



**CITY OF BURLINGTON, VERMONT
CITY COUNCIL TRANSPORTATION, ENERGY &
UTILITIES COMMITTEE**

c/o Department of Public Works
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Councilor Jack Hanson, Chair, *East District*
Councilor Jane Stromberg, *Ward 8*
Councilor Mark Barlow, *North District*

Inquiries:
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Transportation, Energy and Utilities Committee of the City Council
Tuesday March 22, 2022 6:00PM

DPW Front Conference Room
645 Pine St, Burlington, VT 05482

This month, remote attendance is strongly recommended:

Join via Zoom, <https://us02web.zoom.us/j/84603122855>

To call into the meeting, including to speak during public comment:

Phone number: 312-626-6799, Webinar ID: 846 0312 2855

If you prefer to attend in a physical location, you may join us at 645 Pine St in the front conference room

–DRAFT AGENDA–

- 1. Agenda**
- 2. Minutes of 3/14/22**
- 3. Public Forum**
- 4. 2022 Clean Water Resiliency Plan and Integrated Planning Update**
 - Megan Moir, Jenna Olson, Martin Lee
 - Information
- 5. Director's Report**
- 6. Councilors' Update**
- 7. Next Meeting 4/26/22**
- 8. Adjourn**

BURLINGTON'S CLEAN WATER RESILIENCY PLAN

An Update on **Infrastructure Investments** and
Integrated Permitting

Jenna Olson, Water Policy & Programs Manager

Martin Lee, Water Resources Engineer

Megan Moir, Division Director of Water Resources



A background image showing a large stack of orange and white corrugated pipes, likely for wastewater or stormwater infrastructure.

"BURLINGTON ORDERS CLOSE OF TWO BEACHES AFTER WASTEWATER RELEASES..."

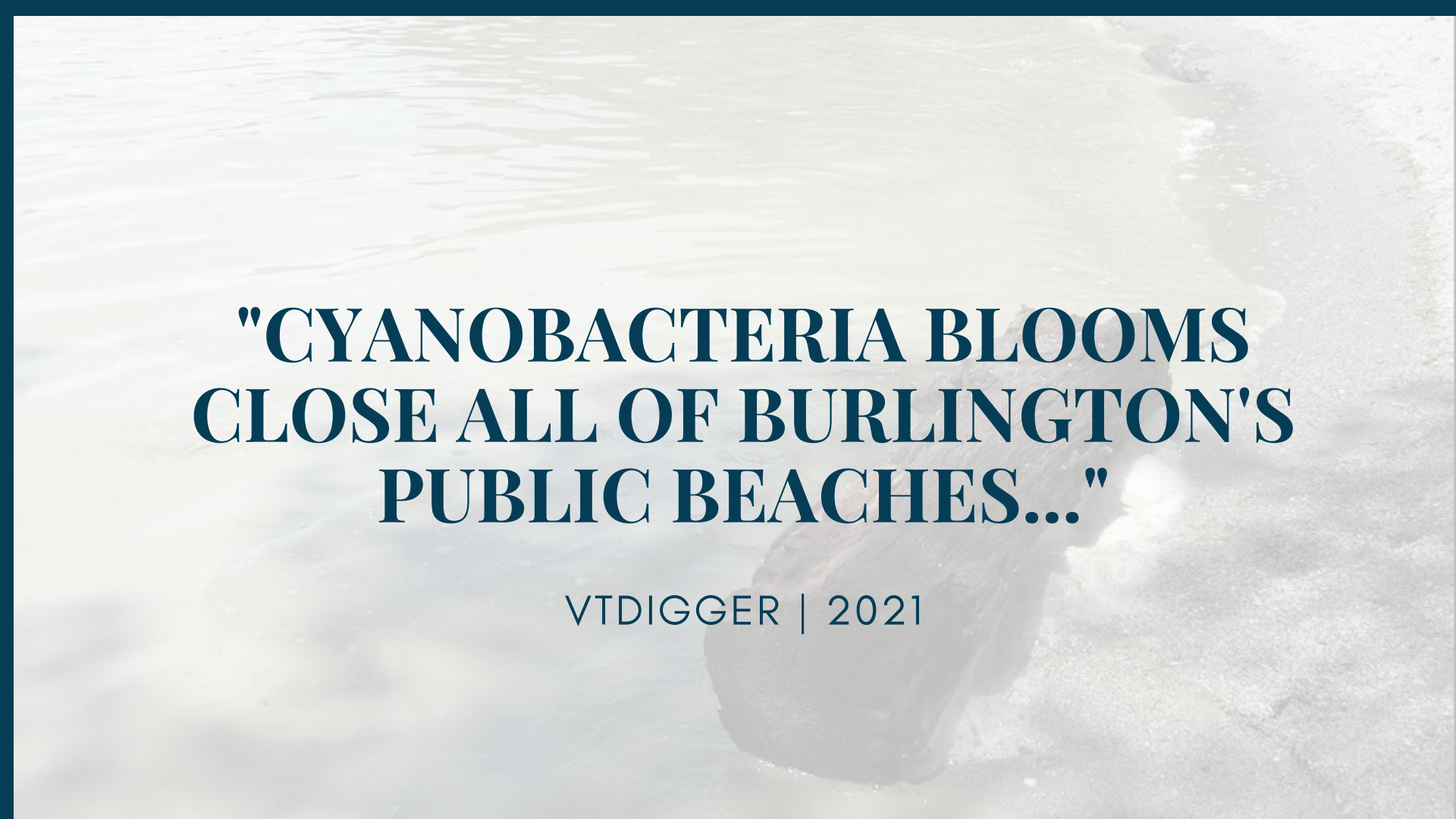
VTDIGGER | 2018

AGING WASTEWATER & STORMWATER INFRASTRUCTURE

REPLACE & MODERNIZE
EXISTING INFRASTRUCTURE

EXCESS PHOSPHOROUS FROM WASTEWATER & STORMWATER

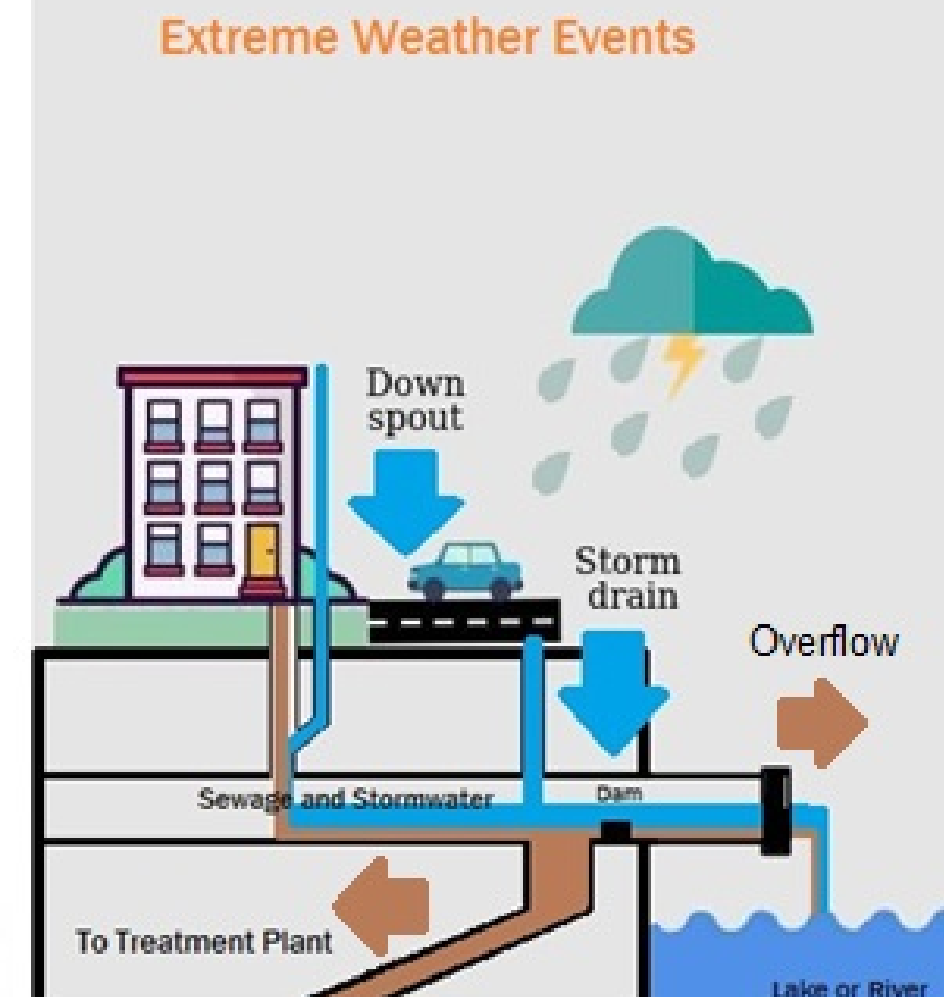
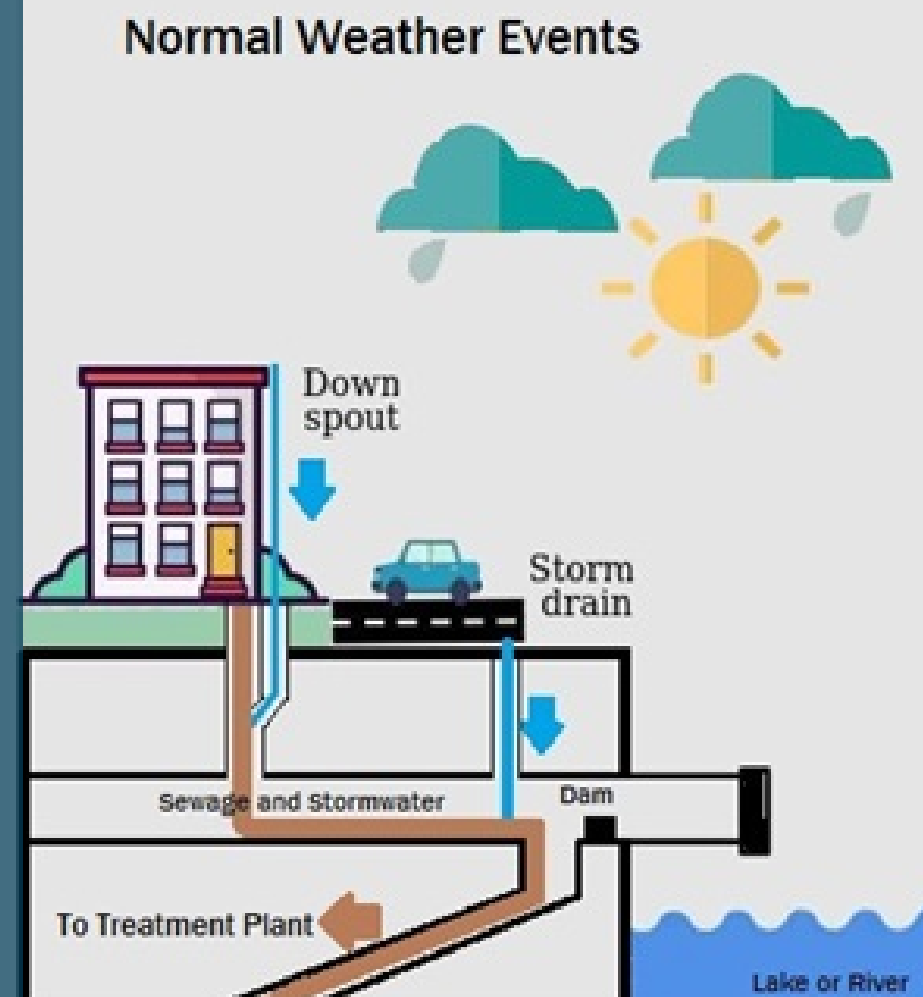
IMPLEMENT PHOSPHOROUS
REDUCTIONS

A background image showing a body of water with a visible cyanobacteria bloom, appearing as a dark, dense mass in the water.

"CYANOBACTERIA BLOOMS CLOSE ALL OF BURLINGTON'S PUBLIC BEACHES..."

VTDIGGER | 2021

OTHER WATER QUALITY GOALS



COMBINED SEWER OVERFLOWS

Remove or store stormwater to reduce frequency of CSOs

.....

EROSION & HABITAT IMPACTS ON URBAN STREAMS

Reduce excess stormwater flows

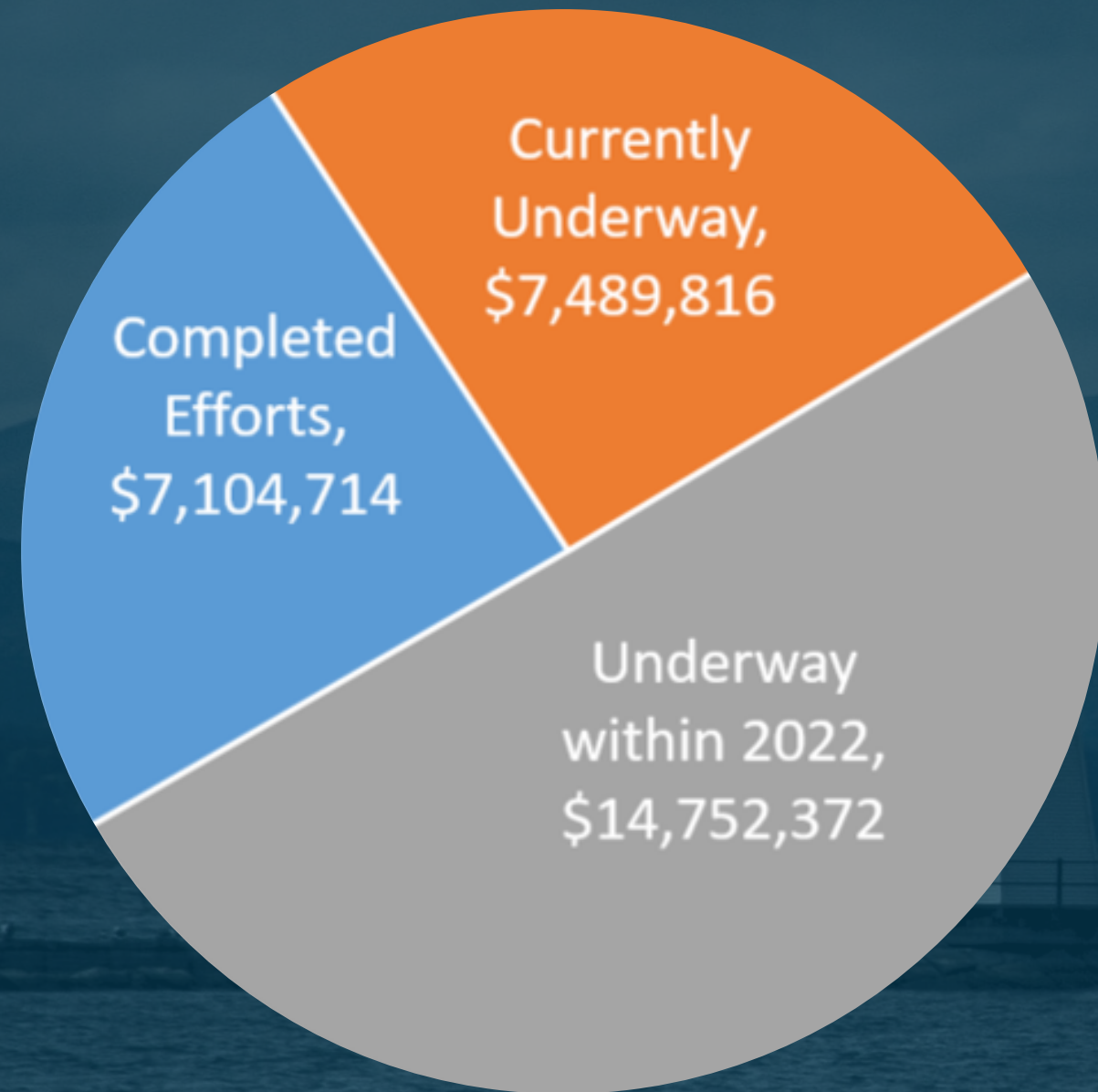
CLEAN WATER RESILIENCY

Improving the resiliency of our Clean Water systems through **7 key strategies** in Wastewater and Stormwater:

1. Investing in Wastewater Treatment Plans
2. Updating Wastewater Pump Stations
3. Relining and Rehabilitating Sewer and Stormwater Pipes
4. Repairing Stormwater Outfalls
5. Implementing Industrial Pollution Prevention Programs
6. Constructing Green Infrastructure
7. Integrated Planning to meet this generation's water quality challenges

\$30MM 2018 Bond Vote to start this work - 92% approval

RESILIENCY INVESTMENTS TO DATE



Voters approved \$30 M in 2018
2018 Bond will be >80% programmed
by end of 2022

List of Clean Water Resiliency Projects

updated 3/9/22

Funding Type

Clean Water Resiliency **Bond** (includes project costs that will be forgiven)

Project Development Loan (includes project costs that will be forgiven)

Grant

italics indicate estimate

Type	Completed Efforts	Expense
Construction	SCADA (computerized controls)	\$ 425,000
Construction	Disinfection Systems (all three plants)	\$ 2,689,600
Planning	WWTF Planning	\$ 463,000
Planning	Integrated Water Quality Plan	\$ 1,272,910
Construction	Pump Station Upgrades Flynn & Fletcher	\$ 1,663,802
Construction	CSO-GSI South End	\$ 590,402

Type	Currently Underway	Expense
Design	CSO-GSI Old North End	\$ 117,628
Planning	Industrial Pollution Prevention Program	\$ 398,881
Planning	Remaining Pump Stations Preliminary Engineering	\$ 350,000
Construction	Collection System Relining (Wastewater)	\$ 3,336,190
Construction	Collection System Relining (Stormwater)	\$ 2,091,417
Design	Phase II Wastewater Upgrades	\$ 1,095,700
Design	Manhattan Drive Outfall Repair	\$ 100,000

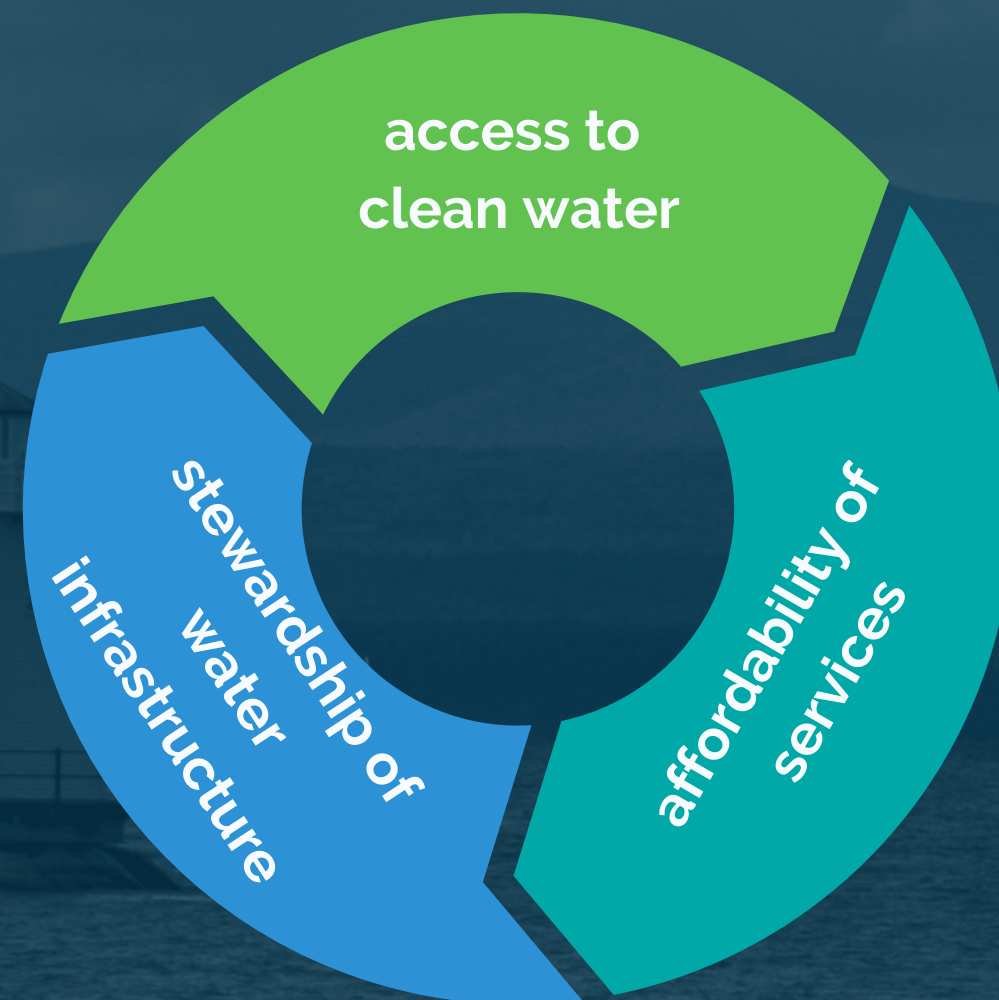
Type	Underway within 2022	Expense
Construction	Phase II Wastewater Upgrades	\$ 12,000,000
Construction	Manhattan Drive Outfall Repair	\$ 1,132,000
Construction	CSO-GSI Old North End	\$ 322,479
Planning	Hydraulic/Hydrologic (Sewer Capacity) Phase II Study	\$ 751,391
Preliminary Design	Tertiary Phosphorus Removal Treatment Pilot Study	\$ 298,832
Preliminary Design	CSO Storage Tank	\$ 247,670

Total Work Completed or Programmed	\$ 29,346,902
Total work under voter authorized bond	\$ 24,214,709
Bond Authorization Remaining from 2018 \$29.958M	\$ 5,743,291

RATEPAYER AFFORDABILITY



- **Fixed Fee Waiver**
 - Low-income
 - 65+
 - Non-Profit Housing Organization
- **Rebates**
 - Sewer lateral inspections
 - WaterSense fixtures



RATE STRUCTURE ADJUSTMENTS

- **Lifeline** rate tier
- **User class**-based rates

**"BURLINGTON ORDERS CLOSE
OF TWO BEACHES AFTER
WASTEWATER RELEASES..."**

VTDIGGER | 2018



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STORMWATER
INFRASTRUCTURE**

REPLACE & MODERNIZE
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WASTEWATER &
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**"CYANOBACTERIA BLOOMS
CLOSE ALL OF BURLINGTON'S
PUBLIC BEACHES..."**

VTDIGGER | 2021

TACKLING AGING INFRASTRUCTURE

- Completed key upgrades at all 3 wastewater treatment plants.
- Replaced the disinfection system with modern equipment.
- At Main plant, we replaced the central computer system. These were areas of our older system that led to Plant disruptions in 2018.



TACKLING AGING INFRASTRUCTURE

- Replaced 2 old pump stations which have in the past required emergency repairs - costing time and money.
- The risk of failure of a pump station is significant and these have been critical upgrades.



TACKLING AGING INFRASTRUCTURE

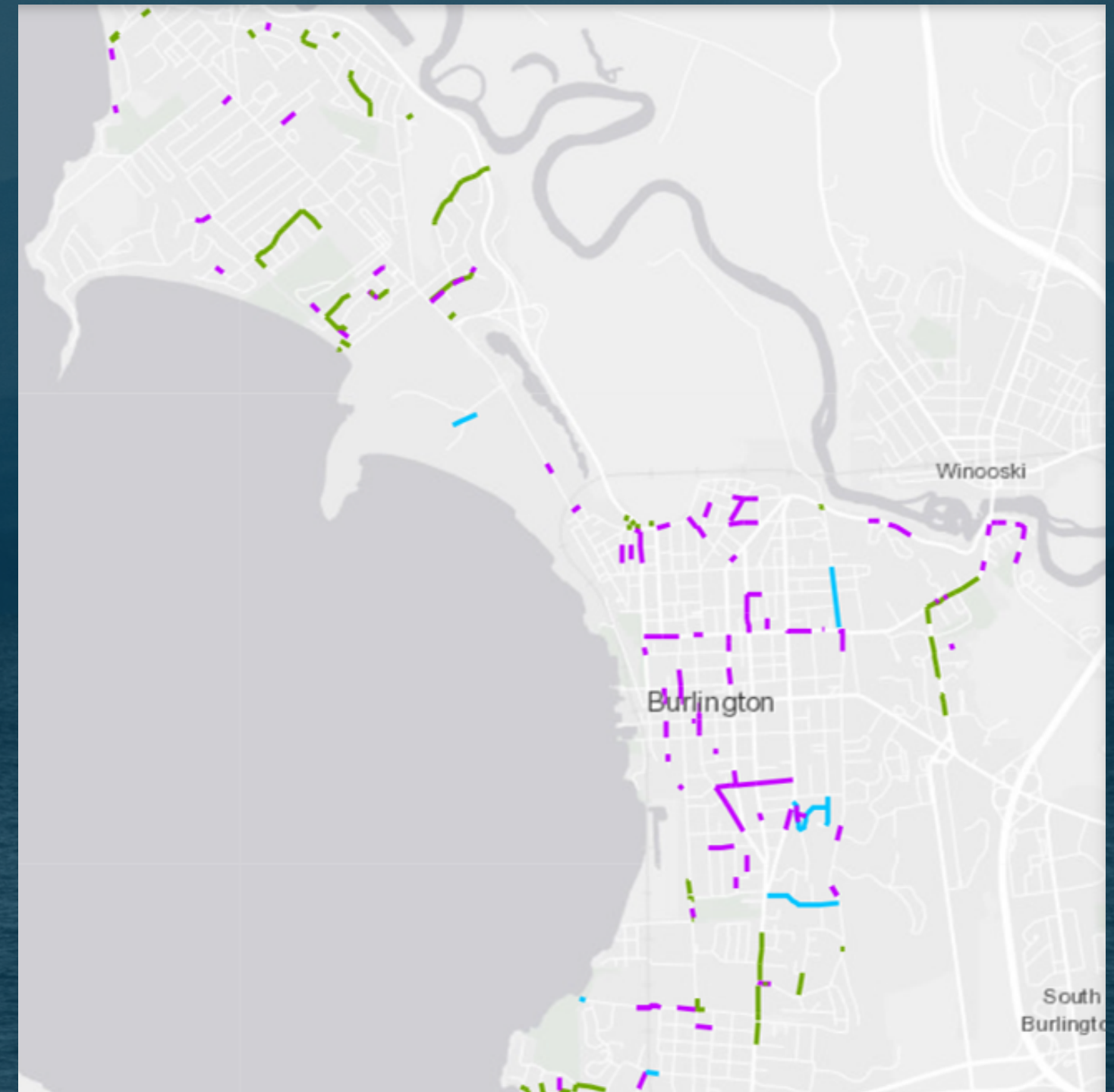
Distribution and Collection System Improvements Project

Schedule: fall 2021 to fall 2022

Scope: water, collection system, paving

- Contractor: Granite Inliner
- Designer: DPW
- Resident Engineer and Project Management: DuBois & King
- Funding Sources: State Revolving Loan Program (SRF), Remaining 2018 Water Bond Proceeds, Water Capital, Paving Capital

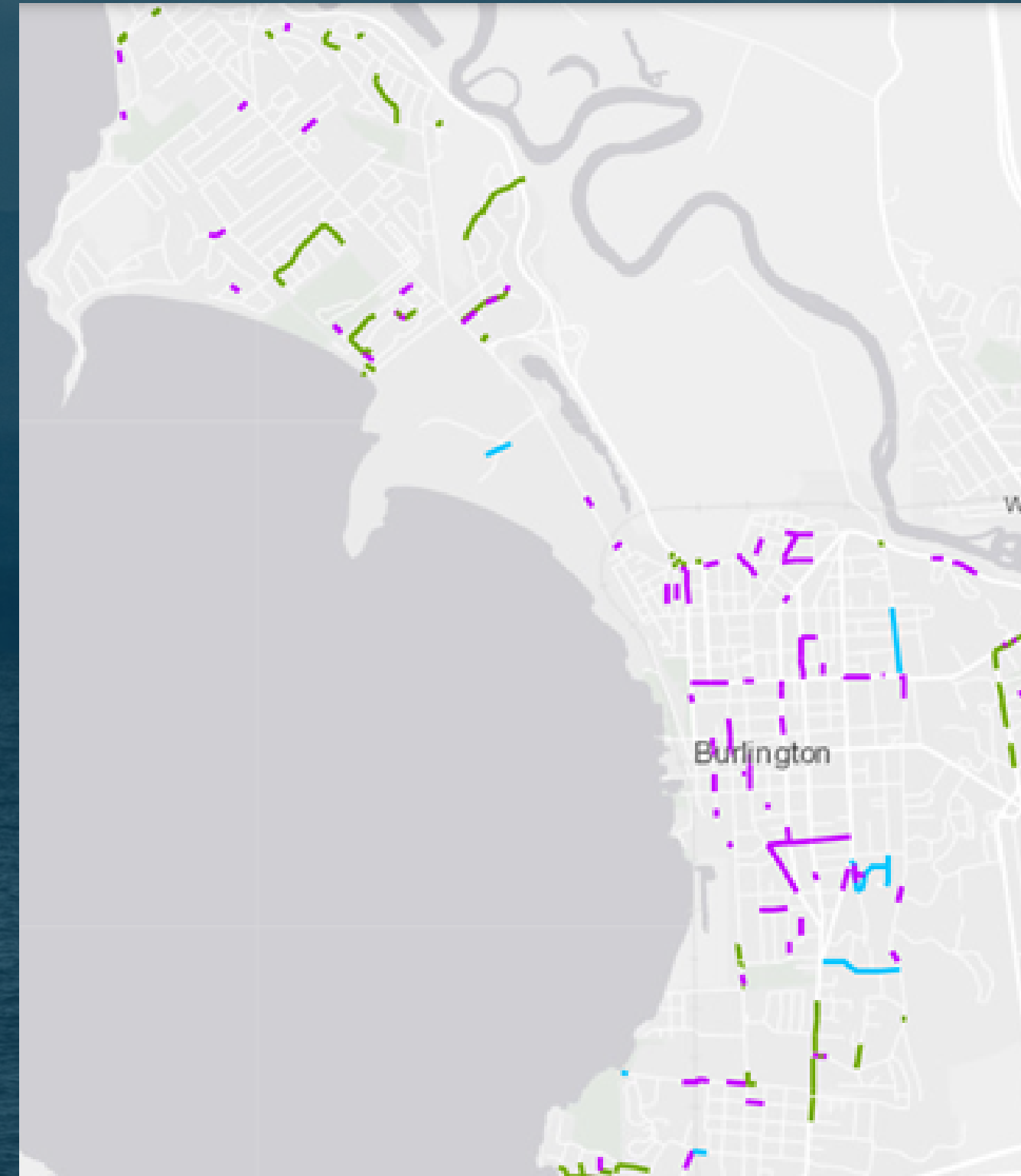
Water Pipe Rehab = ~7,600 ft.
Collection System Pipe Rehab = ~48,000 ft



TACKLING AGING INFRASTRUCTURE

Higher impact project locations for 2022:

- Water Relining: Home Ave, North Prospect Street, Ledge Road, Deforest Road, and Overlake Park (if funding is available)
- Sewer Replacement: Deforest Road, North Avenue, Riverside Avenue, Greene Street, Pine Street, Lakewood Parkway, Tallwood Lane, and West Road
- Full width paving is part of work in these locations: North Prospect, Lakewood Parkway, and Tallwood Lane



TACKLING LEGACY INFRASTRUCTURE

Installed 15 stormwater gardens as part of the \$1M of grant funding to capture and slow a significant amount of runoff above the Pine St Combined Sewer Overflow.

Last year 3 bioretention systems were constructed in the New North End by City DPW Staff and self-funded through the stormwater enterprise fund.

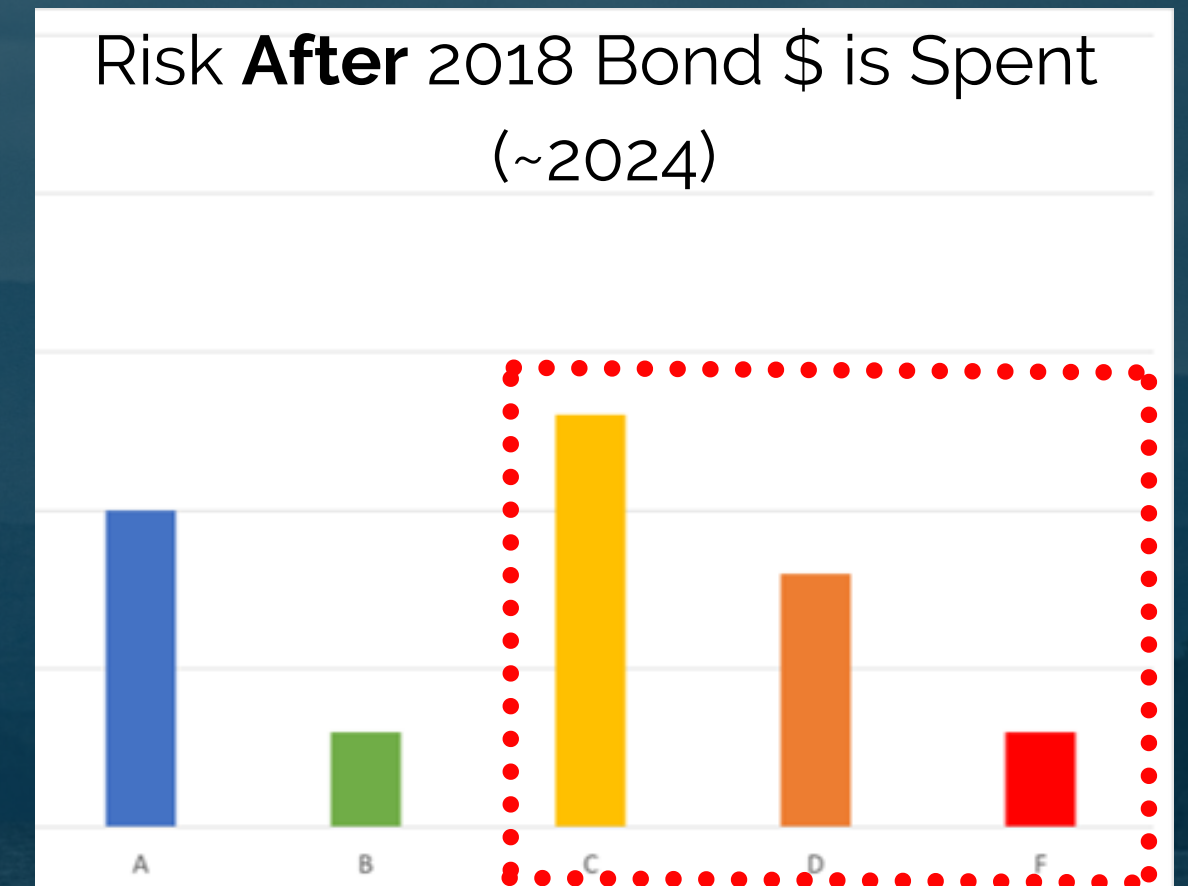
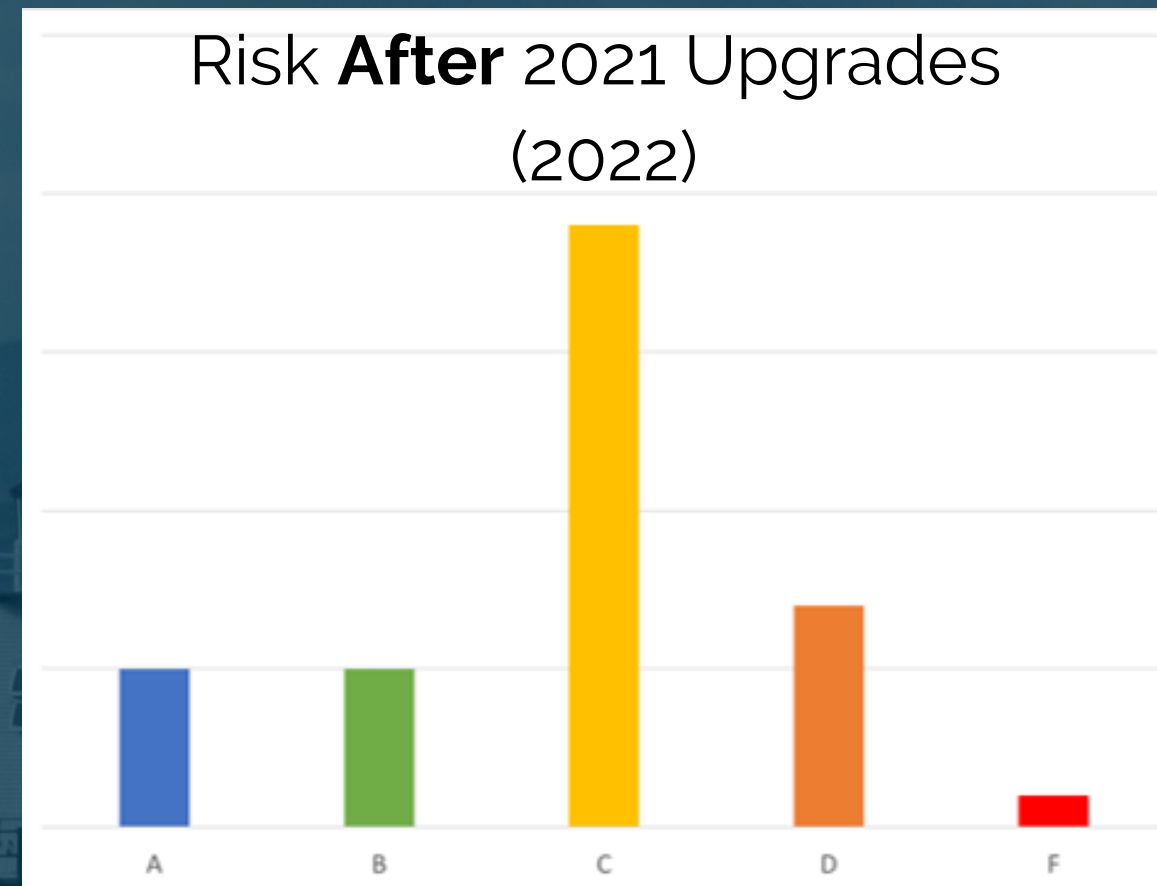


TACKLING AGING INFRASTRUCTURE



1. Wastewater Phase II Treatment Plant Improvements
2. Pump Station Improvements
3. Additional GSI
4. Stormwater Outfall Improvements

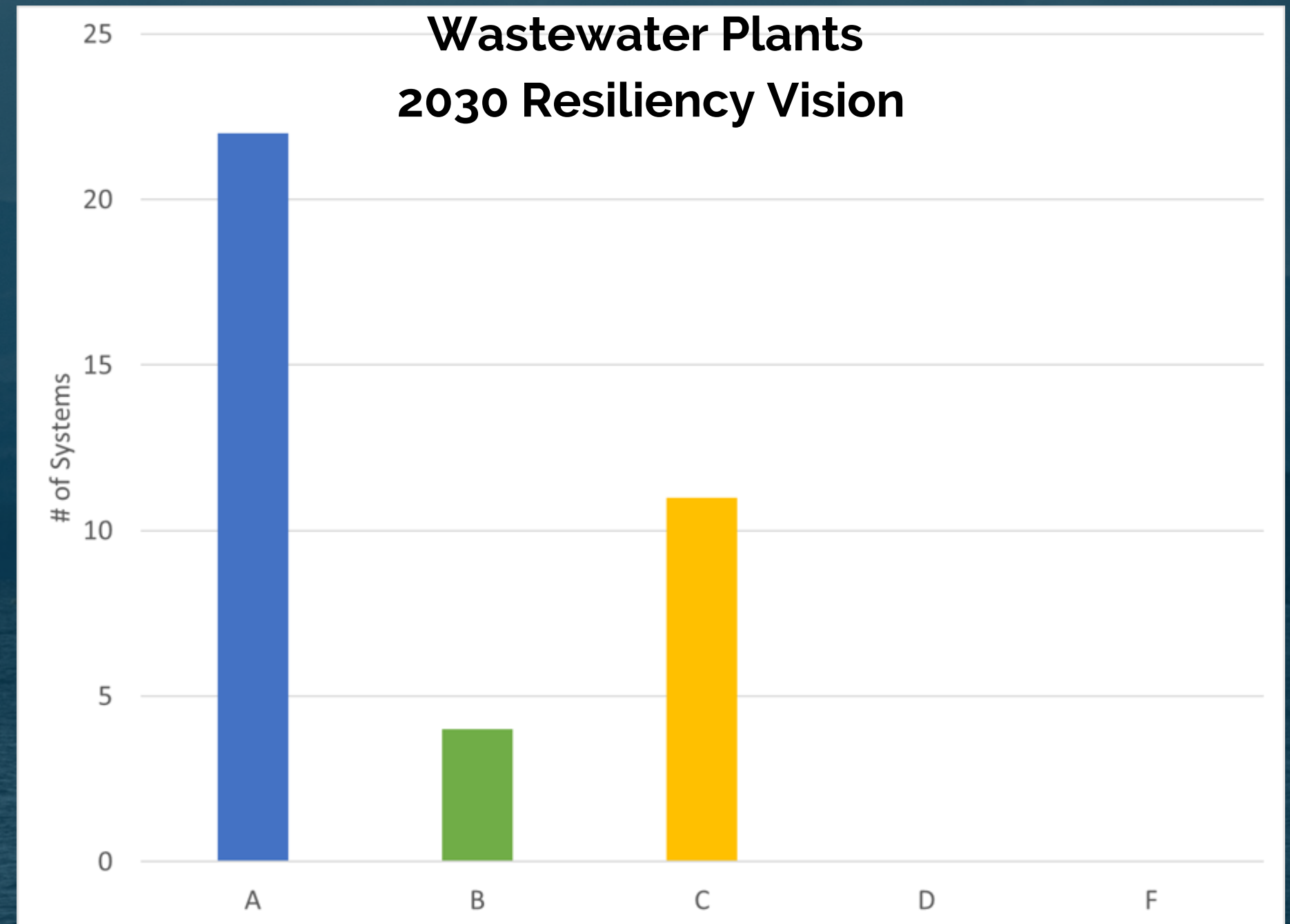
RISK SCORE DISTRIBUTION - WWTP'S



- **Replacement cost** of each system varies
- Risk scoring is **dynamic over time** - systems continue to age (i.e. something in C grade in 2022 that doesn't get replaced turns into D by 2024)

BEYOND THE 2018 CWRP BOND

- Additional **\$150MM+** needed for WWTFs alone
- On-going analysis to determine magnitude of November 2022 Bond
- Consider availability of Federal Funding (loan forgiveness?)
- Consider longer term bonds (35-50 year)
- Possibility of East Plant consolidation with Main
- Consider other infrastructure \$\$ needs too (WW, SW and Drinking Water)



**"BURLINGTON ORDERS CLOSE
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VTDIGGER | 2018

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**"CYANOBACTERIA BLOOMS
CLOSE ALL OF BURLINGTON'S
PUBLIC BEACHES..."**

VTDIGGER | 2021

"Cyanobacteria conditions vary significantly among lake segments, and **warm weather blooms continue to present a challenge to recreation and public health.**"

Lake Champlain Basin Program, 2021 State of the Lake Report

WHY DO BLOOMS HAPPEN?



TOO MANY NUTRIENTS
(CYANO FOOD)

+

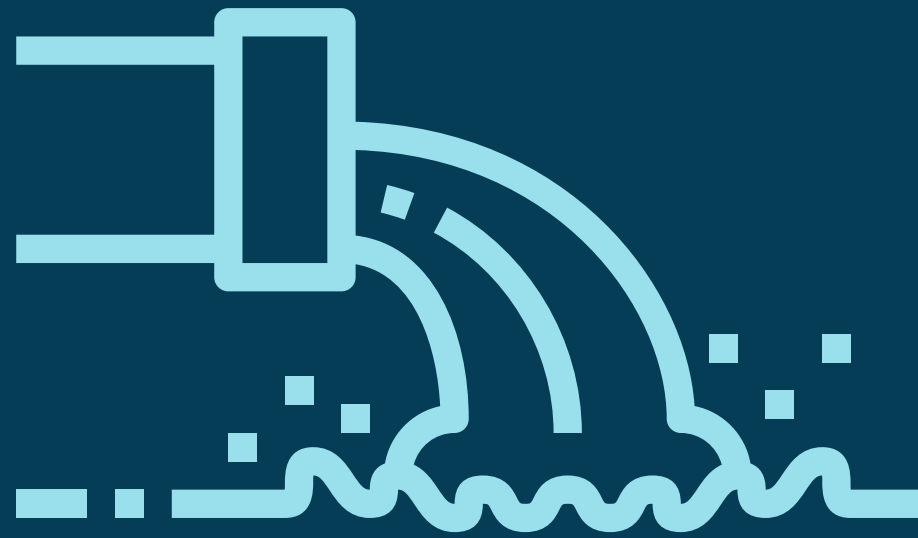
CALM, WARM WATER

=

CYANOBACTERIA BLOOM

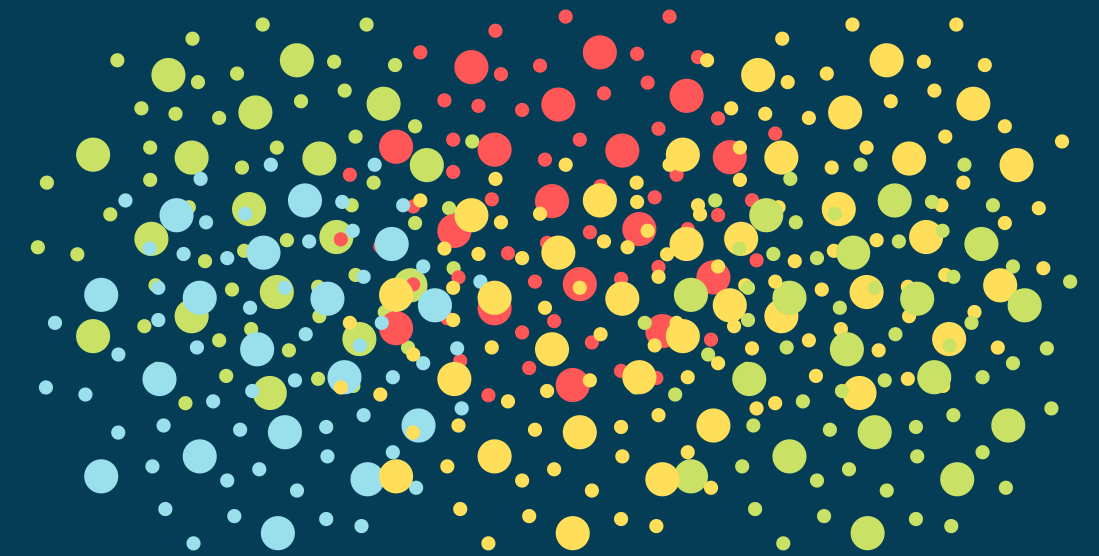
TOTAL MAXIMUM DAILY LOAD (TMDL)

WHAT IS **LOAD**?



FLOW

how much treated wastewater
or stormwater runoff enters a
waterbody each year



CONCENTRATION

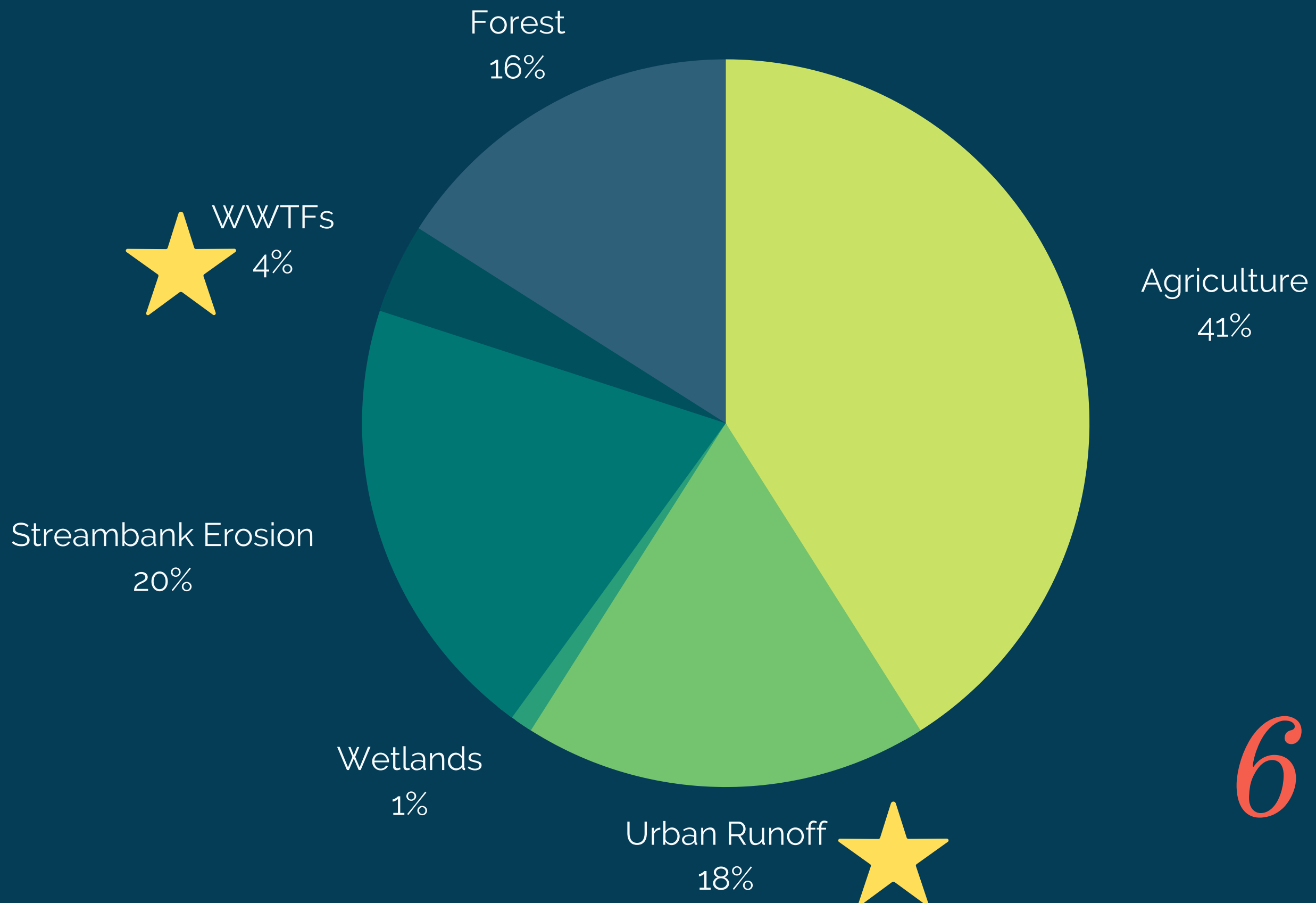
(how much **phosphorous** is
in that water)



LOAD

(how many pounds of
phosphorous is **delivered**
to the waterbody)

Sources of Phosphorus in Lake Champlain



VERMONT =
69% of the total phosphorous load to Lake Champlain

Burlington's Annual Phosphorous Contribution



3.8%

of total phosphorous
load to applicable
segments of Lake Champlain

- Wastewater Treatment Facilities (including Wet Weather)
- Developed Lands

Burlington's Remaining Phosphorous Reduction Target* by Sector

990 lbs

204 lbs

1,102

pounds of
phosphorous per year

*Annual Average

The Economics of Lake Champlain



**IN THE U.S.,
STUDIES ESTIMATE**

\$2.2 billion

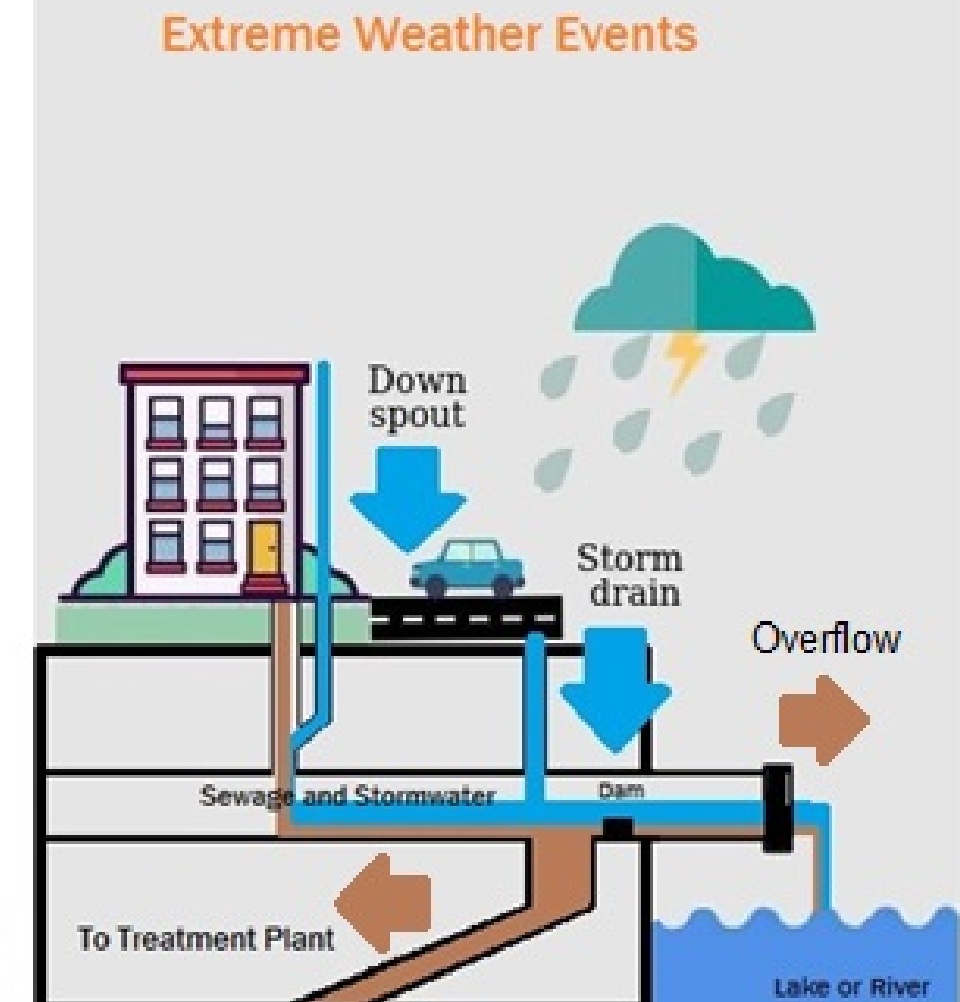
in total economic losses annually
due to eutrophication

**LAKE CHAMPLAIN
GENERATES**
\$300 million

in VT tourism revenues each year



OTHER WATER QUALITY GOALS



COMBINED SEWER OVERFLOWS

Remove or store stormwater to reduce frequency of CSOs

.....

EROSION & HABITAT IMPACTS ON URBAN STREAMS

Reduce excess stormwater flows

What is Integrated Planning?

JUNE 2012
U.S. EPA INTEGRATED
MUNICIPAL PLANNING
FRAMEWORK

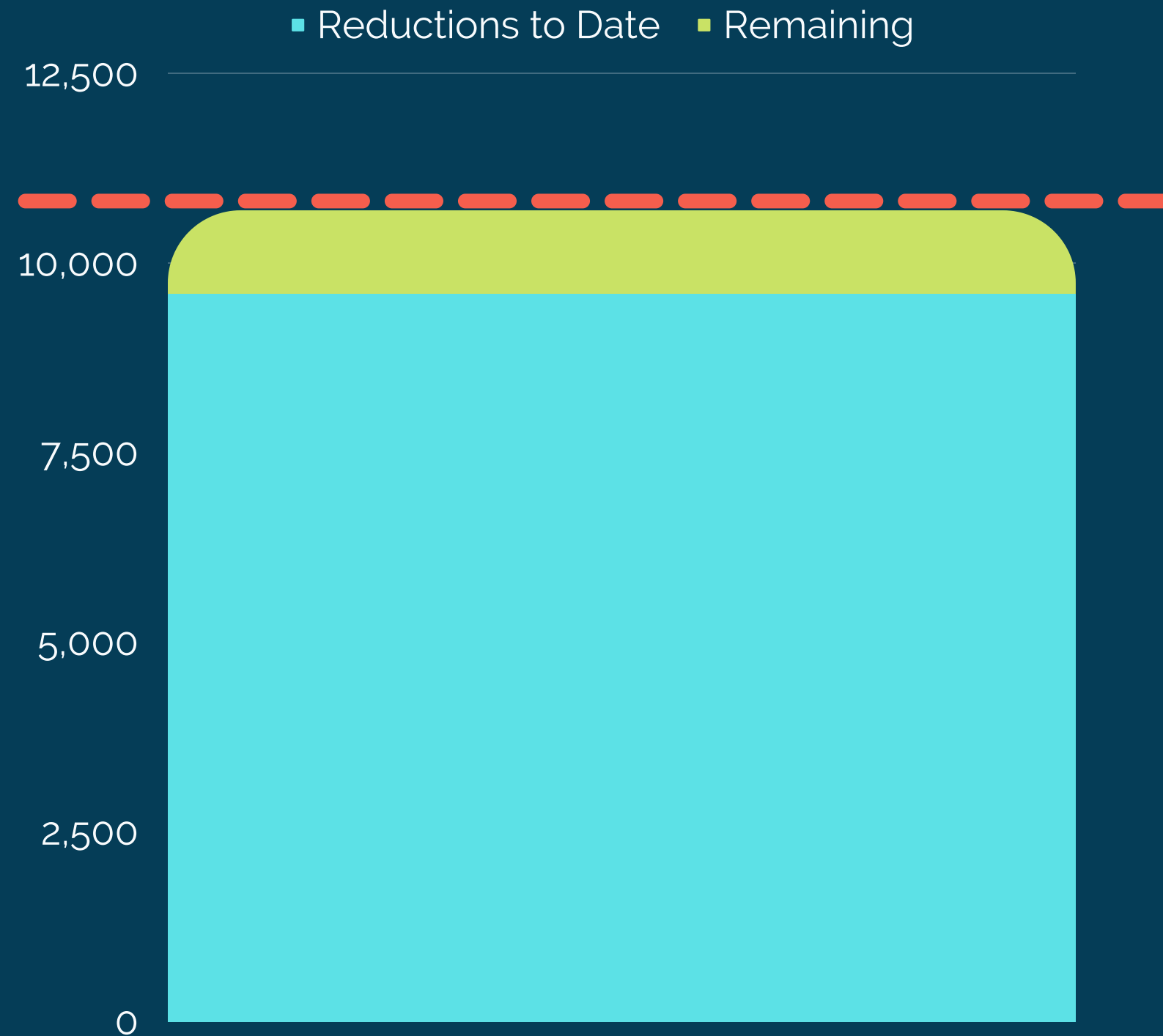


- Examine all **water quality obligations** as a whole while recognizing the need for **on-going investment in existing infrastructure**
- Identify & address community health and water quality priorities by sequencing and scheduling work with the **highest cost-benefit** and **most community support** up front
- Implement **water quality solutions** more **efficiently**, and more **cost-effectively**.

Other Northeast States utilizing IP:

- Connecticut
- Maine
- Massachusetts
- New Hampshire

Burlington's Phosphorous Reduction Goal



BASELINE GOAL=

10,684 lbs/year

PERFORMANCE TO DATE=

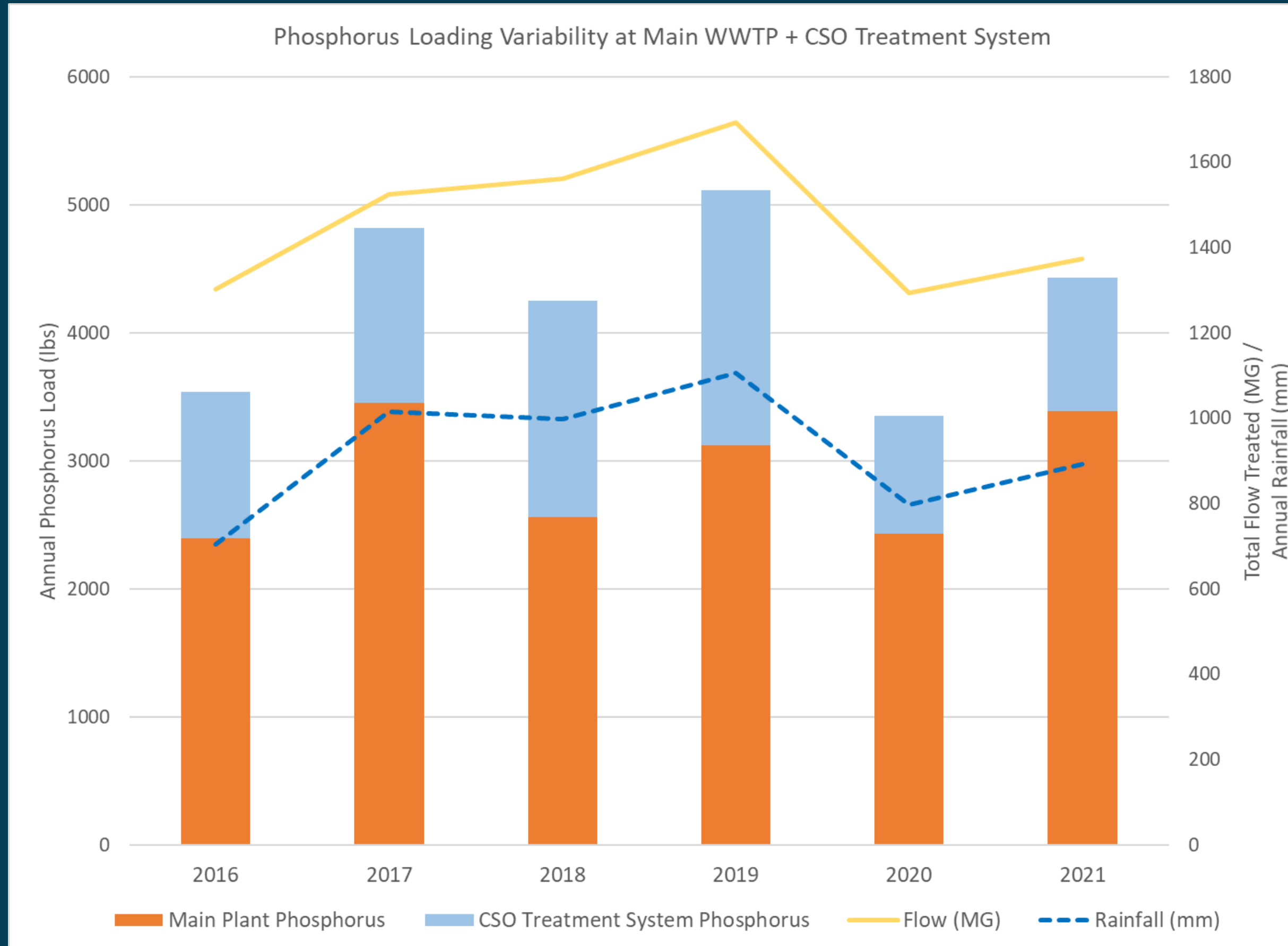
9,582 lbs/year

REMAINING TARGET*=

1,102 lbs/year

*Annual Average

Why the reduction target is "annual average"...

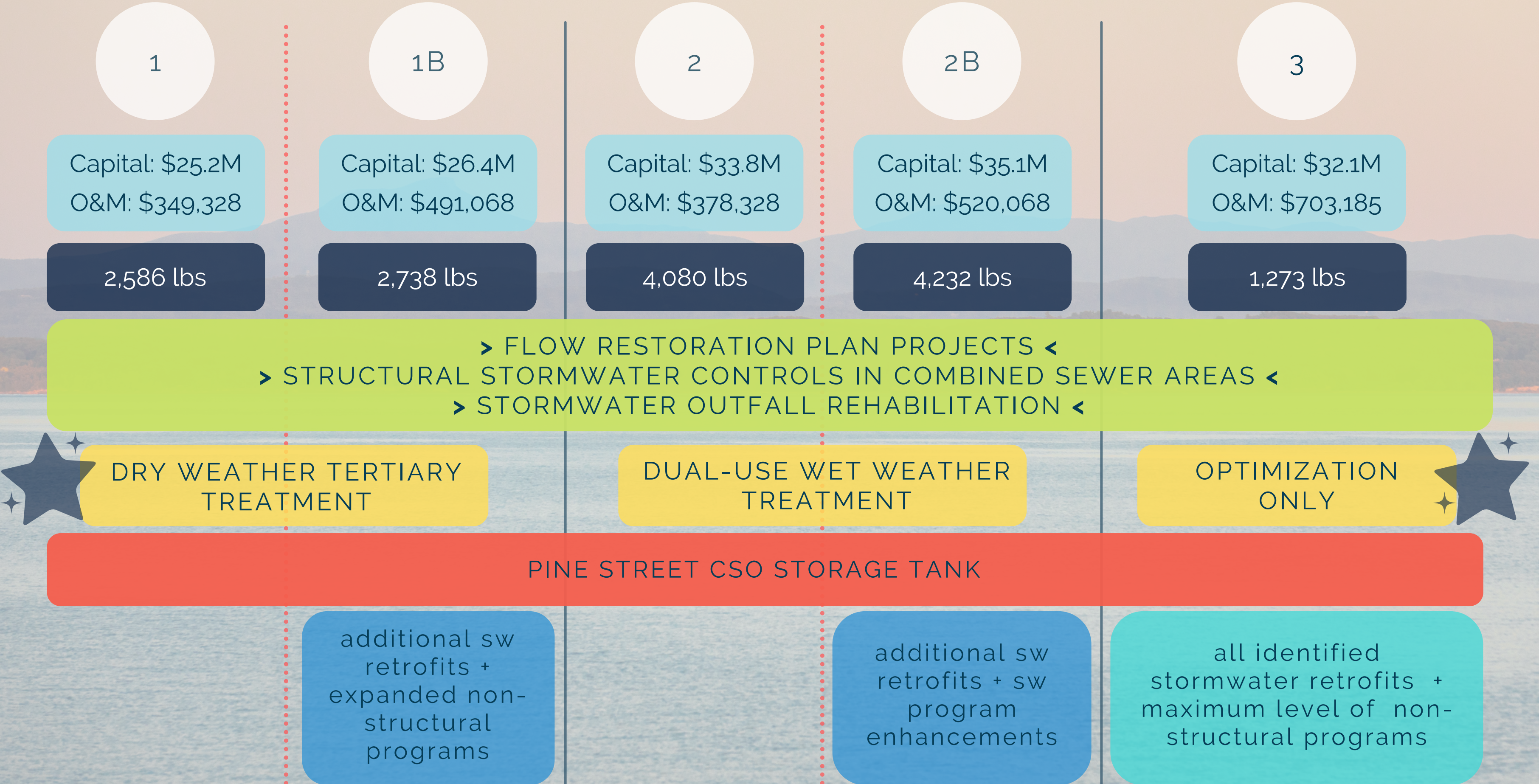


CREATING **PROJECT** PORTFOLIOS

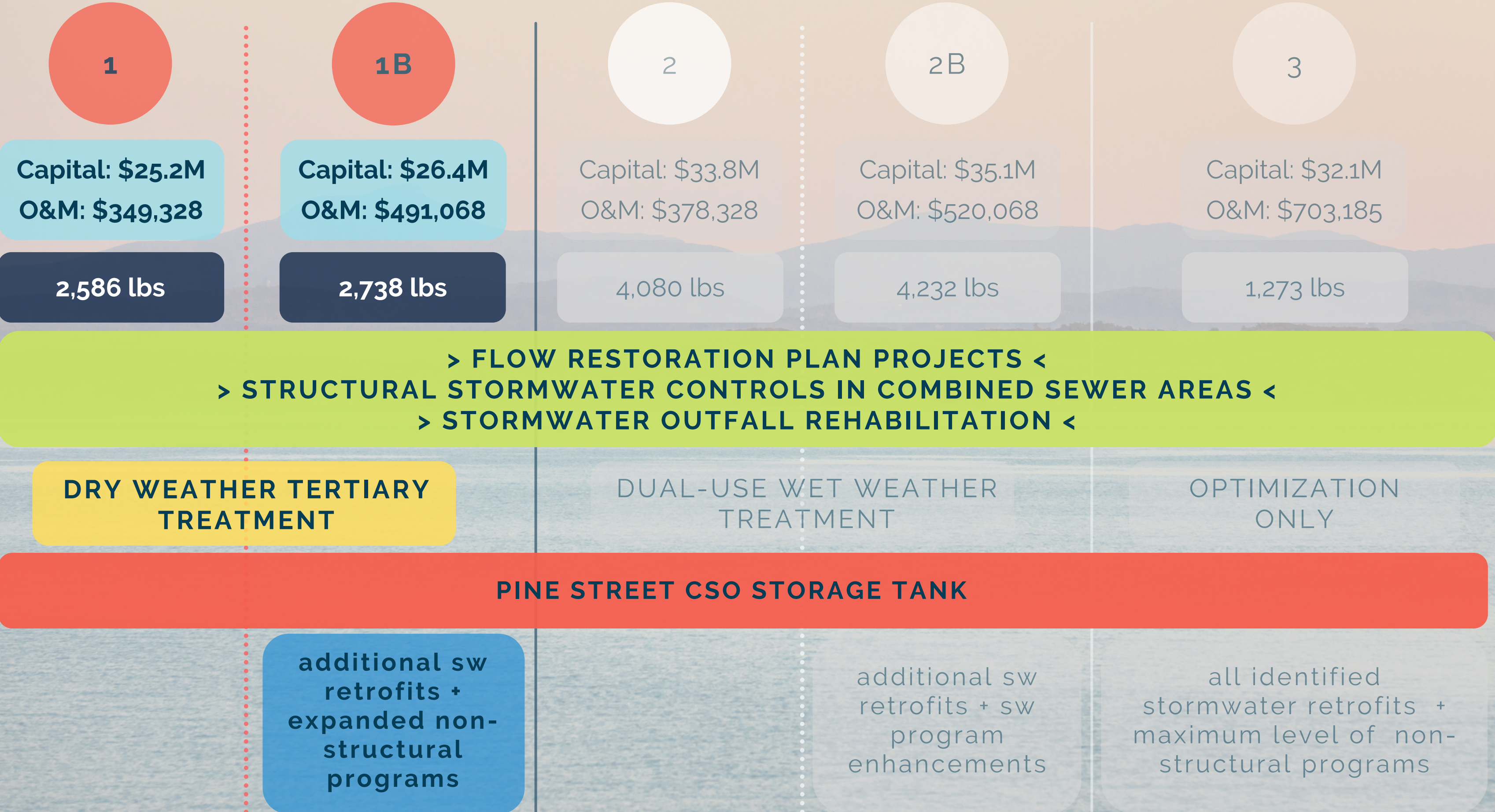
- **Engineering & Technical Analysis**
 - Watershed characterization
 - System characterization & modeling
 - Evaluating program effectiveness
 - Project-specific cost estimates
- **Combining projects** into Project Portfolios
- Developing an **Evaluator Tool** to assess the benefits and impacts of portfolio options
- Completing a **Financial Capability Assessment (FCA)** for each Portfolio



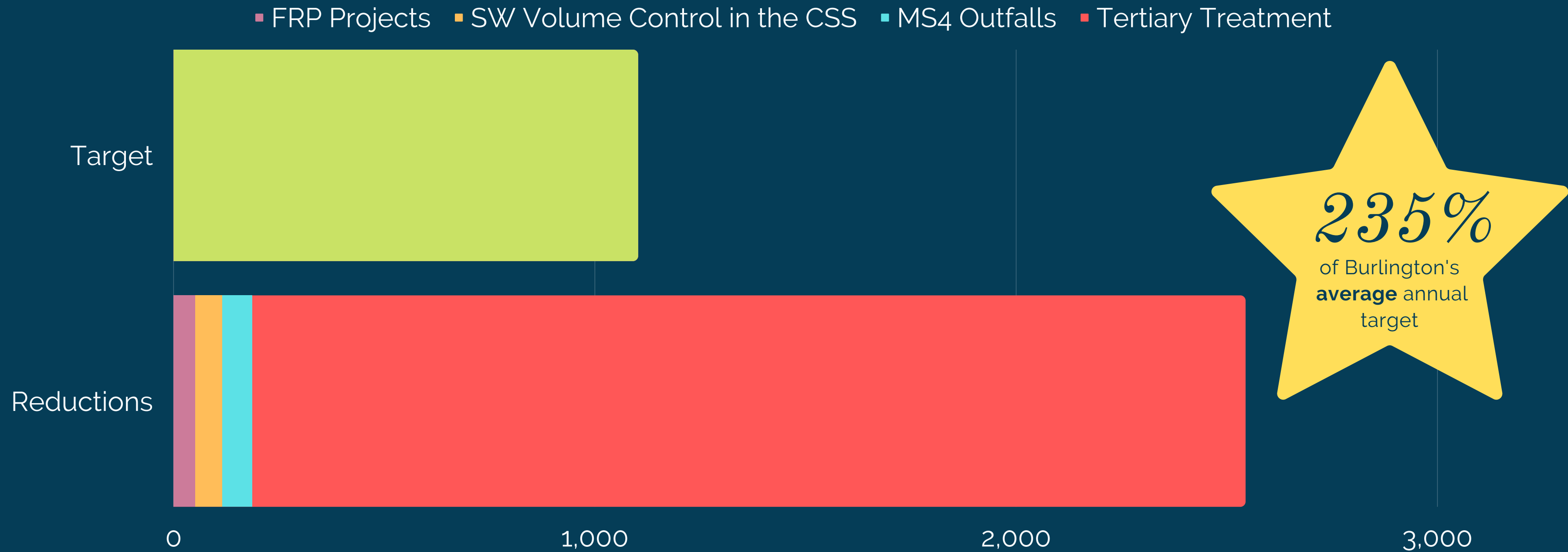
PORTFOLIO OPTIONS OVERVIEW



PREFERRED PORTFOLIO



Proposed Phosphorous Performance



BEYOND PHOSPHORUS CONTROL: **CSO REDUCTIONS**

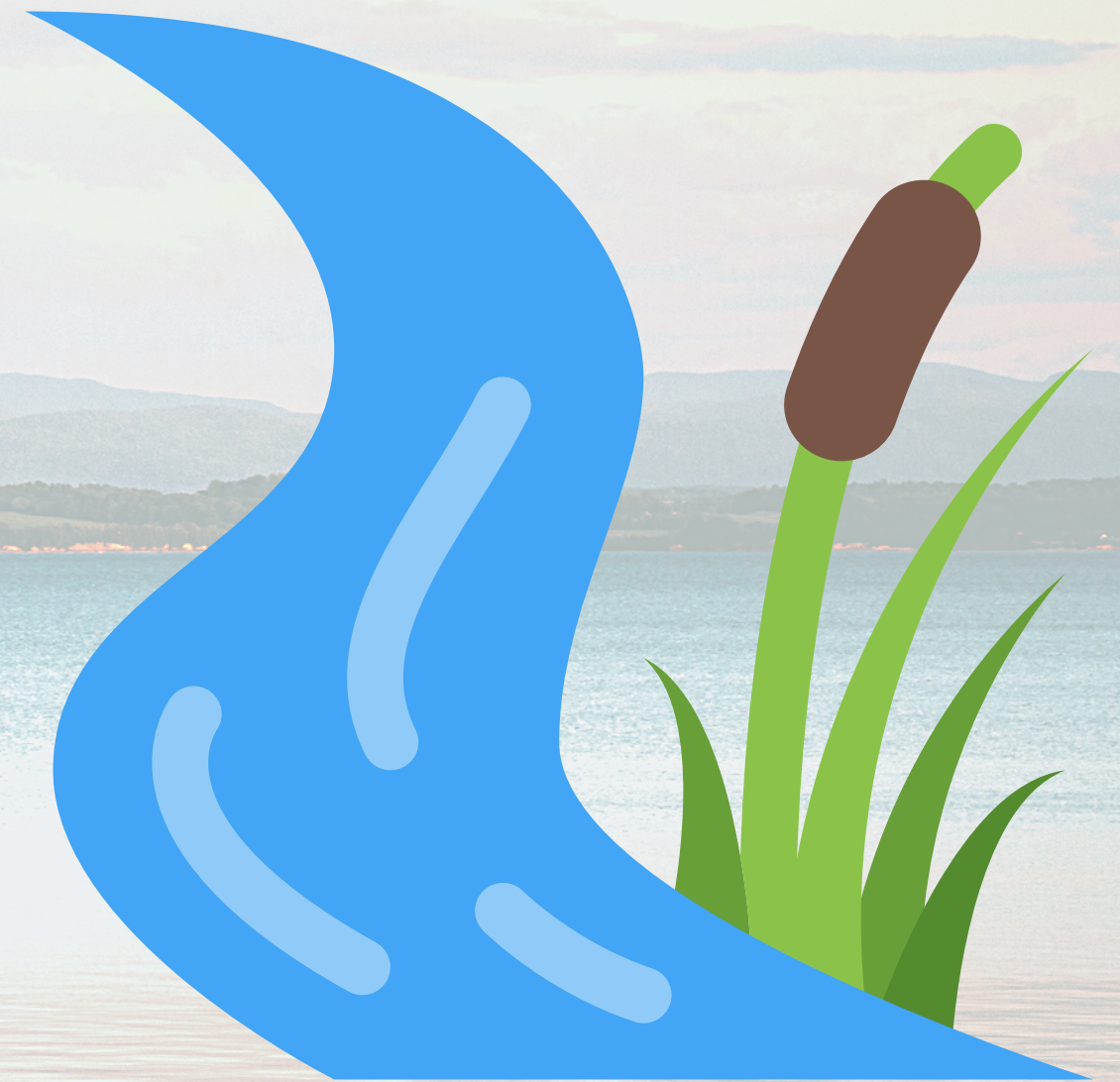
Near term:

- Pine Street CSO Storage Tank (5 year level of control)
- Additional flow metering to refine H/H model in areas with capacity concerns
- Basement Surcharge Prevention Program



BEYOND PHOSPHORUS CONTROL: URBAN STREAM FLOW RESTORATION

- **Prioritize** Flow Reduction Projects that have high Phosphorus removal
 - Gravel wetland for Price Chopper Plaza
- High **Cost Benefit** projects
 - "Smart" valve retrofit for existing detention pond
- Projects with **grant support**



Next Steps

WHAT TO EXPECT



2022-2023

DESIGN & ENGINEERING

WWTP Tertiary Pilot
Pine Street CSO Tank
H/H Work



2022

DEC PERMIT APPROVAL

Following Public
Notice Process



2023-2024

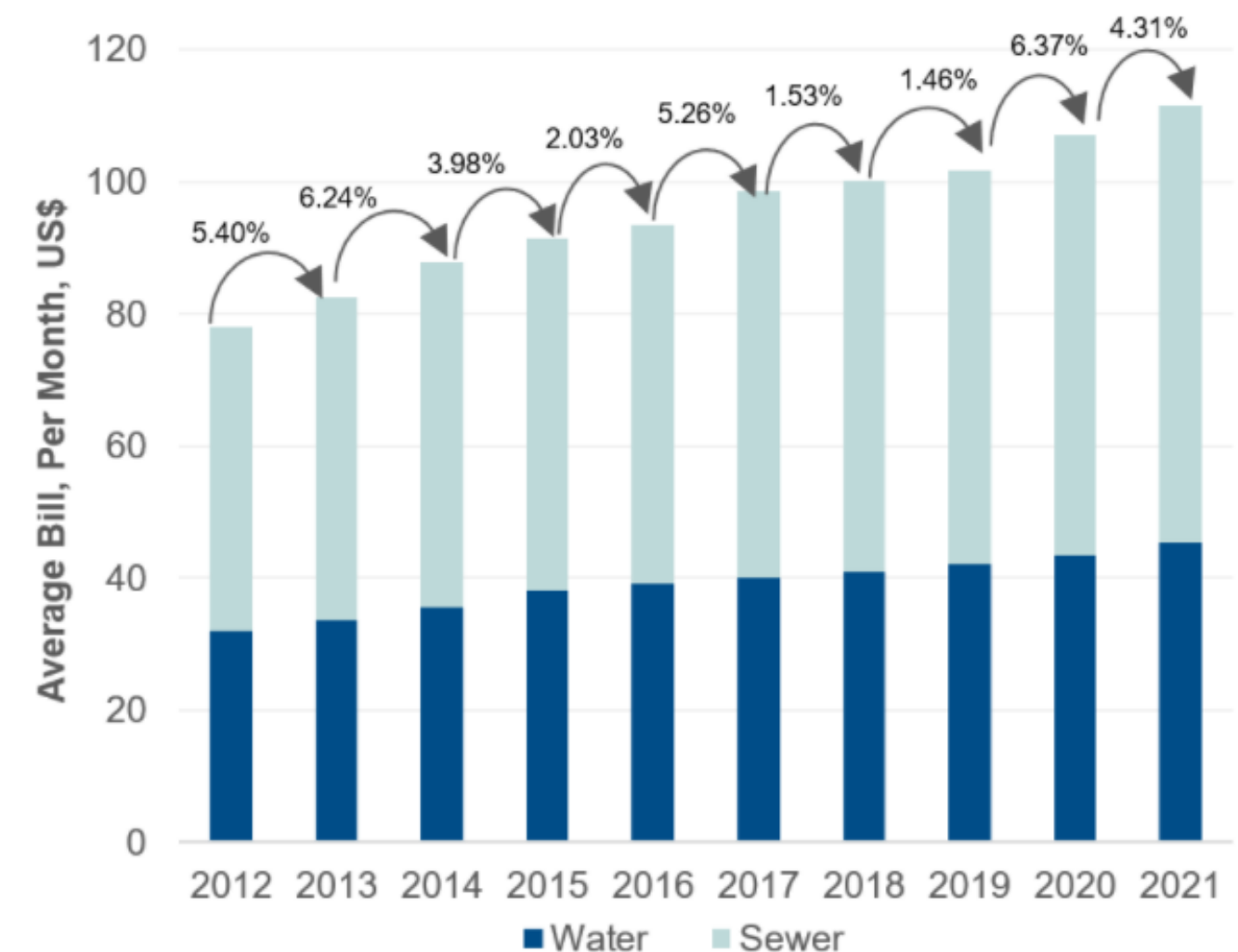
CONSTRUCTION OF PRIORITY PROJECTS

Main WWTP Tertiary
Pine Street CSO Tank

Funding Challenges

- At least \$175M + of WW/SW need
- On-going ratepayer affordability is key
- Financing vs. Funding
- Federal Infrastructure Bill will increase...
 - availability of financing
 - availability of loan forgiveness (not guaranteed)
- Drinking Water also has deferred capital needs
- Consider costs of inaction

Exhibit: Household Water and Wastewater Utility Bills for 50 U.S. Cities, 2012-2021



Source: Utilities, Bluefield Research

QUESTIONS?

MARTIN LEE, P.E.

Water Resources Engineer

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JENNA OLSON

Water Resources Policy & Programs Manager

jolson@burlingtonvt.gov

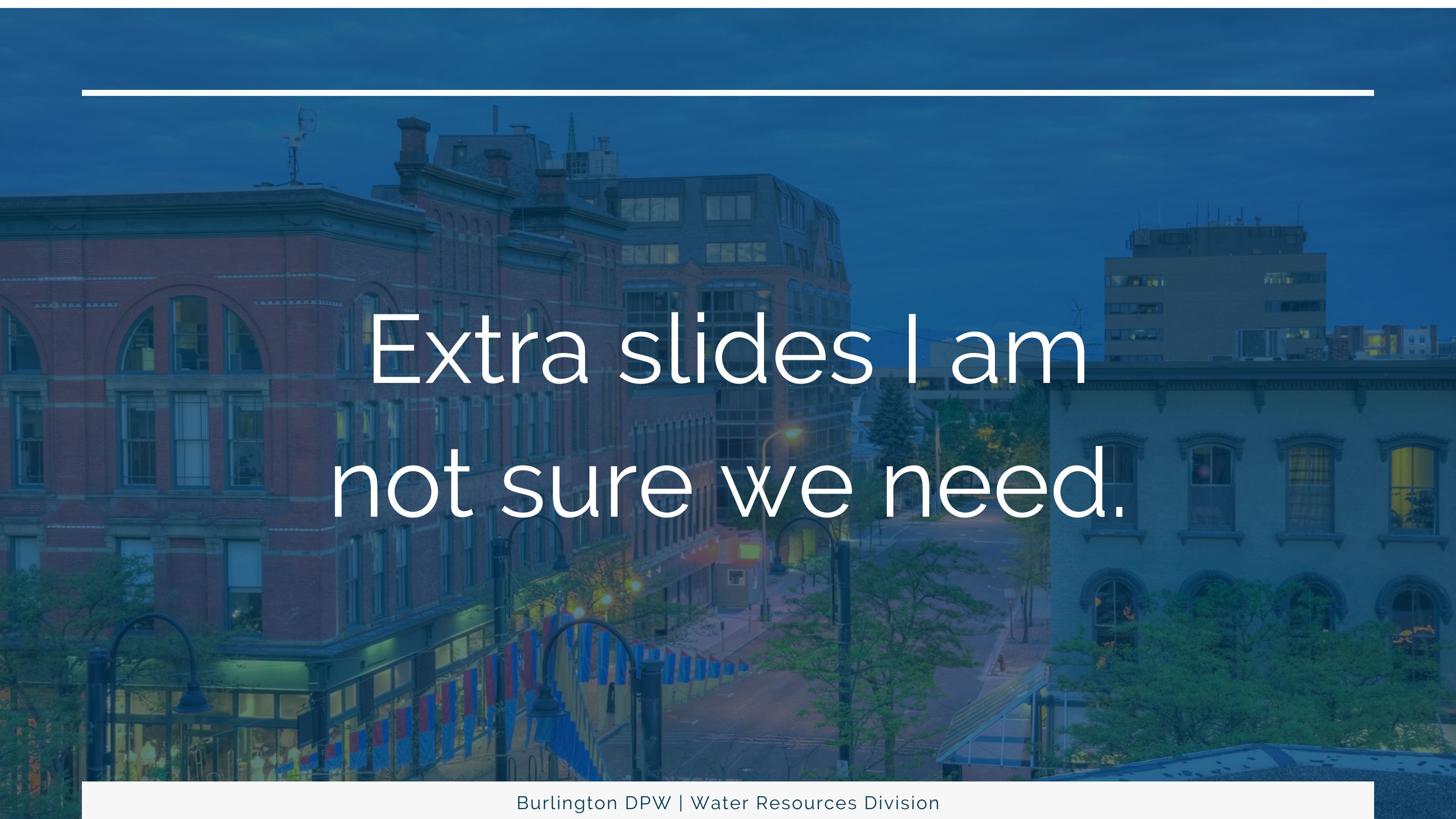
MEGAN MOIR

DPW Division Director - Water Resources

mmoir@burlingtonvt.gov

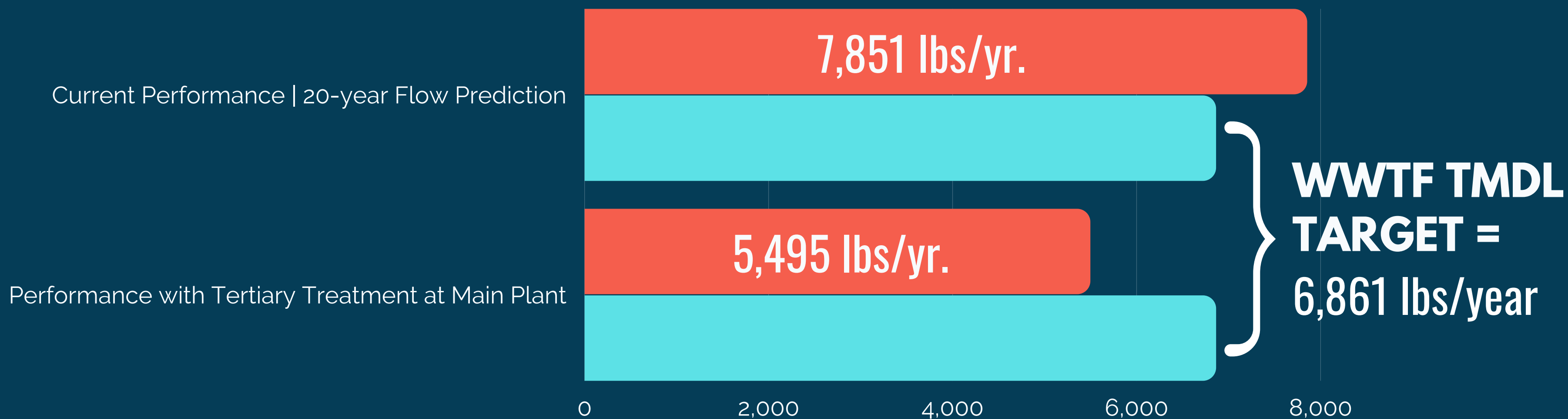
burlingtonvt.gov/water/integratedplan



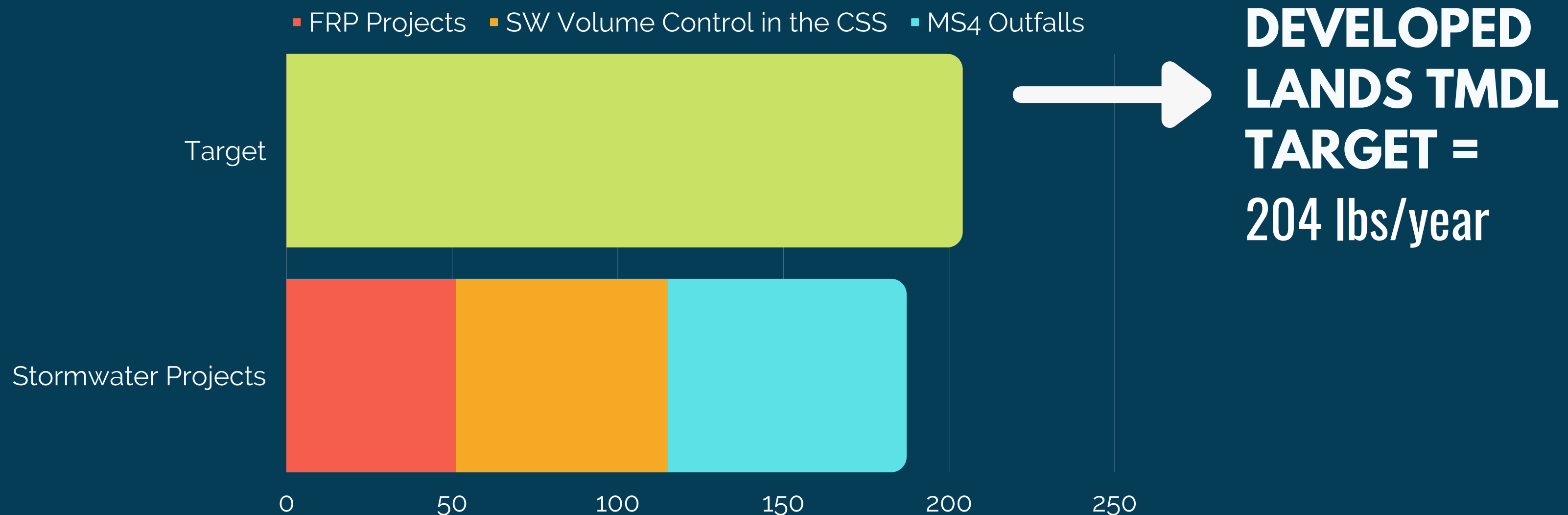


Extra slides I am
not sure we need.

Phosphorous Reduction Associated with Tertiary Treatment at Main Plant



Phosphorous Reduction Associated with Stormwater Projects



"The **monitoring and adaptive management plan...** provides a framework for continued progress towards the Plan's goals, in a manner that **meets regulatory needs, encompasses community and financial characteristics,** and **supports effective decision-making.**"

Burlington Integrated Water Resources Plan Report, 2021

Monitoring Plan & **Adaptive** Management

MEASURING SUCCESS &
EVALUATING PERFORMANCE

Performance Indicators



PROJECTS & ACTIVITIES

- Capital projects implemented
- Pollution prevention
- Conveyance system maintenance
- Treatment system maintenance



BENEFITS

- WWTP effluent characteristics
- Combined Sewer Overflows
- Sewage backups / sanitary sewer overflows
- P-load reduction
- Stream flow restoration
- Waterfront & on-water recreation
- Community engagement
- Community livability & resilience
- Clean streets



FINANCIAL IMPACT & AFFORDABILITY

- Outside resources
- Capital investments
- O&M / programmatic investments
- Affordability

Stakeholder Advisory Group

- Ad hoc committee
- Geographic representation across neighborhoods
- Organizations with interests linked to IP projects (i.e. BPRW)
- Will act as an 'intake point' for staff updates, monitoring information, financial reports, and community issues raised around IP projects
- First step in decision-making process for adaptive management





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Transportation, Energy and Utilities Committee of the City Council
Tuesday, March 22, 2022 6:00PM

DPW Front Conference Room
645 Pine St, Burlington, VT 05482

–DRAFT MINUTES–

Call to order 6:02PM PM by Chair Hanson

1. Agenda

Councilor Barlow moved to approve agenda. Seconded by **Councilor Stromberg**. All in favor passed unanimously.

2. Minutes of 3/14/22

Defer.

3. Public Forum

4. 2020 Clean Water Resiliency Plan and Integrated Planning Update

- Megan Moir, Jenna Olson, Martin Lee
- Information

See Presentation.

Councilor Barlow – Concerned about price and amount of work needed. Combined Sewer, how much work is left?

Megan Moir – Prior to the Main Plant upgrade in the early 1990's, the City was discharging around 170M gallons of untreated wet weather flow (mostly stormwater with a wastewater fraction). With past and recent improvements, the City is down to approximately ~1 million gallons of combined sewer overflows (CSO) in a year with intense storm events. State regulators want to see continued reductions – and our Integrated Plan provides the roadmap. The proposed Callahan Park storage tank would allow for capacity for up the 5 year storm event and will reduce the number of CSO events and the volume discharged significantly.

Councilor Barlow – Is phosphorous loading localized or is this impacted by neighboring communities?

Megan Moir – Phosphorous loading is a basin wide issue and everyone will have to do their part. We will have to advocate a push others to do their work through legislature. Coordination handled at state level.

Councilor Barlow – \$175 million is a lot, all revenue bonded so on rate payers not taxes. Best case what would be federal and state funding?

Megan Moir – We are pursuing every opportunity we can to seek other funding and minimize impacts on current ratepayers. Biden Infrastructure funding ~50% goes to loan forgiveness. We still don't know if we will be able to access this based on the criteria they set for this allocation. We have recently submitted a funding request to Senator Leahy.

Councilor Stromberg – Rate payer affordability, are we planning to keep these all in place and or expanding on this?

Megan Moir – Yes, continuing the Water Resources Affordability Program (WRAP). We are coming back in 2023 with next phase of how we may be able to better get affordability passed onto renters.

Councilor Stromberg – We know this will be more expensive if we push this off. Cost reflects the need and scope of doing this work in VTs biggest City. I support asking for as much money as we need.

Megan Moir – We are looking forward to restarting tours at Main Wastewater Treatment Plant

this season if COVID-19 numbers remain low. We want voters to see what work needs to get done.

Chair Hanson – Phosphorus reduction goals - how are we doing? If we weren't moving forward, would we fall short?

Jenna Olson – The Integrated Plan proposal, mainly through tertiary treatment at our Main Wastewater Treatment Plant, would exceed our Phosphorous reduction goal. There will be years when we don't perform well and years when we do better based on levels of precipitation, but with robust tertiary treatment we should comfortably stay within permit compliance.

Chair Hanson – When will we know about federal funding potential?

Megan Moir – We are taking advantage of opportunities as they come. We are unsure about when the Federal infrastructure bill monies will be available. Until we apply for State Revolving Fund monies, we don't know what loan forgiveness (grants) the State will provide.

Chair Hanson – If we get bond money from voters could that hurt chances of getting grants?

Megan Moir – No. If we come in for a bond vote and get loan forgiveness we can either pass that loan forgiveness directly to voters paying or we could increase the bond limits by loan forgiveness amount.

Martin Lee – When we apply for loan forgiveness we get higher ranking when we already have a bond.

Chair Hanson – Stormwater, nature based solutions in the context of climate crisis. What is our progress?

Jenna Olson – We continue to make good progress on developing green infrastructure including bioretention, sand filters, storage tanks, etc. Outfall rehabilitation repair process underway including inspection for invasive species. Buffer restoration when possible.

Councilor Barlow – What is plan for rolling this information out for public?

Jenna Olson – Present to City Council April 11 and then will go to NPAs in May. Maybe a large city wide meeting at end of May depending on how things progress.

Chapin Spencer – Welcome guidance from Councilors for how we can best do this outreach. Item closes at 7:11 PM

5. Director's Report

Chapin Spencer reported on two items:

- Amtrak – State has announced intent to start train service in July. We need to focus on transportation to and from waterfront. Parking on the waterfront is limited. Will keep you engaged.
- Winooski River Bridge Grant Application – State of VT, the City of Winooski, the CCRPC and the City of Burlington are advancing a joint application for Winooski River Bridge under the Federal BUILD grant program. The maximum possible award is \$25 million which was roughly what the replacement estimate had been. The bridge is 50/50 owned by the two cities. Strong federal and state participation will be huge. We are proposing to bring an item to the April 11 Council meeting and will likely request Council action to demonstrate support for this application. Need strong local support for this large grant ask.

Councilor Barlow – Timing for Bridge replacement?

Chapin Spencer – If awarded we will find out in August of 2022. Funds need to be allocated by 2026 and fully expended by 2031. Permitting, design, bidding will take 3-4 years minimum, likely more. We have been trying to encourage the state for years to prioritize this bridge work. Item closes 7:15PM

6. Councilors' Update

Councilor Barlow – Goodbye and good luck to Councilor Stromberg. Appreciate your positivity and it has been great to work with you.

Councilor Stromberg – Thank you and this whole team.

Chair Hanson – Great working with both of you and the DPW Team.

7. Next Meeting 4/26/22

Defer.

8. Adjourn

Councilor Stromberg motion to adjourn. **Councilor Barlow** seconds. All in favor. Meeting ends **7:18PM**.