



## Bassett Creek Watershed Management Commission

### MEMO

To: BCWMC Commissioners and Alternate Commissioners  
From: Laura Jester, Administrator  
Date: March 12, 2020

**RE: Recommendation to Cost Share Street Sweeper for City of Plymouth**

At the February meeting, commissioners discussed the TAC's recommendation to include cost sharing the purchase of a high efficiency street sweeper on the 5-year CIP list. Staff was asked to bring further information on this topic to the March meeting. The Commission Engineers and I reviewed the following papers and studies regarding the effectiveness of street sweeping to reduce nutrient pollution.

***Evaluation of Leaf Removal as a Means to Reduce Nutrient Concentrations and Loads in Urban Stormwater***; 2016; William R. Selbig; U.S. Geological Survey – Wisconsin Water Science Center, Middleton, WI

***City of Forest Lake Street Sweeping Management Plan (A Study of High Efficiency, Targeting Sweeping Program)***; 2018; City of Forest Lake, Comfort Lake-Forest Lake Watershed District, EOR, Inc.

***User Support Manual: Estimating Nutrient Removal by Enhanced Street Sweeping***; 2014; P. Kalinosky, L. Baker, S. Hobbie, R. Bintner, C. Buyarski, University of Minnesota, for Minnesota Pollution Control Agency (referred to as the University of Minnesota (U of M) Street Sweeping Calculator Tool in this memo)

Bottom line: this is complicated! Taken together, there is varying information on the amount of pollution actually reduced, when and where sweeping is the most effective, and the ultimate cost per pound of removal. The University of Minnesota Street Sweeping Calculator Tool (which is currently undergoing reanalysis), currently assumes that 100% of the material collected by a sweeper would have ended up in a given waterbody and therefore would credit 100% of the corresponding pollutant removal. The Forest Lake study improves on the simple use of the U of M Street Sweeping Calculator Tool by paring down the assigned benefit based on estimates of the current load reduction already attained by downstream BMPs.

However, the Selbig article uses a far more rigorous way of monitoring and assigning seasonal benefit to street sweeping and is likely much more accurate in its nutrient reduction estimation. This is because it takes into consideration the "build up/wash off" of pollutants, similar to the way the P8 model calculates pollutant generation and downstream delivery. Some important points from the study to consider:

- The study estimates that only 40% of the pollutants captured in the sweeper are actually prevented from washing into the downstream waterbody.
- Street sweeping only had a statistically significant effect on downstream water quality if it was done in the fall. The efficiency, frequency, and timing of leaf removal are the primary factors when tailoring a leaf management program.

- The amount of material removed from street sweeping must be large enough to overcome natural variability and result in a detectable change in the downstream concentration.
- The methods used to remove organic material from streets during this study exceed what most municipal programs are capable of implementing and therefore represent maximal reductions in nutrient concentrations as a result of treatment.

**Recommendation and Justification:**

- Street sweeping, particularly with high efficiency sweepers and in areas where it is not feasible to use other more cost-effective best management practices, is an important tool for reducing nutrient pollution to waterbodies, especially during fall sweeping.
- Although actual data are lacking, sweeping left over winter deicers from roadways can be very useful in reducing the amount of chloride reaching waterbodies and is one of the few known mechanisms for reducing chlorides.
- Sweeping solids, regardless of pollutant removals, reduces the amount of solids that accumulate in stormwater ponds and other waterbodies, thus reducing the amount and frequency of dredging.
- Cost sharing the purchase of a high efficiency street sweeper may be a good use of CIP funds with the following caveats:
  - Use of the sweeper is targeted to subwatersheds of nutrient impaired waterbodies, especially those without other BMPs in place to reduce solids and nutrients.
  - The sweeper is used to remove as much leaf litter as possible in the fall, including targeting high tree canopy neighborhoods and completing at least two passes per targeted area each fall.
  - The sweeper is used to remove excess road salt during winter thaw periods and in early spring before heavy rains.
  - Use of the sweeper is well documented including where it's used, when it's used, and how much debris is collected.