

Off-site BMP Implementation in the Little Arkansas River Watershed

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City of Wichita

- Effective February 1, 2014/Large MS4's in July
- Several changes from initial permit (as issued 2004) including monitoring of streams and lakes and an **“Alternative Stormwater Offsite Pollution Reduction Program”**
- KDHE continues to emphasize the MS4 Permittee should develop a Stormwater Management Program which works for their location and circumstances

- KDHE perspective: wastewater management #1; NPS management is second; urban stormwater comes in third
- In most Kansas watersheds, urban areas covered by MS4 is a small (< 10%) portion of the watershed; majority of loads during wet weather come from NPS
- It may be more cost effective to build BMPs outside the MS4 jurisdiction
- Rural BMP Costs typically <<< Urban BMP Costs
- MS4 may spend less money and achieve greater load reductions going off-site in the watershed
- Need a rural broker to put MS4 \$\$ in hands of rural landowner...WRAPS
- Need some formalized arrangement with WRAPS or Conservation District

- Need method of tracking which practices are installed using MS4 funds
- Need assurance that practice will remain in place and functional for set amount of time
- Need to report to KDHE annually activities of previous year
- Not “trading”...no exchange of load allocations, no accounting for NPS already meeting load allocations so new BMP brings enhanced reductions

[A to Z Topic Listing](#)

[Water Home](#)

[Geology & Well Technology](#)

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[Technical Services](#)

[Watershed Management](#)

[Watershed Planning and
TMDL Program](#)

Watershed Restoration And Protection Strategy



A Watershed Restoration and Protection Strategy (WRAPS) is a planning and management framework intended to engage stakeholders in a process to:

- Identify watershed restoration and protection needs
- Establish management goals
- Create a cost effective action plan to achieve goals
- Implement the action plan

In addition to this framework, the process documents stakeholder goals, strategies to achieve the goals, and the resources required to implement the strategies.

WRAPS efforts can address a variety of water resource concerns statewide. These concerns can include water quality, public water supply protection, flooding, and wetland and riparian habitat protection or restoration. Solutions to identified concerns are developed locally by stakeholders within the watershed.

The WRAPS Process-

Contact

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Get Involved

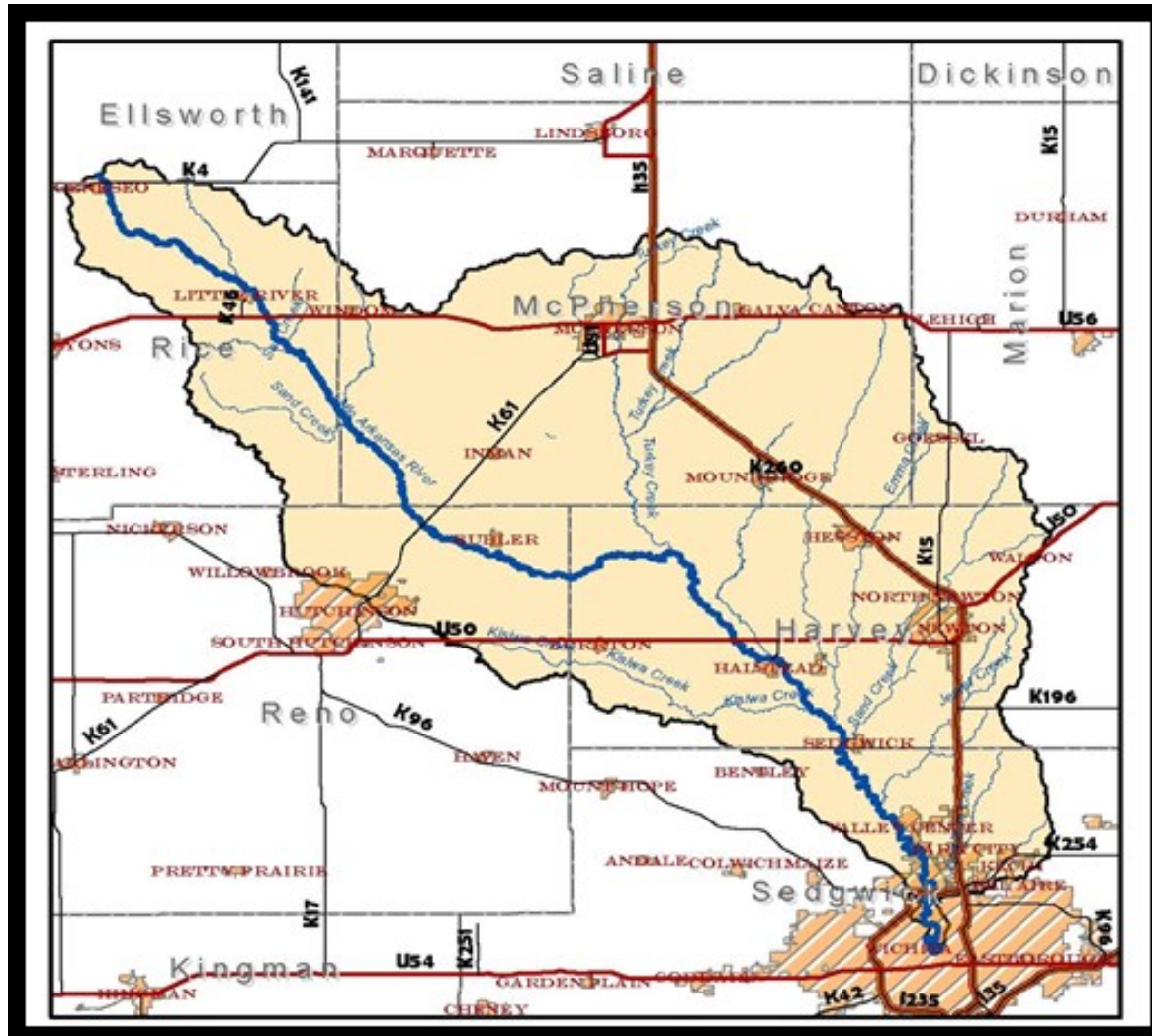
1. Go to www.kswraps.org to see if there is a WRAPS project in your area.
2. Call the WRAPS project contact in your area, or
3. Call the Kansas Department of Health and Environment, Watershed Management Section at 785.296.4195.

WRAPS Info (State and Federal Agencies)

- [Current WRAPS Map](#)
- [WRAPS Brochure](#)
- [Kansas Water Quality Celebrations](#)
- [Banner Creek Watershed Success Story](#)
- [Clarks Creek Watershed Success Story](#)

Approved WRAPS 9-Element Plans

- [WRAPS 9-Element Watershed Plans](#)



Agricultural watershed

- 78% cropland
- 19% grazingland
- 237 registered CAFO's

TMDLs set for the watershed

- 52% of stream segments required TMDLs

Water quality concerns include bacteria, nutrients, sediments, pesticides

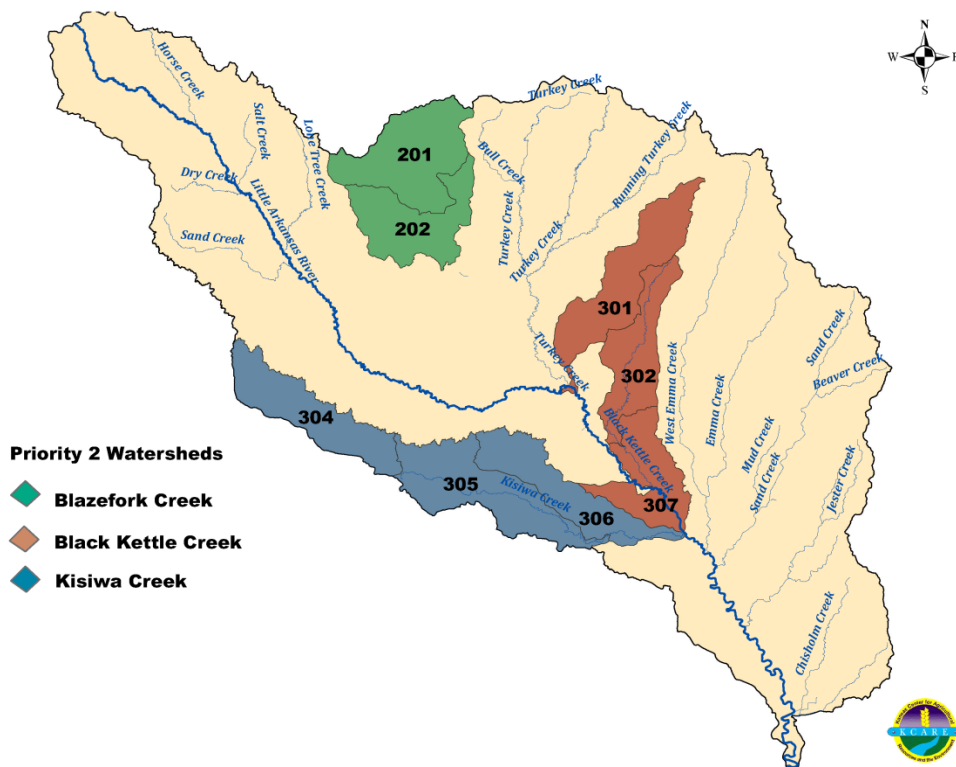
Drinking water source for city of Wichita and numerous smaller cities and towns

- 205 public water supplies
- 7400 groundwater wells

Source for aquifer recharge



- **Emma Creek - 2,336.82 tons/year**
- **Turkey Creek - 4,895.96 tons/year**
- **Sand Creek - 5,458.29 tons/year**



Load Reduction Needed (40 years)

Tier 2:

- Kisiwa Creek - 2,843.29 tons/year
- Black Kettle Creek - 374.21 tons/year
- Blazefork Creek - 1,898.47 tons/year

Cropland Practice Assumptions

Little Ark Watershed Cropland BMP Effectiveness				
Best Management Practice	Cost Per Treated Acre	Erosion Reduction Efficiency	Total Reduction* Over lifetime	\$/Ton
No-Till	\$40	75%	14.0	\$2.87
Conservation Tillage	\$20	38%	7.0	\$2.87
Grassed Waterways	\$160	40%	18.6	\$8.60
Vegetative Buffers	\$67	50%	9.3	\$7.17
Nutrient Management	\$57	25%	11.6	\$4.88
Terraces	\$102	30%	5.6	\$18.28
Intensive Crop Rotations	\$20	25%	4.7	\$4.30
Cover Crops	\$60	25%	1.4	\$43.01
Water Retention Structures	\$125	50%	9.3	\$13.44
Permanent Vegetation	\$500	95%	17.7	\$28.30
Streambank stabilization	\$91/ft	85%	60	\$2.30

**Assumes an erosion rate of 1.86 tons/acre/year, with the exception of streambank stabilization (2.8 tons/ft/yr)*

Urban BMP Effectiveness				
Best Management Practice	Cost Per Acre treated/yr	Erosion Reduction Efficiency	Total Reduction (tons/yr)*	\$/Ton
Hydrodynamic separator	\$1,588	50%	0.32	\$9,928
Pervious pavement	\$3,655	88%	0.38	\$9,720
Extended detention basin	\$3,000	80%	0.35	\$8,530
Bioretention	\$1,070	77%	0.35	\$3,300
Vegetative Buffers	\$1,860	90%	0.4	\$1,860
Grass filter strip	\$425	95%	0.41	\$1,039

**Assumes an Erosion Rate of 640 lbs./acre/year for Medium Density Residential or Parking Lot*

Key result: BMPs implemented offsite in rural area *substantially more cost effective* than onsite or offsite in urban areas to achieve sediment load reductions

Therefore, recommend City partners WRAPS to implement offsite BMPs in rural/ag areas and maximize program cost effectiveness

- Developed guidance for program “rules”
 - Eligibility
 - Minimum onsite runoff management requirements
 - Establish sediment as program “currency”
 - **Setting sediment credit ratio**
 - **Selecting allowable offsite BMPs**
 - **Setting sediment credit payment rate**
 - Administrative framework

- Sediment credit ratio
 - 2:1 selected to meet expectations of regulatory community (KDHE)
 - Ratio serves as “factor of safety” given uncertainty in actual sediment delivery from offsite sediment sources to downstream aquatic systems

- Allowable offsite BMPs
 - City's comfort level with "non-permanent" (e.g., no-till) BMPs was initially low
 - We accommodated by assuming that sediment credits provided by non-permanent BMPs would be replaced. The sediment credit fee reflects this assumption.

- Sediment credit payment rate
 - Developed spreadsheet tool to assist City in setting payment rate in a transparent manner. Payment rate based on:
 - Cost to producer to adopt AND maintain practice (selected no-till as a representative and “most-likely” offsite BMP)
 - Cost to replace offsite BMPs should be discontinued
 - Administrative costs to enroll and track offsite BMPs

USER INPUTS									
Onsite Sediment produced		0.4	tons/ac/yr						
Offsite:onsite credit ratio		2	:1						
% no-till fields replaced		100%	every 5 years						
No-till sediment credit "cushion"		1.1	(affects pace at which no-till implemented to remain ahead of onsite sediment demand)						
Starting fee all acres to date, \$/ton sed.	\$	48.00			\$	38.40	Annual Cost/acre under initial fee		
Reduced fee for all subsequent years, \$/ton sed	\$	10.00	Year of fee reduction	8	\$	8.00	Annual Cost/acre under reduced fee		
Inflation rate, annual program costs		3.00%							
Inflation rate, annual fee		3%	per year						
City growth rate, year 1		200	acre	Avg annual growth, ac/yr		200	City participation rate	100%	
Interest rate on start-up funds		0%	annual	# compounded/yr		12	payback period (yrs)	7	

- Sediment credit fee
 - For program participation, need economic incentive. Here is a comparison of offsite vs onsite options to meet MS4 permit requirements

**Onsite option: 40-acre residential,
pond w/ 1.6 ac-ft WQV**

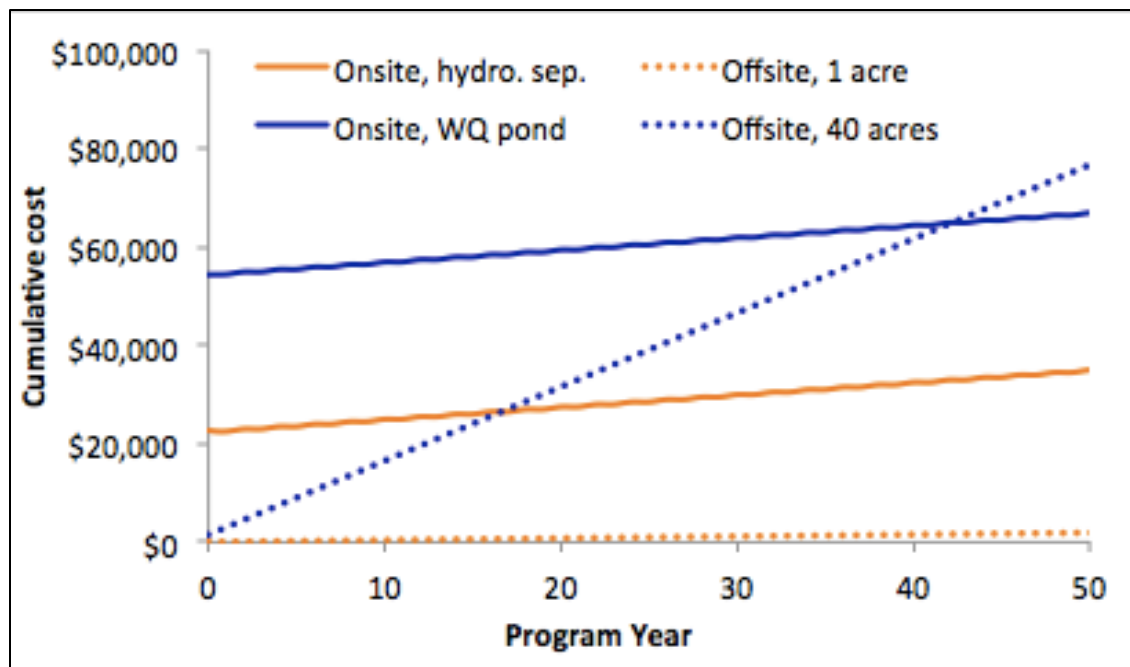
Marginal Cost for WQv in pond	
WQv - 1.6 ac-ft (2581 yd ³)	
Excavation (\$18/yd ³)	\$46,464
Outlet Structure	\$8,000
Total Capital	\$54,464
Biannual inspection	\$500

**Onsite option: 1-acre commercial:
Hydrodynamic seperator**

Marginal Cost, hydro. sep	
Hydrodynamic Separator	
cost	\$15,000
Installation	\$7,500
Total Capital	\$22,500
Biannual inspection	\$500

Offsite option: \$37.60 per acre per year

- Sediment credit fee



40-acre residential,
pond w/ 1.6 ac-ft WQV

1-acre commercial:
Hydrodynamic sep.

Offsite: **\$37.60** per
acre per year

- Wichita Stormwater Advisory Board has submitted a Final Plan Framework to the Director of Public Works & Utilities for approval

