

Project Name	Forest Lake Street Sweeping Management Plan	Date	7/20/2017
To / Contact info	Comfort Lake Forest Lake Watershed District Board of Managers		
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Regarding	Key Preliminary Findings from the Forest Lake Street Sweeping Management Plan		

In 2016, the CLFLWD successfully applied for a Clean Water Fund Grant to develop a Street Sweeping Plan for the City of Forest Lake. Street sweeping can be an effective source control BMP for reducing solids and nutrient loads to waterbodies which receive runoff from roadways – especially where runoff is not intercepted by stormwater BMPs. The objective of the Street Sweeping Plan included identification of areas that would most benefit from enhanced street sweeping based on the length and type of roadway, tree canopy cover, and presence of downstream BMPs; and to estimate the potential phosphorus load reduction to downstream waterbodies for different sweeping frequencies. A sample of the results is included as an Appendix to this memo.

The goal of this project is to develop a formal agreement between the CLFLWD and the City of Forest Lake to implement enhanced street sweeping for the protection of Forest Lake and other resources in the City of Forest Lake. Findings of the analysis will be used by the City of Forest Lake to develop a 2018 Clean Water Fund Grant application for purchase of a regenerative air street sweeper. The City currently uses a contract sweeping service for sweeping. The analysis indicates that in-house sweeping would be significantly more cost-effective than continued use of a contract service. Key findings of the analysis are summarized below.

Key Findings

- Street sweeping is an effective source control BMP:
 - The City of Forest Lake currently has all paved streets swept once each in the spring and fall, recovering a total of approximately 128 pounds of phosphorus from the streets. Adding one additional sweep in the spring and fall can increase phosphorus recovery by about 56%, to 200 pounds per year. This includes portions of the City within the Comfort Lake Forest Lake Watershed District and the Rice Creek Watershed District.
 - The City of Forest Lake has approximately 23 miles of street (46 curb-miles) that drain directly to Forest Lake.
 - The 2017 Forest Lake Diagnostic study estimated that the total phosphorus load to Forest Lake from the direct drainage area is approximately 370 lb/yr, with a 26% reduction needed to achieve long-term District goals for Forest Lake. Current street sweeping operations are estimated to reduce loading to Forest Lake from these areas by about 28 lb/yr. Increasing sweeping frequency to once per month in these areas could decrease phosphorus loading to Forest Lake by 64 lb/yr, or 17% of the total direct drainage load.

- For in-house sweeping, phosphorus reduction through street sweeping can be very cost-effective. For streets draining directly to Forest Lake, phosphorus may be recovered for as little as \$167/ lb for spring and fall sweeping.
- In-house sweeping is significantly more cost effective than using a contract service:
 - In-house sweeping could reduce the cost of current sweeping operations (spring/fall sweeping) by about half compared to the cost of contract sweeping. This calculation is based on a 10-year depreciation valuation of the street sweeper (Figure 1).
 - With an in-house program, the City could increase sweeping frequency to monthly, or more, for the same cost as the current street sweeping service contract.
 - An in-house sweeping program would better enable the City to target streets that act as pollutant 'hot spots' (e.g. drain directly to a lake or resource, are heavily canopied, or susceptible to sediment tracking).
 - For an in-house program, the annual cost of sweeping may be comparable, or less, than the cost to design and install new structural BMPs.

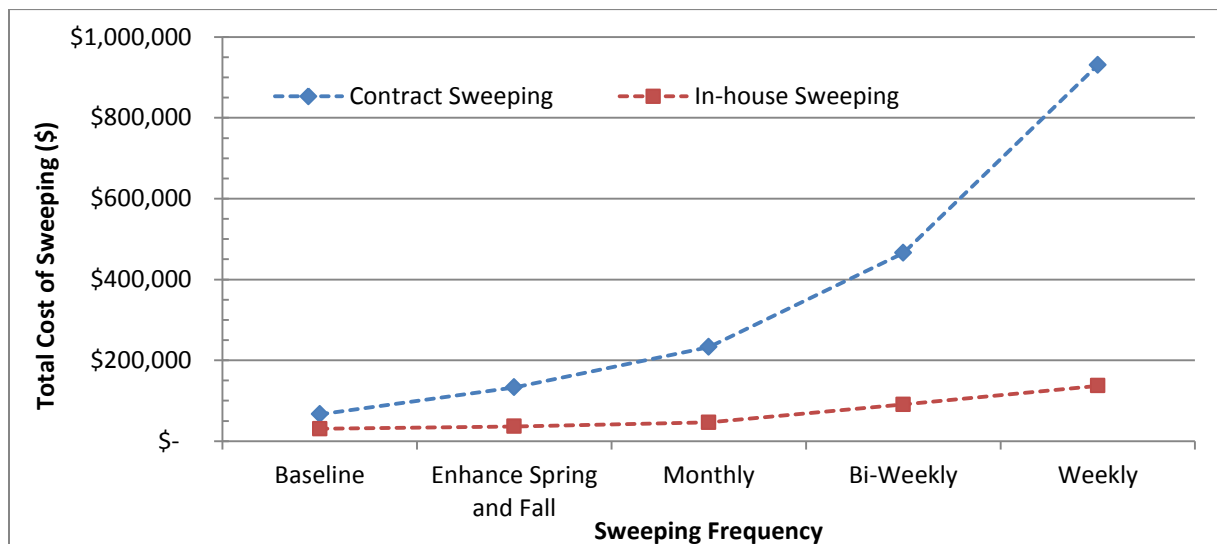


Figure 2. Estimated total cost of sweeping vs. number of sweepings for contract and in-house street sweeping (all swept streets).

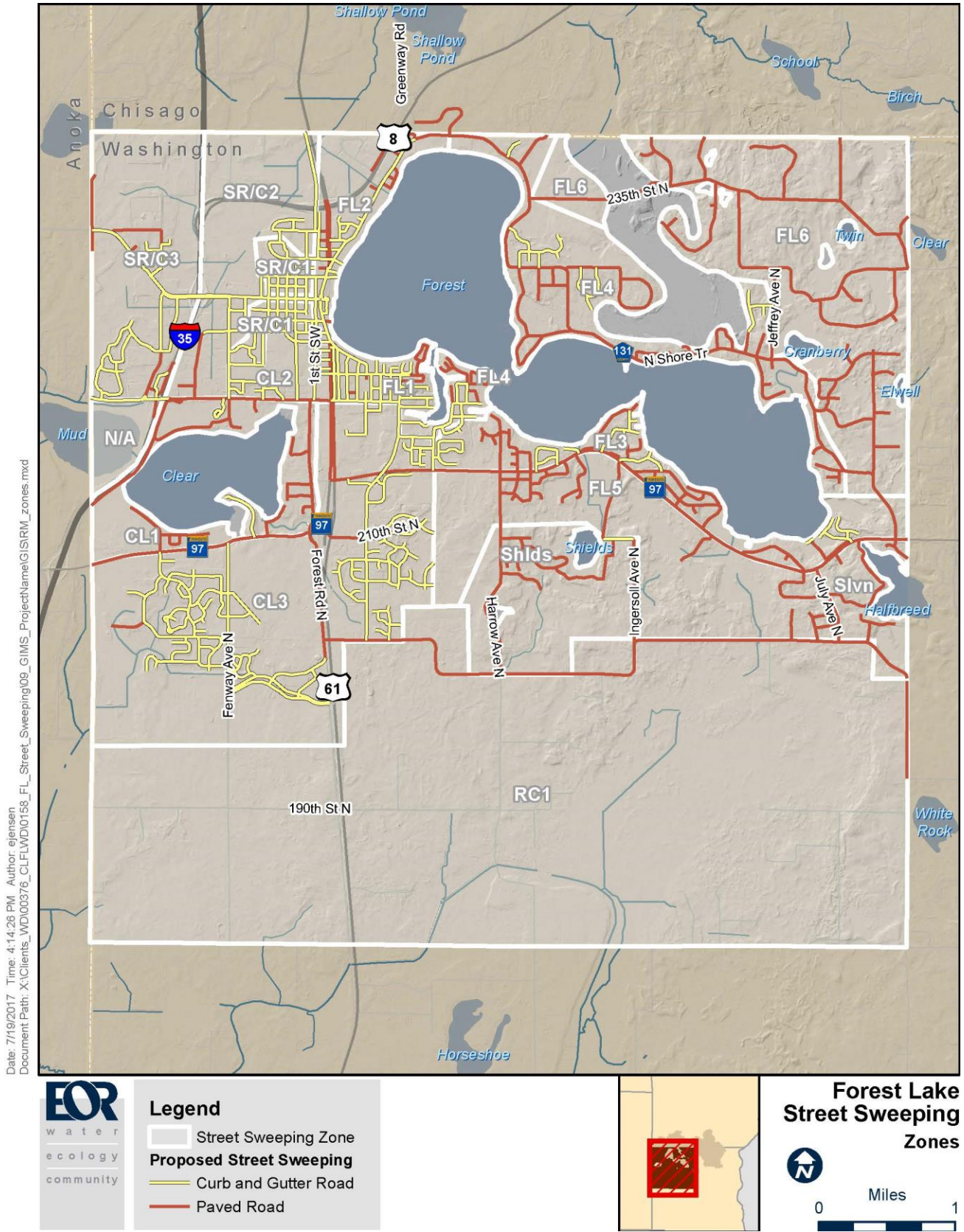


Figure 2. Map of proposed street sweeping zone, Draft City of Forest Lake Street Sweeping Plan

APPENDIX A– Sample of preliminary load reduction and cost estimates for baseline, enhanced baseline, and monthly sweeping scenarios.

		LOAD REDUCTION				COSTS			
		Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping		City-Owned Sweeper	
		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper					
Waterbody	Curb-miles	TS	TP	TS	TP	\$	\$/lb-P (REDUCTION)	\$	\$/lb-P (REDUCTION)
BASELINE Sweeping (once each spring and fall)									
Clear Lake	70.2	1,768	5.7	2,210	7.1	\$ 19,544	\$ 2,758	\$ 8,899	\$ 1,256
Forest Lake	115.9	36,822	32.6	46,028	40.8	\$ 32,293	\$ 791	\$ 14,736	\$ 361
Shields Lake	5.4	676.4	0.6	845.5	0.7	\$ 1,504	\$ 2,074	\$ 685	\$ 946
Sylvan Lake	5.4	961.6	0.8	1202.0	1.0	\$ 1,512	\$ 1,467	\$ 690	\$ 669
Sunrise River/Comfort Lake	41.8	6,629	5.7	8,286	7.1	\$ 11,648	\$ 1,643	\$ 5,305	\$ 749
TOTAL		46,857	45.4	58,571	56.7	\$ 66,500	\$ 1,172	\$ 30,315	\$ 534
ENHANCED BASELINE Sweeping twice each spring and fall)									
Clear Lake	70.2	2,721	8.4	3,572	11.0	\$ 39,087	\$ 3,542	\$ 10,737	\$ 973
Forest Lake	115.9	56,966	48.9	74,804	64.0	\$ 64,585	\$ 1,010	\$ 17,795	\$ 278
Shields Lake	5.4	1041.3	0.9	1366.8	1.1	\$ 3,007	\$ 2,673	\$ 827	\$ 736
Sylvan Lake	5.4	1480.3	1.2	1943.1	1.6	\$ 3,025	\$ 1,891	\$ 832	\$ 520
Sunrise River/Comfort Lake	41.8	10,203	8.4	13,393	11.0	\$ 23,295	\$ 2,120	\$ 6,402	\$ 583
TOTAL		72,412	67.8	95,079	88.7	\$ 133,000	\$ 1,499	\$ 36,594	\$ 413
MONTHLY Sweeping									
Clear Lake	70.2	4,096	11.8	5,536	15.9	\$ 68,403	\$ 4,307	\$ 13,531	\$ 852
Forest Lake	115.9	85,308	67.9	115,293	91.2	\$ 113,024	\$ 1,239	\$ 22,440	\$ 246
Shields Lake	5.4	1567.2	1.2	2118.0	1.6	\$ 5,262	\$ 3,238	\$ 1,043	\$ 642
Sylvan Lake	5.4	2228.0	1.7	3011.1	2.3	\$ 5,294	\$ 2,291	\$ 1,049	\$ 454
Sunrise River/Comfort Lake	41.8	15,357	11.8	20,755	15.8	\$ 40,767	\$ 2,578	\$ 8,069	\$ 510
TOTAL		108,556	94.5	146,713	126.9	\$ 232,750	\$ 1,835	\$ 46,133	\$ 364