Planning Calculator for Estimating Nutrient Removal through Street Sweeping

Quick Reference Users Guide

**Overview of Planning Calculator**

The Planning Calculator for Estimating Nutrient Removal through Street Sweeping is designed to provide an estimate of the average solids and nutrient (phosphorus and nitrogen) loads that can be recovered through street sweeping based on the timing and frequency of sweeping operations and an estimate of the percent tree canopy cover over the streets to be swept. It has been calibrated to conditions in Prior Lake, MN and is recommended for use in the greater Twin Cities metropolitan Region or geographic areas with comparable climate and vegetation.

**Step 1**: Define Sweeping Routes

In order to use the spreadsheet calculator tool, the user must define sweeping routes. This information is entered on the “Routes” tab of the spreadsheet tool.

The following parameters must be defined for each route created:

 1) Unique identification tag (Route ID)

 2) Curb-miles to be swept (curb-mile = 1 mile along one side of a street)

 3) The average **over-street** tree canopy cover for the entire route.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Route ID**\*****\* Denotes Required Field** | Curb-miles**\*** | Average % Canopy Cover**\*** | Priority Rating  | Unique Cost ($/curb-mile) |
| (any string of characters) | (each side of the street) | (route average) | (user defined) | (replaces default cost for special circumstances) |
| Example NW10 | 15 | 20 | 1 |  |

Sweeping routes can be designed based on any number of factors (ex. street or land use type, proximity to receiving waters, stormwater management concerns). For the purpose of the planning calculator, a route represents streets for which the timing and frequency of annual sweeping operations is (nearly) identical. For example, all street for route ‘A’ will be swept once in March and once in the October. Streets with similar characteristics for which the timing or frequency of sweeping will vary should be represented in different routes.

**Step 2**: Define Default Cost

Because the cost of sweeping operations will vary depending on sweeper type and unique overhead considerations, no default cost algorithm was built into the spreadsheet calculator tool. To include cost-estimates in planning calculations, users must supply a default cost basis in the form of the expected *cost per curb-mile of sweeping* on the “Planning” tab. Guidance on estimating the cost-per curb-mile of sweeping is provided in the spreadsheet support material. Cost estimates are not required to calculate expected recovered loads.

|  |
| --- |
| Green boxes are for data supplied by user |
|   |   |   |
| **Default Cost/curb mile** |  $  |

**Step 3**: Design Sweeping Operations for Individual Routes

Once routes have been entered on the “Routes” tab, they are available in a drop down menu on the “Planning” tab. Use the drop down menu to choose a route. The relevant route information will be loaded to the planning tab automatically.



Type the number of sweeping events planned in each month for the chosen route in the frequency column of the Load Prediction table. Hit “enter” to calculate the expected recovered loads and associated costs for each sweeping event. The calculator is calibrated to sweeping frequencies between 0 times per month and once weekly. Frequencies are restricted to integer values and the maximum allowable value of ‘5’ represents the maximum number of weekly sweepings possible in a month. The calculator assumes an equal interval between sweeping operations for frequencies greater than once per month (ex. 3 times per month is calculated at a 10 day interval) and adjusts the expected load for the first sweeping event in each month to reflect sweeping intervals in the previous month.

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Frequency** | **Predicted (lb)** | **Predicted (lb)** |
| Wet Solids | Dry Solids  | Nitrogen  | Phosphorus  | Cost | $ Cost/lb P |
| January |  |   |   |   |   |   |   |
| February |  |   |   |   |   |   |   |
| March | 1 | 3632 | 2931 | 1.8 | 1.6 | $ 138.00 | $ 87.45 |

**Step 4**: Create Sweeping Scenarios

When sweeping operations have been designed to satisfaction for a given route, route operations can be added to sweeping summaries to create sweeping plans. Use the “Accept Changes” button to add operations to summaries, and “Edit Routes” button to edit sweeping operations that have already been saved.

|  |  |
| --- | --- |
| New Route (ctrl+n) | “Start over” command – clears route information and computations from the calculator. |
|  | Adds the current computation to the route summaries. |
|  | Pulls information from route summaries so that routes can be edited. |

Note that the user is able to change route parameters (curb-miles, percent canopy cover) on the “Planning” tab, however, any changes made to route parameters on the “Planning” tab **will not be saved** on the “Route” tab. This means that the next time the route is called, or when the route is called for editing from sweeping summaries, the parameter values will default to those supplied on the “Route” tab.

Routes parameters may be edited at any time on the “Routes” tab; however, sweeping summaries will not automatically update to reflect these changes. To update saved sweeping operations when route parameters have changed, re-load the saved route using the “Edit Route” feature and re-save the route sweeping operations using the “Accept Changes” feature. Expected loads and cost-estimates are re- calculated when route information is loaded from sweeping summaries. The effect of changing route parameters can be seen by comparing saved values with re-calculated values when route are called for editing. Saved values are not over-written until the user accepts edits.

**Step 5**: Export Sweeping Scenarios

When sweeping operations for all routes have been designed to satisfaction, the sweeping plan can be exported to a new workbook using the “Save/Clear” function found on any of the summary tabs. The “Save” feature will export summary information only. If additional editing work is to be complete at a later data, the workbook can simply be saved under a new file name. The workbook is not designed to re-initialize upon opening or closing, so a simple save will protect the current work. The sweeping summaries can be reset using the “Clear” feature on found on any of the summary pages. Choosing this option will reset all sweeping summaries, but will not affect route parameter information. To adjust route parameters simply edit/add/delete from the “Routes” tab.