



Advancing Green Infrastructure in the Menomonee River Watershed through Code Revision

A Project funded by the Fund for Lake Michigan



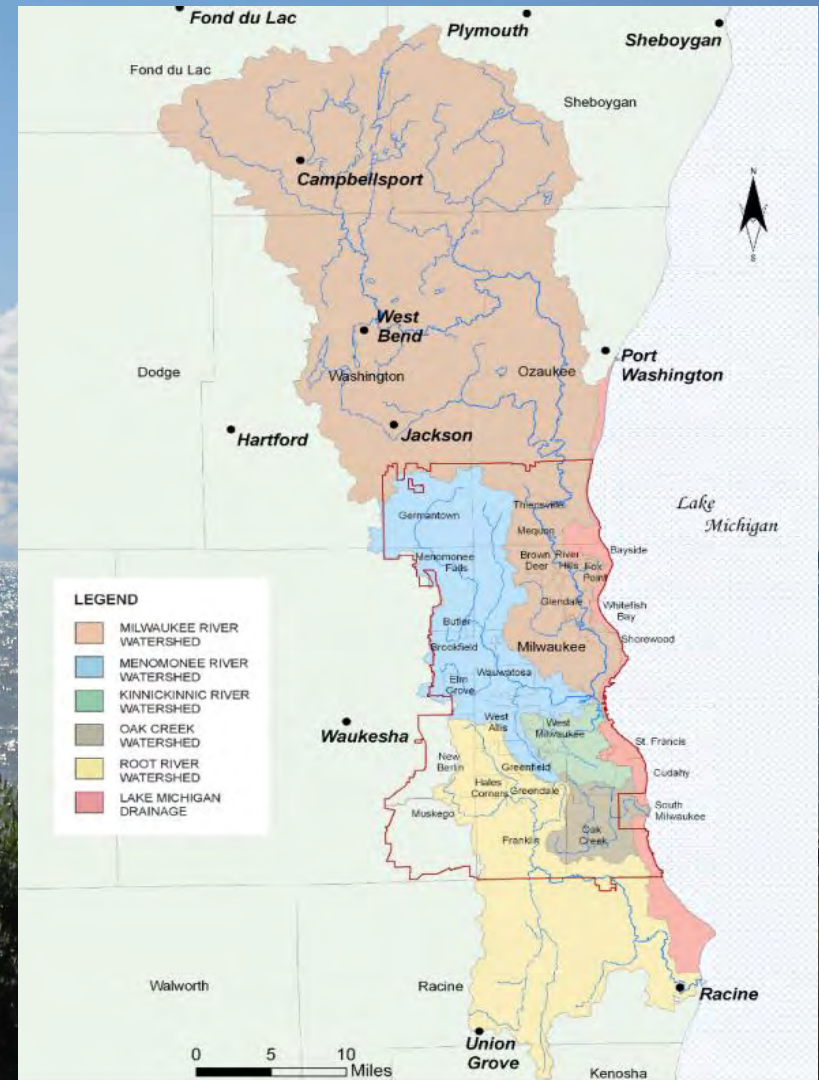
New challenges demand new approaches

- **Rethinking stormwater**
 - Regard stormwater as resource rather than nuisance
 - Retain water where it falls
 - Managed at the source rather than downstream
 - Use natural hydrological processes
 - Address the inter-relationship of water quality and quantity
- **New approaches to stormwater mitigation**
 - Low Impact development
 - **Green Infrastructure**
 - Smart Growth practices
 - Land conservation and habitat and shoreline restoration



Carpe diem

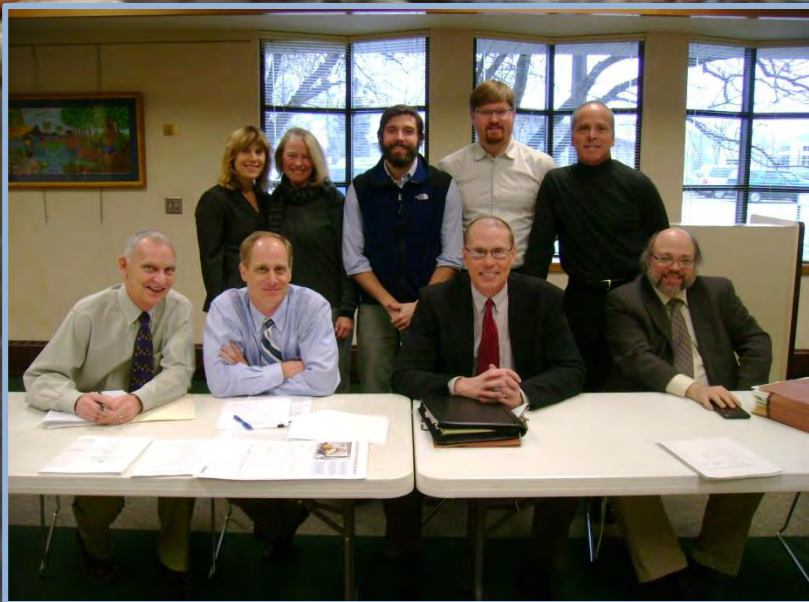
- MN River Restoration Implementation Plan
- MMSD Regional Green Infrastructure Plan
- MMSD permit requirement for green infrastructure
- TMDLs in development
 - Bacteria
 - TSS
 - phosphorus
- MN Watershed-based stormwater permit





August 2011 -- EPA Grant to develop pilot watershed-based stormwater permit for the MN River -- 1st in state; one of three in country





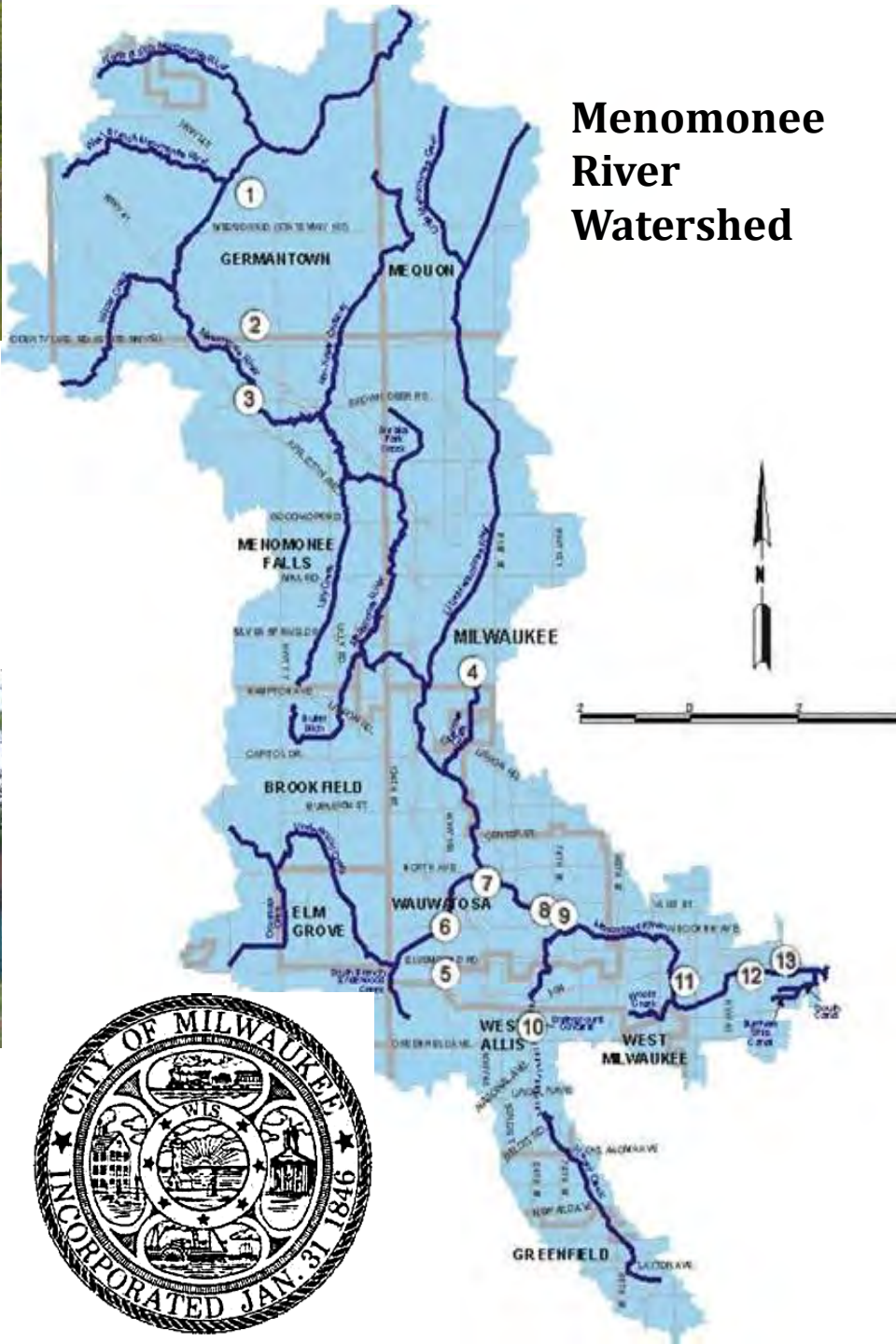
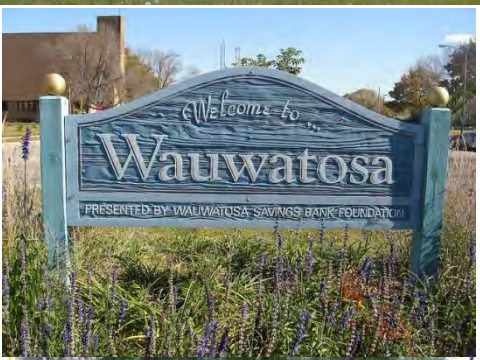
A close-up photograph of a stream with water flowing over rocks and fallen leaves. The water is clear and reflects the surrounding environment. The rocks are dark and wet, and the leaves are in various shades of brown and orange, suggesting an autumn setting. The overall scene is natural and serene.

Goal of project

Identify code/ordinance changes that if enacted in specific locations in the watershed could be expected to have the greatest benefit to watershed health and water quality

Project Partners

- Milwaukee Metropolitan Sewerage District
 - Karen Sands, Sustainability Manager
- Milwaukee County Environmental Services Department
 - Stevan Keith, Sustainability Engineer
- SE WI Watersheds Trust
 - Cheryl Nenn, Milwaukee Riverkeeper
 - Ezra Meyer, Clean Wisconsin
 - Will Moble, GIS Specialist
- Birchline Planning LLC
 - Juli Beth Hinds, AICP, Principal
- and ...



Menomonee River Watershed



Project Phases

- **Phase 1 -- Update of MMSD's 2005 audit**
November 2012 – February 2013
- **Phase 2 -- Develop and prioritize recommendations** – March 2013 – August 2013
- **Phase 3 -- Develop strategizes for recommendations** and tools/materials to aid their adoption – September 2013 – December 2013
- **Wrap-up -- Develop supportive materials** for municipalities, follow up with municipalities, write final report – 2014

Phase 1 – Update of 2005 Audit

Topics for the Audit

- Plan review
- Reducing impervious cover
- Roof runoff and plumbing
- Parking
- Streets
- Paving
- Stormwater standards
- Native soils and vegetation
- Maintenance, inspection and enforcement



2005 Audit – Center for Watershed Protection

Book1.combined.2005.audit.responses. - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Add-Ins PDF Pro 10

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Background Color, Merge & Center

Alignment: Wrap Text, Merge & Center

Number: General, \$, %, +0.00, -0.00

Styles: Conditional Formatting, Format as Table, Cell Styles

Cells: Insert, Delete, Format

Editing: AutoSum, Fill, Clear, Sort & Filter, Find & Select

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
9		5	N	N/A	N/A	N/A	Y	N	N/A	N/A	N/A				
10		6	Y	N/A	N/A	N/A	Y	Y	N/A	N/A	N/A				
11	Rooftop Runoff and Plumbing														
12		7	Y	Y	Y	Y	Q	Y	N	N	Y				
13		8	Y	Y	Y	N	Q	Y	Y	Y	Y				
14		9	Q	Q	Q	Q	Q	Q	Q	Q	Q				
15		10	Q	Q	Q	Q	Y	Q	Q	Q	Q				
16		11	Q	Q	Q	Q	Q	Q	Q	Q	Q				
17		12	Y	Y	Y	Y	Y	Y	Y	Y	Y				
18	Parking Lots														
19		13	N	N	N	N	N	N	N	N	N				
20		14	N	N	N	N	N	N	N	N	N				
21		15	Y	N	N	N	N	Y	Y	Y	N				
22		16	Q	Y	Q	N	N	N	Y	Y	Y				
23		17	Q	N	Q	Y	Y	Y	N	Y	Y				
24		18	N	Q	N	N	N	N	N	N	N				
25		19	Q	Y	Y	Y	Y	Y	Y	Y	Y				
26		20	N	N	N	Y	N	N	N	N	N				
27	Streetscaping														
28		21	Q	Q	Q	N	Q	Q	Q	N	Q				
29		22	N	Y	N	N	N	Q	Q	Q	Q				
30		23	Q	Q	Q	Q	Q	Q	Q	Q	Q				
31		24	Q	Q	Y	Y	Q	Q	Q	Y	Q				
32		25	N	Q	N	N	N	N	N	Y	Q				
33		26	N	Q	Q	Y	Q	Q	Q	Q	Q				

Sheet1 Sheet2 Sheet3

Ready Average: 18.96 Count: 631 Sum: 2370 100%

2012 Audit

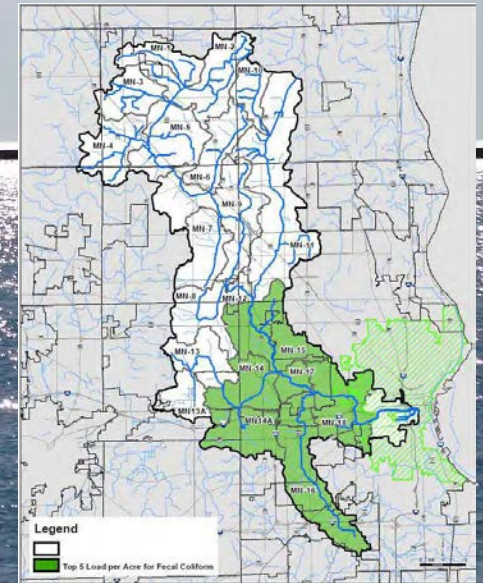
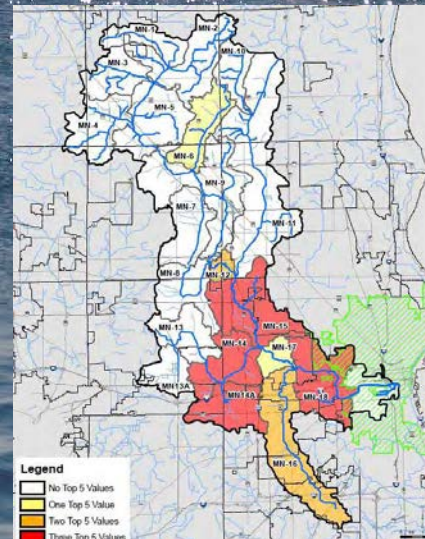
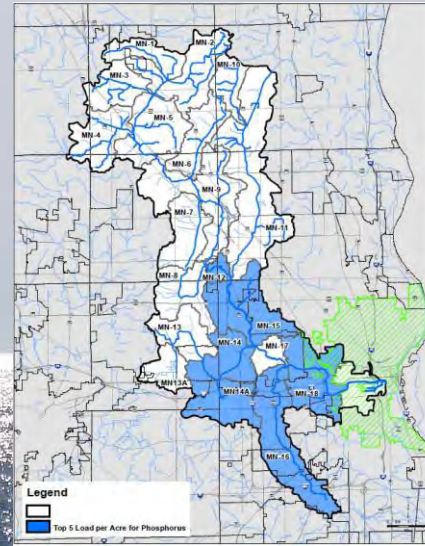
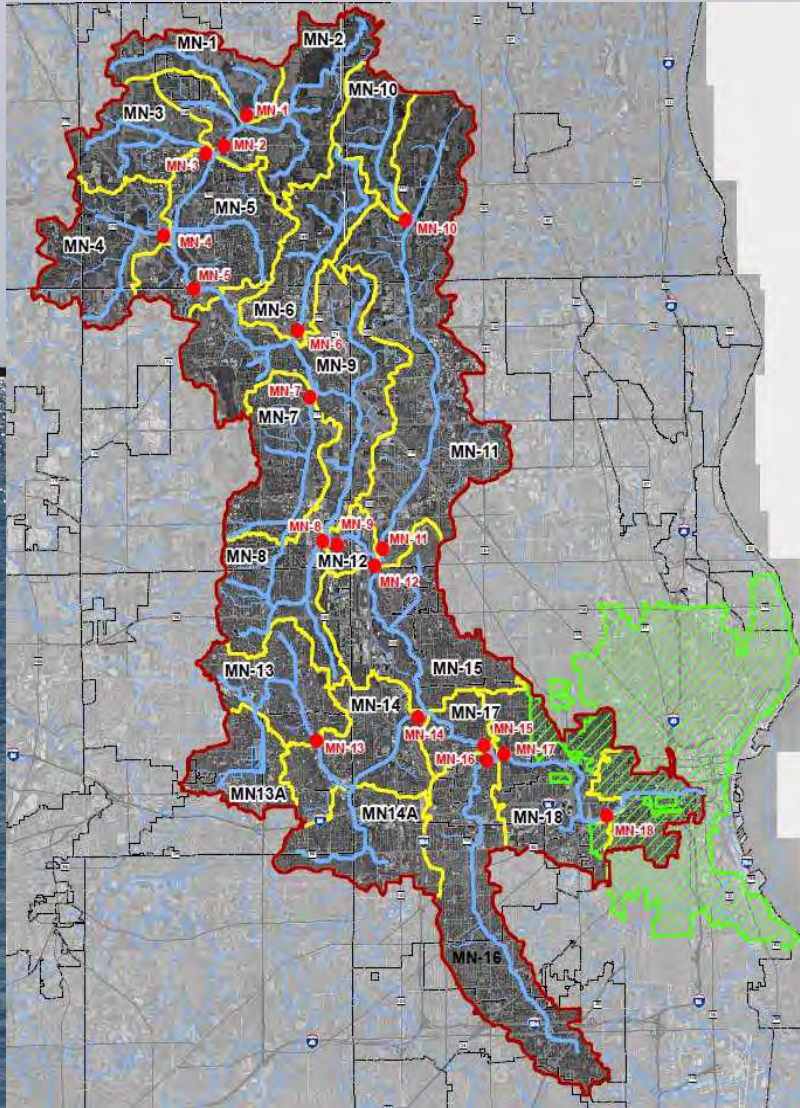
Enabled specifically or as of right	Language that specifically refers to and enables the practice or measure, and if conditional, states the criteria for acceptability so there is as little question as possible about approval.
Enabled, but some ambiguity or potential conflict	Language refers to and supports the practice, but there are other provisions in the code that could potentially be seen as conflicting.
Discretionary approval, practice encouraged or standards or process adopted	The practice is encouraged or supported, and there is a reasonably good indication of the criteria or approval or application.
Practices mentioned, discretionary approval, no standards adopted	Language refers to the practice or a similar approach, but without specifics or criteria.
No policy or standards, but not disallowed	Not mentioned nor prohibited in code, or ambiguous as to its application and intent.
Some limits or prohibitions, but potentially allowable	Practice is discouraged either specifically, or based on other requirements and standards, but a path to approval could be possible
Prohibited or active conflict	Code language either specifically discourages the practice or makes it impractical, without an evident path to approval.

Room for improvement

PERMEABLE MATERIALS :0!!

May alleys be permeable or widths varied?	Blue	Orange	Blue	Blue	Red	Blue	Green	Yellow	Blue
Are parking areas allowed to be permeable?	Red	Red	Green	Orange	Red	Red	Green	Green	Red
Are loading areas allowed/encouraged to be permeable?	Orange	Orange	Blue	Red	Red	Blue	Blue	Orange	Red
Are sidewalks allowed/encouraged to be permeable?	Yellow	Orange	Orange	Red	Red	Red	Green	Orange	Orange
Are driveways allowed/encouraged to be permeable?	Blue	Orange	Blue	Orange	Blue	Green	Green	Yellow	Blue
Are low-volune street sections allowed/encouraged to be permeable?	Red	Orange	Orange	Red	Red	Blue	Blue	Red	Orange
Does the use of permeable materials reduce the stormwater quantity required to be managed? If so is this a written or informal standard?	Orange	Grey	Blue	Yellow	Light Green	Yellow	Yellow	Yellow	Yellow
Is there a provision that driveways may/shall be partially permeable or drained to pervious area if exceeding a certain width/total SF?	Blue	Green	Blue	Blue	Red	Blue	Green	Blue	Blue
Is permeable surfacing allowed for parking lanes?	Orange	Orange	Orange	Red	Red	Blue	Green	Orange	Red
Must driveway aprons be made of impermeable surfaces?	Blue	Orange	Orange	Blue	Red	Red	Green	Blue	Blue
Must a sealant be used and can that provision be waived?	Blue	Orange	Orange	Blue	Red	Blue	Green	Red	Blue
Can grasscrete be used to meet public safety/fire access needs?	Light Green	Light Green	Blue	Light Green	Light Green	Light Green	Green	Green	Blue
Is there municipal experience with permeable material, curbless streets, or other GI measures?	Light Green	Light Green	Green	Light Green	Light Green	Green	Green	Light Green	Blue
Are standard specifications or performance standard adopted or referenced for permeable materials?	Red	Orange	Blue	Red	Blue	Blue	Light Green	Blue	Blue

Phase 2 – Develop recommendations and Prioritize



TMDL Allocations

http://v3.mmsd.com/%5CAssetsClient%5Cdocumr mmsd.com

Secure Search McAfee

Portion of Allowable Load Table – Milwaukee Reach 239

Reach 239			Allowable Load Per Flow Regime									
			Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
			Minimum	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile	Maximum			
JAN	Target Concentration		Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
		Flow (cfs)	0.92	1.57	3.28	5.30	11.72	27.47	59.50			
	TP (mg/L)	0.075	TP Load (pounds/day)	0.37	0.64	1.33	2.55	4.74	11.10	24.06		
	TSS (mg/L)	13.6	TSS Load (pounds/day)	67.37	115.45	240.52	461.79	859.13	2013.69	4362.26		
FEB	Target Concentration		Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
		Flow (cfs)	0.74	1.52	4.78	7.90	11.25	24.82	52.82			
	TP (mg/L)	0.075	TP Load (pounds/day)	0.30	0.61	1.93	4.55	10.03	21.35			
	TSS (mg/L)	13.6	TSS Load (pounds/day)	54.59	111.42	350.74	578.83	824.54	1819.54	3872.28		
MAR	Target Concentration		Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
		Flow (cfs)	0.59	2.50	7.56	9.80	12.31	21.53	35.43			
	TP (mg/L)	0.075	TP Load (pounds/day)	0.24	1.01	3.06	3.96	4.98	8.71	14.32		
	TSS (mg/L)	13.6	TSS Load (pounds/day)	43.13	182.93	554.42	718.68	902.43	1578.51	2597.12		
APR	Target Concentration		Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
		Flow (cfs)	1.95	3.89	7.80	11.60	16.27	29.54	98.98			
	TP (mg/L)	0.075	TP Load (pounds/day)	0.79	1.57	3.15	4.69	6.58	11.94	40.02		
	TSS (mg/L)	13.6	TSS Load (pounds/day)	143.07	285.43	571.63	850.25	1193.05	2165.40	7255.12		
MAY	Target Concentration		Q Min	Q Low	Q Dry	Q Mid	Q Moist	Q High	Q Max			
		Flow (cfs)	0.47	1.13	5.04	9.19	13.75	24.17	41.83			
	FC (cfu/100ml)	400	FC Load (mil. CFU/day)	4.64E+03	1.11E+04	4.93E+04	8.99E+04	1.35E+05	2.37E+05	4.09E+05		
	TP (mg/L)	0.075	TP Load (pounds/day)	0.19	0.46	2.04	3.72	5.56	9.77	16.91		
			TSS (mg/L)	13.6	TSS Load (pounds/day)	34.79	83.07	369.64	673.67	1007.84	1771.90	3066.97

Milwaukee River Basin TMDLs
Draft Work in Progress

CDM Smith

Phase 3 – Develop strategies to advance recommendations



A good project builds its own momentum

- Juli Beth Hinds invited to present at annual Clean Rivers, Clean conference in Milwaukee April 25
- Presenting at the conference of the WI Chapter of the APA in Sheboygan in June
- Bryan Hartsook, DNR, invited to present at the national Water Environment Federation conference highlighting innovative work in the Menomonee River Watershed/the watershed-based permit and codes project
- Invited to present at the International Low Impact Development Symposium, August 2013 Minneapolis, MN
- Root-Pike WIN initial interest to have a parallel project with their group of municipalities
- Invited to participate in green infrastructure ad hoc leadership team led by Office of Sustainability/City of Milwaukee



A scenic view of a rocky stream flowing through a forest with autumn foliage. The water is dark and flows over numerous light-colored rocks. The surrounding trees are mostly bare, with some showing yellow and orange leaves. The overall atmosphere is serene and natural.

We would like to express our appreciation to the Fund for Lake Michigan for their generous support of this project.

Thank you.

**Kate Morgan
Water Policy Director
1000 Friends of Wisconsin**