

## PAVEMENT CLEANING

### WHY CLEAN?

Pavement cleaning will reduce urban stormwater pollution and help a community satisfy its NPDES stormwater management requirements.

**Most cost-effective:** Pavement cleaning is the most cost-effective BMP based on “*dollars per pound of pollutant removed from the stormwater.*” A study of structural BMPs by Caltrans indicates the cost per pound of pollutant removed (as TSS) of \$10 to \$60, not including land costs. In contrast, our studies indicate new mechanical brush sweepers reduce TSS in stormwater at a cost of \$5 to \$10 per pound, and regenerative air and vacuum-assisted sweepers, at a cost of \$2 to \$5 per pound.

**Most effective:** In the built environment, street cleaning has the broadest potential impact on urban stormwater pollution reduction because two thirds of all of the rain that falls on potentially impervious surfaces in the urban landscape is falling on pavement. In the past 5 years, many new street cleaners have entered the market that are much more efficient at picking up accumulated contaminants when compared to the broom/mechanical sweepers owned by most communities today.

**Most immediate impact:** It will take decades to retrofit communities with structural stormwater treatment systems. Street cleaning is immediately employed, and therefore has an immediate impact on urban stormwater pollution reduction.

**Most flexible:** Once a structural BMP is constructed, it cannot be moved. In contrast, a sweeping program can be altered to reflect shifts in sweeping technology, budgets, and changes in traffic patterns and land use, and therefore pollutant loadings.

**Most secondary benefits:** Sweeping reflects the community’s pride in its aesthetics, resulting in positive attitudes and ownership by residents. Most significantly, high efficiency cleaning also benefits air quality and in turn adverse public health effects associated with air pollution.

### WHY ANALYZE?

The question is not whether to clean or sweep, as most communities already sweep in some manner. Rather, it is how to most effectively use the existing sweeping budget, and expand it over time. Street cleaning is not just for aesthetics since it has the potential for becoming your community’s most important asset in meeting NPDES requirements. Relevant questions are: How effective is the community’s current equipment fleet? How should the fleet be upgraded over time and with which equipment? Which streets should be swept, and what is the most cost-effective frequency of sweeping by street category? What are the stormwater pollutant loadings without sweeping? What are the stormwater pollutant load reductions associated with the existing and alternative future street cleaning programs? To answer these questions effectively, a study is needed.

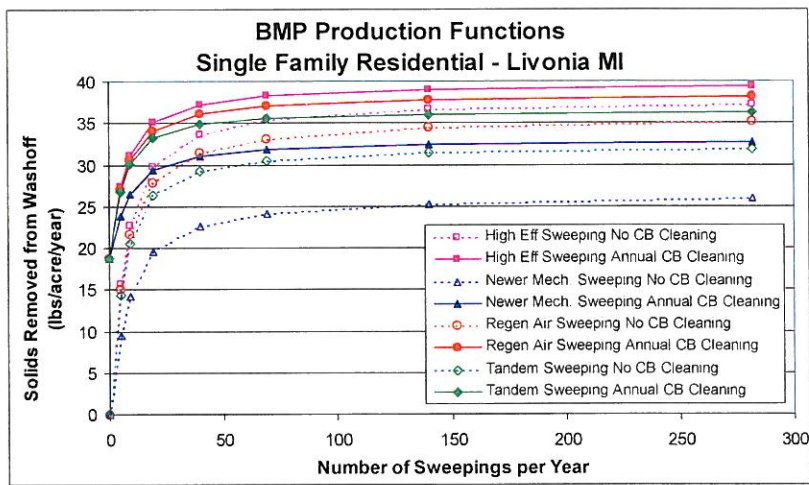
## WHY PACIFIC WATER RESOURCES (PWR)?

PWR is the only firm with the tools and experience needed to answer a community's important questions about street cleaning. PWR has developed a unique stormwater quality model called **SIMPTM** that has been used for years to answer street cleaning related questions. PWR has conducted street cleaning related studies in the following communities:

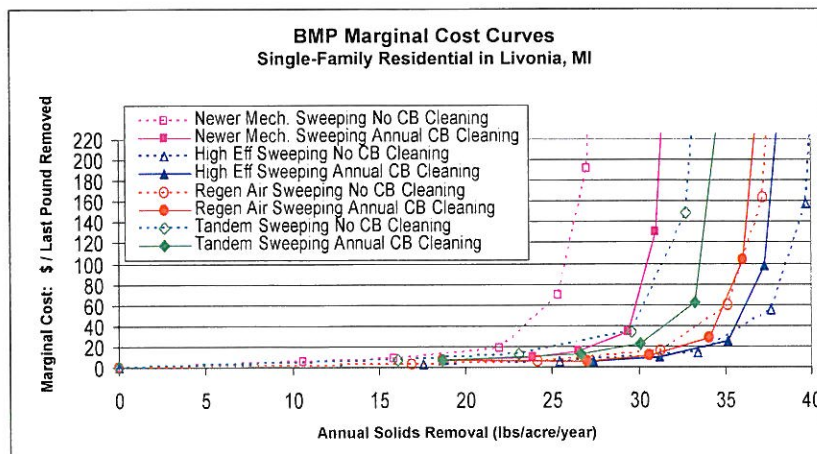
Bellevue, Washington  
 Gresham, Oregon  
 Jackson, Michigan  
 Livonia, Michigan  
 Portland, Oregon

Port of Seattle, Washington  
 Reno, Nevada  
 Washington County, Oregon  
 West Linn, Oregon  
 Tel Aviv, Israel

Below is an example of the sweeping related information that can be obtained through a cleaning study. Production functions show the relationship between effort (i.e. number of sweepings per year) and pollutant removal (i.e. solids removed from stormwater washoff).



Marginal cost, shown below, is essentially the cost of removing the last incremental pound of pollutant (in this case, solids or TSS).



Optimal cleaning, in this example, involves operations that remove pollutants at a cost of approximately \$10 to \$20 for the last pound removed well before the marginal cost starts to rapidly increase.