# South Burlington, Vermont Stormwater Utility

#### September 30, 2019

Presentation by: David P. Wheeler, Stormwater Project Manager South Burlington Department of Public Works



Last Updated: 9/26/2019

#### **Presentation Overview**

- Establishing a Stormwater Utility in South Burlington, Vermont
- Flow Restoration Plans (FRPs)
- Phosphorus Control Plans (PCPs)
- Shelburne Collaboration

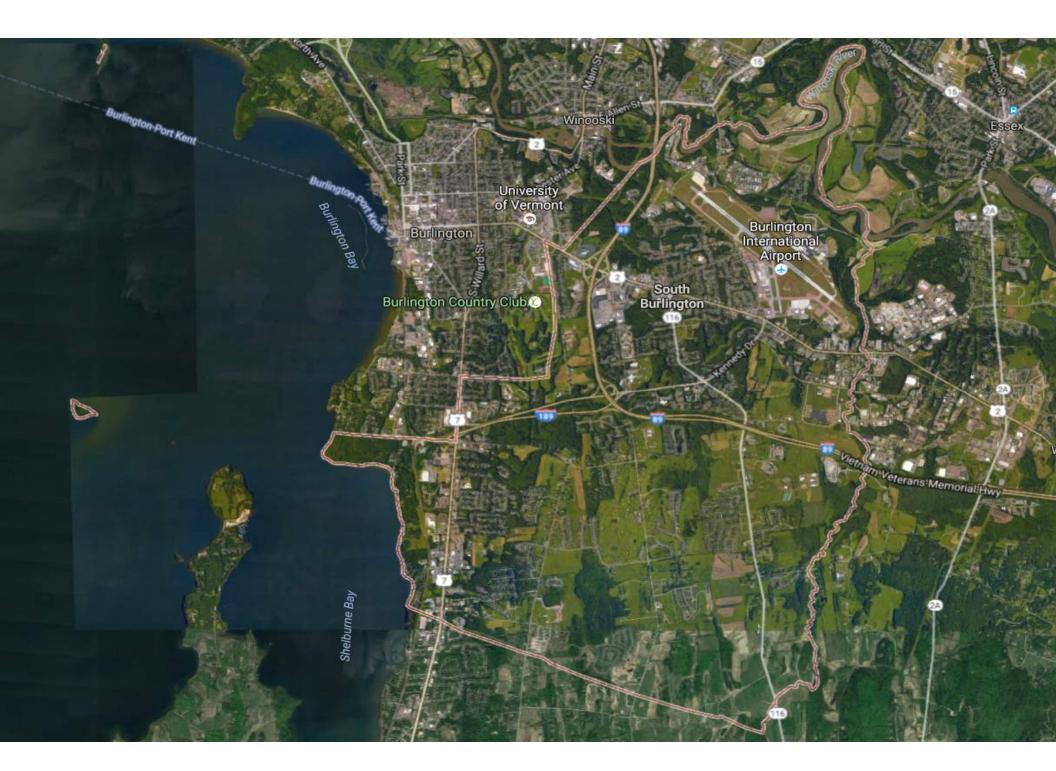


### South Burlington, Vermont

- **Population:** ~19,000
- Area: 16.6 mi<sup>2</sup>
- Stormwater Infrastructure:
  - 6,210 Catch Basins (3,116 public)
  - 176 Miles of Pipe (91 miles public)
- Major Features:
  - Airport, Mall, University







#### **Before the Stormwater Utility:**

- Most state permits (141)
- Most expired state permits (98)
- Most impaired watersheds (6)
- Most streams draining directly into the Lake (5)
- Most annual housing starts (average of 250)
- Most CLF lawsuits in past 5 years (7!)



#### **Stormwater Utility Timeline**

- 2002 Stormwater Utility Enabling Legislation Passed by Vermont Legislature
- 2003 Stormwater Utility Feasibility Study
- 2003 to 2005 Public Outreach & Utility Development
- 2005 Sewer ordinance updated, first stormwater fees assessed, Stormwater Superintendent hired
- 2006 Requirements for City take over of residential stormwater treatment systems



#### **Stor**mwater Utility Development Costs

- Stormwater Utility Feasibility Study \$70,000
- Development and Implementation of Stormwater Utility ~\$330,000
  - Included five policy papers, a cost of services study, a credit manual, ordinance development, and public outreach
- The City took \$1M loan to pay for this work.
  - Included design/construction of large stormwater treatment practice.



# Stormwater Advisory Committee (SWAC)

#### **City of South Burlington**

Steering Committee: City Managers Office Department of Planning & Zoning Department of Public Works City Council Representative Champlain Water District

Stormwater Advisory Committee (SWAC): Business Community Environmental Organizations Engineering Professionals

> University of Vermont Burlington International Airport Local Developers Property Management Specialist Concerned Citizens

TABLE 2 - EXISTING PROBLEMS & NEEDS RANKED BY SWAC

	NUMBER OF VOTES
ADMINISTRATION & MANAGEMENT	
Private System Inspection and Regulation	5
Public Knowledge / Concern About Stormwater	5
Regional Coordination	<mark>5</mark>
Regulatory Uncertainty	4
Inadequate Funding	2
Maintenance Easements and Policies	2
Develop Long Term Cost of Program*	1
Inadequate Staffing*	1
Limited Public Outreach	1
Phase II NPDES	1
Billing Capabilities	0
ENGINEERING & PLANNING	
Watershed Planning	8
Impaired Streams	4
Inadequate Knowledge of System	3
Lake and Stream Pollution	3
Baseline and Ongoing Monitoring*	2
Complete GIS System*	2
Comprehensive Stormwater Management Plan*	1
OPERATION & MAINTENANCE	
Routine Maintenance Inadequate	9
Maintenance Backlog	3
O&M - Inadequately Staffed and Equipped	3
CAPITAL IMPROVEMENTS	
Capital Improvements	5

\* Problem / Need Identified by SWAC Member



### **SWAC Recommendations**

- Staff: Stormwater Administrator, Stormwater Engineer, Maintenance Staff
- Funding
- Planning: Watershed Planning, GIS Mapping, Monitoring & Inspections
- O&M
- Capital Improvements
- Preliminary Program Budget: \$700,000/year



### **Stormwater Program Funding Options**

1.Tax Funded Program
Increase property taxes
2.User Fee Funded Program
Develop funding methods & credits
3.Combination of Tax and User Fee

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udget of approximately \$177,000 per year, fun	ded using the City's Gen
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Table 1 - Current Starmwater Pro	genna cour reconsto
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**Existing Program leaves and Priorities** 

1.2



#### Tax vs. User Fee



#### > Tax

- Easy to collect
- Little added administrative cost
- Invisible to the citizen month to month
- About 5 cents per \$100
- Vote on budget changes (?)

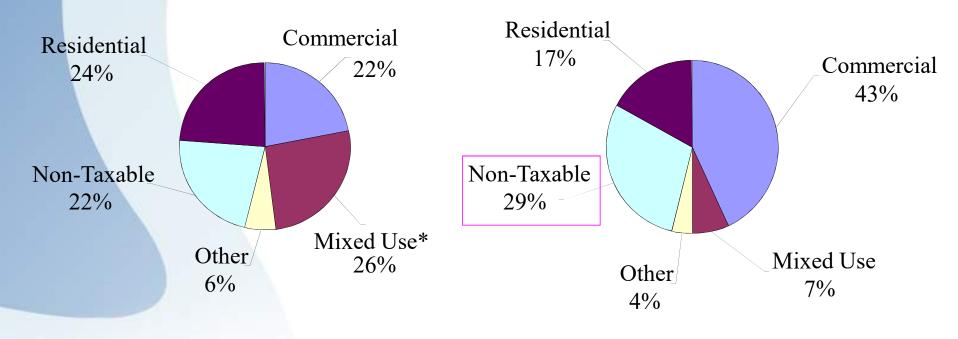
#### > User Fee

- Equitable:
  - Based on amount of runoff
  - Collects from tax exempt parcels
- Dedicated and grows with growth
- Flexible allows credits and fees to enhance equity and tailor program
- Incentive to reduce impervious area
- Others uses of databases/mapping
- Added administrative cost



#### Total Area by Existing Land Uses

#### Impervious Area by Existing Land Uses



\*Mixed Use includes farm, open space, misc.

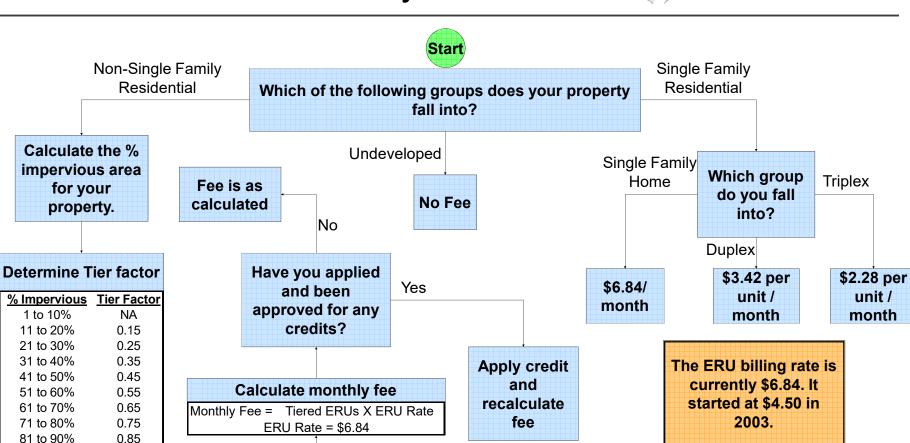


#### **Stormwater Utility Rate Structure**

- ERU = Equivalent Residential Unit
- In South Burlington, the average residential parcel has 2,700 square feet of impervious area
- $1 \text{ ERU} = \frac{6.84}{\text{month}}$



#### Process Flowchart For Calculation of Stormwater Utility Fee



Calculate the number of Tiered ERUs for the property (round up) Tiered ERUs = Tier Factor X Gross Area ERU ←

0.95

91 to 100%

**Equivalent Residential Unit (ERU):** An equivalent residential unit is the base billing unit that is established for the purpose of standardizing stormwater fees and allocating costs, based on impervious area, to different property types. One ERU is equal to the amount of impervious area (e.g., rooftops and paved areas) that can be found on a typical single-family residential property and was determined to be 2,700 square feet in South Burlington.

South Burlington Stormwater Utility

#### **Stormwater Credits**

 By installing storm water treatment practices a facility can reduce its fees by up to 50%

Treatment Standard or Criteria	Credit Amount
Water Quality (WQ <sub>v</sub> )	15%
Groundwater Recharge (Re <sub>v</sub> )	15%
Channel Protection (CP <sub>v</sub> )	15%
Overbank Flood (Q <sub>p10</sub> ) or Extreme Storm (Q <sub>p100</sub> )	10%



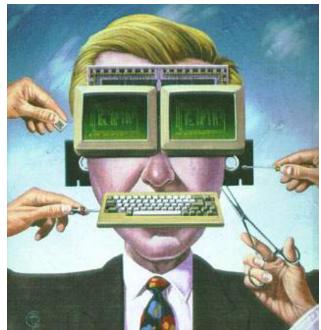
#### **Credit System - Lessons Learned**

- Credit System not utilized as anticipated.
  - Planned for 10% of billable ERUs be credited.
  - Currently  $\sim 1.5\%$  of billable ERUs are credit.



### **BILLING & DATABASE**

- South Burlington SW Utility:
  - 6,600 accounts total
  - 13 years of billing





### How to Bill?

- Utilize existing water & sewer billing database
- Billing Scenarios:
  - Properties w/ single water account
  - Properties w/ multiple water accounts
  - Properties w/ no water account ("SW Only" accounts)
- Condo Properties how are utilities currently billed?, Multiple associations, etc.
- Large Customers UVM, Airport, VTrans
- Tenant / Owner Issues



# **Ongoing Billing & Database Maintenance**

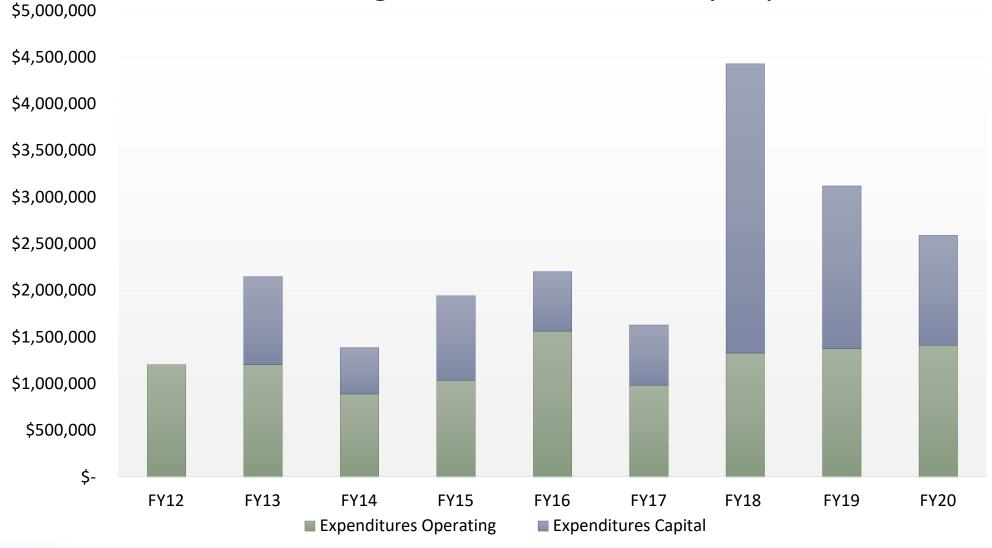
- Construction/demolition update satellite imagery
- Property transfers & new leases
- Response to customer complaints appeals and adjustments
- Activating approved SW Fee Credits



#### South Burlington Stormwater Revenue & Expenditures

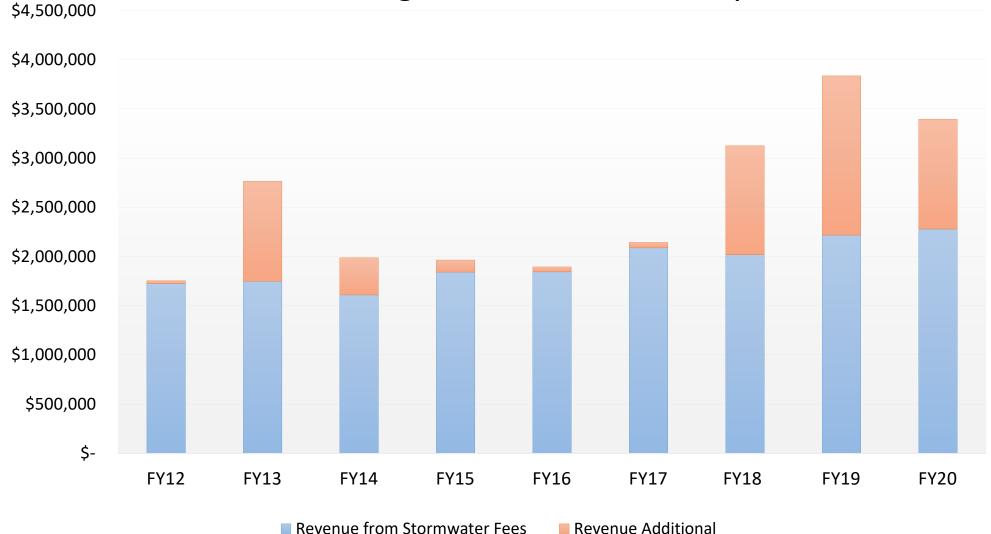


#### South Burlington Stormwater Utility Expenditures



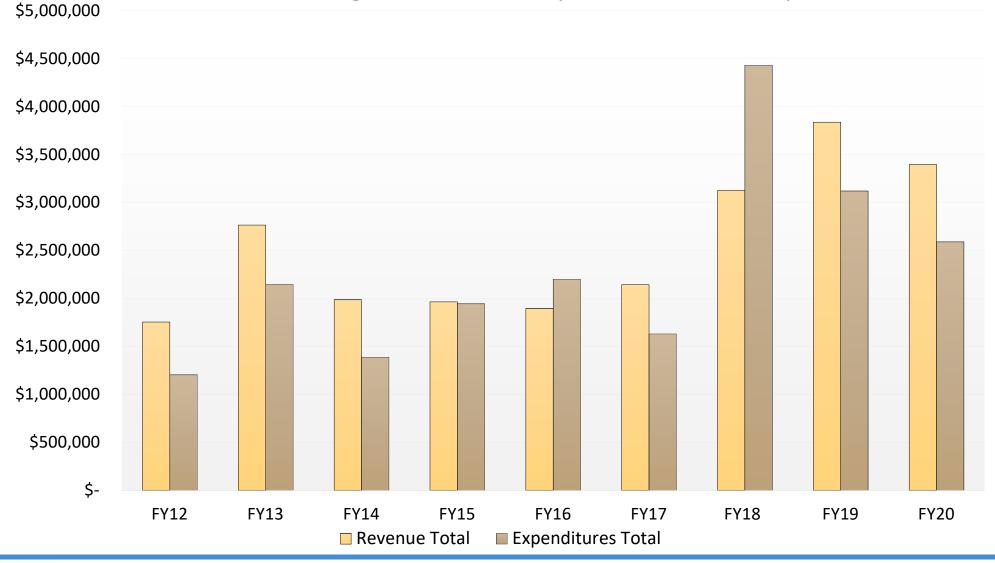


#### South Burlington Stormwater Utility Revenue

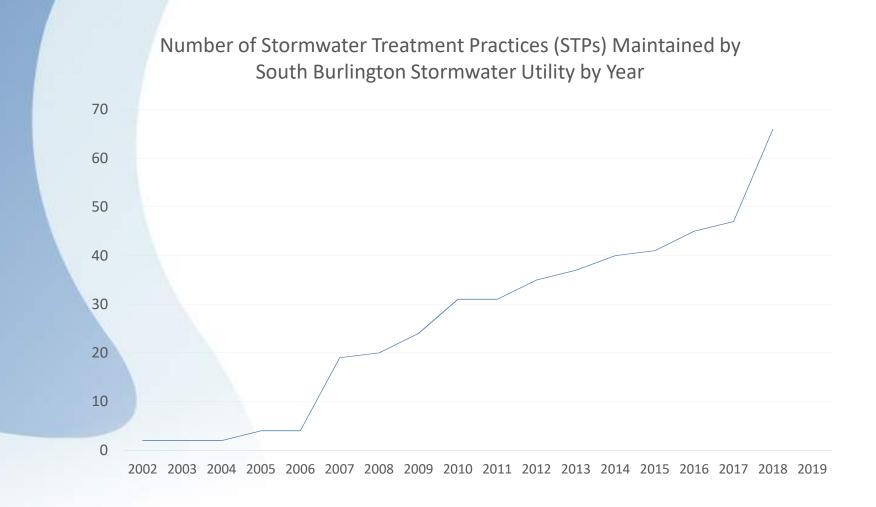




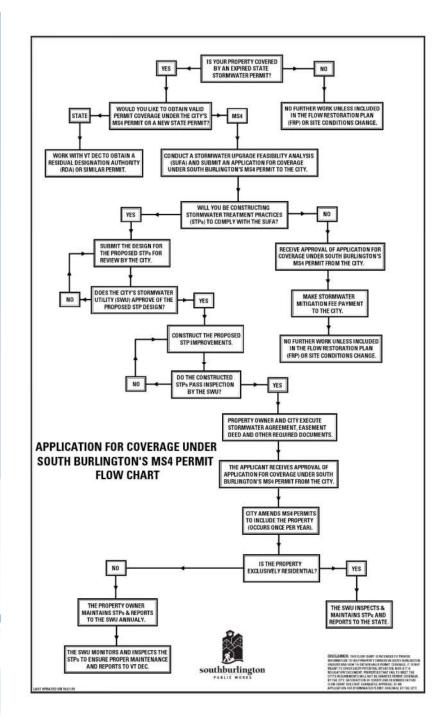
#### South Burlington SW Utility Revenue & Expenditures











### Residential Stormwater System Take-over

•Exclusively residential properties can apply to have the City take-over their State issued stormwater permit. Once transferred, the City will complete maintenance of the system.

•Commercial properties can apply to obtain permit coverage under the City's MS4 permit. They do their own maintenance and report to the City.

### **SWAC Recommendations**

- Staff: Stormwater Administrator, Stormwater Engineer, Maintenance Staff
- Funding
- Planning: Watershed Planning, GIS Mapping, Monitoring & Inspections
- O&M
- Capital Improvements
- Preliminary Program Budget: \$700,000/year

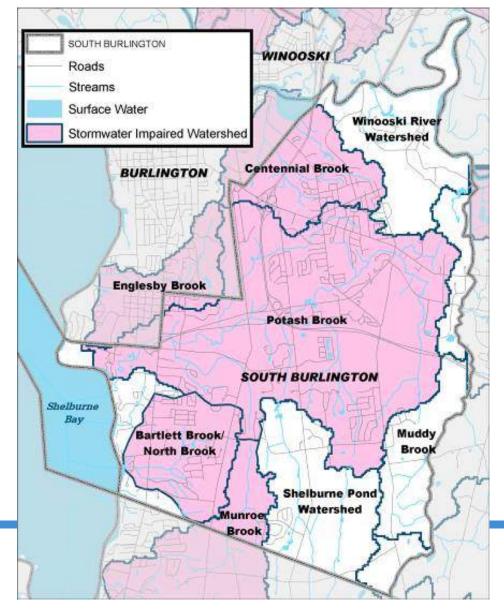


# **Total Maximum Daily Loads (TMDLs)**

#### • Stormwater TMDLS:

- Potash Brook
- Bartlett Brook
- Centennial Brook
- Munroe Brook
- Englesby Brook
- Phosphorous TMDL:
  - Lake Champlain
- Driver of State & Local Regulations





### **Flow Restoration Plans (FRPs)**

- 1.VT DEC determined the cause of impairment for these streams is unmanaged stormwater runoff and put the streams on Vermont's 303(d) list of impaired waters.
- 2.Increased flow in streams causes streambank erosion, which is a major cause of stream impairment.
- 3.VT DEC prepared a Total Maximum Daily Load (TMDL) with flow targets specified for each of the streams.
- 4.VT DEC required Flow Restoration Plans (FRPs) be developed as part of the 2012 VT MS4 Permits.



### **Required Elements of a FRP**

- Identification of required STPs necessary to manage stormwater runoff, reduce stream flow, and restore stream health.
- Design and Construction Schedule (Deadline 2032)
- Financial Plan
- Regulatory Analysis
- Identification of Regulatory Assistance
- Third-Party Implementation



### **BMP DSS Model**

- VT DEC used the Best Management Practice Decision Support System (BMP DSS) Model to assess stream flow.
- Developed by Tetratech as part of work completed by EPA in Prince George County, MD.
- Adapted for use in VT by DEC and Tetratech. Calibrated based on actual flow data.
- An existing / baseline model was prepared.
- Proposed BMPs are added to the model and their impact on stream flow is assessed.

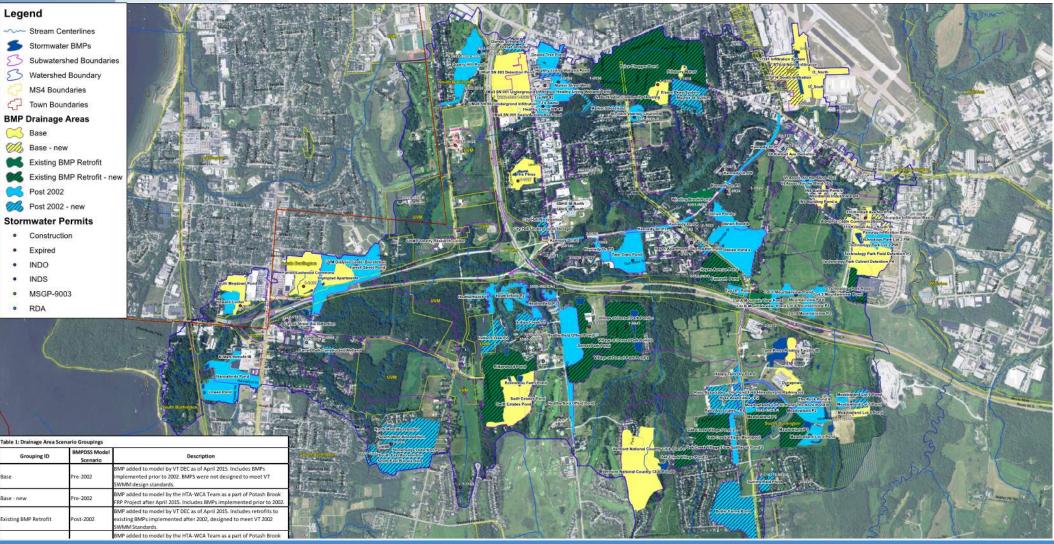


### **Finding BMP Opportunities**

- Consultants were told to evaluate the entire watershed for BMP opportunities. They were asked to first evaluate the following properties:
  - Existing BMPs that could be retrofit or expanded to provide improved treatment.
  - Properties with expired State stormwater permits.
  - City owned property.



#### **Potash Brook FRP**





#### Table 5: Summary of BMPDSS Model Results

		Q0.3		Q95		# of BMPs	Impervious	% of Total
Description	Area (sq. mi)	Area adjusted (cfs/sq.mi.)	Unadjusted flow (cfs)	Area adjusted (cfs/sq.mi.)	Unadjusted flow (cfs)	Added for Model Runs	Area Managed (acres)*	Watershed Impervious Managed
Pre-2002 BMPs	7.055	18.570	131.020	0.1885	1.330			
Post-2002 BMPs	7.045	17.697	124.677	0.1873	1.320	93	254.3	27.2%
% Change vs Base			-4.8%		-0.8%			
Credit 1	7.046	16.403	115.580	0.1887	1.330	54	473.0	50.1%
% Change vs Base			-11.8%		0.0%			
Credit 2	7.024	15.932	111.900	0.1894	1.330	15	533.8	57.1%
% Change vs Base			-14.6%		0.0%			
Credit 3	7.024	15.811	111.050	0.1894	1.330	13	561.4	60.0%
% Change vs Base			-15.2%		0.0%			
Credit 4	7.024	15.592	109.520	0.1894	1.330	16	601.6	64.3%
% Change vs Base			-16.4%		0.0%			
CMAC Valve	7.024	15.568	109.350	0.1922	1.350	18 Ponds w/CMAC	601.6	64.3%
% Change vs Base			-16.5%		1.5%			
Credit 5	7.024	15.558	109.280	0.1922	1.350	01	601.6	64.3%
% Change vs Base			-16.6%		1.5%			



#### **FRP Projects & Cost**

	Watershed	Number of BMPs in Flow Restoration Plan	FRP Cost	South Burlington's "Share"
В	Bartlett Brook	18	\$3,500,000	\$3,450,000
	Centennial Brook	27	\$10,250,000	\$6,694,000
	Englesby Brook	5	\$900,000	\$128,700
M	Iunroe Brook	3	\$7,000,000	\$48,000
P	Potash Brook	109	\$17,000,000	\$13,750,000
	Total	162	\$38,650,000	\$24,070,700



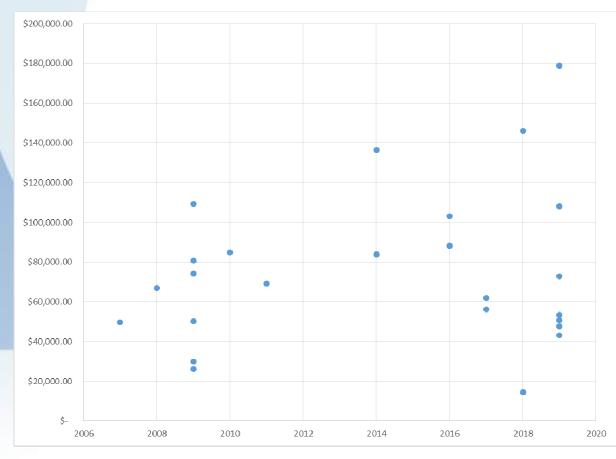
#### Table 7: Proposed BMP Unit Costs and Adjustment Factors

Base Cost (\$/ft3)
\$2
\$4
\$12
\$10
\$22
Cost Multiplier
0.25
1
1.5
2
0.5

\*Excerpt from Horsley Witten Memorandum Dated January 9<sup>th</sup> 2014 (Page 11)



#### **Cost Per Impervious Acre Treated**



<u>\$62,500/Acre Average</u> for Construction & Engineering

<u>\$75,500/Acre Average</u> for Construction, Engineering & Maintenance over 20 year period



#### **Table 6: Project Ranking Matrix**

Category	ID	Criteria
Cost/Operations	А	Project Cost per Impervious Acre
	В	Impervious Acres Managed (ac)
Project Design Metrics	С	Channel Protection Volume (CPv) Mitigated, (ie. 1-year Storm)
	D	Volume Infiltrated (ac-ft)
Project Implementation	E	Permits
Project Implementation	F	Land Availability
	G	Flood Mitigation (Is existing flooding issue mitigated by project?)
Other Project	н	TMDL Flow Target Addressed (Q03, Q95)
Benefits/Constraints	I	Lake Champlain Phosphorus TMDL
	J	Other Project Benefits/Constraints



## Village at Dorset Park - 2017



View of Village at Dorset Park Pond 3 – Project included the upgrade of 3 stormwater treatment ponds to current standards.

- •State Stormwater Permit Issue Resolved
- •Retrofit of 3 Stormwater Ponds
- •Project Cost: \$520,000 -ERP Grant: \$250,000



# Stonehedge Stormwater Project – 2017







- Project Included: Construction of a Stormwater Pond, Installation of 3 Bio-Retention Areas, and Drainage Improvements
- Project Cost: \$543,730
  - -Project Partnership Agreement with U.S. Army Corp of Engineers



#### Market Street Culvert Replacement – 2017



- •Replaced Aging and Undersized Infrastructure
- •Improved Aquatic Organism Passage (AOP)
- •Increased Culvert Size to Address Climate Change
- •Project Cost: \$634,000

View of Replaced Culvert Facing Upstream



# Replacement of Two Culverts in Oak Creek Village – 2017



 Placing Precast Culvert Sections Under Moss Glen Lane
 The project included replacement of two undersized culverts in Oak Creek Village

- •Replaced Aging and Undersized Infrastructure
- Improved Aquatic Organism Passage
- Increased Culvert Size to Address Climate Change
- •Reduced Risk of Flooding
- •Project Cost: \$ 515,000 -TAP Grant: \$ 300,000



#### Commerce Square Detention Pond – 2017 to 2018



Commerce Square Detention Pond After Construction – The project included construction of the detention pond, installation of a swirl separator, and reconfiguration of drainage pipe to bring additional water to treatment.

- •Resolved State Stormwater Permit Issue
- •Significant Reduction in Stormwater Flow to Potash Brook
- •Reduction in TSS and TP Reaching Potash Brook and Lake Champlain
- •Project Cost: \$475,000



# **Iby Street Gravel Wetland - 2018**



Iby Street Gravel Wetland During Construction – Project included construction of a small gravel wetland at the entrance to Dumont Park. Stormwater from the street and neighborhood previously discharged untreated to Potash Brook

- Reduced TSS and TP Reaching Potash Brook and Lake Champlain
- Flow reduction benefits to Potash Brook
- Provides Opportunity forWater Quality Educationat Park Entrance
- Project Cost: \$91,326
  - ERP Grant: \$ 83,497



# Kennedy Drive Pond 3 - 2019



Existing Kennedy Drive Pond 3 – Retrofit and expansion of the Kennedy Drive Pond to a treatment wetland will provide better treatment of stormwater to a larger drainage area

- The Project Will Reduce TheAmount Of TSS and TPReaching Potash Brook andLake Champlain.
- The Project Will Provide FlowReduction Benefits To PotashBrook (SW Impaired)
- Project Cost: \$300,000 (est.)
  - DEC Grant: \$ 298,000















#### **Bartlett Brook**





#### **Bartlett Brook FRP Schedule**

SB ID	Project Name	BMP Landowner	New or Retrofit	ВМР Туре	Soil	Land Use	Overall Rank (All watersheds)	Fiscal Year
BB0003	BBC	MS4 Owned	New	Gravel Wetland	D	Residential	5	2017
BB0014	Pinnacle at Spear Pond A	Private	Retrofit	Detention Pond	D	Residential	94	2018
BB0015	Pinnacle at Spear Pond B	Private	Retrofit	Detention Pond	C/D	Residential	139	2018
BB0004	BBSTS Expansion	Private	Retrofit	Detention Pond	D	Commercial	62	2020
BB0010	Horticulture Farm Bioretention	MS4 Owned	New	Bioretention	В	Residential	16	2020
BB0011	Horticulture Farm Detention Pond	MS4 Owned	Retrofit	Detention Pond	A/B	Residential	136	2020
BB0005	Brownell Way	MS4 Owned	New	Infiltration Basin	A	Residential	124	2021
BB0006	Brownell Way-3	MS4 Owned	New	Bioretention	С	Residential	148	2021
BB0007	Deerfield Drive 1	MS4 Owned	New	Infiltration Basin	A	Residential	104	2021
BB0008	Deerfield Drive 2	MS4 Owned	New	Bioretention	С	Residential	152	2021
BB0012	Irish Farm Condos Pond B	Private	Retrofit	Gravel Wetland	А	Residential	93	2021
BB0017	Whatley Road	MS4 Owned	New	Bioretention	D	Residential	147	2021
BB0018	Windsor Court	MS4 Owned	New	Infiltration Basin	A	Residential	110	2021
BB0009	Holiday Inn Parking Lot	Private	New	Underground Detention	В	Commercial	42	2023
BB0013	Laurel Hill Detention Pond	MS4 Owned	R	Detention Pond	A	Residential	131	2024
BB0016	Underwood Stormwater Pond	MS4 Owned	New	Detention Pond	D	Residential	30	2025
BB0001	1690 Shelburne Road	MS4 Owned/ Private	New	Underground Detention	B/D	Transportation	127	2028
BB0002	Allen Road	MS4 Owned	New	Detention Pond	С	Residential	99	2028



# Laurel Hill South Drainage Improvements - 2017



Dual Pipe Installation – The project replaced old and undersized drainage pipe to prevent flooding and slow the rate at which stormwater flows to Bartlett Brook

- Reduced risk of neighborhood flooding
  - Allowed some homes to obtain homeowners insurance again!
- Slightly reduced TSS and TP reaching Bartlett Brook
- Slight reduction in stormwater flow to Bartlett Brook
- Project Cost: \$745,429
  - Project Partnership Agreement with U.S. Army Corp of Engineers



# Bartlett Brook Central Treatment Wetland – 2017

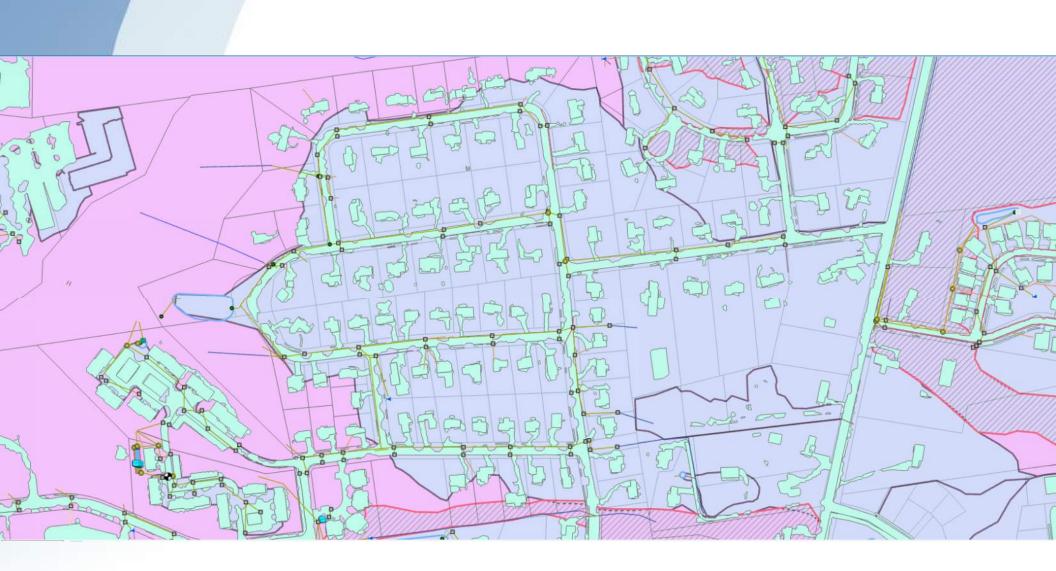


The Bartlett Brook Central Stormwater Treatment Wetland Shortly After Construction – The project included construction of the treatment wetland and drainage improvements to direct additional water to treatment. •Significant Reduction in Stormwater Flow To Bartlett Brook

•Significant Reduction in TSS and TP Reaching Bartlett Brook and Lake Champlain

BMP Drainage Area	Impervious Area Managed (acres)	Project Cost	Cost per Impervious Acre Managed
70.71	16.37	\$767,138	\$46,862







# Pinnacle at Spear – 2019



Placing Stone As Part of Treatment Wetland Construction – Project included retrofit of two existing stormwater ponds to stormwater treatment wetlands, and retrofit of two existing stormwater detention ponds to meet current standards

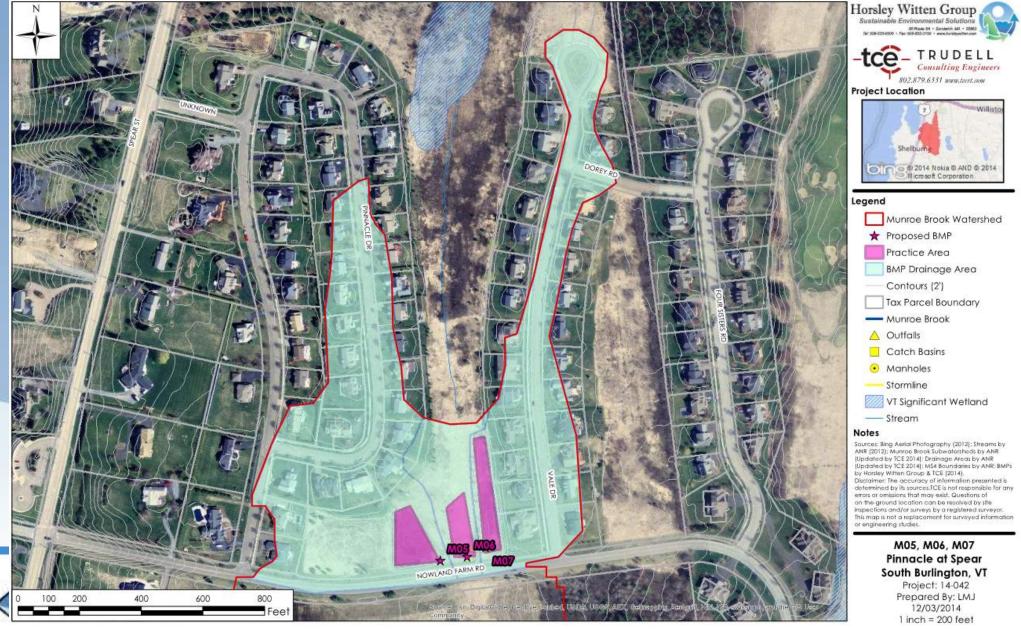
South Burlington Stormwater Utility

- Resolved A State Stormwater Permit Issue
- Reduces TSS and TP Reaching Lake Champlain
- Provides Flow Reduction Benefits To Munroe and Bartlett Brooks (SW Impaired)
- Project Cost: \$498,300
  - ERP Grant: \$109,612
  - LCBP Grant: \$125,000
  - CW Block Grant: \$85,100
  - Total Grants: ~\$319,712

Approximate address:       Prinacle Dr, South Burlington       MS4 where BVP is located       South Burlington       New or existing BMP?       Existing BMP?         Proposed BMP type:       Gravel Wetland       Image: Control of the second of th	Site name: Pinn	acle at Spear Pond A	South Burlington ID:	BB0014
Estimated project cost\$141,000Drainage area (acres)12.66Impervious acres managed4.50% Impervious36%Land owner of BMP locationPrivateBMP Footprint Size (acres)0.34BMP Depth (feet)5.00Primary or secondary BMP?SecondaryExpired permit(s)?1-1155	Pippac	le Dr, South Burlington	BMP is South Burlington	existing Existing
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Hydrologic soil group D Expired permit(s)? 1-1155	Drainage area (acres) mpervious acres managed % Impervious		MS4s contributing drainage to BMP Primary land use in drainage 2 or more landowners?	Residential Yes
Hanoperan Root	Drainage area (acres) mpervious acres managed % Impervious Land owner of BMP location		MS4s contributing drainage to BMP Primary land use in drainage 2 or more landowners? CPv managed (ac-ft)	Residential Yes 0.43
Proposed BMP description: Feasibility concerns:	Drainage area (acres) Impervious acres managed % Impervious Land owner of BMP location BMP Footprint Size (acres)		MS4s contributing drainage to BMP Primary land use in drainage 2 or more landowners? CPv managed (ac-ft) Volume infiltrated (ac-ft) Primary or secondary BMP?	Residential Yes 0.43 0.00 Secondary
	Drainage area (acres) Impervious acres managed % Impervious Land owner of BMP location BMP Footprint Size (acres) BMP Depth (feet)		MS4s contributing drainage to BMP Primary land use in drainage 2 or more landowners? CPv managed (ac-ft) Volume infiltrated (ac-ft) Primary or secondary BMP?	Residential Yes 0.43 0.00 Secondary



#### **Munroe Brook FRP**















South Burlington Stormwater Utility





### **Centennial Brook FRP**

	Site name: Picard Circle Infiltration		South Burlington ID: CB0023		
Approximate address:	Picard Cir, South Burlington	MS4 where BMP is located:	South Burlington	New or existing BMP?	New
Proposed BMP type:	Infiltration Gallery				
			a contraction		
	Legend i furen Audi Variani Vari		rofit #25: Picard Circle		
Estimated project cost	Salaria Sa	MS4s contributir	rofit #25: Picard Circle		ngton, BTV
Estimated project cost Drainage area (acres)	\$318,000 51.85	And Unspectral Tract Design Control	rofit #25: Picard Circle	99(4190	ngton, BTV
Drainage area (acres)	51.85	MS4s contributir	rofit #25: Picard Circle	99(4190	ngton, BTV
Drainage area (acres) Impervious acres manag	51.85	MS4s contributir BMP	rofit #25: Picard Circle	South Burlin	igton, BTV
Drainage area (acres) Impervious acres manag	51.85 ged 15.84 31%	MS4s contributir BMP Primary land use	rofit #25: Picard Circle ng drainage to : in drainage wners?	South Burlin Residential	ngton, BTV
Drainage area (acres) Impervious acres manag % Impervious	51.85 ged 15.84 31% ation MS4 Owned	MS4s contributir BMP Primary land use 2 or more landow	rofit #25: Picard Circle ng drainage to in drainage wners? c-ft)	South Burlin Residential Yes	ngton, BTV
Drainage area (acres) Impervious acres manag % Impervious Land owner of BMP loca	51.85 ged 15.84 31% ation MS4 Owned	MS4s contributir BMP Primary land use 2 or more landow CPv managed (ar	ng drainage to in drainage wners? c-ft) ed (ac-ft)	South Burlin Residential Yes 0.68	ngton, BTV
Drainage area (acres) Impervious acres manag % Impervious Land owner of BMP loca BMP Footprint Size (acr	51.85 ged 15.84 31% ation MS4 Owned	MS4s contributir BMP Primary land use 2 or more landoo CPv managed (ac Volume infiltrate	ng drainage to in drainage wners? c-ft) ed (ac-ft) ndary BMP?	South Burlin Residential Yes 0.68 0.68	ngton, BTV
Drainage area (acres) Impervious acres manage % Impervious Land owner of BMP loca BMP Footprint Size (acre BMP Depth (feet) Hydrologic soil group	51.85 ged 15.84 31% ation MS4 Owned es)	MS4s contributir BMP Primary land use 2 or more landow CPv managed (ad Volume infiltrate Primary or secon	ng drainage to in drainage wners? c-ft) ed (ac-ft) ndary BMP?	South Burlin Residential Yes 0.68 0.68 0.68 Primary No Permit	ngton, BTV



#### Picard Circle - 2019



Picard Circle in Fall 2016 – Homes along the Picard Circle cul-de-sac were removed. The cul-desac was removed and the space was used to treat stormwater runoff from City owned streets.

- The Project Reduces theAmount of TSS and TPReaching Centennial Brookand Lake Champlain.
- The Project Provides Flow Reduction Benefits to Centennial Brook (SW Impaired)
- Project Cost: \$695,000
  - Vtrans Grant: \$229,600



















# **Phosphorus Control Plans (PCPs)**

 MS4 permit requires creation of a Phosphorus Control Plan (PCP) due to the Lake Champlain P TMDL.

#### **Reduction Targets**

 Municipally owned (road ROW and parcels) – target is equal to the base load multiplied by the developed lands target for the lake segment.

	Developed Lands
Lake Segment	WLA
South Lake B	21.10%
South Lake A	18.10%
Port Henry	7.60%
Otter Creek	15.00%
Main Lake	20.20%
Shelburne Bay	20.20%
Burlington Bay	24.20%
Malletts Bay	20.50%
Northeast Arm	7.20%
St. Albans Bay	21.70%
Missisquoi Bay	34.20%
Isle La Motte	8.90%

 3-acre sites – the target is a 35% reduction. This is calculated by multiplying to the 50% Water Quality Volume requirement by time 70%, which is the average reduction expected by practices in the 2017 Vermont Stormwater Management Manual. Section 8.2 of the MS4 permit did state that the required reduction was 50%, but that was based on a draft of the standards for the three acre sites and has since changed.





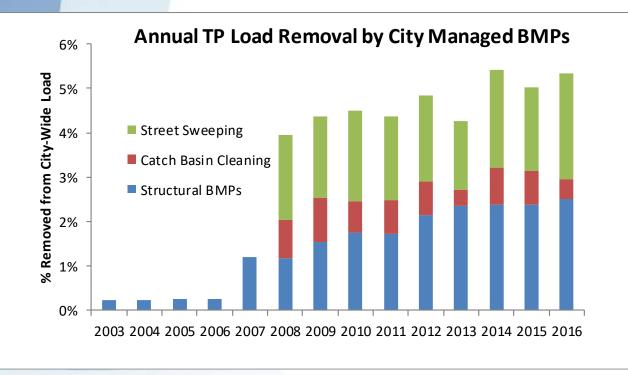


Table	Table 6: Enhanced Sweeping Program P Reduction Credit							
Sweeping Zone	Frequency	Amount of P Load Removed by Enhanced Sweeping Program						
20110		(Ib/year)						
1	Spring & Fall	0.28						
2	Spring & Fall	0.25						
3	Spring & Fall	0.34						
4	Spring & Fall	0.56						
5	Spring & Fall	0.33						
6	Spring & Fall	0.57						
7	Spring & Fall	0.49						
8	Spring & Fall, Summer	0.99						
9	Spring & Fall	0.34						
10	Spring & Fall, Summer	0.64						
11	Spring & Fall	0.72						
12	Spring & Fall	0.64						
13	Spring & Fall	0.32						
14	Spring & Fall	0.32						
15	Spring & Fall	0.82						
16	Spring & Fall	0.19						
	Total	7.80						

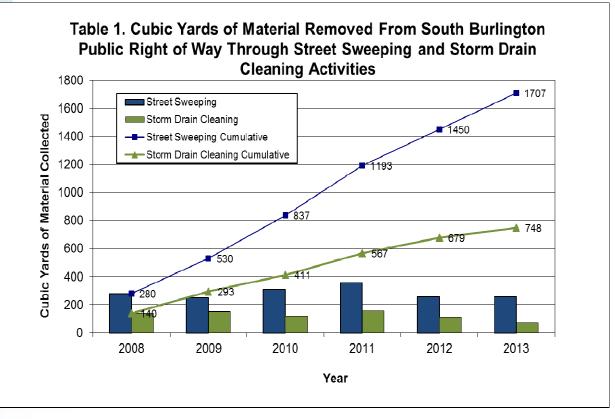




	atch Basin Cleaning P Reduction Credit (MA Method)*	-	c Waste and Leaf Litter Collection Program P duction Credit (MA Method)**		Table 8: Or	ganic Waste and Leaf Litter Collection Program P Reduction Credit (WI Method)***
Sweeping Zone		Sweeping Zone	Amount of P Load Removed by Leaf Litter Collection Program (Ib/year)		Sweeping Zone	Amount of P Load Removed by Leaf Litter Collection Program (Ib/year)
1	0.54	1	1.36		1	1.58
2	0.41	2	1.02		2	3.48
3	0.53	3	1.33		3	2.89
4	0.81	4	2.02		4	6.87
5	0.57	5	1.43		5	4.14
6	0.93	6	2.31		6	6.45
7	0.92	7	2.30		7	6.44
8	1.41	8	3.54		8	0.00
9	0.53	9	1.33		9	4.53
10	1.00	10	2.50		10	0.00
11	1.26	11	3.14		11	10.68
12	0.95	12	2.38		12	6.62
13	0.47	13	1.17		13	0.00
14	0.49	14	1.23		14	4.18
15	1.19	15	2.98		15	8.93
16	0.34	16	0.86		16	2.40
Total	12.36	Total	30.90		Total	69.18
catch b	removing accumulated materials from catch basins (i.e., basin cleaning) in the Watershed such that a minimum storage capacity of 50% is maintained throughout the	roadways and parking lo to December 1 of each y surfaces that are cleared	wastes, organic debris, and leaf litter from impervious ts at least once per week during the period of September 1 ear. Credit can only be earned for those impervious I of organic materials in accordance with the description d removal shall occur immediately following any	1. Me Densi	ty Residential with tion and street clea	-
		achieve a weekly cleani	the Watershed and at additional times when necessary to ng frequency. The permittee must ensure that the disposal ot contribute pollutants to any surface water discharges."	3. A tr curb f may b or gre 4. The and a 5. Mu Nover piles s 6. Wit cleani	ee cover defined as or every 80 linear fe ee counted toward t ater. Field investiga municipality has ar policy stating that r nicipal leaf collectic mber. Leaves may b are left in the street hin 24 hours of leaf ing machines, such a	corm sewer drainage systems. as an average of one or more mature trees between the sidewalk and ever of curb. Where sidewalk is not present, trees within 10 feet of th ree cover. Generally, this equates to a tree canopy over the street or ations or aerial photography may be used to document the tree cover n ordinance prohibiting residents from placement of leaves in the si esidents may place leaves on the terrace in bags or piles for collection on provided at least 4 times spaced throughout the months of Octob te pushed, vacuumed, or manually loaded into a garbage vehicles. No to vernight. collection, remaining leaf litter in the street must be collected usin as a mechanical broom or vacuum assisted street cleaner. A brush er is not an acceptable equivalent."

<

# **PCP** Tracking

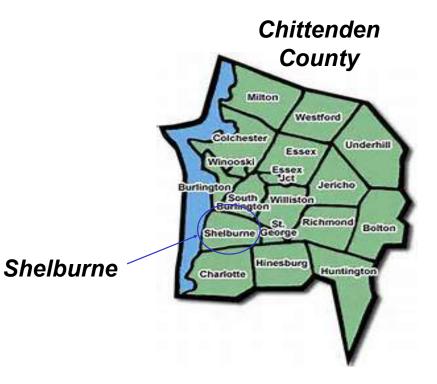






#### **Shelburne Overview**

- Population:  $\sim 7,750$
- Area: 24.3 mi<sup>2</sup>
- Catch Basins: 887
- Major Features:
  - Shelburne Museum
  - Shelburne Farms
  - Vermont Teddy Bear Factory
  - Fiddlehead Brewery





#### Town of Shelburne, Vermont

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P.O. BOX 88 5420 SHELBURNE ROAD SHELBURNE, VT 05482

#### Shelburne's Organizational Structure





### Shelburne Public Works

- Highway Department
  - 4 employees plus 1 mechanic
- Wastewater Department
  - 5 employees
  - Two facilities & 19 pump stations
- Water Department
  - 3 employees distribution system only (no treatment)
- No publics works director







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### Shelburne's Stormwater Requirements

#### MS4 Designated (since 2002)

- Minimum Measures
  - 1 Public Education and Outreach on Stormwater Impacts
  - 2 Public Involvement/Participation
  - 3 Illicit Discharge Detection and Elimination (IDDE)
  - 4 Construction Site Stormwater Runoff Control
  - 5 Post-Construction Runoff control
  - 6 Pollution Prevention & Good Housekeeping
- Flow Restoration Plan (2012) Munroe Brook
- Expired Permits: 12 (7 potential Town-owned)
- Town owned permits: 13 currently







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### Shelburne's Stormwater Infrastructure

- Catch Basins: 887
- Outfalls: 101
- Conveyance: Unknown
- Culverts: Unknown







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### Shelburne's Stormwater Management Timeline

- 2002 Issued MS4 Permit
  - Town Manager and Director of Planning & Zoning
- 2005 PW Director hired stormwater focus
- 2012 New MS4 Permit issued
  - PW Director resigns
- 2014 Town Manager Retires
  - New Town Manager No time or technical background
- 2015 Water Quality Superintendent
  - Wastewater & Stormwater
- 2016 South Burlington Agreement









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### Shelburne's Needs

- Management, equipment, expertise
- Update our GIS data for Stormwater Infrastructure
- Revise Stormwater Management Plan
- Annual stormwater inspections (13 sites)
- Annual storm drain cleaning
- Bi-Annual street sweeping
- Site-plan review
- Technical assistance







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## **Current Annual Cost**

- 12 Stormwater Permits \$11,500
- South Burlington Contract \$50,000
- MS4 Permit \$5,133
  - Minimum Measures
  - Flow Restoration Plan \$12
  - Flow Monitoring

\$12,500 \$12,200

\$11,800

• TOTAL ANNUAL COST \$103,133



#### Town of Shelburne, Vermont

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### **Future Expected Costs**

- Additional annual costs in near future
  - Flow Restoration Projects \$450,000/yr
  - Municipal Roads Permit \$3,361/yr
  - Phosphorus Control Plan Unknown
  - Expired Permits Unknown
  - "3 Acre" Permit Unknown
  - South Burlington Contract Unknown



#### Town of Shelburne, Vermont

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# Shelburne & South Burlington SW Agreement

- Inter-Municipal agreement in place that allows Shelburne to obtain assistance from South Burlington SW Utility for specific tasks.
- Assistance limited to \$50,000 for FY17.
- Includes both "field work" and "administrative work".



Town of Shelburne, Vermont

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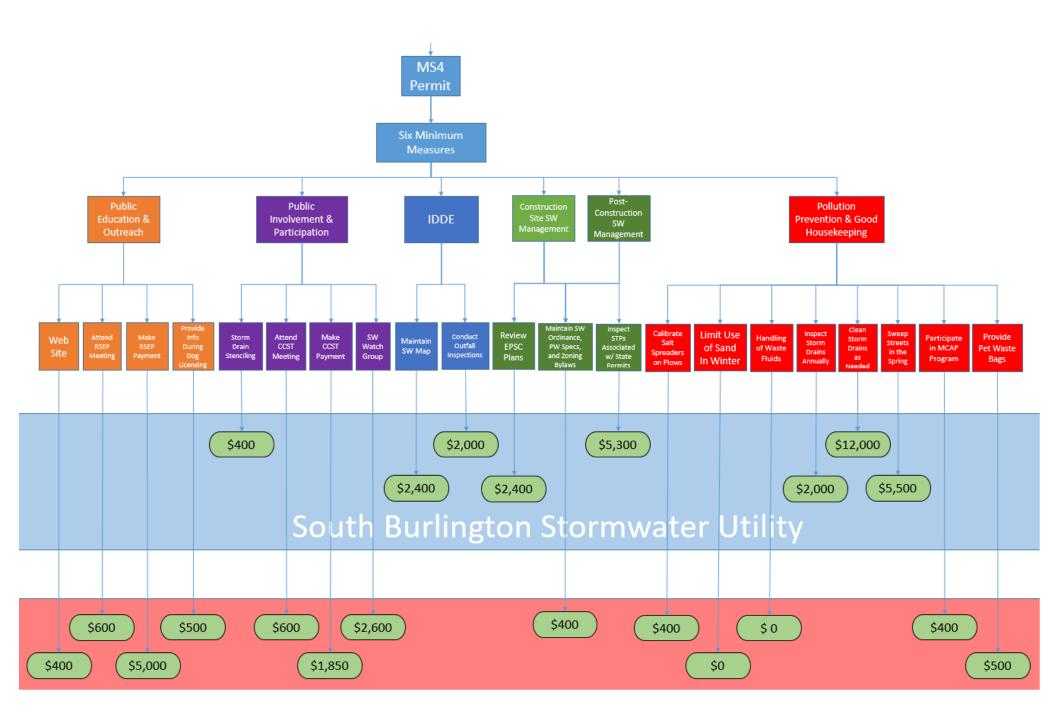
# Shelburne & South Burlington SW Agreement

- Storm drain cleaning and street sweeping have already been completed under this agreement.
- The City is currently working with the Town of Shelburne to revise their Stormwater Management Plan (SWMP) and Stormwater Ordinance.



Town of Shelburne, Vermont

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## Benefits of Inter-Municipal Agreement: South Burlington

- Allows us to more efficiently utilize our equipment.
  - Street sweepers are parked for much of the year.
- Helps us pay for our equipment.
  - Added line item for revenue.
- Allows us to hire additional staff.
- Watersheds cross political boundaries. Municipalities need to work together to find the most effective solutions.
- Allows us to share the expertise we've gained with others.



#### Town of Shelburne, Vermont

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## **SB Stormwater Utility Assets**

- Two (2) vacuum assisted street sweepers (~\$250,000 each)
- Two (2) vacuum trucks (\$500,000 each)
- One (1) small excavator (\$52,000,shared with highway department)
- One (1) large excavator (\$180,000, shared with highway department)
- One (1) dump truck (\$150,000)
- Two (2) pickup trucks (~\$28,000 each)
- Multiple mowers and attachments (shared with highway department)



Town of Shelburne, Vermont

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## Benefits of Inter-Municipal Agreement: Shelburne

- Allows them to forego additional staffing & equipment
- Allows them to partner with an industry leader
- Allows them to retain local control
- Allows them one-stop shopping
  - Maintenance equipment & manpower
  - Technical expertise permitting & design review
  - Management policies and potential stormwater billing
- Economy of scale
- Why reinvent the wheel?



#### Town of Shelburne, Vermont

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# Moving Forward...

- Shelburne is working to develop policies and procedures
  - Development regulations
  - Inspection reports
  - Annual reporting
  - Expired permit policy
  - Etc.
- Get community buy-in



#### Town of Shelburne, Vermont

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# Why Don't We See More of This?

- No strong county government to enable this.
- Municipalities want to retain control of operations and "do things their own way".
- Difficult determining a workable structure.
- Concerns over accountability.





#### Town of Shelburne, Vermont

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## **Contact Information**

David Wheeler Stormwater Project Manager, South Burlington (802) 658-7961 dwheeler@sburl.com



www.sburlstormwater.com

