

# Massachusetts DEP Infiltration and Inflow Regulatory Requirements

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# Presentation Topics

- Infiltration and Inflow Quick Overview
- Regulatory Perspective – SSOs
- Regulatory Framework
- I/I and SSES Plan Development and Abatement Requirements
- Recent DEP I/I Activities
- Funding



# Infiltration

Groundwater entering sanitary sewer mains, service laterals, or manholes through defects or pipe joints in the system.



# Inflow

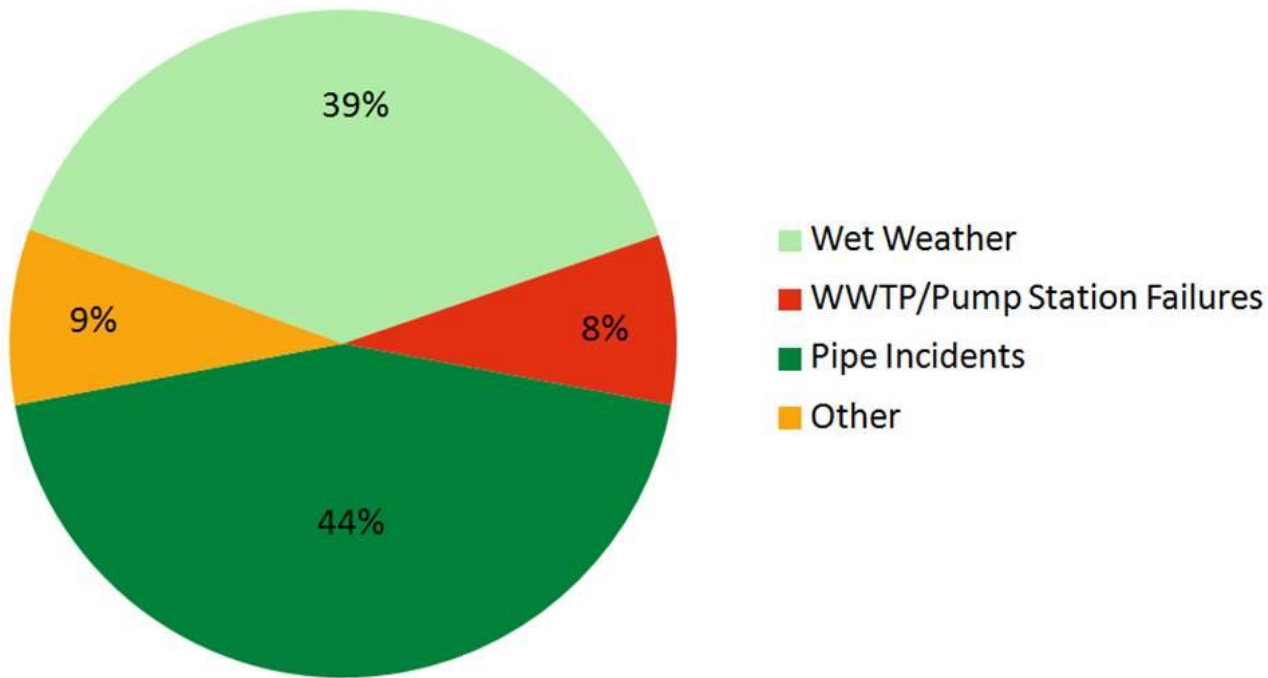
Stormwater entering the sanitary sewer system through foundation or area drains, catch basins, roof leaders, manhole covers, and flows from sump pumps connected to the sewer.





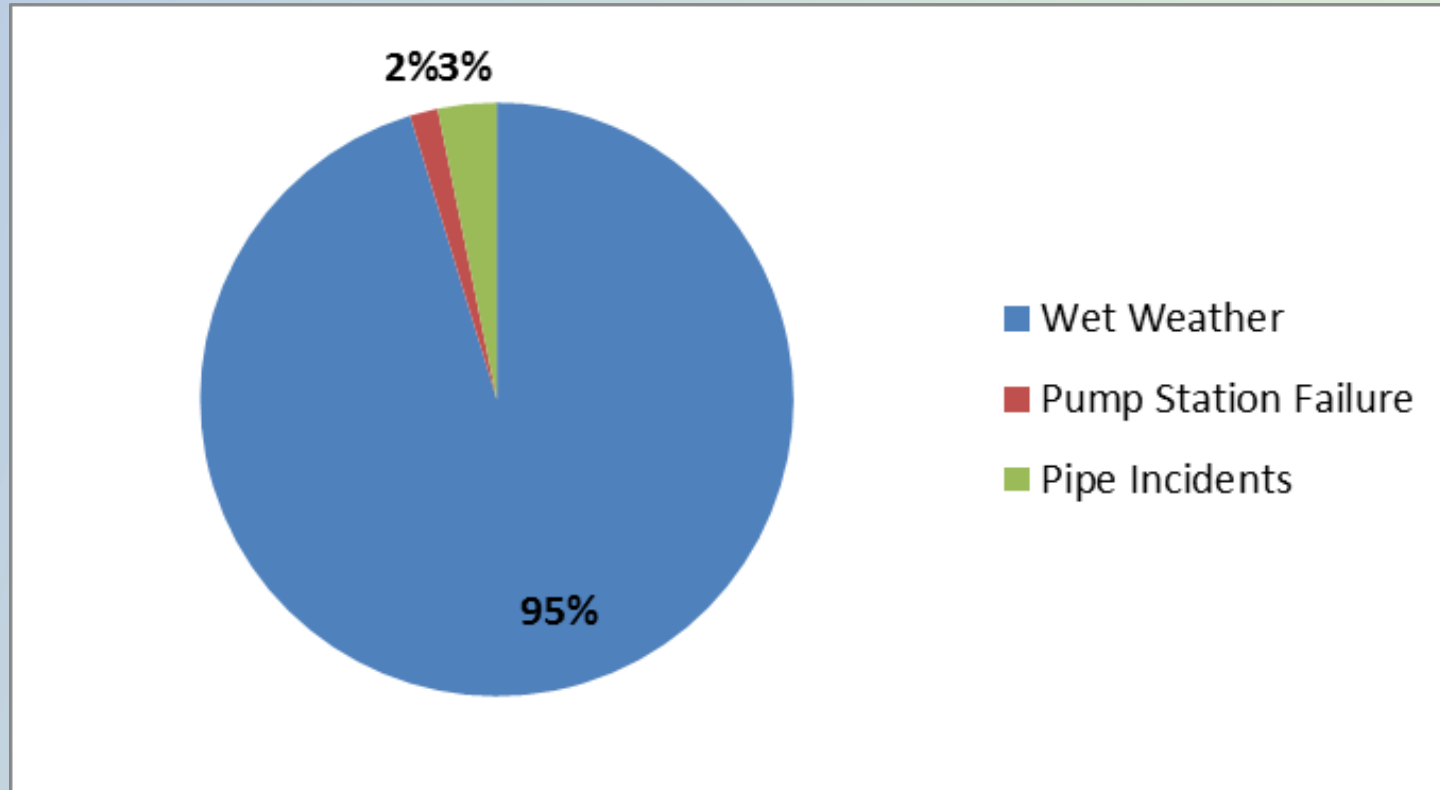
# Sanitary Sewer Overflows

2006-2016 in the DEP Northeast Region - 3,500 SSO events in 70 communities



# Sanitary Sewer Overflow Volumes

- Largely due to wet weather
- Over 500 million gallons in SSO from 2006-2016 in Northeast Region
- 330 SSO events statewide in 2016 – majority wet weather related



# Regulatory Framework

Inflow/Infiltration Requirements: **314 CMR 12: Operation, Maintenance, and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers** (i.e., non-domestic sources)

➤ 314 CMR 12.04(2) – Maintenance of Treatment Works and Sewer Systems (O&M Regulations)

➤ MassDEP I/I Guidance – Issued in 1993, revised May 2017, Recommends four step approach:

- Infiltration and Inflow Analysis
- Sewer System Evaluation Survey
- Sewer System Rehabilitation
- Post-Construction Monitoring

314 CMR: DIVISION OF WATER POLLUTION CONTROL

314 CMR 12.00: OPERATION, MAINTENANCE AND PRETREATMENT STANDARDS FOR WASTEWATER TREATMENT WORKS AND INDIRECT DISCHARGERS

Section

12.01: Purpose  
12.02: Definitions  
12.03: Operations of Treatment Works and Sewer Systems  
12.04: Maintenance of Treatment Works and Sewer Systems  
12.05: Safety Program  
12.06: Sampling and Analysis  
12.07: Recordkeeping and Reporting  
12.08: Prohibitions and Standards for Discharges to POTWs  
12.09: POTW Pretreatment Programs  
12.10: Exemptions  
12.11: Requirements for Industrial Wastewater Pretreatment Systems  
12.12: Enforcement

12.01: Purpose

Pursuant to the authority of M.G.L. c. 21, §§ 27(9), 27(12), 34 and 43 the Department hereby establishes standards and pretreatment requirements to insure the proper operation and maintenance of wastewater treatment works and the protection and enhancement of water resources within the Commonwealth.

12.02: Definitions

When used in 314 CMR 12.00 the following words and phrases shall have the following meanings:

Bypass - the intentional or unintentional diversion of wastes from any portion of a treatment works.

Categorical Pretreatment Standard or Pretreatment Standard - any regulation containing pollutant discharge limits promulgated by the EPA in accordance with § 307(b) and (c) of the Federal Water Pollution Control (Clean Water) Act, 33 U.S.C., §1317(b) and (c), which applies to Industrial Users. This term includes the general and specific prohibitions established in 314 CMR 12.08(1) and (2).

Combined Sewer Overflow or CSO - any intermittent overflow, bypass or other discharge from a municipal combined sewer system which results from a flow in excess of the dry weather carrying capacity of the system.

Combined Sewer System - a sewer system which by design conveys both wastewaters and storm water runoff.

Department - the Massachusetts Department of Environmental Protection.

Discharge or Discharge of Pollutants - any addition of any pollutant or combination of pollutants to waters of the Commonwealth from any source, including but not limited to, discharges from surface runoff which is collected or channeled by man, discharges through pipes, sewers, or other

# Regulatory Requirements – 314 CMR 12.04 (2)

Municipality or regional entity required to develop and implement an **ongoing** I/I operation and maintenance program:

- Identify and eliminate “excessive” I/I sources
- Focus on inflow sources
- Phased evaluation of sewer system consistent with MassDEP Guidance
- I/I mitigation for new connections for CSO and tributary systems





# I/I and SSES Plan Development

DEP required by December 31, 2017 that municipalities submit I/I Analysis Report:

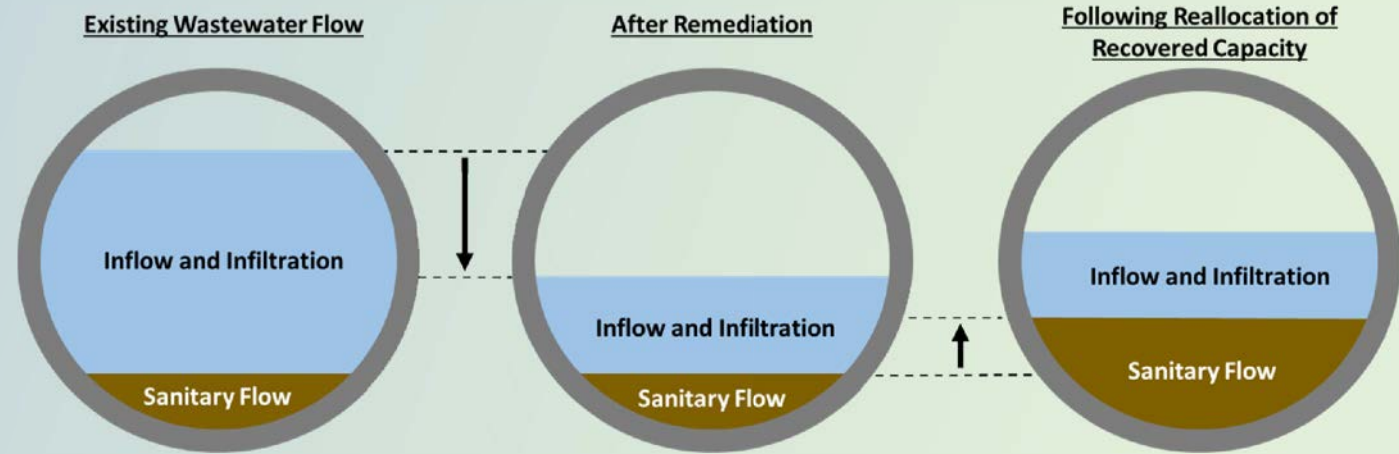
- To address I/I based on MassDEP's *Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys*
- Assess the risk for sanitary sewer overflows for the 5-year 24-hour storm
- Plan and schedule for completing SSES
- Presumptive DEP approval 120 days after submittal



# Mitigation Requirements

## For CSO/tributary systems:

- 4:1 I/I mitigation requirement for all new connections > 15,000 gpd
- Up to sewer authority to incorporate into its sewer regulations and establish program, including:
  - Design flows (recommend using 310 CMR 15.00 Septic Systems (Title 5 flows))
  - Direct removals or fees.



# Revision of 1993 DEP I/I Guidance

- 2015/16- NEWEA Collection System Committee/Advisory Group meetings
- Noticed for Public Comment in 8/24/2016 Environmental Monitor
- Comments from municipal groups and consultants
- Final Guidance issued May 2017



## Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Surveys



May 2017

# 2017 Draft Guidance Comments

Flexibility in developing I/I control approaches

- *Yes*

Inflow removal programs difficult

- *Yes, but most often necessary*

Number of Meters Required

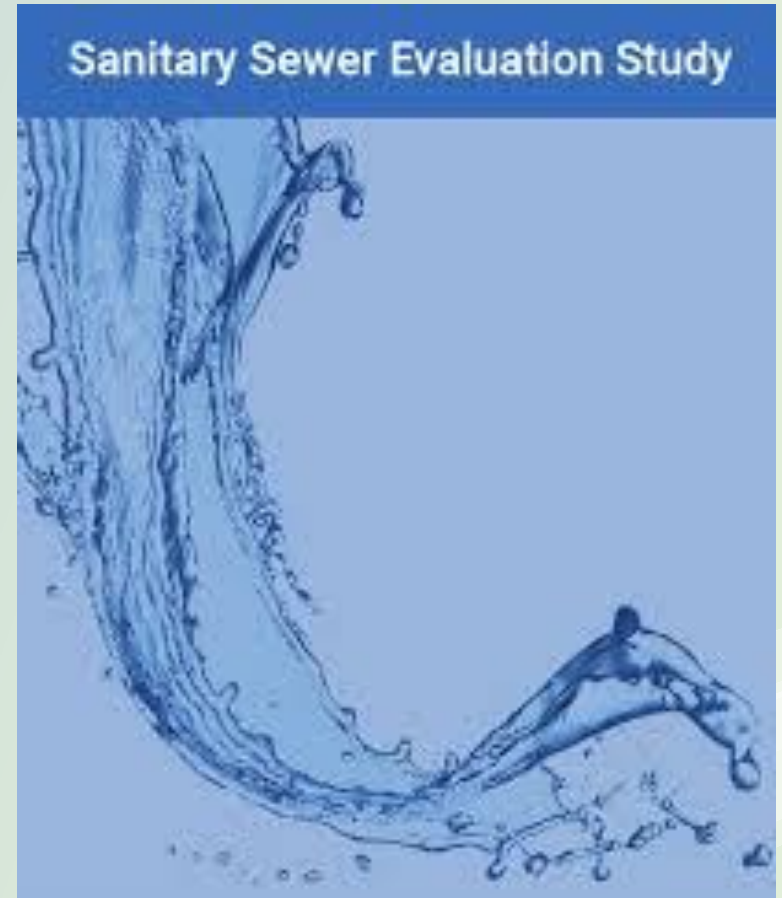
- *Some flexibility*
- *Use all permanent meter data available*
- *Some use of pump station data*





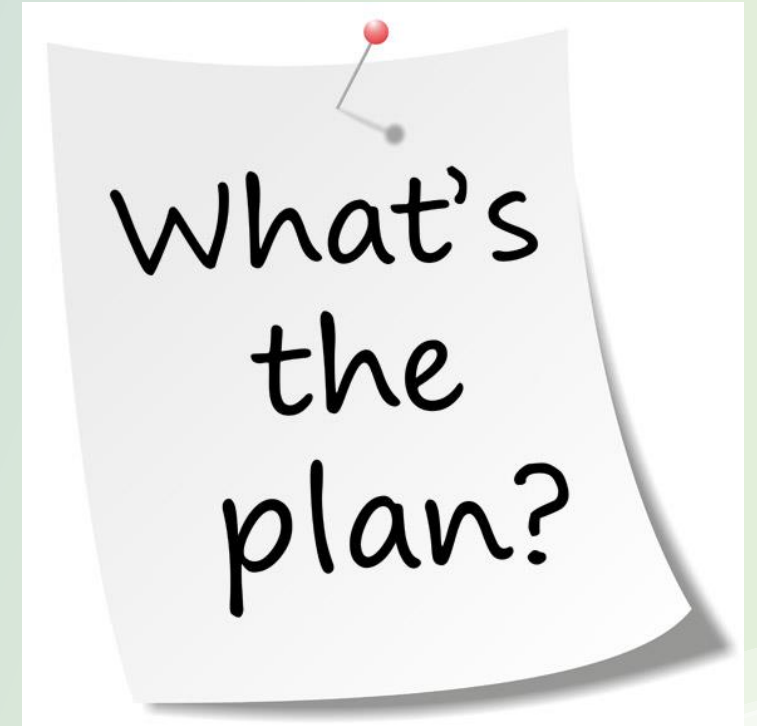
# 2017 I/I Guidance – I/I Abatement Plan

- Infiltration and Inflow Analysis Report – 12/31/2017
- Sewer System Evaluation Survey – Scope of Work in accordance with the I/I Analysis
- Plan and Schedule for Sewer System Rehabilitation
- Post-Construction Monitoring
- Alternative approaches may be proposed



# Elements of I/I Plan

- Inventory of Sewer System
- Flow Monitoring (3/1 – 6/30)
- Manhole inspections (10% Initial)
- Groundwater level monitoring
- Rainfall Monitoring (min. 2 gauges, 1 meter/20,000 sf or lower)
- Hydraulic Analysis:
  - Base Sanitary Flow
  - Infiltration (peak and average)
  - Inflow (peak rate, total volume, correlating to storm size)



# Sanitary Sewer Overflow Analysis

Rainfall Data Source: National Oceanic and Atmospheric Administration Atlas 14, Volume 10

- 5-Year, 24-hour storm  
(1993 Guidance: 1-year, 6-hour storm)
  - 4.61 inches of rain peak intensity  
of 0.73 inches/hour
- Wet Weather SSO Event Assessment
  - Review wet weather SSO event  
history vs. storm events



NOAA Atlas 14



Precipitation-Frequency Atlas  
of the United States

Volume 10 Version 3.0: Northeastern States

Connecticut, Maine, Massachusetts, New Hampshire,  
New York, Rhode Island, Vermont

Sanja Perica, Sandra Pavlovic, Michael St. Laurent,  
Carl Trypaluk, Dale Unruh, Deborah Martin, Orlan Wilhite

U.S. Department  
of Commerce

National Oceanic  
and Atmospheric  
Administration

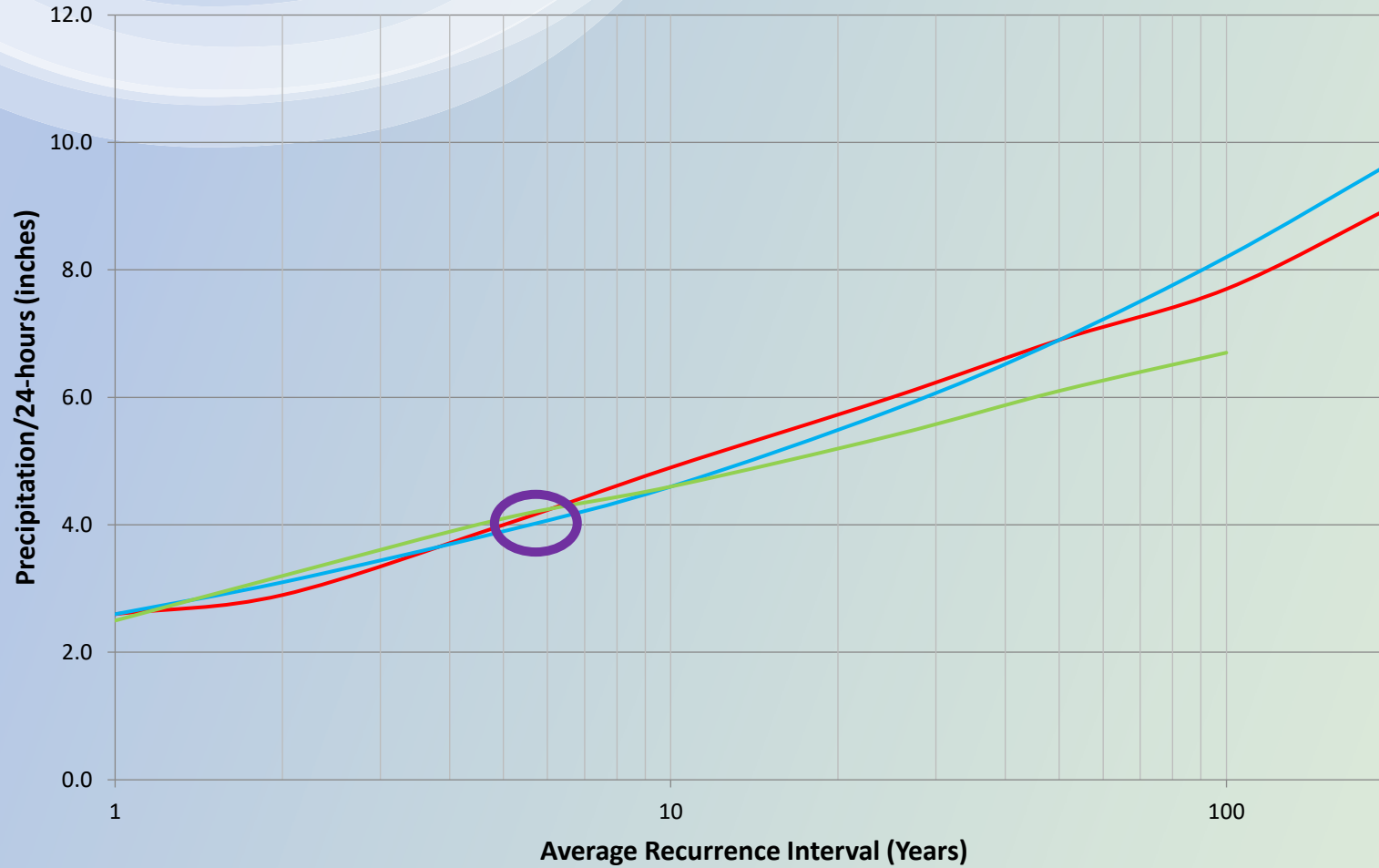
National Weather  
Service

Silver Spring  
Maryland

2015  
revised 2019

# 5-year, 24-Hour Storm Data Sources

## Massachusetts - Statewide Average 5-Year 24-Hour Duration Storm



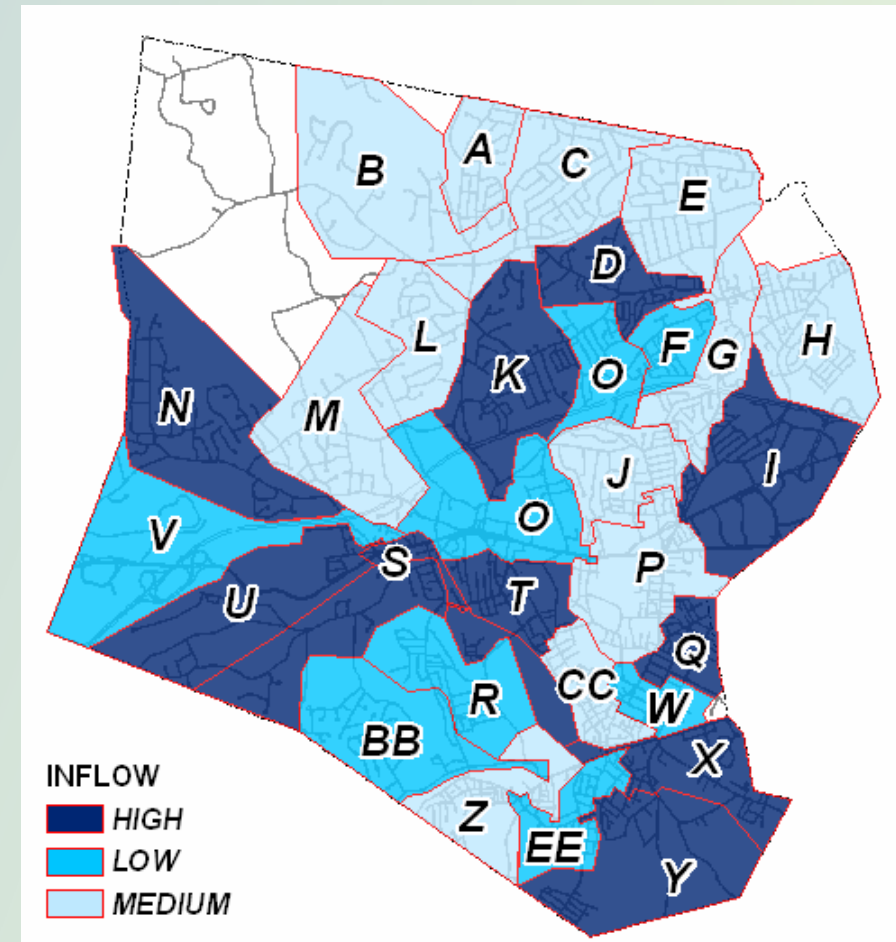
- NOAA 14 MA STATEWIDE MEAN (1-year PDS, Others AMS)
- NRCC MA STATEWIDE MEAN
- TP40 BY COUNTY FROM NRCS STORM VALUES IN TR55 MEAN



# I/I Report Analysis - Prioritize SSES Areas

## Sewer System Evaluation Survey (SSES)

- Infiltration: Prioritize subareas with highest infiltration for further investigation – initially those > 4,000 gpd/idm
- Inflow: Further investigation of subareas comprising 80% of total inflow to system



# Develop SSES Scope of Work

More intense I/I investigation to identify specific sources:

- Infiltration: Flow isolation, CCTV, manhole inspections, flow metering
- Inflow: Smoke testing, dye testing, property inspections
- Initial SSES targets removal of excessive I/I



# SSES – When is I/I Excessive

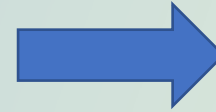
- $\geq 4,000$  gpd/idm – Not necessarily excessive, but typically cost effective to remove
- Contributes/ causes SSOs for events up to 5-year, 24-hour storm
- Infiltration that can be cost effectively removed (vs. transport and treatment cost)
- Public and private inflow sources must be removed unless found to be technically infeasible or cost prohibitive



# Post Construction Analysis

CEA has not yielded effective I/I removal in some cases:

- Migration of infiltration from rehabilitated defect to another defect if CEA not evaluated systemwide
- Limited design life of some rehabilitation techniques
- Low T/T costs are not an incentive for addressing I/I



Need to Evaluate:

- Design life of rehabilitation techniques
- Infiltration removal assumptions
- Collect additional postconstruction monitoring data



# Private Inflow Removal

- Sewer regulations **must** prohibit connection of inflow sources
- Can have BIG impact, but often avoided:
  - Sump pumps
  - Roof leaders
  - Area and floor drains
- Requires property inspections
- Municipality determines how to fund



# Inflow Removal – Feasibility

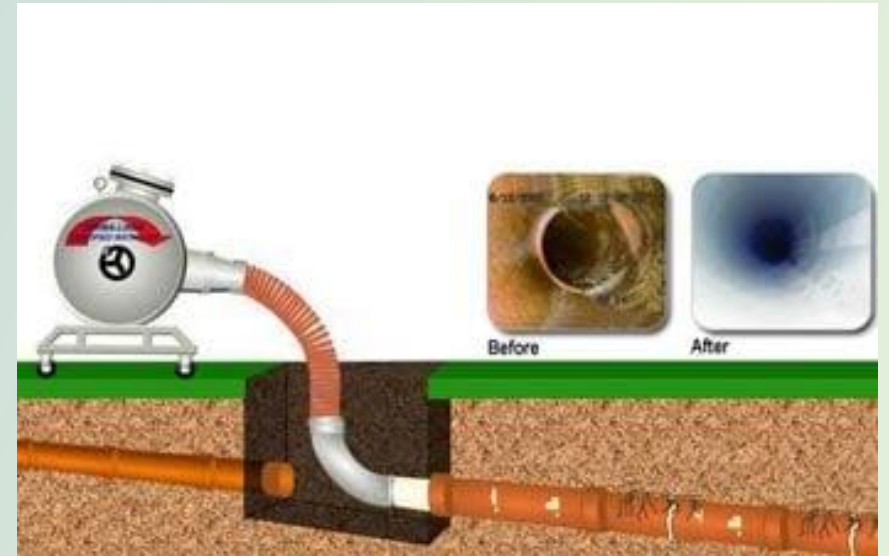
## Factors to Consider:

- Private inflow causing/contributing to SSOs
- Costs to municipality or property owner to remove
- Creation of public safety concerns (flooding, icing)
- If SSOs are frequent, rigorous private inflow source removal is required



# SSES Report Recommendations

- Proposed rehabilitation scope and cost
- Estimates of I/I removed
- Schedule for design and construction
- Post construction monitoring plan



# Current DEP Activities

- Ongoing review of I/I and SSES reports submitted in 2017 or at a later date
- Contacting municipalities to review program progress
- Requiring follow up documentation on program status
- Reviewing design plans and specifications for 2021 SRF funded rehabilitation construction projects
- Review 2022 SRF applications for project funding





# Funding

- State Revolving Fund provides 2% Loans
- Planning: I/I Analysis and SSES
- Construction: Construction of proposed rehabilitation
- Competitive process, planning is typically funded

