Welcome

Challenging today.

Our unique approach to challenge what's accepted, using our expertise and knowledge to rethink the way we solve problems.

Reinventing tomorrow.

The outcome, from the innovations we build for our clients to the positive impact our solution have on the world.

To create a more connected, sustainable world.

Building Sanitary Sewer Collection System Resiliency Through Comprehensive CMOM Program

Case Study – Waterbury CT

May 23, 2022

Presented by Karina Massey and Nicole Petrozza

Jacobs

Challenging today.
Reinventing tomorrow.

Agenda

1. **EPA Route to Resilience**
2. **Plant Information and History**
3. **CMOM Focus Areas and Corrective Action Plan**
4. **GIS Update**
5. **Asset Management Implementation**
    1. SEDARU Implementation
    2. Consequence of Failure Matrix
    3. SCREAM Implementation
6. **Inflow and Infiltration**
7. **FOG Program Updates**
8. **CMOM CAP Progress Summary**

EPA Route to Resilience

ASSES

Find threats and vulnerabilities in your system

PLAN

What will you do when the worst happens?

TRAIN

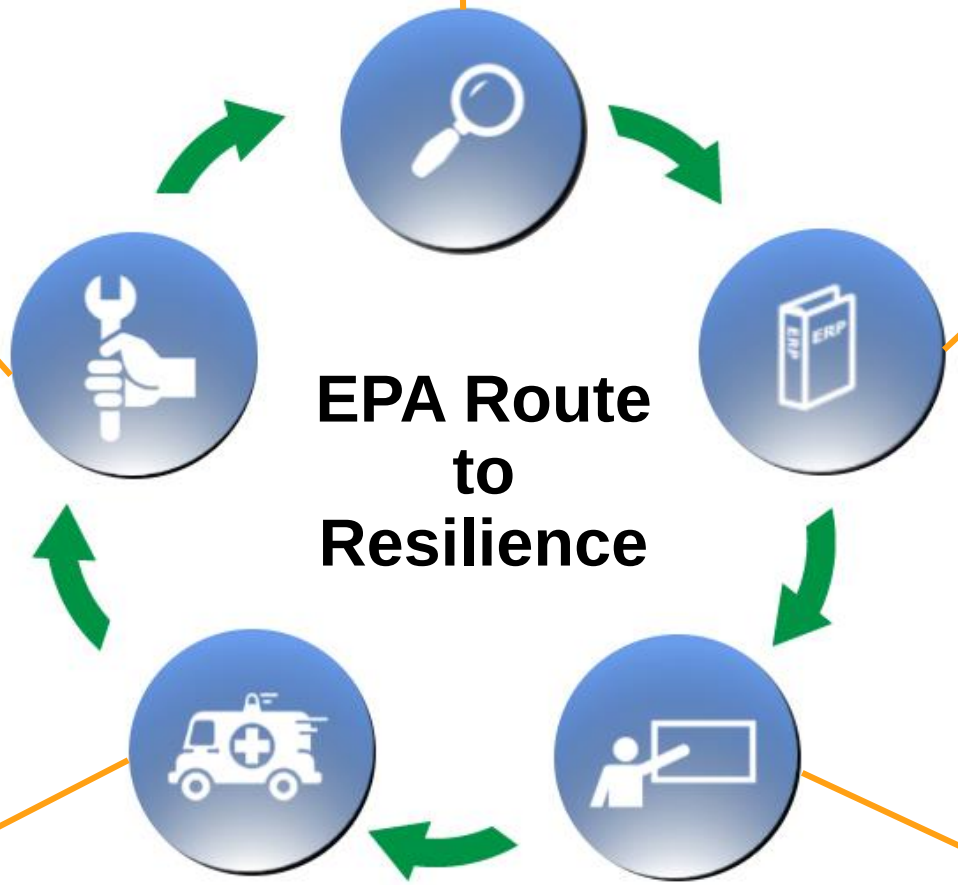
Staff must know, train, and practice plans

RESPOND

Put plans into action when an emergency happens

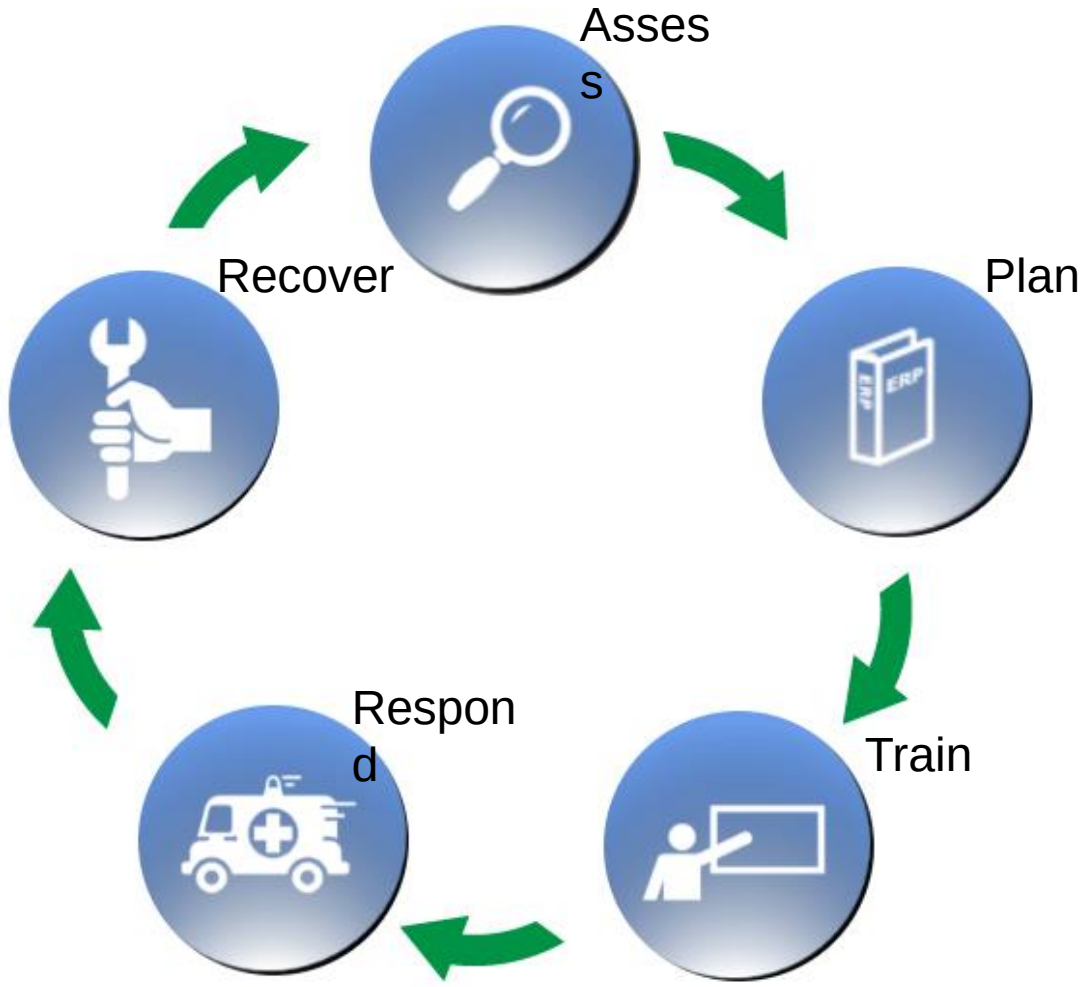
RECOVE

Rebuild, reassess, learn and improve



EPA Route to Resilience

- Waterbury's CMOM program focuses on the first three steps of the EPA Route to Resilience, Assessment, Planning, and Training.
- Through the CMOM updates Waterbury has assessed the current infrastructure and has made plans for additional assessment and corrective actions to make a better working collection system.
- Through good assessment, planning and training less response and recovering will be needed.



https://rtor.epa.gov/

Waterbury’s Water Pollution Control Facility

210 Municipal Road

Waterbury, CT 06708

Jacobs

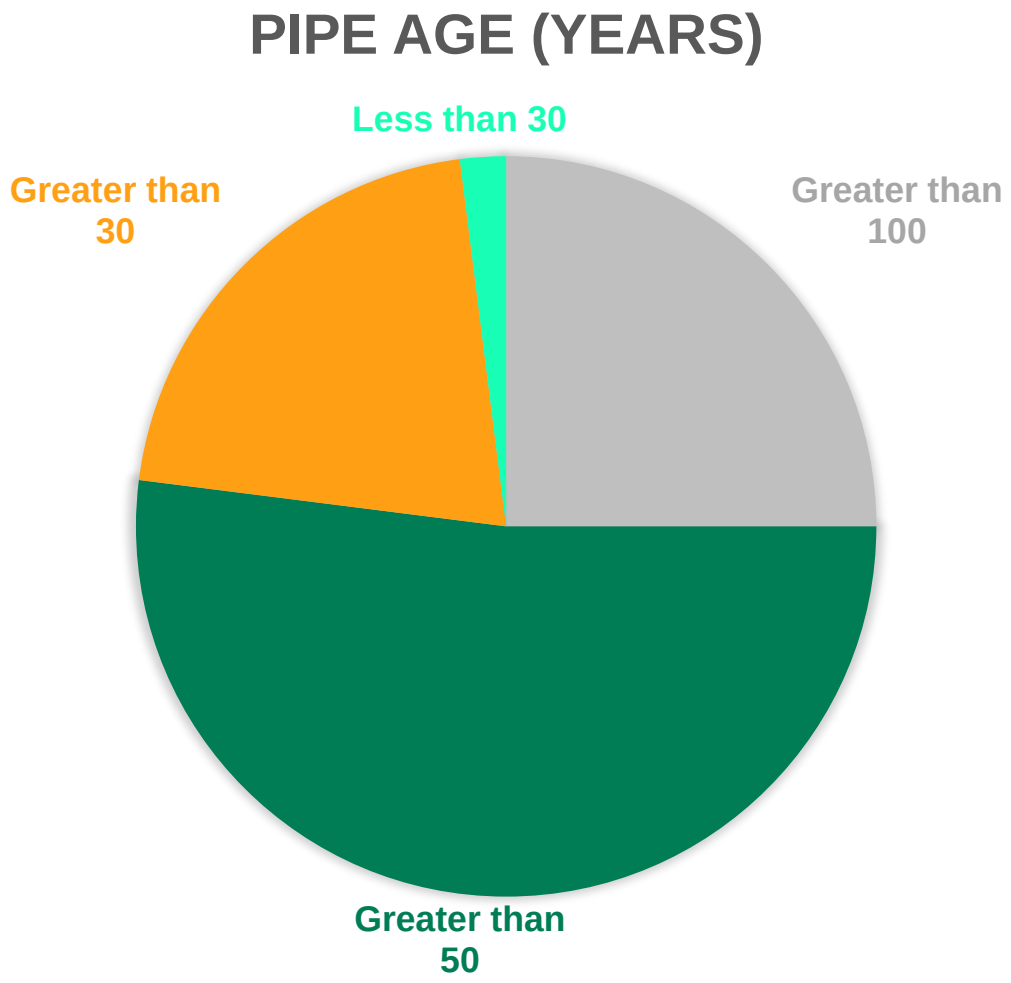
Water Pollution Control

Waterbury, CT

Collection System Description

- Serves approximately 109,890 people

Service Connections	27,091
Manholes	9,815
Pump Stations	20
Miles of Gravity Sewer	320
Miles of Force Main	6.23
Siphons	1



CMOM Operations

- In September of 2018, the City of Waterbury entered into a 10-yr agreement with Jacobs to operate, maintain, and manage the wastewater collection and treatment systems.
- As part of this agreement, Jacobs performs collection system operation and maintenance tasks, including:
  - 20 miles of CCTV a year
  - 30 miles of sewer cleaning a year
  - FOG inspections
  - IPP inspections
  - Building inspections
  - Manhole inspections
  - System repairs

Understanding Sewer Backup/Bypass Causes

Bypass Cause	Number of Bypasses Affected*
Debris	20
FOG	17
Rags	11
Roots	8
I/I	6
Pump Electrical Failure	3
Broken Sewer	2
Illicit Connections	2
Structural Defect	1
Vandalism	1

*A single bypass event may be represented in multiple cause categories.

- Majority of sewer backups or bypasses are caused by grease, debris, rags and roots
  - Pipe segments that experience a bypass are added to the LTMP
- Numbers presented in the table are from 2012-2021
- Most of these bypasses occurred on private property

CMOM Correction Action Plan (CAP) Focus Areas

From the Capacity, Management, Operation, and Maintenance Self-Assessment it was determined that Waterbury should be focusing on these four areas…

Geographic Information Systems

- Updating GIS with pipe age, diameter, and material
- Began in 2018

Inflow and Infiltration

- Identify areas of I/I within the collection system
- Decided to conduct a targeted SSES program
- Scheduled for 2019-2024

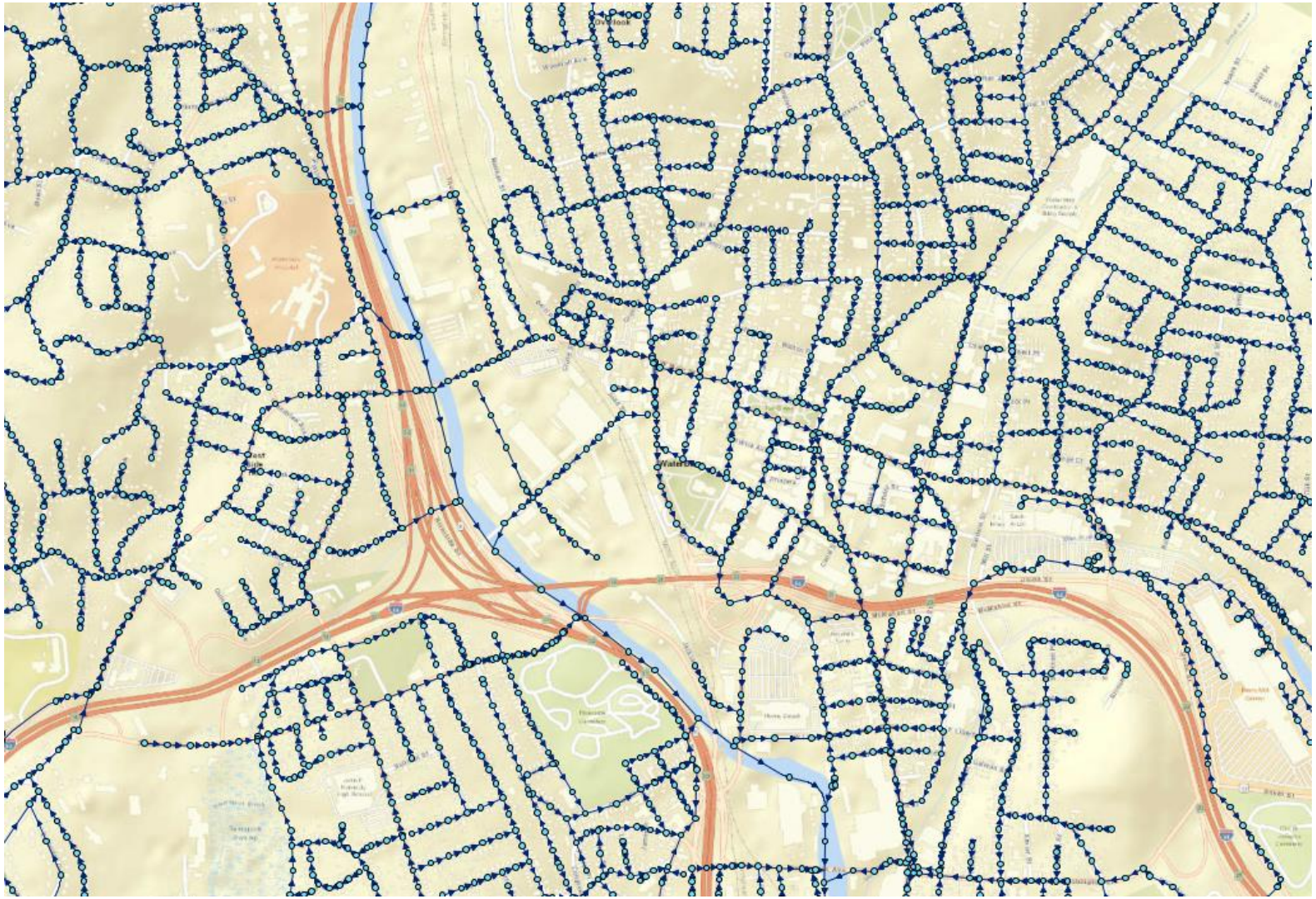
Asset Management/CMMS

- Implement an asset management system with a CMMS system and more preventative maintenance activities.
- Implemented SEDARU and SCREAM
- Began in 2019

Fat Oils and Grease Program

- Conduct additional public and FSE outreach
- Achieved through a FOG program update
- Began in 2018

GIS Update - Assessment



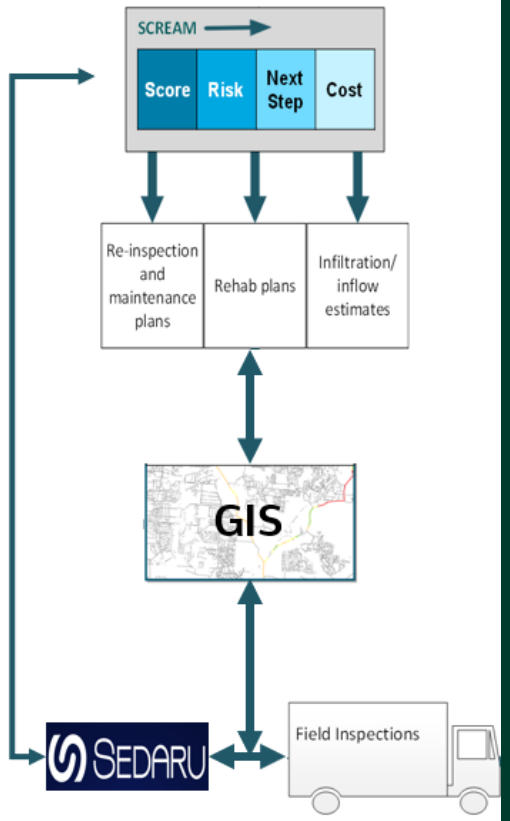
In 2018, Waterbury began a large-scale GIS update starting with reviewing as-built information to confirm pipe diameters, pipe material, and pipe ages.

By 2019, WPC had over 99% of this information populated in GIS.

This information is continuously updated through the CMOM CCTV program.

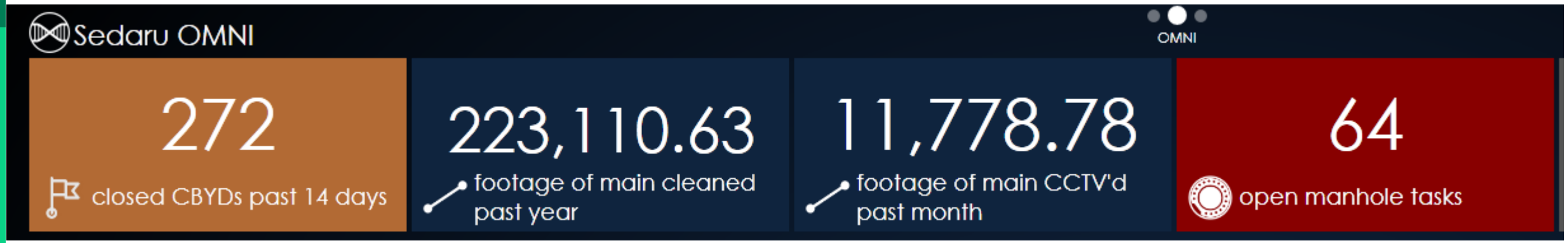
Asset Management Overview - Assessment

- GraniteNet for CCTV inspections – NASSCO PACP
- SEDARU to track collection system key performance parameters
  - Pipe and MH inspections
  - Building inspections
  - Customer complaints
  - Permits
  - Contractor activity
  - CBYD
- SCREAM for collection system condition assessment and next steps
- GIS to tie all the programs together



Asset Management - SEDARU Implementation

- In 2019, Jacobs began the process of integrating SEDARU into WPC processes.
- SEDARU provides the WPC a way to electronically track their work orders and automatically updates the GIS when work orders are filled out.
- GIS and Key Performance Index's are displayed on the online GIS interface to quickly gauge the team's performance and show problem areas within the system.



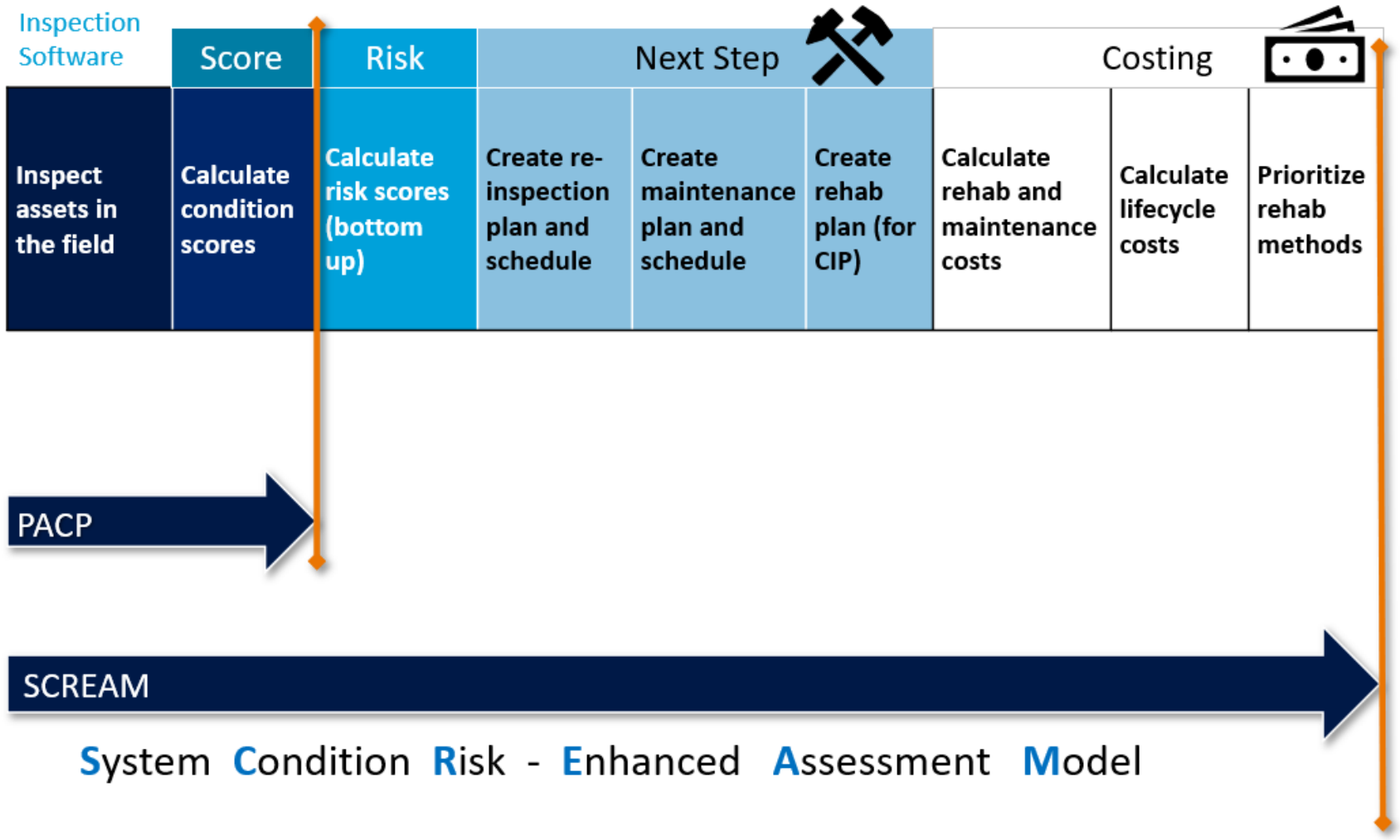
Asset Management – Consequence of Failure Matrix

- With any large collection system, it is important to prioritize where updates, maintenance, repairs, etc. are needed.
- In 2020, Waterbury developed a unique Consequence of Failure Matrix tailored to their needs.

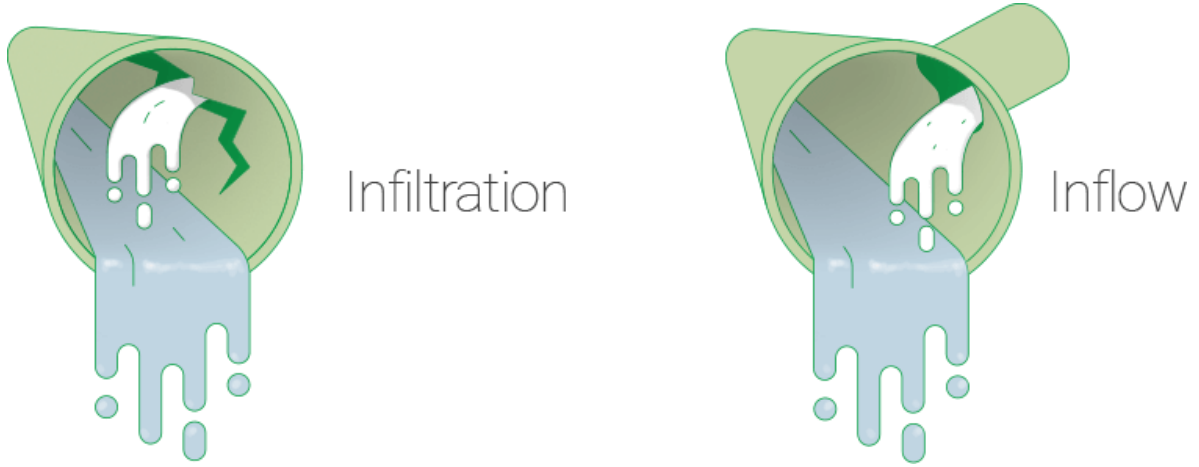
Consequence Category	Critical/High Risk Facilities	Force Main Proximity	Diameter	Pipe Location	SSO Impact	Pipe Material
Weight	20%	10%	30%	15%	15%	10%

Asset Management - SCREAM Implementation

- In 2020, Jacobs began implementing SCREAM
- SCREAM helps collection system staff plan cleaning, maintenance, and repair efforts based on system data
- Aim is to ultimately reduce costly reactive repairs by taking proactive steps to improve the system



Inflow and Infiltration

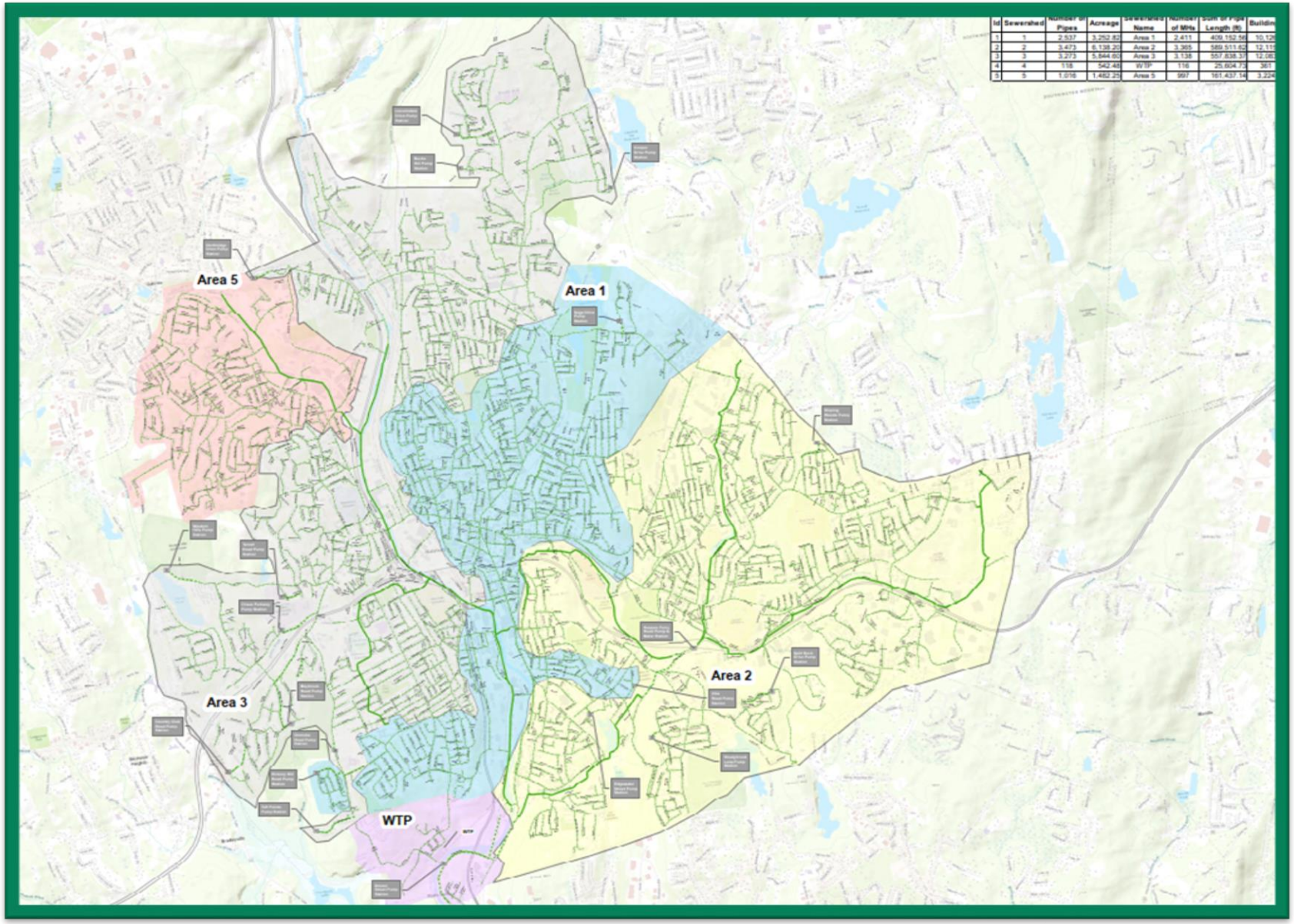


- In 2011, Anchor Engineers provided flow monitoring analysis on 5 meters within the City, identifying 2 problem Sewersheds within the collection system.
- In 2019, Jacobs and the City began a SSES program that targets the problem basins identified in Anchor Engineers 2011 report that were further defined into I/I priority areas based on the Phase I flow monitoring program that occurred in 2020.
- Phase II investigations began in 2021 and included smoke testing, building inspections, CCTV and manhole inspections
- Data collected during Phase II was supplemented with historical data to identify sources of I/I.

Image: inbound.envirosight.com

Phase I

- In 2020, 40 flow meters were distributed among the problem sewersheds
- Flow data was used to classify priority basins
- Data was used to determine the next investigation steps



Phase II Investigations

Smoke Testing

- 135,000 LF

Building Inspections

- 417 external inspections
- 142 dye tests

CCTV

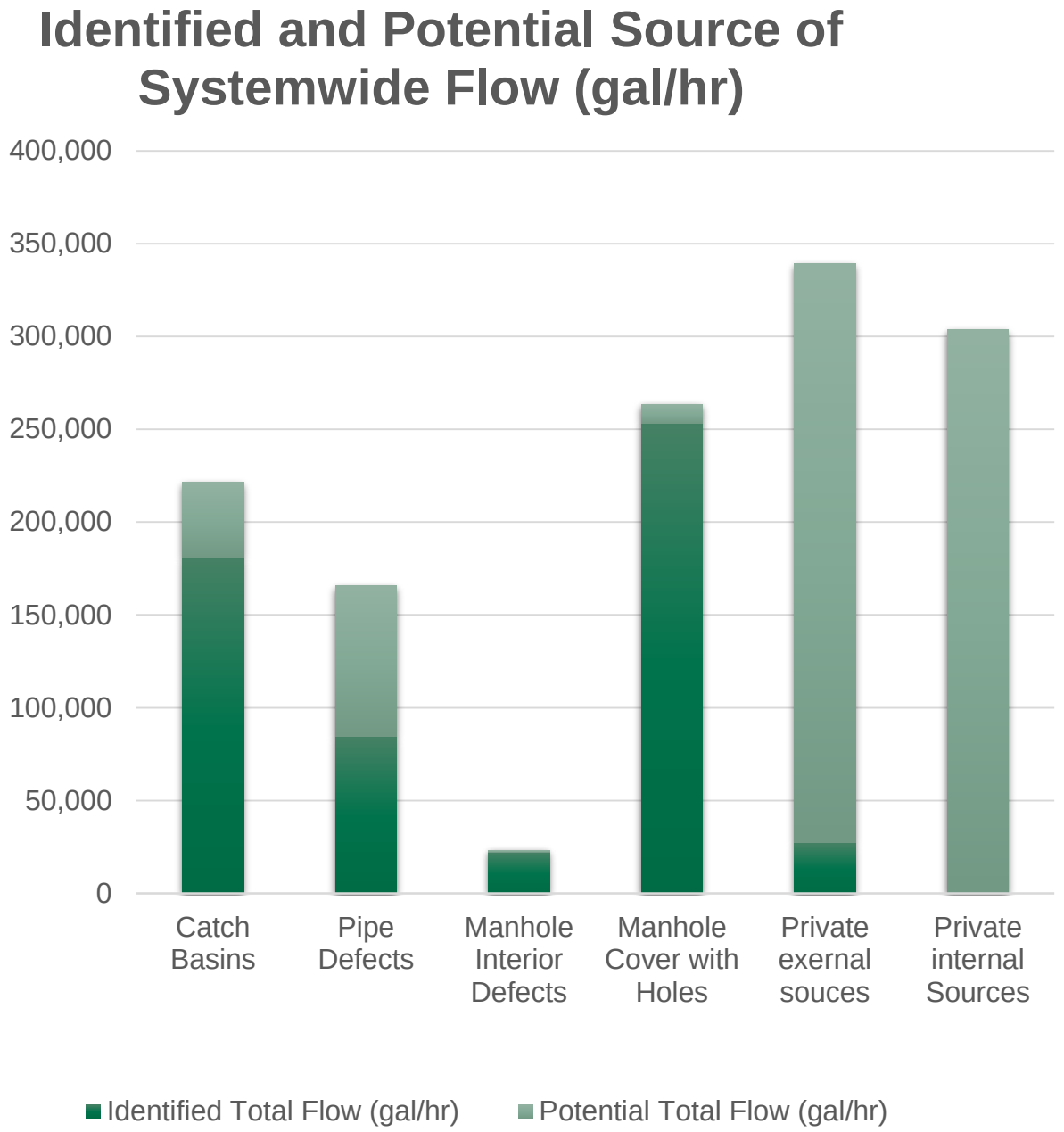
- 19 miles

Manhole Inspections

- 1,120 inspections

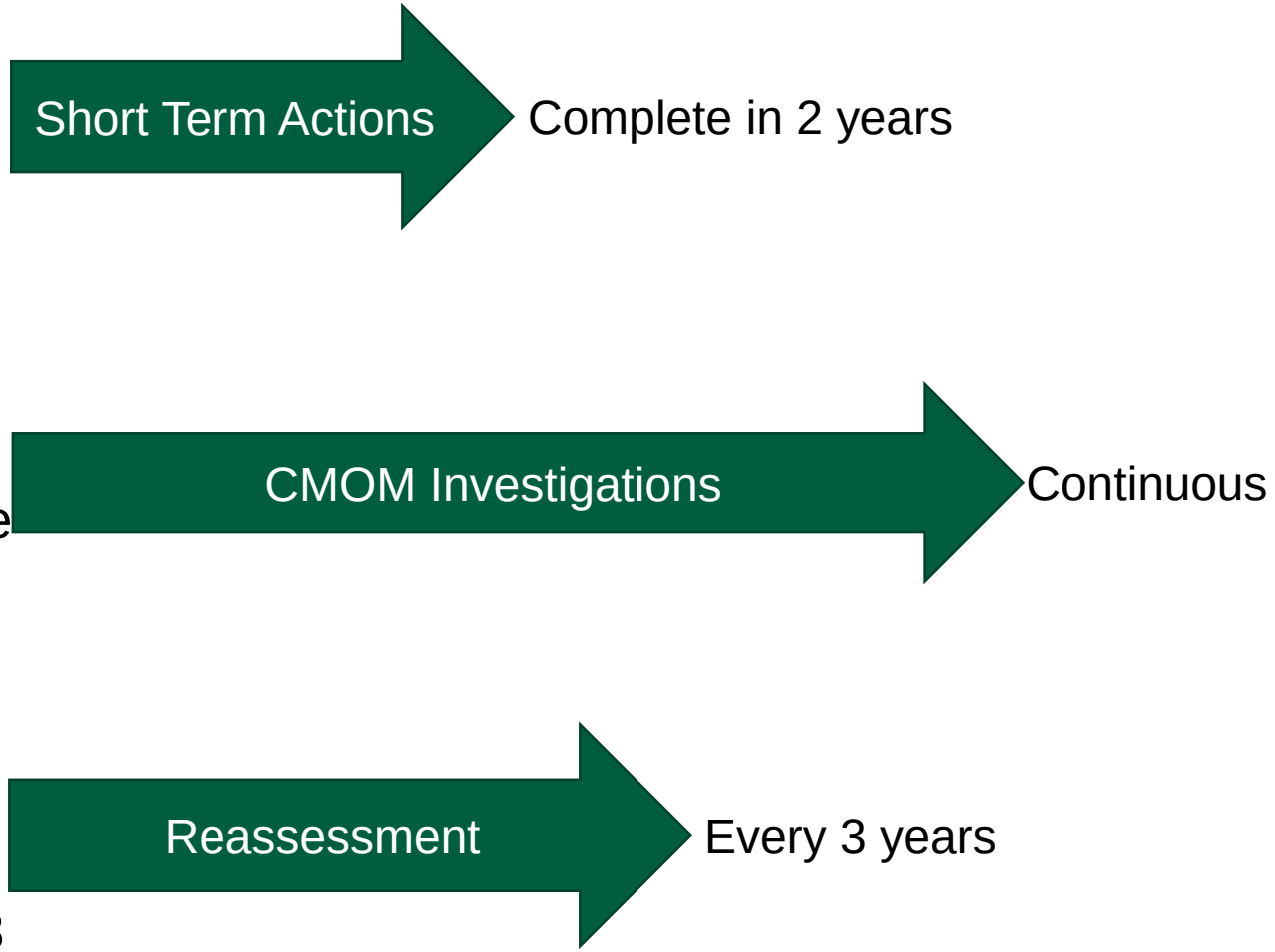
SSES Conclusions

- 99% of the manholes in the system have been inspected.
- 51% of the pipe segments have been PACP CCTV inspected.
- Manhole Covers with holes were the biggest identified source of Inflow
- Private sources of I/I are the biggest potential source of I/I



SSES Next Steps

- Short Term Action Plan (Next 2 Years)
  - Replace identified manhole covers with holes
  - Disconnect catch basins that can be readily removed
  - Engage DPW and develop plan to address catch basins not readily disconnected
  - Formalize building inspection program and make more robust
  - Develop Hydraulic Model
- Continue CMOM investigations as applicable the annual CMOM report
  - MH inspections
  - CCTV
  - Building Inspections
- Assess progress and needed future action items during CMOM Self Assessment Periods (every 3 years)



Fats, Oils and Grease Program

Waterbury WPC tackles FOG issues by educating FSEs and residents on FOG best management practices and providing FSE inspections to ensure permit compliance.

Jacobs Challenging today. Reinventing tomorrow.

FOG Program – Public Education Program

- BMPs for residents and FSE's are on WPC's website and distributed yearly with residential water/sewer bills.
- The WPC's FOG program manual, CT DEEP General Permit for Discharge of Wastewater Associated with Food Preparation Establishments, "No Grease Signs" for use by FSE's, and FAQ information

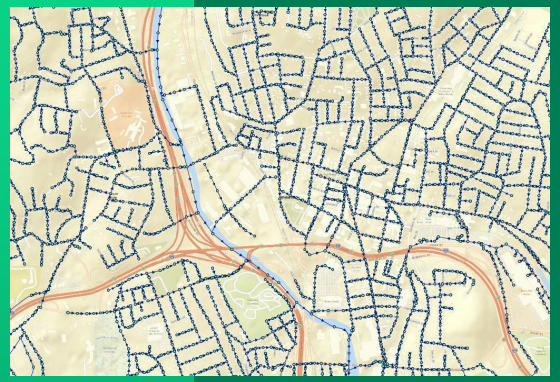
FOG Program – FSE Inspections

- Class III and IV FSE are inspected multiple times a year for compliance with CT Statutes.
  - Must have a FOG pretreatment system
  - Must hang BMP poster for employees
  - Must hang no grease signs
- FSEs may request a waiver if certain criteria as outlined in the CT General Permit are met
- Department of Public Health (DPH) performs FOG inspections as part of the health inspections; WPC performs random inspections of FSE's to support DPH. Delays in inspections were experienced due to Covid-19.
- FSE's with violations receive a Notice of Violation (NOV); most violations are paperwork-related and easily remediated
- DPH and WPC can support FSE's resolve more complex issues, if needed

CMOM Corrective Action Plan Progress

Since the CMOM CAP was developed in 2018 Waterbury WPC has made significant progress on the identified problem areas:

- GIS – Fully updated.
- Asset Management – With SEDARU and SCREAM Waterbury has access to historical inspection data and data on future problem areas.
- I/I Control – The City to start the short-term action plan and continue CMOM activities to further I/I removal.
- FOG – Program was fully updated.



SCREAM

Questions?

Karina.Massey@jacobs.com
linkedin.com/in/karinamassey

Nicole.Petrozza@jacobs.com
linkedin.com/in/nicole-petrozza

Jacobs

Challenging today.
Reinventing tomorrow.

Copyright Notice

Important

The material in this presentation has been prepared by Jacobs®.