

# Seattle Public Utilities Capital, Program & Policy Work Supporting the Reduction of I&I

Presentation to MWPAAC, Engineering & Planning  
12/1/2022

Don Anderson, Caroline Barlow, Ann Corbitt

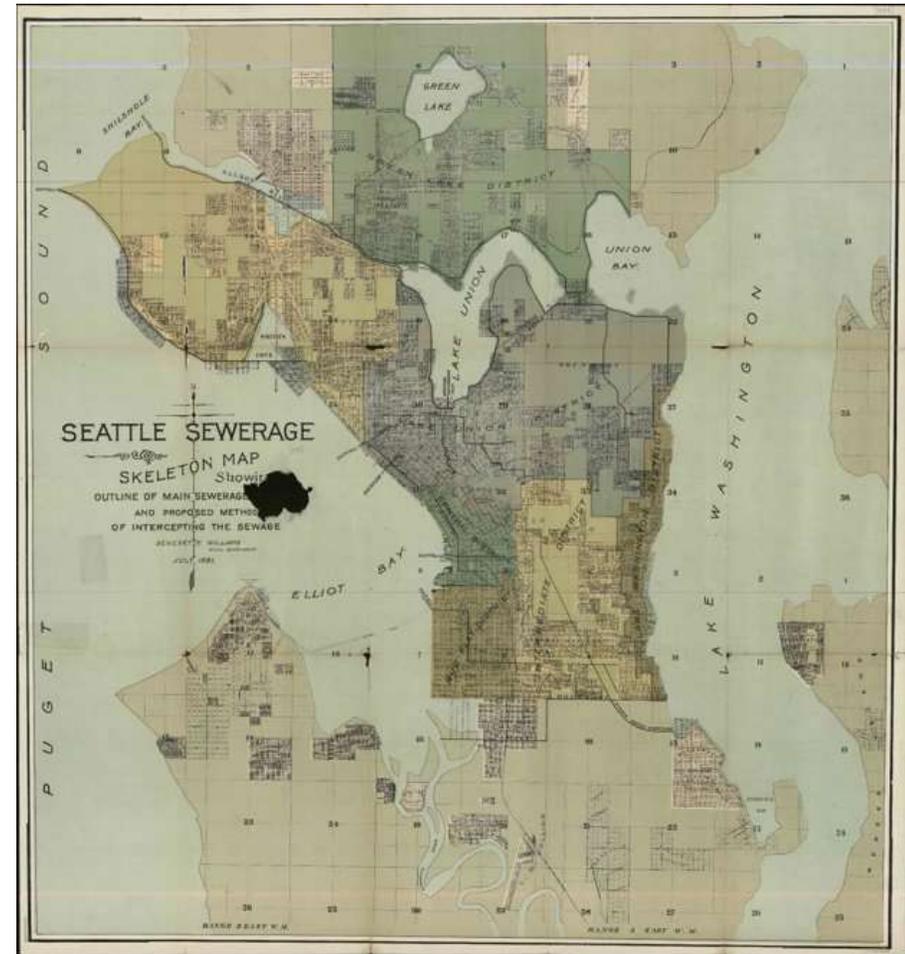
Seattle Public Utilities



City of Seattle

# Today's discussion

- Context on Seattle's sewer system
- CMOM Program & Pipe Rehab Program
- Spotlight on a Couple Projects
- Policy & Program
- Questions/Discussion



# Seattle's Wastewater System

## Pipelines

1420+ miles of wastewater pipes

400+ miles of drainage pipes

Average age over 80 years

## Pump Stations and Force mains

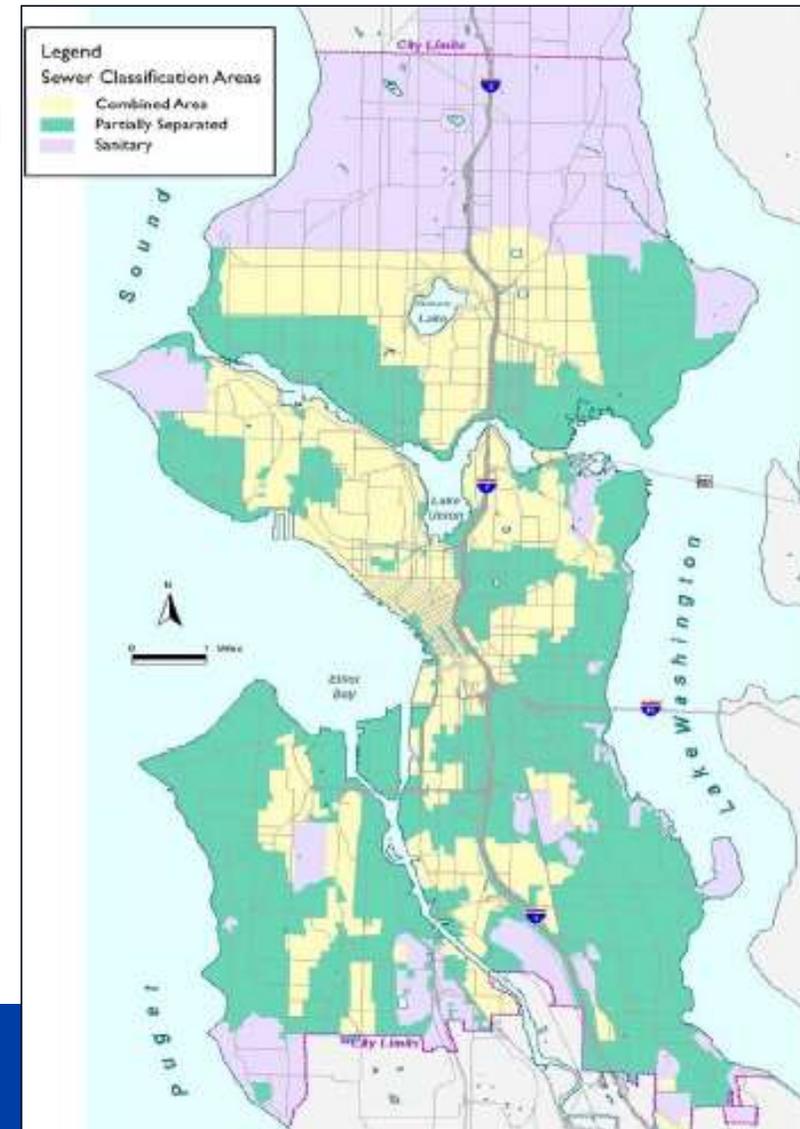
68 wastewater pump stations

68 force mains

## Conveyance

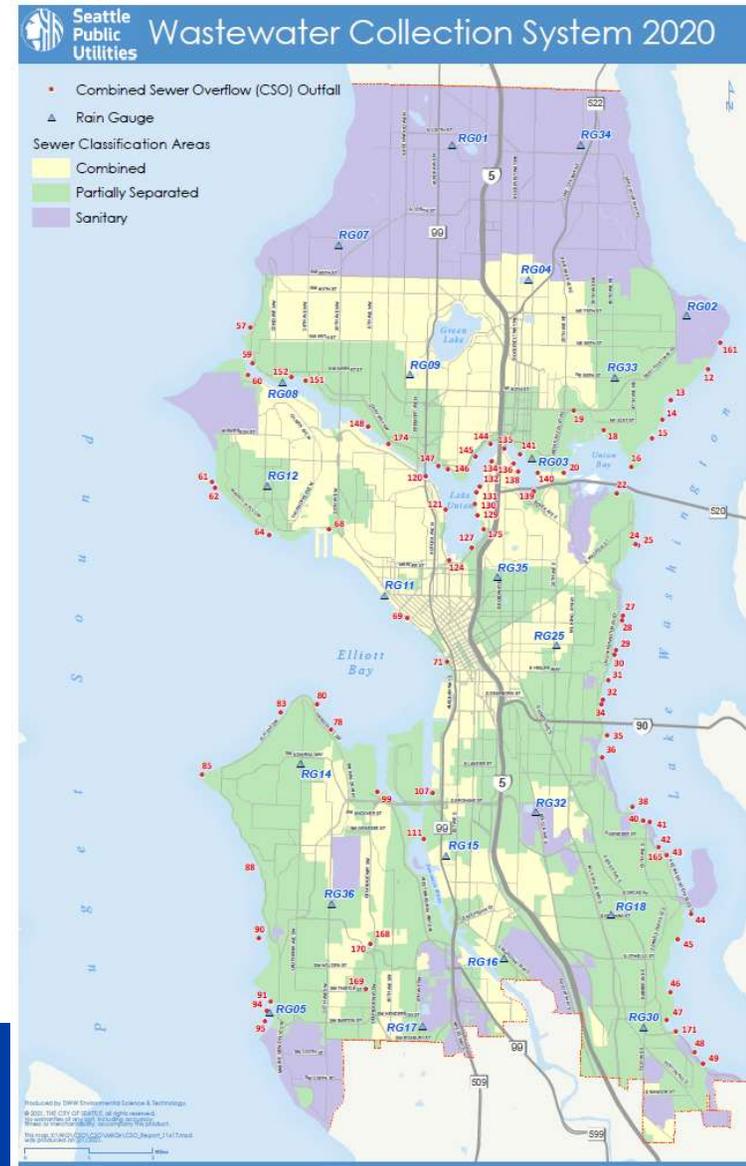
To King County Regional Collection System

~120 miles Regional Interceptor through Seattle



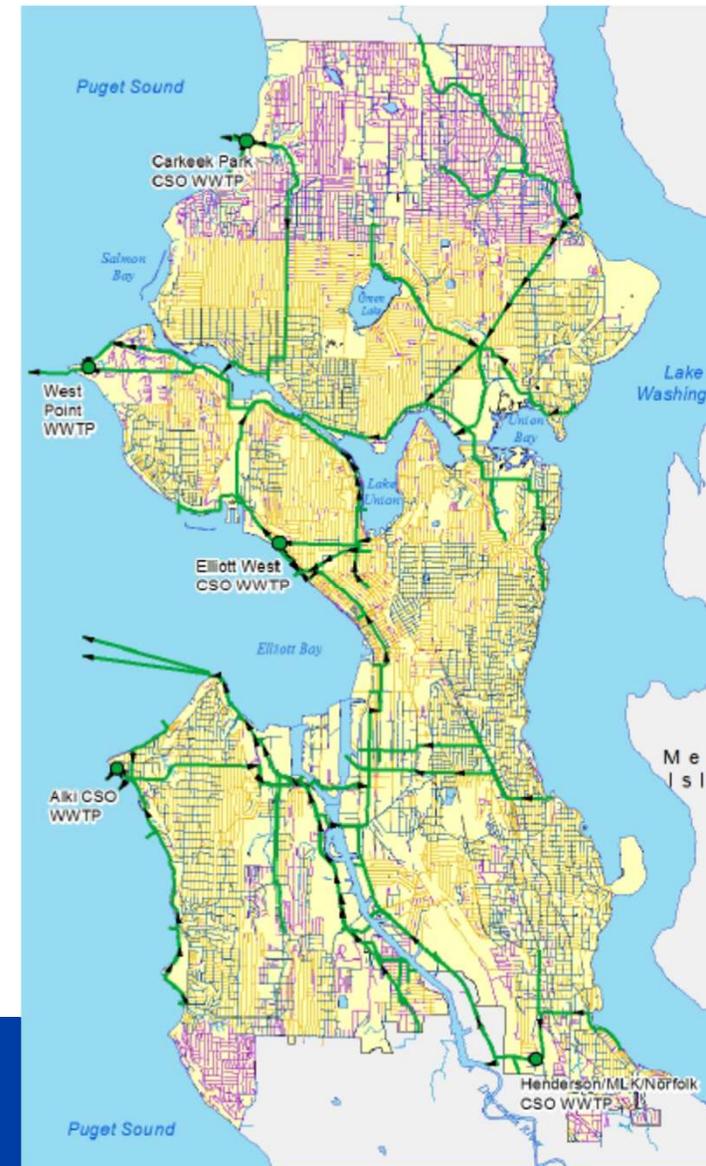
# Seattle's Wastewater System Timeline

- 1880-1900 – First sewers built
  - Fully combined system, stormwater and wastewater in the same pipe
- 1950's-ish – Annexations of unincorporated areas, informal drainage
  - Separated system, only wastewater in wastewater pipe
- 1958 – Formation of METRO/King County regional wastewater treatment system
- Infrastructure serving basins larger than 1,000 acres owned and operated by King County
- 1960-1970s – “Forward Thrust” separation program
  - Partially separated, streets connected to separate stormwater system
  - Over time
    - Redevelopment connects to separate stormwater system
    - And redevelopment extends the separate stormwater system

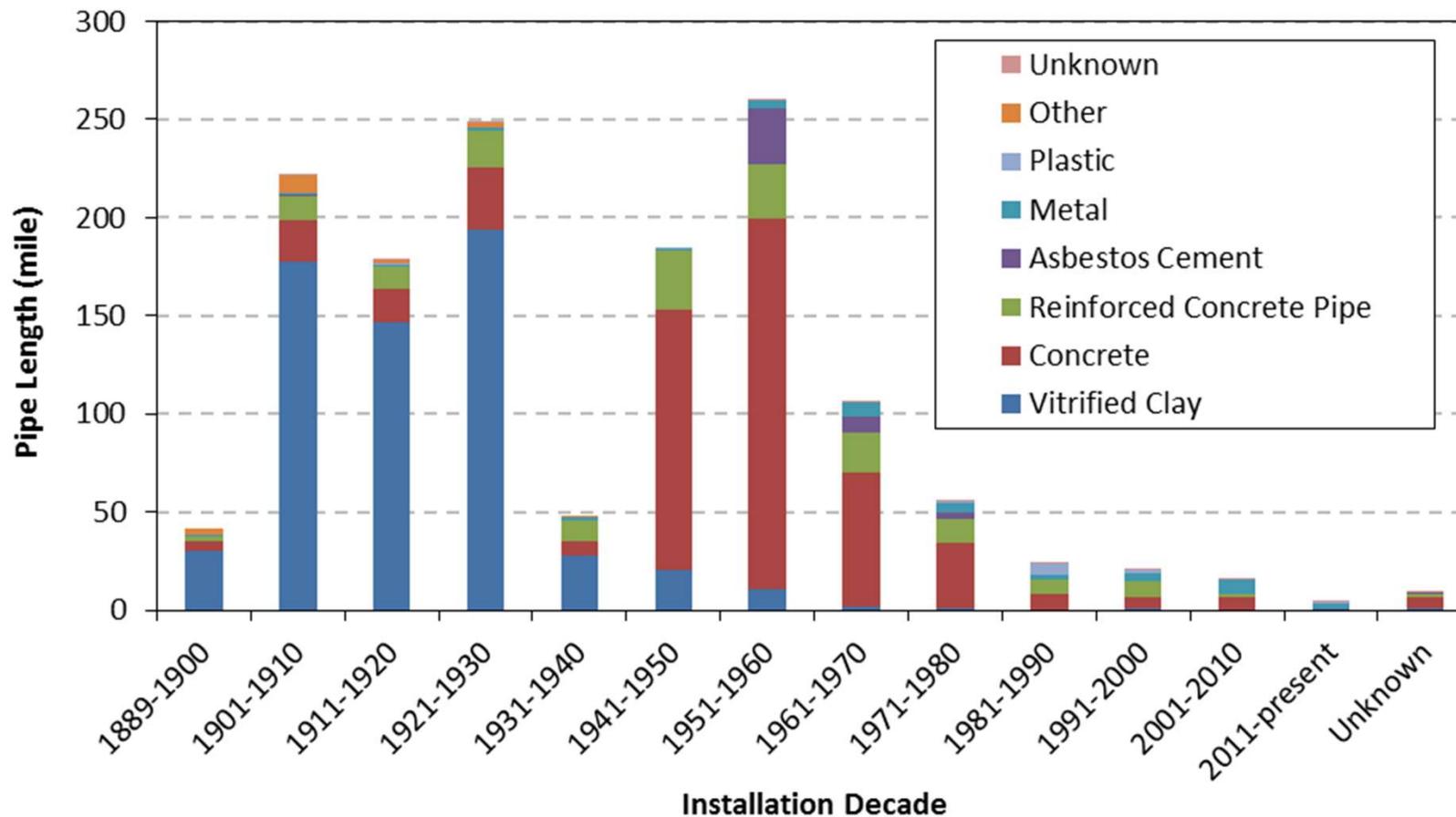


# Seattle's Wastewater System Timeline

- 1880-1900 – First sewers built
  - Fully combined system, stormwater and wastewater in the same pipe
- 1950's-ish – Annexations of unincorporated areas, informal drainage
  - Separated system, only wastewater in wastewater pipe
- 1958 – Formation of METRO/King County regional wastewater treatment system
- Infrastructure serving basins larger than 1,000 acres owned and operated by King County
- 1960-1970s – “Forward Thrust” separation program
  - Partially separated, streets connected to separate stormwater system
  - Over time
    - Redevelopment connects to separate stormwater system
    - And redevelopment extends the separate stormwater system

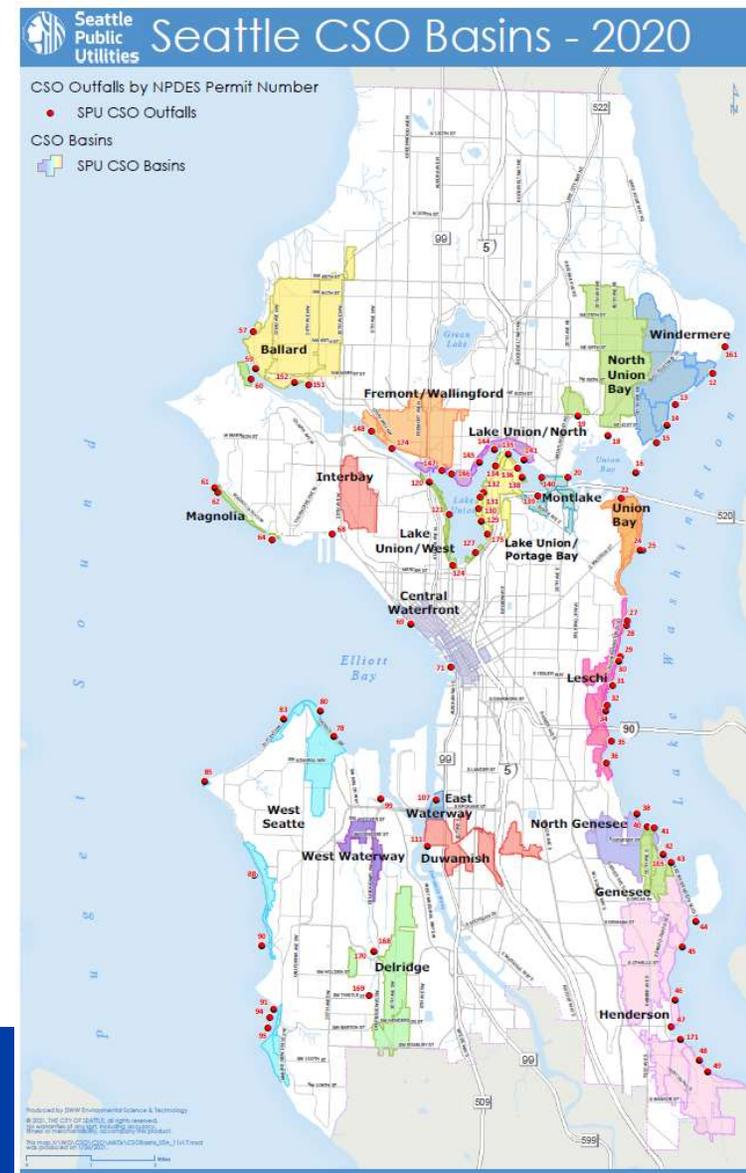


## Wastewater Pipe Profile by Material & Installation Decade



# Drivers for Program Work

- Consent Decree
  - 82 CSO outfalls, 51 controlled
  - 1 CSO per basin per year, on a 20-year average
- SSO requirements
  - 4 SSOs per mile of pipe per year on a 2-year average
- Asset Conditions > Asset Management approach



# Condition Assessment Strategy & Pipe Rehab Program

Knowing our System to Better our System

Seattle Public Utilities



City of Seattle

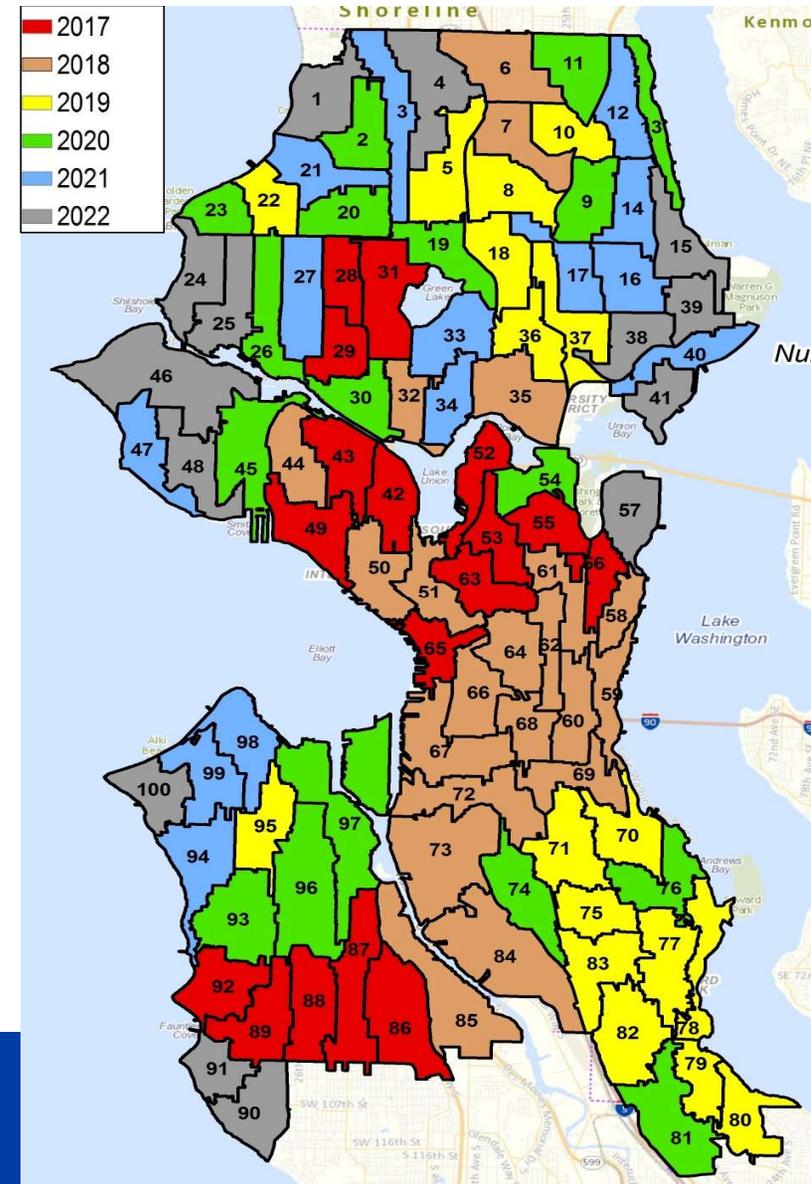
# Condition Assessment Strategy Objective

- Proactively gain understanding of system condition
- Build a foundation for the Rehab Strategy



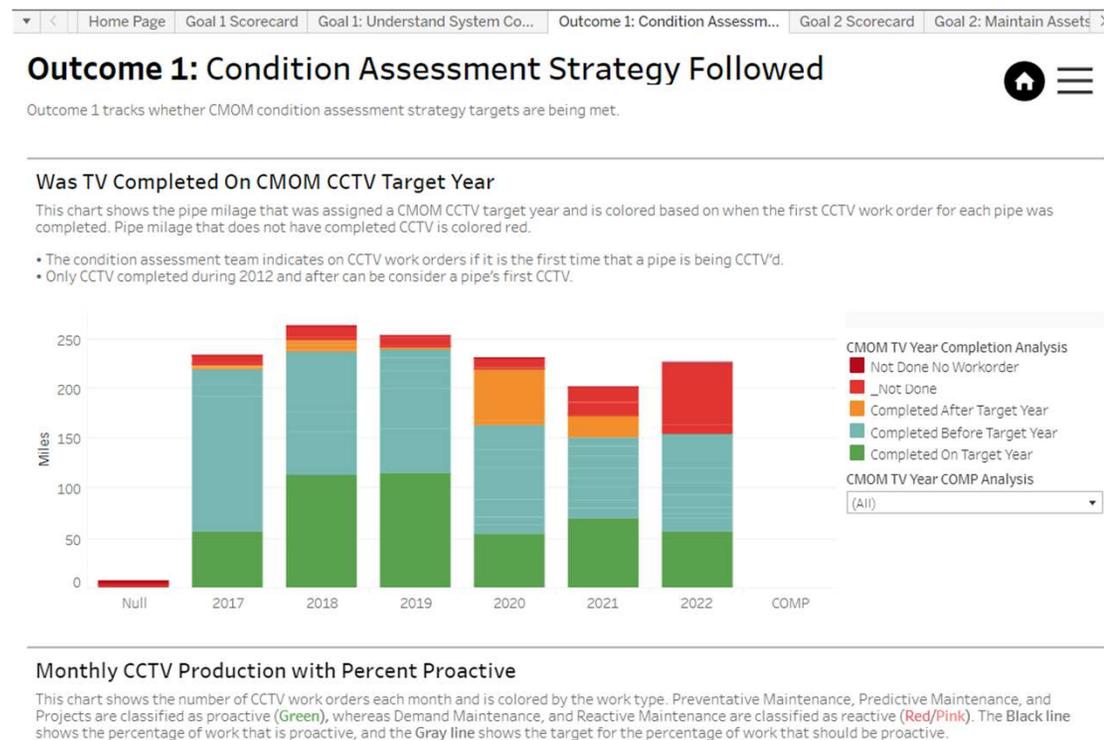
# Condition Assessment Strategy Goal

- CCTV all wastewater pipes between 2012-2022
- Implement ongoing 10-year inspection cycle

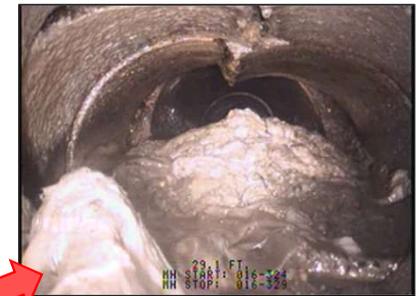
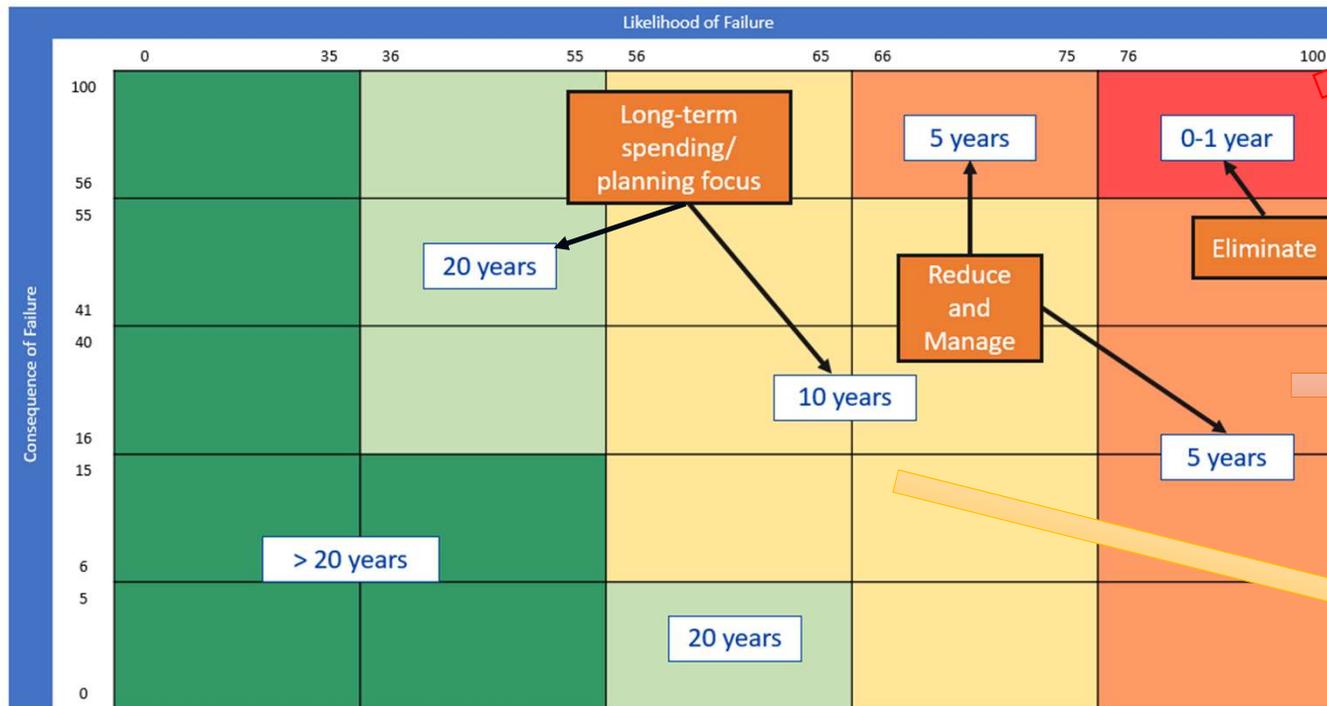


# Condition Assessment Strategy Progress

- CCTV Goal: ~140 miles of pipe per year
- Track and report progress via a dashboard 
- Up Next: 2023-2033

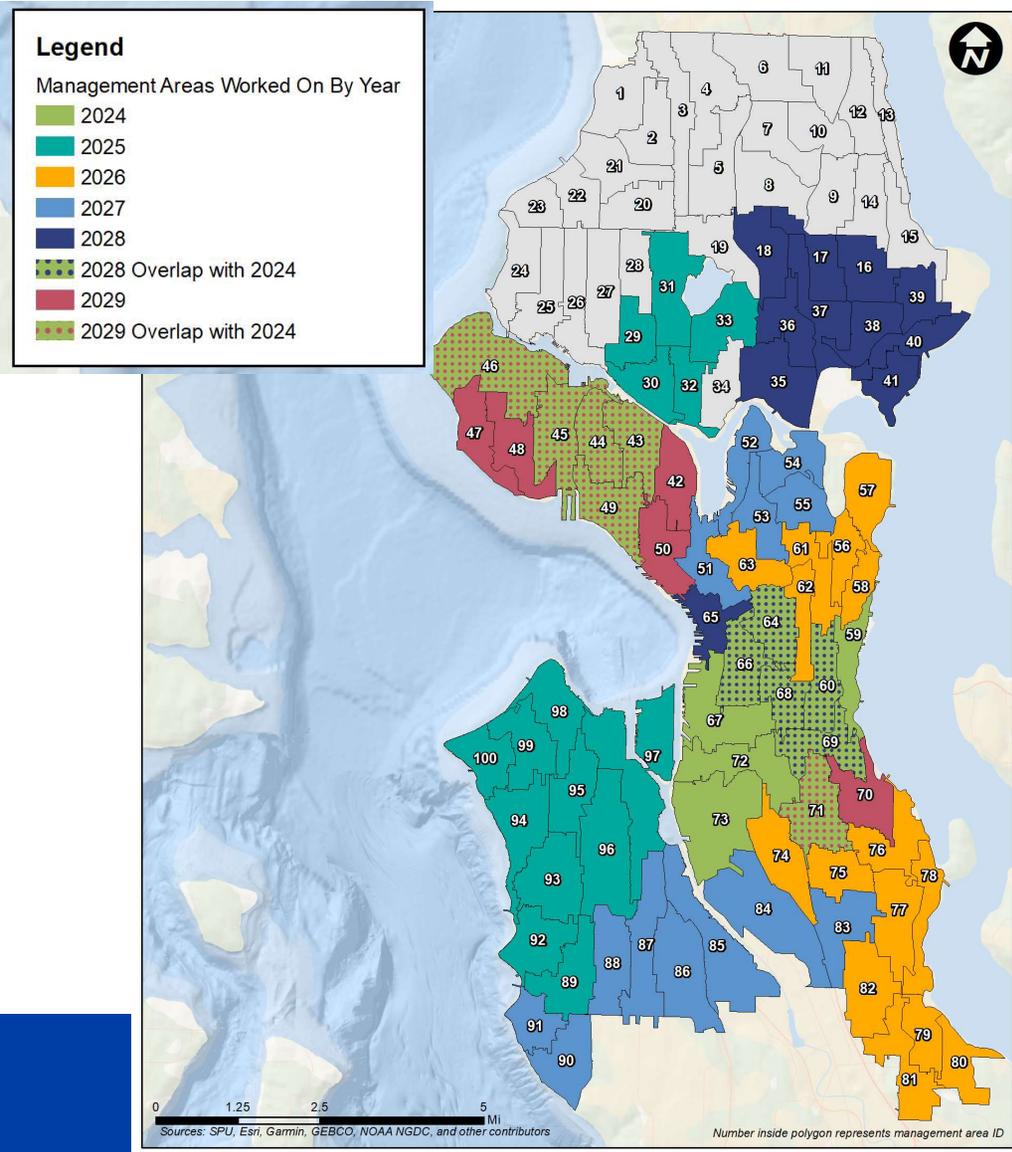


# Risk matrix relates to rehabilitation windows which indicate when SPU plan to repair the asset

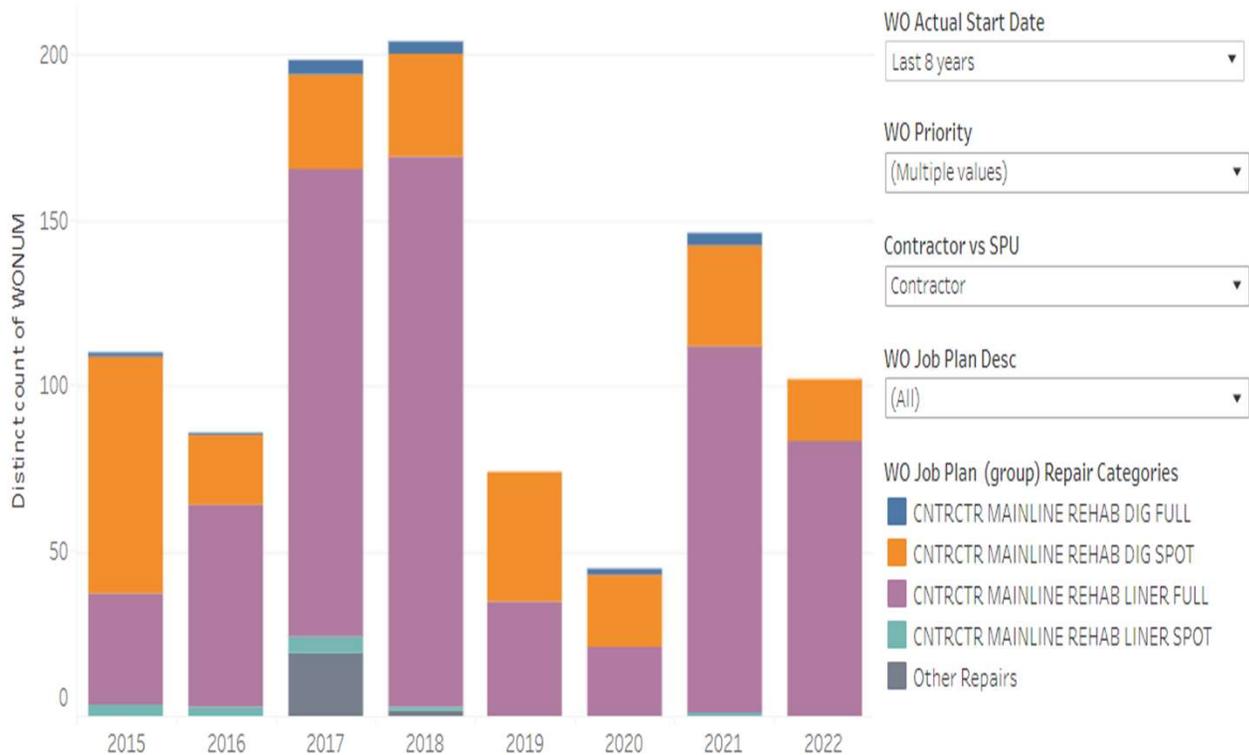


# Sewer Rehab Strategy

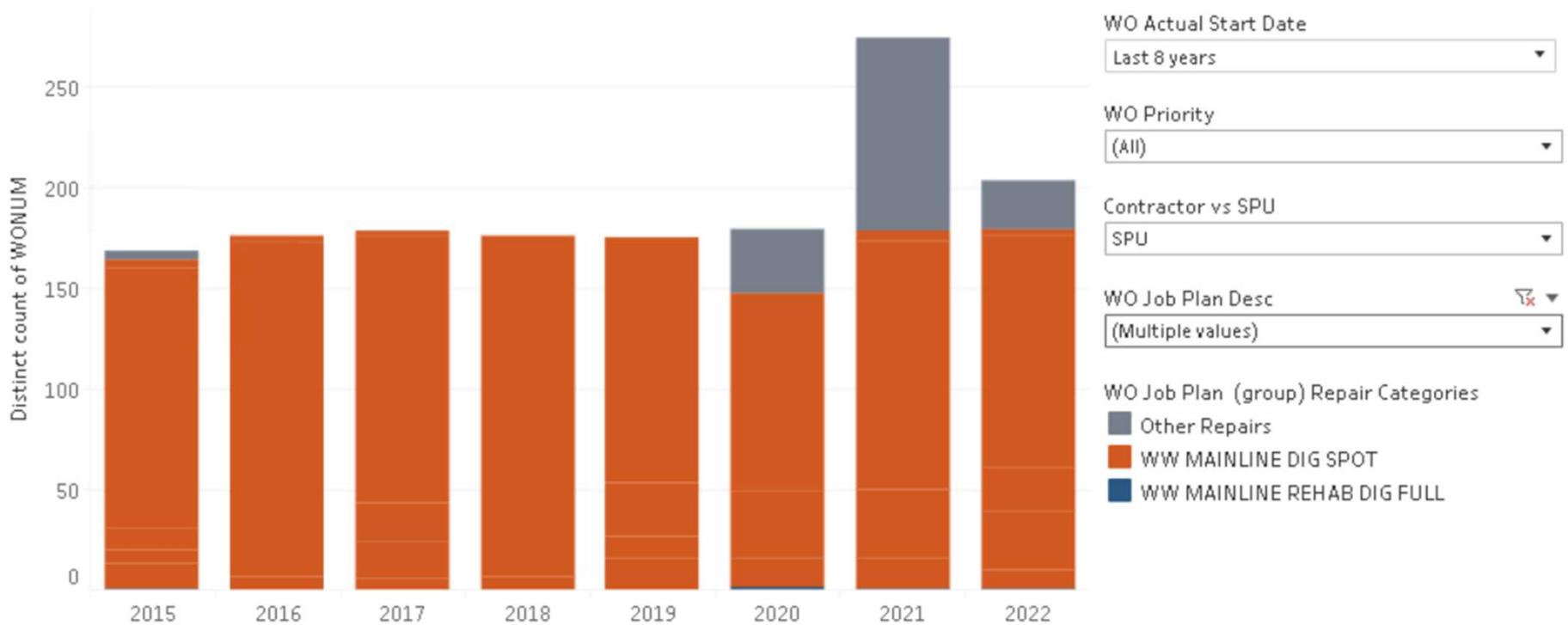
- **Strategy** to move from reactive to proactive program
- **2050** – Year high-risk (<5yrs remaining in rehab window) pipe backlog will be addressed at current funding rates
- **\$30-35 million** – Max annual rehab funding necessary to reach risk goals by 2030
- **Increase in lining technology and resource needs.**



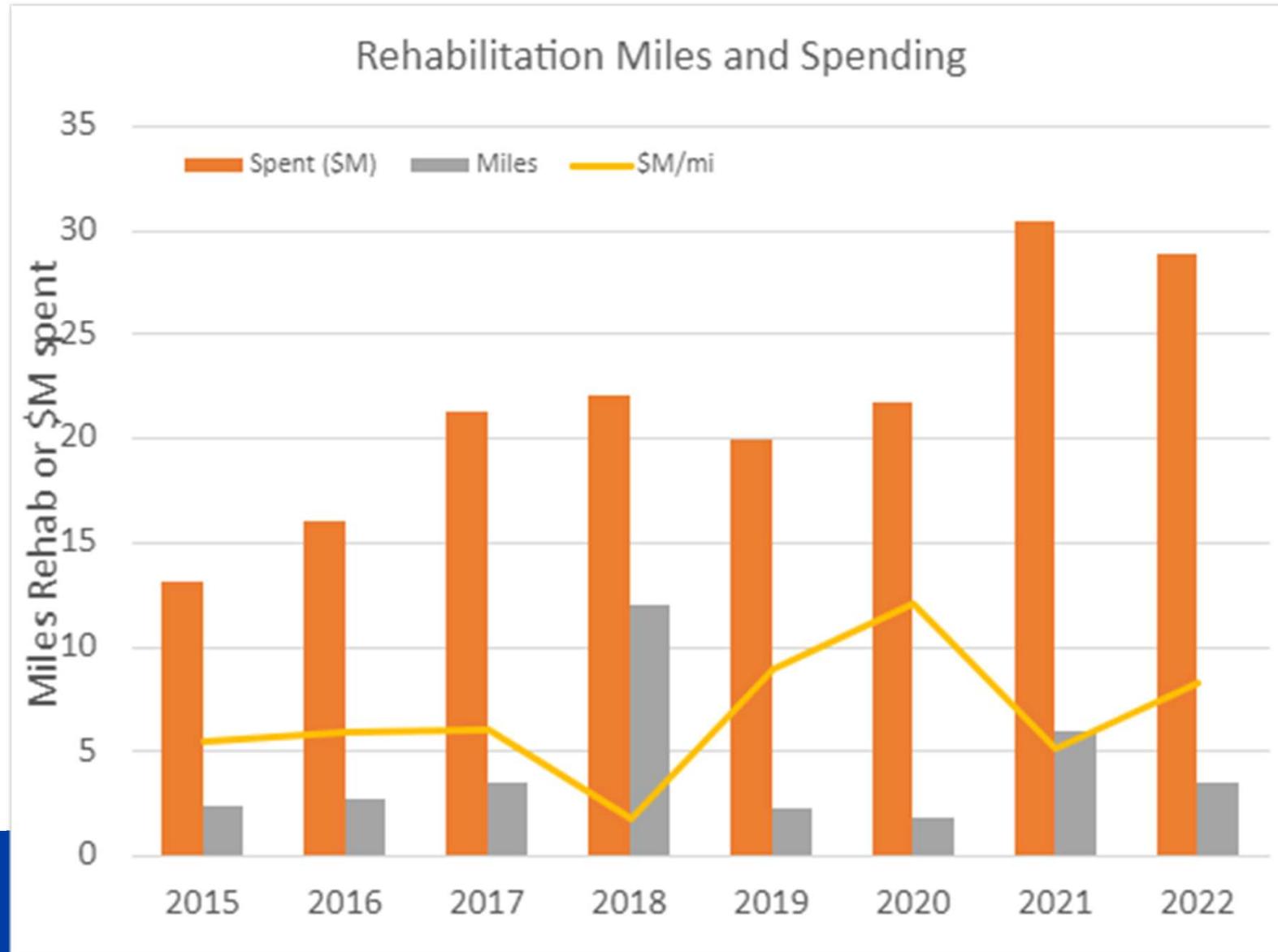
# Pipe Rehabilitation - Contractor



# Pipe Rehabilitation - In-house Crews



# Rehab Historical Spending



# Spotlight on Projects

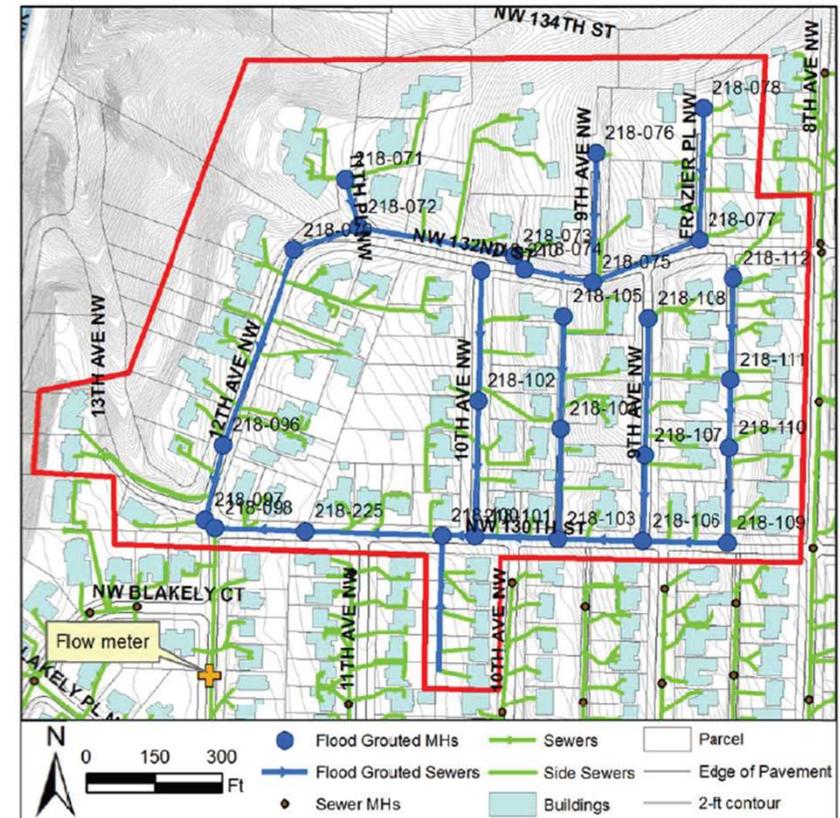
Seattle Public Utilities



City of Seattle

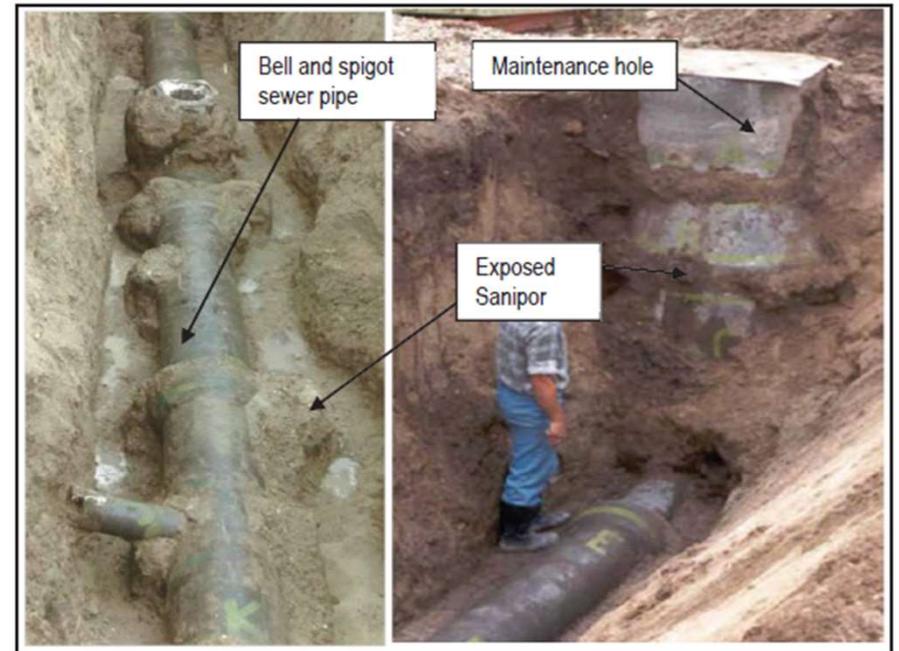
# Broadview Flood Grouting

- 80% of peak flow during large storm events due to infiltration
- Pilot sub-basin: 30-acres, 5,880 LF of 6" and 8" diameter concrete mainline pipes, ~9,725LF of 4", 6" and 8" diameter side sewers (conc and PVC)
- Evaluated flood grouting, joint grouting, pipe bursting, CIPP lining. Business case identified flood grouting to have the greatest benefit cost ratio of the options



# Broadview Flood Grouting

- Internally flooding an entire sewer segment and side sewers with a two-part liquid grout process
- Grout leaches, exfiltrates around pipe and MH cracks
- Completion of the chemical reaction hardens over 2-3 days



# Broadview Flood Grouting

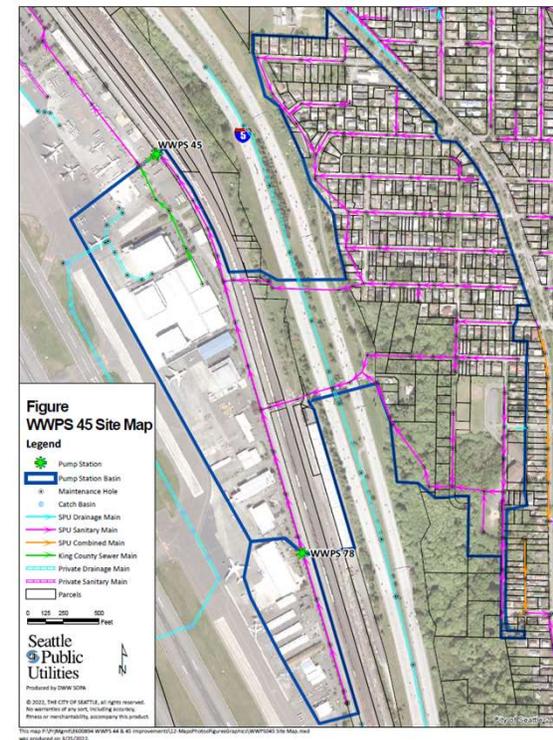
- MHs, mainlines and side sewers sealed
  - 30% of side sewers flood-grouted (challenges: side sewer branches, landscaping, elevation, homeowner approval and participation)
  - About 56% of the entire sewer basin was sealed through flood grouting
- 2011 costs: ~\$77 / lf.
- Construction Costs (2011) \$1,033,400
- Flow monitoring results peak hour flows reduced by 41%, and reduced storm volumes by 66%

## ***Takeaways***

- *Successful in reducing infiltration*
- *Working on private side sewers challenging – maximize participation and branching side sewers*
- *When infiltration is controlled, groundwater migration needs to be addressed*
- *Hilly areas are very challenging (pressure on plugs)*

# PS 45: I&I Assessment

- Problem: Increased and regular SSOs at PS 45 (where suspected cause is significant I&I)
  - All overflows are contrary to our mission
  - Overflows to adjacent private storm system, requiring costly cleanup
  - Counts against our regulatory limits

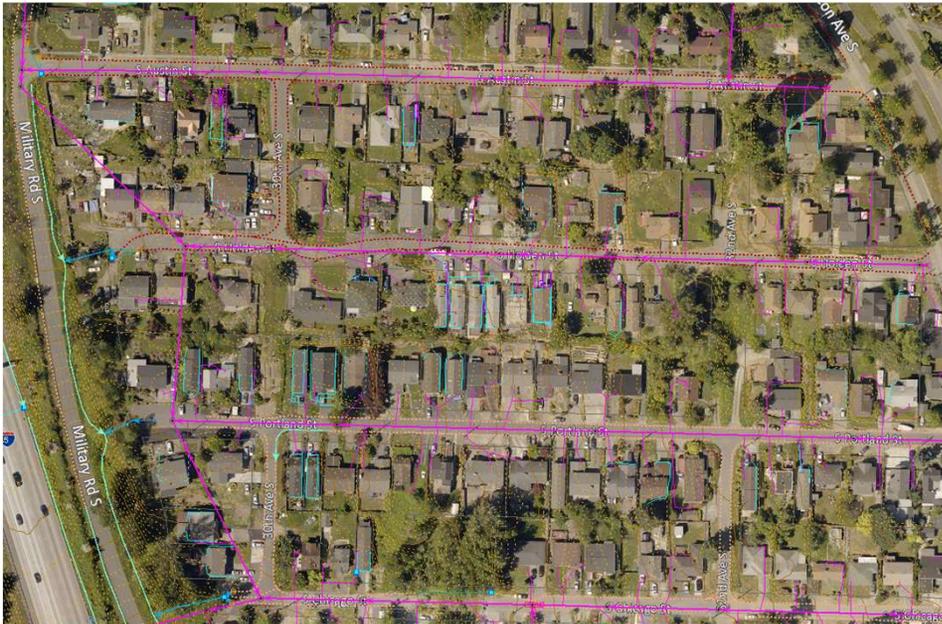


# PS 45: I&I Assessment

- Two sub-basins: one mainly commercial, one mainly residential
- Smoke testing completed for commercial October 2022; upper basin to be completed weather-permitting, early 2023
- Flow monitoring results also to be analyzed for I&I (suspected private pipe flow has high I&I)



# PS 45: I&I Assessment



## Next steps:

- Future phase smoke testing
- Completion of flow metering analysis
- Consultant tech memo: initial and final with recommendations
- Challenges for capital work: lacking storm infrastructure

# Program & Policy Work

Side Sewer Assistance Program

GSI Voluntary Beyond Code Partnership Program

Seattle Public Utilities



City of Seattle

# Side Sewer Assistance Program

## Deferred Loan Program

- ✓ 0% interest deferred loans
- ✓ \$3,000 to \$45,000 per loan
- ✓ No monthly payments due
- ✓ Secured by lien against the property
- ✓ 10 year term  
(with two options to renew, for a total possible term of 30 years)



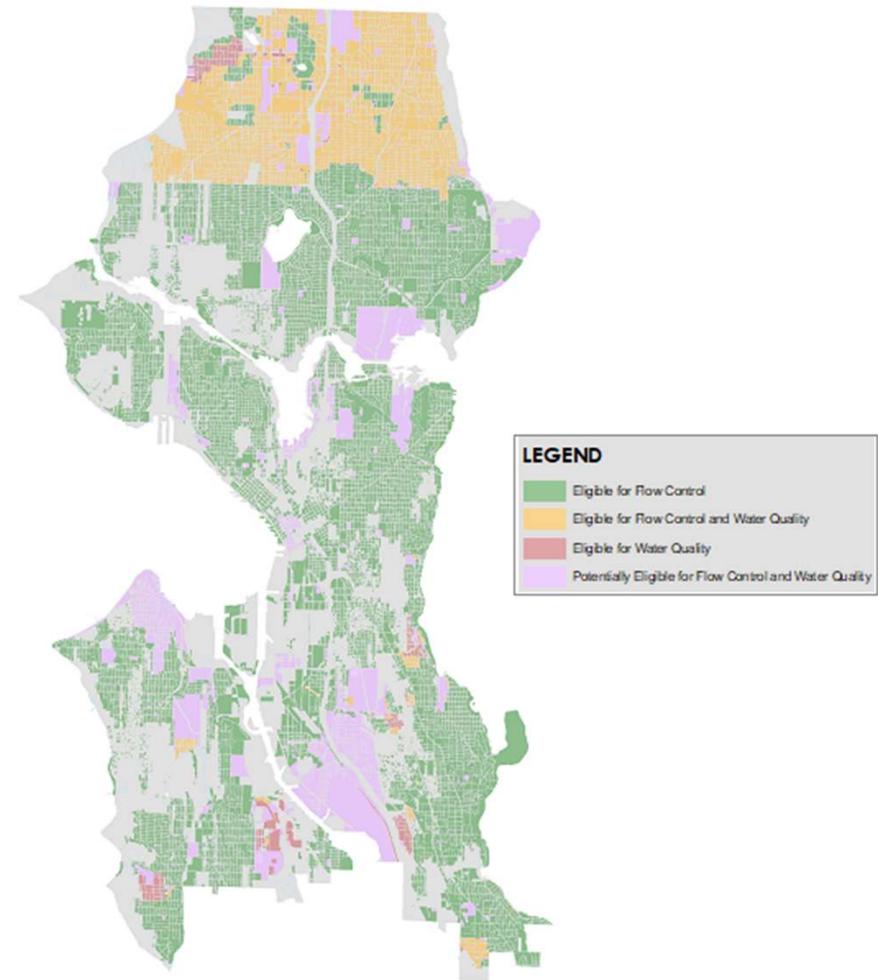
## Loan Eligibility

- Owner-occupied single-family home
- In Seattle city limits
- Household combined gross income under 80% Area Median Income
- **Currently experiencing a side sewer emergency or urgent issue**
  - full/partial collapse or break in the line

- Financial assistance in the form of loans for income-eligible households in need of urgent side sewer repairs
- SPU funds support loans; program is administered by Office of Housing under its Home Repair Program

# GSI Voluntary Beyond-Code Partnering Program

- Identified unit cost benefit amounts (\$/SF Impervious Area Managed)
- Incentivizes private development to further remove Inflow
- SPU provides direct funding for additional flow control or WQ
- Negotiated during development permitting -> Covenants



# Summation

I&I work driven and supported by:

- Layout and nature of Seattle's sewer system
- Asset management needs of infrastructure
- CMOM Program, Pipe Rehab Program, and individual capital project work - focusing on I&I removal
- Side Sewer Assistance Program
- Code Incentives



# Discussion

Seattle Public Utilities



City of Seattle