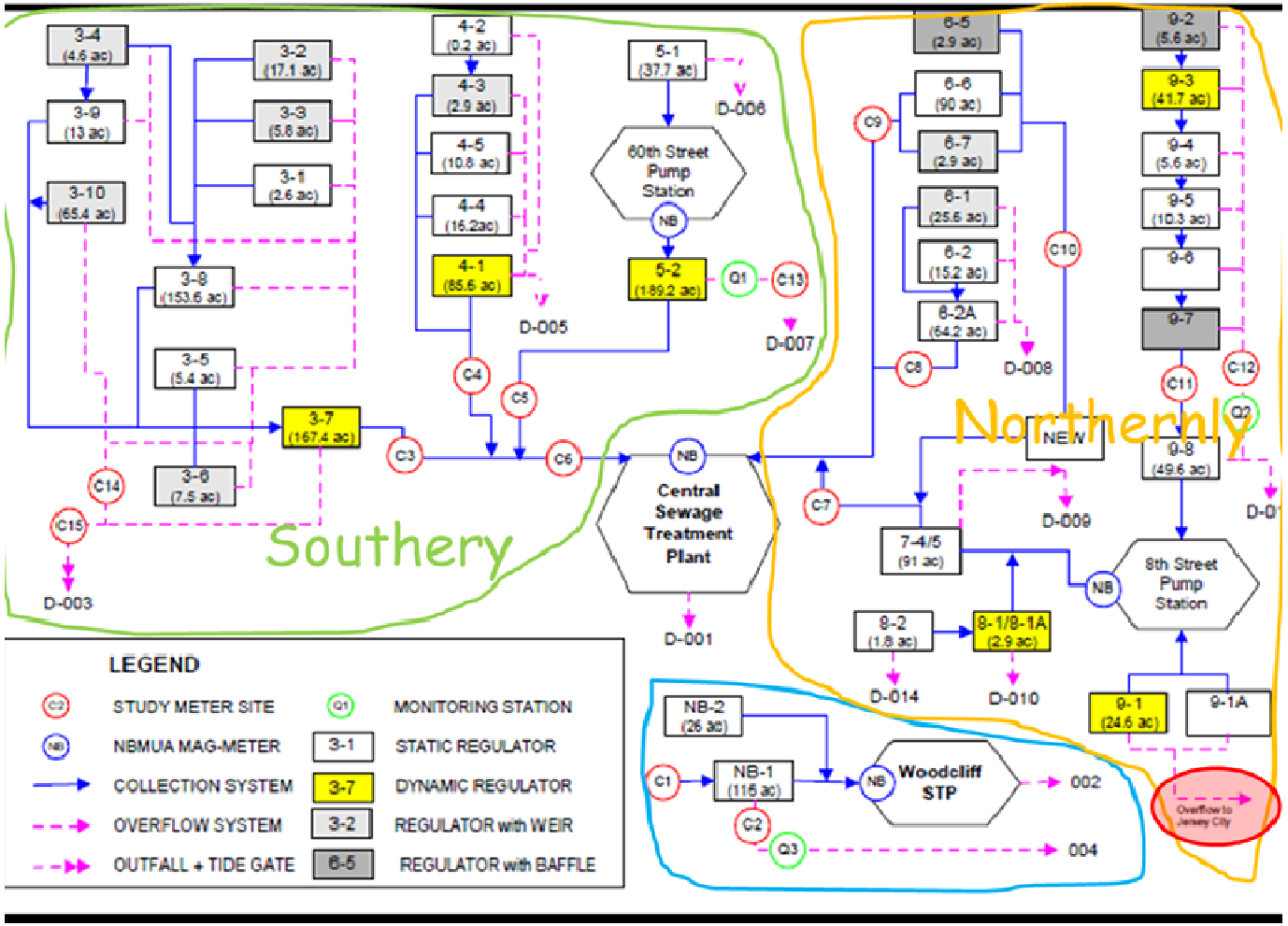
- Bayonne force main connected to Hudson County Force Main
- 11 RTC rules appended to the integrated model
- Datum updated to PVSC datum



CLEAN WATERWAYS
Healthy Neighborhoods

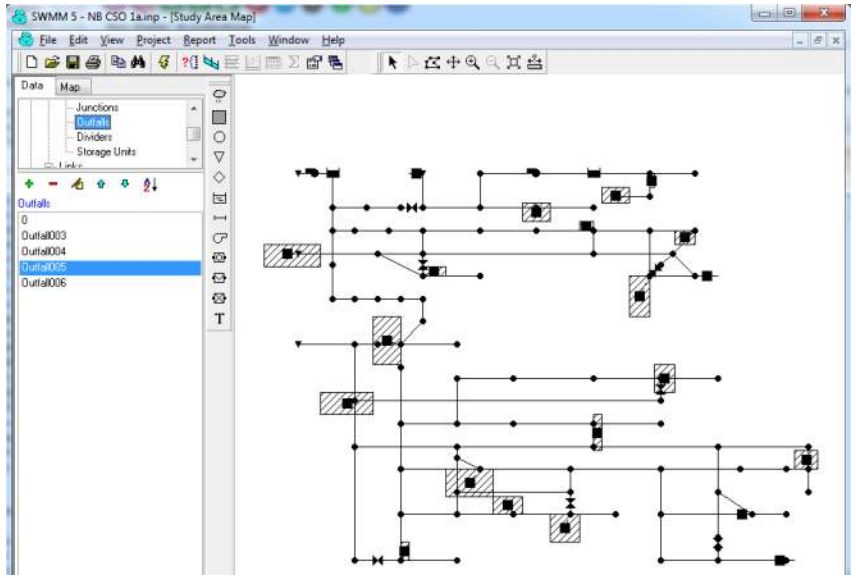
North Bergen Model

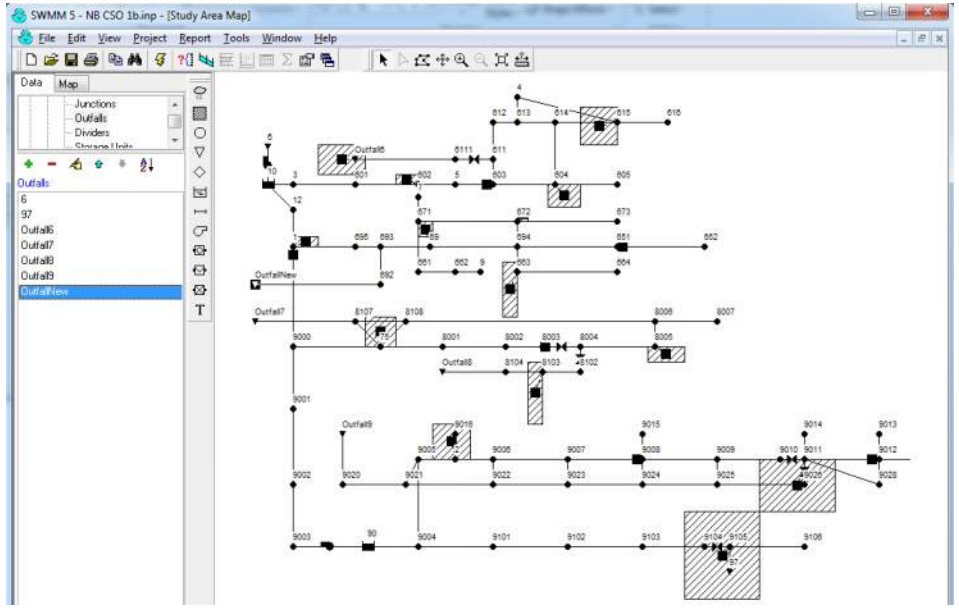
- Developed by Najarian Associates
- PCSWMM
- Schematic model



CLEAN WATERWAYS
Healthy Neighborhoods

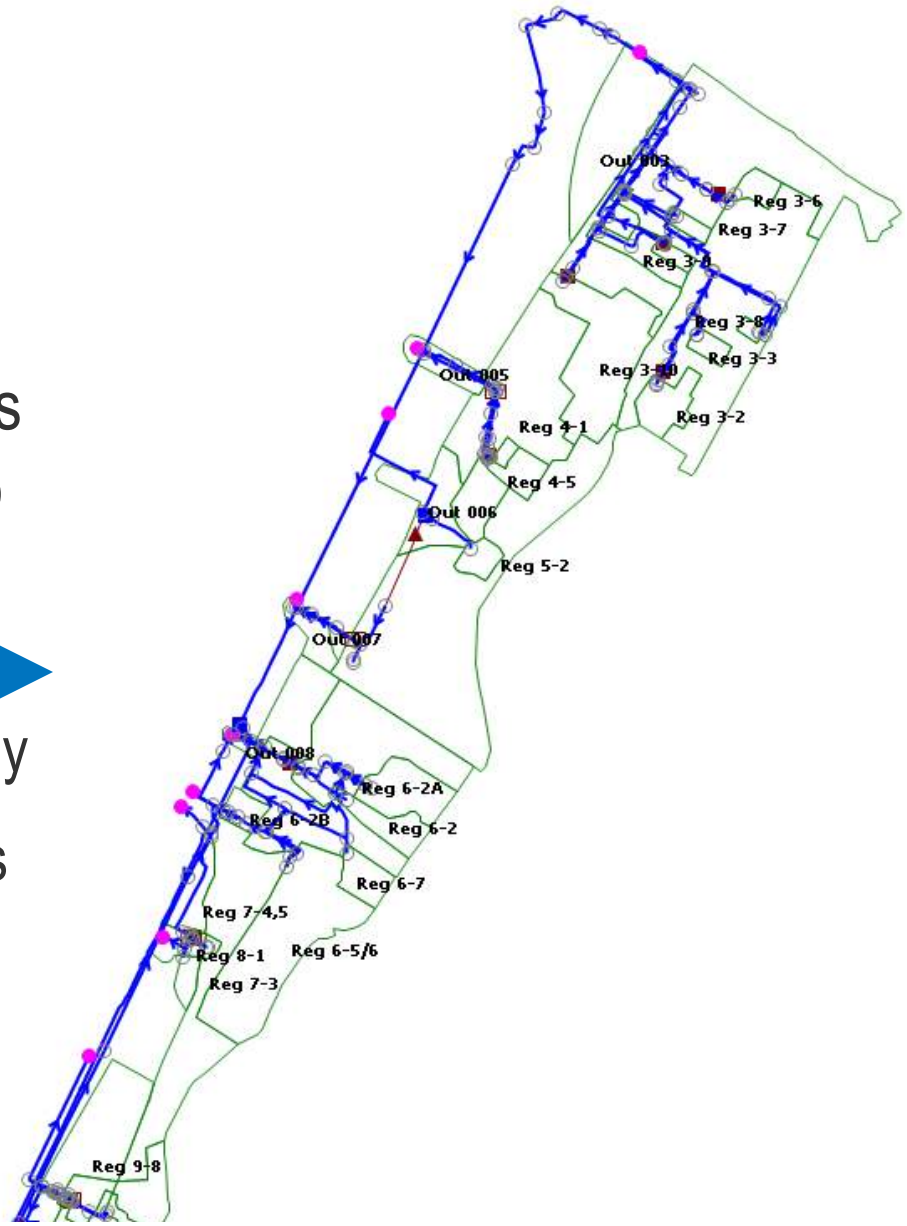
North Bergen Model Integration





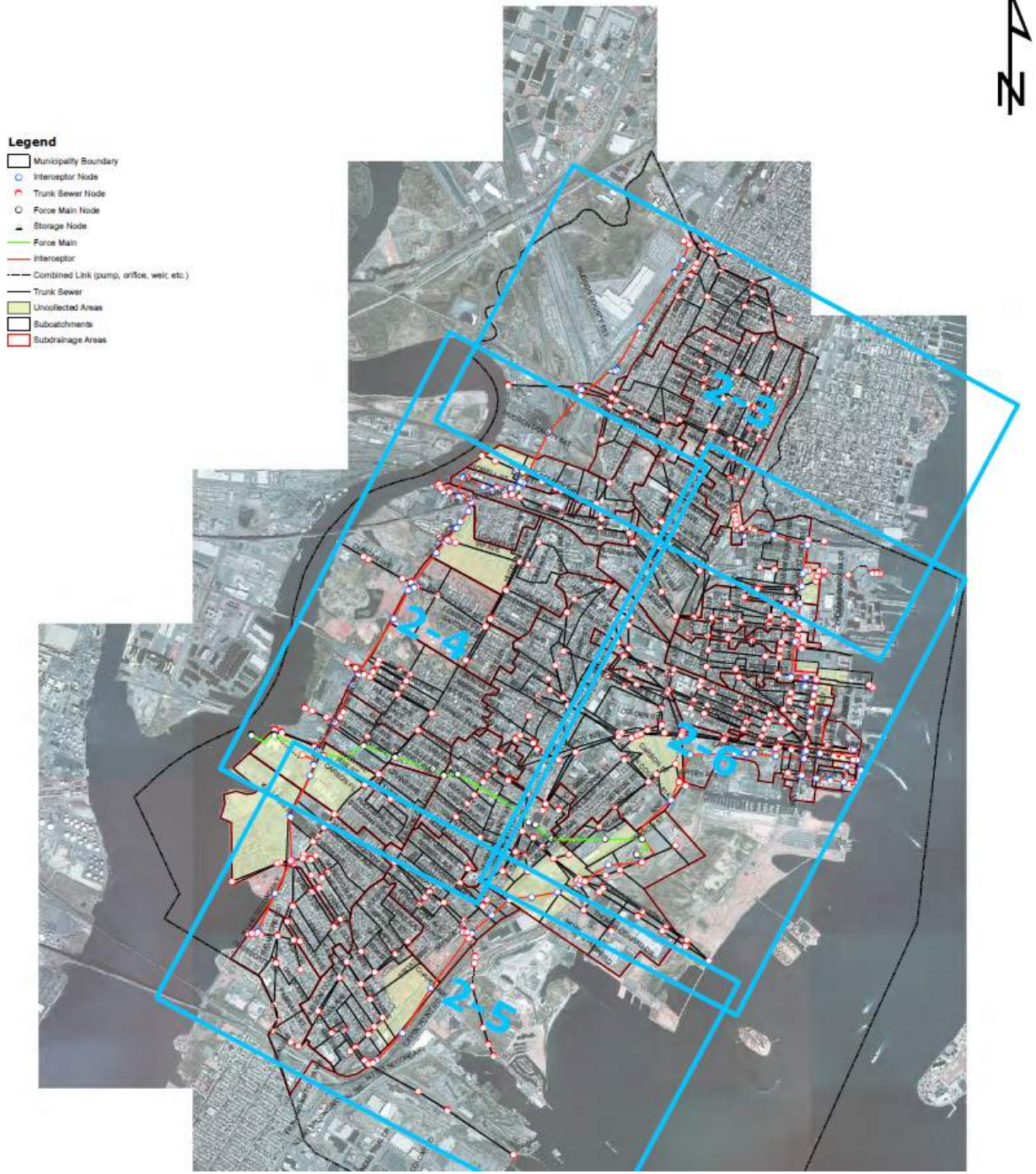
Convert Models from SWMM to InfoWorks

- Add Geography
- Update Pumps
- Update Datum
- Update DWF



Jersey City Model

- Modeling being performed by ARCADIS
- XPSWMM



Jersey City Model Representation

- Model was created with coarse estimates to allow connection of the North Bergen and Bayonne models to the PVSC model

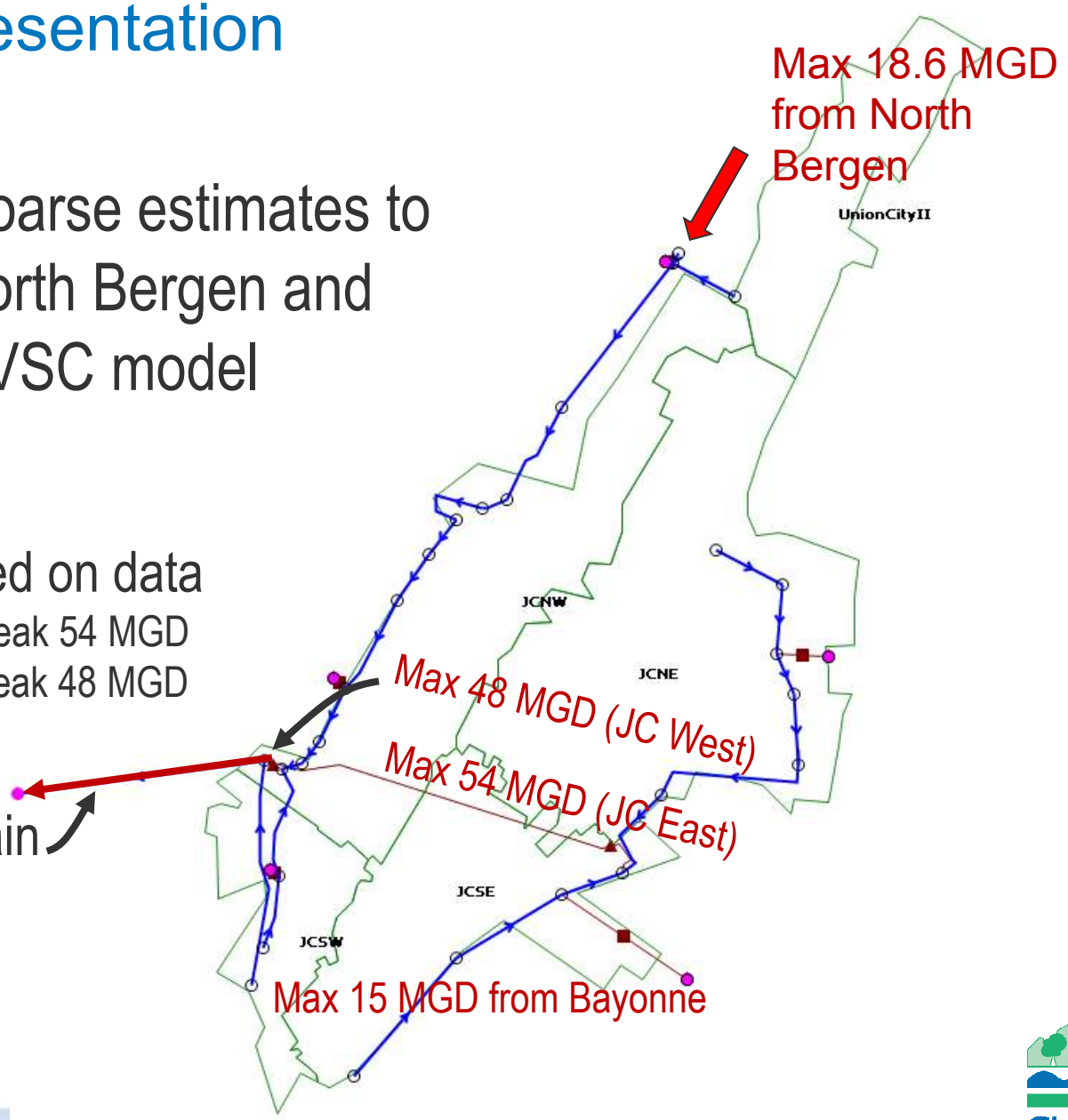
Max pump rate based on data

Jersey City East: Peak 54 MGD
Jersey City West: Peak 48 MGD

Flows in Hudson County Force Main

- Jersey City East: Peak 54 MGD
- Jersey City West: Peak 48 MGD
- Bayonne: Peak 15 MGD

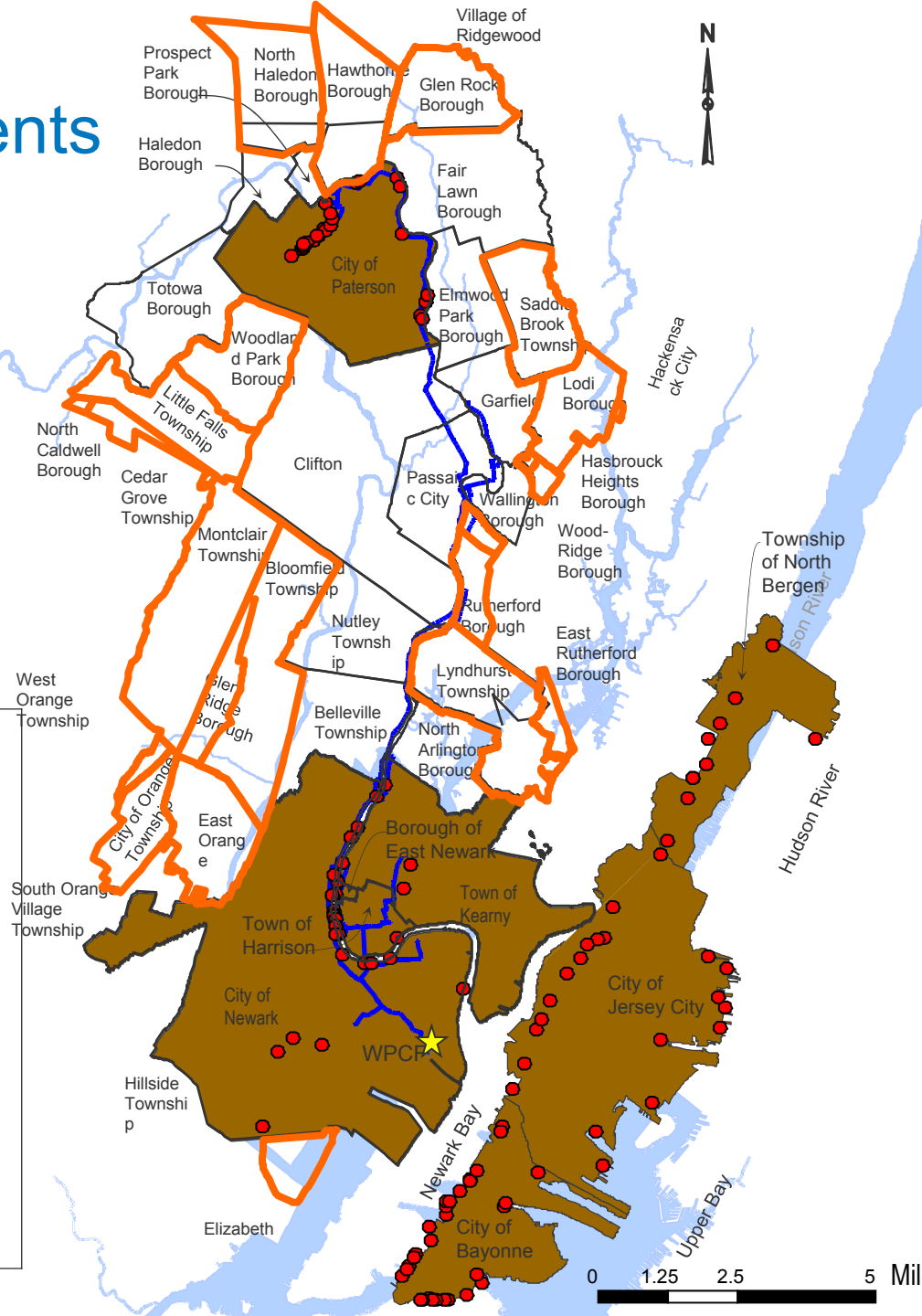
Total Maximum: 117 MGD



CLEAN WATERWAYS
Healthy Neighborhoods

PVSC Main Interceptor Model Improvements

- Separately Sewered Areas Added to the Model
- Regulator Modifications
- Paterson Subcatchment Delineations
- Wet Weather Operating Rules

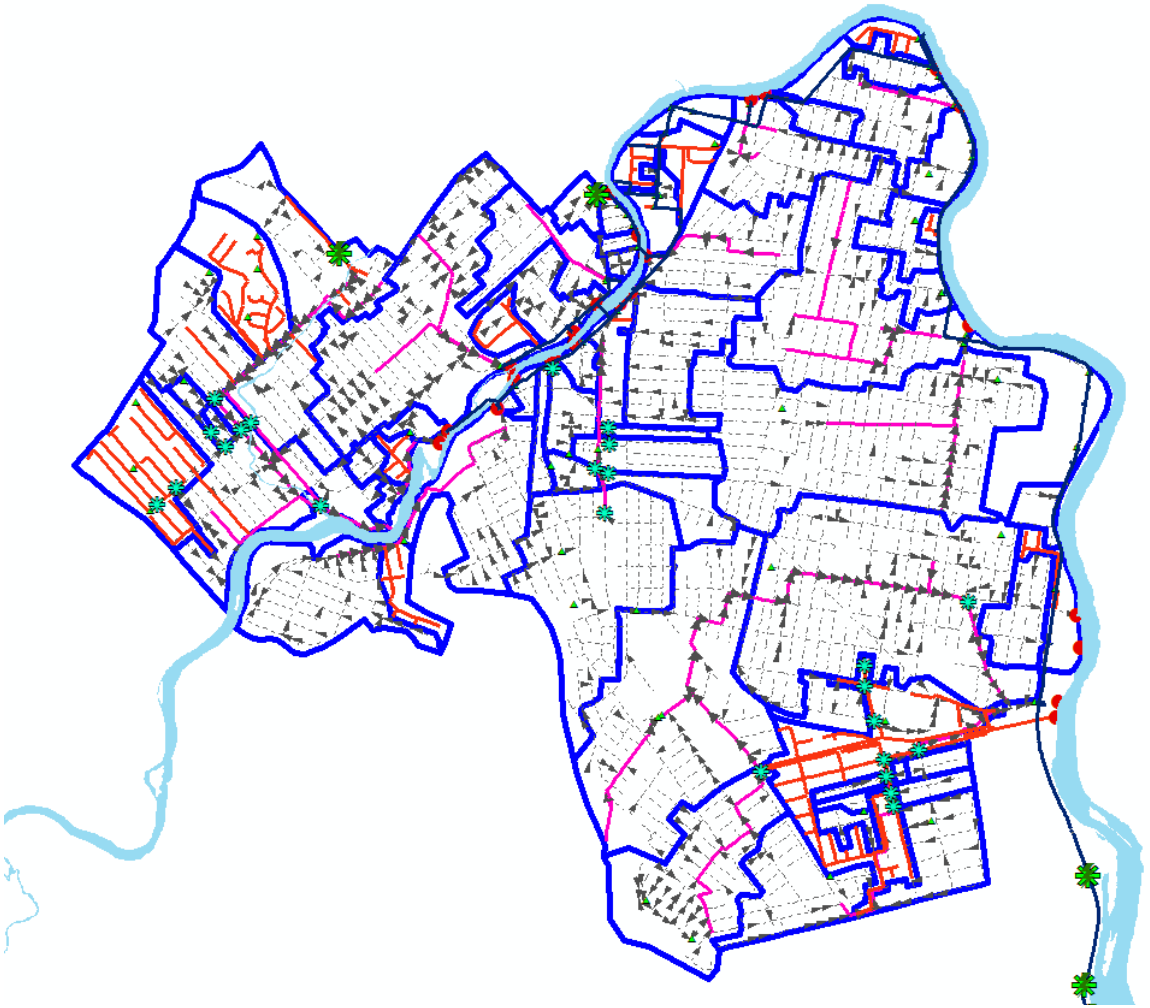


Legend

- PVSC Service Area
  - CSO Communities
  - Separated Communities
- PVSC WPCF (Water Pollution Control Facility)
- PVSC Interceptor / Sewer
- CSO Outfall
- Added Separated Communities

Updated Paterson Delineations

Old Delineations
Thiessen Polygons



Updated Delineations
Flow and Sewer Connectivity

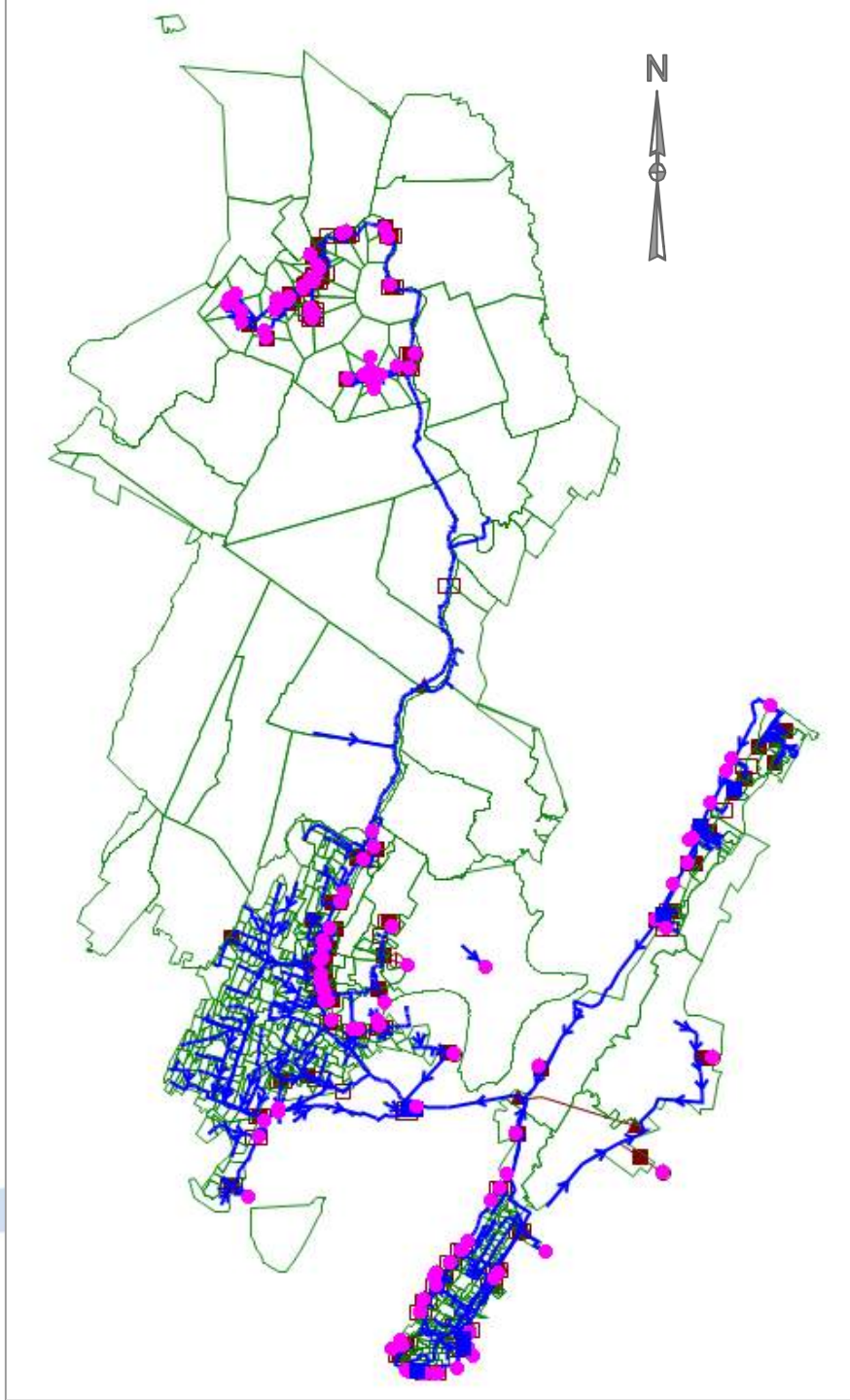
A Snapshot of Integrated Model…

- ❑48 PVSC communities
- ❑8 CSO communities
  - ✓ Paterson
  - ✓ Newark
  - ✓ East Newark
  - ✓ Harrison
  - ✓ Kearny

(Above 5 discharge to interceptor by gravity to WPCF)

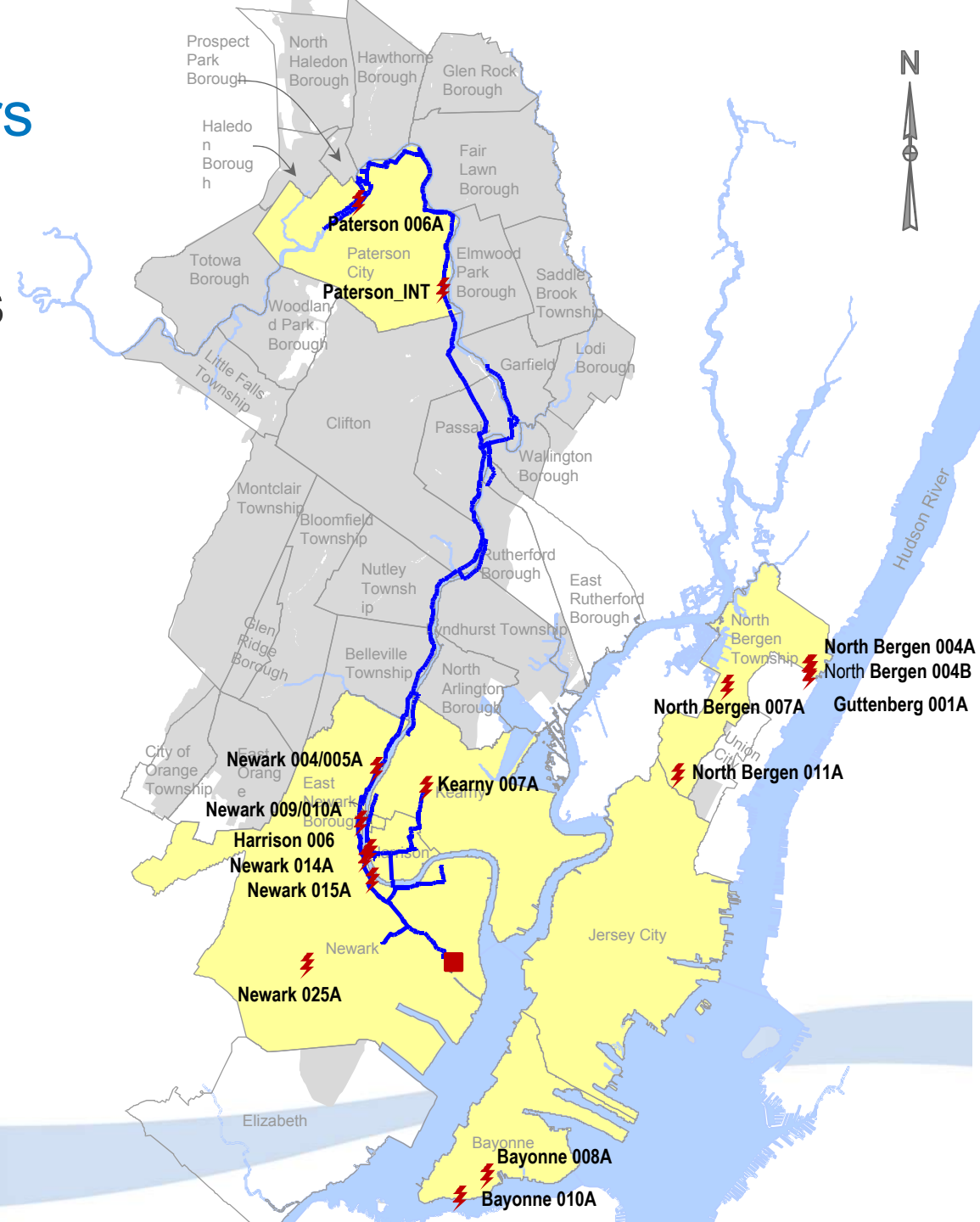
  - ✓ Bayonne
  - ✓ Jersey City
  - ✓ North Bergen

(Above 3 discharge to Hudson County Forcemain to WPCF)



Temporary Flow Meters

- 21 Temporary Flow Meters
- 3 Inclinometers

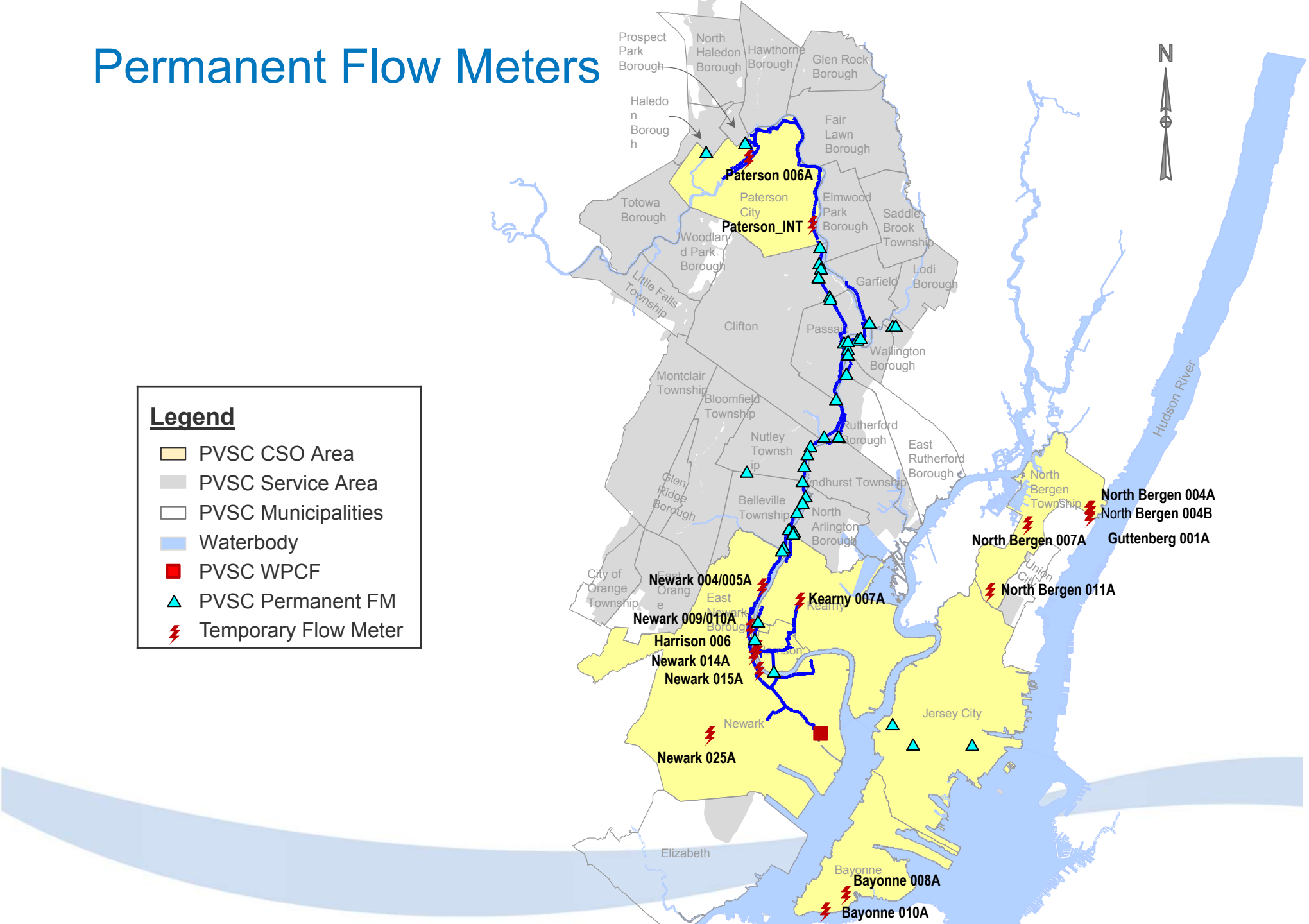


Legend

- PVSC CSO Area
- PVSC Service Area
- PVSC Municipalities
- Waterbody
- PVSC WPCF
- Temporary Flow Meter

CLEAN WATERWAYS
Healthy Neighborhoods

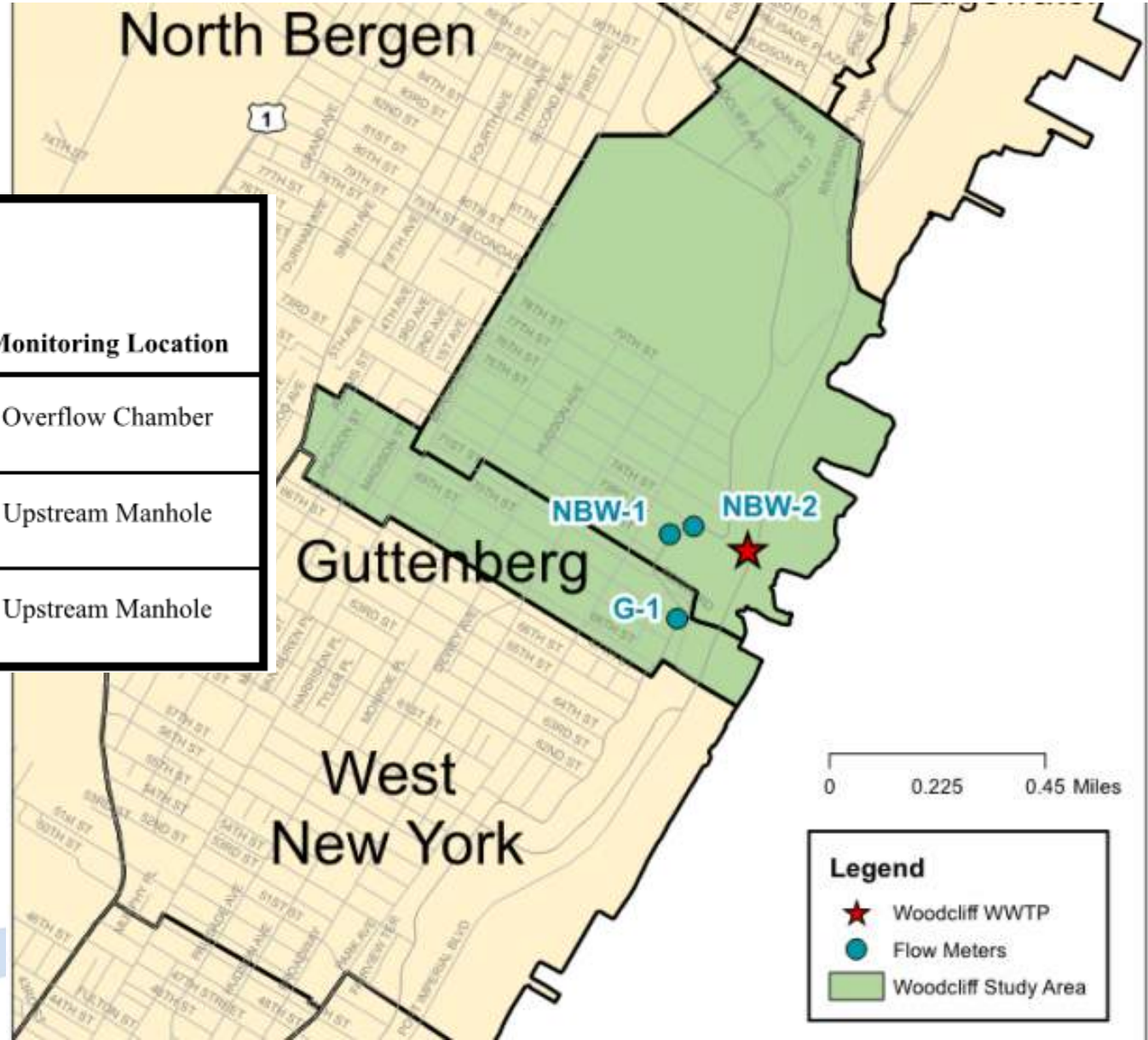
Permanent Flow Meters



CLEAN WATERWAYS
Healthy Neighborhoods

North Bergen Woodcliff WWTP
Temporary Flow Meter Locations

Flow Meter ID	Municipality	NJPDES Permit No.	Name	Monitoring Location
G-1	Guttenberg	001A	G-1, 70th Street & JFK Boulevard East	Overflow Chamber
NBW-1	North Bergen	004A	Regulator NB-1, 73rd Street & Hudson County Road	Upstream Manhole
NBW-2	North Bergen	004A	Regulator NB-1, 74th Street & Hudson County Road	Upstream Manhole



Next Steps

- Model Calibration and Validation
  - Using flow metering and rainfall data to make model refinements
- Utilize Model for System Characterization and Alternatives Analysis

CLEAN WATERWAYS
Healthy Neighborhoods

Questions and Final Discussion

CLEAN WATERWAYS
Healthy Neighborhoods