

BURLINGTON PUBLIC WORKS

*Wastewater and
Stormwater
Management
Update*

7.18.18



Clear Progress, More to Do

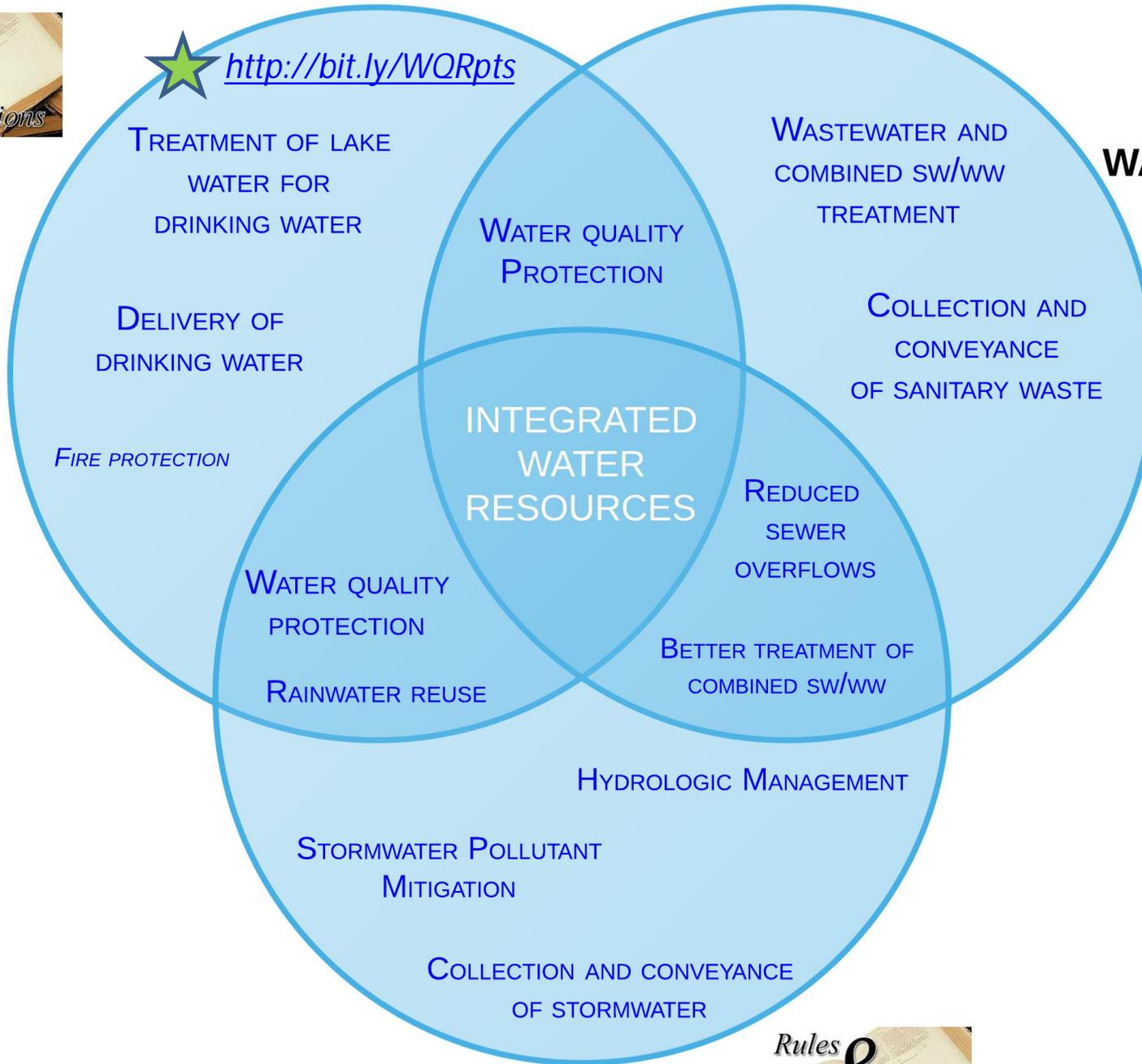
- Any one gallon of less than fully treated and fully disinfected discharge is too many
- While unfortunate and unplanned, recent discharges from the plant have been fully treated according to wet weather standards and all but one discharge have been at least partially disinfected. Stormwater makes up the greatest volume of this flow.
- Act 86, signed in 2016, rightfully requires enhanced public reporting around unpermitted discharge from the plant and untreated CSO (from the collection system) discharge events. We are more likely to hear about these events than we did in the past.
- In the last generation, there has been clear progress in dramatically reducing the number of gallons of untreated, non-disinfected discharge. Before the 1994 Wastewater Improvement Project an estimated average of more than 170 million gallons of untreated Combined Sewer Overflow was entering Burlington's waterbodies.
- CSO points around the City have been reduced from 12+ to 5, with less frequent discharges occurring for most of the remaining CSOs since the most recent wave of implementation subsequent to the launch of the Stormwater Utility in 2009.
- Blanchard Beach was closed from the early 90's until 2007. We now manage beach closures in days rather than weeks or years. Of course, more progress is necessary.
- Integrated Planning and Green Infrastructure Implementation will continue these favorable trends



WATER



<http://bit.ly/WQRpts>



WASTEWATER

STORMWATER



Unauthorized WW Incident Management

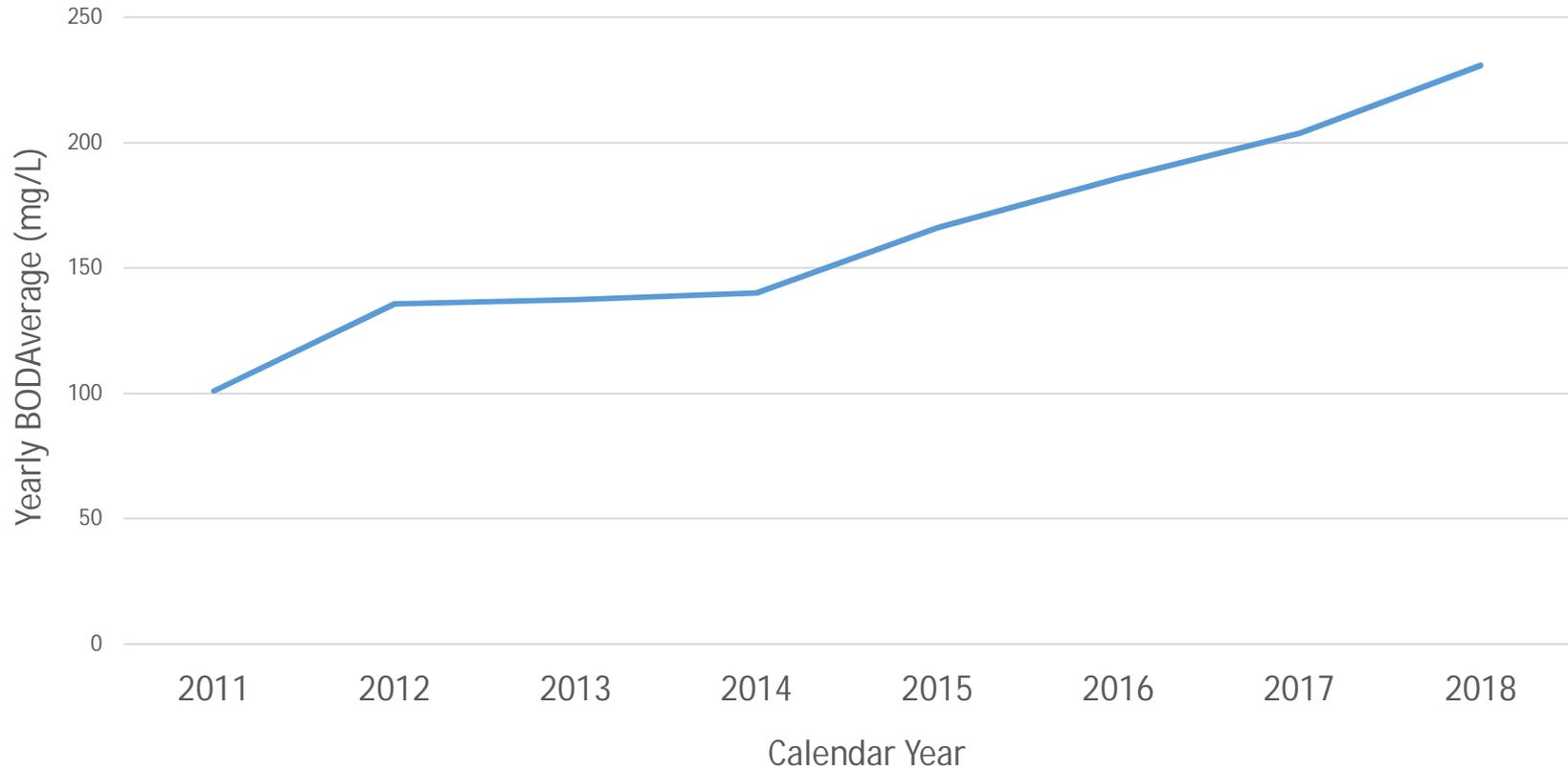
Incident	Actions
<p>April 16: Release of 7.1M gallons of treated and partially disinfected effluent from Main WWTP due to valve failure during storm event</p>	<ul style="list-style-type: none"> • Immediately replaced wet weather disinfection chemical feed valve • Add chemical feed valve area to capital upgrade re-design and implementation plan • (Also see July 10 incident response actions)
<p>May 21: Release of ~500 gallons of WW into Flynn Ave constructed wetland due to paving contractor plugging sewer main</p>	<ul style="list-style-type: none"> • Billing the contractor for cost of clean up and monitoring • Requiring paving contractors to contact City inspector in any instance of disturbing subterranean infrastructure
<p>June 2 & 4: Release of 1.8M gallons of treated and partially disinfected effluent from Main WWTP due to stressed biological process (nutrient imbalance) and storm event</p>	<ul style="list-style-type: none"> • Drafting full written incident report; submitting to DEC • Adjusted staffing during intense storms until biological process is back to health • Accelerating pollution prevention plans (P3) with breweries (including enhanced sampling); developing comprehensive P3 program for all high strength dischargers. Met with brewers 6/8 and 6/12 • Working with National WW Treatment expert on possible capital improvements to handle increased BOD

Main Plant's discharge volumes in these incidents are directly related to the size and intensity of the storm events. Additionally, storm events can exacerbate WWTP process challenges.



Increasing Strength (BOD) of Wastewater in Main Plant Flow

Biological Oxygen Demand of Main Plant Flow Entering Biological Reactors



Typical domestic WW = 250 mg/L

Brewery/Cidery WW ranges from 4000-15,000 mg/L

July 10 WW Incident Management

Incident	Actions
<p>July 10: Release of 3.3 M gallons of treated and non-disinfected effluent from Main WWTP due to computerized control (PLC) failure during storm event</p>	<ul style="list-style-type: none">• On-call staff responded and manually operated the pumps to achieve disinfection of remainder of the storm• Immediately re-wired disinfection system to be operated by primary computer control system.• Maintaining increased staffing during storm events• Issued scopes of work to assess and upgrade disinfection system and engaged qualified consultant (7/17/18)<ul style="list-style-type: none">• Computerized control system (disinfection PLC and Main PLC)• Mechanicals and electrical system

Main Plant's discharge volumes in these incidents are directly related to the size and intensity of the storm events. Additionally, storm events can exacerbate WWTP process challenges.

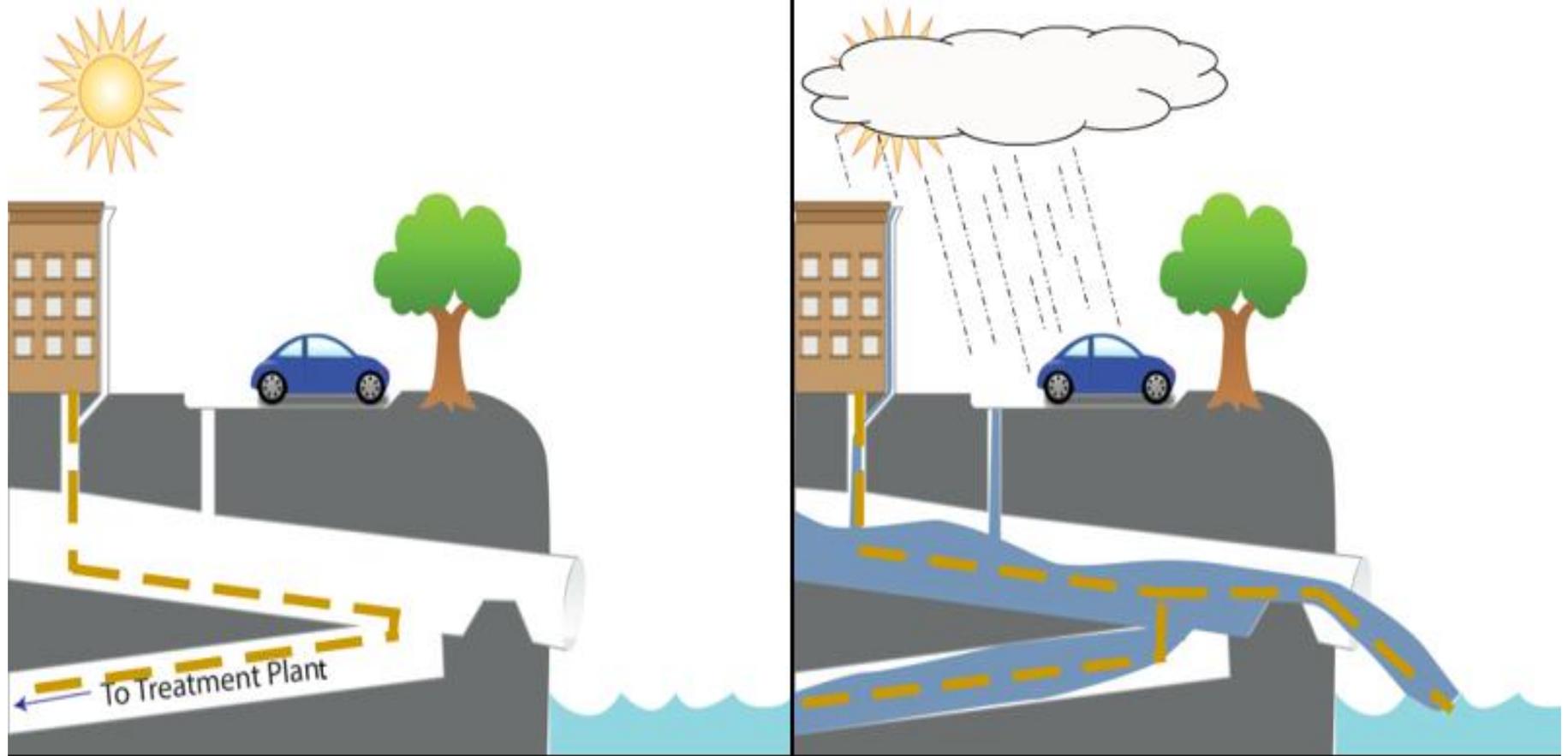


Okay...

**BUT WHY IS MAIN WW PLANT
SIGNIFICANTLY INFLUENCED BY STORM
EVENTS?**

Collection System – Untreated CSO Primer

Prior to 1994, the City had 12+ Untreated Combined Sewer Overflow points



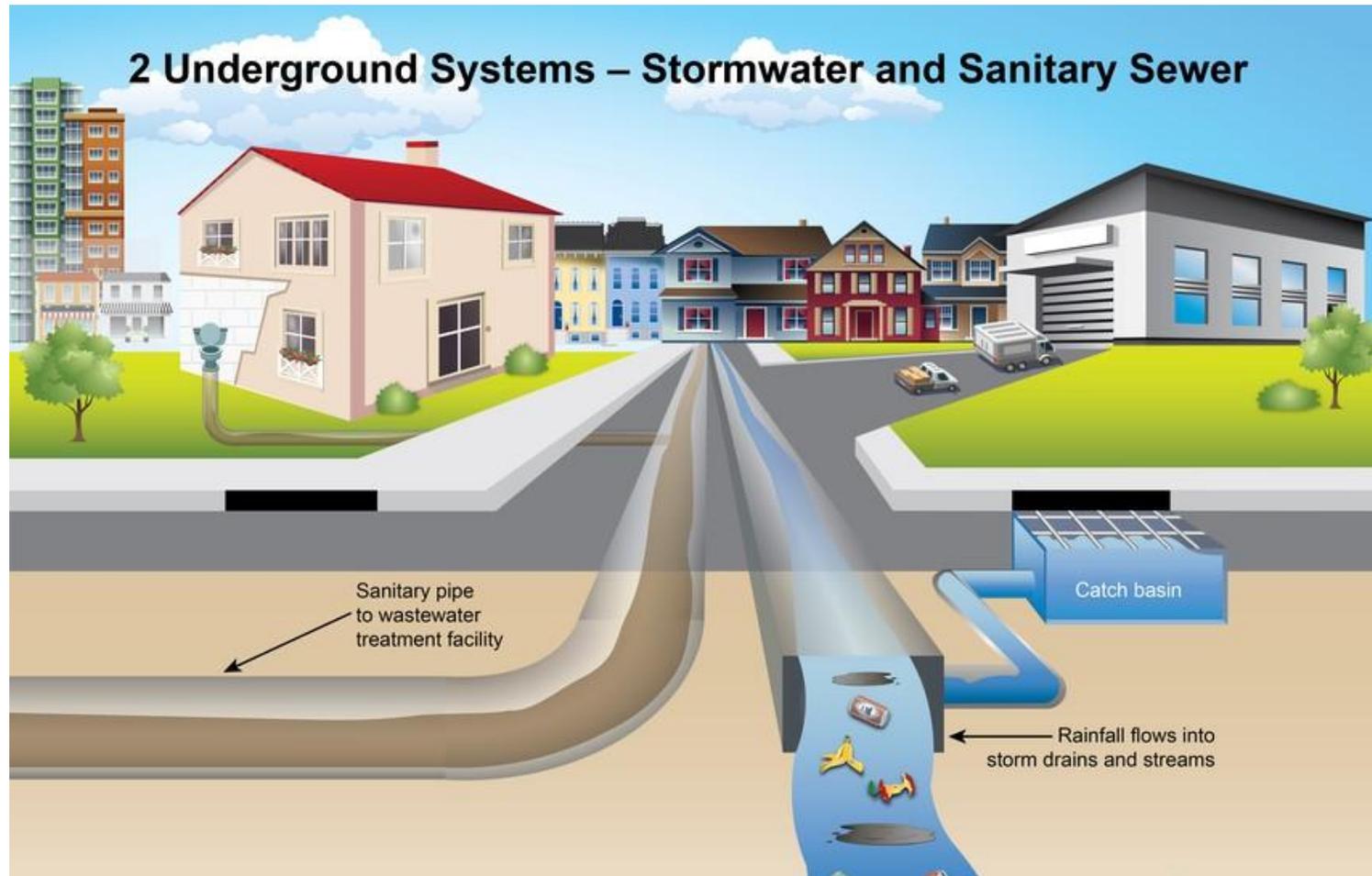
Under normal conditions, wastewater goes directly to the wastewater treatment plant

When a large rain event occurs, stormwater joins wastewater and excess flows get discharged into nearby streams

This prevents sewage backups into properties and onto roadways/sidewalks

Collection System – CSO Elimination

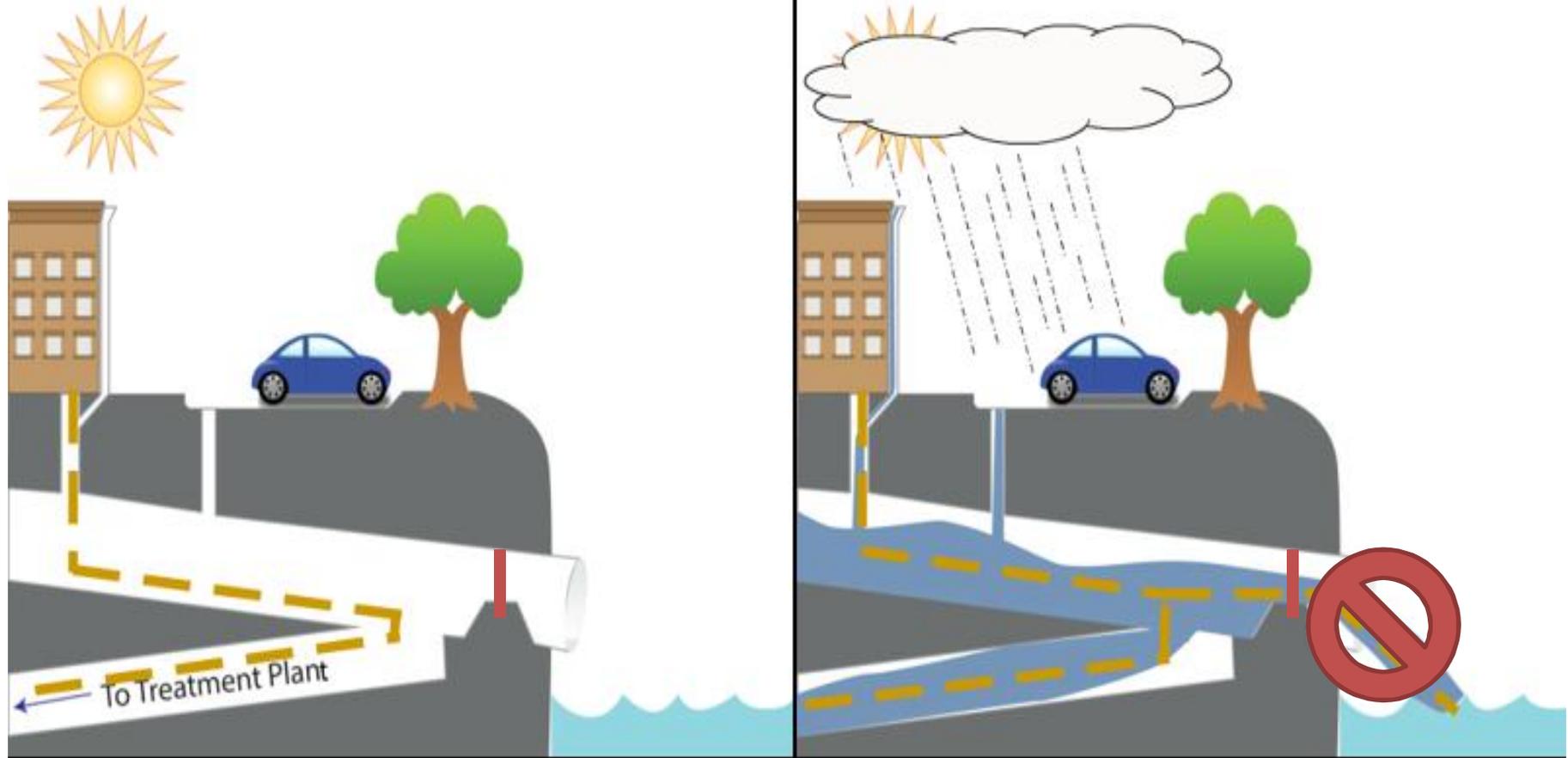
Through sewer separation (unfortunately without treatment)



Unfortunately we now know that untreated stormwater runoff can have long term chronic impacts such as nutrient loading and bacteria pollution.

Collection System – CSO Treatment

Through end of pipe wet weather treatment



Under normal conditions, wastewater goes directly to the wastewater treatment plant

In Burlington, storm events up to 0.15"/hr go through full WW treatment; > 0.15"/hr get Wet Weather treatment – screening and disinfection

When a large rain event occurs, stormwater joins wastewater and excess flows get discharged into nearby streams

CSOs were eliminated except for 5 locations in the City where local pipe capacity causes overflow

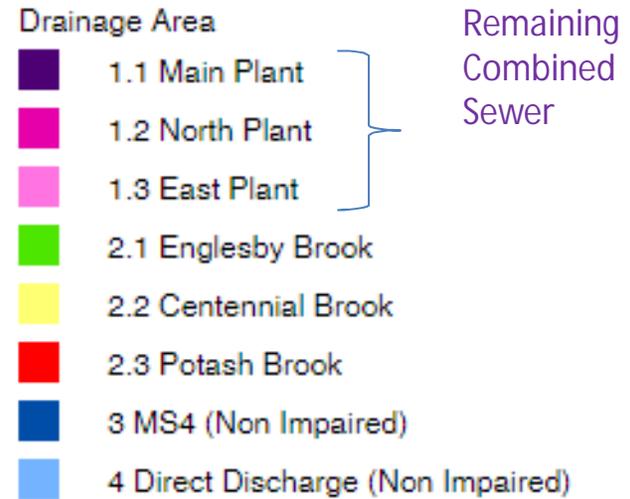
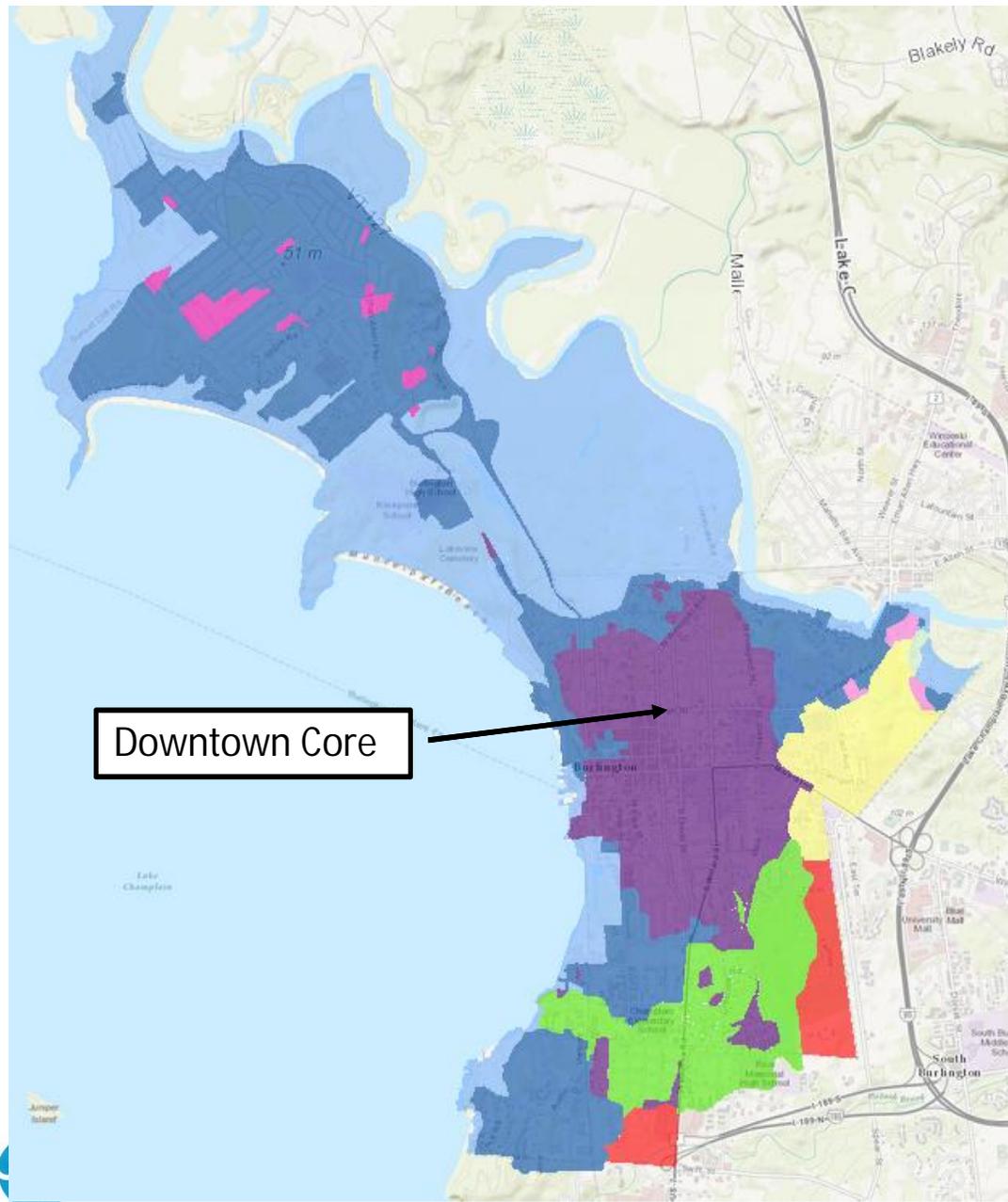
Early 1990s: \$52 M Wastewater Bond : Upgraded WWTPs and Significantly Reduced # and Volume of Untreated CSOs

Up until early 1990s – 12+ CSO	Today – 5 Locations
Gazo Ave	Gazo Ave
Manhattan @ Park St	Manhattan @ Park St
Manhattan @ N Champlain St	Manhattan @ N Champlain St
Colchester Ave (not ID'ed until 2010)	Colchester Ave (not ID'ed until 2010)
Pine St @ Lakeside (not ID'ed until 2015)	Pine St @ Lakeside (not ID'ed until 2015)
Bottom of Maple St	
Bottom of College St	
Howard St	
Marble Ave	
Englesby Brook (multiple points)	
Main WWTP (shoreline discharge with no treatment or disinfection)	

An estimated 170,000,000 gallons of Untreated Combined Sewage was being discharged annually prior to 1994 WW upgrades



Burlington Sewersheds/ Watersheds



- 26% of sewered land area 37% of City's total impervious area drains to Combined Sewer (3 WWTPs)
 - Main WWTP Plant Combined Sewer Area has very high % imperviousness (~57% avg)



Collection System – Remaining Untreated CSOs



Today – 5 Locations

Gazo Ave

Manhattan @ Park St

Manhattan @ N Champlain St

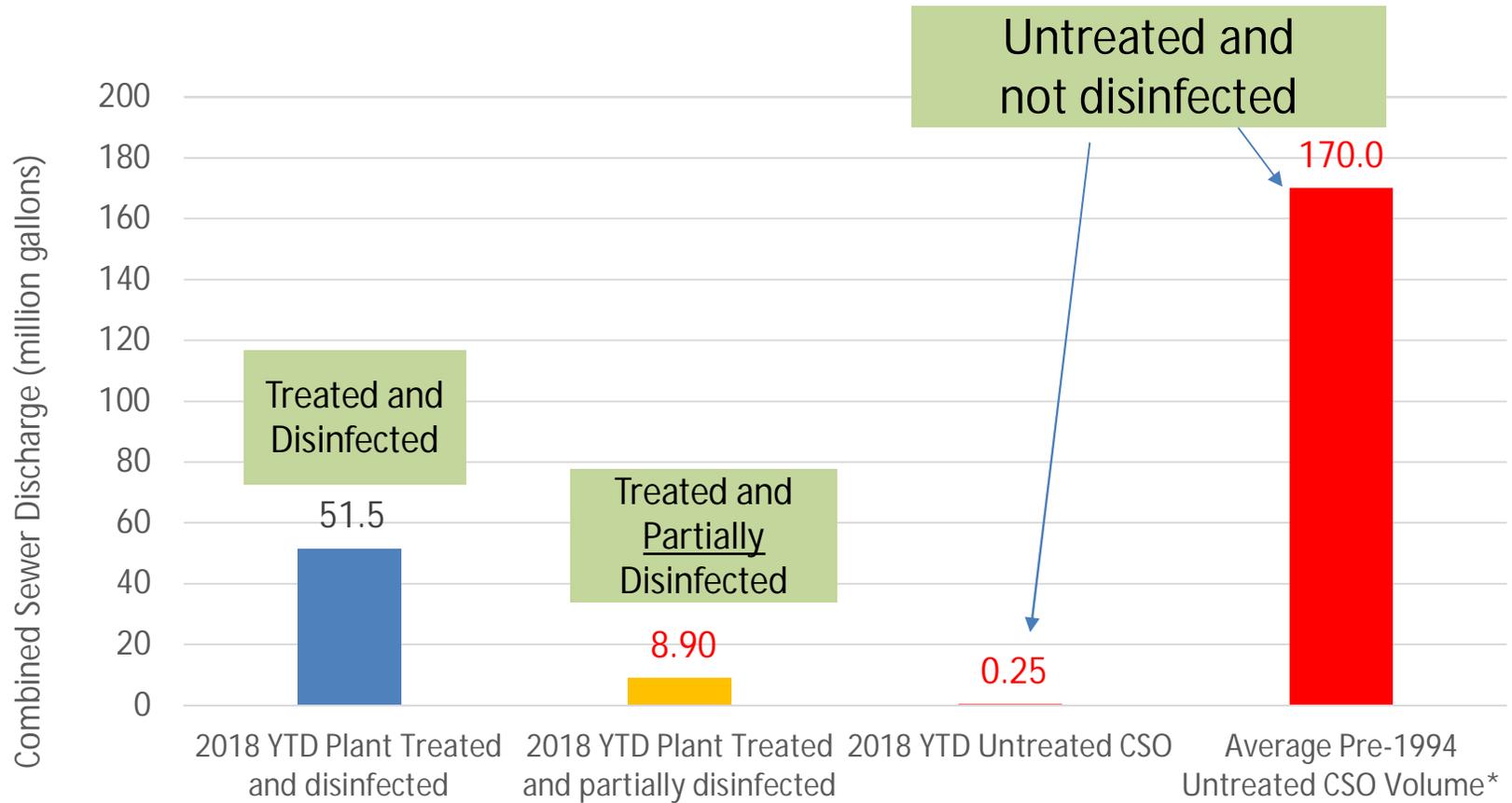
Colchester Ave (not ID'ed until 2010)

Pine St @ Lakeside (not ID'ed until 2015)

Pine Street CSO is the most active CSO

Main Wastewater Plant

Comparison of Combined Sewer Discharges Pre 1994 to 2018 Through 7/1/18



*Pre-1994 estimate is based on average annual combined sewer wet weather flows treated by Vortex between 2001 and 2017.

See <https://www.burlingtonvt.gov/DPW/Water-Quality-History>.

Authorized Wet Weather Flow Incidents

Incident	Actions
<p>January 12: 81 minute and ~68,000 gallons Pine Street Barge Canal CSO from 0.54" storm event, peak of 0.27"</p>	<ul style="list-style-type: none"> • Continue to implement Chapter 26 stormwater management requirements and Wastewater offset requirements for larger projects • Advancing integrated planning (including CSO Long Term Control Plan) <ul style="list-style-type: none"> • Installing flow meters for improved Hydrologic/Hydraulic modeling • Identifying/prioritizing Wet Weather management projects • Increasing WW and SW capital reinvestment, coordinated with other City reinvestment projects • <u>Enhancing downstream sampling of waterways to determine possible recreation impacts during recreation season</u>
<p>April 16: 47 minute ~40,000 gallons Pine Street Barge Canal CSO, 0.79" rainfall, peak intensity 0.17" (possible snow melt/frozen/saturated ground influence)</p>	
<p>June 18: Release of ~145,000 gallons (>90% SW) from Pine St CSO point into Barge Canal from 2.28" storm event with two peaks of intense rainfall</p>	
<p>55 second CSO from Gazo</p>	

July 10 Park Street – False alarm confirmed by field staff checking overflow pipe for evidence of overflow



Stormwater Management

- Launched Stormwater utility in 2009 – 2nd in state
- Greater regulatory review of new developments (Chapter 26 of City Ordinance)
 - Required to manage at least 50% of current impervious
 - Required to manage 100% of new impervious
 - Large projects required to take additional SW off Combined Sewer system to offset their projected WW flows (Cambrian Rise, City Place Burlington, etc.)
- Embedding SW management into City infrastructure projects (Paving, Traffic Calming, Great Streets, City Hall Park, Champlain Parkway)
- Underway with Enhanced Illicit Discharge Detection & Elimination (IDDE) efforts

Collection System – Improving Untreated CSO Trends

Frequency of Untreated CSOs 2005 through 6/18/18

Year	N. Champlain	Park	Gazo	Colchester	Pine Street	Notes
2005	3	12	1	UNK	UNK	
2006	1	11	3	UNK	UNK	
2007	3	8	2	UNK	UNK	
2008	2	13	?	UNK	UNK	
2009	4	8-9	?	UNK	UNK	
2010	0	5	?	2	UNK	Colchester Ave CSO discovered through mapping/outfall visits
2011	1	9	1	3	UNK	Gazo, North Champlain and Park frequency and Volume reduced by ARRA projects 2010-2012
2012	1	6	1	9	UNK	
2013	4	6	2	10 - 13	UNK	Wet year
2014	0	1	1	2	UNK	Colchester CSO improved through pipe cleaning downstream
2015	0	3	1	0	8	Pine Street Discovered through mapping
2016	0	1	0	0	5	
2017	0	1	1	0	8	
2018 YTD	0	0	1*	0	3	Late 2017 conducted significant cleaning of downstream section

Note: Frequency data do not show decreases in duration or volume, particularly for Park and Gazo; nor adjust for the impact of wet/intense rainfall years such as 2011 and 2013.

UNK = Previously unidentified CSO point, no data available

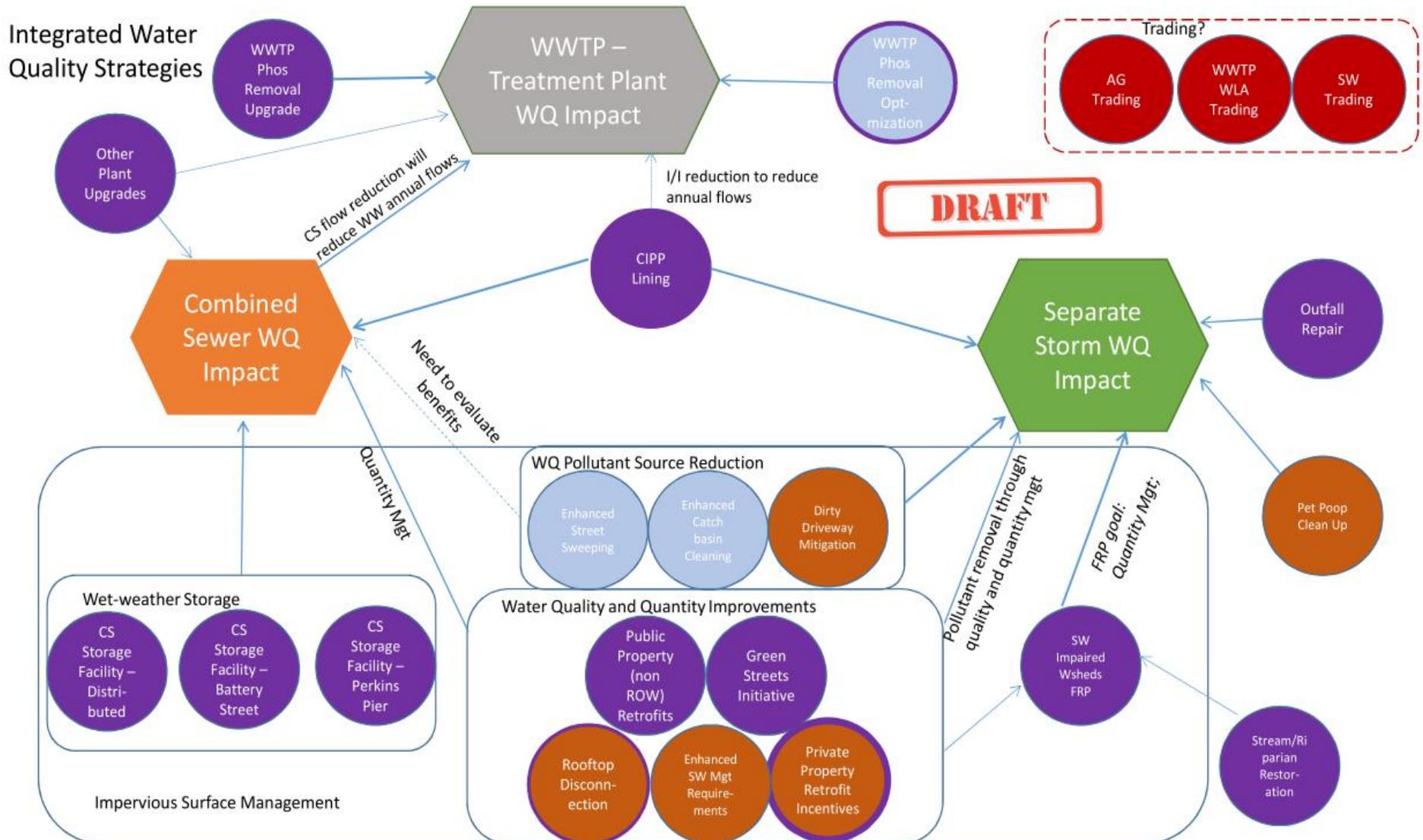
? = data not easily available, still researching

Range provided when unclear or multiple events on one day

* Gazo discharged for 55 seconds on 6/18/18



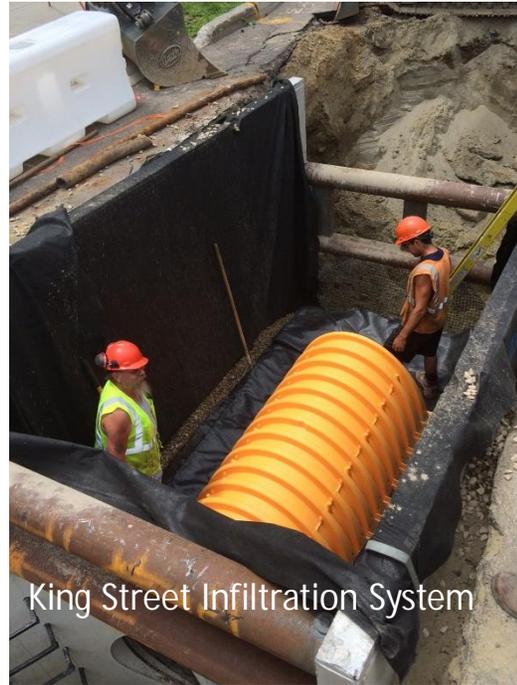
INTEGRATED WATER QUALITY PLANNING 2017-2019



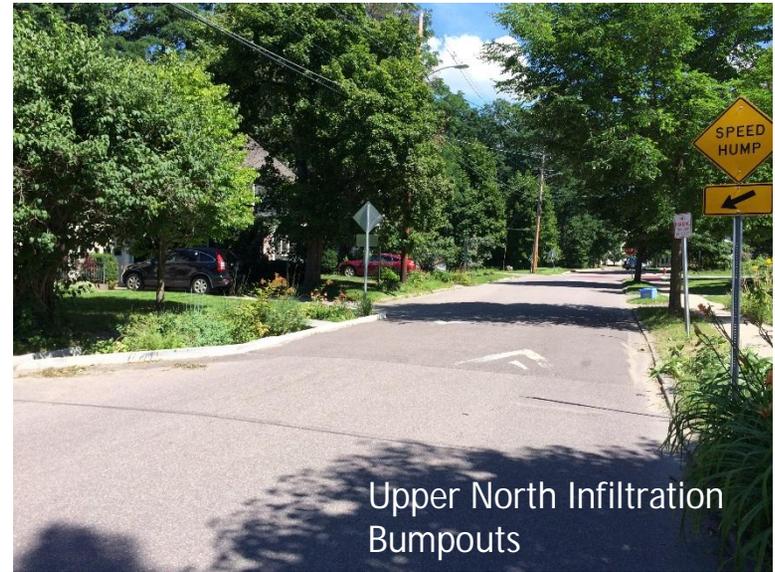
Water Resources Wet Weather Work



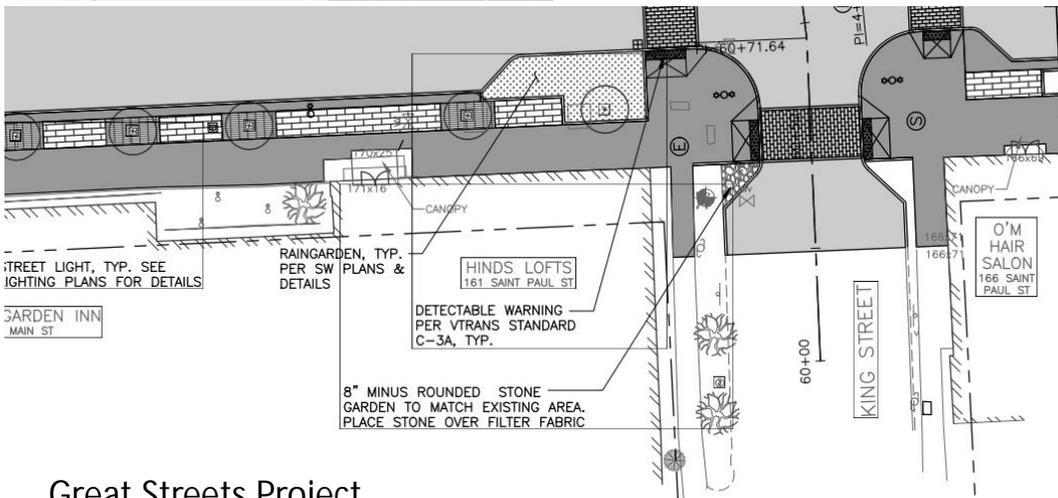
Grant Street Infiltration System



King Street Infiltration System



Upper North Infiltration Bumpouts



Great Streets Project

Additional Implementation:

- Hyde Street Bioretention
- S. Winooski SW Sidewalk
- Park Street Infiltration System
- Russell Street Infiltration System
- North Ave Infiltration System
- Allen Street Infiltration System
- Booth Street Bumpouts
- Possible Separate SW Outfall for Railyard Enterprise Project



Looking ahead to FY 20 and beyond

Challenges

- Future Water Resources Borrowing Needs to Meet Existing Capital Needs and Implementation of Next Wave of Water Quality Improvements
 - Wastewater:
 - Replacement of existing treatment system components at WWTPs and pump stations (\$8-10M)
 - Existing Collection System Pipe capital needs (~\$1M/year for 5 years)
 - Lake Champlain TMDL possible plant upgrades
 - Biosolids management
 - Stormwater
 - Existing Collection System Pipe capital needs (~\$1M/year for 5 years)
 - Existing Outfall Repair (\$3 M to fix top 11 worst outfalls)
 - Lake Champlain TMDL impervious retrofits
 - Englesby Bacterial TMDL
 - Stormwater Impaired Streams TMDL
 - Combined Sewer Overflow Management

*Bond Vote Plan
due December 1
for Town Meeting
Day 2019 Vote*

Public Resources

- Detailed Informational Releases

- <https://www.burlingtonvt.gov/Press/Water-Resources%E2%80%99-Statement-on-April-16-Wet-Weather-Event-Partially-Disinfected-Release-into>
- <https://www.burlingtonvt.gov/Press/PUBLIC-WORKS-STATEMENT-ON-SANITARY-SEWER-OVERFLOW-EVENT>
- <https://www.burlingtonvt.gov/Press/PUBLIC-WORKS-STATEMENT-ON-CONTINUED-BEACH-CLOSURE>
- <https://www.burlingtonvt.gov/Press/Water-Resources%E2%80%99-Statement-on-June-2-4-Wet-Weather-Events-Partially-Disinfected-Release-into>
- <https://www.burlingtonvt.gov/Press/PUBLIC-WORKS-STATEMENT-ON-JUNE-20TH-BEACH-CLOSURES>
- <https://www.burlingtonvt.gov/Press/public-works-statement-on-july-10th-wastewater-treatment-plant-discharge>

- Water Quality History Document

- <https://www.burlingtonvt.gov/DPW/Water-Quality-History>

- DPW is planning to host a public engagement opportunity on Water Quality



Questions ?

