DPW WATER RESOURCES

Sustainable Infrastructure Plan

Phase II

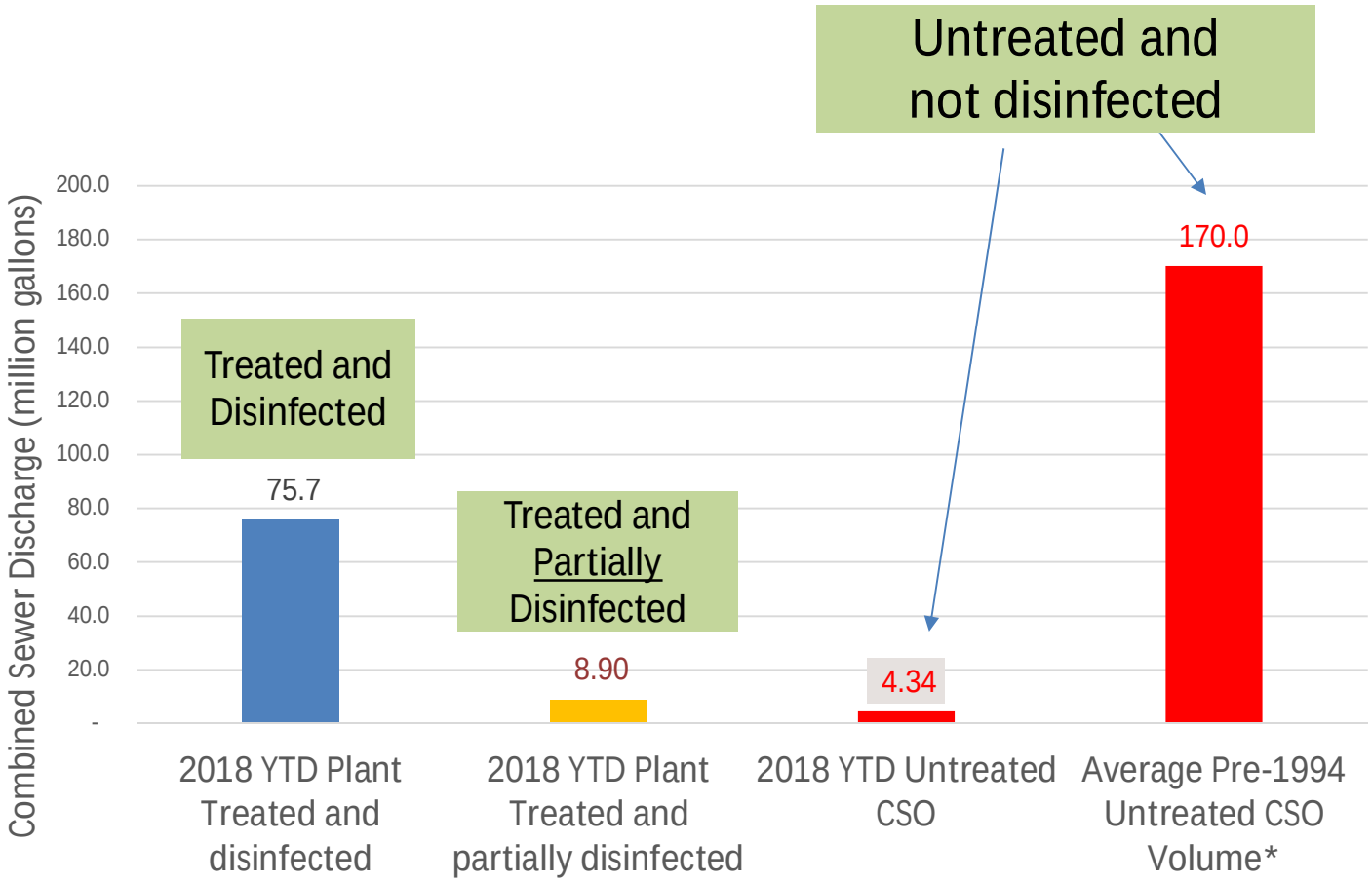
Proposed Wastewater and Stormwater Upgrade Bond

City Council Presentation

August 27, 2018 (revised for BOF 9-5-18)

Main Wastewater Plant

Comparison of Combined Sewer Discharges Pre 1994 to 2018 Through 8/26/18



*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.

Today's Topics

- Overall WW/SW Capital Planning
- 2018 Challenges
- Reinvestment Proposal
- Rate Impact
- Rate Mitigation Strategies
- Overall Benefits
- Next Steps
- Questions

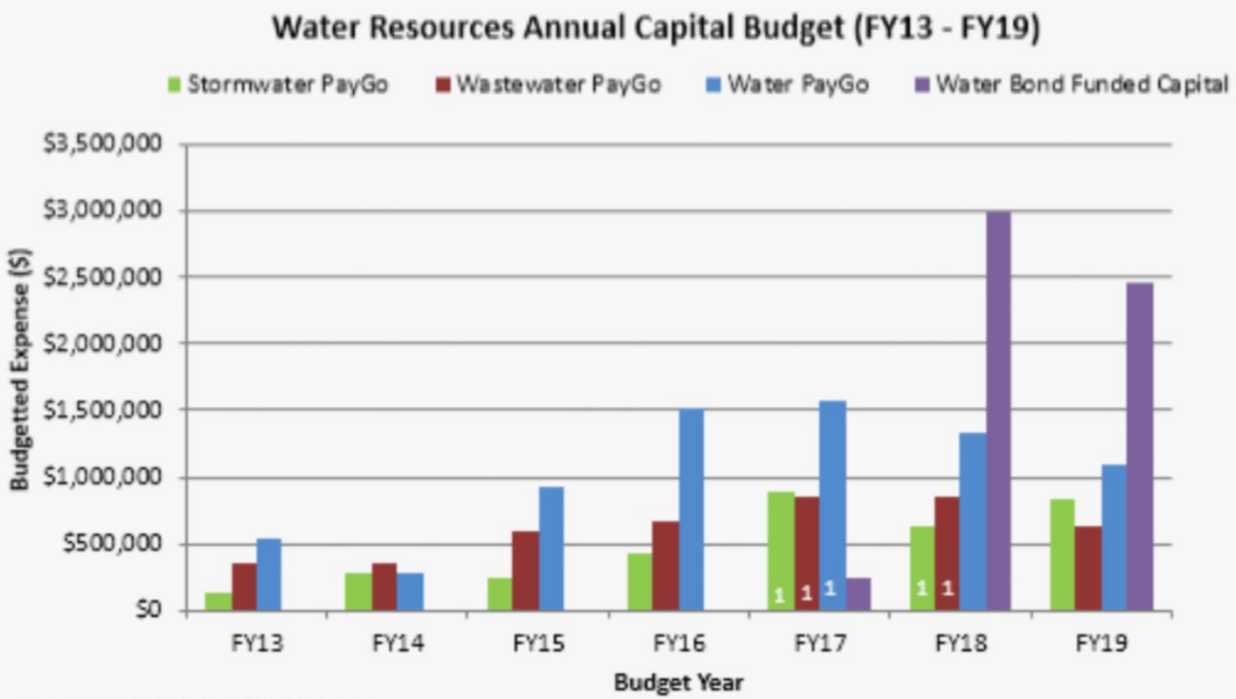
Background on City's water quality efforts:
www.burlingtonvt.gov/dpw

Capital investments have increased for Wastewater and Stormwater since FY15, though not enough to keep up with system need

Key Drivers (expense side) cont'd.

FY19 Budget Presentation Slide

- **Continued focus on capital improvements**



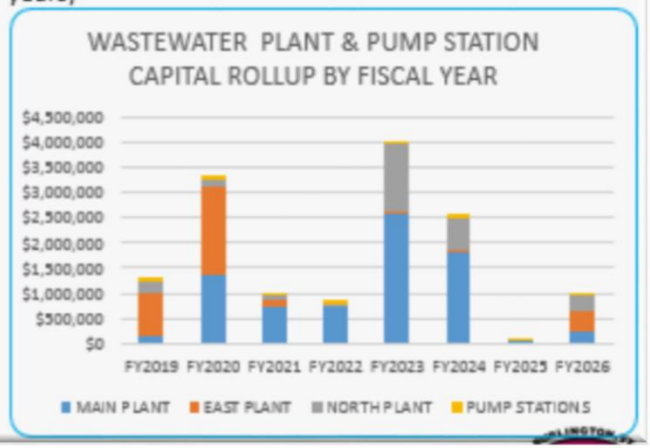
Note 1: Included use of cash reserve

Quickly approaching need for significant existing infrastructure upgrades, as was included in FY18 & FY19 Budget Presentations:

Looking ahead to FY 20 and beyond

Challenges

- **Water Debt**
  - Important to maintain or increase Moody's A1 rating
  - Maintain required 1.25 Debt Coverage Ratio
- **Future Water Resources Borrowing to meet Capital Deficits**
  - Water:
    - Water Bond authorization will only replace/rehabilitate ~8-10 miles of our 110 mile distribution system
    - High Service Tanks: At a minimum, Redstone Storage tank maintenance (~$500k) due in FY2021 (likely sooner); UVM tank maintenance ($1M) in FY27
  - Wastewater:
    - ★ Replacement of **existing treatment system components** at WWTPs and **pump stations** ($8-10M)
    - ★ Collection System capital needs (~$1M/year for 5 years)
    - Lake Champlain TMDL possible plant upgrades
    - Biosolids management
  - Stormwater
    - ★ Collection System capital needs (~$1M/year for 5 years)
    - ★ Outfall Repair ($3 M to fix top 11 worst outfalls)
    - Lake Champlain TMDL impervious retrofits
    - Combined Sewer Overflow Management
- **Revenue**
  - Conservation/Water efficiency
  - Lose rest of Hadley Road in FY2020 ($110K)



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Sustainable Infrastructure Plan

- Phase I – Voter approval Nov. 2016
- Drinking Water infrastructure was prioritized in first phase due to:
  - Higher need for advanced coordination with expanded paving program
  - "Frost-pocalyspe" in 2014/2015 and increasing water main breaks on newly paved streets

- <u>Current request:</u> Phase II – Address Wastewater and Stormwater existing infrastructure capital needs; maintain steady progress on known stormwater/wet-weather issues in parallel with integrated planning study

- Future: Phase III – Address WW and SW enhancements

2018: Challenges and Solutions

Mitigating Future Risk

Wastewater permit violations & beach closures caused by infrastructure failure

April 16 valve failure and July 10 PLC failure @ Main Plant ; August 24 chemical feed line blockage @ North Plant

→ Accelerate WW capital improvements for all high risk assets

Wastewater permit violations & beach closures caused by impact of high strength waste on biological treatment system

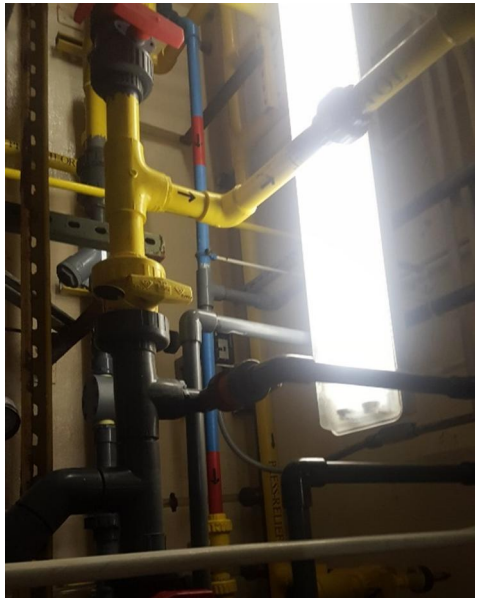
June 2 & 4 @ Main Plant

→ Accelerate and expand development of industrial wastewater program (require high strength users to divert high strength waste away from sewer system)

Risk = Consequence of Failure X Likelihood of Failure

No significant upgrades have been made to the system since 1994.

Following are a number of examples of the impacts of underinvestment



Disinfection system pipes: Multiple repairs (different color pipes)

Disinfection system control panel: only one switch (hand-off-auto) works. Other control panels have obsolete parts that cannot obtain anymore..

Bromine pumps: 24 years old; critical to disinfection of wet weather

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No significant upgrades have been made to the system since 1994.

Following are a number of examples of the impacts of underinvestment

Headworks: Automatic gate that is no longer automatic

Corroded metal components: Full of bandaids and patches or not easily repairable.

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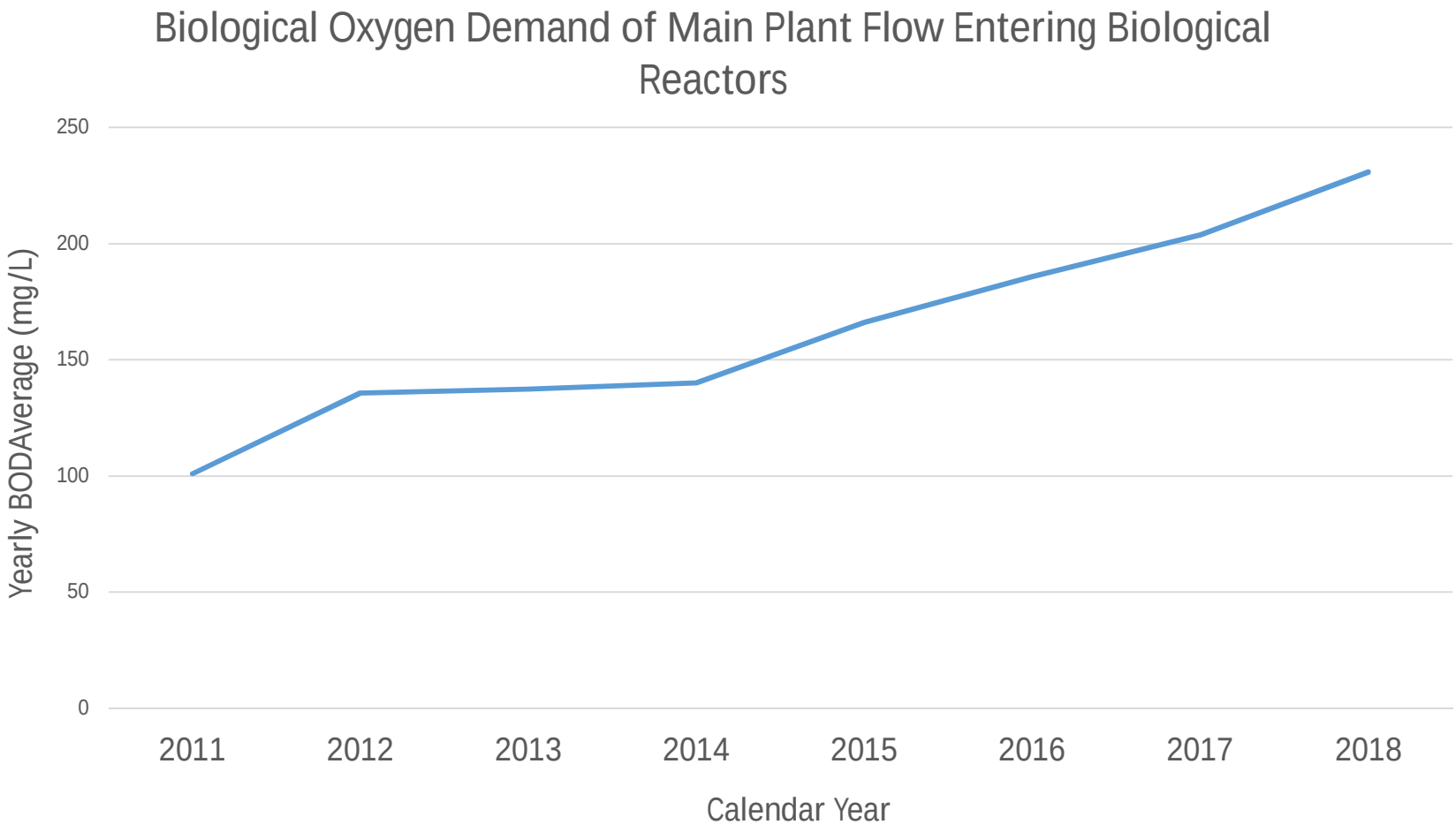
Increasing Strength (BOD) of Wastewater in Main Plant Flow has significantly increased in recent years



Typical domestic WW = 250 mg/L
Brewery/Cidery WW ranges from 4000-15,000 mg/L

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2018: Challenges and Solutions

Mitigating Future Risk

Impact of combined sewer flow on Main Plant during process/system challenges (April 16, June 2&4, July 10)

&

Collection system combined sewer overflows (Jan 12, April 16, June 18, July 25, Aug 7, Aug 17)

Ensure continued progress on design and implementation of combined sewer runoff reduction retrofits

&

Accelerate feasibility evaluation and possible implementation of satellite disinfection for Pine Barge Canal CSO

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Risk = Consequence of Failure X Likelihood of Failure

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2018: Challenges and Solutions

Mitigating Future Risk

Potential failure of high risk assets:

- sewer pump stations
- sanitary, combined & stormwater pipes
- stormwater outfalls

→ Ensure adequate funding for capital improvements on high risk pump stations, collection system and outfall assets

Additional regulatory obligations anticipated for separate storm sewer runoff

→ Ensure adequate funding for evaluation, design and implementation of retrofits in the separate storm sewer system

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Risk = Consequence of Failure X Likelihood of Failure

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Sustainable Infrastructure Plan – Wastewater Proposal

	Construction Cost (with ~20-25% contingency generally)	Design & Oversight (15-25% of construction cost)	Total	
Disinfection and SCADA/PLC upgrades (Main, East and North)	$ 1,236,000	$ 203,000	$ 1,438,000	
Other WW Plant (Main, East and North) Capital Needed in next 5 years	$ 8,793,000	$ 1,384,000	$ 11,403,000	*
Proposed WW Planning Studies in Next 5 years to make decision for next Bond (East Plant suitability, dewatering)		$ 180,000	$ 180,000	
Pump Stations (10 Highest Need)	$ * 2,017,000	$ 578,000	$ 2,595,000	
Collection System Planning/Assessment (current planning loan)		$ 997,204	$ 997,204	
Collection System (Sewer Rehab) WW (35,485 lf = 6.72 mi)	$ * 1,798,500	$ 400,000	$ 2,199,000	
Collection System (Sewer Rehab) WW Subtotal (35,485 lf = 6.72 mi)	$ 1,798,500	$ 1,398,000	$ 3,360,000	*
Asset Management CMMS (50% share with SW)	$ 113,000	$ 60,000	$ 173,000	
Industrial Wastewater Program development		$ 175,000	$ 175,000	
Industrial Wastewater Pass through loans	$ 250,000		$ 250,000	
Industrial WW Subtotal	$ 250,000	$ 175,000	$ 425,000	
City Project Management Staff (0.625 FTE x 4 years)		$ 282,000	$ 282,000	
		Wastewater Total Request	$ 19,856,000	

*construction inflation applied

Sustainable Infrastructure Plan – Stormwater Proposal

	Construction Cost (with ~20-25% contingency generally)	Design & Oversight (15-25% of construction cost)	Total
Stormwater Outfalls (top 5 of 11 high risk outfalls)	$ * 1,880,000	$ * 470,000	$ 2,350,000
SW Collection System (33,381 linear feet = 6.3 miles)	$ * 2,913,831	$ 245,692	$ 3,160,000
Stormwater and Wet Weather Management			
Wet-Weather Mitigation			
Combined Sewer Runoff Reduction (Pine Barge Canal as priority, with other projects throughout Main Plants)	$ * 1,460,000	$ 212,000	$ 1,672,000
Pine Street CSO disinfection Station	$ 400,000	$ 100,000	$ 500,000
Wet Weather (CSS) Mitigation and Disinfection	$ 1,860,000	$ 312,000	$ 2,172,000
Great Streets and City Hall Park SW (if assume SW pays 1/2)			$ 1,650,000
Separate Stormwater Management			
3 acre permit obligation (City parcels) EFAs		$ 65,000	$ 65,000
Regulatory Req'd Separate Stormwater Retrofits (between 2020-2024)	$ 150,000	$ 100,000	$ 250,000
Separate SW Regulatory Obligations	$ 150,000	$ 165,000	$ 315,000
Asset Management CMMS (50% share with SW)	$ 113,000	$ 60,000	$ 173,000
City Project Management Staff (0.625 FTE x 4 years)		$ 282,000	$ 282,000
		Stormwater Total Request	$ 10,102,000

*construction inflation applied

WW and SW TOTAL = $29,958,000

Mitigating the impact of the proposed $30 M bond
Overall ~40% mitigation of rate payers cost

- Utilize Clean Water State Revolving Fund (SRF) Loans ☑
  - 2% admin fee vs. 3.9%+ municipal bond interest
  - Deferred Pay back on planning/design $ until after construction
  - 1 year deferred pay back on construction
  - 30 year payback eligible on longer term assets (collection system)
  - Higher administrative burden (approval process, Davis Bacon, Buy America Iron/Steel)

  Ø <u>$8.18M in interest savings over life of loan ($37M vs $45M total payback)</u>

  Ø <u>Single family savings = ~$19.44/year</u>
- Use existing PayGo Capital to offset some debt service costs ☑
  - Maintain sufficient amount for unplanned and/or smaller capital needs
  - Maintain sufficient amount to re-purpose for improved staffing resiliency

  Ø <u>Funds ~$13.3M of total $37.4M in total debt service costs</u>

  Ø <u>Approximately 30% of new bonding will be paid for by existing revenues</u>

  Ø <u>Typical single family savings = ~$26.40/year</u>

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Additional Rate Impact Minimization Strategies

- Mitigate Total Debt Service Amount
  - State Grants/Loan Forgiveness Subsidy
    - Loan forgiveness % varies from year to year (often capped)
    - Upcoming Green Infrastructure CSO grants ($1.25-$2.5 M across 5 CSO communities)
    - Pollution Control Grants (up to 35%, depends on priority ranking of project, priority can be improved through sponsorship of natural resource projects)
  - Determine whether TIF funded projects should fully fund stormwater improvements

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Additional Rate Impact Minimization Strategies

- Find $ to Cover Remaining Debt Service
  - Work with City General Fund to evaluate alternative strategies to current PILOT paradigm
    - Wastewater PILOT = $1.1 M/Annually
  - Develop appropriate additional fees for service from users of services (fire service, project review, connection fees)

Additional Rate Impact Minimization Strategies

- Minimize Rate Increases for Residential Users and Low Income Users
  - Evaluate alternative rate structures
  - Create affordability programs

Rate Impact Minimization Commitments

- Commitment to secure at least $1 M worth of grants/loan forgiveness or other offsets to bond principal

- Commitment to find additional annual funding to offset debt service and other operational rate increase drivers, through new sources of revenue or expense decreases

- Commitment to propose ways to minimize impact to single family/residential rate payers and low income rate payers through alternative rate structures and affordability programs

- Reminder: All SRF loan applications and executions require City Council approval, so there will be opportunity to review the outcome of mitigation strategies prior to incurring debt

Estimated Wastewater Rate Impact due to Bond

		CUMULATIVE				
Fiscal Year	Amount Borrowed	Annual Cumulative Debt Service (DS)	DS Payment Remaining after use allowable portion of PayGo Capital ($237K)	WW Monthly Increase per typical single family (6 Ccf)	Monthly Typical Bill Single Family WW Bill (6 Ccf)	% increase (year over year)
FY19	$ 1,438,000	$ -	N/A	N/A	$ 34.92	N/A
FY20	$ 4,604,500	$ (87,943)	$ -	$ -	$ 34.92	0%
FY21	$ 4,604,500	$ (355,674)	$ (118,674)	$ 0.60	$ 35.52	1.7%
FY22	$ 4,604,500	$ (623,404)	$ (386,404)	$ 1.80	$ 36.72	3.4%
FY23	$ 4,604,500	$ (891,135)	$ (654,135)	$ 3.06	$ 37.98	3.4%
FY24	$ -	$ (1,158,865)	$ (921,865)	$ 4.26	$ 39.18	3.2%
Total:	$ 19,856,000					

- No rate increase required by this bonding until FY'21
- After 5 years, total 12.2% increase over FY19 bill (~$51.12/year increase)

AVAILABLE PAYGO CALCULATION	
PayGo capital in annual budget (without grants)	$ 632,000
Amount reserved for PayGo capital and operational resiliency improvements	$ (395,000)
Remaining funds available for debt service payment each year:	$ 237,000

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Estimated Stormwater Rate Impact due to Bond

		CUMULATIVE				
Fiscal Year	Amount borrowed	Annual Cumulative Debt Service (DS)	DS Payment Remaining after use allowable portion of PayGo Capital ($285K)	SW Monthly Increase per Single Family (2.67 ISUs)	Monthly Typical Single Family SW Bill	% increase (year over year)
FY19	$ -	$ -	N/A	N/A	$ 6.60	N/A
FY20	$ 2,525,500	$ -	$ -	$ -	$ 6.60	0%
FY21	$ 2,525,500	$ (141,411)	$ -	$ -	$ 6.60	0.0%
FY22	$ 2,525,500	$ (282,822)	$ -	$ -	$ 6.60	0.0%
FY23	$ 2,525,500	$ (424,233)	$ (139,233)	$ 0.57	$ 7.17	8.6%
FY24	$ -	$ (565,644)	$ (280,644)	$ 1.10	$ 7.70	7.4%
Total :	$ 10,102,000					

- No rate increase required by this bonding until FY'23
- After 5 years, total 16.7% increase over FY'19 bill ($13.20/year increase)

			AVAILABLE PAYGO CALCULATION	
			PayGo capital in annual budget (without grants)	$ 610,000
Amount reserved for PayGo capital and operational resiliency improvements				$ (325,000)
	Remaining funds available for debt service payment each year:			$ 285,000

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Additional Needed Investments

- Near term requests
  - Anticipate requesting BOF approval (9/5) of contract amendment for Resiliency Plan/ 3rd party reorganization and staffing recommendations
    - ensure proper operations (including emergent situations) and permit compliance
    - fully implement increased capital investment
    - Keep pace of coordination with public and private infrastructure projects
  - Anticipate requesting BOF/CC approval (~November 2018) of amendments to Integrated Planning Study scope and existing SRF planning loan
- Drinking Water not included in this bond proposal
  - additional $ money will likely be needed for continued work on distribution system and newly identified challenges at both high service water tanks
- Beyond 2020/2021
  - Capital needs driven by outcome of Integrated Plan and other regulatory requirements
    - Phosphorus upgrades at WW Plants
    - Combined sewer reduction projects (large and small scale)
    - Separate stormwater runoff management
    - Additional investment in remaining high risk collection system and stormwater outfalls

Summary

- Overall costs:
  - No bond driven rate impact for WW or SW in FY20
  - Maximum bond-driven rate impact for typical residential customer after 5 years =
    - $64.32/year or $5.36/month for WW and SW portion of bill
    - Likely less due to pursuit of grants and other rate mitigation strategies
  - Currently applied rate impact mitigation strategies save rate payers approximately 40%

- Overall benefits
  - Fewer permit violations and beach closures
  - Upgraded disinfection systems in all three plants
  - Major rehabilitation to all other critical systems
  - More green infrastructure and stormwater runoff reductions in combined sewer system

Potential Next Steps

- Gather Council feedback
- September 5: Board of Finance
- September 11: City Council - vote
- September 17: Water Quality Town Hall
- September 19: DPW Commission
- September/October: NPA Tour
- November 6: Bond vote

Questions/Feedback

Future questions?

Chapin Spencer, Director, cspencer@burlingtonvt.gov

Megan Moir, Assistant Director – WR, mmoir@burlingtonvt.gov

Rob Goulding, Public Information Mgr, rgoulding@burlingtonvt.gov

Thank you to the Water Resources "Nerd Herd" for their daily dedication to water resources and for helping to pull this plan together!

We greatly appreciate you: Matt Dow, Nate Lavallee, Steve Roy, Jenna Olson, Ashley Walenty, Martin Lee, Steve Perron, Natty King

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Answers to Questions Received

- Question about math on subtotal for WW collection system (design amount > 25%):
  - This is because we have an outstanding $1M Planning assessment loan that has to be included in the bond in order to roll it into the SRF construction loan (standard practice)
  - Also did change where contingency was applied (to construction # and at roll up, subtotal did not change

	Construction Cost (with ~20-25% contingency generally)	Design & Oversight (15-25% of construction cost)	Total
Collection System Planning/Assessment (current planning loan)		$ 997,204	$ 997,204
Collection System (Sewer Rehab) WW (35,485 lf = 6.72 mi)	$ 1,798,500	$ 400,000	$ 2,199,000
Collection System (Sewer Rehab) WW Subtotal (35,485 lf = 6.72 mi)	$ 1,798,500	$ 1,398,000	$ 3,360,000

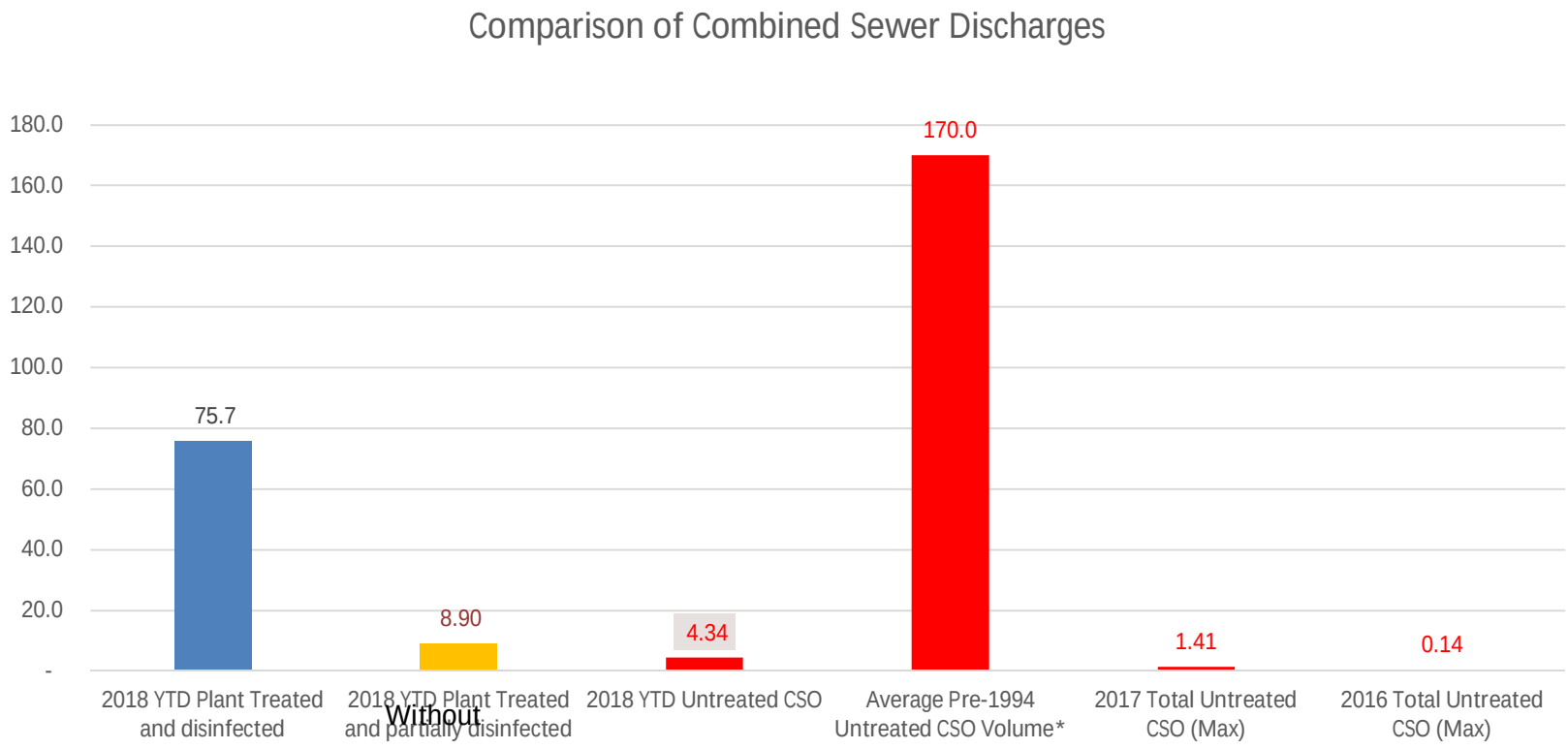
Answers to Questions Received

- Long term trajectory of existing debt service

Existing Debt Service		FY 2019 Projected	FY 2020 Projected	FY 2021 Projected	FY 2026 Projected	FY 2027 Projected	FY 2028 Projected
2014 Series 1 & 2	Ends 2034	$ 1,158,077	$ 1,143,153	$ 1,124,897	$ 1,001,178	$ 972,524	$ 943,064
ARRA AR1-013-02 (ARRA Turbo Blower)	Ends 2033	3,189	3,189	3,189	3,189	3,189	3,188
RF1-103-2 (Siphon)	Ends 2027	93,922	93,922	93,922	93,922	93,922	-
RF1-069-3 (Digester)	Ends 2028	98,758	98,758	98,758	98,758	98,758	98,758

- First expiration of DS (~$94K not until FY28)

Untreated CSOs: 2018 compared to 2017 and 2016



Without

Without 7/10 PLC failure, untreated CSO # would be 1.04 M gallons, less than 2017.

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APPENDIX A

Frequency of CSO events

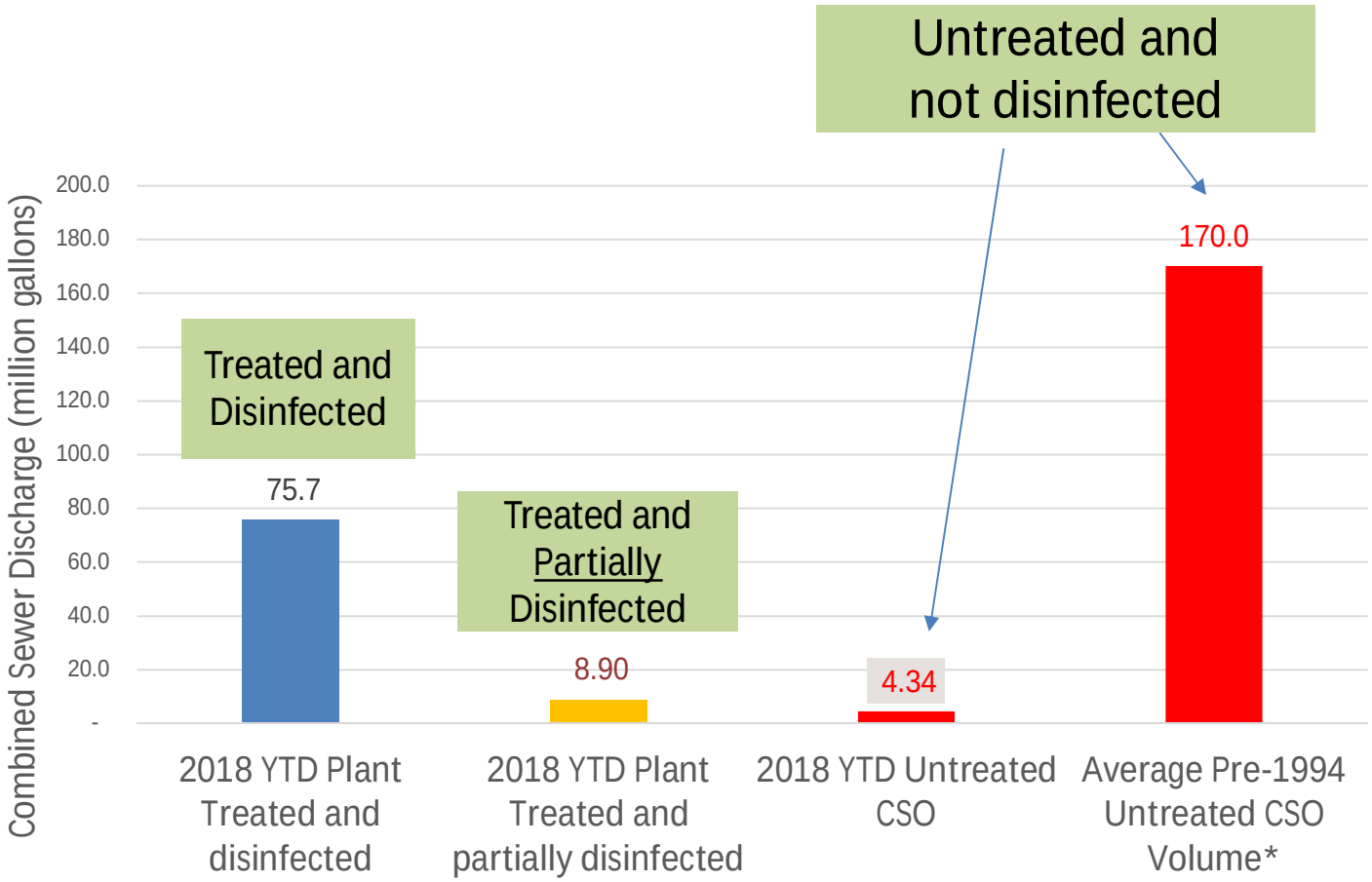
Year	N. Champlain	Park	Gazo	Colchester	Pine Street	Notes
2005	3	12	1	UNK	UNK	
2006	1	11	3	UNK	UNK	
2007	3	8	2	UNK	UNK	
2008	2	13	?	UNK	UNK	
2009	4	8-9	?	UNK	UNK	
2010	0	5	?	2	UNK	Colchester Ave CSO discovered through mapping/outfall visits
2011	1	9	1	3	UNK	Gazo, North Champlain and Park frequency and 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	1	1	2	0	6	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

Main Wastewater Plant

Comparison of Combined Sewer Discharges Pre 1994 to 2018 Through 8/26/18



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APPENDIX B

	Construction Cost (with ~20-25% contingency generally)	Design & Oversight (15-25% of construction cost)	Total
Disinfection and SCADA/PLC upgrade			
Main Plant Disinfection upgrade	$ 480,000	$ 111,000	$ 590,000
Main Plant SCADA/PLC upgrade (global upgrade)	--	--	$ 350,000
North Plant Disinfection System Upgrade	$ 173,000	$ 40,000	$ 213,000
East Plant Disinfection System Upgrade	$ 173,000	$ 40,000	$ 213,000
North & East SCADA/PLC improvements	$ 60,000	$ 12,000	$ 72,000
Disinfection and SCADA/PLC upgrades (Main, East and North)	$ 1,236,000	$ 203,000	$ 1,438,000
Other WW Plant (Main, East and North) Capital Needed in next 5 years	$ 8,793,000	$ 1,384,000	$ 11,403,000
Proposed WW Planning Studies in Next 5 years to make decision for next Bond (East Plant suitability, dewatering)		$ 180,000	$ 180,000
Pump Stations (10 Highest Need)	$ 2,017,000	$ 578,000	$ 2,595,000
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		Wastewater Total Request	$ 19,856,000

	Construction Cost (with ~20-25% contingency generally)	Design & Oversight (15-25% of construction cost)	Total
Stormwater Outfalls (top 5 of 11 high risk outfalls)	$ 1,880,000	$ 470,000	$ 2,350,000
SW Collection System Planning/Assessment (current planning loan)		$ 100,000	$ 100,000
SW Collection System	$ 2,913,831	$ 145,692	$ 3,060,000
SW Collection System (33,381 linear feet = 6.3 miles)	$ 2,913,831	$ 245,692	$ 3,160,000
<u>Stormwater and Wet Weather Management</u>			
Wet-Weather Mitigation			
Combined Sewer Runoff Reduction (Pine Barge Canal as priority, with other projects throughout Main Plants)	$ 1,460,000	$ 212,000	$ 1,672,000
Pine Street CSO disinfection Station	$ 400,000	$ 100,000	$ 500,000
Wet Weather (CSS) Mitigation and Disinfection	$ 1,860,000	$ 312,000	$ 2,172,000
Great Streets (if assume SW covers $125k of $250k/block)			*$ 1,500,000*
City Hall Park (if assume that SW may have to cover $150K of $300k)			*$ 150,000*
Great Streets and City Hall Park SW (if assume SW pays 1/2)			$ 1,650,000
Separate Stormwater Management			
3 acre permit obligation (City parcels) EFAs		$ 65,000	$ 65,000
Regulatory Req'd Separate Stormwater Retrofits (between 2020-2024)	$ 150,000	$ 100,000	$ 250,000
Separate SW Regulatory Obligations	$ 150,000	$ 165,000	$ 315,000
Asset Management CMMS (50% share with SW)	$ 113,000	$ 60,000	$ 173,000
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		Stormwater Total Request	$ 10,102,000

TOTAL	$ 29,958,000

APPENDIX C

Wastewater Plant Improvements

Equipment	Description	Facility	D and K 2016 report	Estimate	Revised Consultant Estimate (2018)	Construction Total (with contingency)	ENR (inflation) adjustment as necessary	Design + Mgt 15% to 25% depending on size and complexity) based on non adjusted construction total	SUBTOTAL
Main Plant Disinfection System Upgrade (does not include PLC)	This system controls the ability to disinfect wastewater and is require to protect public health.	Main			X	$ 479,375.00		$ 110,256.25	$ 590,000
Main SCADA/PLC wholesale upgrade	This system acts as the central nervous system of the facility. Without this automation, there is more possibility for error.	Main			X	---	--	--->	$ 350,000
North Plant Disinfection System Upgrade	This system controls the ability to disinfect wastewater and is require to protect public health.	North			X	$ 172,750.00		$ 39,732.50	$ 213,000
East Plant Disinfection System Upgrade	This system controls the ability to disinfect wastewater and is require to protect public health.	East			X	$ 172,750.00		$ 39,732.50	$ 213,000
North and East PLC Upgrade/optimization	This system acts as the central nervous system of the facility. Without this automation, there is more possibility for	North, East		X		$ 60,000		$ 12,000	$ 72,000
Total Disinfection and PLC/SCADA									$ 1,438,000
East plant outfall	Pipe that transports wastewater effluent to the Winooski	East	Fy20			$ 180,000	$ 30,600	$ 45,000	$ 256,000
North Influent Pump Controller	This controls the heart of the facility. Without it, North plant is not able to treat wastewater.	North	FY17	X		$ 18,000		$ 3,600	$ 22,000
North/East Fire system replacement	Fire protection. North failed last fire inspection. East likely to fail	North, East		X		$ 60,000			$ 60,000
Upgraded Blower (Hybrid)	This is central to the biological process. This equipment will provide better control of the process, redundancy and electrical efficiency	Main				$ 210,000		$ 31,500	$ 242,000

Wastewater Plant Improvements

Equipment	Description	Facility	D and K 2016 report	Estimate	Revised Consultant Estimate (2018)	Construction Total (with contingency)	ENR (inflation) adjustment as necessary	Design + Mgt 15% to 25% depending on size and complexity) based on non adjusted construction total	SUBTOTAL
Dialers & Rain gauges	This allows for notification of problems at the facilities and better data on localized rain storms	North, East		X		$ 12,000			$ 12,000
Electrical component study and upgrade (Including Arc flash assessment) Find critical components that we need to have a backup on the shelf, or that needs to be replaced. i.e. foul sewer breakers.	This allows us to discover which components are failing and/or obsolete, to better manage risk and safety.	All		X		$ 240,000		$ 48,000	$ 288,000
EMG Building Improvements	To management and maintain our building envelopes.	All		X		$ 300,000		$ 60,000	$ 360,000
Back Up Blower	This is central to the biological process. This equipment will provide better control of the process, redundancy and electrical efficiency. But mostly for the redundancy.	Main		X		$ 90,000		$ 13,500	$ 104,000
Main Plant Main Bar Rack (4 ft)	This equipment screens out debris from the influent, and is imperative for treatment and protection of equipment further down the line.	Main	FY21		X	$ 363,576	$ 61,808	$ 72,715	$ 499,000
North and East Bar Racks	This equipment screens out debris from the influent, and is imperative for treatment and protection of equipment further down the line.	North, East	FY23, 20		X	$ 603,576	$ 102,608	$ 120,715	$ 827,000
Grit						$ -			$ -
Classifiers	This equipment screens out grit and course material from the influent, and is imperative for treatment and protection equipment from wear.	North, East			X	$ 243,696		$ 48,739	$ 293,000
Trolley drive upgrades		North, East		X		$ 36,000	$ 6,120	$ 5,400	$ 48,000
Controls		North, East	FY17,18			$ 120,000	$ 20,400	$ 18,000	$ 159,000
Complete replacement		Main	FY22		X	$ 441,665	$ 75,083	$ 88,333	$ 606,000
Main Inf. Ferric Storage	Ferric is used in phosphorus control. It is a nasty chemical, and this will change our current temporary storage, to a safe and permanent installation.	Main		X		$ 42,000		$ 4,200	$ 47,000

Wastewater Plant Improvements

Equipment	Description	Facility	D and K 2016 report	Estimate	Revised Consultant Estimate (2018)	Construction Total (with contingency)	ENR (inflation) adjustment as necessary	Design + Mgt 15% to 25% depending on size and complexity) based on non adjusted construction total	SUBTOTAL
Rehab gates that do not work	The gates are used in various processes for flow control, maintenance and staff safety.	All		X		$ 480,000	$ 81,600	$ 72,000	$ 634,000
CSO pump controller and level sensor	This controls the ability to process wet weather events	Main	FY19,26	X		$ 36,000		$ 7,200	$ 44,000
Rehab Rodney Hunt controller, panel, solenoids and gas cylinders	This controls various gates at main plant, including the relief gate for CSO treatment.	Main	FY18,26	X		$ 60,000		$ 12,000	$ 72,000
Gas Detection systems	This is a safety system to protect staff from dangerous gasses.	All		X		$ 24,000		$ 4,800	$ 29,000
Aeration Membranes of all Plants	This is part of the biological process to deliver oxygen to the bacteria so that they can treated the wastewater.	All	FY23, 19, 19	X		$ 132,000	$ 22,440	$ 26,400	$ 181,000
North and East Piston Pump Replacement (Primary Sludge pump)	These pumps provide the ability to transfer waste solids to storage for residuals management.	North, East		X		$ 96,000			$ 96,000
Yard Hydrant Replacement All plants	Yard hydrants are used to clean and maintain equipment and tanks.	All	FY19	X		$ 120,000			$ 120,000
Godwin Pump	This piece of equipment is a trailer mounted pump which can be used as a backup pump station in an emergency.	All		X		$ 78,000			$ 78,000
Main Plant Primaries (Has to happen)	Primaries are a part of the process in which you settle out as much of the organic material as possible. They reduce the need for more expensive secondary processing.	Main	FY20		X	$ 1,092,050	$ 185,649	$ 198,582	$ 1,477,000
Main Plant CSO Bar Rack (12ft)	This equipment screens out debris from the wet weather influent system, which is a major component of the wet weather treatment process.	Main			X	$ 1,074,000	$ 182,580	$ 214,800	$ 1,472,000

Wastewater Plant Improvements

Equipment	Description	Facility	D and K 2016 report	Estimate	Revised Consultant Estimate (2018)	Construction Total (with contingency)	ENR (inflation) adjustment as necessary	Design + Mgt 15% to 25% depending on size and complexity) based on non adjusted construction total	SUBTOTAL
Clarifiers (Primary or Secondaries) High Priority and/or East Plant redesign #	Primaries are a part of the process in which you settle out as much of the organic material as possible. They reduce the need for more expensive secondary processing. Secondaries are important for settling out biologically treated solids leaving a clean, polished effluent.	Any	FY24			$ 2,400,000	$ 408,000	$ 240,000	$ 3,048,000
On-Shore Relief Box Culvert	This is the culvert used to discharge off shore in the case of hydraulic overload for the wet weather system. The lab building sits on top of this structure.	Main		X		$ 240,000	$ 40,800	$ 48,000	$ 329,000
Total						$ 8,792,563	$ 1,217,687	$ 1,383,485	$ 11,403,000

STUDIES

Dewatering Decision (Brewery option) Final Study		Main, All		X				$ 120,000	$ 120,000
Engineering evaluation of East Plant, which may include recommendations for alternative treatment strategies		East				$ -		$ 60,000	$ 60,000
								Total Studies	$ 180,000

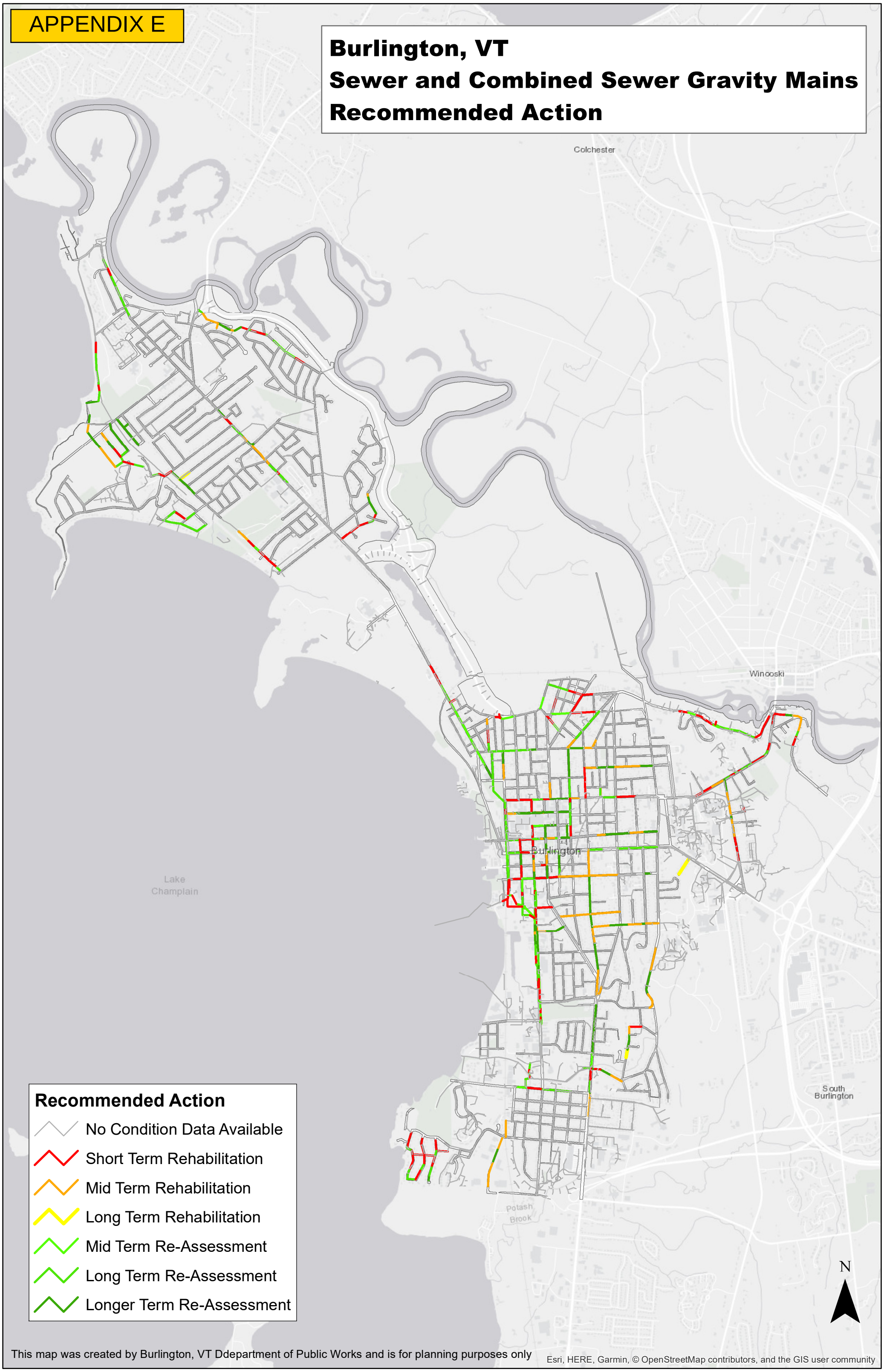
APPENDIX D

WASTEWATER PUMP STATION IMPROVEMENTS

Pump Station	Dry Pit or Submercible	Capital Planning D&K Year	D&K recomnmendation	Risk Totals	AEW Rank based on D&K Upgrades	FM Size/Material	Waterway Impacted by Spill?	Construction Total	Design and Oversight (30%)	Subtotal
Fletcher Place	S	2018 & 2020	VV metal and failing, valves, piping & pumps original. Controls showing safety issues	32	1	4" Steel	Yes, would have to go over an embankment	$ 120,394	$ 42,138	$ 162,532.10
Crescent Beach	D	2018	WW old brick, DW failiing, original valves, pumps and piping. Controls require entry to DW - Requiring a complete replacement of system	29	2	4" UNK	Yes but would have to be a large spill	$ 270,369	$ 94,629	$ 364,997.54
Queen City	D	2023	WW & DW both in poor condition, valves & pumps original and should be replaced. Controls OK but may need to be relocated to surface	27	3	4" Cast	Yes but would only be from a FM or gravity break since the WW is 25ft deep	$ 192,809	$ 67,483	$ 260,292.35
South Cove	D	2019	WW & DW both in poor condition, valves & piping original, pumps recently replaced but aren't submersible. Panel ok but structure is poor & needs replacement	26	4	4" PVC (relined 2018)	Yes directly on private beach	$ 139,799	$ 48,929	$ 188,727.98
Flynn Avenue	D	2020	DW metal and failing, valves, piping & pumps original. Controls showing minor seal fitting issues, controls to be moved above ground	26	5	Half 6" HDPE Half 6" Cast	Yes direct access to beach	$ 242,238	$ 84,783	$ 327,020.96
Water Plant	S	N/A	WW & VV both deteriorating, valves showing heavy corrosion, pumps ok but capacity could be issue, junction boxes are code violations C1 D1, seal fittings needed on conduits, controls OK	26	6	4" Ductile	Yes direct access to storm CB's that discharge to lake	$ 196,998	$ 68,949	$ 265,947.44
Upper Beach	S	2022 & 2024	Hatch to be replaced, WW steel insert questionable but unknown, valves & piping original but pumps recently replaced. Controls old but ok	23	7	4" AC	No, but does have high public impact	$ 171,668	$ 60,084	$ 231,751.13
Proctor Place	D	2024	WW & DW both in poor condition, valves & pumps original and should be replaced. Controls OK	21	8	6" Cast	Yes direct access to storm CB's that discharge to lake	$ 316,350	$ 110,723	$ 427,072.50
Van Patten	S	2020	WW hatch poor, valve vault not sealed & submerged with GW, valves, pumps & pipes original, VFD's good, need covers	20	9	4" PVC	Yes, but over an embankment into intervale	$ 67,522	inhouse	$ 67,522.00
Chase Street	S	2020	Plug valves original, checks recently changed, pumps need to be replaced, panels & conduits showing corrosion	19	10	4" Cast	Yes, CB's with direct discharge into Winooski River	$ 108,529	inhouse	$ 108,528.50
Intervale Landfill	S	2026	Might not be the best use of our capital bond this time around	0	25		N/A	$ 100,000	inhouse	$ 100,000.00
Mission Control	N/A		Need to upgrade telemetry for improved staff efficiency and alarming					$ 90,000	inhouse	$ 90,000.00
								$ 2,016,674	$ 577,718	$ 2,594,392

APPENDIX E

Burlington, VT
Sewer and Combined Sewer Gravity Mains
Recommended Action



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APPENDIX F

High Risk Stormwater Outfall Repair

Location	Estimated Construction Cost (includes 25% cont)	Design & Oversight (25%)	Total Estimate
Manhattan Drive	$725,000.00	$181,250.00	$906,250.00
505 Riverside Avenue	$600,000.00	$150,000.00	$750,000.00
Northeast of Riverside Plant	$179,906.25	$44,976.56	$224,882.81
North Avenue @ 127, just north of on ramp	$245,000.00	$61,250.00	$306,250.00
Burlington High School	$40,000.00	$10,000.00	$50,000.00
Ethan Allen Park, near Moore Drive	$600,000.00	$150,000.00	$750,000.00
Englesby Brook @ Pine Street	$100,000.00	$25,000.00	$125,000.00
Riverside Avenue, near Salmon Hole Park	$60,000.00	$15,000.00	$75,000.00
Upper Little Eagle Bay	$72,500.00	$18,125.00	$90,625.00
Leddy Park	$120,000.00	$30,000.00	$150,000.00
Just west of Riverside	$62,631.25	$15,657.81	$78,289.06
Total construction with 10% additional contigency ---->	$3,085,541.25	$701,259.38	$3,786,800.63
Total construction for top 5, with 5% additional contigency on construction and design	$1,879,401.56	$469,850.39	$2,349,251.95

APPENDIX G

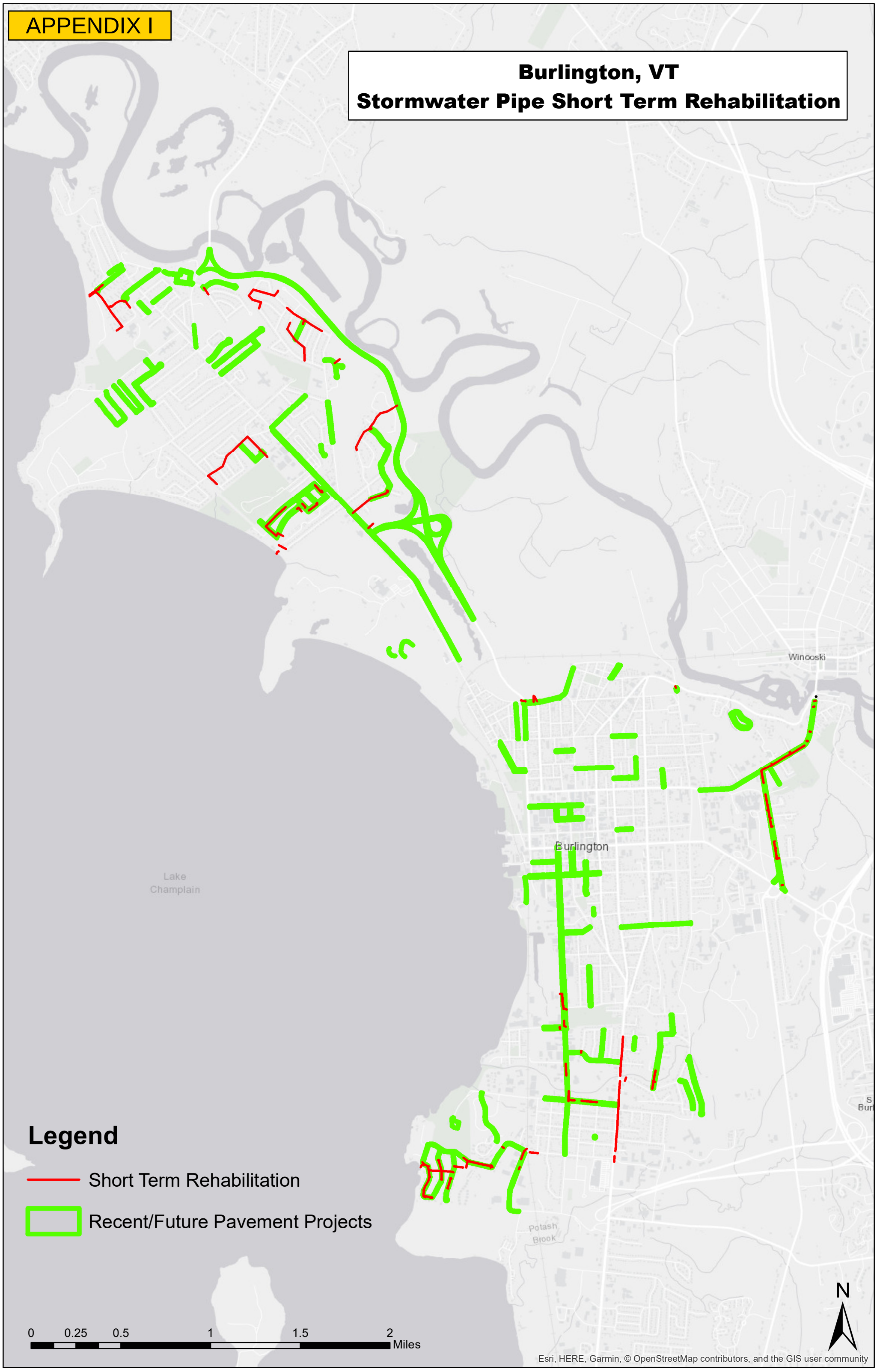
Combined Sewer Retrofit Opportunities

Project Currently Proposed	Acres of Impervious	Construction with contingency (25%)	Design/oversight	Watershed
Allen Street (below CSO)	1.13	$105,937.50	$10,593.75	Main Plant
Cedar Street @ Rose Street	0.5	$62,500.00	$6,250.00	Main Plant
Cedar Street @ LaFountain	0.62	$77,500.00	$7,750.00	Main Plant
North Prospect - North to Pearl	5.62	$395,156.25	$39,515.63	Main Plant
Cedar @ North Champlain?	2.75	$193,359.38	$19,335.94	Main Plant
Rose Street (above CSO)	1.61	$150,937.50	$15,093.75	Main Plant
Front/Summer	0.44	$55,000.00	$5,500.00	Main Plant
Hyde Street (near North Street)	0.31	$38,750.00	$3,875.00	Main Plant
Main Plant and/or Manhattan CSOs		$1,079,140.63	$107,914.06	
Fairmount Street	1.02	$127,500.00	$25,500.00	Main Plant - Above CSO
South Prospect (3 locations total)	3.19	$299,062.50	$59,812.50	Main Plant - Above CSO
Glen Road @ South Street	0.53	$66,250.00	$13,250.00	Main Plant - Above CSO
South Street	0.92	$115,000.00	$23,000.00	Main Plant - Above CSO
Prospect Parkway (2 sites)	0.99	$123,750.00	$24,750.00	Main Plant - Above CSO
Chestnut Terrace	0.26	$32,500.00	$6,500.00	Main Plant - Above CSO
Pine Street Barge Canal CSO		$764,062.50	$152,812.50	
Charlotte Street - bumpouts or subsurface or tank	1.1	$103,125.00	$20,625.00	Main Plant
	20.99	$1,946,328.13	$281,351.56	
75% of total possible opportunities, knowing that we want to wait until Integrated Plan is done to pick best bang for buck projects	12.6	$ 1,459,746.09	$ 211,013.67	
GREAT STREETS				
St. Paul				
Other 12 blocks		$1,500,000.00	estimated cost is $250K per block, use $150K (60%)	
City Hall Park		$150,000.00	Estimated cost is $300K for CHP, assume 50%	
	Total Great Streets/Downtown	$1,650,000.00		

APPENDIX H

Basis for Separate Stormwater Management 2019-2022 Budget #

3-Acre Site Compliance	Details / Notes	EFA Cost	Final Engineering & oversight	Construction Cost (Imp. * $75000)
Alexis Drive Subdivision	3.1 acres total (1.55 acres required)	$5,000.00	$29,062.50	$145,312.50
Grey Meadows Subdivision	3.87 acres total (1.94 required)	$5,000.00	$36,375.00	$181,875.00
Lori Lane Subdivision	3.1 acres total (1.55 acres required)	$5,000.00	$29,062.50	$145,312.50
Van Patten Parkway Subdivision	9.3 acres total (4.65 acres required)	$5,000.00	$87,187.50	$435,937.50
Riverwatch	Co-permittee - EFA only	$5,000.00		unknown
Ledgewood	Co-permittee - EFA only	$5,000.00		unknown
Strathmore	Co-permittee - EFA only	$5,000.00		unknown
Other City 3-Acre sites	38.06 acres impervious, across 10 sites, (outside of the CSS)	$50,000.00	$300,000.00	$1,427,250
	Subtotals	$85,000.00	$482,000	*$2,335,688*
Assume need to do remaiing EFAs (some being done in FY19) and some design by 2023, with some limited capital implementation of separate stormwater improvements. There should be grant funds available for non regulatory retrofits. USE		$65,000.00	$100,000.00	$150,000

APPENDIX I

Burlington, VT
Stormwater Pipe Short Term Rehabilitation