



COON CREEK
WATERSHED DISTRICT

Street Sweeping Study Findings

4/11/2024 | TAC Meeting

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Background

- As of 2020, all MS4s (CCWD, Cities, Road Authorities) are required to track progress towards meeting required TMDL pollutant reductions since the baseline year of each impaired waterbody (2009-2012)
- Growing recognition for street sweeping as WQ improvement practice
- In 2022, MN Pollution Control Agency launched a Street Sweeping Credit Calculator to provide water quality credits for sweeping

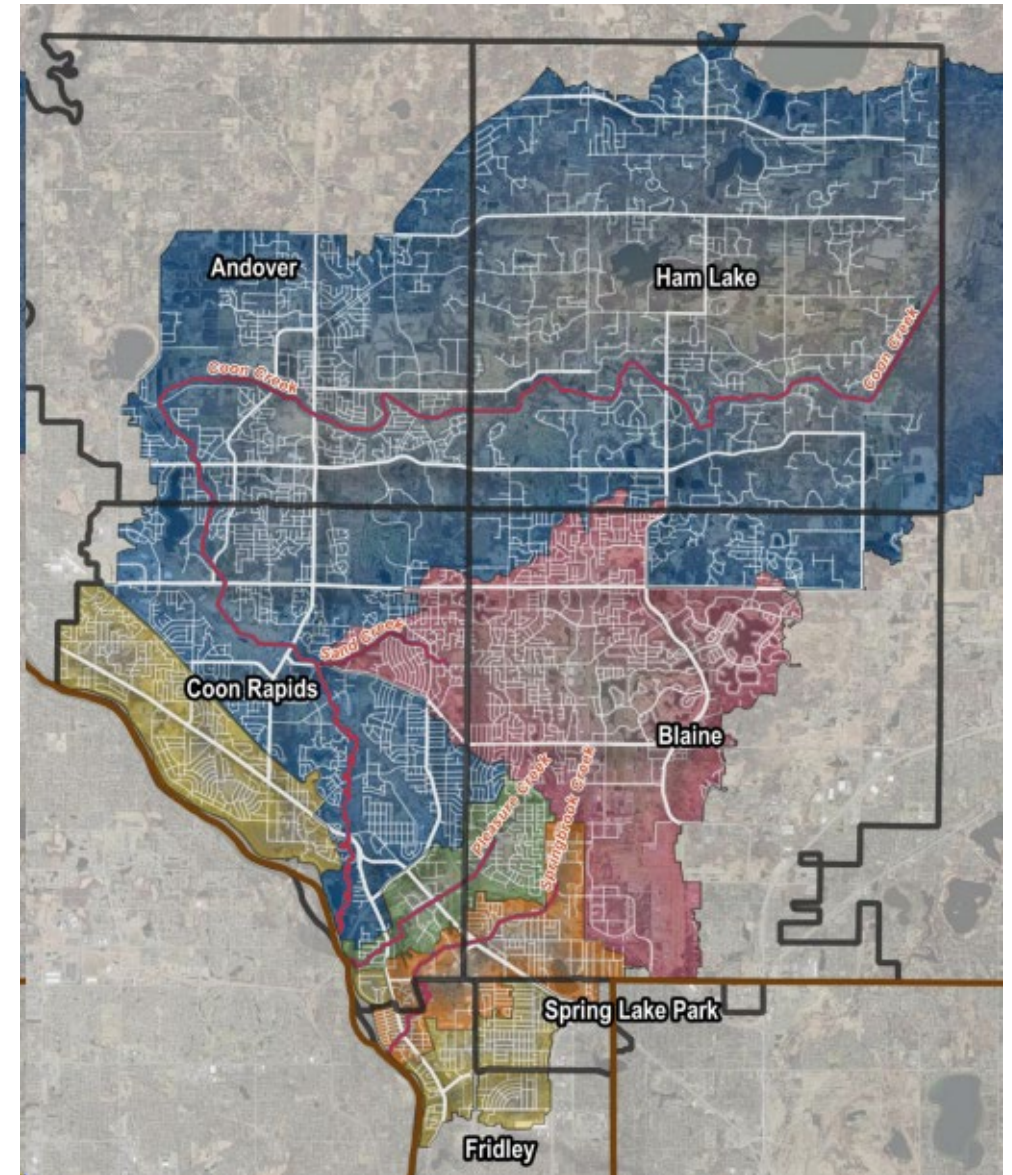


2022-23 CCWD Sweeping Study

Purpose

Phase 1: Quantify pollutant reductions/credits associated with Districtwide sweeping activities (2009-2022) to fulfill TMDL compliance reporting requirements

Phase 2: Provide recommendations for cost-effective enhanced sweeping strategies to address water quality impairments



Phase 1 Methods

1. Inventory of past and present sweeping activities for all MS4s (2009-2022)
2. Calculate credits using MPCA Sweeping Calculator
 - Miles Swept
 - Mass/Volume

Eligible Credits = Current year Credits – TMDL Baseline Year Credits

3. Summarize credits by year for each MS4 and receiving water



Phase 1 Results



Example: TP credits (lbs) for Coon Creek

MS4	Calculator Method	2009		2022		Eligible Credits
		Lane-miles swept	TP Credits (lbs)	Lane-miles swept	TP credits (lbs)	
ACHD	Volume	230	653	230	653	0
Andover	Mass	413	81	574	370	289
Blaine	Volume	230	108	294	202	94
Coon Rapids	Volume	1351	1685	1351	1685	0
Ham Lake	Miles Swept	260	0.06	557	0.13	0.07
TOTAL		2484	2527	3006	2910	383



Phase 1 Key Findings

1. Big discrepancy on the benefits of sweeping “on paper” vs “in reality”
 - MS4s removing the most pollutants have largely been doing so since 2009 = no credits
 - Record-keeping method more impactful than sweeping effort for calculating credits...
 - MPCA calculator is based on pollutant recovery, not necessarily reduction at the stream
2. Current sweeping efforts result in the following “on paper” benefits:

Receiving Water	Eligible TP credits (lbs)	% TMDL goal achieved (WLA, LA)
Coon Cr	383 + 344	5%
Sand Cr	344	32%
Pleasure Cr	71	>100%
Springbrook Cr	82	18%



Phase 2: Cost-Benefit Analysis

Methods

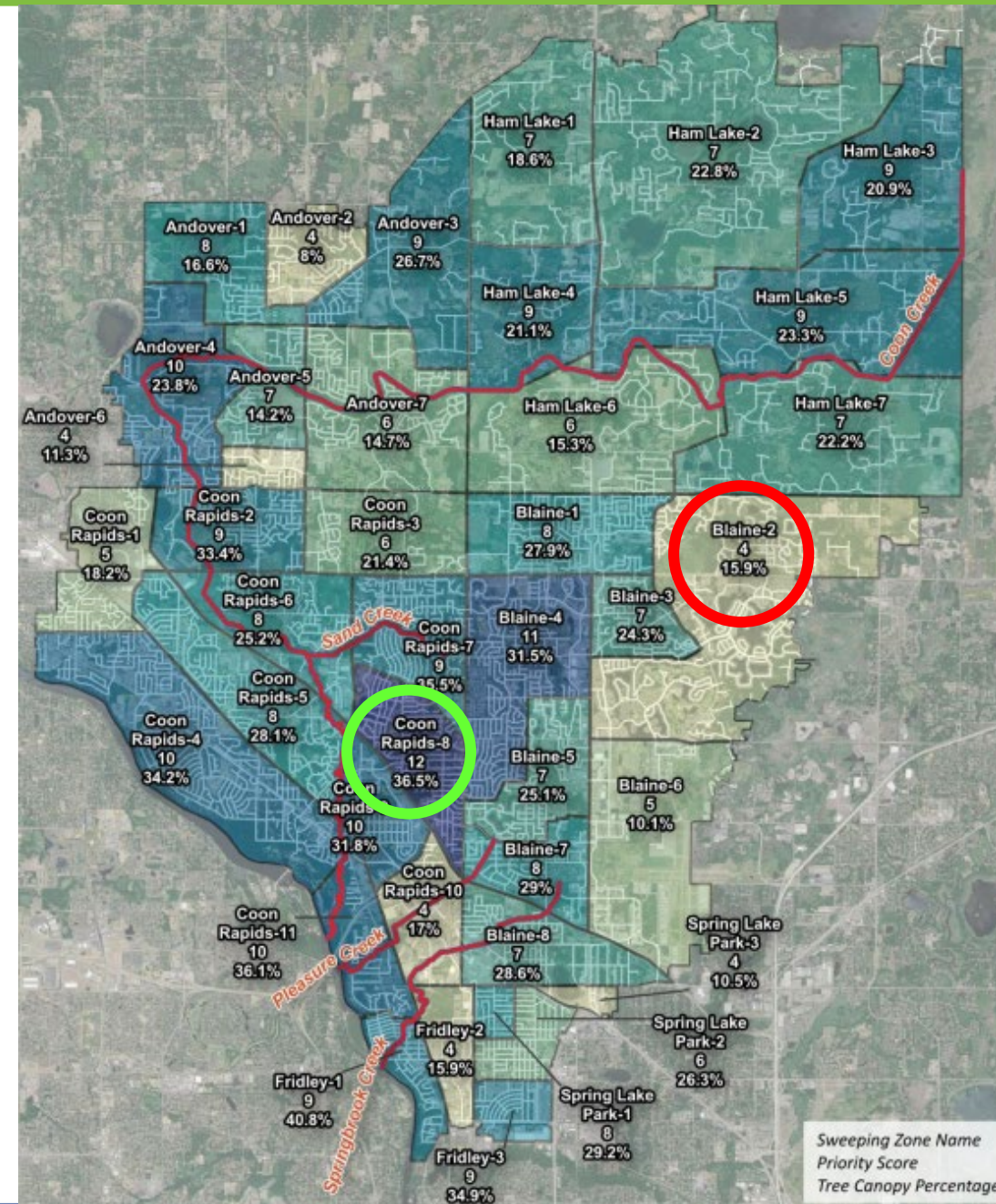
1. Compile sweeping program costs for each MS4: Operation, Disposal, & Depreciation
2. Prioritize sweeping zones considering pollutant source, fate, & transport
3. Model a range of enhanced sweeping scenarios
 - 2022 baseline > optimized existing effort > increased effort (4-12x per year)
 - Model TP and TSS **reduction** using UMN Clean Sweep Calculator (w/ MPCA approval)
4. Make recommendations for each MS4 based on pollutant reduction per unit effort and cost-effectiveness



Phase 2 Results:

Priority Scores (4-12)

*Tree Canopy
Existing BMPs
Connectedness*



Phase 2 Results: Pollutant Recovery

~8 sweeps per year (monthly Apr-Nov) is point of diminishing returns for average sweeping zone

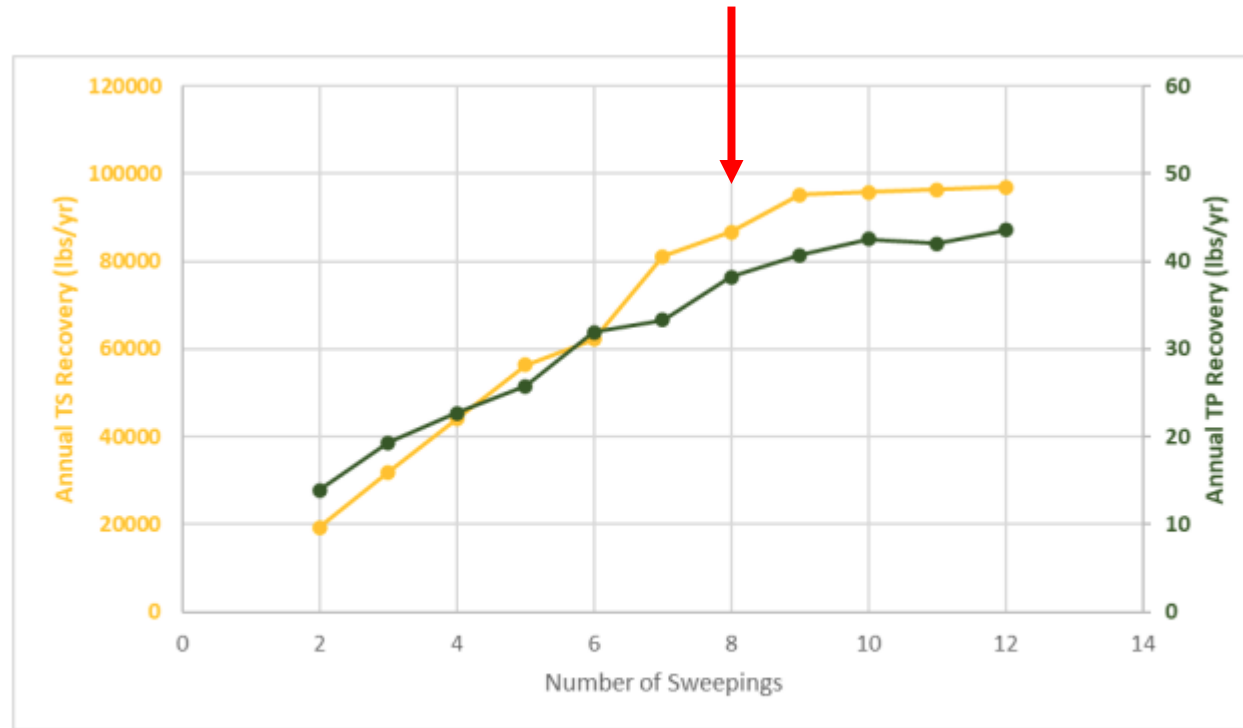
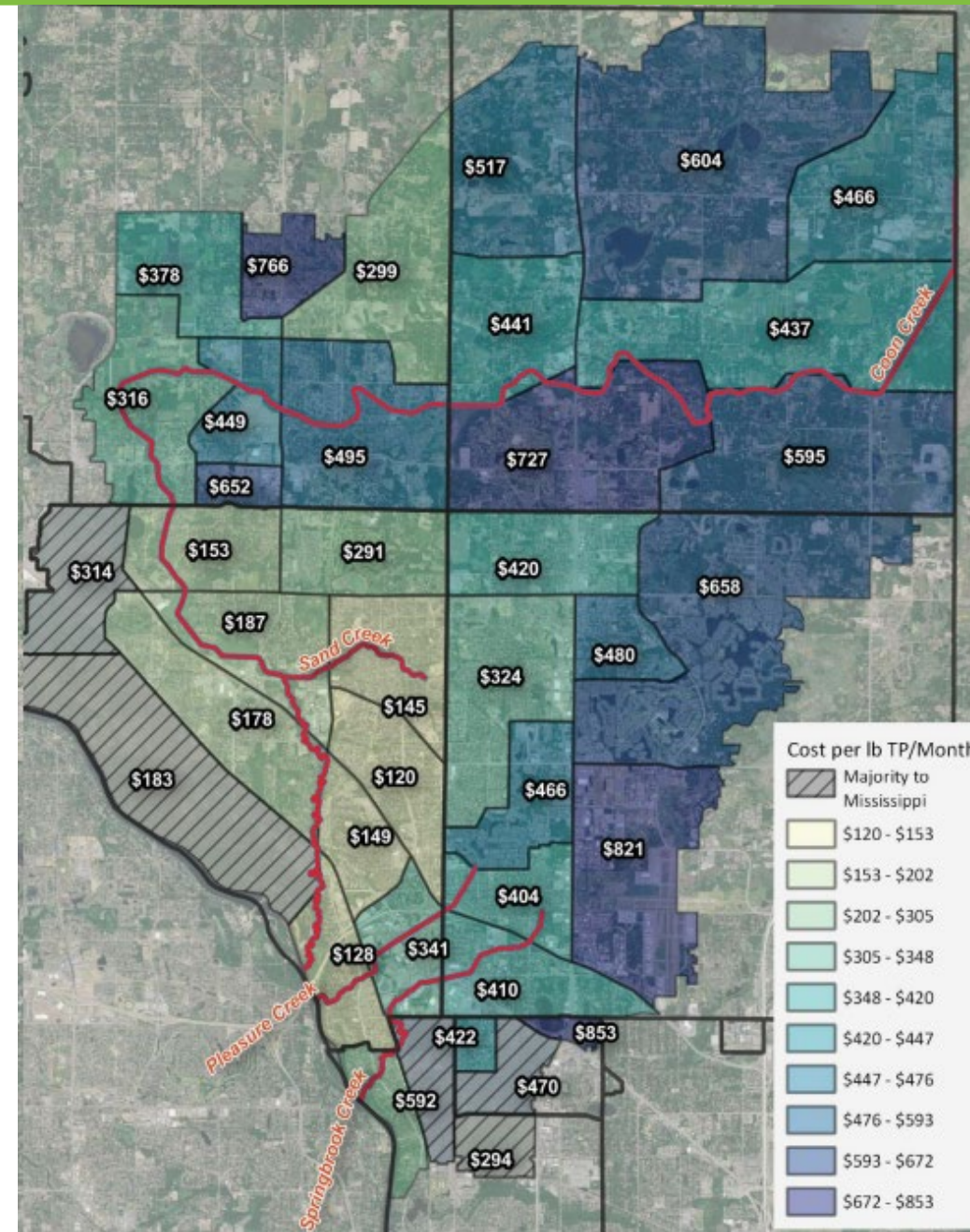


Figure 8 Annual pollutant recovery predicted for each sweeping schedule for a representative zone with 20 lane-miles and 15% tree canopy percentage.



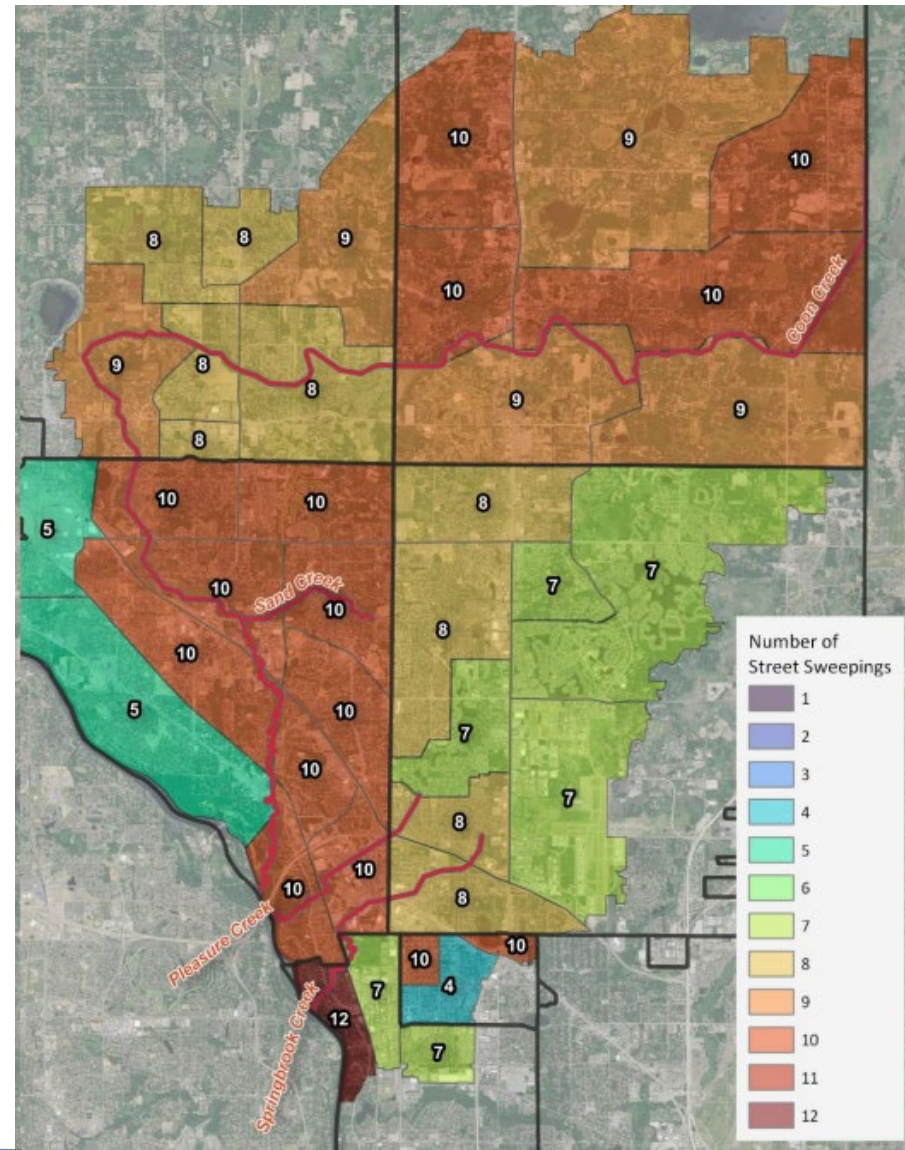
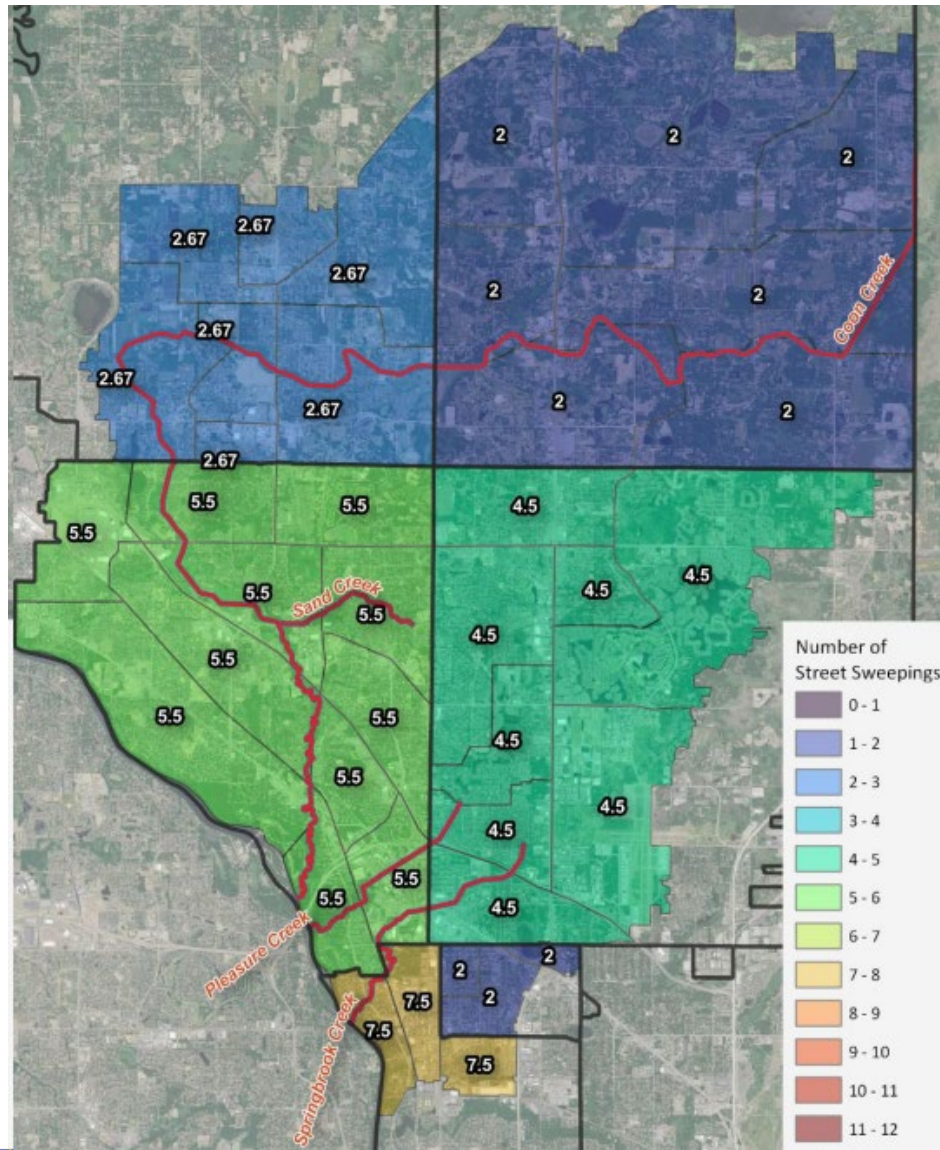
Phase 2 Results: Cost-effectiveness

\$120-853 per lb TP
(monthly sweeping scenario)



Phase 2 Results: Sweeping Scenarios

Existing
(2022)



+ 3
Sweepers
Districtwide



Phase 2 Results: MS4-specific Recommendations

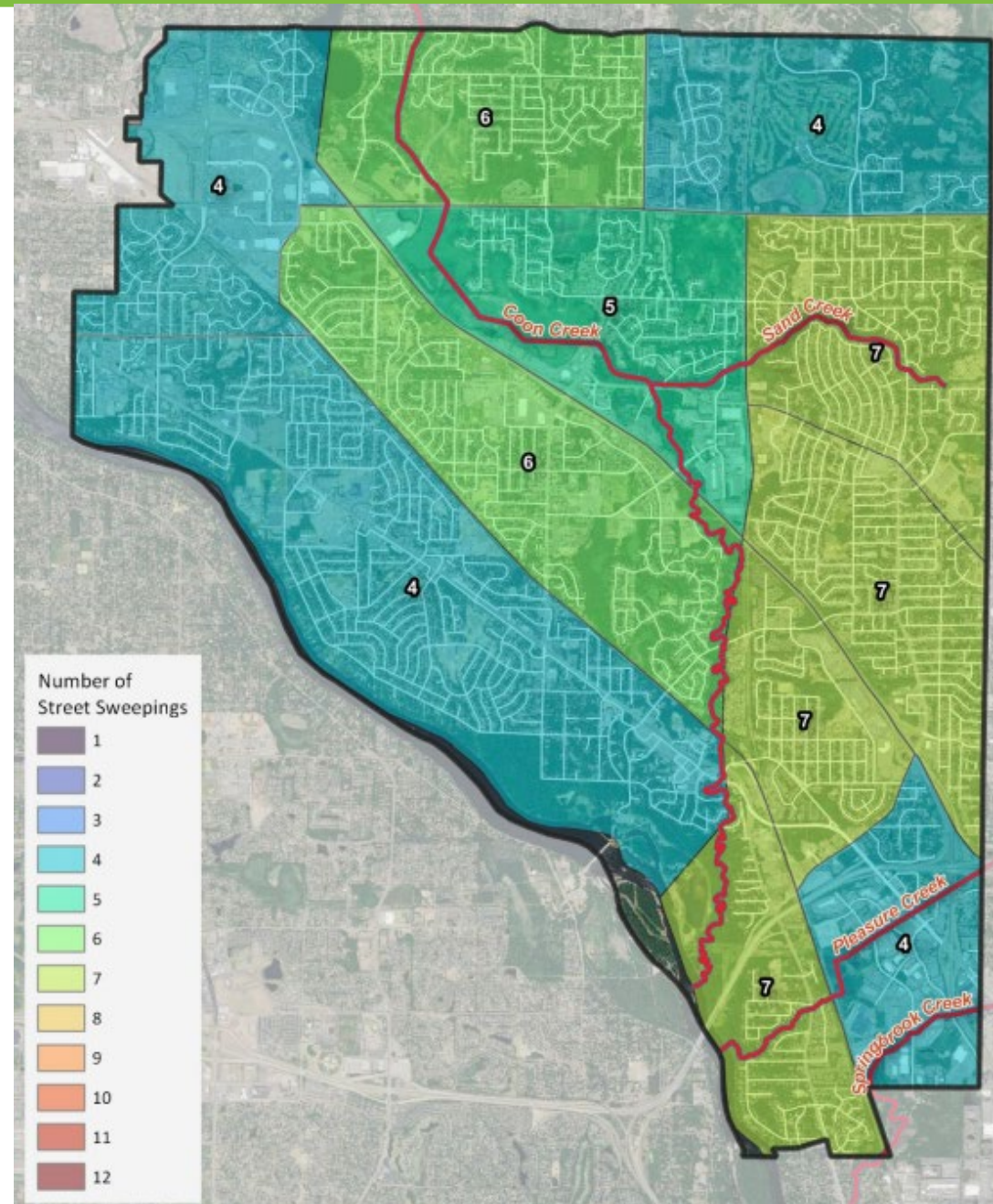
Optimizing existing level of effort in Coon Rapids

Same # lane miles swept
(2465)

2% more TP (20 lbs)

12% more TSS (3.6 tons)

+\$939/yr (disposal)



Phase 2 Results: Summarized Results

Stream	Estimated TP Removal by scenario (lbs)					
	TMDL Baseline	2022 Baseline	Optimized existing effort	+ 1 sweeper (4-7x/y)	+ 3 sweepers (7-10x/y)	Max (12x/yr)
Coon	925	1075	1185	1424	2084	2233
Sand	470	471	498	512	742	854
Pleasure	86	86	92	93	136	156
Springbrook	140	157	173	180	245	265
TOTAL (lbs)	1621	1789	1948	2209	3207	3508
<i>Additional lbs</i>			<i>+159</i>	<i>+420</i>	<i>+1418</i>	<i>+1719</i>
<i>Additional cost</i>			<i>\$24,000</i>	<i>\$190,000</i>	<i>\$706,000</i>	<i>\$1.24M</i>
<i>Add'l cost/lb</i>			<i>\$151</i>	<i>\$452</i>	<i>\$497</i>	<i>\$721</i>



Phase 2 Findings

- Enhanced sweeping for water quality is a cost-effective practice for all MS4s!
 - Sweeping all streets 4x per year is minimum recommendation
 - Realistic long-term goal of 7-10x per year would cost addt'l \$706,000 (<\$500 per lb TP)
- Optimizing & increasing sweeping effort within the District could result in achieving a significant portion of joint TMDL reduction goals for TP across the 4 impaired streams:

Stream	% TMDL GOAL (TP WLAs)			
	Current (2022)	Optimized Effort	+ 3 sweepers (7-10x/yr)	Maximum (12x/yr)
Coon	2%	4%	19%	22%
Sand	0.1%	3%	29%	41%
Pleasure	0%	21%	>100%	>200%
Springbrook	4%	7%	23%	28%



Implications

1. The District is now positioned to provide needed technical assistance to our road authorities
 - Tracking progress/ credits
 - Enhanced sweeping recommendations
2. The District should continue to incentivize enhanced sweeping
 - Need to identify specific constraints/ barriers to implementation for each MS4
 - Consider increasing annual cost share budget (currently \$100K; \$135K requested in first year)
 - Foster buy-in from operators & decision-makers
3. Street sweeping is not a silver bullet; other watershed BMPs and in-channel improvements will be needed to meet TMDL goals (especially for Coon Creek)



Questions?



Phase 2 Results: Summarized Results

Table 28 Additional TP Credits for each Stream, MS4, and Scenario

Stream	MS4	TP Credits							
		TMDL Baseline ¹	2022 Base	Optimized Existing Effort	Enhanced Baseline	1 Additional Sweeper	3 Additional Sweepers	5 Additional Sweepers	Maximum
Coon Creek	Andover	144	181	184	235	253	407	450	450
	Anoka County	60	60	78	97	108	164	187	187
	Blaine	69	69	68	66	68	104	127	127
	Coon Rapids	571	571	621	571	648	828	858	862
	Ham Lake	81	194	234	317	347	581	607	607
	Total	925	1075	1185	1286	1424	2084	2229	2233
Pleasure Creek	Anoka County	5	5	7	8	9	13	15	15
	Blaine	52	52	57	52	54	80	97	97
	Coon Rapids	29	29	28	29	30	43	44	44
	Total	86	86	92	89	93	136	156	156
Sand Creek	Anoka County	22	22	25	36	38	61	70	70
	Blaine	313	313	320	313	318	480	578	578
	Coon Rapids	135	135	152	135	155	199	204	204
	Ham Lake	0.3	0.8	0.8	1.3	1.3	2.3	2.4	2.4
	Total	470.3	470.8	497.8	485.3	512.3	742.3	854.4	854.4
Springbrook Creek	Anoka County	8	8	10	13	14	21	24	24
	Blaine	67	67	74	67	74	109	124	124
	Coon Rapids	15	15	16	15	16	22	23	23
	Fridley	43	60	64	60	64	72	73	73
	Spring Lake Park	6.7	6.7	8.9	11	12	21	21	21
	Total	139.7	156.7	172.9	166	180	245	265	265

¹The TMDL Baseline predicted load reduction may differ from Phase 1 credits because of the method used to estimate the credits. If the MS4 currently tracks sweepings mass or volume they should continue to do so because they will receive more credits.

