Updated City-Wide Stormwater Management Plan

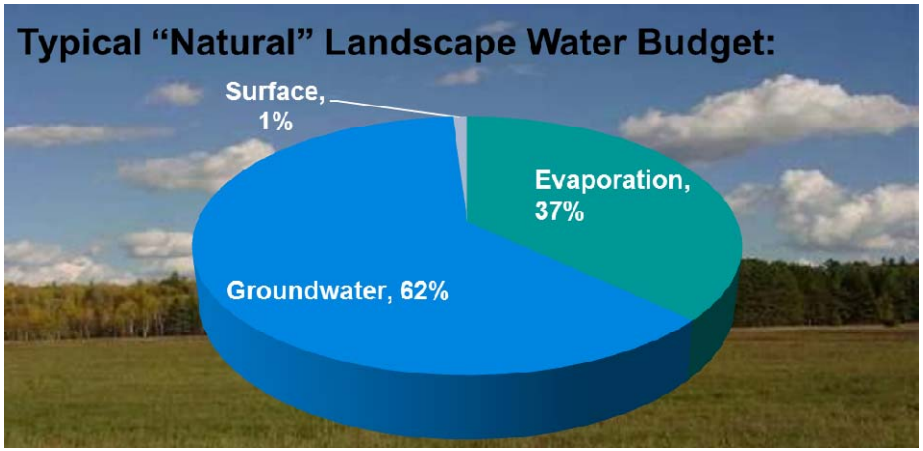
Utilities Committee

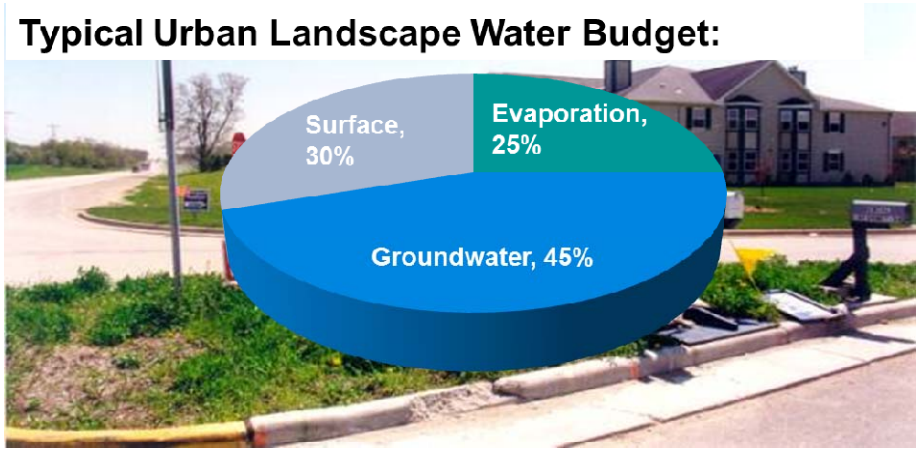
City of Appleton
June 10, 2014

Urban Development Impacts Stormwater Quantity and Quality

Urbanization Can Cause:

- More Runoff (flooding)
- Dirtier Runoff (pollution)





Stormwater Runoff Quality in turn Impacts Receiving Waters

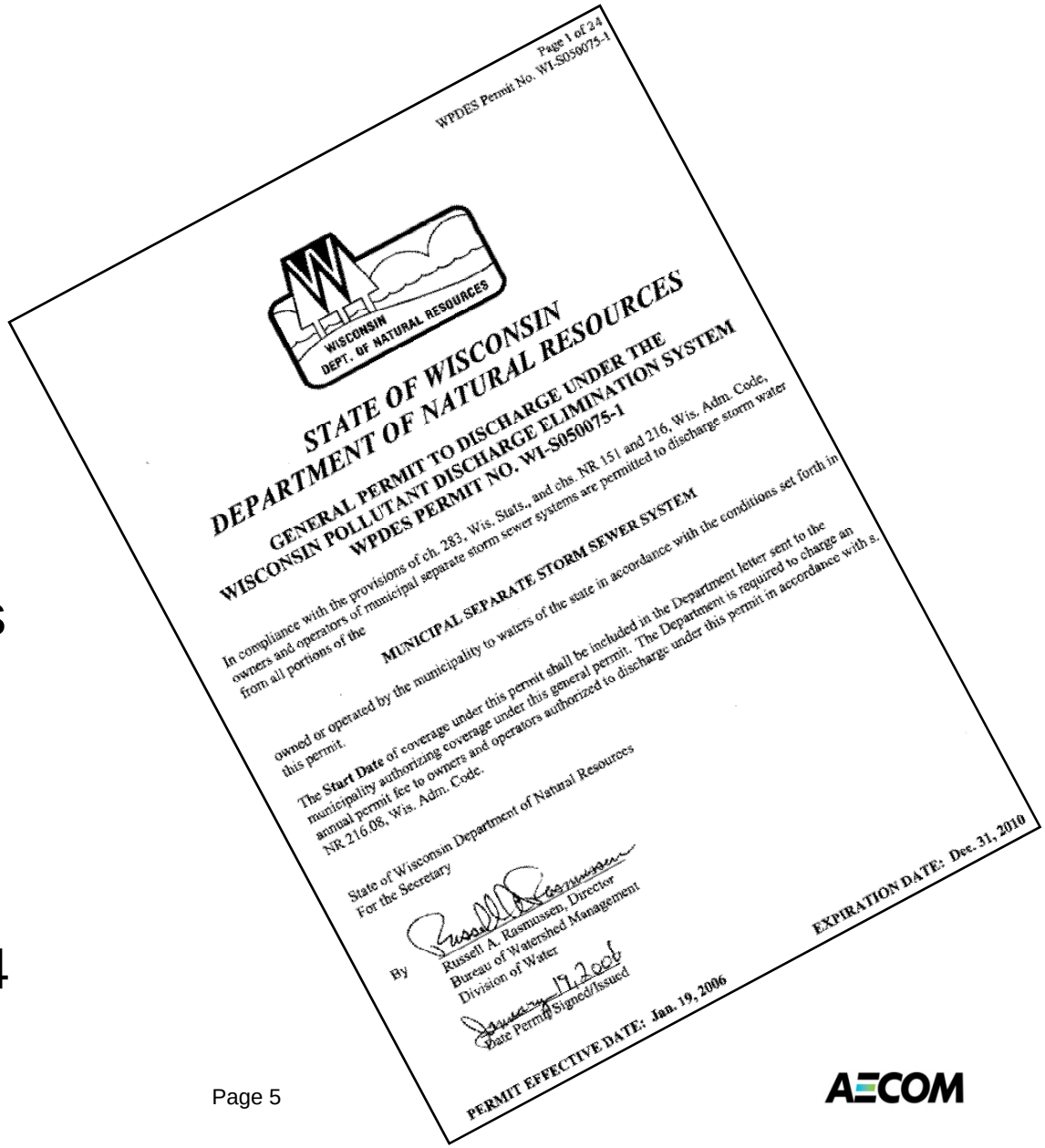
With each rain event, runoff water flows over the land, into storm sewers, and into rivers & lakes

Stormwater Pollution from Urban Sources – Not All the Same

Urban Source Area	Pollutant Type / General Severity		
	TSS	Nutrients	Heavy Metals
Streets • Residential • Commercial • Industrial	 High High High	 High High High	 Medium High High
Roof • Residential • Commercial • Industrial	 Very Low Medium Medium	 Low Medium Low	 Low - Medium Medium High
Sidewalk	Low	Medium	Medium
Lawn	Very Low	Low	Very Low
Parking Lots	High	Medium	High

Federal Regulations Delegated to States – Wisconsin DNR

- WDNR Established Stormwater Permit System
- Permit Requirements Defined in Administrative Rules (NR 216 & NR 151)
- Appleton Permit Issued in Dec. 2006
- Re-issued May 2014



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WPDES Permit No. WI-S050075-1

WISCONSIN DEPT. OF NATURAL RESOURCES

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

GENERAL PERMIT TO DISCHARGE UNDER THE
WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM
WPDES PERMIT NO. WI-S050075-1

In compliance with the provisions of ch. 283, Wis. Stats., and chs. NR 151 and 216, Wis. Adm. Code, owners and operators of municipal separate storm sewer systems are permitted to discharge storm water from all portions of the

MUNICIPAL SEPARATE STORM SEWER SYSTEM

owned or operated by the municipality to waters of the state in accordance with the conditions set forth in this permit.

The **Start Date** of coverage under this permit shall be included in the Department letter sent to the municipality authorizing coverage under this general permit. The Department is required to charge an annual permit fee to owners and operators authorized to discharge under this permit in accordance with s. NR 216.08, Wis. Adm. Code.

State of Wisconsin Department of Natural Resources
For the Secretary

By Russell A. Rasmussen, Director
Bureau of Watershed Management
Division of Water

January 17, 2006
Date Permit Signed/Issued

PERMIT EFFECTIVE DATE: Jan. 19, 2006

EXPIRATION DATE: Dec. 31, 2010

Municipal Stormwater Permit Requirements in Wisconsin

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Erosion Control Ordinance
5. Post-Construction Stormwater Ordinance
6. Pollution Prevention
7. ***Stormwater Quality Management***

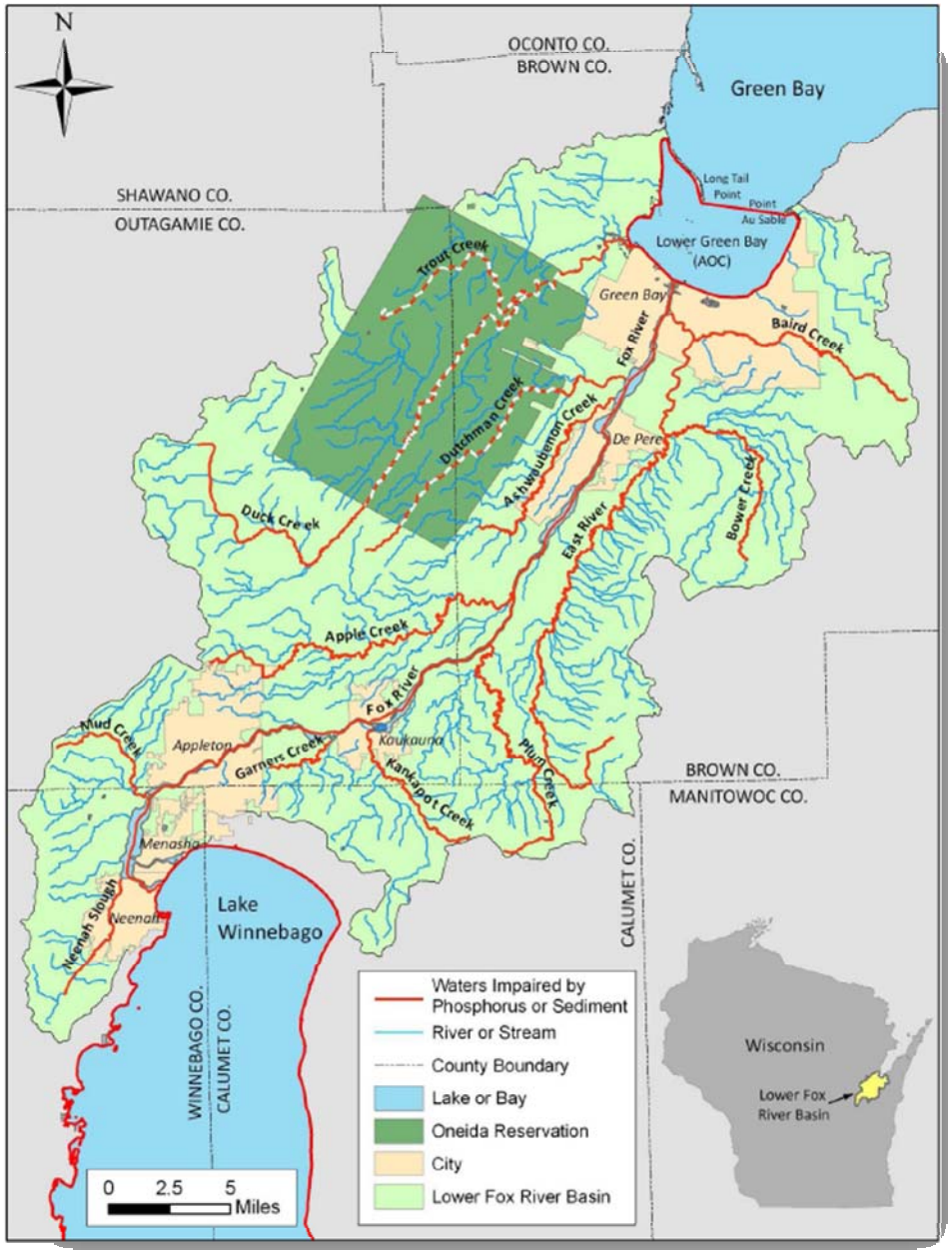
New Stormwater Requirements: "TMDL"

- Clean Water Goal is "Fishable and Swimmable"
- The EPA and DNR have defined "clean water" with chemical and biological numeric standards for each waterbody
- **T**otal **M**aximum **D**aily **L**oads:
  "The amount of pollution a water body can receive and still meet water quality standards
- The Lower Fox River now has TMDLs for sediment and phosphorus

Lower Fox River TMDL

Lower Fox River Basin

- 641 square miles
- 27 listed waters for Sediment and Phosphorus
- 45 TMDLs
- 29 Municipal Stormwater Permits
- 34 Wastewater Permits
  - 20 industrial
  - 14 municipal
- 15 Large Livestock Operations

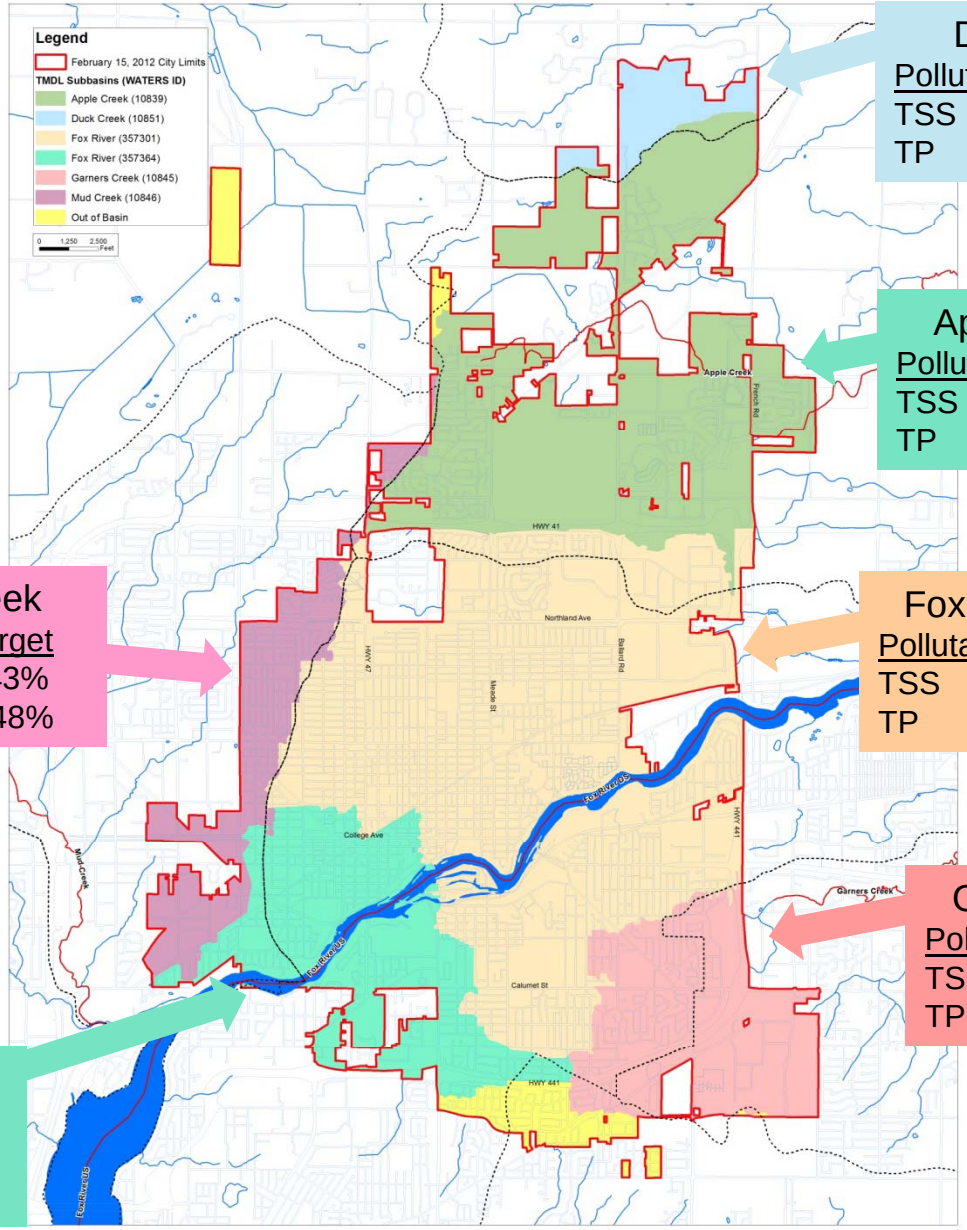


Lower Fox River Basin TMDL

Completed by DNR and Approved by EPA in March 2012

TMDL sets “acceptable pollution loads” for each watershed

TMDL Pollution: Reduction Targets



Duck Creek

Pollutant	Target
TSS	52%
TP	40%

Apple Creek

Pollutant	Target
TSS	52%
TP	40%

Mud Creek

Pollutant	Target
TSS	43%
TP	48%

Fox River (DS)

Pollutant	Target
TSS	72%
TP	40%

Garners Creek

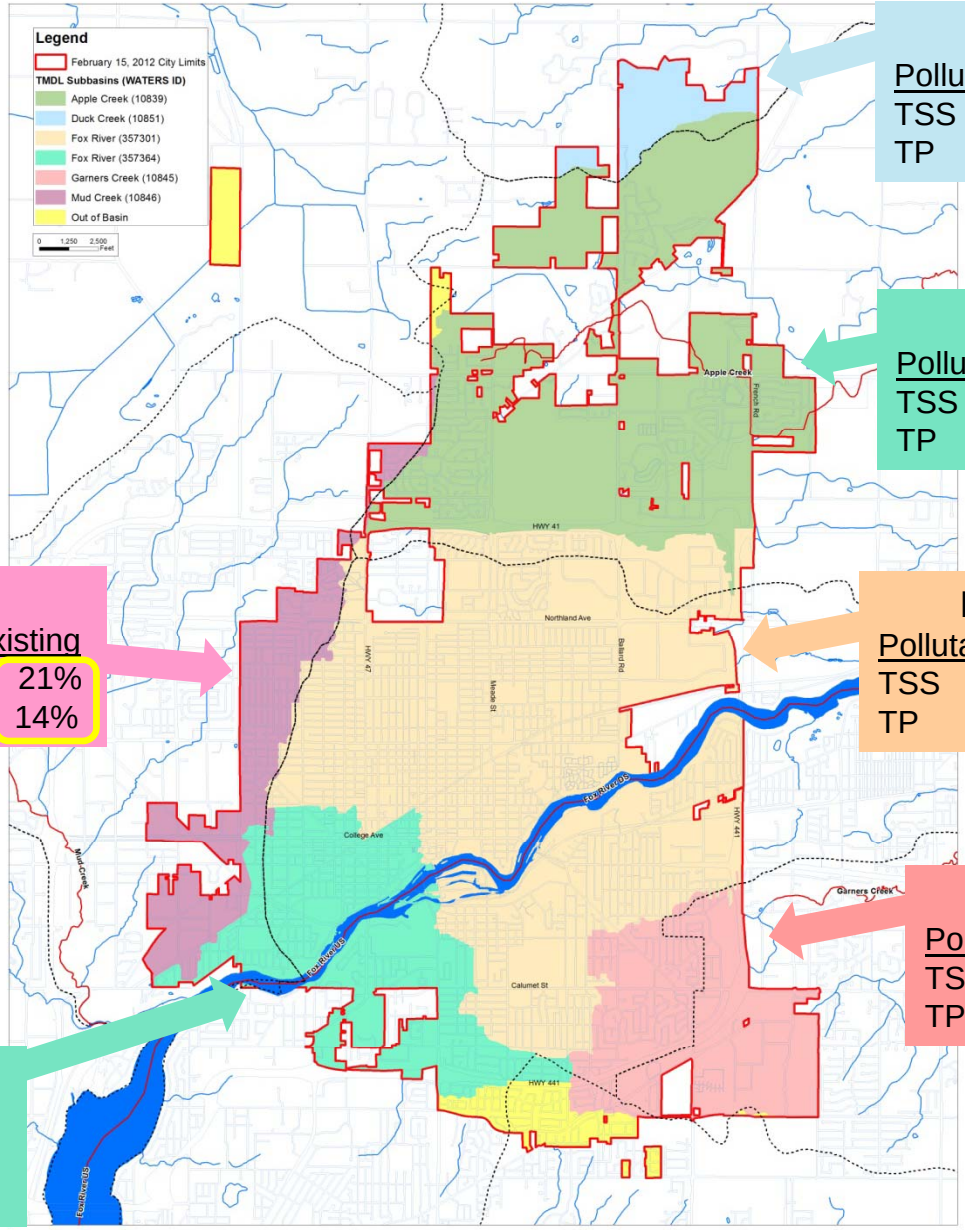
Pollutant	Target
TSS	60%
TP	69%

Fox River (US)

Pollutant	Target
TSS	72%
TP	40%

AECOM

TMDL Pollution: Existing Pollution Control



Duck Creek

Pollutant	Target	Existing
TSS	52%	69%
TP	40%	44%

Apple Creek

Pollutant	Target	Existing
TSS	52%	80%
TP	40%	60%

Mud Creek

Pollutant	Target	Existing
TSS	43%	21%
TP	48%	14%

Fox River (DS)

Pollutant	Target	Existing
TSS	72%	28%
TP	40%	20%

Garners Creek

Pollutant	Target	Existing
TSS	60%	78%
TP	69%	58%

Fox River (US)

Pollutant	Target	Existing
TSS	72%	18%
TP	40%	11%

AECOM

Stormwater Pollution Control “Tool Box”









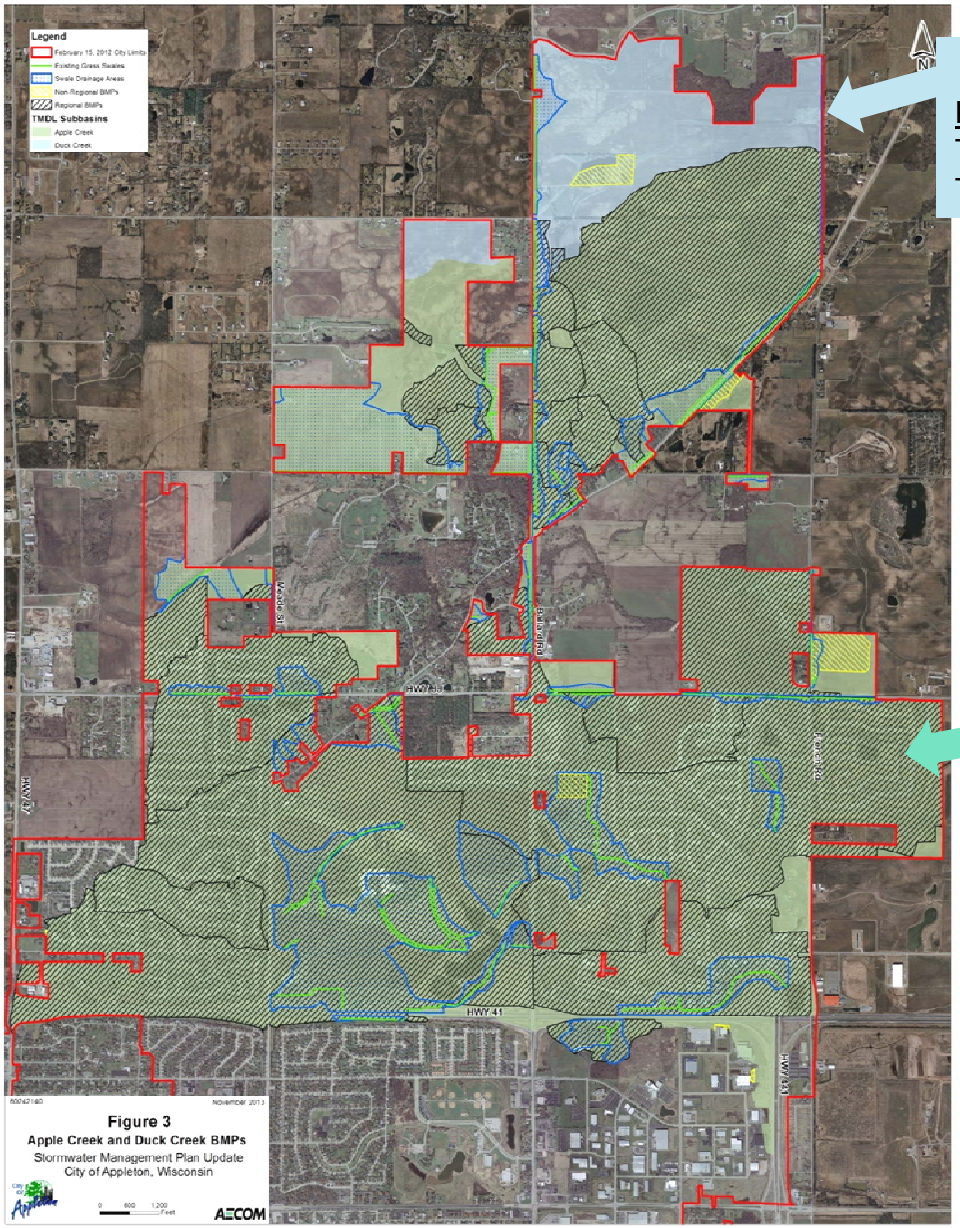
Cost Analysis

BMP	Annual Cost (per Ton of TSS Removed)	Annual Cost (per lb of TP Removed)
Street Cleaning	$1,000 - $1,500	$400 - $500
Regional Stormwater Pond	$2,000 - $7,000	$400 - $1,300
HSD (in Conjunction with Street Reconstruction)	$2,000 - $54,000 (avg. $10,000)	$400 - $4,200 (avg. $1,500)
HSD (as Separate Project)	$3,000 - $87,000 (avg. $18,000)	$700 - $8,200 (avg. $2,600)
Pond Retrofit – Enhanced Chemical Treatment	$5,000 - $110,000 (avg. $18,000)	$300 - $7,200 (avg. $1,200)
Biofilter	$29,000- $50,000	$12,000- $45,000
Permeable Pavement	$33,000 - $58,000	$15,000 - $55,000

Duck Creek and Apple Creek – In Compliance

Requires

- **No New City Funded BMPs**
- **Maintenance of Existing Public/Private BMPs**
- **BMP Implementation for Future Development**



Duck Creek

Pollutant	Target	Existing
TSS	52%	69%
TP	40%	44%

Apple Creek

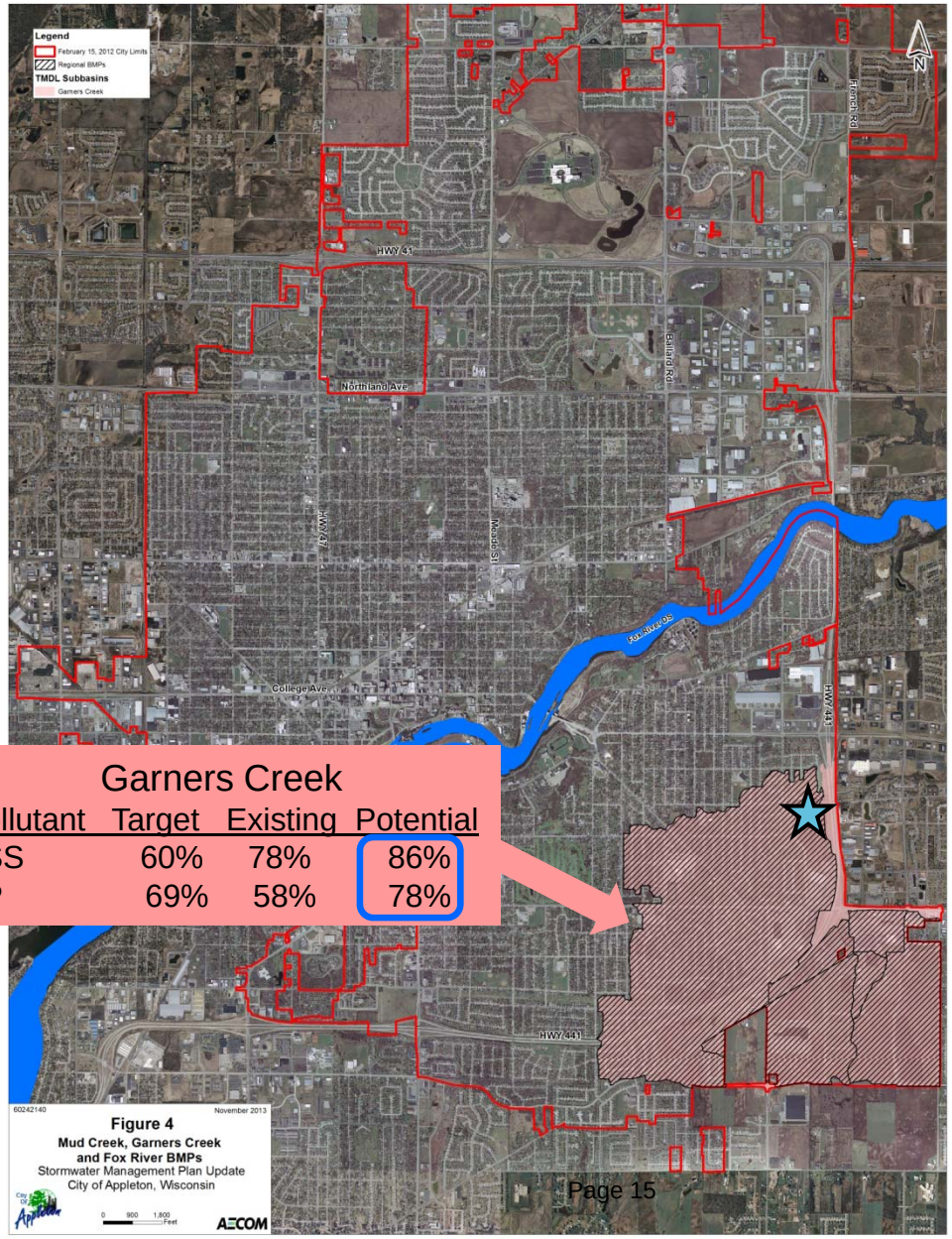
Pollutant	Target	Existing
TSS	52%	80%
TP	40%	60%

City Of Appleton

AECOM

Garners Creek Alternative BMPs

Requires Additional TP Control



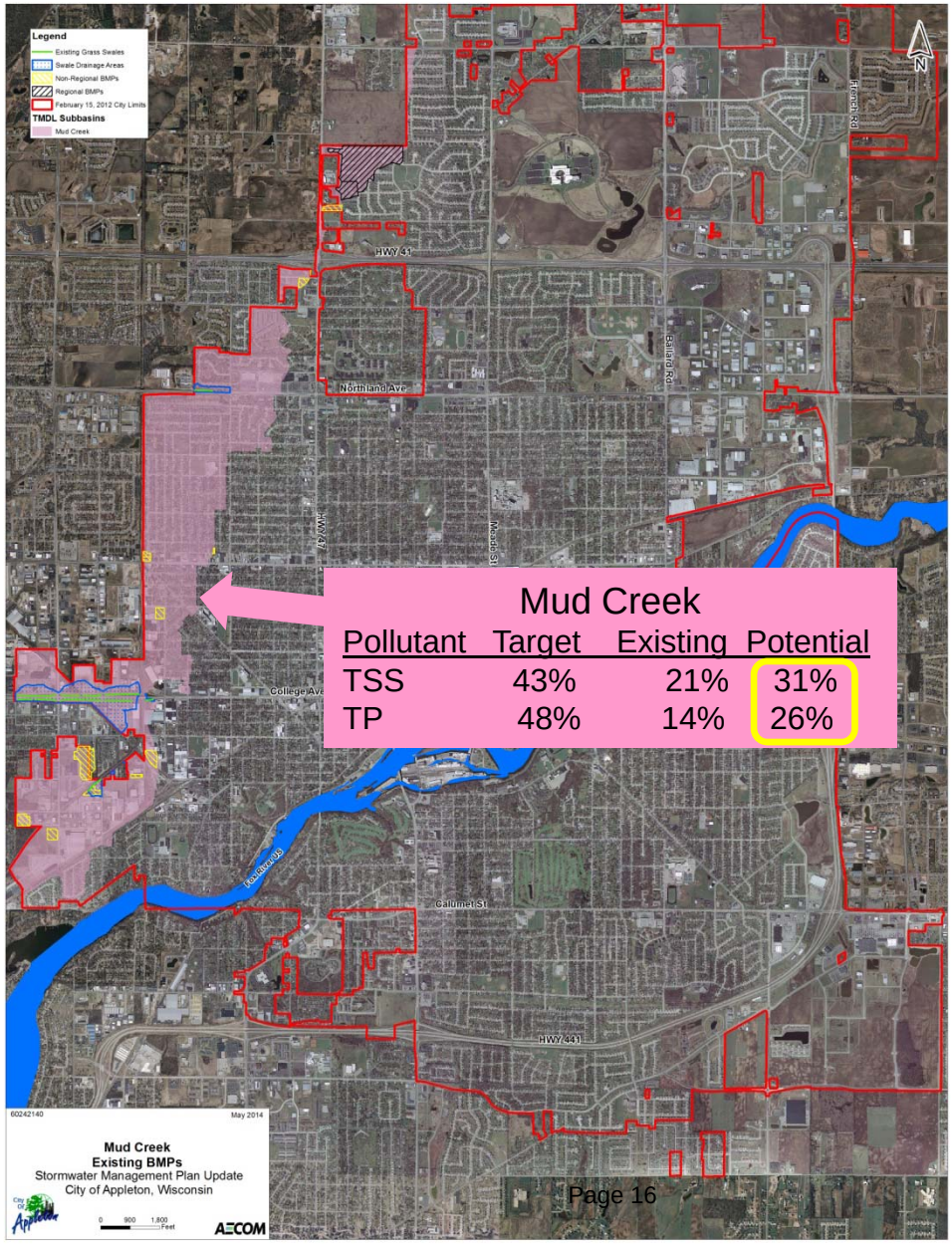
Practices Evaluated

1. Enhanced Settling for Phosphorus Removal (Kensington Pond only)

BMP	TSS (tons/yr)	TP (lbs/yr)	Capital
1	11	190	$ 945,000

Mud Creek Alternative BMPs

Requires Additional TSS and TP Control



Mud Creek

Pollutant	Target	Existing	Potential
TSS	43%	21%	31%
TP	48%	14%	26%

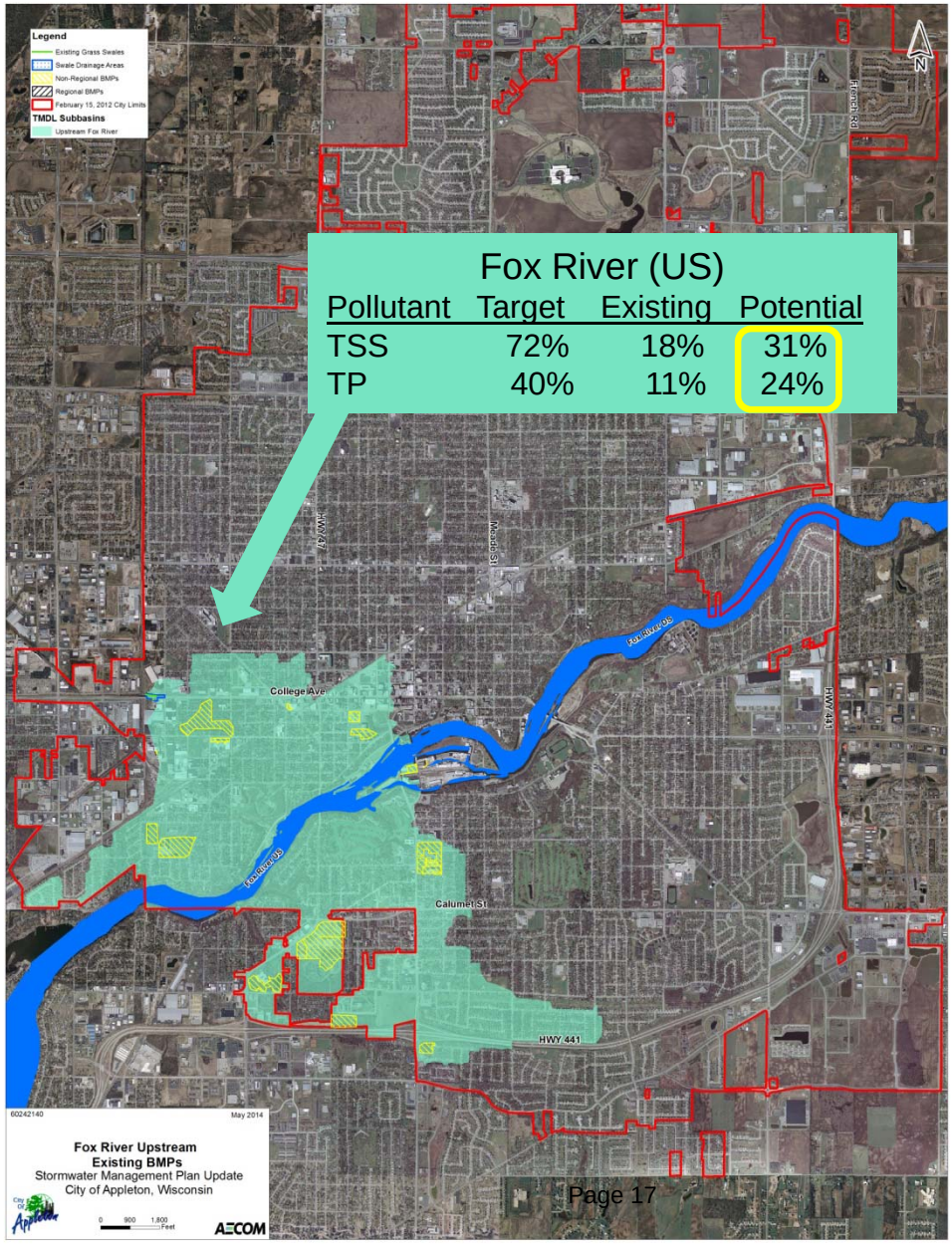
Practices Evaluated

1. Expanded Street Cleaning
2. Wet Detention (Northland Avenue)
3. Enhanced Settling (Northland Avenue, Mud Creek South)
4. HSDs (7)
5. Biofiltration / Porous Pavement

BMP	TSS (tons/yr)	TP (lbs/yr)	Capital
1	23	87	$ 40,000
2	10	51	$ 1,980,000
3	1	24	$ 120,000
4	1	2	$ 90,000
5	40	55	$22,000,000
	75	**219**	**$24,230,000**

Lower Fox River (Upstream of Dam) Alternative BMPs

Requires Additional TSS and TP Control



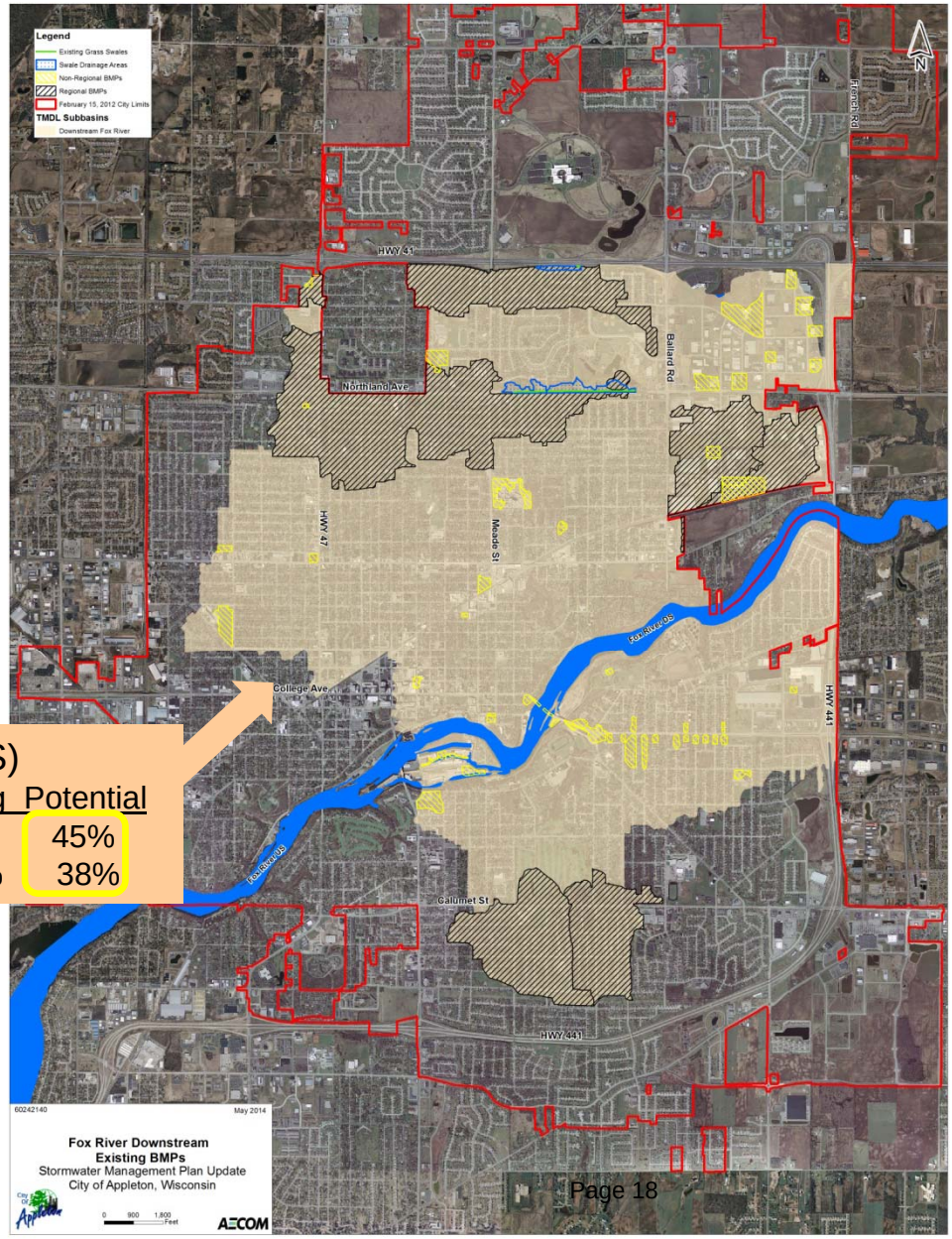
Practices Evaluated

1. Expanded Street Cleaning
2. Wet Detention (Pierce Park, Valley Road)
3. Enhanced Settling (Pierce Park, Valley Road)
4. HSDs (34)
5. Biofiltration / Porous Pavement

BMP	TSS (tons/yr)	TP (lbs/yr)	Capital
1	32	131	$ 80,000
2	24	119	$ 1,820,000
3	4	53	$ 270,000
4	2	13	$ 350,000
5	33	53	$20,560,000
	95	**369**	**$23,080,000**

Lower Fox River (Downstream of Dam) Alternative BMPs

Requires Additional TSS and TP Control



Fox River (DS)

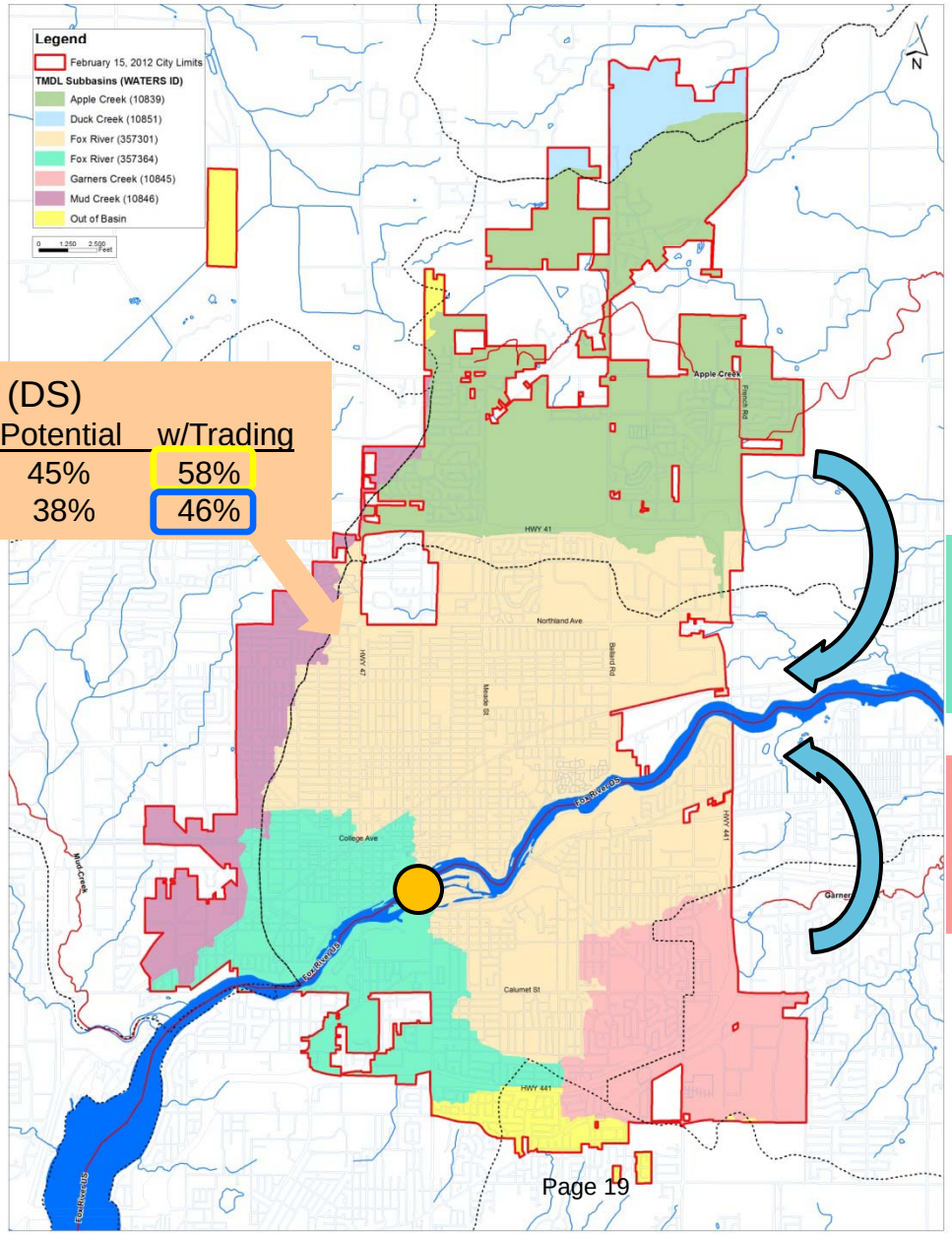
Pollutant	Target	Existing	Potential
TSS	72%	28%	45%
TP	40%	20%	38%

Practices Evaluated

1. Expanded Street Cleaning
2. Wet Detention (Leona Street)
3. Enhanced Settling (Leona Street and All 10 Existing Ponds)
4. HSDs (62)
5. Biofiltration / Porous Pavement
6. Bellaire Ravine Porous Pavement

BMP	TSS (tons/yr)	TP (lbs/yr)	Capital
1	85	346	$ 200,000
2	17	80	$ 1,420,000
3	23	324	$ 1,620,000
4	5	31	$ 670,000
5	79	125	$45,860,000
6	80	405	$46,000,000
	289	**1,311**	**$95,770,000**

Compliance Point Internal Trading



Fox River (DS)

Pollutant	Target	Existing	Potential	w/Trading
TSS	72%	28%	45%	58%
TP	40%	20%	38%	46%

Apple Creek and Garners Creek Excess TSS and TP can be Applied to the Lower Fox River Downstream of the Middle Dam Compliance Point

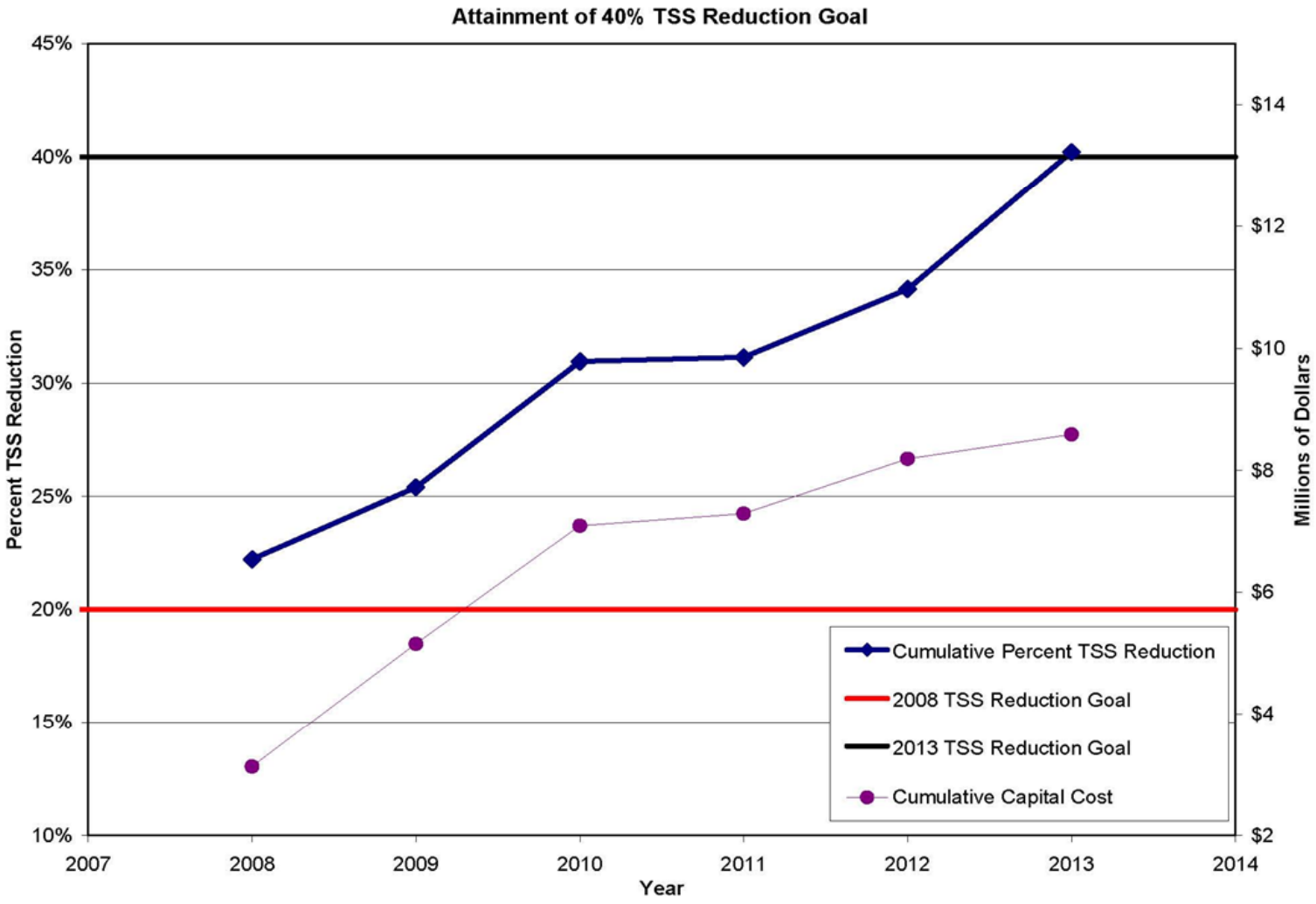
Apple Creek

Pollutant	"Excess"
TSS	68 tons/yr
TP	325 lbs/yr

Garners Creek

Pollutant	"Excess"
TSS	38 tons/yr
TP	89 lbs/yr

Pre-TMDL Approach To Permit Compliance



TMDL Approach to Continued Compliance

- Benchmarking (Identify interim permit targets)
- Strategic Continual Progress

Implementation Plan Considerations

- Economics
- Utility Rate
- Private Property
- Regulatory
- Technology
- Public Acceptance/Perception
- Flood Control

Appleton's Proposed Strategy

Each Year

- Continue to implement the other items in the Permit
- Continue to operate and maintain existing practices
- Monitor studies, technology and regulations
- Watch for and act on opportunities

Appleton's Implementation Plan

- 2014
  - Preliminary Engineering of Northland Pond
  - Evaluate Stormwater Utility Credit Policy
  - Preliminary Engineering of Leona Street Pond, including evaluation of enhanced Phosphorus treatment
  - Purchase Land for Northland Pond
  - Continue discussion with WDOT re: 441 project
  - Start on requirements of new Permit
- 2015
  - Final design/permitting of Northland Pond
  - Work with Counties to clarify credit
  - Evaluate potential Mud Creek project
  - Relocate public storm sewer at WWTP to address Illicit Discharge

Appleton's Implementation Plan

- 2016
  - Solicit bids for Northland Pond
  - Work with WDOT to clarify credit
- 2017
  - Construct Northland Pond
  - Evaluate possibility of adding private street sweeping contract to supplement City staff
  - Final Design and Purchase Land for Leona Street Pond
- 2018
  - Construct Leona Street Pond
  - Possibly construct pond with WDOT 441 Project

Appleton's Implementation Plan

- 2019
  - Budget for next City-wide plan update
  - Issue RFP for consultant selection

- 2020-2021
  - High Efficiency Street Sweeper Upgrade
  - Update the City-wide Stormwater Management Plan

Questions and Discussion

Committee

Thank You!