

2021 Regenerative Air Street Sweeper Report City of Plymouth – December 2021

Background

City of Plymouth purchased a Tymco 500X Regenerative Air Street (RAS) sweeper to collect fine sediment and debris more effectively with financial assistance from the Bassett Creek Watershed Management Commission, Elm Creek Watershed Management Commission, and Shingle Creek Watershed Management Commission. A requirement of the financial assistance includes annual reporting of use and effectiveness of the RAS sweeper.



RAS Sweeper near Medicine Lake



Example sweepings pile

The City's 2018 street sweeping policy assists in meeting the requirements of Municipal Separate Storm Sewer System (MS4) permit as a best management practice to reducing the amount of solids, nutrients, and chlorides entering water bodies throughout the City across all four watersheds.

Total Swept Length

Table 1 below outlines the total number of curb miles swept within the City, separated by cost participating watershed. Curb miles includes lane miles of local roadway (curb or no curb) and lane miles of concrete median swept. The mileage within the Bassett Creek Watershed includes contract sweeping miles the City completes for the City of Medicine Lake. In total the City has operated the sweeper for 1,075 hours since purchased in spring 2020.

Table 1: Summary of Curb Miles Swept by Watershed

Watershed	Total Curb Miles Swept
Bassett Creek Watershed	368
Elm Creek Watershed	87
Shingle Creek Watershed	140
Total	595

Note: Minnehaha Creek Watershed District is not a funding partner of the sweeper.



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Estimated Pollutant Removals

Table 2 below shows the summary of total pounds of Total Phosphorus (TP) and Chloride (Cl⁻) collected within the Bassett Creek Watershed district in 2020 and 2021. Table 3 shows the use and reporting requirements by zone number including associated downstream waterbodies, sweeping start date, curb miles swept, and estimated pollutant load reduction per curb mile of TP and Cl⁻ as estimated from random sampling done with spring and fall sweeps. See the appendix of this report for a map of sweeping zones in the City.

Table 2: Removal Summary for Bassett Creek Watershed

	Bassett Creek Watershed Estimated Pollutant Removals			
	2020 TP	2020 Cl ⁻	2021 TP	2021 Cl ⁻
Average Per Zone (lbs)	13.68	5.14	10.04	9.66
Total Annual Removal (lbs)	232.48	87.37	169.45	163.09

Note: Values calculated based on random sampling of street sweeping material at the University of Minnesota Soil Testing Laboratory and Three Rivers Park District Water Resources Laboratory

Table 3: Annual Sweeping Reporting by Zone

Zone	Curb Miles	Downstream Waterbody	2020 Spring Sweep Date	2020 Fall Sweep Date	2021 Spring Sweep Date	2021 Fall Sweep Date	Estimated Annual Pollutant Removals (Pounds)			
							2020 TP	2020 Cl ⁻	2021 TP	2021 Cl ⁻
1B	11.9	Medicine Lake	6/16	9/2	4/7	9/7	7.52	2.83	5.52	5.32
1C	4.6	Northwood Lake	6/22	9/4	3/26	9/9	2.91	1.09	2.14	2.06
2A	22.8	Parkers Lake	5/29	9/9	4/8	9/14	14.42	5.42	10.58	10.19
3A	26.8	Medicine Lake & Bassett Creek	6/4	9/14	4/9	9/16	16.94	6.37	12.44	11.98
3B	27.3	Plymouth Creek & Medicine Lake	6/9	9/17	3/26	9/6	17.26	6.49	12.67	12.20
3C	24.7	Medicine Lake	6/18	8/25	4/15	9/3	15.62	5.87	11.47	11.04
3D	22.2	Lost Lake & Northwood Lake	6/20	8/26	4/19	9/1	14.04	5.27	10.31	9.92
4A	30.1	Turtle Lake & Plymouth Creek	6/11	9/17	4/29	9/17	19.03	7.15	13.97	13.45
4B	27.1	Plymouth Creek	5/29	10/14	4/6	11/4	17.13	6.44	12.58	12.11
4C	10.6	Plymouth Creek	6/23	9/10	3/22	9/9	6.70	2.52	4.92	4.74
4D	12.2	Medicine Lake	6/19	9/17	4/20	9/10	7.71	2.90	5.66	5.45
5A	37.9	Cavanaugh Lake & Medicine Lake	5/29	9/4	5/21	9/16	23.96	9.01	17.60	16.93
5C	36.1	Plymouth Creek & Parkers Lake	6/2	9/15	3/5	10/1	22.82	8.58	16.76	16.13
5D	16.6	Northwood Lake	6/22	9/11	4/27	8/31	10.50	3.94	7.71	7.42
6B	31	Plymouth Creek	6/11	8/31	4/6	9/20	19.60	7.37	14.39	13.85
6C	23.4	Plymouth Creek	6/15	10/8	3/25	9/20	14.79	5.56	10.86	10.46
6D	2.4	Plymouth Creek	6/4	10/13	4/28	9/17	1.52	0.57	1.11	1.07

Notes: - Sweep date refers to start date or the primary date zone was swept.

- Samples were analyzed by University of Minnesota Soil Testing Laboratory and Three Rivers Park District Water Resources Lab



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RAS Sweeper Funding

Breakdown of funding for the purchase of the RAS sweeper is found in Table 4. Ongoing operations and maintenance costs are paid by the City.

Table 4: RAS Funding Summary

Funding Agency	Funding Amount
Bassett Creek Watershed Management Commission:	\$75,000
Elm Creek Watershed Management Commission:	\$29,715
Shingle Creek Watershed Management Commission:	\$75,000
City of Plymouth:	\$136,328.23
Total Purchase Price (State Contract Pricing)	\$316,043.23

In addition to this report, attached is a request to the Bassett Creek Watershed Management Commission for reimbursement of \$75,000 per the “Cooperative Agreement for Cost Share Purchase of High Efficiency Street Sweeper ML-23” between the City of Plymouth and the Commission. The City is grateful for this partnership to assist with improving water quality and protections.

Sincerely,

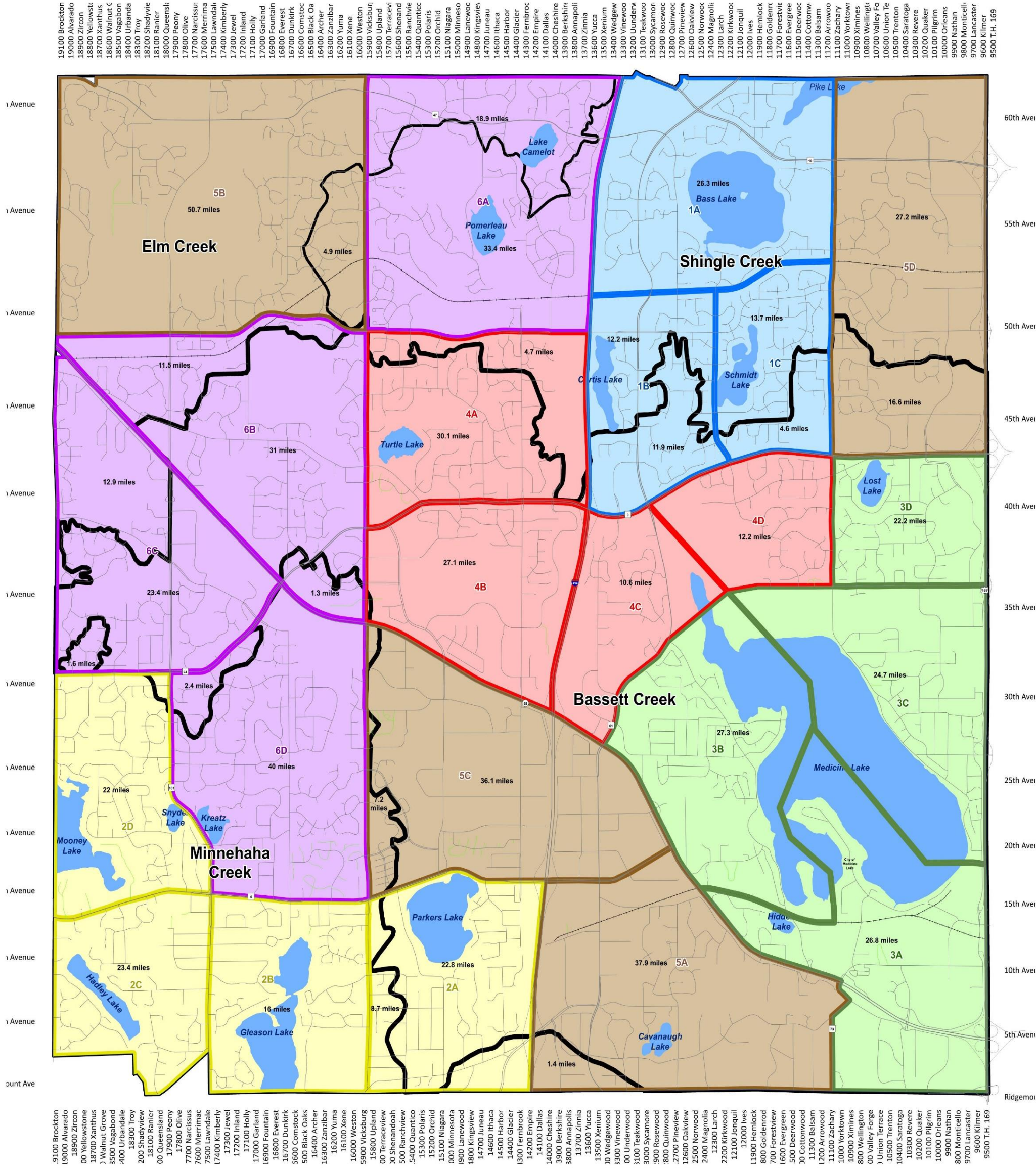


Ben Scharenbroich
Water Resources Supervisor



Street Sweeping Zones

Below is a map defining the City's street sweeping zones, including broken down by watershed district.



**Street Sweeping Zones
Total Lane Miles - 708.8**

