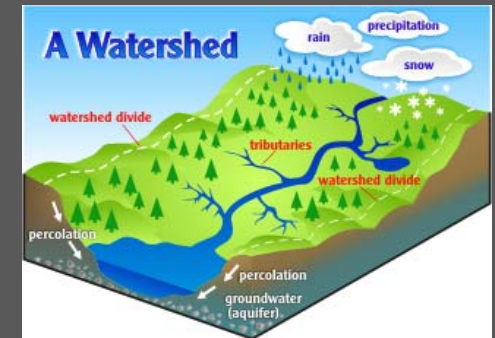
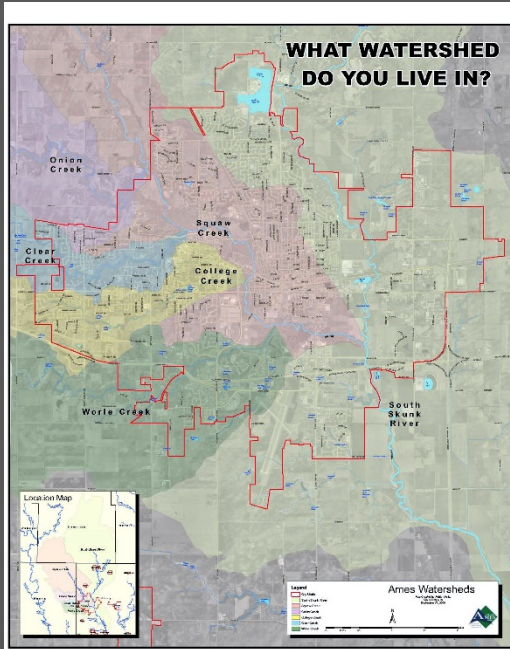


# WATERSHEDS



City Council Workshop August 21, 2018

# Watersheds

- City of Ames was a founding member of the 28E Agreement that established the Squaw Creek Watershed Management Authority in 2012

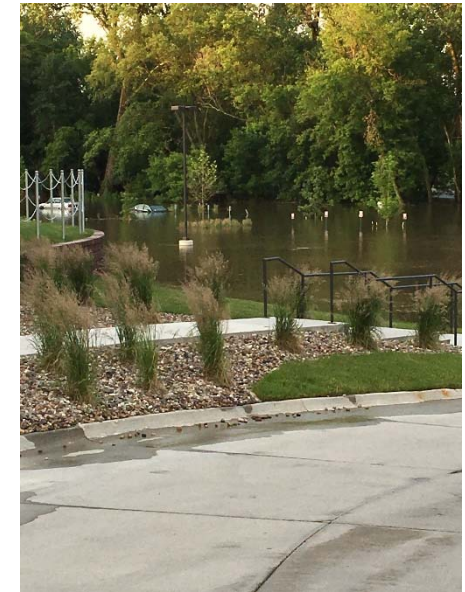
- Reduce Riverine Flooding
- Improve Water Quality
- Educate Residents



Above: Brookside Park



Right: Stadium View Apartments



Left: S Duff Avenue Area

# Watersheds

## □ City of Ames Stream Assessments (2006, 2011)

- 41 miles of perennial stream
  - Expanding with additional areas of annexation
- Establishment of stream conditions, 2006
- Post-floods updated stream conditions, 2011
- Aids in prioritizing erosion hazards into CIP
- Streambank erosion (sediment loads in Iowa stream)
- Degraded streams reflect
  - diminished habitat
  - increased nutrients





# Watersheds

## □ Riverine Flooding and Water Quality

### ■ Nutrients coming into Ames

### ■ Similar approaches to improve

#### ■ Stabilize streambanks

#### ■ Reduce nutrient loads

■ Nitrogen attaches to water

■ Phosphorus attaches to soil

### ■ Results in improved stream health

#### ■ Stabilized conveyance

#### ■ Habitat



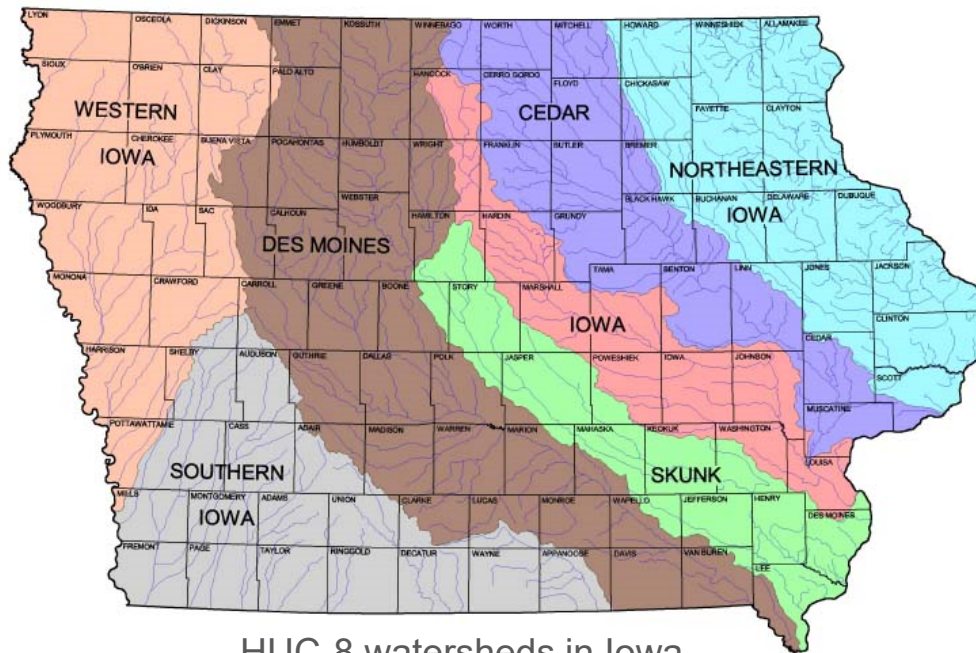
# WATERSHEDS



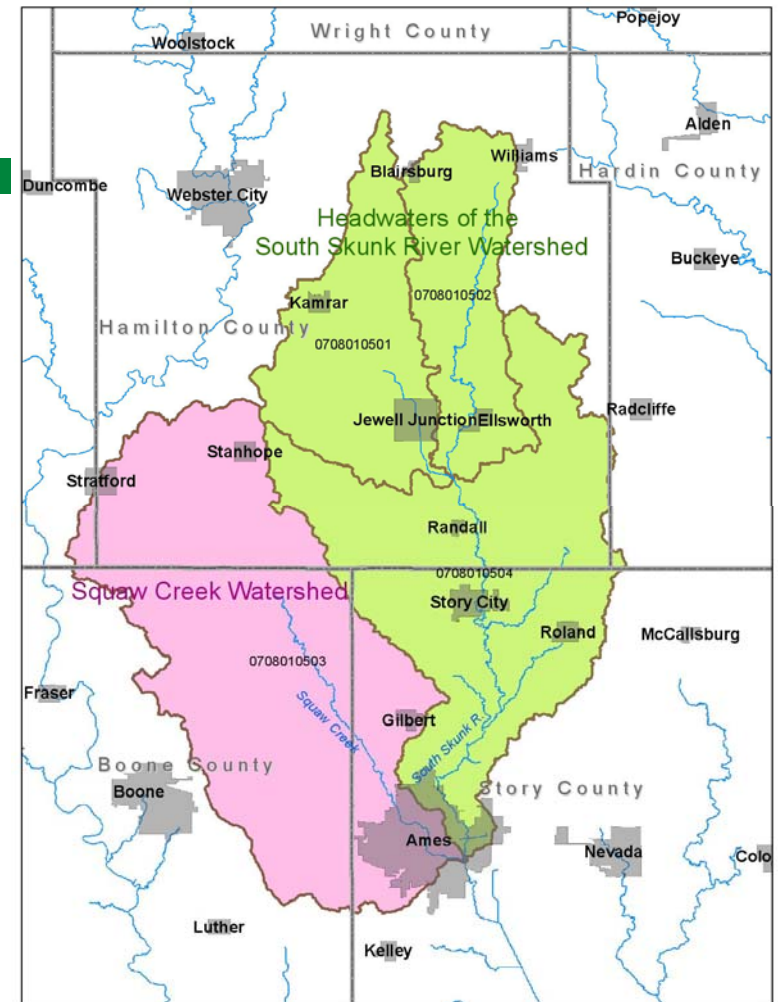
Watersheds & Waterways Program

City Council Workshop August 21, 2018

# Watersheds Leading to Ames



HUC-8 watersheds in Iowa



# History of Work

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- 20-year management plan developed by the Watershed Management Authority (28E agreement)
  - Ames a key partner in developing and implementing plan
- Water Quality Initiative Project from Iowa Department of Agriculture and Land Stewardship
- Prairie Rivers of Iowa implementing plan and continually bringing partners in and maintaining WMA while moving focus area down South Skunk River Watershed
- Appointed 'Watershed Management Agent' by Story County Supervisors in spring of 2018

# Iowa Nutrient Reduction Strategy

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- Iowa Department of Agriculture and Land Stewardship, Iowa Department of Natural Resources, and Iowa State University
- Following call-to-action from EPA on hypoxic zone in the Gulf of Mexico (Mississippi River Watershed)
- Science-based goals in Iowa
  - 41% reduction in Nitrogen
  - 29% reduction in Phosphorus



# Work that has been done

## Squaw Creek Watershed



### **Cover crops**

2,061 acres 2016-2017  
1,289 acres current for 2018



### **No-till/Strip-till**

1,381 acres 2016-2017  
1,563 acres current for 2018



### **Denitrifying Bioreactors**

1 unit installed fall 2017  
2 units in progress for 2018

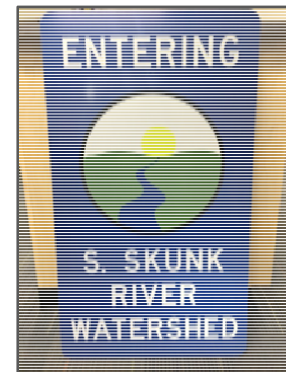
Example: Lundys Creek and Worrell Creek (2 HUC-12 subwatersheds)  
7,340 acres of cover crops, 2,560 acres of no-till/strip-till, and 38 denitrifying bioreactors

# Water Quality Monitoring

<b>Sample Date</b>	<b>Nitrate (mg/L)</b> Standard: 3.3 mg/L	<b>Total Phosphorus (mg/L)</b> Standard: 0.12 mg/L	<b>E.coli (organisms/100 mL)</b> Standard: 126 organisms/100 mL
4/25/2018	7.4	<0.1	98
6/13/2018	13.0	0.5	11,199
6/14/2018	3.0	2.0	14,120
6/27/2018	9.9	0.3	3,700
7/11/2018	6.2	0.31	2,755

# Work that has been done

- Education and Outreach Campaign focused on watershed awareness, water quality, and soil health
  - Publications, videos, social media, mailings, and events
  - In 2017 alone, Prairie Rivers of Iowa reached over 600 adults and 400 students through outreach events



# What's Next?



- Continue implementing practices and educating in Squaw Creek Watershed
- Work directly with subgroups of landowners (i.e. urban fringe, livestock owners)
- Management plan for Headwaters of South Skunk River Watershed
- Utilizing recently published Story County watershed assessment
- Continue to bring strong local and national partners to our work in the South Skunk River Watershed



# Takeaways

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- Strong local, statewide, and national partners working on this issue – Ames important piece of the puzzle
- Expand citizen education and implementation of practices in order to reduce nitrogen and phosphorus loading to Gulf of Mexico
- Be the first watershed in the state to prove lowans can reduce nutrient loading in our waterways!

# Nutrient Reduction Feasibility Study

Purpose: To determine the most appropriate, cost-effective means of meeting the Iowa Nutrient Reduction Strategy's goals for Point Sources

45% reduction in the total number of pounds of Nitrogen and Phosphorus exiting the state in rivers and streams



# Iowa DNR's Point Source Requirements

- Approach: Implement a “technology-based standard” based on “biological nutrient removal”
  - ▣ Remove **66% of the Total Nitrogen (TN)** that enters a facility
  - ▣ Remove **75% of the Total Phosphorus (TP)** that enters a facility



# Performance of the Ames WPCF

- Already removes:
  - ▣ 36% of the incoming TN (684 lbs./day removed)
  - ▣ 19% of the incoming TP (47 lbs./day removed)
  
- To meet the Nutrient Reduction Strategy, need to remove an additional:
  - ▣ 541 lbs./day of Total Nitrogen
  - ▣ 136 lbs./day of Total Phosphorus





# Putting Pounds into Context

Source	Total Nitrogen lbs./year (% of total)	Total Phosphorus lbs./year (% of total)
Ames Water Pollution Control Facility	457,400 (4.8%)	73,338 (20.5%)
Total Watershed Load*	9,447,648	357,490

- Watershed load is based on USGS's SPARROW model for the watershed area immediately upstream of the Ames WPCF*

# Adaptability of Existing WPCF

- Ames currently: Two-stage trickling filter/solids contact treatment scheme
  - Cannot be easily retrofitted to the “Biological Nutrient Removal” technology that the Nutrient Reduction Strategy was built around



# Nutrient Reduction Feasibility Study

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- Focus: Develop alternatives that demonstrate commitment and intent to ultimately achieve the goals of the Iowa Nutrient Reduction Strategy
  - Identify opportunities to optimize the nutrient removal performance of the existing facility
  - Seek watershed-based options as a means to demonstrate our commitment, but only where they “make sense” by providing some other ancillary benefit in addition to nutrient removal
  - Defer major construction of an alternative nutrient removal technology until a future plant expansion is required

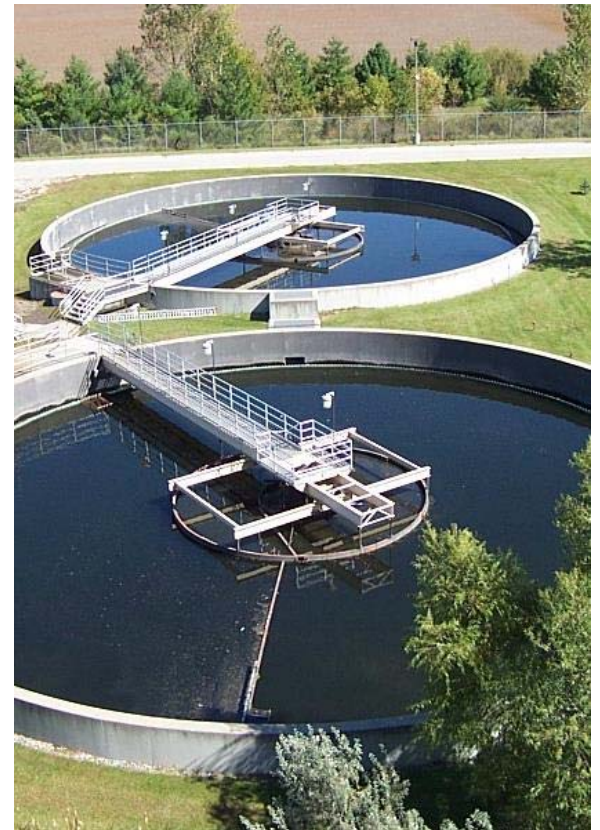
# Watershed-based Opportunities

- Working with Prairie Rivers of Iowa to identify potential locations for agricultural Best Management Practices
  - Perennial groundcover in the presence of crops
  - Cover crops
  - Water and sediment control basins
  - Constructed wetlands
  - Denitrification bioreactors
  - Riparian buffers
  - Grassed waterways
  - \*\*Opportunities within the City limits\*\*
- Not practical as a means to completely eliminate the need for infrastructure improvements inside the WPCF



# Nutrient Reduction Exchange

- Developed by Iowa League of Cities
- Inventory of BMP's installed by utilities after the Nutrient Reduction Strategy was adopted in Jan. 2013
- Can include projects done for other purposes, but that provide nutrient reduction as well.
- Potential value as an “offset” towards future growth



# Schedule / Timeline for Study

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- Continued workshops through the fall
- Stakeholder open house planned for October
- Council workshop in November
- Outcome will be reflected in CIP presented in January



# Public Works Department

## □ Capital Improvements Plan

- Teagarden Drainage Improvements
- Storm Water System Analysis
- Storm Water Quality Improvements
- Storm Water Facility Rehabilitation Program
- Low Point Drainage Improvements
- Storm Water Erosion Control Program
- Storm Water Improvements Program
- Sanitary Sewer Rehabilitation Program

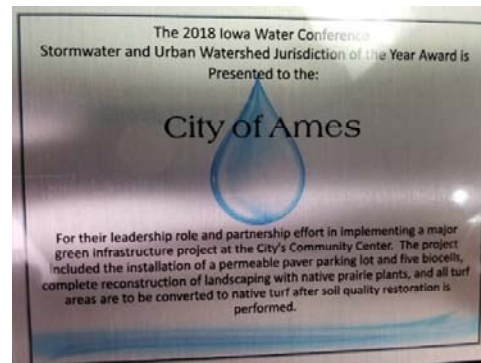


Stream Restoration  
and Stabilization





# Public Works Department



City Hall Parking Lot Project





# Public Works Department



Storm Water Erosion Control  
Program – S Skunk River



# Public Works Department

NPDES MS4 Permit (2014-2019)

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Storm Water Runoff Control
- Post-Construction Storm Water Management
- Pollution Prevention/Good Housekeeping

# National Pollutant Discharge Elimination System (NPDES)

Municipal Separate  
Storm Sewer System  
(MS4)

[illegible]

# Public Works Department



**SMART WATERSHEDS**  
FOR CLEAN RIVERS AND STREAMS

# Public Works Department

## □ Cost Share Programs

- Rain Gardens
- Rain Barrels
- Native Landscape
- Soil Quality Restoration
- Composters
- Trees Forever – Iowa Event



**SMART WATERSHEDS**  
FOR CLEAN RIVERS AND STREAMS



The City of Ames has implemented a Smart Watershed Program to increase local awareness of the importance of protecting our local streams and lakes. It is promoting methods to capture, infiltrate, and reduce storm water runoff in residential areas. Applying compost and Aeration to yards helps reduce compaction and increases infiltration resulting in less runoff.

#### Why Soils Need to be Improved.

Lawn soils have been significantly altered by tillage for farming and grading practices associated with urban development. Years of tillage and soil erosion has caused the loss of more than half of Iowa's topsoil. The organic matter content has been reduced from a healthy sponge-like 10% to less than 2%. Often remaining topsoil is completely removed during development for urban growth. Little to no organic matter remains and the graded soils are compacted. Compacted soils with no organic matter cause runoff at the water to runoff during rainfall. Stormwater runoff flows untreated to storm sewers, and washes associated pollutants directly into nearby streams, rivers, lakes and wetlands.

#### Direct Benefits of Soil Quality Improvements

A compacted, nutrient poor soil with low organic matter content also requires more time and money to stay green! Doing soil quality improvements will help you create a beautiful, healthy lawn that requires less water and reduced fertilizer and pesticide applications.

#### Can I Make Soil Quality Improvements to my Yard?

Anyone can make soil quality improvements to their yard. The City of Ames is now offering a soil share program. In order to qualify for this program you must meet some simple criteria. The participant must be a City of Ames utility customer. The owner of the property needs to approve the improvements and sign the application form. The program requires all the improvements be done which include aerating, adding 1" of compost, and seeding. Physical activity is involved if you do the work yourself. You are allowed to hire the aerating or topdressing to be done by a contractor however the overall cost of the project will increase greatly. By having a contractor aerate the property and spreading the compost and seed yourself, you are able to not greatly reduce overall costs. You must agree to improve the soil to a minimum 800 square feet to qualify.

#### Want to Learn More About the Soil Quality Improvement Program?

The City of Ames is offering a rebate of up to \$250 for the improvements to green spaces within city limits. The program will cover materials cost. Preapproval is necessary to ensure reimbursement will be available. To qualify one must complete the following steps:



The City of Ames has implemented a Smart Watershed Program to increase local awareness of the importance of protecting our local streams and lakes. It is promoting methods to capture, infiltrate, and reduce storm water runoff in residential areas. Native landscaping can be used in residential yards to restore soil quality and therefore reduce the amount of runoff.

#### The Benefits of Native Landscaping

The use of native plants in modern landscapes provides a connection to our prairie heritage. Once established, native plants are aesthetically pleasing and require little watering, fertilizing, and mowing. The reduced maintenance can lead to significant cost savings when compared to labor intensive turf grass. Native landscaping attracts songbirds, dragon flies, butterflies and other desirable species and also helps reduce the problems associated with weeds, annual, grass weeds. Most important, it helps restore soil quality over time and helps landscapes absorb more rainfall, reducing the amount of runoff from urban spaces.

#### Can I put Native landscaping in My Yard?

Almost anyone can have native landscaping if they have the space available and are City of Ames utility customers. There are three options for native landscaping in yards: plant native prairie or woodland plants in gardens for a maintained look, plant a "Patch-of-Paradise" for a natural look, or plant native turf for a low maintenance lawn.

Native landscaping requires a 4 ft buffer where it approaches homes, sidewalks and neighboring parcels. A 20 foot setback is required on corner lots where streets meet. Certain listed species are only allowed for the program. A minimum 100 square foot area and a minimum of 50% of the green space in your yard can be planted with native plants. Native turf must be regularly such as Buffalo Grass or Blue Grass has no size limit. The first couple years the native plants develop slowly. Annual weeds often dominate new plantings. Keep competing vegetation mowed to a height of six to eight inches, allowing sunlight to reach the smaller natives. By the third year the natives should start to flourish and out compete other weeds. Mowing for weed control should only need to be done every fall mowing at a 6" height.

It is recommended that homeowners check with neighborhood associations to clarify covenants addressing vegetation. Native plant landscaped areas MUST be maintained similar to horticultural gardens! Owner must agree to maintain the native plant landscaped area by putting back all vegetation in the fall or spring. Weeds must be removed from the area. Refer to the following for weed identification: [www.weeds.iastate.edu](http://www.weeds.iastate.edu)

#### Want to Learn More About the Native Landscaping Program?

The City of Ames is offering a rebate of up to \$250 for the installation of native landscaping within city limits. The program will cover materials cost. Preapproval is necessary to ensure reimbursement will be available. To qualify one must complete the following steps:

# Next Steps

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- Reconfirming City Council's support for Watershed activities
  - Are there any additions that City Council would like to see as part of the Watershed activities?

# Next Steps



- Informing City Council about Watershed activities
  - These updates (either written or oral presentations) will occur periodically as progress occurs or decision points are needed



# Next Steps

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- Currently, City staff serves on the Board of both Watershed Management Authorities to provide technical assistance.
- In addition to City staff, does City Council want to have one Council member on each of the Watershed Management Authority Boards?
  - Estimated 6 to 12 meetings a year