Status of Calculator

MIDS Work Group

January 18, 2013

Calculator

- Update complete
- User guide ~90% complete

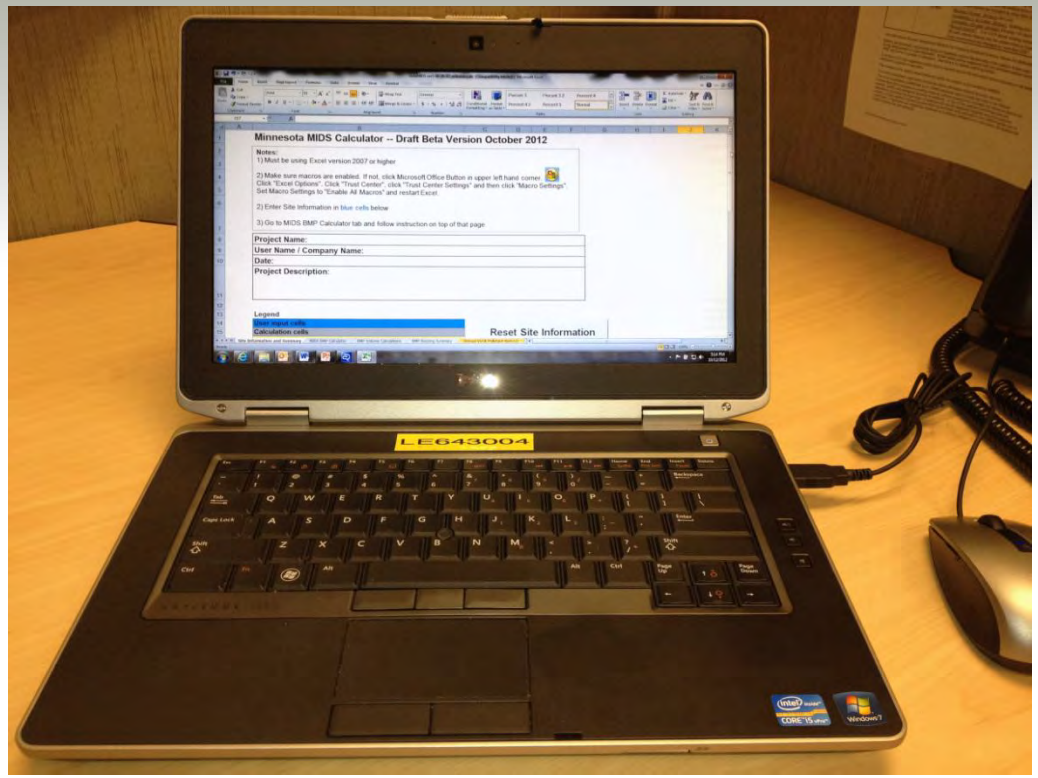


Photo: John Hanson

Developed a calculator output summary sheet

- Organizes BMPs by routing order and summarizes volume and pollutant reductions

Summarize BMPs

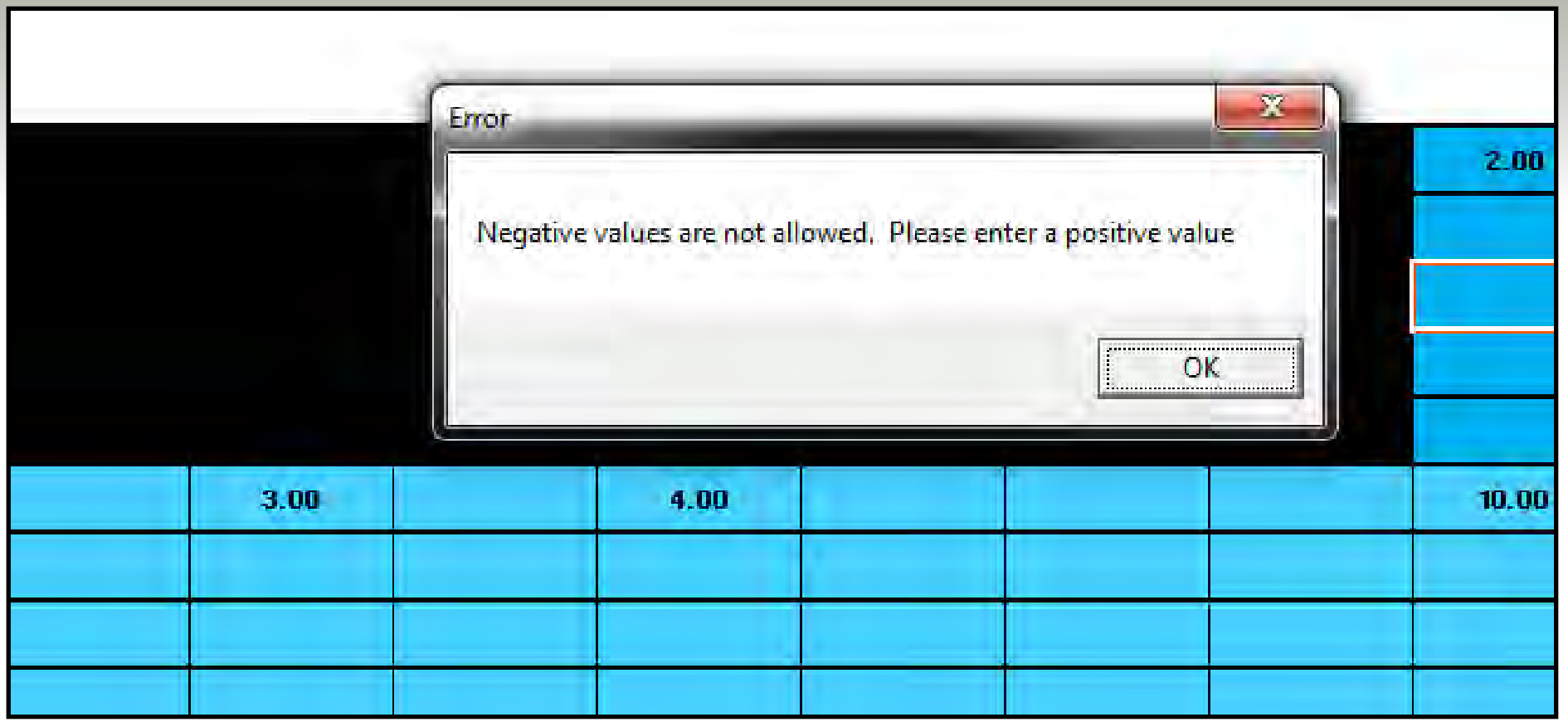
BMP	Total Direct Drainage Area to BMP (acres)	Direct Imperviousness (%)	Routing/Downstream BMP	Runoff From Direct Drainage Area routed to BMP	BMP Volume Credit	Runoff Volume Removed (%)
1 - Green roof	2	100%	1 - Bioretention basin (elevated drain tile)	7986	4000	50%
1 - Bioretention basin (elevated drain tile)	15	67%	1 - Stormwater pond	39930	13125	30%
1 - Stormwater pond	0	0%		0	0	0%
1 - Pervious pavement	10	100%	1 - Bioretention basin (w/o drain tile)	39930	39930	100%
1 - Bioretention basin (w/o drain tile)	19	53%	1 - Infiltration basin/Underground Infiltration	39930	26250	66%
1 - Infiltration basin/Underground Infiltration	15	33%		19965	13500	40%
Totals	**61**	**61%**		**147740**	**96805**	**66%**

Split total phosphorus into dissolved (45%) and particulate (55%) phosphorus

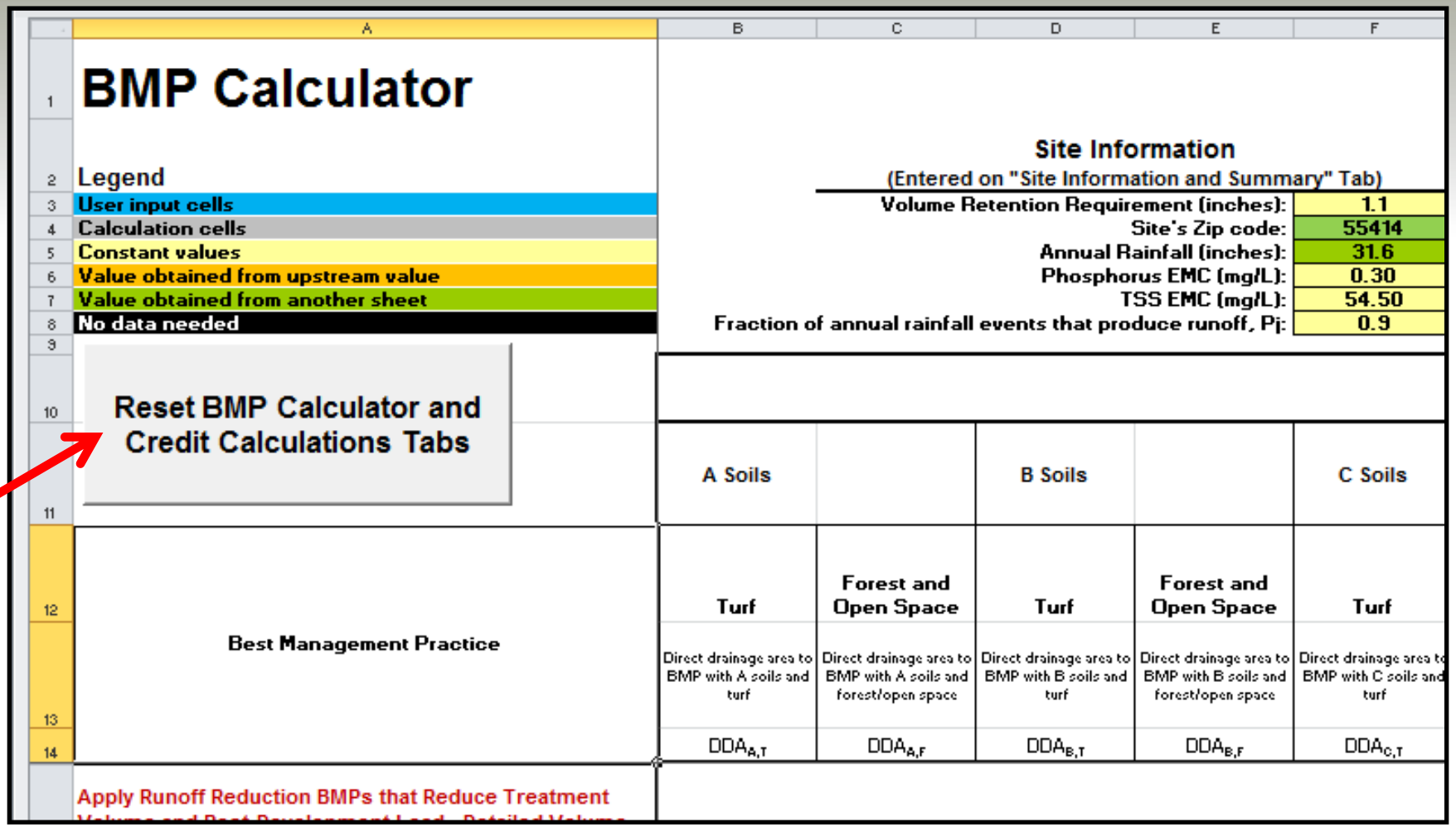
Summary Information

Total impervious cover (acres)	37.00
Total watershed area (acres)	61.00
Site runoff coefficient, Rv	0.63
% Impervious	61%
Development volume retention requirement (cubic feet)	**147,740**
Volume removed by BMPs (cubic feet)	96,805
Additional volume removal needed to meet requirement (cubic feet)	50,936
Percent volume removed	65.52%
Post-development annual Particulate P load (lb/yr)	40.95
Annual Particulate load removed by BMPs (lb/yr)	38.34
Post-development annual Dissolved P load (lb/yr)	33.50
Annual Dissolved P load removed by BMPs (lb/yr)	27.58
Percent annual TP removed	88.54%
Post-development annual TSS load (lb/yr)	13,526
Annual TSS load removed by BMPs (lb/yr)	12,643
Percent annual TSS removed	93.47%

Set restriction on entering negative numbers



Created a button to clear all values and reset worksheet



BMP Calculator

Legend

- User input cells
- Calculation cells
- Constant values
- Value obtained from upstream value
- Value obtained from another sheet
- No data needed

Reset BMP Calculator and Credit Calculations Tabs

Site Information
(Entered on "Site Information and Summary" Tab)

Volume Retention Requirement (inches):	1.1
Site's Zip code:	55414
Annual Rainfall (inches):	31.6
Phosphorus EMC (mg/L):	0.30
TSS EMC (mg/L):	54.50
Fraction of annual rainfall events that produce runoff, Pj:	0.9

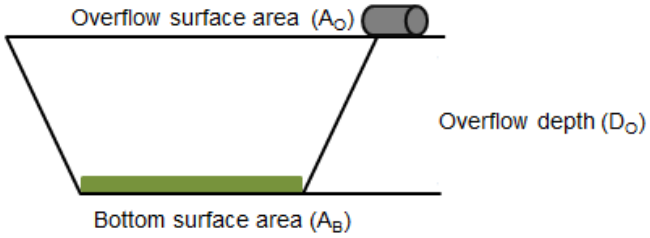
Best Management Practice	A Soils		B Soils		C Soils
	Turf	Forest and Open Space	Turf	Forest and Open Space	Turf
	Direct drainage area to BMP with A soils and turf	Direct drainage area to BMP with A soils and forest/open space	Direct drainage area to BMP with B soils and turf	Direct drainage area to BMP with B soils and forest/open space	Direct drainage area to BMP with C soils and turf
	$DDA_{A,T}$	$DDA_{A,F}$	$DDA_{B,T}$	$DDA_{B,F}$	$DDA_{C,T}$

Apply Runoff Reduction BMPs that Reduce Treatment

Include a user defined infiltration rate with predetermined upper threshold (1.63 in/hr)

Bioretention Basin (w/o drain tile)

$$V = \left[\frac{A_O + A_B}{2} * (D_O) \right]$$



	1 - Bioretention basin (w/o drain tile)	2
Required treatment volume (RV) [ft^3]	39,930	
Overflow surface area (A_O) [ft^2]	20,000	
Bottom surface area (A_B) [ft^2]	15,000	
Outflow depth (D_O) [ft]	1.5	
Underlying soil - Hydrologic Soils Group (MN Stormwater Manual)	User Defined	
Required drawdown time (hrs)	48	
Volume reduction capacity of BMP (V) [ft^3]	26,250	
User Defined Infiltration Rate [**Set Soils to User Defined**] (in/hr)	1.4	
Infiltration rate (in/hr)	1.4	
Volume of retention provided by BMP (BMPV) [ft^3]	26,250	

Note:
Bioretention basin must meet infiltration requirements for 48 hour drawdown under normal condition or 24 hour drawdown in special areas (i.e. near trout streams) according the Minnesota Storm water Manual.

If requirements are not met, red text will appear warning user

Display calculated drawdown time for comparison with required drawdown time

	1 - Bioretention basin (w/o drain tile)	2 - B
Required treatment volume (RV) [ft^3]	39,930	
Overflow surface area (A_O) [ft^2]	20,000	
Bottom surface area (A_B) [ft^2]	15,000	
Outflow depth (D_O) [ft]	1.5	
Underlying soil - Hydrologic Soils Group (MN Stormwater Manual)	User Defined	
Required drawdown time (hrs)	48	
Volume reduction capacity of BMP (V) [ft^3]	26,250	
User Defined Infiltration Rate [**Set Soils to User Defined**] (in/hr)	0.3	
Infiltration rate (in/hr)	0.3	
Volume of retention provided by BMP (BMPV) [ft^3]	26,250	

Drawdown time of 60.0 hrs does not meet drawdown time requirement

Summarize BMP drainage areas entered to compare with total watershed area defined in "Site Information and Summary" tab

Site Information

Volume Retention Requirement (inches):	1.1
Site's Zip code:	55414
Annual Rainfall (inches):	31.6
Phosphorus EMC (mg/L):	0.30
TSS EMC (mg/L):	54.50
Fraction of annual rainfall events that produce runoff:	0.9

Total Watershed Area

Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Totals (acres)
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	2.00	3.00			5.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	12.00	3.00	4.00		19.00
Impervious Cover (acres)					37.00
				Total:	61.00

Watershed Area Routed to BMPs (Summary of "MIDS BMP Calculator" Tab)

Land Cover (acres)	A soils	B Soils	C Soils	D Soils	Totals (acres)
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	2.00	3.00			5.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	12.00	3.00	4.00		19.00
Impervious Cover (acres)					37.00
				Total:	61.00

Other notable changes to calculator

- Made worksheet compatible with Excel 2003
- Added a general link to the MPCA's Minnesota Stormwater manual on the "Annual Vol & Pollutant Rem LU" tab
- Updated volume pollutant reduction credits to be consistent with bioretention basins (i.e., use P8 modeling lookup tables) for infiltration basins, pervious pavement, infiltration trench/tree boxes, and bioretention basins with under drains

Other notable changes to calculator

- Set maximum depth in infiltration basin to 1.5 feet
- Enable the user to edit the name of practice fields for “Other” BMPs
- Only allow impervious areas to be routed to green roofs and pervious pavement
- Fix routing error so BMPs cannot be routed back to themselves
- Reorder cells based on when data should be entered (i.e., move volume reduction button to the left before routing selection)
- Add wetland BMP to calculator

Version 2

- Work Plan submitted, but not yet approved
- Adds Graphical User Interface
  - By mid-March, draft layout/"storyboard" for each screen and present to Tech Team/MPCA
  - Program GUI, QA/QC, and prepare User Guide before July 1, including Tech Team meeting and Work Group meeting