POLLUTANT LOAD REDUCTION CALCULATOR

For Water Quality Improvement Project (WQIP) Program Applicants

Purpose

Excessive amounts of nutrients (primarily nitrogen and phosphorus) can harm waterbodies. The water quality goal for many watershed plans or projects is to identify which best management practices (BMPs) will result in the greatest reduction of pollutants. To ensure consistency when estimating potential load reductions for selected BMPs, DEC has developed the **Pollutant Load Reduction Calculator** with accepted efficiencies for nitrogen and phosphorus for commonly implemented practices. The method used to estimate load reductions (see Background for description of the Simple Method) does not account for soil information, slope, or other site specific factors that may influence potential pollution reductions for a practice. This additional information would impact the practice efficiencies. All best management practices have been assigned the same efficiencies, based on the efficiencies in DEC's <u>Stormwater Management Design Manual</u>.

Applicants of DEC's Water Quality Implementation Project (WQIP) program can use this calculator to evaluate potential nitrogen and phosphorus reductions that may be achieved by their proposed project(s).

For more information on nonpoint source best management practices and BMP efficiencies, visit DEC's <u>Nonpoint</u> Source Guidance and Technical Assistance website.

Background

The calculator is based on the "Simple Method to Calculate Urban Stormwater Loads". The Simple Method estimates pollutant load from a site or drainage area based on runoff coefficients. The load includes: annual rainfall, percent impervious surface, pollutant event concentration, and area of a particular land use.

The Simple Method estimates pollutant load as a product of annual runoff volume and pollutant concentration.

Prepared: April 2017

$L = R \times C \times A \times 0.226$

Where:

L is the pollutant load (lbs./year)

R is the annual runoff (inches)

C is the pollutant concentration (mg/l)

A is the area of a particular land use (acres) - A is assumed to equal one acre of land

0.226 is a unit conversion factor

The Simple Method calculates annual runoff as a product of runoff volume: $R = P \times Pj \times Rv$

Where:

R is the annual runoff (inches)
P is the annual rainfall (inches) – assumed 42 inches
Pj is the % rainfall producing runoff - default is 90%
Rv is the runoff coefficient = 1.05+0.009l
I is the percent impervious surface (0-100%)

Therefore the pollutant load, L, can be expressed as: $L = P \times Pj \times Rv \times C \times A \times 0.226$

Table 1 lists the pollutant and runoff coefficients used in the Simple Method calculation for one acre of land.

Table 1. Land use categories, loading coefficients and total nitrogen (TN) and total phosphorus (TP) concentrations used in the Simple Method calculation per acre of land

Land use Category*	TP Coefficient (C)	TN Coefficient (C)	Runoff Coefficient (Rv)	Impervious Surface* (I)	TN Load (lbs./year/acre) (L)	TP Load (lbs./year/acre) (L)
Developed, Open Space	0.31	2.1	0.14	10%	0.25	0.37
Developed, Low Intensity	0.31	2.1	0.23	20%	0.83	0.61
Developed, Medium Intensity	0.31	2.1	0.5	50%	4.48	1.32
Developed, High Intensity	0.31	2.1	0.77	80%	11.05	2.04

^{*} Based on National Land Cover Dataset (NLCD) (http://www.mrlc.gov/nlcd11_leg.php)

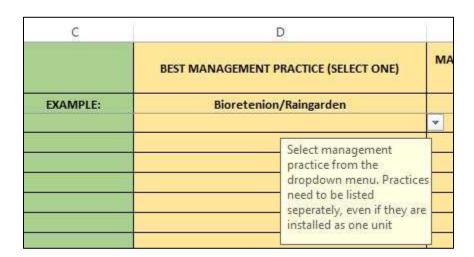
How to Use the Calculator

A baseline pollutant load has already been calculated in the corresponding Excel spreadsheet; the user only needs to select 1) the type of best management practice; 2) the number of acres of the BMP; and 3) the land cover type that the practice will be installed on to get an output of the estimated annual reduction of nitrogen and phosphorus. Each BMP type must be entered in the Excel spreadsheet separately, even if multiple BMPs are installed together as a system.

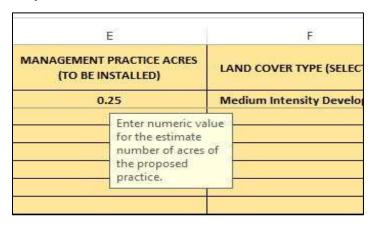
Step 1: Open the Pollutant Load Reduction Calculator Excel spreadsheet.

Step 2: Click on the drop down menu in Column D to select the best management practice(s) that will be implemented. If a project is implemented on more than one land cover type, list each on a separate line in the spreadsheet.

Prepared: April 2017



Step 3. Enter a numeric value of the number of acres of each practice that will be installed in Column E.



Step 4. Using the drop down menu in Column F, select the land use type for the project that corresponds to where the practice listed in Column D will be installed. A practice may be implemented on multiple land use types, but each type must be listed separately. Land use information can be found through the National Land Cover Dataset (NLCD) or tax parcel information. Definitions for NLCD land use types are listed in Table 2.

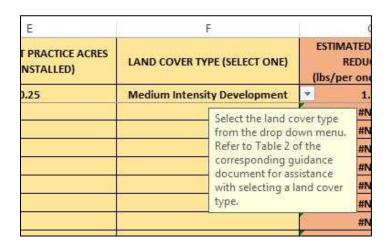


Table 2. Land Use Category Definitions

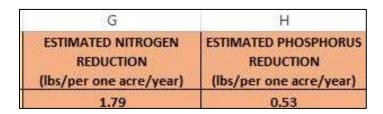
Land Use Category	Percent Imperviousness	Description		
Developed, Open Space	0-20%	Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.		
Developed, Low Intensity 20-49%		Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.		
Developed, Medium Intensity	50-79%	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.		
Developed, High Intensity	80-100%	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.		

Prepared: April 2017

Outputs:

Column G will provide an output of the estimated reduction of nitrogen in pounds <u>per one acre</u> per year after the BMP is installed.

Column H will provide an output of the estimated reduction of phosphorus in pounds <u>per one acre</u> per year after the BMP is installed.



Column I will provide an output of the estimated <u>total</u> reduction of **nitrogen** in pounds per year after the BMP is installed.

Column J will provide an output of the <u>total</u> reduction of **phosphorus** in pounds per year after the BMP is installed.

I	J		
TOTAL NITROGEN	TOTAL PHOSPHORUS		
REDUCTION	REDUCTION		
(lbs/acres/year)	(lbs/acres/year)		
0.45	0.13		

Additional Online Resources

New York DEC Nonpoint Source (NPS) Program: http://www.dec.ny.gov/chemical/94150.html

Water Quality Improvement Project (WQIP) Program: http://www.dec.ny.gov/pubs/4774.html

Simple Method to Calculate Urban Stormwater Loads:

http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm

Prepared: April 2017

CONTACT INFORMATION

New York State Department of Environmental Conservation

Division of Water - Bureau of Water Resource Management

625 Broadway, Albany, NY 12233 | P: 518-402-8086 | nonpointsource@dec.ny.gov