Updates to Region 5 Model

September 28, 2017

Urban Runoff EMC Worksheet (New Worksheet)

This worksheet is taken from STEPL version 4.4 and added to the latest version of the Region 5 model. The previous version used land use specific loading rates for estimating the load. The newer version with the addition of this new worksheet allows user to estimate the load based on the rainfall and runoff Event Mean Concentration (EMC) values.

Urban BMPs

Urban BMPs from STEPL version 4.4 were added to the latest Region 5 model as shown in Table 1, below.

Table 1. Urban BMPs in Region 5 model and default BMP efficiencies, with flow volume reduction BMPs in blue[1]. (Reference STEPL 4.4)

BMP	Default BMP efficiency numbers			
	N	P	BOD	Sediment
No BMP	0.00	0.00	0.00	0.00
Alum Treatment	0.60	0.90	0.60	0.95
Bioretention facility	0.63	0.80	ND	ND
Combined BMPs-Calculated	0.00	0.00	0.00	0.00
Concrete Grid Pavement	0.90	0.90	ND	0.90
Dry Detention	0.30	0.26	0.27	0.58
Extended Wet Detention	0.55	0.69	0.72	0.86
Filter Strip-Agricultural	0.53	0.61	ND	0.65
Grass Swales	0.10	0.25	0.30	0.65
Infiltration Basin[1]	0.60	0.65	ND	0.75
Infiltration Devices[1]	ND	0.83	0.83	0.94
Infiltration Trench[1]	0.55	0.60	ND	0.75
LID*/Cistern[1]	0.00	0.00	0.00	0.00
LID*/Cistern+Rain Barrel[1]	0.00	0.00	0.00	0.00
LID*/Rain Barrel[1]	0.00	0.00	0.00	0.00
LID/Bioretention[1]	0.43	0.81	ND	ND
LID/Dry Well[1]	0.50	0.50	0.70	0.90
LID/Filter/Buffer Strip	0.30	0.30	0.40	0.60
LID/Infiltration Swale[1]	0.50	0.65	ND	0.90
LID/Infiltration Trench[1]	0.50	0.50	0.70	0.90
LID/Vegetated Swale	0.08	0.18	ND	0.48
LID/Wet Swale	0.40	0.20	ND	0.80
Oil/Grit Separator	0.05	0.05	ND	0.15
Porous Pavement[1]	0.85	0.65	ND	0.90
Sand Filter/Infiltration Basin[1]	0.35	0.50	ND	0.80
Sand Filters	ND	0.38	0.40	0.83

BMP	Default BMP efficiency numbers			
	N	P	BOD	Sediment
Settling Basin	ND	0.52	0.56	0.82
Vegetated Filter Strips	0.40	0.45	0.51	0.73
Weekly Street Sweeping	ND	0.06	0.06	0.16
Wet Pond	0.35	0.45	ND	0.60
Wetland Detention	0.20	0.44	0.63	0.78
WQ Inlet w/Sand Filter	0.35	ND	ND	0.80
WQ Inlets	0.20	0.09	0.13	0.37

ND – No Data
N – Nitrogen
P – Phosphorus
BOD – Biological Oxygen Demand
LID – Low Impact Development

Weather Stations

The updated weather stations in STEPL version 4.4 were included in the latest Region 5 model.

Figure 1 and Figure 2 show the spatial locations of the weather stations for the contiguous U.S. and for Alaska, Puerto Rico, and Hawaii respectively.

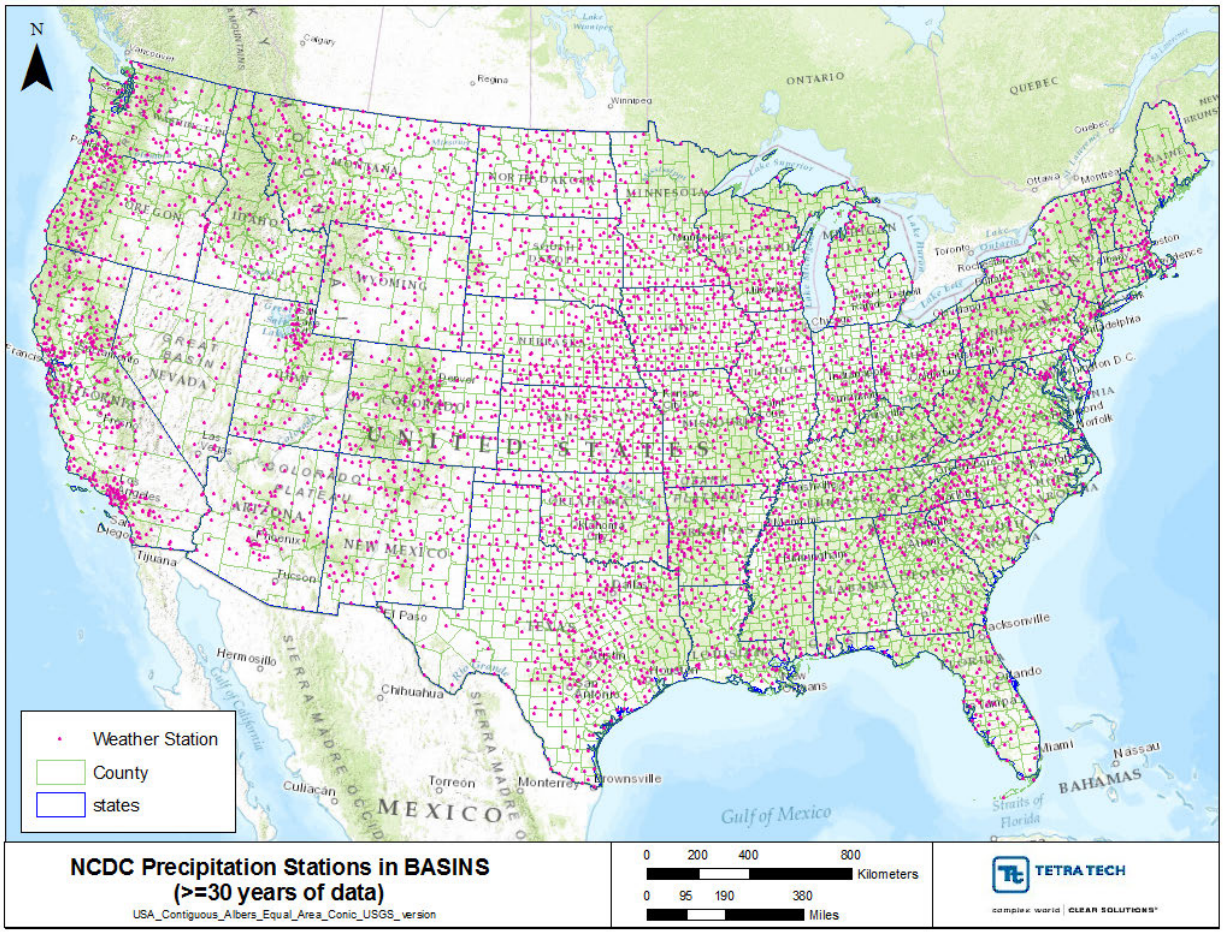

Figure 1. National Climactic Data Center (NCDC) Precipitation Stations – Contiguous United States

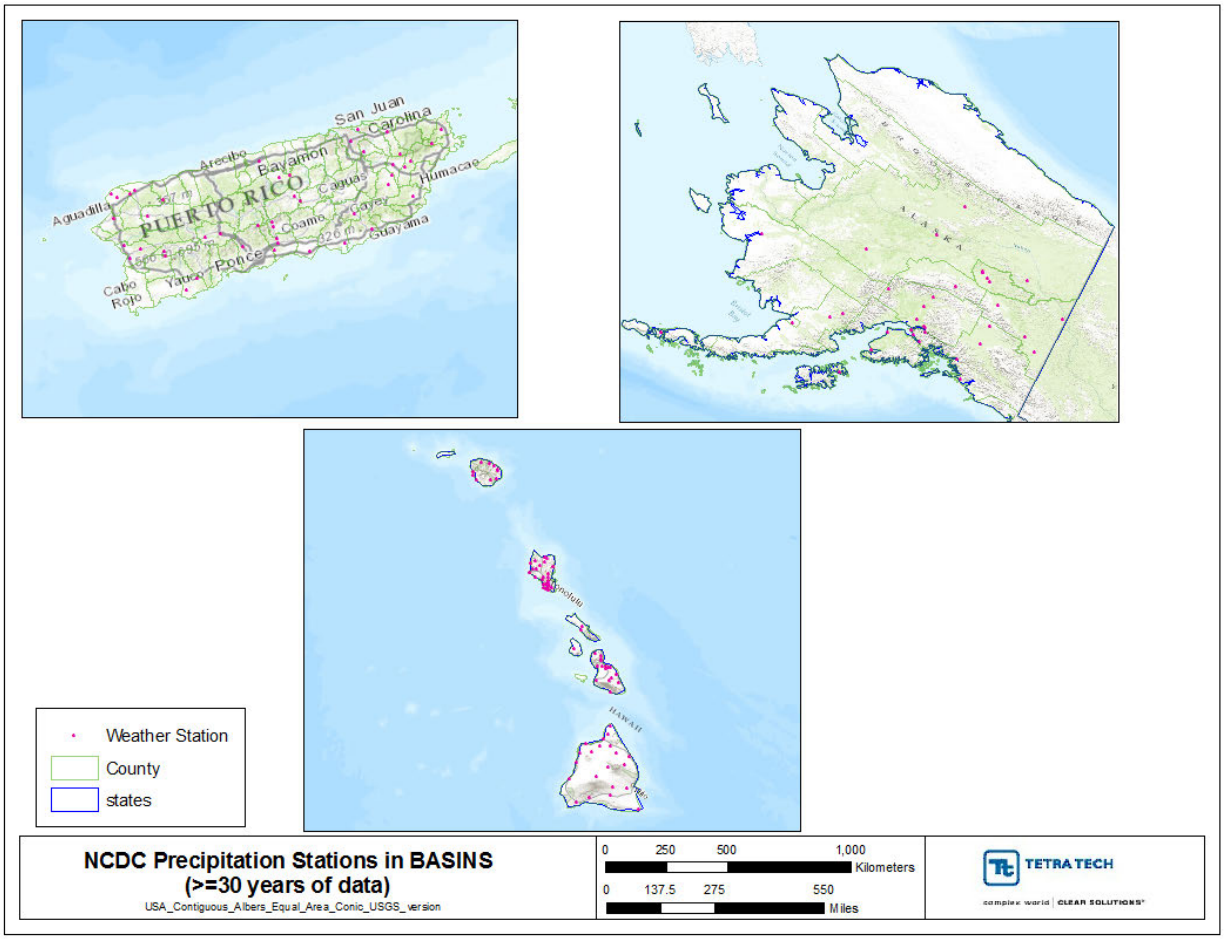

Figure 2. NCDC Precipitation Stations – Alaska, Puerto Rico, and Hawaii

Flow Volume Reductions for Urban LID and Infiltration Practices

The same feature is also new to STEPL version 4.4.

Region 5 model can now estimate flow volume reductions for urban LID and infiltration BMP practices. This is represented as gallons/year by urban land use type in a watershed. The *Urban Runoff EMC* worksheet contains pre-populated design storage depths for each of the available infiltration BMPs. The user enters the design runoff captured depth and percent imperviousness of the BMP drainage areas. The urban practices in Region 5 model that provide the flow volume reduction are listed in Table 2.

Table 2. Urban LID and infiltration practices in Region 5 model with flow volume reductions.

Land Use	BMP
Urban	Infiltration Basin
Urban	Infiltration Devices
Urban	Infiltration Trench
Urban	LID*/Cistern
Urban	LID*/Cistern+Rain Barrel
Urban	LID*/Rain Barrel
Urban	LID/Bioretention

Land Use	BMP
Urban	LID/Dry Well
Urban	LID/Filter/Buffer Strip
Urban	LID/Infiltration Swale
Urban	LID/Infiltration Trench
Urban	LID/Vegetated Swale
Urban	LID/Wet Swale
Urban	Oil/Grit Separator
Urban	Porous Pavement
Urban	Sand Filter/Infiltration Basin

Conservation Easements and Green Roofs (New Worksheets)

Tetra Tech received these worksheets from EPA Region 5 and added them to the latest version as received. The Conservation Easements worksheet provides a location to add proposed easement acres and will calculate the load reduction from the easement compared to the proposed or probable land use that would have existed without the easement. The Green Roof worksheet provides for an accounting of load reductions from green roofs based on the land use type where the green roof is placed. It assumes the entire load intercepted by the green roof is eliminated.

Urban Runoff Loading Rate (Existing Worksheet)

The ability to enter user defined urban runoff loading rates instead of the default pollutant loads from various urban land use types (commercial, residential, etc.) was added. A new radio button was added to toggle from default land use pollutant loading rates to user defined pollutant loading rates. When set to user-defined, any of the default rates can be modified to reflect local data. Any loading rates not changed by the user will remain at the default values.