



# INFRA 2014

---

## Halifax Water's Wet Weather Management Program December 3, 2014



Providing world-class services for our  
customers and our environment



# Overview of Halifax Water

***Halifax Water*** is the only regulated water, wastewater, and stormwater utility in Canada and provides potable water, wastewater and stormwater services to approximately 400,000 residents.



# What is Halifax Water?

- **Operates in accordance with Act of Provincial Legislature with rules and regulations approved by NS Utility and Review Board.**
- **Operates like a business, governed by Board of Directors, and owned by HRM.**
- **Self financed water, wastewater, and stormwater utility; capital and operating budgets are funded directly from water sales and fire protection revenue.**



# Halifax Water – Wastewater and Stormwater Linear Assets

## Stormwater Asset Statistics

- 884 km of storm mains
- 28 stormwater retention facilities
- 29,500 catchbasins



## Wastewater Asset Statistics

- 1,700 km of wastewater & combined mains
- 14 treatment facilities
- 172 pumping stations
- 4 holding tanks
- 34,000 manholes
- 78,900 service laterals

## ▶ Our Collection System

- Sewers dating to 1870s
- Pipe Material
  - Hand-laid brick
  - Asbestos cement
  - Orangeburg no-corrode
  - Reinforced Concrete



**We have it all: age, material  
and all their problems!**



# The Problem: I / I



## Inflow (typically from rainwater):

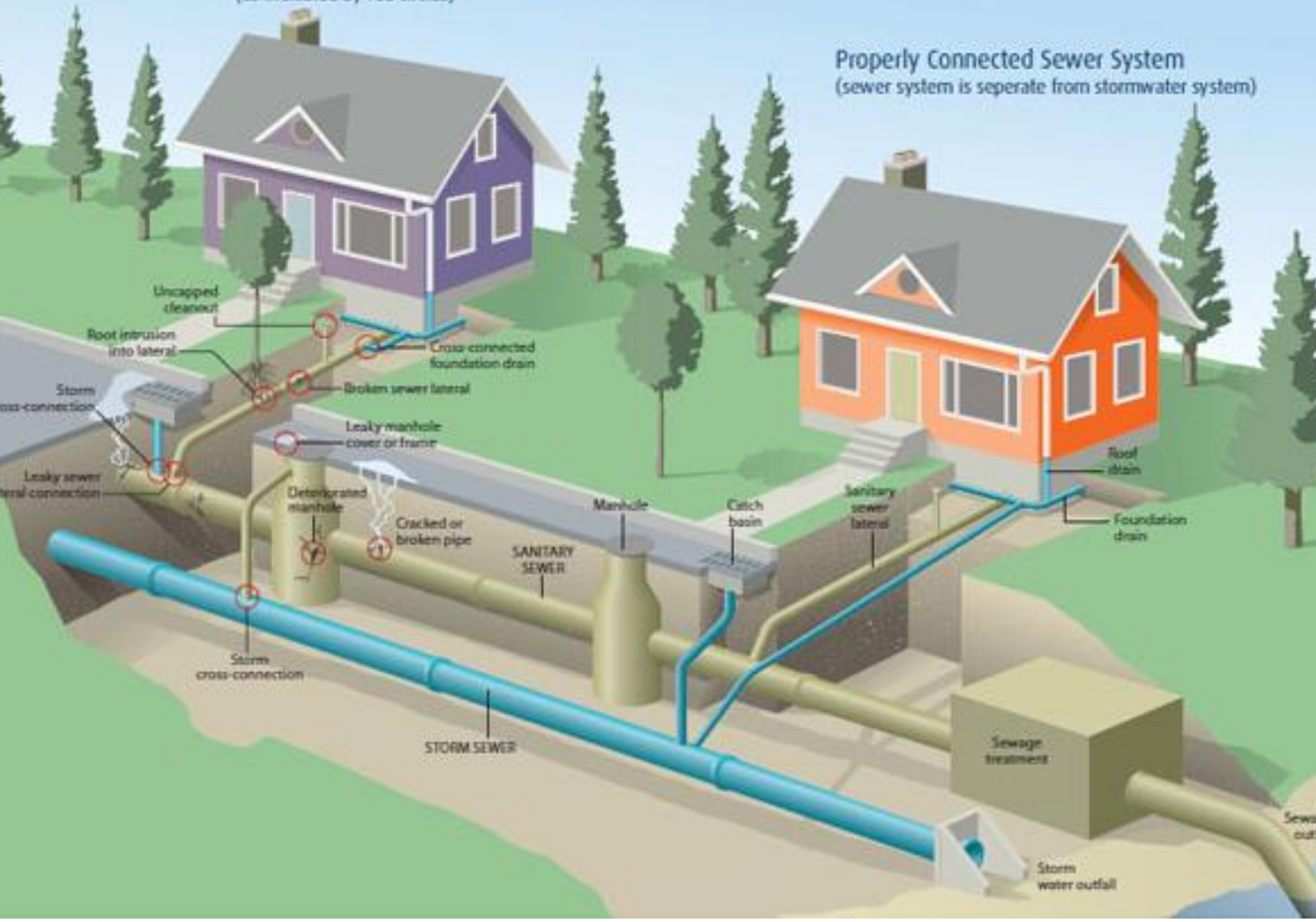
- Clearwater: Cross connected catchbasins, private property connections (sump pumps, roof downspouts, etc.)
- **Fast** inflow of stormwater causing immediate response.

## Infiltration (typically from groundwater):

- Cracks and breaks, separated joints, root intrusion, etc.
- Found in mains, laterals, manholes, etc.
- **Slower** response but can last over a longer time.

## Sources of Inflow and Infiltration (as indicated by red circles)

## Properly Connected Sewer System (sewer system is separate from stormwater system)



## ▶ I / I: A Challenge to Manage

### Peak flows cause:

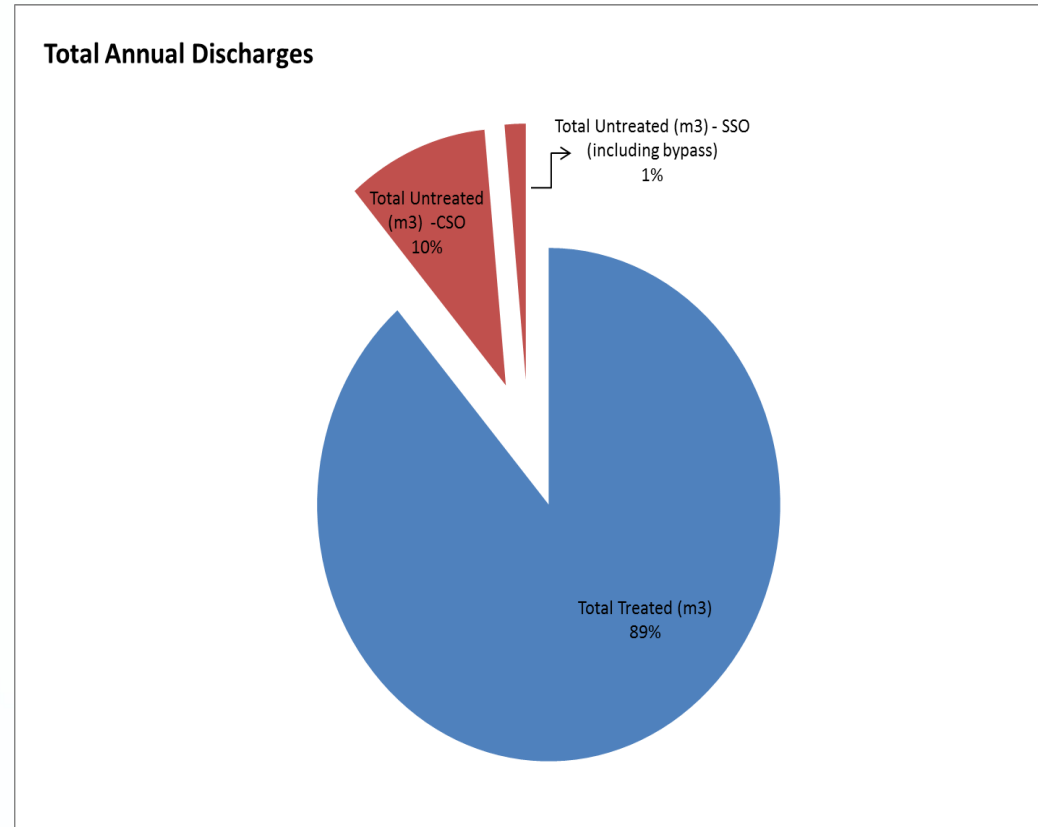
- Limitations on infrastructure capacity
- Restrictions on growth
- Property damage
- Increased capital and operating costs
- Regulatory non-compliance.





# Wet Weather Impacts for Halifax Water

- **Wastewater total annual flows: 87,000,000 m<sup>3</sup>**
- **89% treated discharge**
- **11% untreated discharge**
  - 10% CSO (regulated)
  - 1% SSO (unregulated)



## Mandate

*“To efficiently manage the volume of wet weather generated flows entering the sanitary wastewater system.”*

# Wet Weather Management Program

## *Drivers*

- **Support protection of Human Health & the Environment**
- **Maintain service levels while minimizing rate impacts**
- **Provide cost-effective Operations and Maintenance**
- **Ensure responsible Asset Management & Planning**

## Wet Weather Management Program

### **Develop wet weather action plan**

- Clearly defined activities, timelines, milestones, measures
- Develop a prioritization matrix
- Develop flow monitoring program

### **Pilot Program – “learning through doing”**

- Employ strategies and measure their effectiveness
- Lessons learned
- Used to fully develop the Long Term Strategy



# WWMP – Prioritize our System

## 1. Pumping Station Peaking Factor

- ADF/Peak Flow;

## 2. Regulatory Compliance Obligation

- WSER SSO Identification Report;

## 3. Operations Wet Weather Hit List

- Sites with chronic high wet weather flows;
- Sites that require operator intervention.

The result was 210 sites evaluated and prioritized.

100	WATERVILLE #2 PS
100	WATERVILLE #1 PS
100	WATERVILLE #3 PS
100	WATERVILLE #4 PS
100	WATERVILLE #5 PS
100	WATERVILLE #6 PS
100	WATERVILLE #7 PS
100	WATERVILLE #8 PS
100	WATERVILLE #9 PS
100	WATERVILLE #10 PS
100	WATERVILLE #11 PS
100	WATERVILLE #12 PS
100	WATERVILLE #13 PS
100	WATERVILLE #14 PS
100	WATERVILLE #15 PS
100	WATERVILLE #16 PS
100	WATERVILLE #17 PS
100	WATERVILLE #18 PS
100	WATERVILLE #19 PS
100	WATERVILLE #20 PS
100	WATERVILLE #21 PS
100	WATERVILLE #22 PS
100	WATERVILLE #23 PS
100	WATERVILLE #24 PS
100	WATERVILLE #25 PS
100	WATERVILLE #26 PS
100	WATERVILLE #27 PS
100	WATERVILLE #28 PS
100	WATERVILLE #29 PS
100	WATERVILLE #30 PS
100	WATERVILLE #31 PS
100	WATERVILLE #32 PS
100	WATERVILLE #33 PS
100	WATERVILLE #34 PS
100	WATERVILLE #35 PS
100	WATERVILLE #36 PS
100	WATERVILLE #37 PS
100	WATERVILLE #38 PS
100	WATERVILLE #39 PS
100	WATERVILLE #40 PS
100	WATERVILLE #41 PS
100	WATERVILLE #42 PS
100	WATERVILLE #43 PS
100	WATERVILLE #44 PS
100	WATERVILLE #45 PS
100	WATERVILLE #46 PS
100	WATERVILLE #47 PS
100	WATERVILLE #48 PS
100	WATERVILLE #49 PS
100	WATERVILLE #50 PS
100	WATERVILLE #51 PS
100	WATERVILLE #52 PS
100	WATERVILLE #53 PS
100	WATERVILLE #54 PS
100	WATERVILLE #55 PS
100	WATERVILLE #56 PS
100	WATERVILLE #57 PS
100	WATERVILLE #58 PS
100	WATERVILLE #59 PS
100	WATERVILLE #60 PS
100	WATERVILLE #61 PS
100	WATERVILLE #62 PS
100	WATERVILLE #63 PS
100	WATERVILLE #64 PS
100	WATERVILLE #65 PS
100	WATERVILLE #66 PS
100	WATERVILLE #67 PS
100	WATERVILLE #68 PS
100	WATERVILLE #69 PS
100	WATERVILLE #70 PS
100	WATERVILLE #71 PS
100	WATERVILLE #72 PS
100	WATERVILLE #73 PS
100	WATERVILLE #74 PS
100	WATERVILLE #75 PS
100	WATERVILLE #76 PS
100	WATERVILLE #77 PS
100	WATERVILLE #78 PS
100	WATERVILLE #79 PS
100	WATERVILLE #80 PS
100	WATERVILLE #81 PS
100	WATERVILLE #82 PS
100	WATERVILLE #83 PS
100	WATERVILLE #84 PS
100	WATERVILLE #85 PS
100	WATERVILLE #86 PS
100	WATERVILLE #87 PS
100	WATERVILLE #88 PS
100	WATERVILLE #89 PS
100	WATERVILLE #90 PS
100	WATERVILLE #91 PS
100	WATERVILLE #92 PS
100	WATERVILLE #93 PS
100	WATERVILLE #94 PS
100	WATERVILLE #95 PS
100	WATERVILLE #96 PS
100	WATERVILLE #97 PS
100	WATERVILLE #98 PS
100	WATERVILLE #99 PS
100	WATERVILLE #100 PS

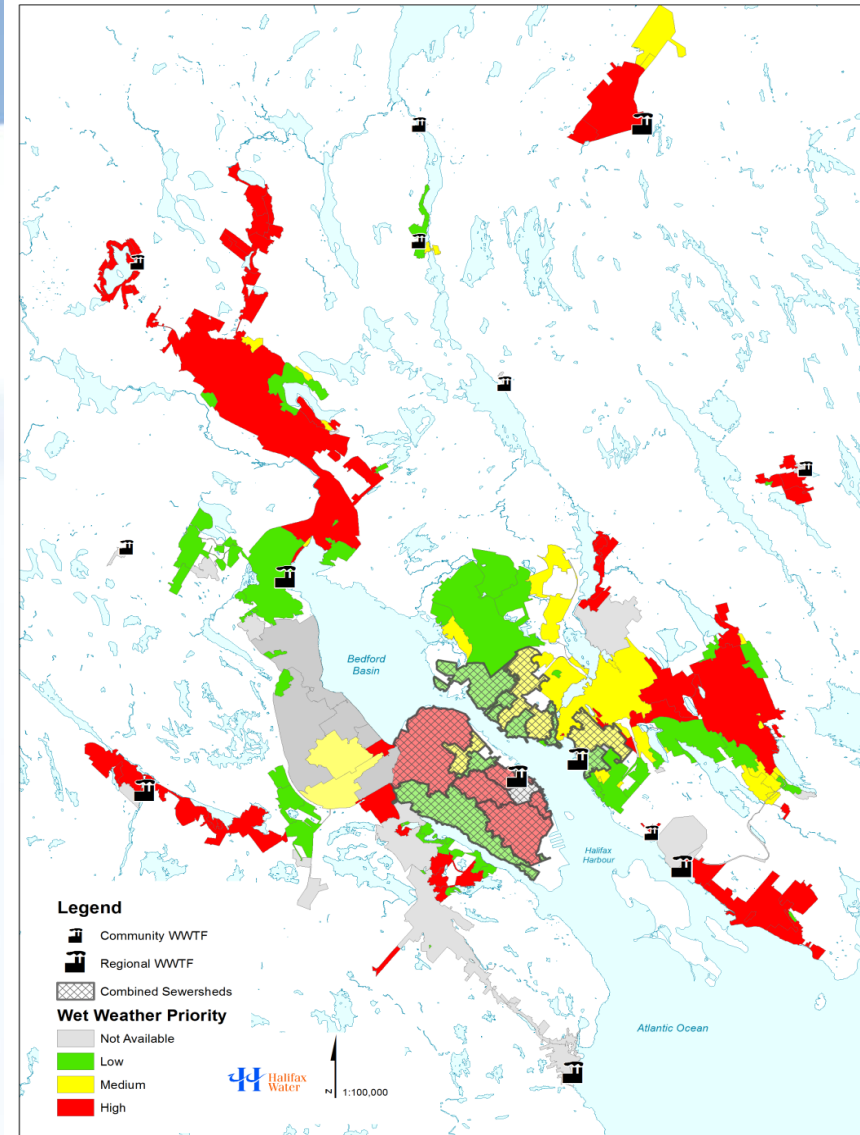


# Priority Ranking

## Wet Weather Priorities:

- 210 sewersheds assessed
- 23 high priority areas
- 16 mid priority areas
- Drive Flow Monitoring Program
- Drive CCTV Condition
- Assessment activity
- Drive Data Management

## Priority Map - 2014 Wet Weather Management Program



# Wet Weather Management Program

## *Program Goals*

### 1. Develop an I/I Reduction Strategy

- Based on Industry best practices.

### 2. Develop an I/I Reduction Program

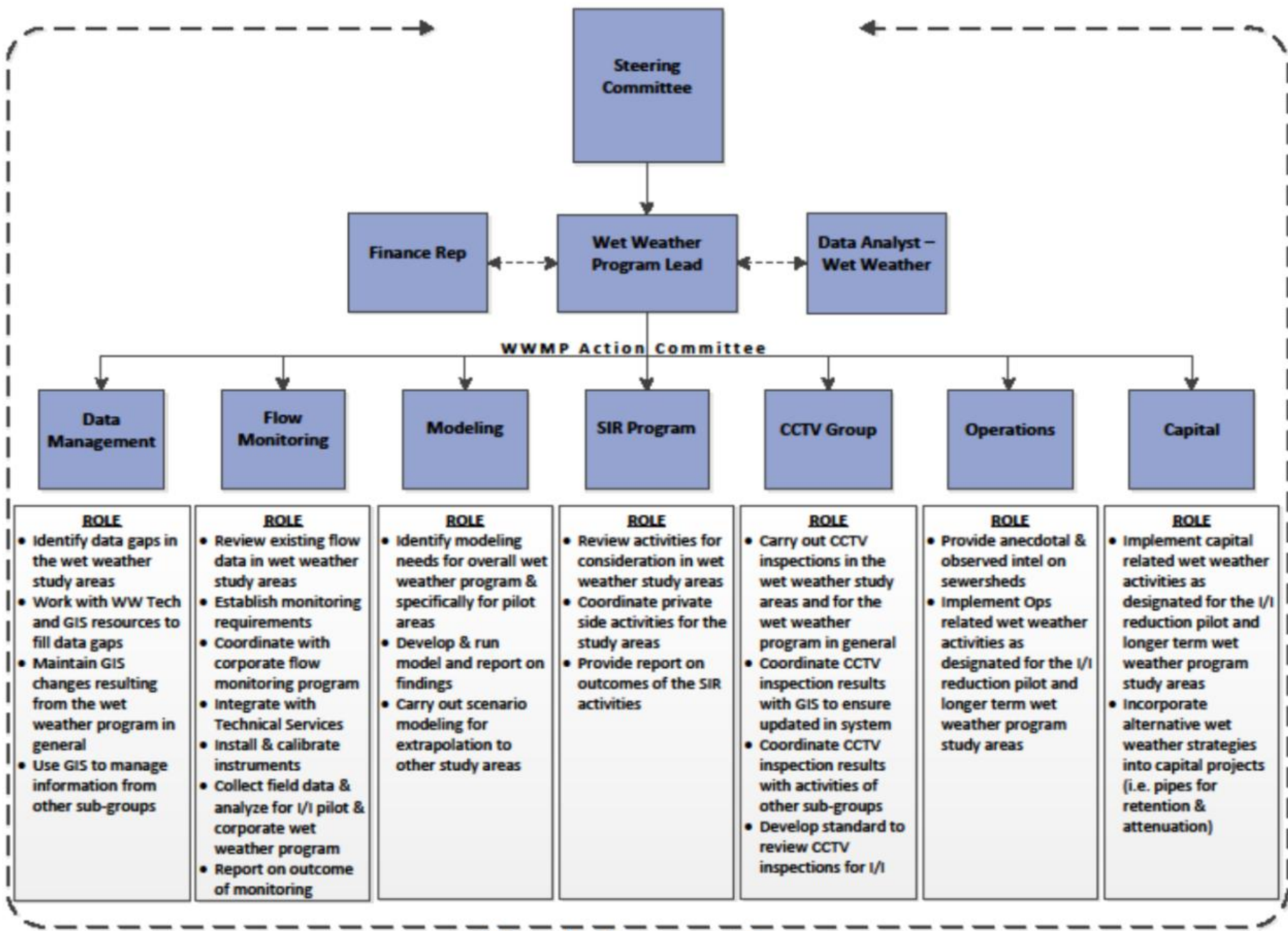
- Manage system capacity to defer expansion while managing growth expectations;
- Improve level of service;
- Build a WW management toolbox, including costs-benefits.



## How do we execute a Wet Weather Program?

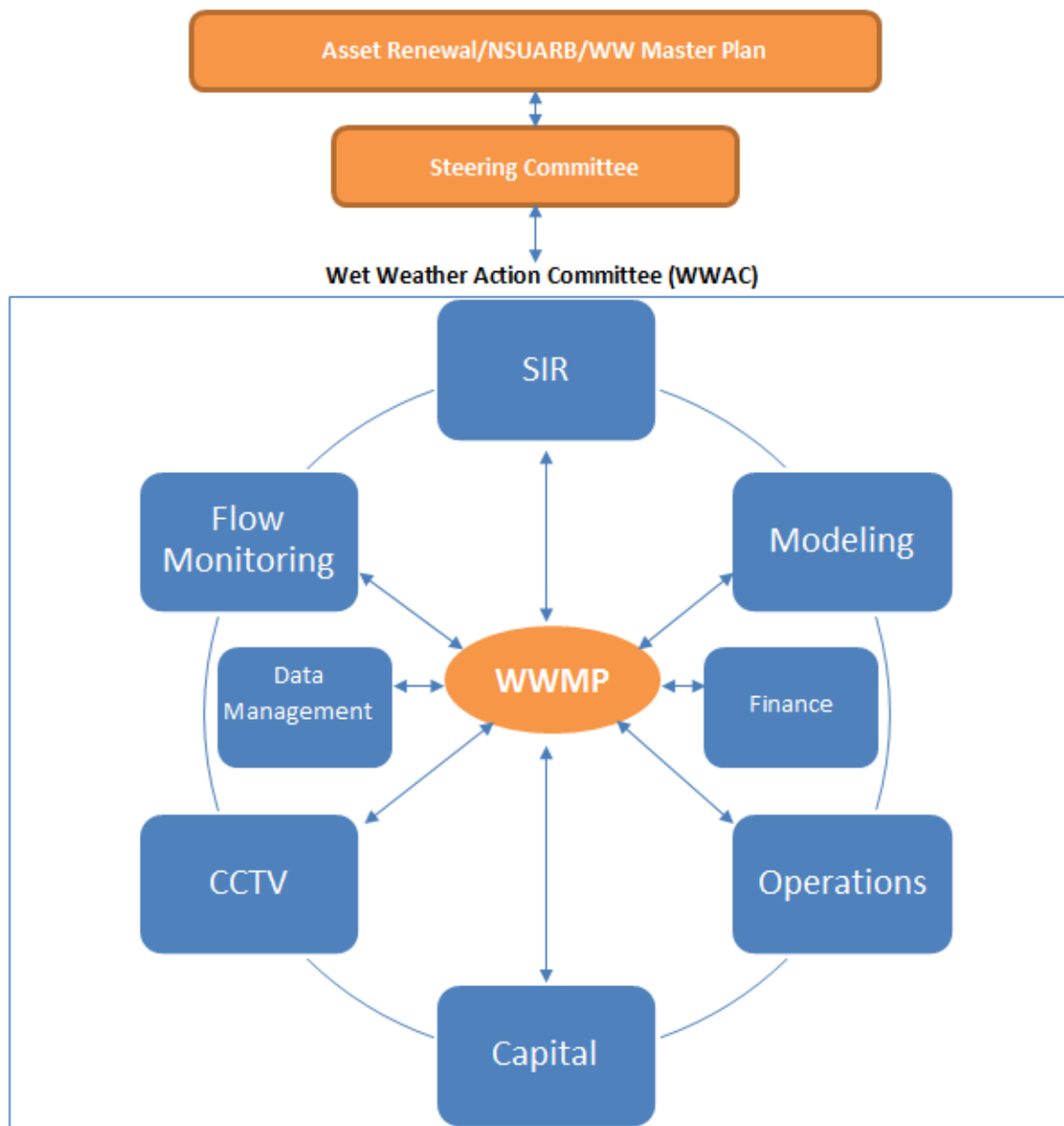
- **Significant in-house resources**
  - We have a lot of expertise in house
- **Possess a lot of data**
  - Pumping station runtime
  - Flow monitoring
- **Breaking Down the Silos**
  - Collaborative working departments rather than in isolation





**Wet Weather Management Program**

- **Wet Weather Steering Committee**
  - Makes strategic decisions on future I/I projects;
  - Reviews prioritization method & outcomes;
  - Directs the Action Committee (WWAC) efforts;
  - Manages & monitors long-term Program direction.
- **Wet Weather Action Committee (WWAC)**
  - Work group of cross-departmental “champions”;
  - Realizes I/I projects chosen by Steering Committee;
  - Reports outcomes.





# WWMP - Metrics

<b>Quantitative Measures</b>
# of SSOs per service connection
# of SSOs per length of main
# of SSOs per vol. of conveyed & treated
Vol. of SS discharge per service connection
Vol. of SS discharge per length of main
Vol. of SS discharge per vol. conveyed & treated
No. of basement backups per length of SS main or number of service connections
WWTF non-compliance as a result of rain event (>XX mm)
<b>Investigative Work</b>
Length of SS CCTV inspected
Length of SS assigned PACP condition rating
No. of private property inspections
No. of illegal private cross-connections
No. of manholes inspected (condition & I/I)
No. of identified cross connections
<b>Rehabilitation</b>
Length of SS rehabilitated/replaced
No. of manholes rehabilitated/replaced
No. of cross connections repaired
No. of illegal private cross-connections corrected
No. of lateral repairs

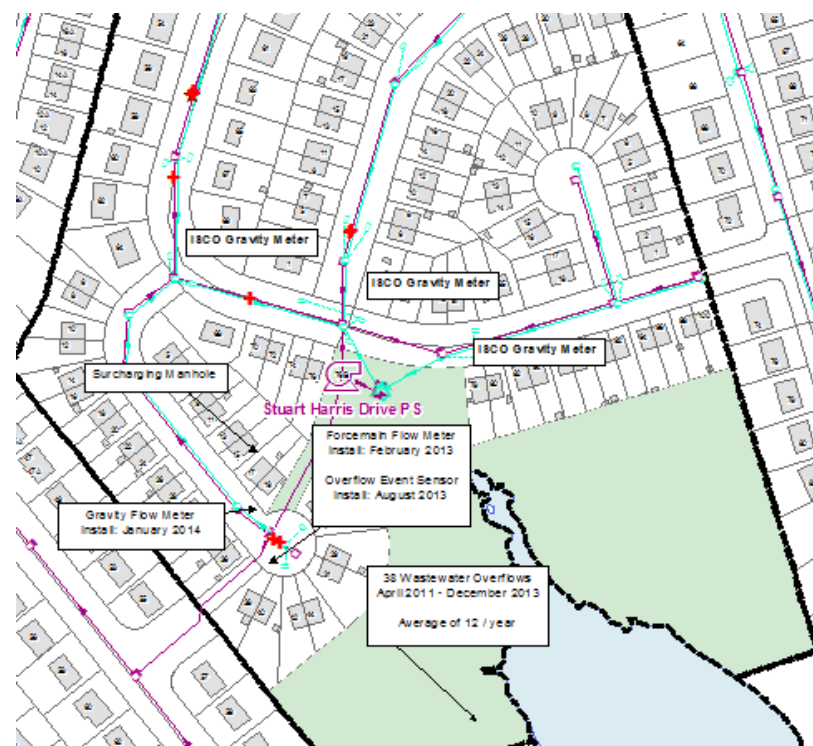
# ▶ Pilot Project: Stuart Harris PS Sewershed

## Public & Private I/I Reduction

- Review existing rehabilitation methods

## STATS:

- Landuse: Residential
- Pipe material: concrete
- # of customers: 142
- Area: 9.4 HA
- SSOs/year: 12
- System age: 40 years
- KM of sanitary pipe: 1.1
- Storm system: deep storm
- Actual PF: 8 / Theoretical PF: 4





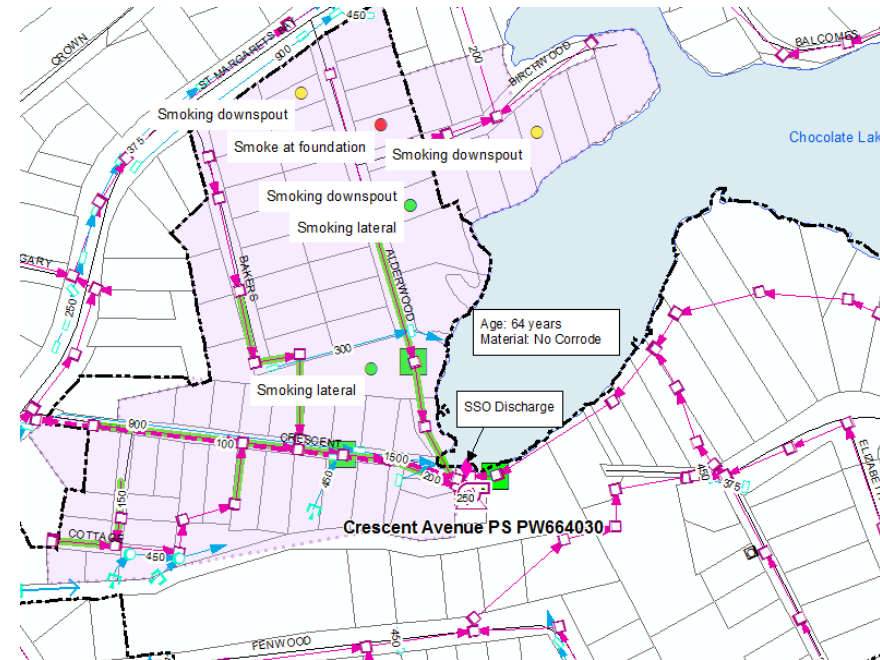
# Pilot Project: Crescent Ave PS Sewershed

## Comprehensive Rehabilitation

- Measure success of pipe relining

### STATS:

- Landuse: Residential
- Pipe material: concrete/no corrode
- # of customers: 50
- Area: 4 HA
- SSOs/year: 7
- System age: 64 years
- KM of sanitary pipe: 0.6
- Actual PF: 18 / Theoretical PF: 4





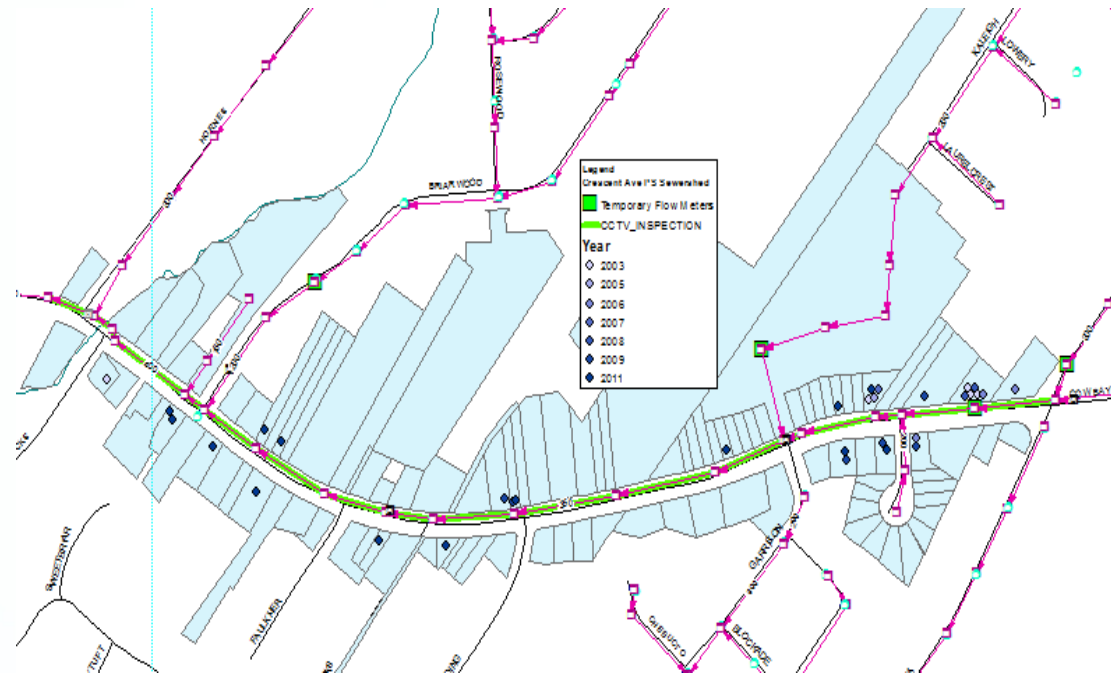
# Pilot Project: Cow Bay Road

## Deep Storm Implementation

- Private side separation and enforcement

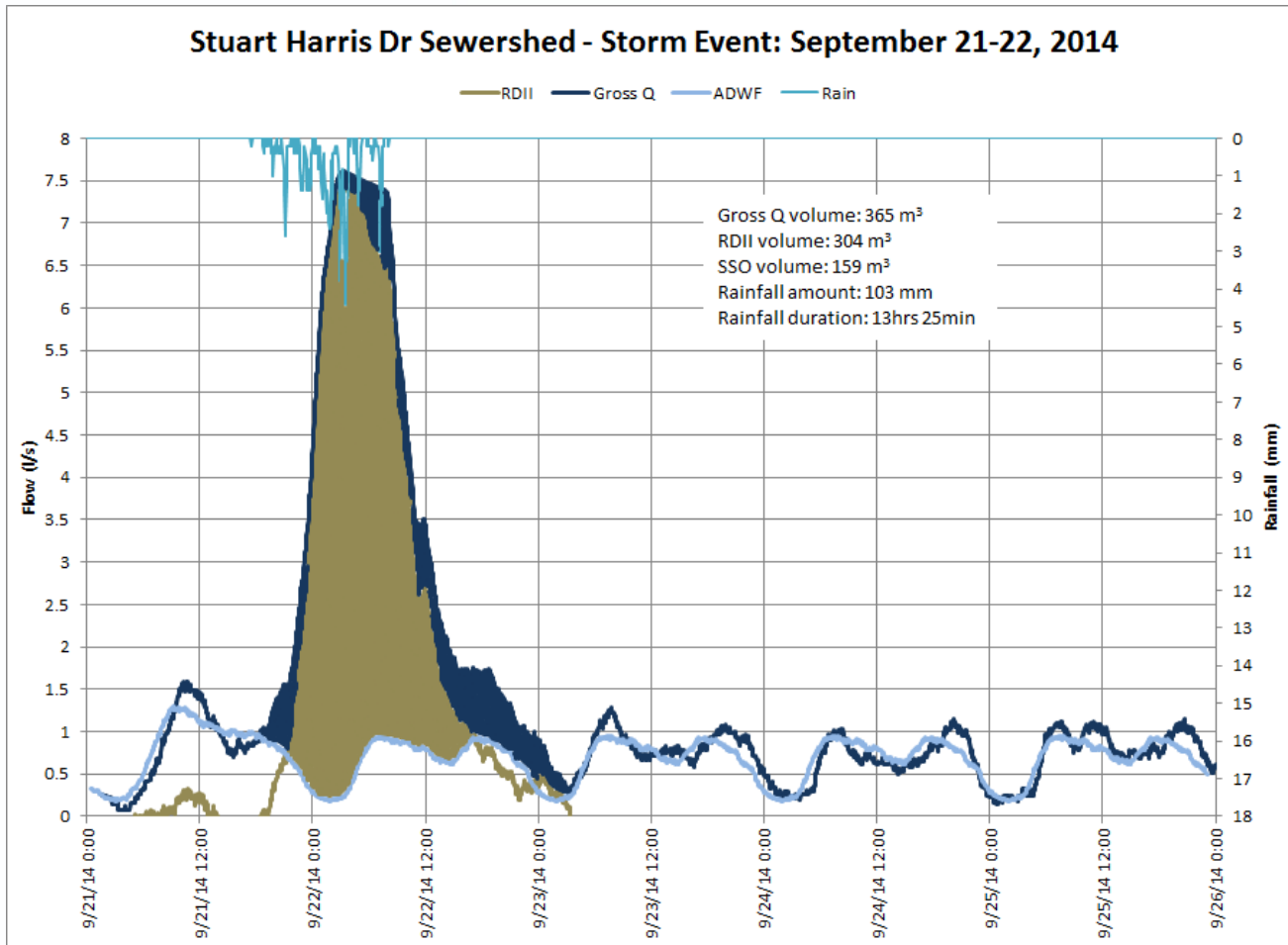
### STATS:

- Landuse: Residential
- # of customers: 98
- # of flood calls: 5 / year
- System age: 40 years
- KM of sanitary pipe: 1
- Storm system: shallow





# Quantitative I / I Reductions







## Going Forward

- **Dealing with the Private Side**

- ~50% of I/I
- Policy
  - ✓ Access for inspection
  - ✓ Who pays for rehab/replacement
  - ✓ Enforcement

- **Flow Monitoring Challenges**

- Mag meters are most accurate but flow is attenuated
- Gravity meter installs tend to be lower accuracy but represent instantaneous responses
- Maybe pump run times are sufficient?



## Going Forward

- **Public Information and Buy in**
  - What is the sweet spot?
- **Rainfall Distribution**
  - Accounting for spatial variations
- **Data Overload**
  - lots of information but what is enough? How much is too much?
- **Metrics**
  - How do we represent success?
  - What is the cost of success? Absolute requirement.



## Going Forward

- **Finalize the Pilots**
  - Quantify Results.
- **Implement New Projects**
  - Based on the Prioritization Ranking;
  - Use Lessons Learned.



## Questions or Comments?

**Susheel Arora, M.A.Sc., P.Eng.**  
**Director, Wastewater and Stormwater Services**  
**Halifax Water**  
**[susheel.arora@halifaxwater.ca](mailto:susheel.arora@halifaxwater.ca)**