

# Estimating Nonpoint Source Pollution Removal Effect of Road Sweeping by SWMM

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## (a) Purpose of study or research hypothesis

In this study, the effect of road sweeping was to be verified by analyzing the change of road deposited sediment (RDS) amount on highway surface area using the build-up and wash-off modules of the Surface Layer in SWMM model.

## (b) Key issue(s) or problem(s) addressed

The stormwater runoff from road is known as one of important nonpoint source (NPS) pollution. Especially highway surfaces accumulate significant quantities of RDS including pollutants since high vehicle speed and traffic load. Most of pollutants are discharged to the adjacent soil and aquatic environment.

## (c) Methodology or approach used

In SWMM model, power function was applied because monitoring results was highly accumulation rate in the early stages and decreased over time. Based on the four-lane road, the width of the road was set at 10 m and the road length was 1,000 m, with a total area of 1 ha. Surface condition was an impervious asphalt. It was applied rainfall data during five years (2014~2018) in Giheung-gu, Yongin, Gyeonggi Province.

## (d) Results or conclusions derived from the project

Using SWMM model, the collection RDS amount of road sweeping was calculated for one day, three days, seven days, 10 days, 20 days, 30 days term of road sweeping period. When road sweeping is carried out every month, the annual collection of RDS was 6,638.0 kg/ha/year, with 37.2% deposits of the annual amount was 17,860.2 kg/ha/year. The annual load of TSS is 10,598.7 kg/ha/year, BOD is 0.5 kg/ha/year, TOC is 32.8 kg/ha/year, TN is 1.8 kg/ha/year, TP is 1.3 kg/ha/year, Cu is 0.227 kg/ha/year, Pb is 0.068 kg/ha/year, Zn is 0.716 kg/ha/year, and Ni is 0.042 kg/ha/year when road sweeping was performed at every month. The removal rates of nonpoint pollutants load was 17% for sweeping every month and 57% for every week.

## (e) Implications of the project relevant to congress themes

In this study, the effect of reducing nonpoint source pollution caused by road sweeping was verified and the basis for road Sweeping was prepared.

**Keywords** : road sweeping, road deposited sediment (RDS), SWMM model, nonpoint pollutants load