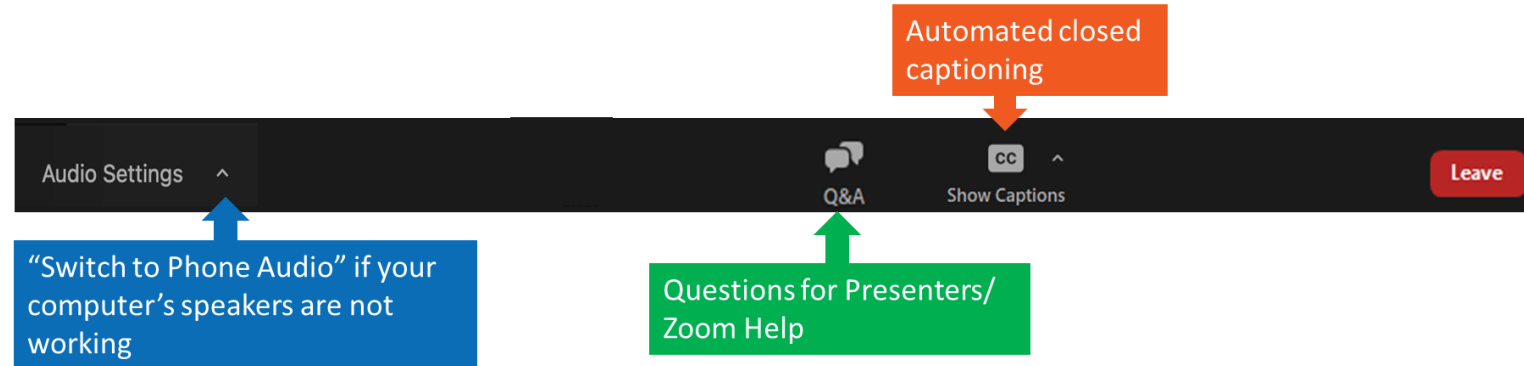




Communities with Combined Sewers Adapting to a Changing Climate

January 30, 2024

Webinar Logistics



- This webinar is being recorded.
- To ask a question: Type your question in the Q&A Box for the moderators to see.
- Technical difficulties: If you are having technical difficulties, please send a message through the Q&A Box or email Kathryn.Harrison@erg.com and the Host will assist you.
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- **Recording:** Please note that we are recording this webinar and will make it available via EPA's website: <https://www.epa.gov/npdes/combined-sewer-overflow-training>
- Certificates of attendance will be provided to participants who attend at least 70% of today's webcast

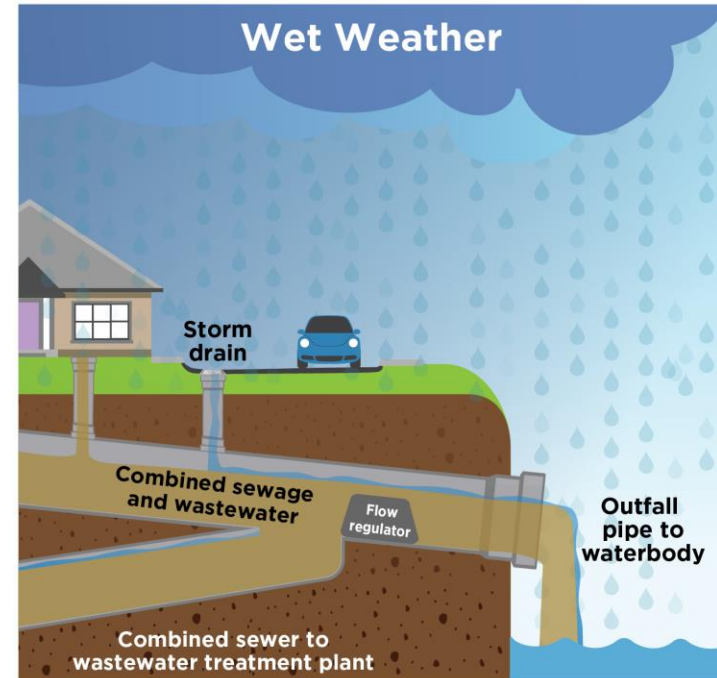
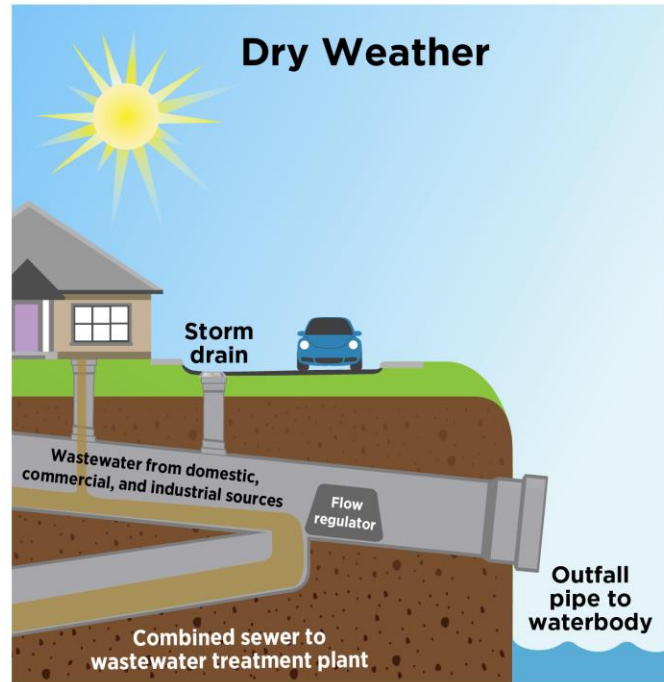
Agenda: January 30, 2024

- Opening Remarks – Kathryn Kazior, USEPA
- Camden, NJ
 - Scott Schreiber, Camden County Municipal Utilities Authority
 - Dr. Franco Montalto, Drexel University
- Spokane, WA – Marlene Feist, City of Spokane
- Questions and Discussion

Disclaimer

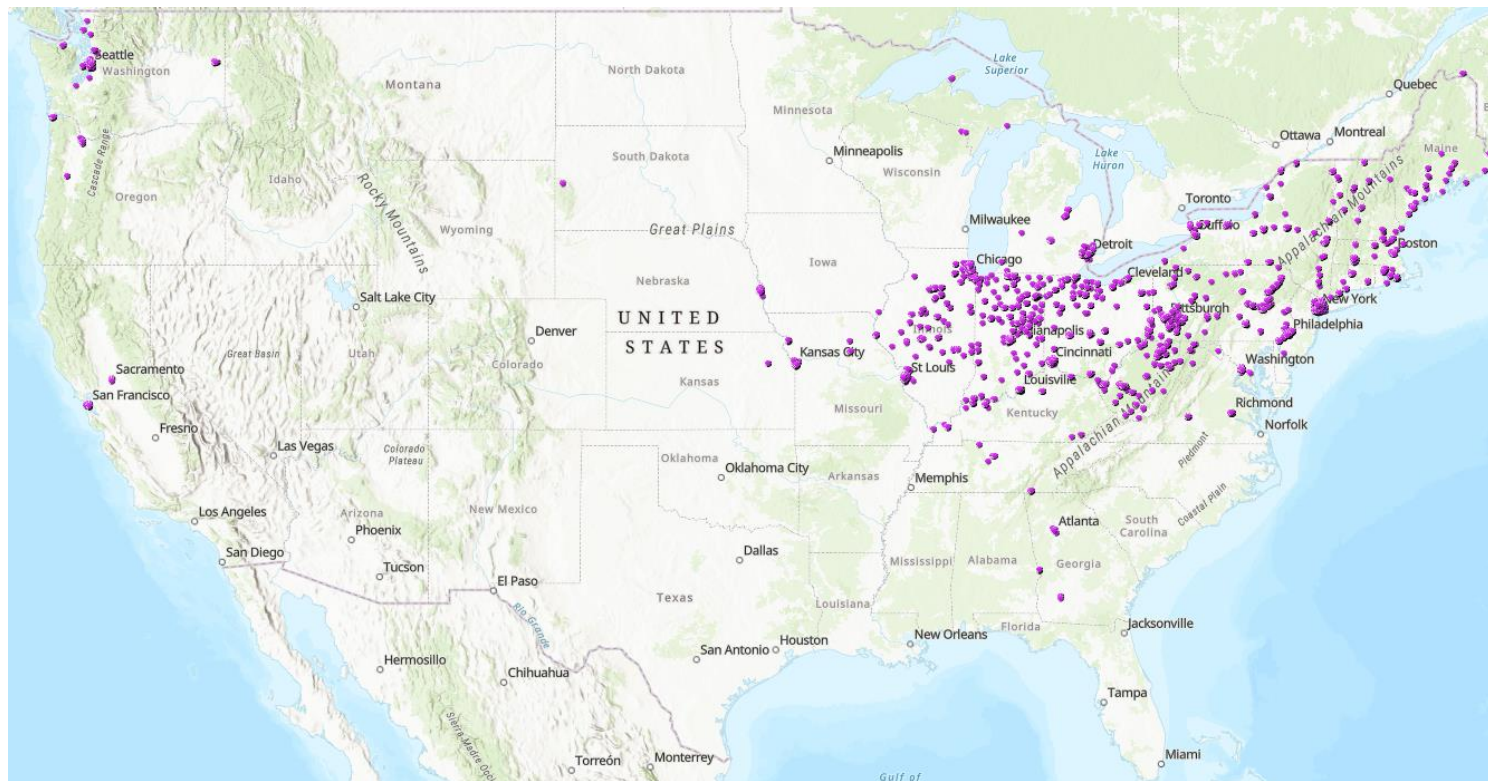
- The views expressed in these presentations are those of the author and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency. Any mention of trade names, products, or services does not imply an endorsement by the U.S. Government or the U.S. Environmental Protection Agency. EPA does not endorse any commercial products, services, or enterprises.

What are Combined Sewer Overflows (CSOs)?



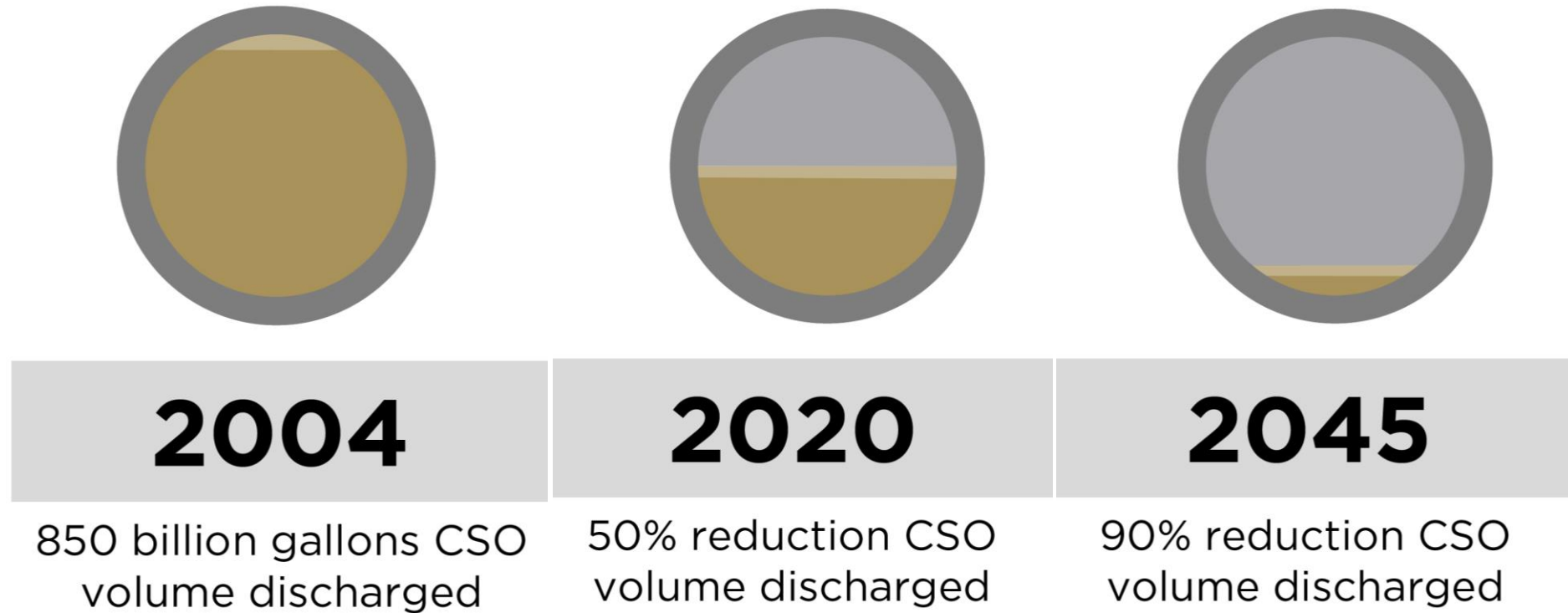
- More information here: <https://www.epa.gov/npdcs/combined-sewer-overflows-csos>

Where are CSOs located?



<https://www.epa.gov/npdes/where-combined-sewer-overflow-outfalls-are-located>

Progress



Challenges for CSO Communities

- Complexity
- Water Quality
- Climate Change
- Environmental Justice



Solutions

- Gray infrastructure
- Green infrastructure
- Integrated Planning
- Smart Sewers



Technical Assistance and Funding

Funding

- Clean Water State Revolving Funds (SRF)
- Water Infrastructure Finance and Innovation Act (WIFIA)
- Water Infrastructure Improvements for the Nation (WIIN) Act Grants)
- Clean Water Indian Set Aside (CWISA)

Technical Assistance (TA)

- EPA Water TA
 - Environmental Finance Centers
 - Direct Technical Assistance
 - Preliminary Engineering Support
 - Cybersecurity Technical Assistance
 - Creating Resilient Water Utilities

More information here: <http://www.epa.gov/WaterTA>

Creating Resilient Water Utilities (CRWU)



- EPA's CRWU initiative provides water sector utilities with the following tools, training, technical assistance, and funding:
 - Resilient Strategies Guide
 - Climate Resilience Evaluation and Awareness Tool
 - Climate Data Maps
 - Adaptation Case Studies
 - Climate Risk and Resilience Trainings
 - Climate Adaptation Funding

Visit <https://www.epa.gov/crwu> for more information.

Camden, NJ



Scott Schreiber

Executive Director, Camden County Municipal Utilities Authority



Dr. Franco Montalto

Professor, Drexel University



**Dr. Franco Montalto,
P.E.**
Professor, Dept. of
Civil, Architectural,
and Environmental
Engineering,
Drexel University
(Philadelphia, PA)



Scott Schreiber
Executive Director,
Camden County
Municipal Utilities
Authority
(Camden, NJ)

CROSS-SECTOR COLLABORATION TO MEET COMMUNITY NEEDS AND PLAN FOR A CHANGING CLIMATE

A Case Study of the C23A Sewer Shed in Camden City, NJ

SNAPSHOT OF THE CCMUA

Services 525,000 customers
in 36 municipalities (2 CSO)

80 MGD Plant (58 MGD
Average)

Wet Weather Capacity of 185
MGD

135 Miles of Interceptor, 27
Pumping Stations

Renewable Energy Portfolio
consisting of Solar, Biogas,
and CHP provides 60% of
demand

Manages County-Wide
Environmental Infrastructure
Projects

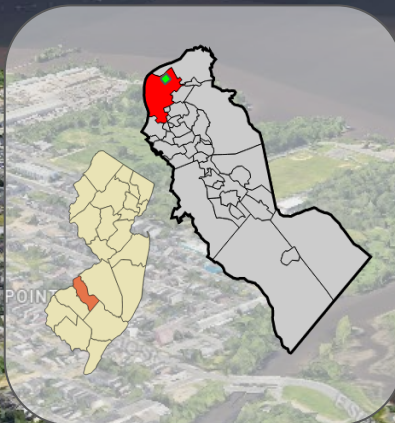


* Routinely recognized for pioneering sustainability measures *

BACKGROUND: CSOS AND THE REGIONAL LTCP

- Both CSO municipalities - Camden City, Gloucester City - are EJ communities
- Significant financial and contractual limitations
- Historical underinvestment and under-cleaning of collection system (clean it first!)
- CCMUA owns just one of the 30 outfalls

Permittee	# Sewer-sheds	Collection System Pipe in Miles ¹⁻¹	Appurtenances				Contributing Area (square miles)
			Active Regulators	Active Outfalls	Pump Stations	Overflow Netting Facilities	
Camden	27 ¹⁻²	173	24	22	8	22	6.6
Gloucester	7	39	7	7	7	7	1.6
CCMUA			<u>1</u>	<u>1</u>	<u>2</u>	<u>1</u>	
Totals	34	212	32	30	17	30	8.2



Petty Island

Delaware River

Delaware River

Delaware River

Cramer Hill Waterfront Park

The Salvation Army Kroc Center

Camden Towing Inc

EAST CAMDEN

CRAMER HILL

Arells

Elena Hair Studio

Vizcaya Liquors

Raul's Auto Repair Center

ABLETT VILLAGE

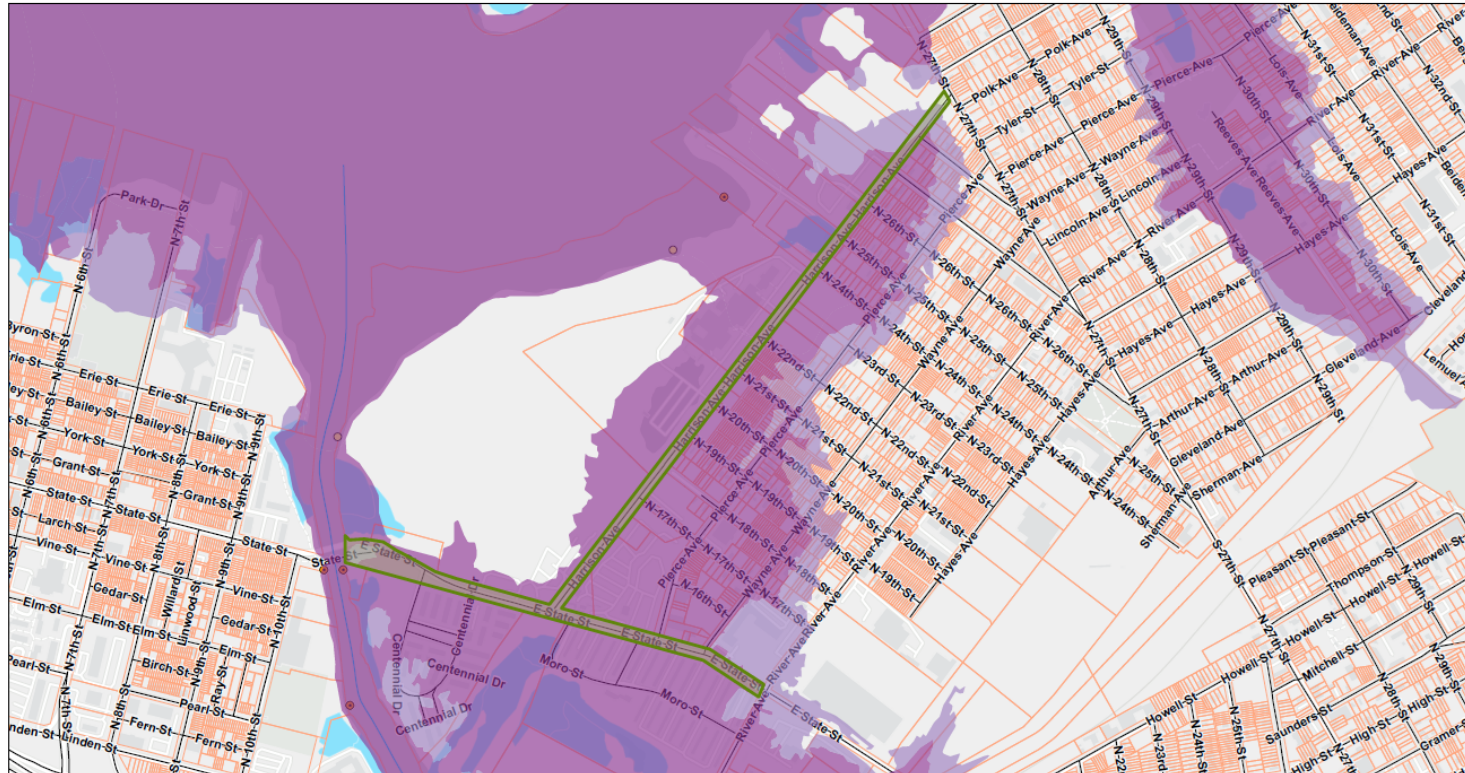
Conrail Shared Assets Operations Pavonia Yard

Patrick J Kelly Drums

en
val

River Ave
Federalist

Harrison & State SICS Project Area



2/25/2022, 11:53:48 AM

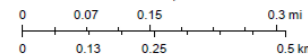
- Wetlands (2012)
- Override 1
- Category One (C1) Waters
- County Boundaries
- NJPDES Combined Sewer Overflow (CSO)

NJPDES Discharge Points-Surface Water

- Minor
- Parcels Data (Block and Lot)
- Roads NJ (Centerlines)

■ FEMA Flood Zone Designations (1% Annual Chance; 0.2% Annual Chance)

1:9,028



Esri Community Maps Contributors, City of Philadelphia, data.pa.gov, New Jersey Office of GIS, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METINASA, USGS, EPA, NPS, US Census Bureau, USDA

BACKGROUND: THE HARRISON AND STATE AREA

- **\$200+ million reinvestment in this neighborhood** (Kroc Center, CH Waterfront Park, School Rehabs, waterfront trail system, etc.)
- **ONE YEAR flood causes significant losses** to commuters and property of neighboring residents and businesses
- **Wide, high traffic roadways , poorly designed for ped and bike**
- **Fixing the area the #1 Priority in Neighborhood Plan**



HOW THE CCMUA BECAME INVOLVED

- Not “our” outfall (but that’s not how we think)
- The CCMUA has led the Camden SMART Initiative since 2013
 - Over 60 green infrastructure projects installed,
- Idea: Complete Streets (safety, beautification) of Harrison and State becomes GREEN Street project
 - Conceptual renderings completed





HOW THE CCMUA BECAME INVOLVED



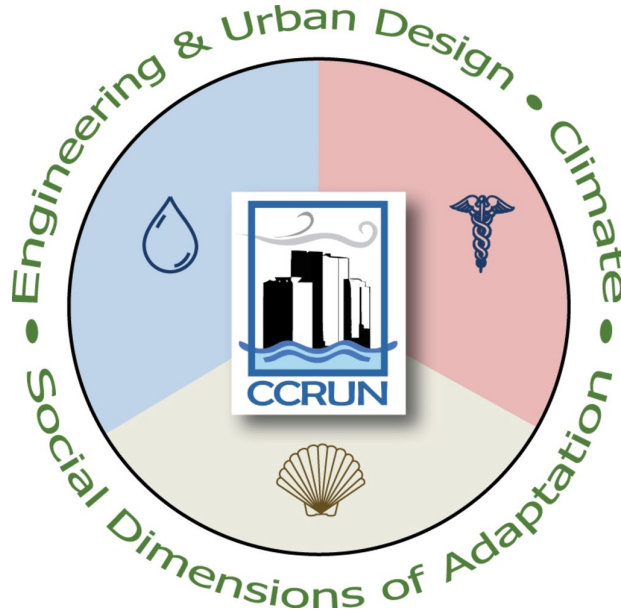
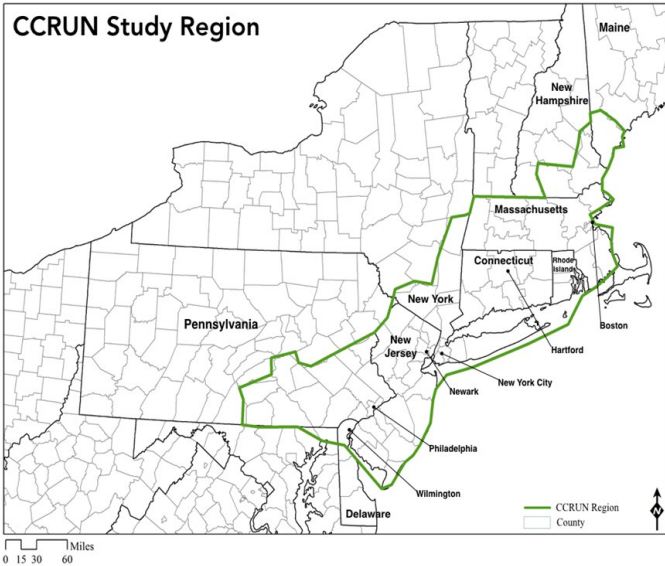
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 - Over 60 green infrastructure projects installed,
- Idea: Complete Streets (safety, beautification) of Harrison and State becomes GREEN Street project
 - Conceptual renderings completed
- Funding Opportunities arise!
 - GSI funding for Harrison awarded 319(h) grant, CCMUA a partner - \$1.5m
 - GSI funding for State awarded to CCMUA - NJDEP Stormwater Mit. Grant - \$1.2m
 - FEMA, state OEM approach CCMUA for Hazard Mitigation Grant
 - Needed to determine feasibility

UNIQUE CHALLENGES AND DEMANDS OF THE PROJECT

- **Strong (and Understandable!) demand for Community Benefits beyond traditional gray infrastructure**
- **Flooding only anecdotal, not always reported**
- **Cleaning not yet completed, clogging happens quickly**
- **CSO mitigation and street flooding not necessarily complementary (next image)**
- **All exacerbated by climate change**

We needed a partner!

DREXEL UNIVERSITY - A CORE MEMBER OF CCRUN

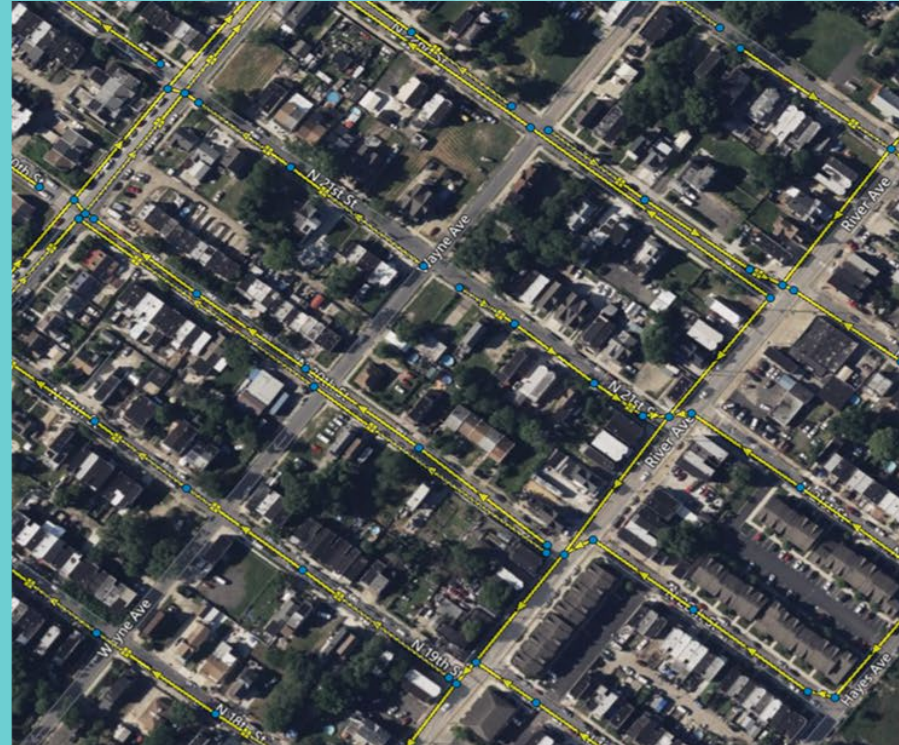


- 1. Characterize the existing and future flood hazards in Camden**
 - **H&H modeling**
 - **Flood sensing**
- 2. Work with local stakeholders to identify multifunctional infrastructure strategies**
 - **Reduce combined sewer overflows**
 - **Reduce flooding**
 - **Engage the community in managing their watershed**
- 3. Use validated models to evaluate the effectiveness of integrated solutions**

RAIN ON MESH ALL PIPES MODELING APPROACH



2D distributed subcatchments with buildings as obstacles



1D pipe network with inlets

FLOOD SENSING: PHOTO DOCUMENTATION



2/17/23 Rain event



2/17/23 Model results

FLOOD SENSING: FLOODNET SENSORS

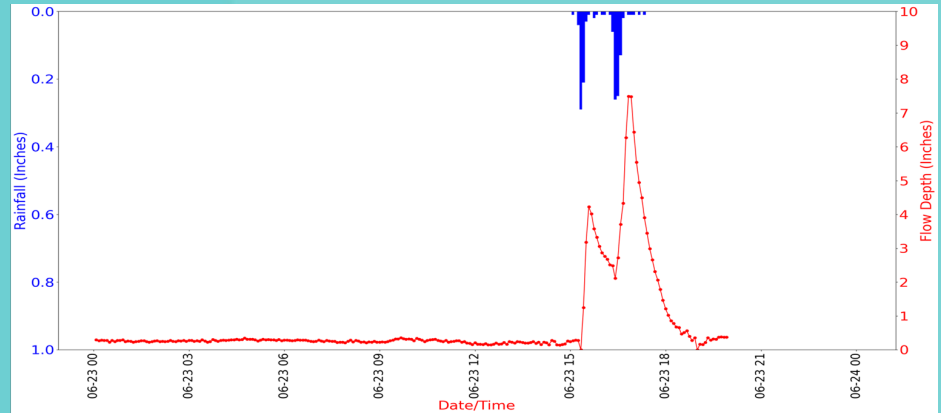
Background:

- Sensors originally developed by an academic team including CUNY, Brooklyn College, NYU, SRIJB and various NYC agencies
- Hundreds to be deployed across NYC



Functionality:

- Ultrasonic sensors generate real-time data regarding the depth and duration of flooding
- Ultrasonic waves determine distance from the sensor to the water surface below
- Data transmitted in real-time through the LoRa network and a network of gateways

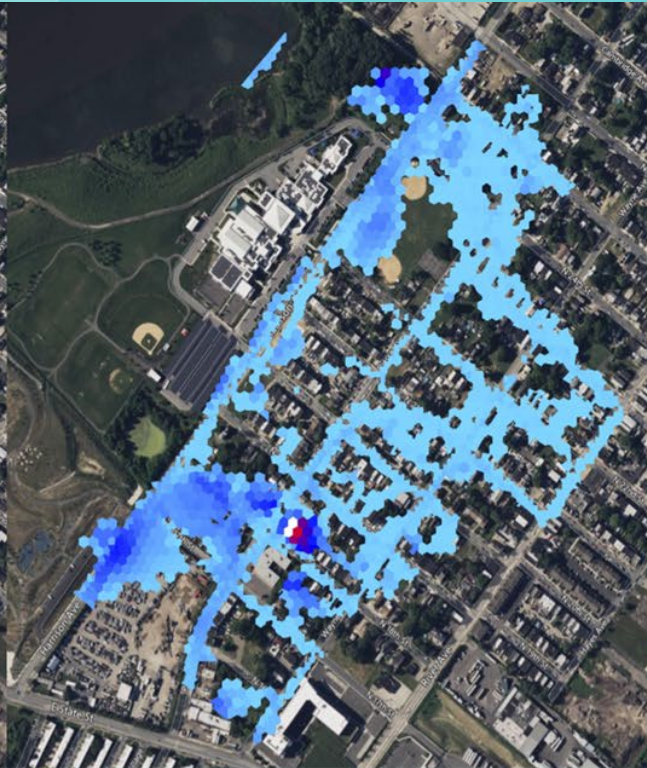


Rainfall-runoff response based on sensors data vs the rainfall data
Sensor #19 Harrison Avenue and N 24th Street, Camden, NJ on June 23rd, 2023

CLIMATE CHANGE IMPACTS ON EXISTING CONDITIONS



Historical 10Y storm (24 hrs)

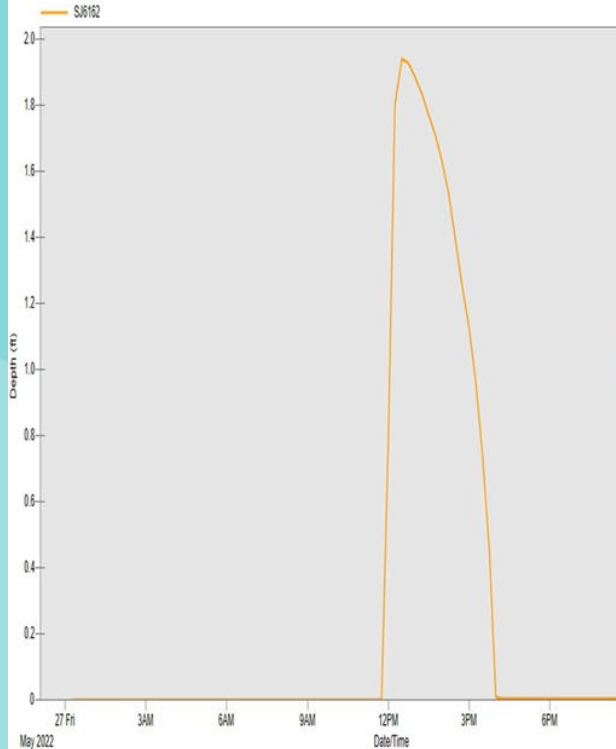


1.2 x 10Y storm

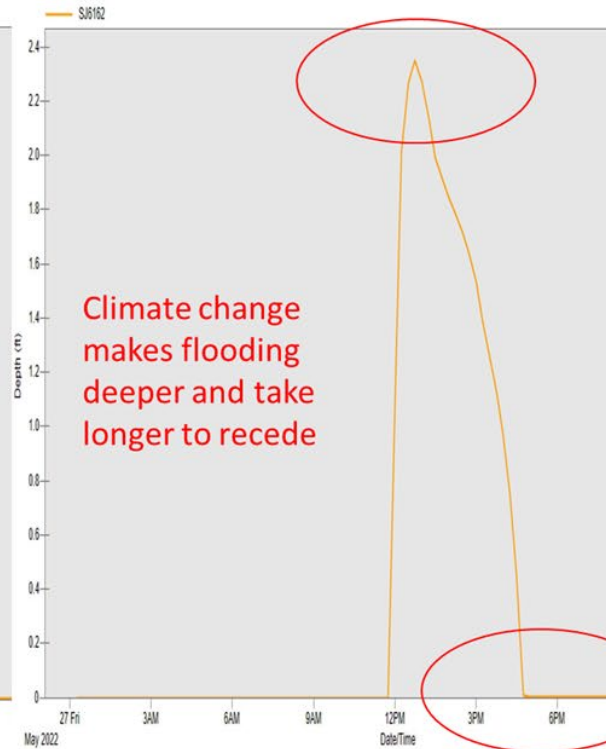


1.5 x 10Y storm

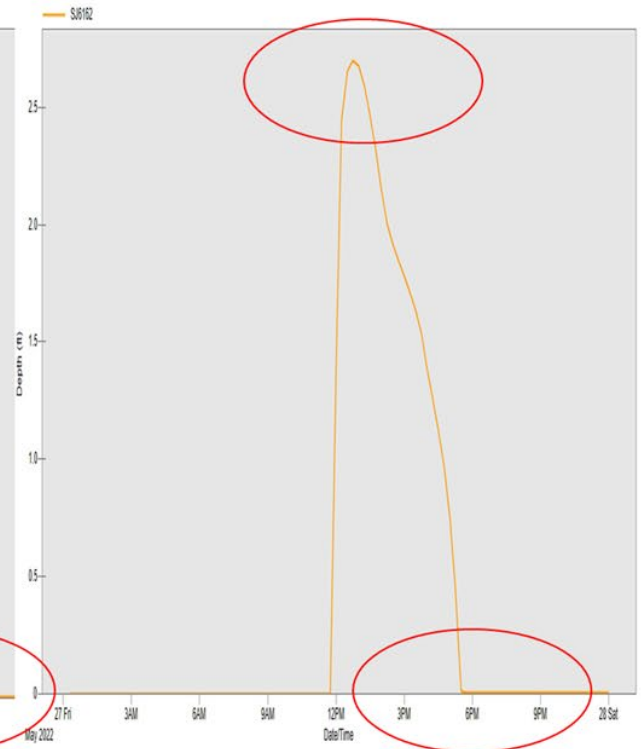
CLIMATE CHANGE IMPACTS ON EXISTING CONDITIONS



Historical 10Y storm (24 hrs)



1.2 x 10Y storm



1.5 x 10Y storm

MODELING GOALS

Add inlets to better utilize existing sewer capacity?

Check for full pipes during existing and future design storms



Add GSI to divert runoff from the existing collection system?

Check whether GSI can increase conveyance capacity of existing pipes



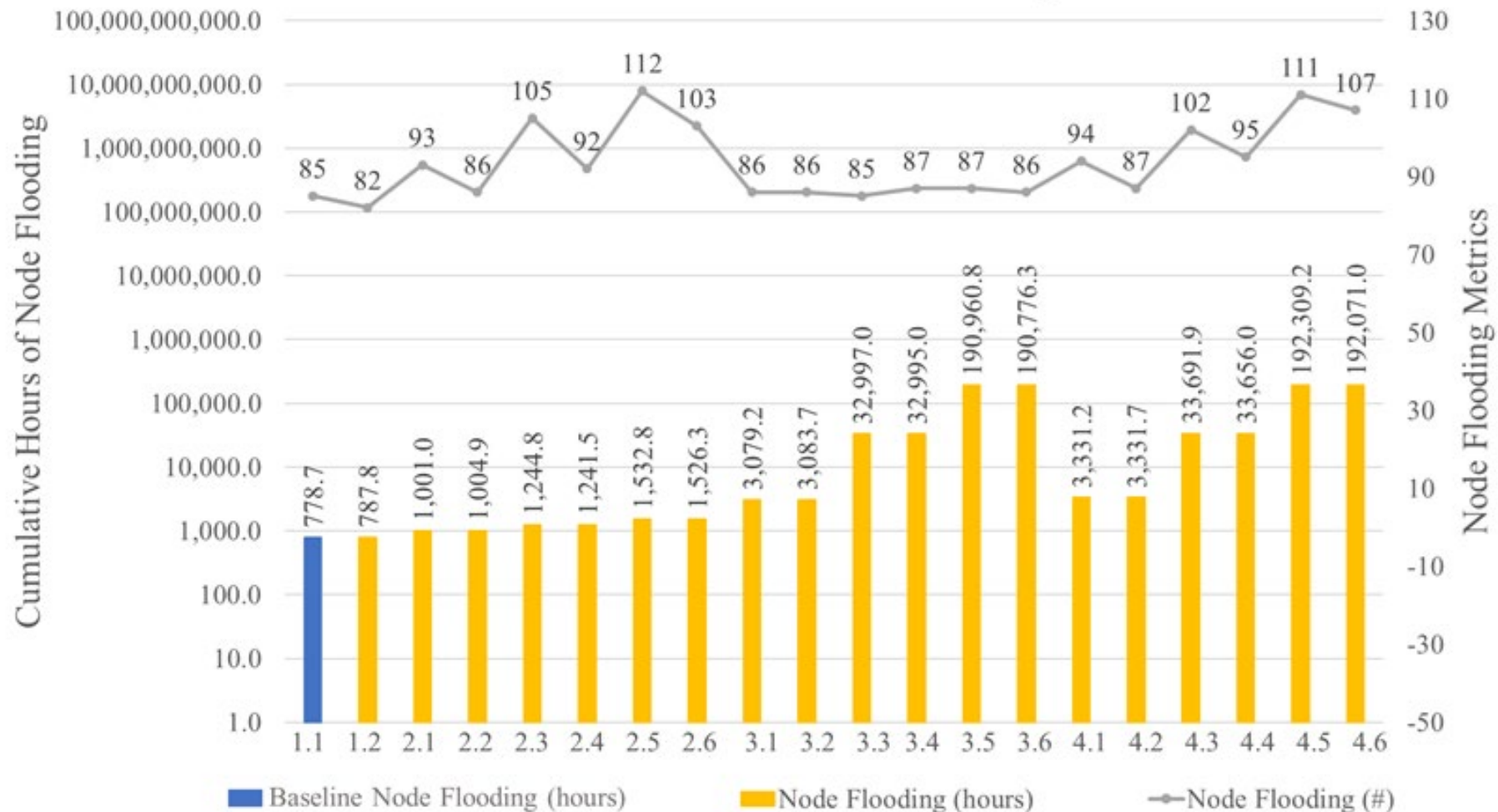
Increase conveyance and add detention?

Convey flood waters to new subsurface detention tank



ALL SIMULATIONS PERFORMED ASSUMING HISTORICAL AND FUTURE CLIMATE

1D Model Metrics - Node Flooding

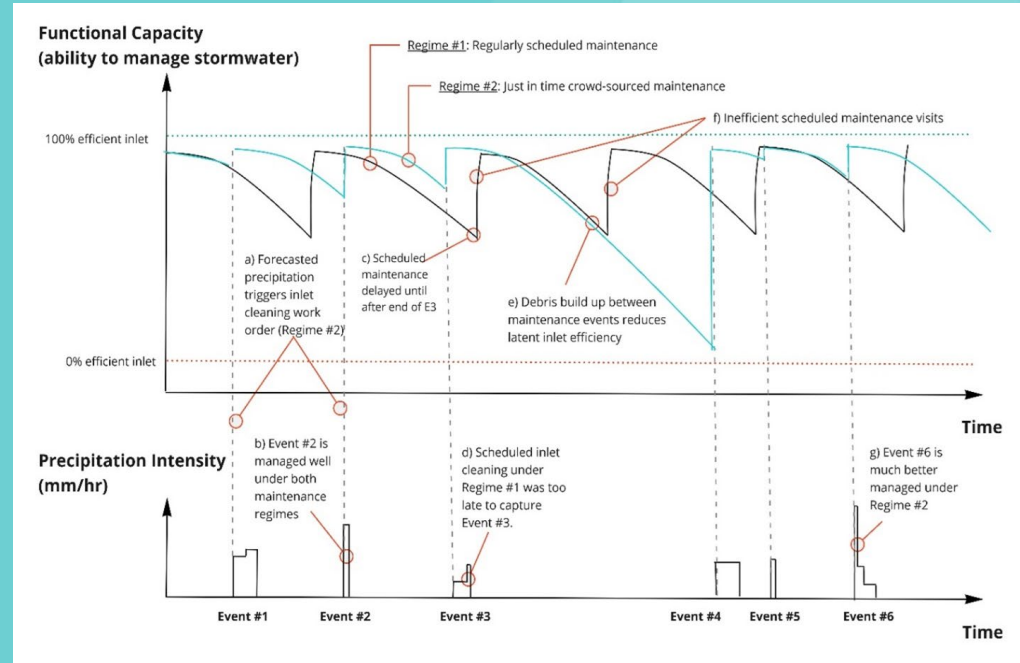


Cleanlet

Keep Inlets Clean

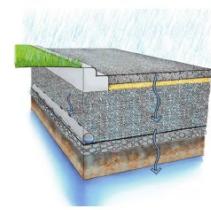
A new app that engages urban residents in just-in-time inlet cleaning

- After downloading the app, users can register to clean specific inlets
- Registered users receive push notifications on their phones when precipitation is expected
- Users receive points after submitting photos of the clean inlet
- User status increases with points



WHERE DO WE GO FROM HERE?

- Drexel's Modeling invaluable in completing Benefit Cost Analysis
- FEMA awarded \$2.1 million for design + additional feasibility
- Complete designs for GSI and other improvements + construct GSI by 2025
- Complete modeling and design, submit to FEMA -> up to \$22m to construct



PERMEABLE PAVING



STORMWATER RECHARGE/STORAGE LAWN PANEL



URBAN RAIN GARDENS

KEY TAKEAWAYS

- **Actively engage with and build rapport** with your regulators and funders (...and nonprofits... and the community... and academics...and...)
- **The need to confront EJ and climate change are here. Embrace them** and incorporate them at the core of your decision making
- **Good work happens incrementally.** This green street idea was “on the shelf” until the right funding sources lined up.
- **You’ll have to do some “firsts”**

QUESTIONS?

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<http://www.ccmua.org>

<https://research.coe.drexel.edu/caee/swre/>

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Spokane, WA



Marlene Feist
Public Works Division Director, City of Spokane



City of Spokane, WA Integrated Clean Water Plan

Environmentally & Financially Responsible!

January 2024

City of Spokane

- Located in Eastern Washington
- 30 miles from Idaho border
- 232,000 people
- 2nd largest City in Washington
- Spokane River runs through the heart of the City
- Regional hub for health care, entertainment & commerce



Improving the Health of the Spokane River



In 2013, Faced with a Regulatory Requirement to Manage Combined Sewers by 2017



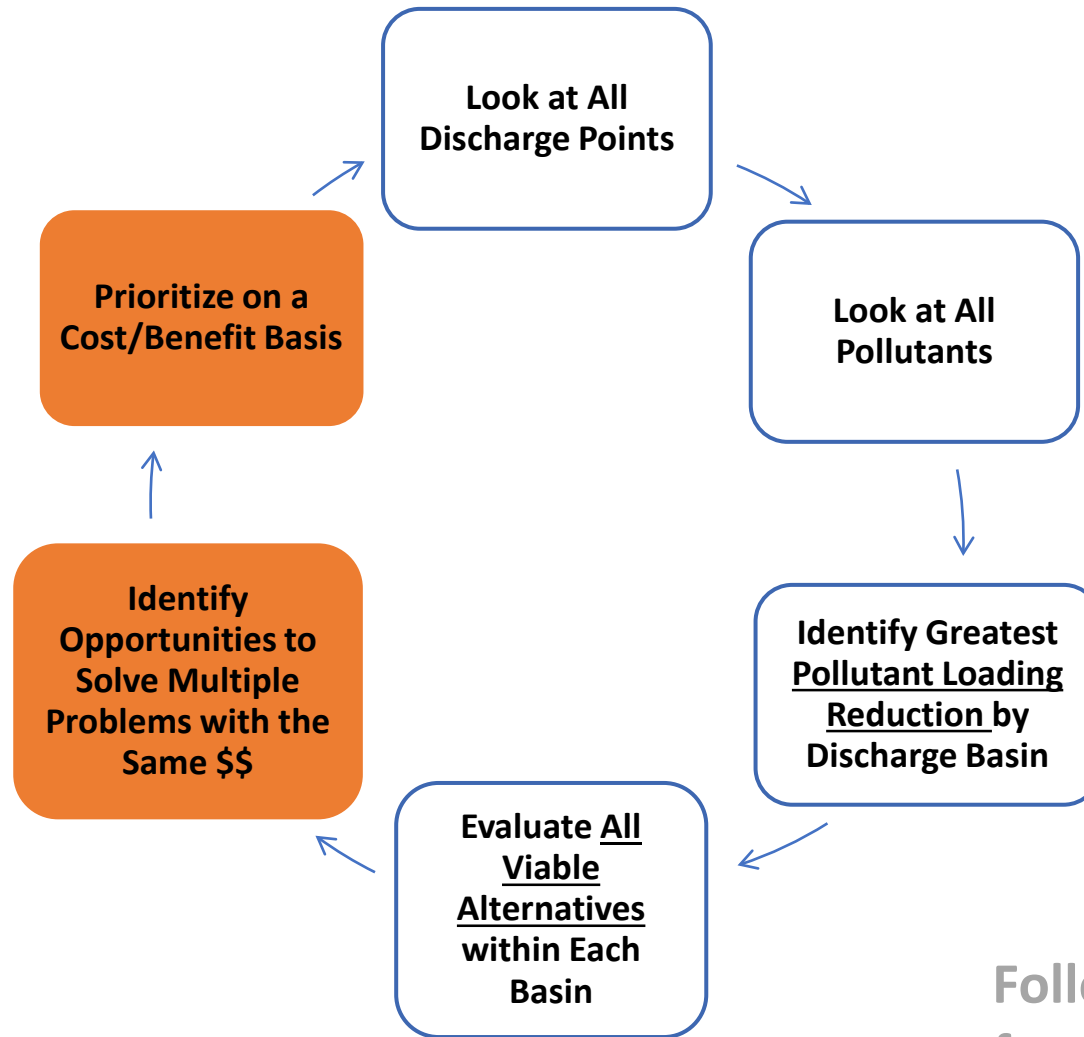
Problem: Too Expensive & Left Some Problems Unaddressed



Response: Development of the Integrated Clean Water Plan



What is an Integrated Approach?



Following EPA framework



Integrated Plan Objectives

Environmentally & Financially Responsible

- Cleaner River faster
 - Prioritize work that has a greater impact on pollutants
- Implement cost-effective & innovative technologies
 - Add “green” technologies
 - Right-size existing projects
- Holistic integration with other critical infrastructure
 - Solve multiple problems
 - Better streets, new water mains, better parks...



Integrated Clean Water Plan

- Three components:
 - **CSO:** Manage flows going to River from combined sewers
 - **Stormwater:** Include Cochran Basin project
 - **NLT:** Add tertiary treatment at Treatment Plant; year-round operation
- \$340 M in construction
- City sold \$200 M in “green” bonds in November 2014
- Interest rate = 3.08%



Integrated Clean Water Plan



Developed the Plan projects using Multi-Objective Decision Analysis (MODA)



Criteria looked a variety of risks, benefits and outcomes



All options were balanced against cost to ensure affordability

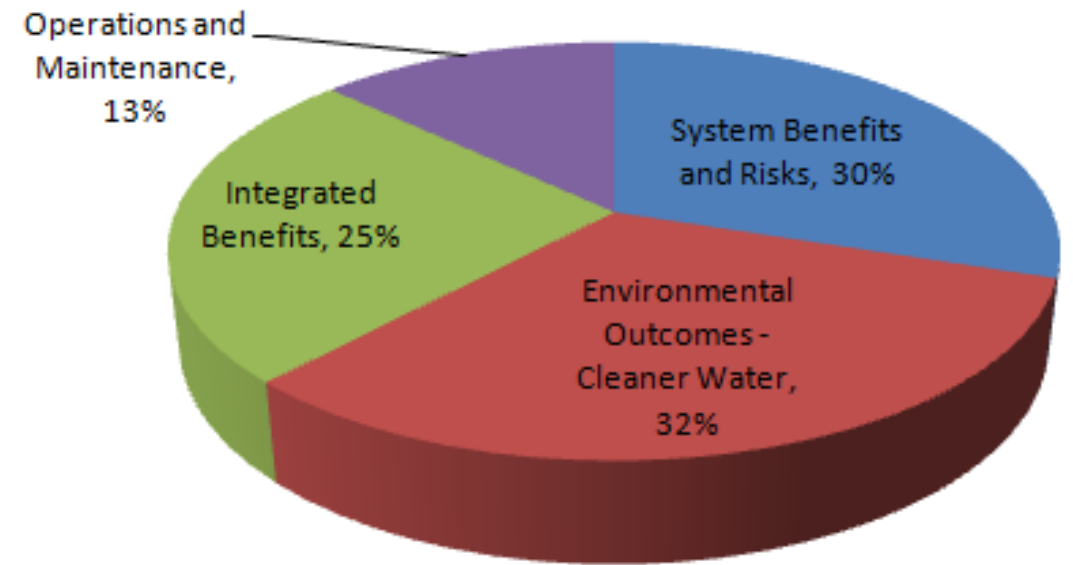


System Benefits & Risks included adaptability for climate change



Most important was protecting human health, aquatic life, the aquifer and the river

Relative Weights by Category

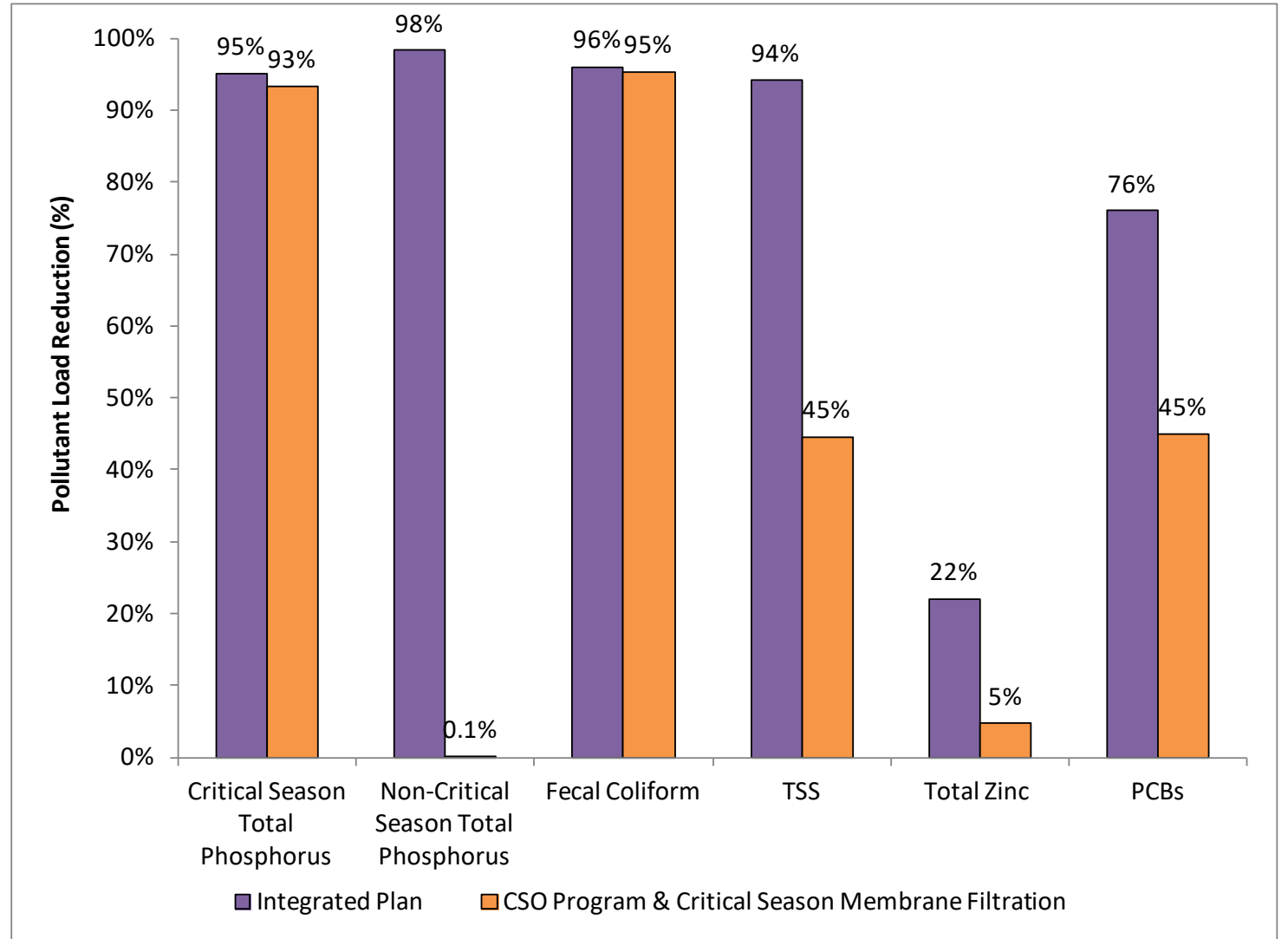


Pollutant Load Percent Reduction

With and Without Integrated Plan

Environmental Justice:

- A Healthier Spokane River for River Users
- “Free” recreation area – swimming, fishing, kayaking, SUPs
- Downstream tribal lands



Integrated Clean Water Plan – Enviro. Justice

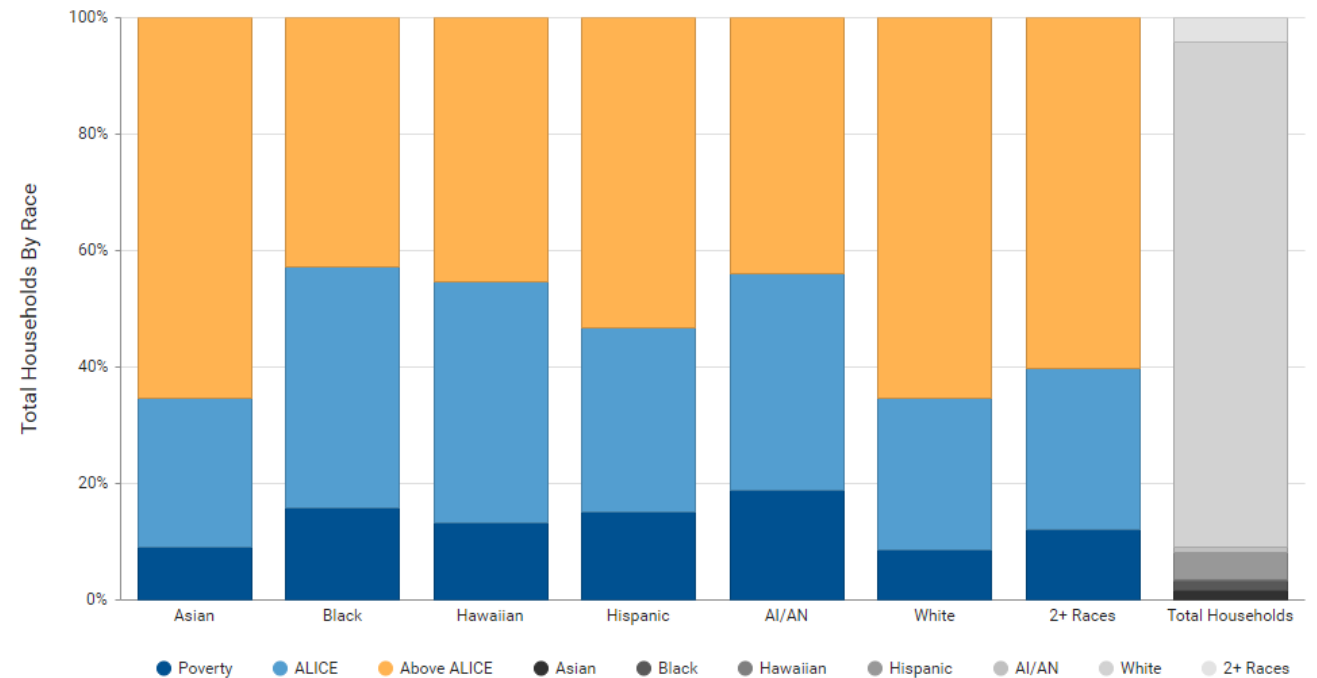
- Maintaining affordability is key!
- Look at the ALICE! (Asset Limited, Income Constrained, Employed)

41% of City of Spokane households fall below the ALICE threshold

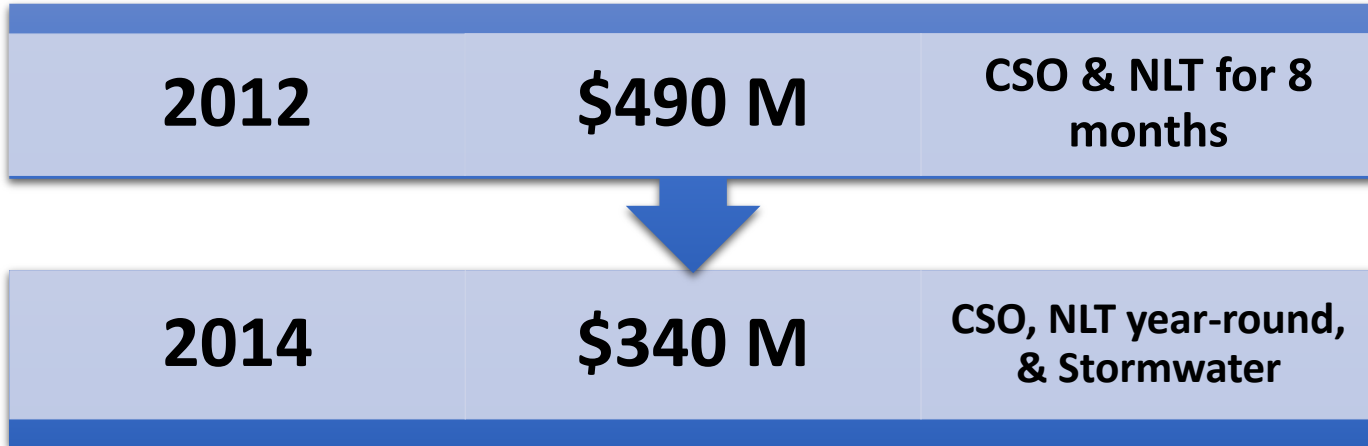
Compared to 24% in the State of Washington & 29% Nationwide

ALICE Definition: Earn more than the Federal Poverty Level but not enough to afford the basics

Households by Race/Ethnicity, Spokane County, Washington, 2021



Integrated Clean Water Plan



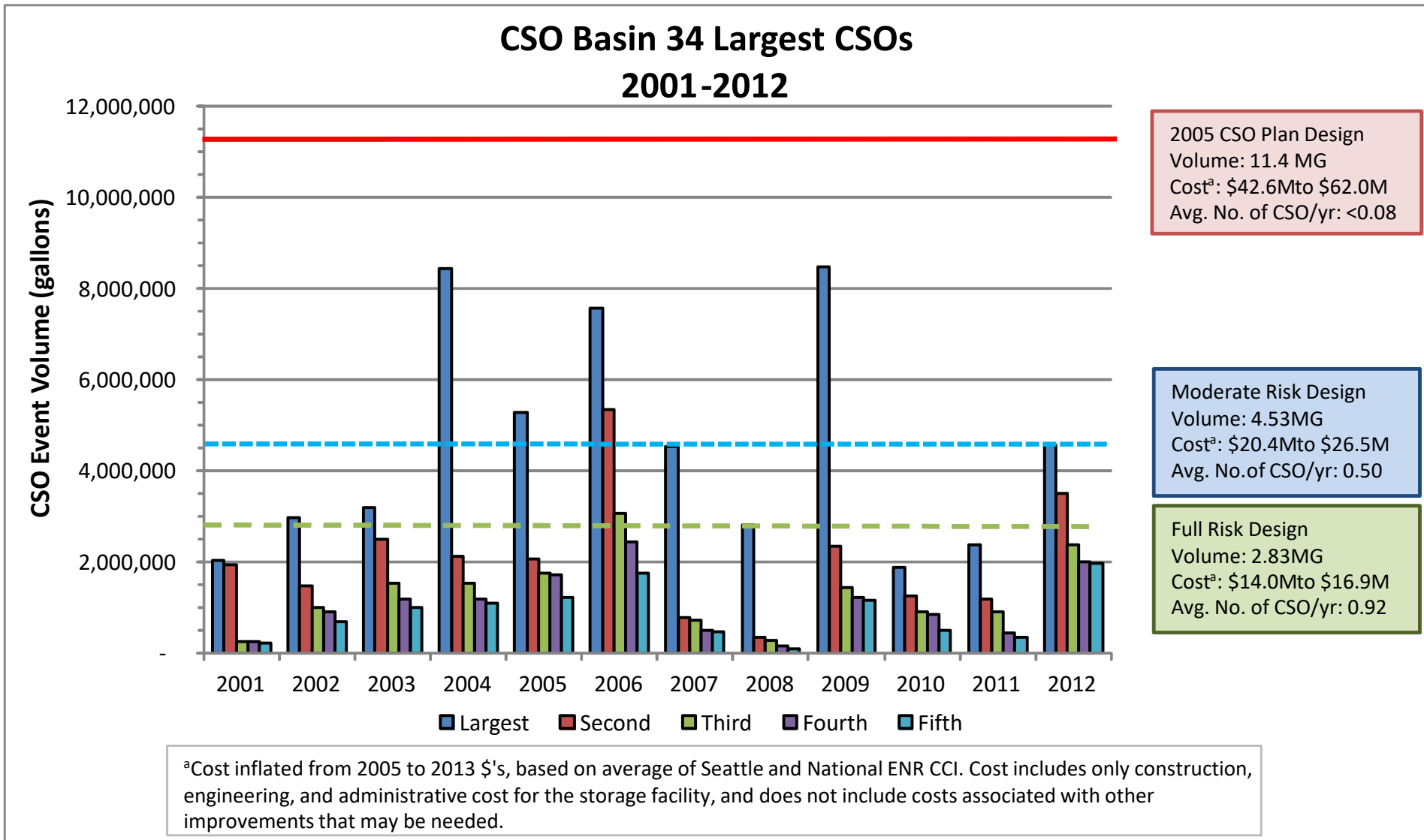
Year	Wastewater Rate Change
2009	3.5%
2010	15.0%
2011	15.0%
2012	13.7%
2013	3.5%
2014*	2.9%
2015	2.9%
2016	2.9%
2017	2.9%
2018	2.9%
2019	2.9%
2020	2.9%
2021	2.9%
2022	2.9%
2023	2.9%



Affordability

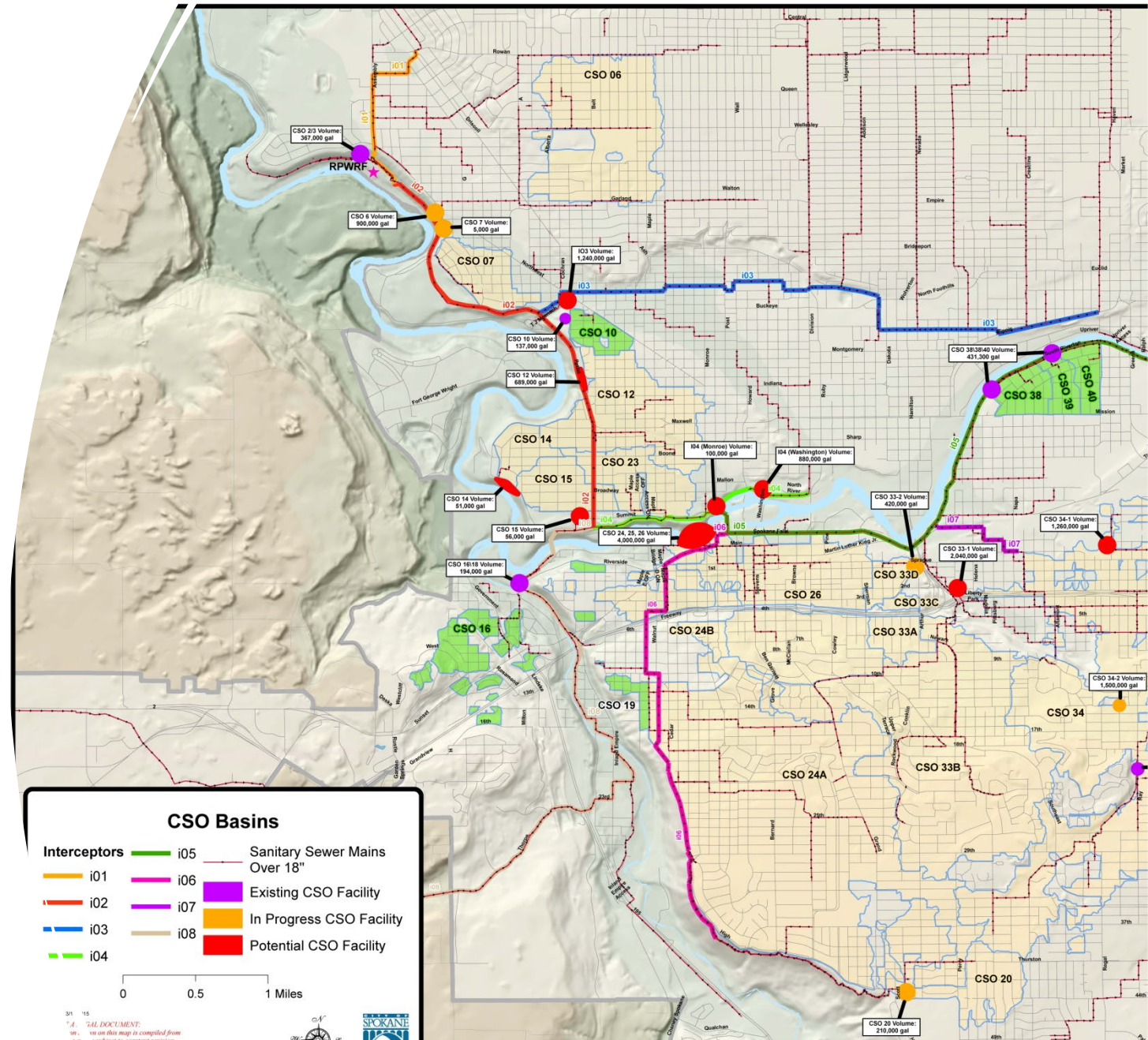
- Utility Rate increases limited to inflation
- 2.9% annually
- New wastewater credit for low water users

Accepting Some Risk: During Extreme Storms



Geographic considerations

- Tanks mostly located near the Spokane River
- Older neighborhoods
- Less affluent
- Focused on providing above-ground benefits when building below-ground infrastructure



First & Adams Plaza



Spokane Falls Plaza

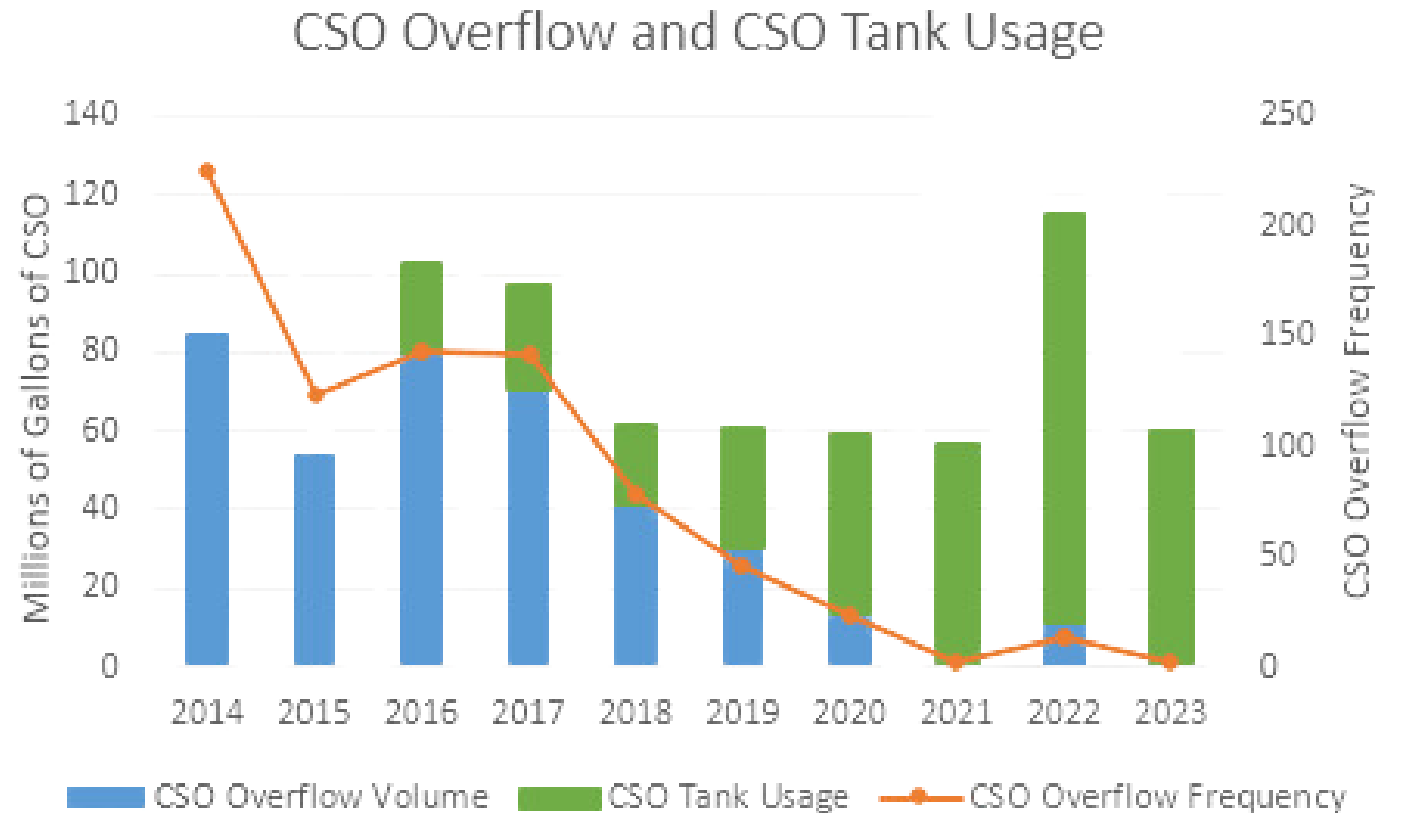


A Playfield, Shared Use Trail, More



Integrated Clean Water Plan – Climate Change

- More precipitation will fall as rain, rather than snow
- More intense storms
- Timing of storms will change
 - More rain on frozen ground
- Mitigate with active control of flows within the CSO system (SCADA)
- Mitigate with up-basin investments





Integrated Clean Water Plan – Climate Change

- Integration of stormwater management in street improvements & other infrastructure work
- Green infrastructure
- Solve multiple problems





Silva Cells in West Central

- Created underground swale
- Added Trees
- Improved Sidewalks



Other Examples

Disc Golf Course



Havana
bike
lanes



Indiana Avenue



Where are we today?

- Completed System to manage overflows from Combined Sewers
- Installed Next Level of Treatment at Riverside Park Water Reclamation Facility
- Finishing work to manage stormwater flows from Cochran Stormwater Basin
- Continuous monitoring & modeling
 - Decide on new investments – more or bigger green infrastructure or even more gray!
- Pay for work: Monsanto settlement & Aquifer Protection Area
- Support the addition of Spokane River access points to create more River stewards!





Questions?



Contact Information



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Questions?

