# Kitsap County Green Sweep Program

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## Kitsap County Green Sweep Program

Under the National Pollution Discharge Elimination System (NPDES) permit that governs municipal pollution prevention, jurisdictions are required to reduce pollutant loading from streets. Kitsap County operates and maintains numerous stormwater treatment facilities as part of this overall effort to reduce pollutant loading. However, engineered facilities are not 100% effective and the coverage of developed areas is limited based on available space and treatment technology. Utilizing high-efficiency (HE) street sweepers to remove pollutants from roads surfaces is one method to reduce pollution near its source and meet NPDES permit requirements.

The Kitsap County Department of Public Works (DPW) Road Maintenance and Stormwater Divisions have coordinated in developing a street-sweeping program called Green Sweep, focused on pollutant removal and water-quality enhancement. Kitsap County DPW purchased three HE sweepers which use brooms like traditional sweepers for collecting larger debris, but also has high-pressure air to loosen very fine sediment from pavement surfaces and vacuum-assisted filter systems to collect this fine material and attached pollutants. The Green Sweep program uses a sweeping route and frequency that is based on factors related to pollutant loading potential: traffic levels and type of traffic, surrounding land use activity, and proximity to receiving waters.

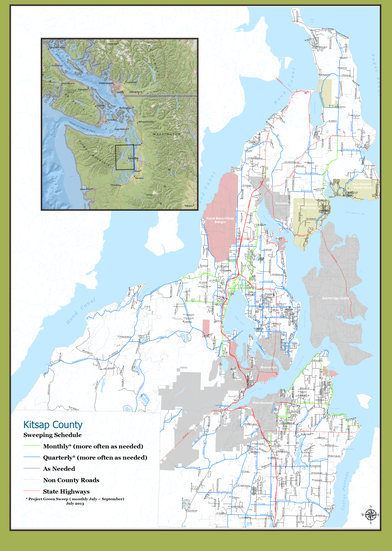
An integral part of the Green Sweep program is measuring the effectiveness. Kitsap County DPW tracks the tons of material removed, lane miles swept, and samples for pollutants including metals, oils, and hydrocarbons. In 2012 and 2013 the Green Sweep program generated 509 and 555 tons of solids respectively, and within those many tons approximately 103 and 113 pounds of metals (copper, lead and zinc) and 111 and 159 gallons of oil respectively.

## Where to Sweep and Why

The new sweepers focus on high-traffic roads, shoreline roads, and roads with multiple stream-crossings where road runoff and pollution can rapidly flow into sensitive waters.

An analysis incorporating three factors was performed to prioritize the HE sweeping routes. Current scientific research indicates that pollutant loading from roads is, in large part, due to motor-vehicle use and pollutant loading is correlated with the following factors:

- Traffic Levels and Type of Traffic
- Surrounding Land Use Activity
- Proximity to Receiving Waters



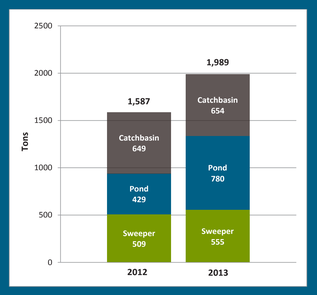

Based on current scientific literature, roads were also evaluated for their surrounding land use. Roads in industrial and commercial areas were given a greater pollution-potential weighting than residential roads. Roads in urban areas were also weighted more than rural roads for pollution potential.

Finally, roads were evaluated for their proximity to natural receiving waters because of the greater likelihood of road runoff reaching these water bodies without encountering some type of water quality treatment device or having the opportunity to be filtered by contact with native soil and vegetation. Therefore, roads with multiple stream crossings and shoreline roads were ranked higher for pollution potential.

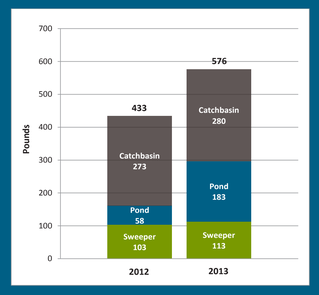
## The Storm Solids Removal Program: It's More than Just Sweeping

### Street Related Pollution Removed From the Stormwater System and Roadways

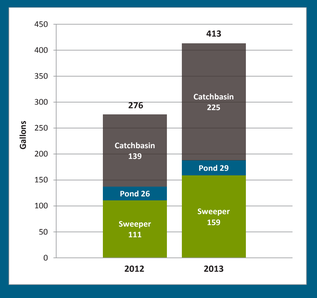
**Tons of Solids Removed**



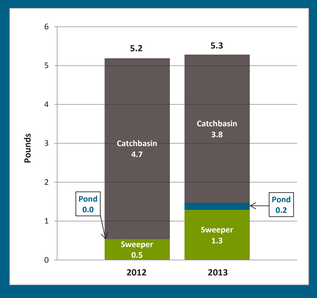

**Pounds of Zinc, Copper & Lead Removed**




**Gallons of Oil Removed**




**Pounds of Polycyclic Aromatic Hydrocarbons (PAH) Removed**




Data is also collected from materials removed from catch basins and ponds. We are able to quantify the street related pollution removed from the County storm system and roadways. That information is then used to relate the water quality benefits to the general public. The Green Sweep and partner catch basin and pond cleaning programs are the first line of defense in protecting Kitsap streams, wetlands, lakes and the Salish Sea.

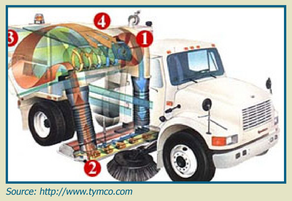
## What Are the Benefits of Street Sweeping?

Street sweepers remove pollutants near their source, thus improving the quality of stormwater runoff and keeping our waterways healthy.

**Street sweeping benefits include:**

- Preventing pollution from entering streams, and stormwater systems along roads
- Less trash and debris on roads
- Improved air quality
- More cost effective to remove pollution on the road than after it's entered the stormwater system or natural waters

## How the Regenerative Air System Works




*Source: http://www.tymco.com*

1.The closed-loop Regenerative Air System uses the force of a high velocity controlled jet of air created by the powerful blower wheel.

2.This jet of air blasts down and across the pick-up head onto the pavement and into the cracks forcing up into the air stream packed-on heavy debris as well as fine dust particles.

3.The debris-laden air stream is pulled into the large hopper, where the air loses velocity and the larger debris falls to the bottom. A screen at the top of the hopper prevents items such as leaves, paper, cans, and rocks from leaving the hopper and entering the centrifugal dust separator.

4. The patented centrifugal dust separator spins the air along the curved wall of the chamber until the micron-size dust particles are skimmed off into the hopper. Only clean air is returned to the blower to start the Regenerative Air cycle again. This closed-loop system means no dirty air is exhausted into the environment only to settle on the surface again.

## Lessons Learned and Challenges

Coordinating maintenance activities, even within the same department can be challenging. Long standing routines and procedures can take a while to change. Setting up a simple plan and regularly reviewing the plan with the maintenance supervisors is very important. That plan can also help with keeping on top of proper waste handling procedures and general storage housekeeping of sweeper solids.

An unforeseen issue has been sweeper maintenance. A high-efficiency (HE) sweeper is a complex piece of machinery and can easily break down. Vehicle down time due to mechanical issues seems to be higher than with the older sweepers, but this could be explained by generally higher sweeping miles/hours. We plan to look into the number of repair problems per HE sweeper per year compared to usage hours.

A composite sample is collected twice a year at all three facilities.

## Limitations

The Kitsap County Green Sweep Program is not set up to be a scientifically rigorous study of pollution removed by high-efficiency sweepers. Sampling for even a modest suite of parameters is expensive and time consuming. We have tried to set up the program to be a balance between the limited funds and the expensive analytical costs. Twice a year composite samples are collected at three storage facilities for a total annual cost of $8,500. The data is then averaged and extrapolated over the whole sum of sweeper solids. The data presented here is intended for the general public and elected officials to tell the story of the value and benefit of the sweeper and storm maintenance programs.

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