BLACK HAWK CREEK HUDSON WATERSHED STEWARDSHIP PLAN

A plan for social, environmental and economic sustainability in the Black Hawk Creek Hudson Watershed

Prepared by: Iowa Soybean Association
Environmental Programs & Services
2019

Iowa Soybean Association
Environmental Programs & Services

Black Hawk Creek Hudson

Watershed Stewardship Plan

A plan for social, environmental and economic sustainability

in the Black Hawk Creek Hudson Watershed

Developed by

IOWA SOYBEAN Association

Iowa Soybean Association Environmental Programs & Services

Funded by

IAWA IOWA AGRICULTURE WATER ALLIANCE

Planning partners

Farmers, landowners, and residents

Black Hawk Creek Water and Soil Coalition

Middle Cedar Watershed Management Authority

Black Hawk and Grundy Soil and Water Conservation Districts

Iowa Department of Agriculture and Land Stewardship

Natural Resources Conservation Service

City of Hudson

La Crosse Seed

Iowa Agriculture Water Alliance

Iowa Soybean Association

Not funded by the soybean checkoff

Contents

Summary

The Black Hawk Creek Hudson Watershed Stewardship Plan was developed to support local stakeholders to articulate a community vision for their watershed, develop partnerships and strengthen relationships, and identify a plan of action. This watershed plan integrates existing datasets, mapping and analysis, and stakeholder input to establish goals, objectives, and a strategy for watershed project implementation and management. The plan is designed to incorporate and address input and feedback from the watershed community. The community-based planning process integrated with data compilation and analysis was used to develop goals, objectives, and action steps for stakeholders and partners in the Black Hawk Creek Hudson Watershed. The overall goals established by watershed stakeholders are to:

1. Build watershed community.
2. Adopt practices to address natural resource stewardship challenges.
3. Maintain and grow economic well-being in the watershed.

The watershed plan includes information about the watershed and provides specific objectives under each goal. Strategies for implementation of the watershed plan and project management also are detailed. The Black Hawk Creek Hudson Watershed Stewardship Plan is intended to guide all watershed stakeholders as they steward local social, environmental, and economic resources.

Context

The Black Hawk Creek Hudson Watershed Stewardship Plan was developed to support local stakeholders to articulate a community vision for their watershed, develop partnerships and strengthen relationships, and identify a plan of action. The area encompassed by this watershed plan includes the HUC-12 sub-watershed of the Black Hawk Creek Watershed immediately upstream of Hudson, Iowa. This HUC-12 watershed (070802050601) is named Wilson Creek-Black Hawk Creek but is referred to as the Black Hawk Creek Hudson Watershed (BHCHW) due to local recognition of Black Hawk Creek as a valued water resource. Watershed maps are included in Appendix A.

The BHCHW is a sub-watershed of the Black Hawk Creek Watershed, which is nested within the Middle Cedar Watershed and the larger Cedar River Watershed. The BHCHW spans 20,100 acres primarily in Black Hawk County, with a small portion in Grundy County. The watershed is located in the Iowan Erosion Surface landform region, which is characterized by gently rolling terrain. Predominant soil types in the watershed include Kenyon, Clyde, Floyd, Dinsdale, and Klinger. These soils formed in loess-mantled glacial till and are generally very fertile: the average CSR2 for soils in the watershed is 80. Subsurface tile drainage is common in the watershed, as these soil types range from poorly drained to moderately well drained. Land use in the watershed is 79 percent row crop agriculture.

Table 1. Land use in the watershed is primarily agricultural.

Land use	Acres	Percent of watershed
Corn and soybeans	15,855	78.9%
Grass	1,537	7.6%
Trees	276	1.4%
Water and wetlands	969	4.8%
Developed	1,447	7.2%
Other	17	0.1%
Total	20,100	100.0%

Hudson is the only incorporated community in the watershed. In 2010 the watershed had a total estimated population of 2,416 and Hudson had a population of 2,282, although Hudson is growing steadily. Ninety-four percent of the watershed is owned by Iowa residents, and 87 percent of landowners live within 10 miles of the watershed.

Local water quality data and associated information provide key indicators of current conditions in the watershed. Average precipitation in the BHCHW is 34.5 inches per year (Mesonet). A 2018 US Geological Survey study based on 2000 through 2015 water monitoring data determined that the Black Hawk Creek Watershed yielded an average of 27.9 pounds of nitrate-N per acre per year and 0.92 pounds of total phosphorus per acre per year (USGS). Soil erosion in the BHCHW is estimated to be 3.2 tons per acre per year (Daily Erosion Project). Total maximum daily load (TMDL) studies that encompass the BHCHW include the Cedar River (nitrate) and Black Hawk Creek (bacteria) watersheds. These analyses showed that nitrate loss is primarily due to row crop agriculture along with some inputs from other non-point sources and point sources, whereas bacteria originate from both point (wastewater treatment plants, livestock feeding operations) and non-point (manure application, grazing livestock, failing septic systems, urban runoff) sources. The Cedar River TMDL calls for a 35 percent reduction in nitrate concentration to meet water quality standards. Many conservation practices already exist in the watershed, which were identified through a combination of Iowa BMP Mapping Project data, additional publicly available datasets, and 2018 remote sensing.

Table 2. Conservation practices in place in the watershed as of 2018.

Conservation practice	Unit	Quantity
No-till	acres	1,286
Cover crops	acres	416
Grassed waterways	feet	408,423
Terraces	feet	127,495
WASCOBs	feet	31,426
Ponds	structures	4
Bioreactors	structures	1
CRP (perennial cover)	acres	216
Stream buffers	% of streams	78%
Black Hawk Co. Conservation	acres	352

During recent years watershed management activities and water quality programming have advanced in the Middle Cedar Watershed, which is a priority watershed identified in the Iowa Nutrient Reduction Strategy (INRS). Nearby watershed demonstration projects have proved successful in working with farmers and landowners to increase adoption of conservation practices that improve water quality. Additionally, the Middle Cedar Watershed Management Authority is overseeing watershed planning and conservation implementation in sub-watersheds throughout the Middle Cedar Watershed. Furthermore, the Black Hawk Creek Water and Soil Coalition was formed in 2017 to improve water and soil quality and recreation in the Black Hawk Creek Watershed. This watershed plan integrates existing datasets, mapping and analysis, and stakeholder input to establish goals, objectives, and a strategy for watershed project implementation and management.

Goals and Objectives

Goals

Watershed goals were established through a participatory planning process. Local farmers, landowners, and watershed partners engaged in facilitated discussions to identify local conditions, challenges, and opportunities. From these conversations a community vision for the watershed emerged and broad goal statements were developed to serve as overarching guides for the watershed and its stakeholders.

The community vision for the Black Hawk Creek Hudson Watershed is:

> *A strong, sustainable, and vibrant community actively engaged in reducing nutrient loss, building healthy soils, and reducing floods through socially, environmentally, and economically sustainable approaches.*

The watershed goals set by the group of farmer, citizen, and technical expert leaders are to:

1. Build watershed community.
2. Adopt practices to address natural resource stewardship challenges.
3. Maintain and grow economic well-being in the watershed.

Each goal addresses one of the three sustainability pillars: society, environment, and economics. Watershed leaders envision a future where stakeholders and partners identify and implement approaches and practices that simultaneously improve the watershed in each of these three capacities. Specific objectives within each goal are included to guide stakeholder actions.

Objectives

For each overall watershed goal, a brief set of objectives was developed to more specifically guide future watershed project activities. These objectives are listed in the following table.

Table 3. Objectives are recommended to support each long-term watershed goal.

Goal 1. Build watershed community.
Objective 1.1. Regularly convene watershed advisory council of farmers, landowners, and technical experts.
Objective 1.2. Conduct outcome-focused outreach events to demonstrate conservation practices.
Objective 1.3. Communicate project goals, benefits, and successes to stakeholders and the public.
Objective 1.4. Develop and strengthen partnerships with organizations that support watershed goals.
Goal 2. Adopt practices to address natural resource stewardship challenges.
Objective 2.1. Implement practices and technologies to achieve Iowa Nutrient Reduction Strategy goals.
Objective 2.2. Adopt practices that build soil health.
Objective 2.3. Install oxbows and wetlands to improve water quality, flooding, and recreation.
Objective 2.4. Utilize a combination of in-field and edge-of-field practices to manage and treat water.
Goal 3. Maintain and grow economic well-being in the watershed.
Objective 3.1. Identify and adopt systems that increase farm profitability and resilience.
Objective 3.2. Develop and promote local recreation and tourism.
Objective 3.3. Secure funding to implement and manage watershed project practices and programs.

Timeline

The Black Hawk Creek Hudson Watershed Stewardship Plan encompasses 2019 through 2035. The 17-year planning horizon is separated into three phases: 2019 through 2021, 2022 through 2024, and 2025 through 2035. For each objective, recommended actions were identified for each phase to ensure steady progress towards long-term watershed goals.

Table 4. Under each watershed objective, supporting tasks are identified as specific tasks. Tasks are separated into three phases: Phase 1 (2019-2021), Phase 2 (2022-2024), and Phase 3 (2025-2035).

Goal 1. Community	Phase 1	Phase 2	Phase 3
1.1. Advisory council			
Hire watershed coordinator	As soon as possible	Continue to support	Continue to support
Convene watershed advisory meetings	Quarterly	Quarterly	Quarterly
Assess current project status relative to goals	Annually	Annually	Annually
Identify and modify project plans as needed	End of 2021	End of 2024	End of 2035
1.2. Outreach events			
Hold field day to demonstrate ag and urban conservation	Annually	Annually	Annually
Host community meeting to share watershed data	Annually	Annually	Annually

1.3. Communication			
Communicate directly with watershed stakeholders to raise awareness	Quarterly and for events	Semi-annually and for events	For events
Share project successes and benefits with media and public	As needed	As needed	Annually
1.4. Partnerships			
Challenge existing partners to support outreach and implementation	Ongoing	Ongoing	Ongoing
Identify and secure additional project partners	2 new per year	3 new per year	As available
Goal 2. Natural resources	**Phase 1**	**Phase 2**	**Phase 3**
2.1. Iowa Nutrient Reduction Strategy			
Voluntarily achieve ag nitrogen and phosphorus reduction goals	Ongoing	Ongoing	By 2035
Meet and maintain point-source nutrient reduction goals	As needed	As needed	As needed
Monitor water quality to measure long-term trends	Apr. - Aug. annually	Apr. - Aug. annually	Apr. - Aug. annually
2.2. Soil health			
Adopt soil health principles on agricultural land	Ongoing	Ongoing	Ongoing
No-/strip-till (new acres per year during phase, total goal: 11,200 ac/yr)	1,900	3,000	5,000
Cover crops (new acres per year during phase, total goal: 9,600 ac/yr)	1,200	2,000	6,000
2.3. Multi-benefit practices			
Wetlands (new sites during phase, total goal: 5)	-	1	4
Oxbows (new sites during phase, total goal: 5)	1	1	3
2.4. In-field and edge-of-field			
N mgmt. (new acres per year during phase, total goal: 7,400 ac/yr)	2,600	3,000	-
Saturated buffers/bioreactors (new sites during phase, total goal: 60)	9	20	30
Goal 3. Economics	**Phase 1**	**Phase 2**	**Phase 3**
3.1. Farm profitability			
Build soil health and optimize nutrient management	Ongoing (see Goal 2)	Ongoing (see Goal 2)	Ongoing (see Goal 2)
Adopt practices and strategies to mitigate risk and increase resilience	Share best practices	Demonstrate best practices	Increase use of best practices
3.2. Recreation and tourism			
Maintain and promote Black Hawk Creek as a paddling destination	Assess stream corridor	Address key sites within creek	Maintain stream corridor
Maintain and increase wildlife habitat	Ongoing	Ongoing	Ongoing
3.3. Funding			
Develop and submit grant applications	As available, likely every few years	As available, likely every few years	As available, likely every few years
Identify and obtain additional funding for watershed improvement	Identify sources	Identify and obtain	Continue to obtain
Attract non-traditional, innovative investment in the watershed	Gather information	Identify funders	Secure resources

Conceptual Plan

A conceptual plan was developed to illustrate an example scenario of future conservation practice adoption that could help to meet watershed objectives. The conceptual plan considers the watershed perspective and therefore includes a combination of practices to meet watershed goals: 11,200 acres per year of no-till/strip-till, 9,600 acres per year of cover crops, 7,400 acres per year of nitrogen management, 10 wetlands or oxbows, and 60 saturated buffers or bioreactors. Potential locations were identified using the Agricultural Conservation Planning Framework (ACPF) toolbox. Ground-truthing will be required before practices are constructed. Appendix A includes a map of the watershed conceptual plan, and Appendix B contains detailed ACPF maps of many additional potential conservation practice locations throughout the watershed. An additional resource available for sub-watersheds in the Middle Cedar Watershed including the BHCHW is the Integrated ACPF-PTMApp Application (IAPA), which was developed by Houston Engineering Inc. in partnership with the Iowa Agriculture Water Alliance. The IAPA applies the PTMApp engine to ACPF model outputs to calculate additional information including sediment and nutrient reduction benefits, conservation practice costs, and cost efficiencies. Data such as ACPF and IAPA outputs could be used to supplement the conceptual plan in an adaptive management approach as the watershed plan is executed. While theoretical, the conceptual plan can be used to guide identification and implementation of conservation practices. The baseline (2010), current (2018) and future (2035) benefits of conservation implementation in the watershed were estimated to illustrate soil and water outcomes.

Table 5. Modeled rates of soil erosion, phosphorus loading, and nitrate as nitrogen (nitrate-N) loading in the watershed for 2010 baseline conditions, present 2018 status, and anticipated 2035 conditions at full watershed plan implementation. Percent reductions from the baseline were also estimated.

Water quality parameter	2010 baseline	2018 status (% reduction)	2035 goal (% reduction)
Soil erosion (tons/year)	49,770	44,633 (10%)	17,110 (66%)
Phosphorus load (pounds/year)	6,197	5,543 (11%)	2,334 (62%)
Nitrate-N load (pounds/year)	440,820	427,014 (3%)	260,240 (41%)

Implementation Strategy

Outreach and engagement will be necessary to build and sustain the watershed community. Messaging should be focused on outcomes and tailored to specific audiences. In the initial stages of plan implementation, outreach should be broad and inclusive to raise stakeholder awareness of the watershed plan, goals, and activities. As awareness increases, outreach should be more targeted to reach a specific subset of watershed stakeholders or to achieve a desired outcome. As momentum continues to build in the watershed, success stories should be shared with both watershed residents and the general public to

highlight the benefits and outcomes of community collaboration within the watershed. Initially, technical staff, volunteers, and soil and water conservation district commissioners will likely need develop and distribute communications. To sustain long-term outreach and community engagement, local leaders within the watershed should be consulted and relied on and local media should be utilized to distribute information about the watershed. In addition to marketing materials, watershed events such as field days, workshops, and banquets can be hosted to provide opportunities for stakeholders to gather, learn, and engage.

Evaluation and monitoring will be important to track progress and measure success. For example, water quality monitoring can be a key indicator of overall conditions within the watershed. Stream water samples were collected in 2017 and 2018 at a site located on Ranchero Road in Waterloo, just downstream of the BHCHW. Monthly sample collection should continue at this location to maintain a long-term record of Black Hawk Creek water quality. Water quality parameters to measure include nitrate-nitrogen, dissolved reactive phosphorus, turbidity and/or total suspended solids, and *E. coli* bacteria. Water quality models also could be utilized to estimate impacts of future conservation practice adoption. Field-scale monitoring activities could include tile water monitoring, soil health testing, and agronomic evaluations such as nutrient management trials or plant tissue sampling. Such studies can be important sources of data to inform decision making by individual farmers and landowners. Watershed project evaluation also should include tracking of social indicators such as surveys of attitudes and awareness, event attendance, and media reach. Finally, additional success indicators such as practice adoption, practice retention, new project participants, and new project partners should be documented and reported annually.

Management Strategy

Watershed management requires substantial investment in technical assistance (human resources) and financial assistance (funding to support practice adoption or construction). The total estimated cost to fully implement the Black Hawk Creek Hudson Watershed Stewardship Plan is estimated to include $1,700,000 in up-front capital plus an additional $325,000 per year in annual operating expenses. The annual operating budget is comprised of $235,000 per year in conservation financial assistance plus approximately $90,000 per year to fund watershed management and technical assistance, which includes salary and benefits for a professional watershed coordinator, supplies for outreach materials and events, and monitoring along with overhead costs such as office space, computer, phone, and vehicle. The Grundy Soil and Water Conservation District recently was selected for a grant application that includes initial funds for a watershed coordinator for the Black Hawk Creek Watershed. Long-term financial support for a full-time watershed coordinator is paramount. The following practice costs were estimated based on typical costs for this region of Iowa and on Iowa State University tools including Ag Decision Maker and the Corn Nitrogen Rate Calculator.

Table 6. Projected annual or initial costs of priority conservation practices.

Practice	Unit	Goal	Unit cost	Total cost
No-till/Strip-till	acres/year	11,200	-$10	-$112,000
Cover crops	acres/year	9,600	$40	$384,000
Nitrogen management	acres/year	7,400	-$5	-$37,000
Wetlands	sites	5	$200,000	$1,000,000
Oxbows	sites	5	$20,000	$100,000
Saturated buffers/Bioreactors	sites	60	$10,000	$600,000

Short- and long-term cost savings to farmers and landowners are anticipated from no-till adoption and optimized nutrient management. These financial gains could offset costs associated with other practices such as cover crops. Investment in soil and water conservation should be balanced between one-time, up-front construction and annual, in-field practices to efficiently achieve watershed goals. For example, nitrogen load reduction and associated cost efficiency can be considered as one approach to prioritize practices. These benefits and costs should be aligned with needs and goals of individual farmers and landowners that will implement each practice.

Table 7. Estimated annual unit costs (i.e., dollars per pounds of nitrate-N load reduction per year) derived from practice costs and benefits.

Practice	Unit	Goal	Unit cost	Total cost	N reduction (lb/yr)	N cost ($/lb/yr)
Saturated buffers	sites	30	$5,000	$150,000	15,779	$0.19
Wetlands	sites	5	$200,000	$1,000,000	38,289	$0.35
Oxbows	sites	5	$20,000	$100,000	4,523	$0.44
Bioreactors	sites	30	$15,000	$450,000	13,570	$3.32
Cover crops	acres/year	9,600	$40	$384,000	83,030	$4.62

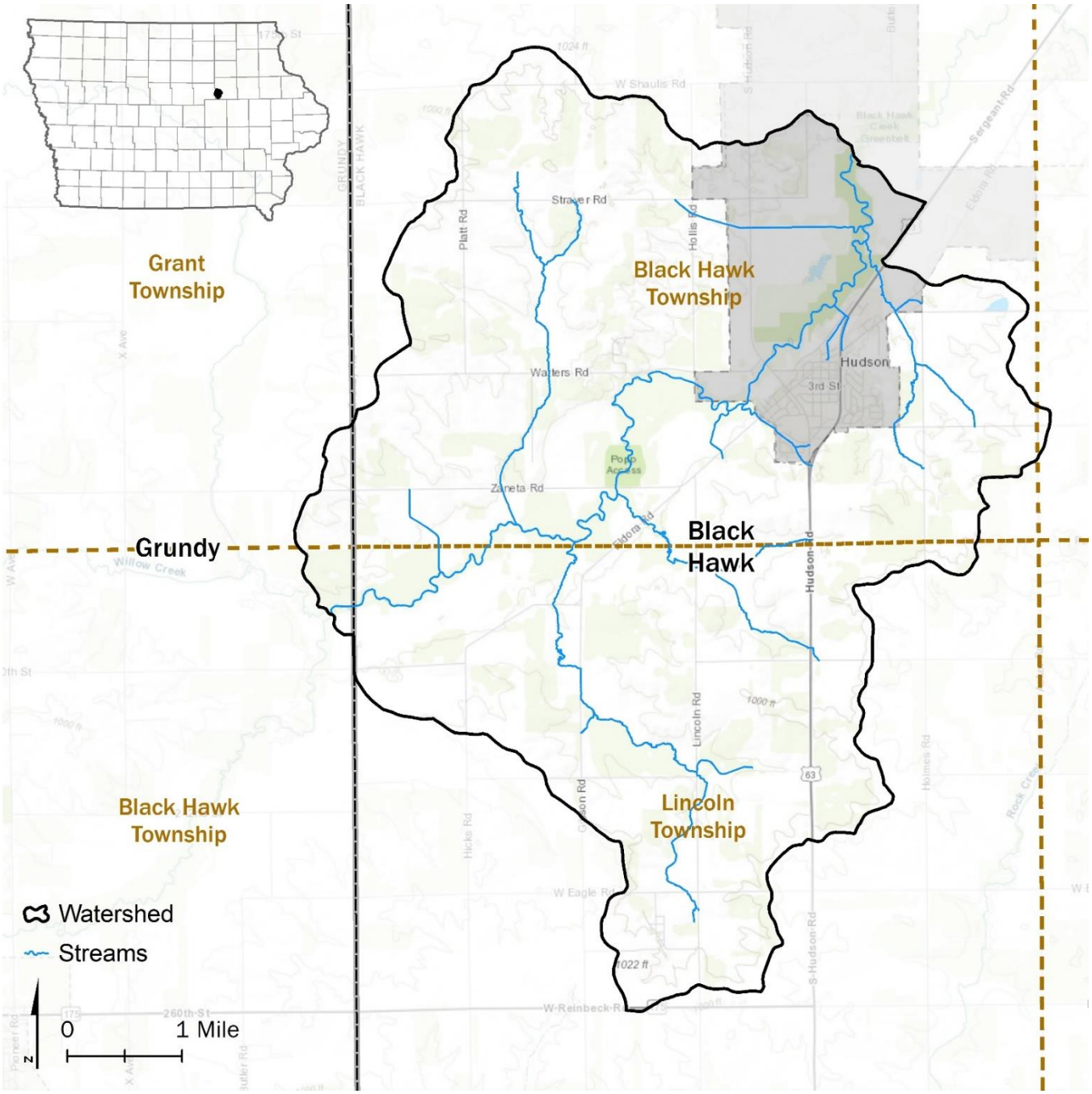
Funding opportunities include state and federal grants (e.g., IDALS, IDNR) and state and federal cost-share (e.g., WQI, EQIP, RCPP), which typically are obtained and administered by a soil and water conservation district. The Black Hawk Creek Water and Soil Coalition also may be an appropriate entity to secure and manage funds for watershed improvement. Non-traditional, innovative funding sources will likely be necessary to supplement public funds and meet the substantial cost requirements to fully implement the watershed plan. Examples could include private or foundation funding, participation in the Iowa Nutrient Reduction Exchange, development of a Clean Water State Revolving Fund sponsored project, pay for success models (e.g., NRCS Pay for Success), whole-enterprise scale farm accounting (e.g., EDF farm finance and conservation report), and conservation addendums to agricultural land rental agreements.

Watershed management requires commitment, collaboration, and coordination among multiple entities. Much of the responsibility for implementing the watershed plan ultimately will be assumed by farmers and landowners, so it will be critical to involve them in active leadership roles. The Black Hawk Creek Water and Soil Coalition can provide overall leadership and coordination for the watershed through volunteer efforts (current status) and professional services (full-time, paid watershed project coordinator). Black Hawk County and Grundy County soil and water conservation districts are

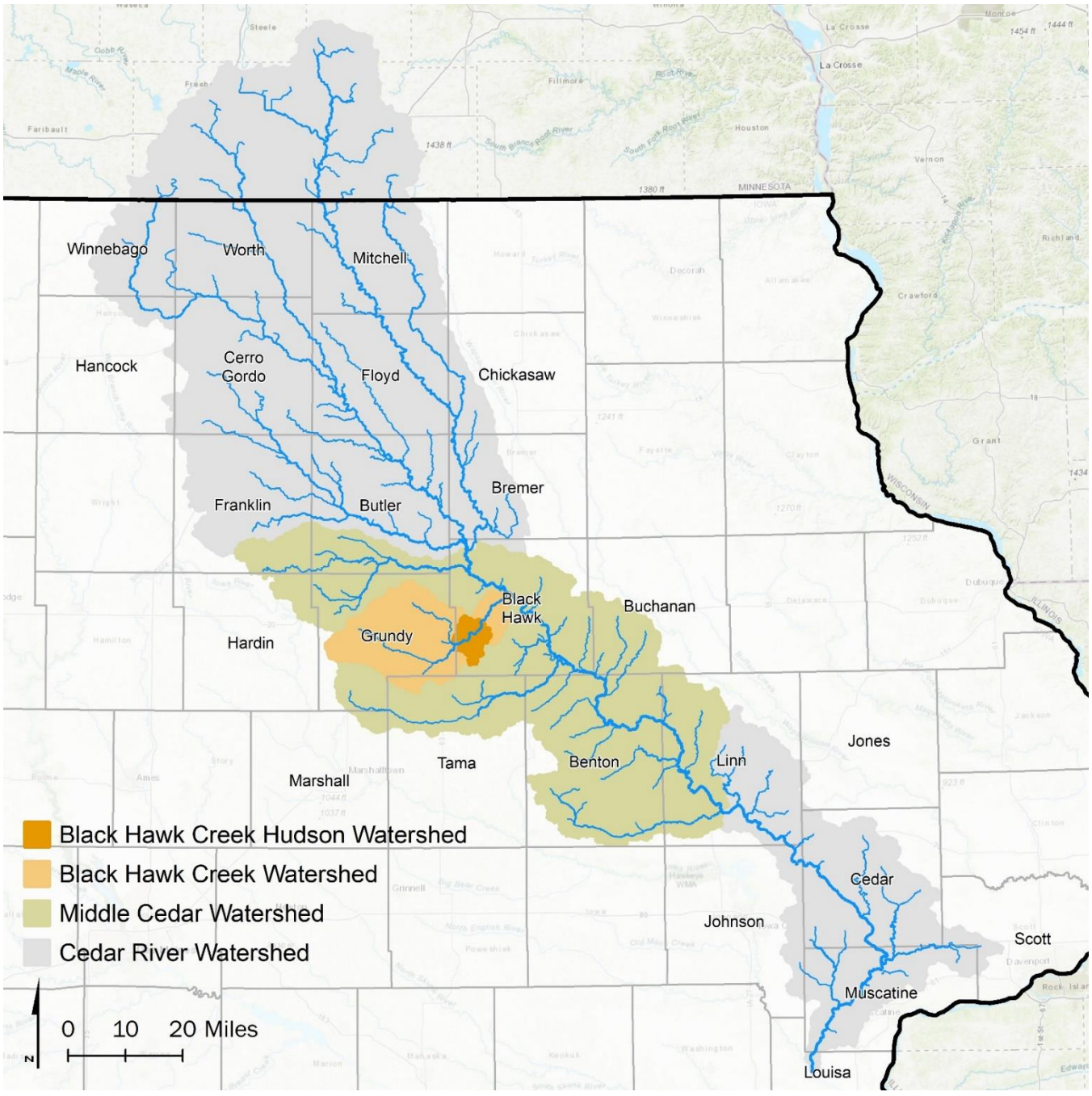
positioned to manage funds and house project personnel, including supporting technical staff from the Iowa Department of Agriculture and Land Stewardship and the Natural Resources Conservation Service. Conservation programming within the BHCHW also should be aligned with the larger Middle Cedar Watershed Management Authority. Finally, educational (e.g., public universities, local schools), non-profit (e.g., outdoor groups, commodity organizations, agricultural groups), and private sector (e.g., construction contractors, engineering firms, agribusinesses) entities also should provide partnership support to the watershed. Such relationships and partnerships must be cultivated and coordinated to maximize long-term engagement, collaboration, and impact.

Appendix A

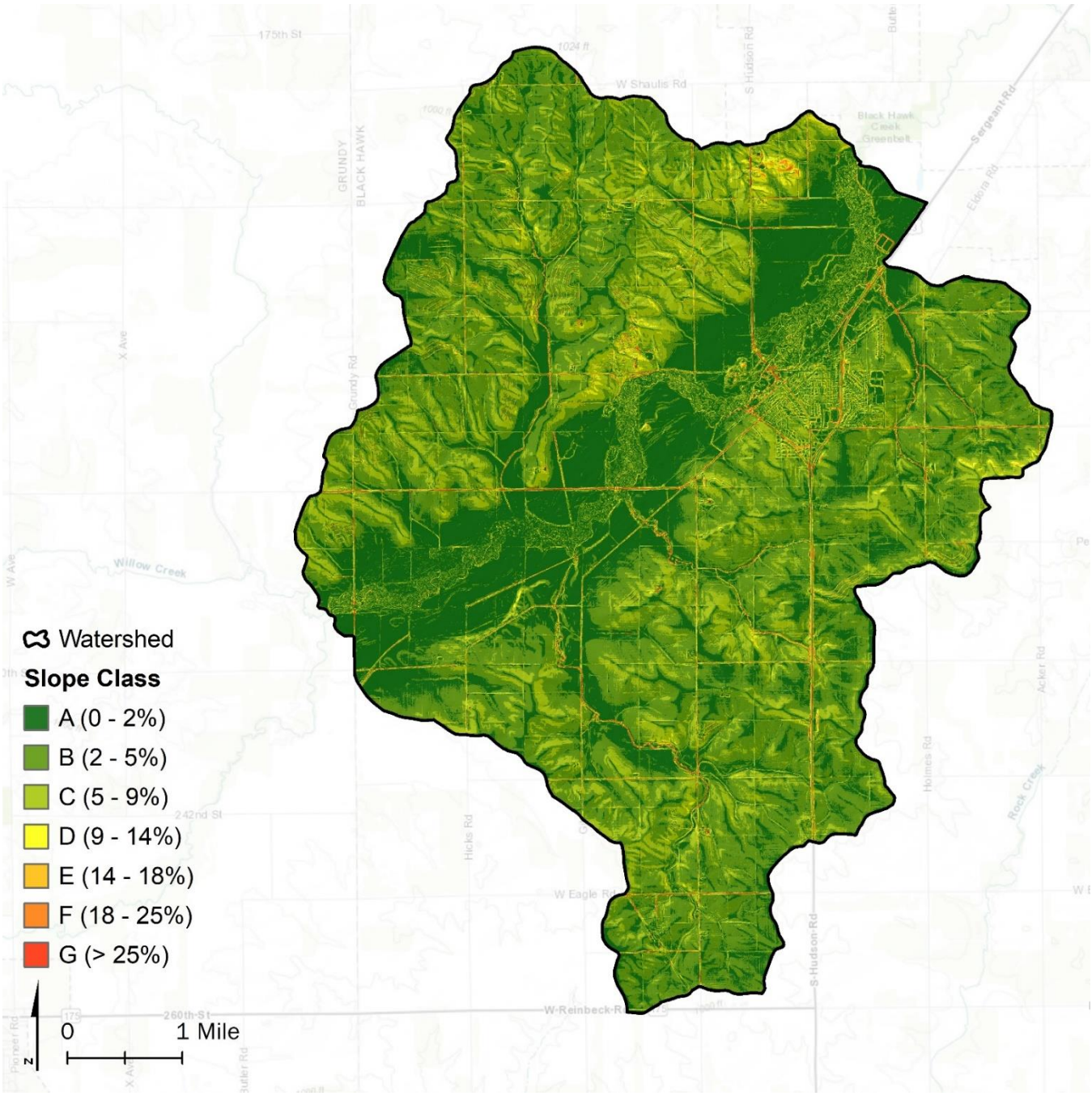
Watershed Maps



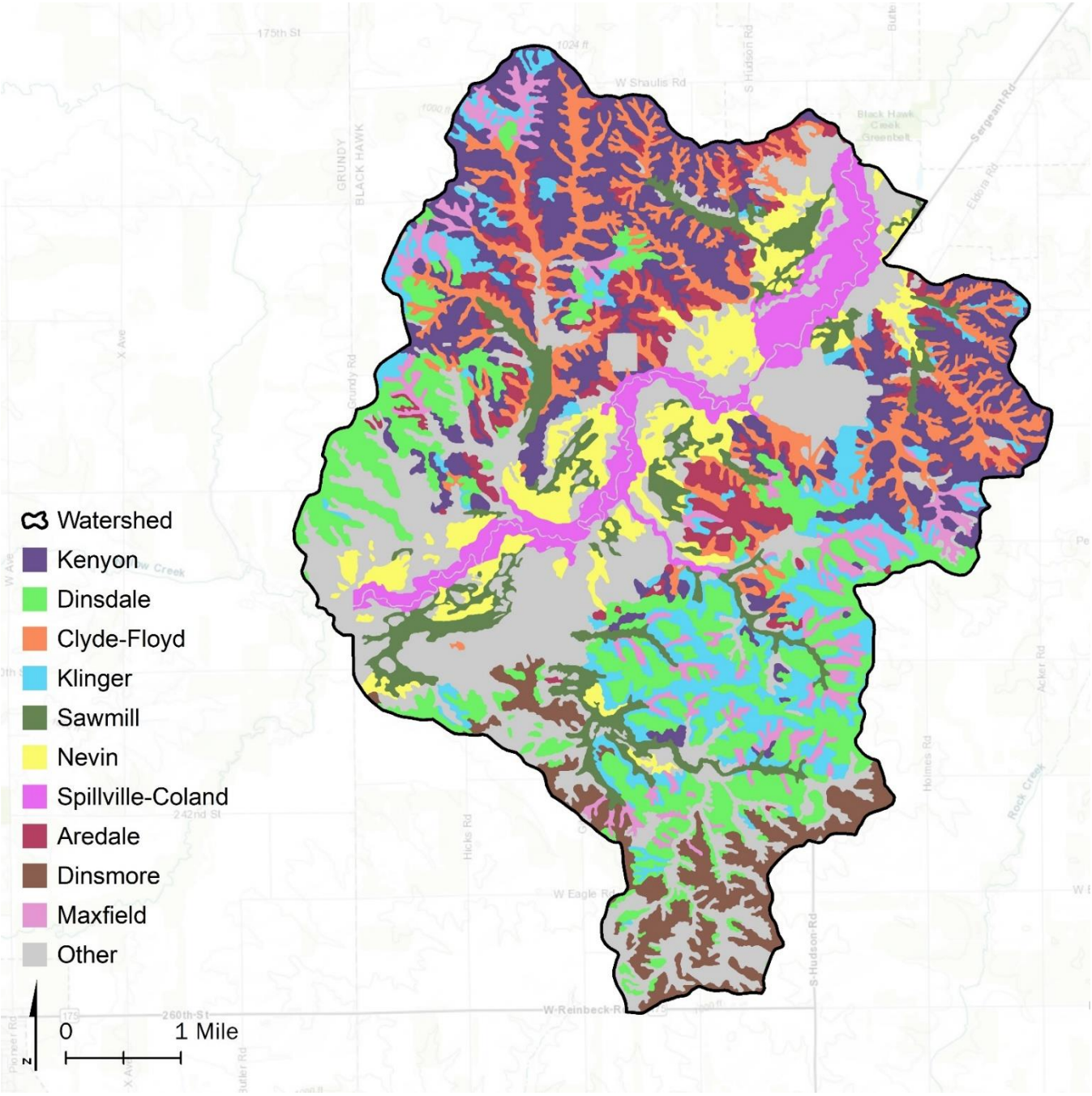
Black Hawk Creek Hudson Watershed (BHCHW) location, extent, local administrative units, and streams. The BHCHW is also named Wilson Creek-Black Hawk Creek and has a hydrologic unit code (HUC) ID of 07080205060. The HUC classification is a nested address system for watersheds. Small sub-watersheds are designated by 12 digits.



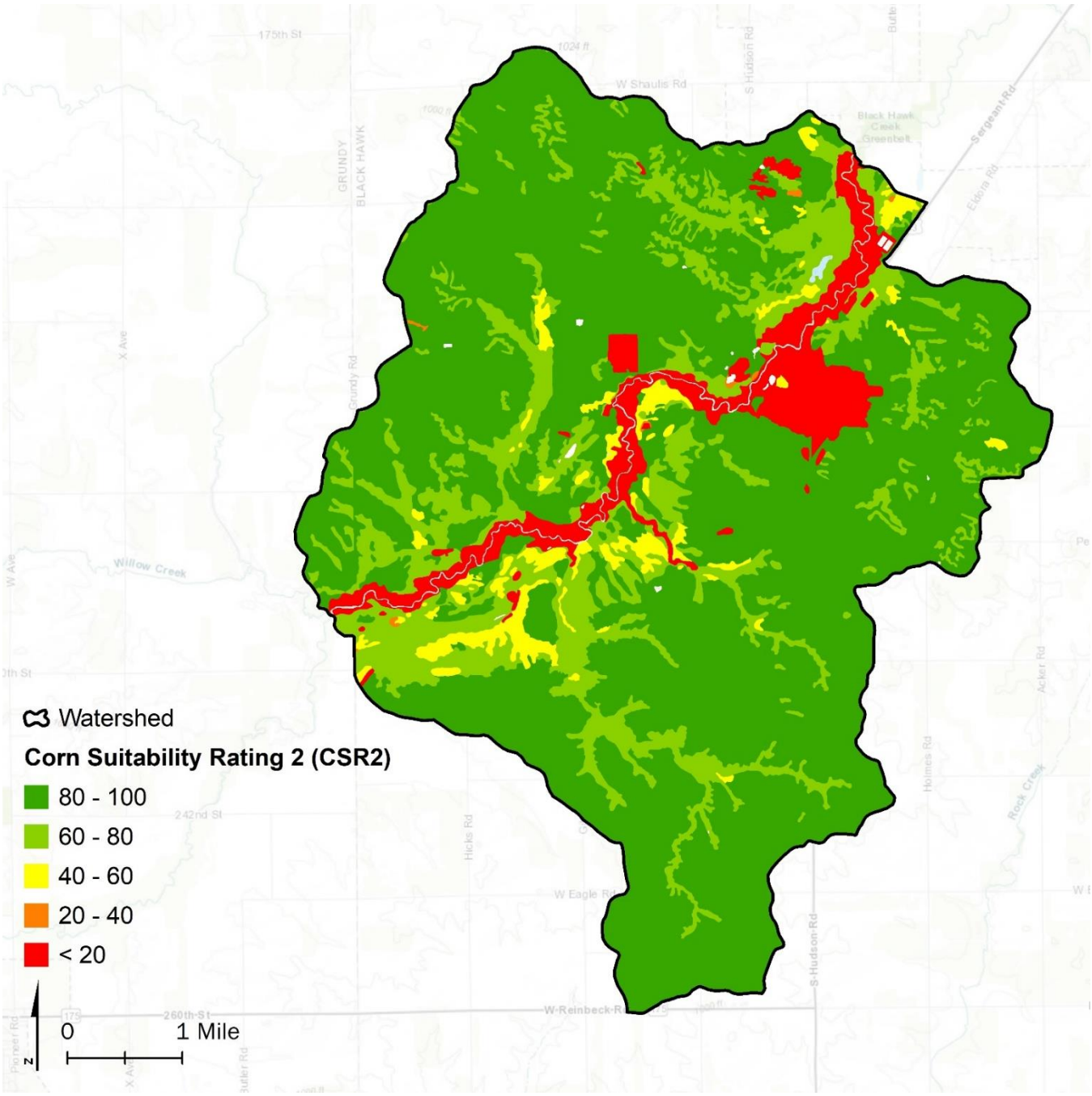
The BHCHW is nested within the Black Hawk Creek, Middle Cedar, and Cedar River watersheds.



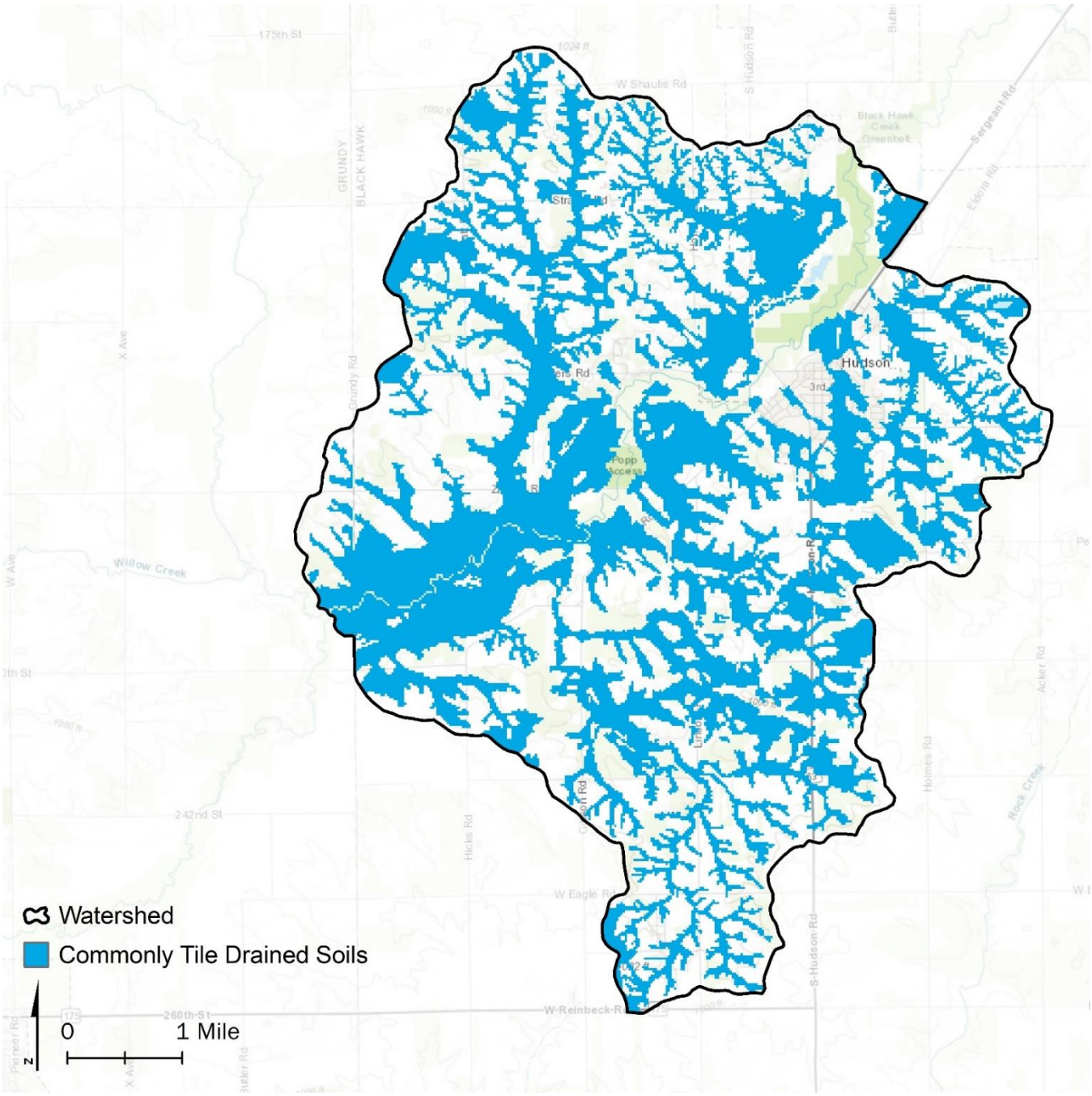
Seventy-eight percent of the BHCHW has a slope of five percent or less.



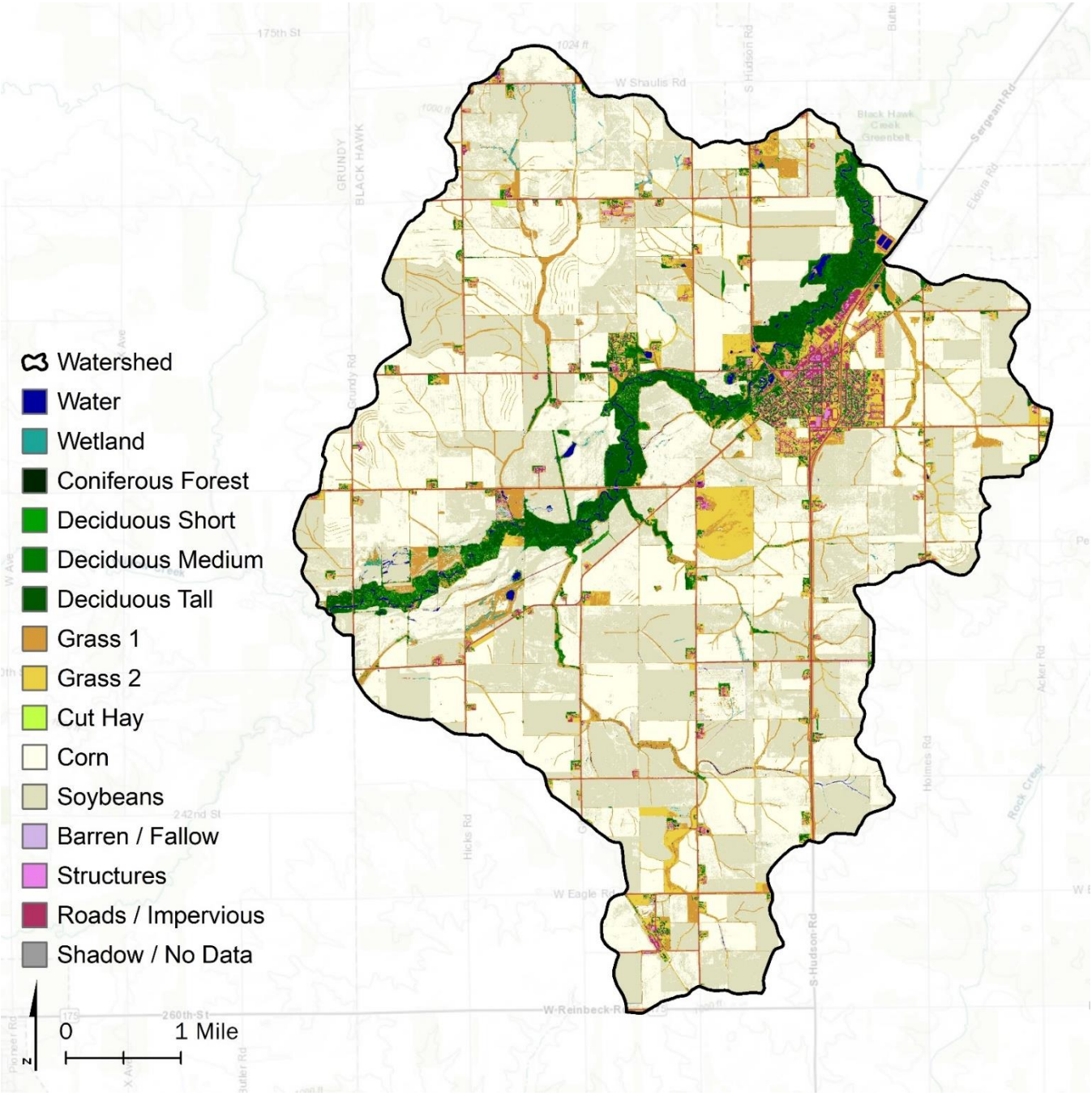
The Kenyon, Clyde, Floyd, Dinsdale, and Klinger soils are common in the watershed. These soils tend to be productive, tile-drained, and used for row crop production.



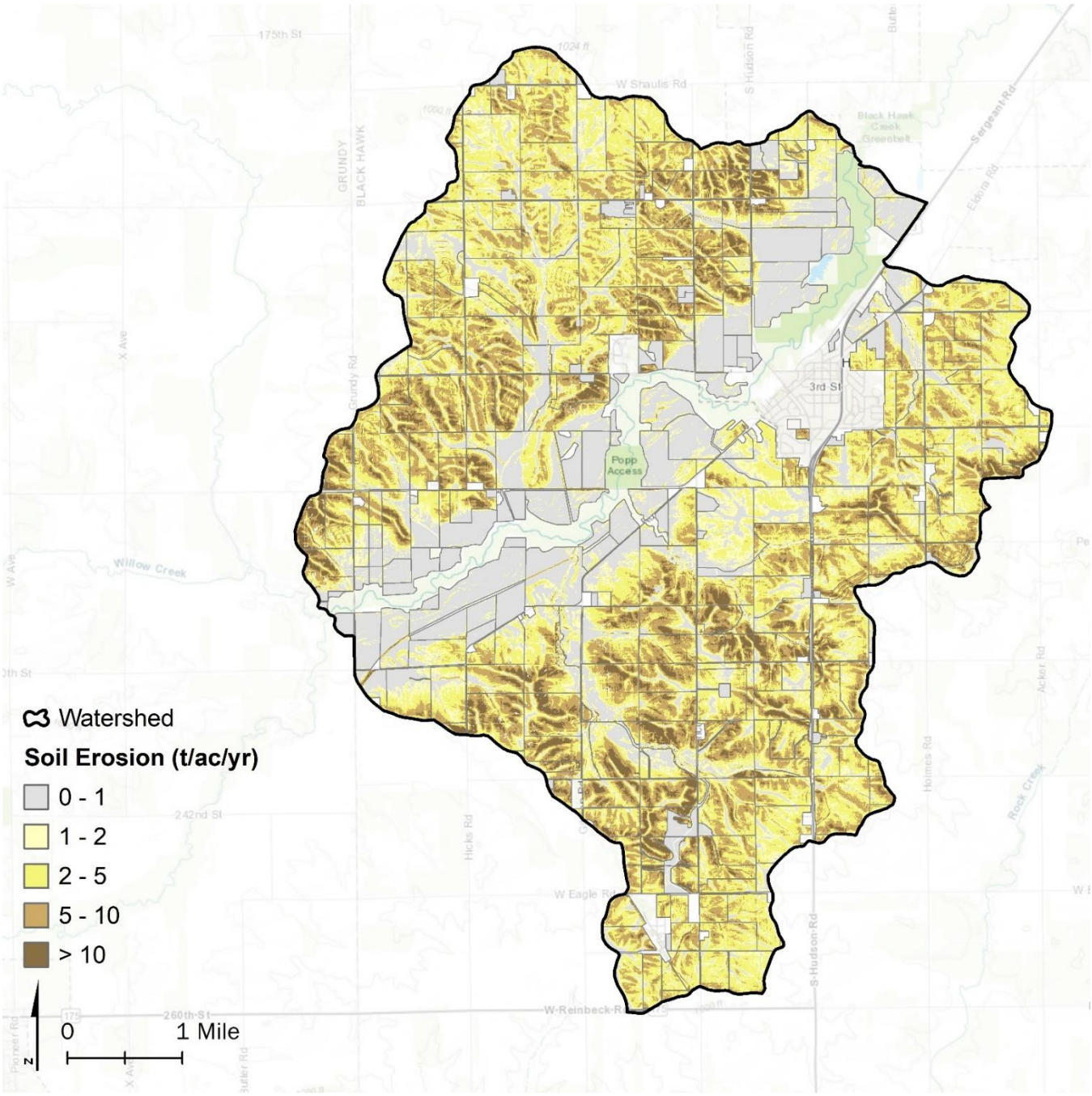
Corn suitability rating (CSR2) values are high within the BHCHW, with an average rating of 80.



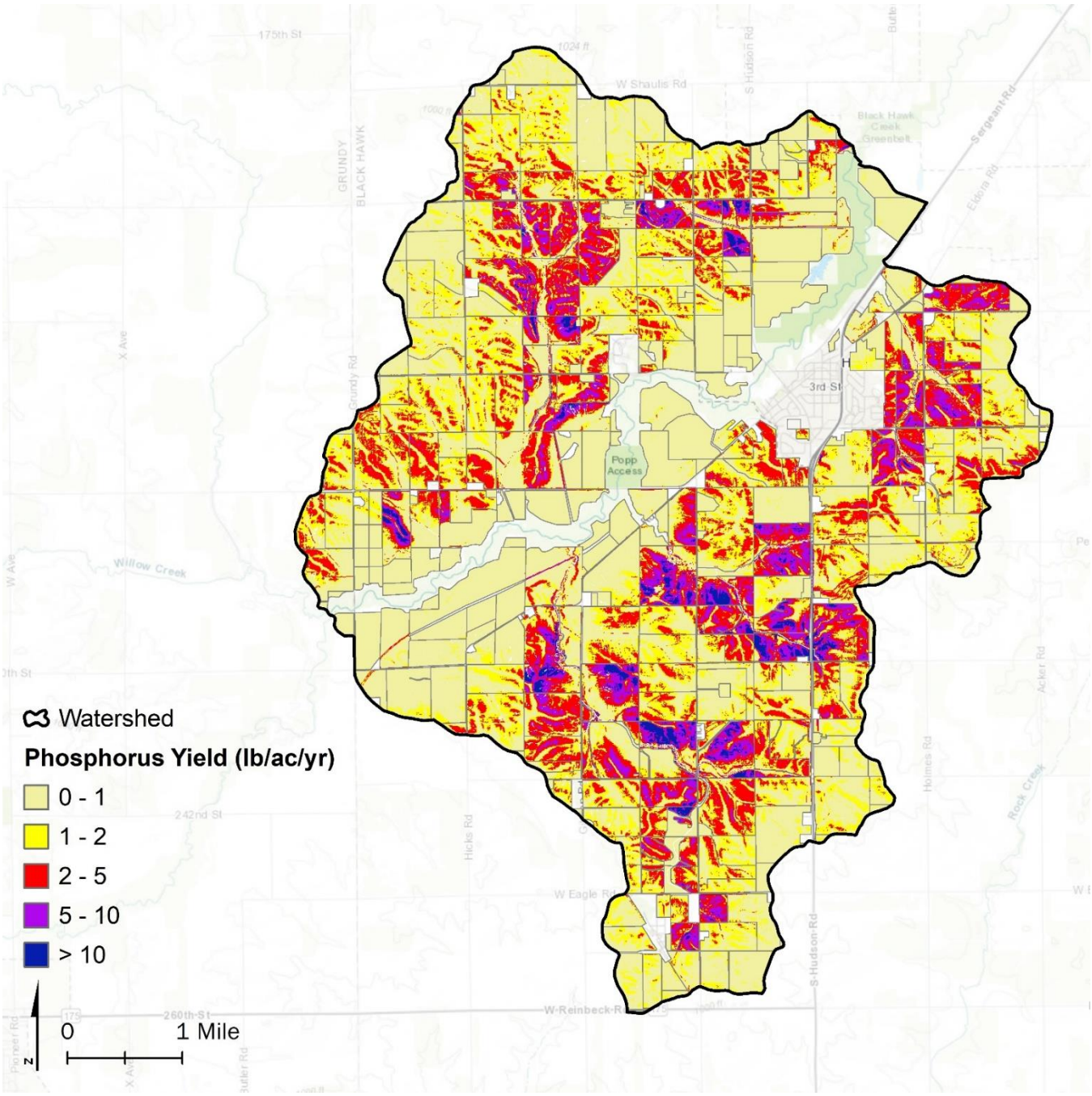
Subsurface tile drainage is common for many soils in the watershed. While a comprehensive inventory of subsurface drainage infrastructure does not exist, knowledge of elevation data, soil properties, and local practices suggests that most farm fields contain some subsurface drainage.



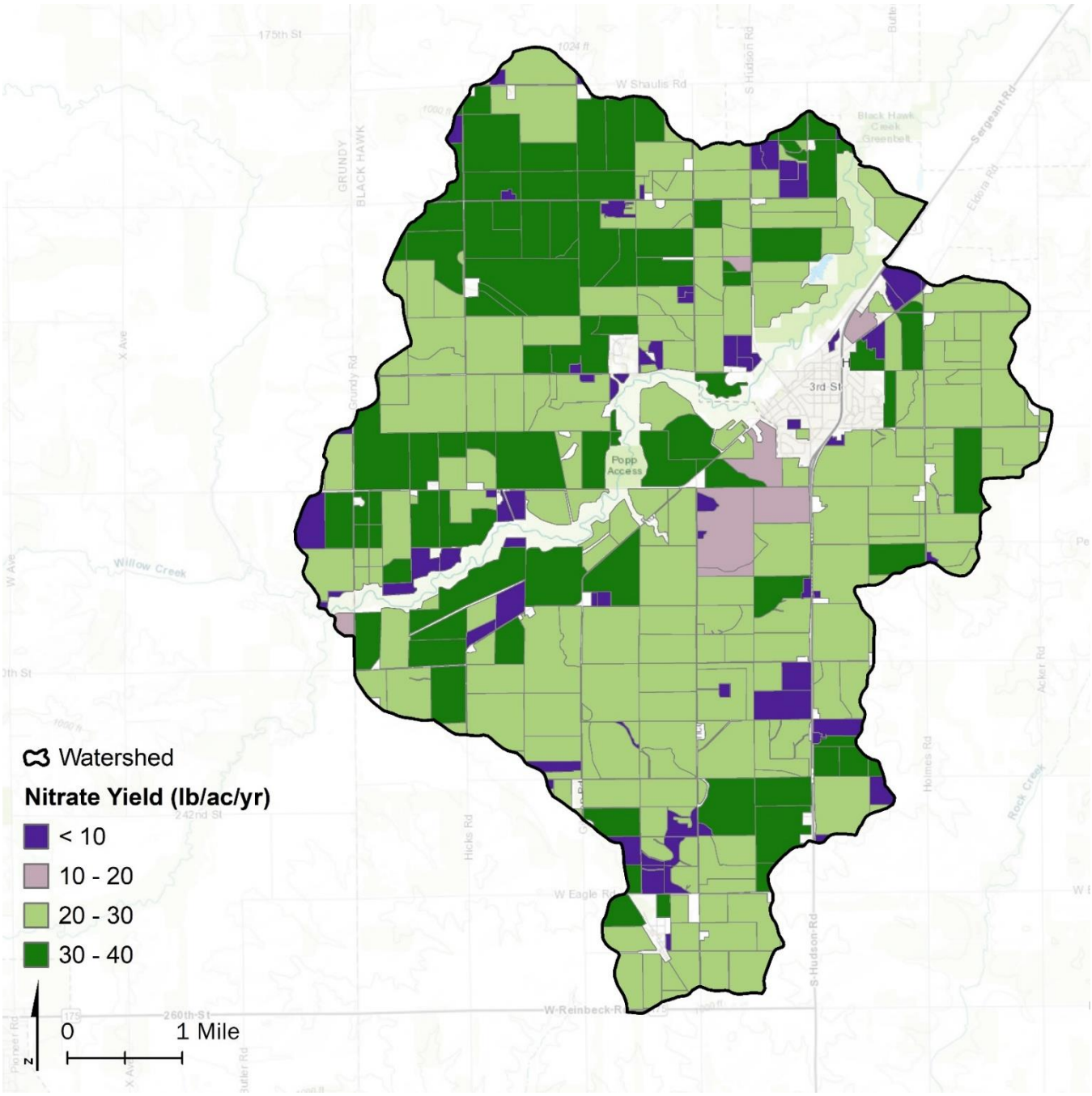
On average from 2009 through 2018, 79 percent of the watershed was planted to corn and soybeans. Grass is located primarily within stream buffers and field borders, many trees grow along the Black Hawk Creek riparian corridor, and developed land is concentrated within Hudson.



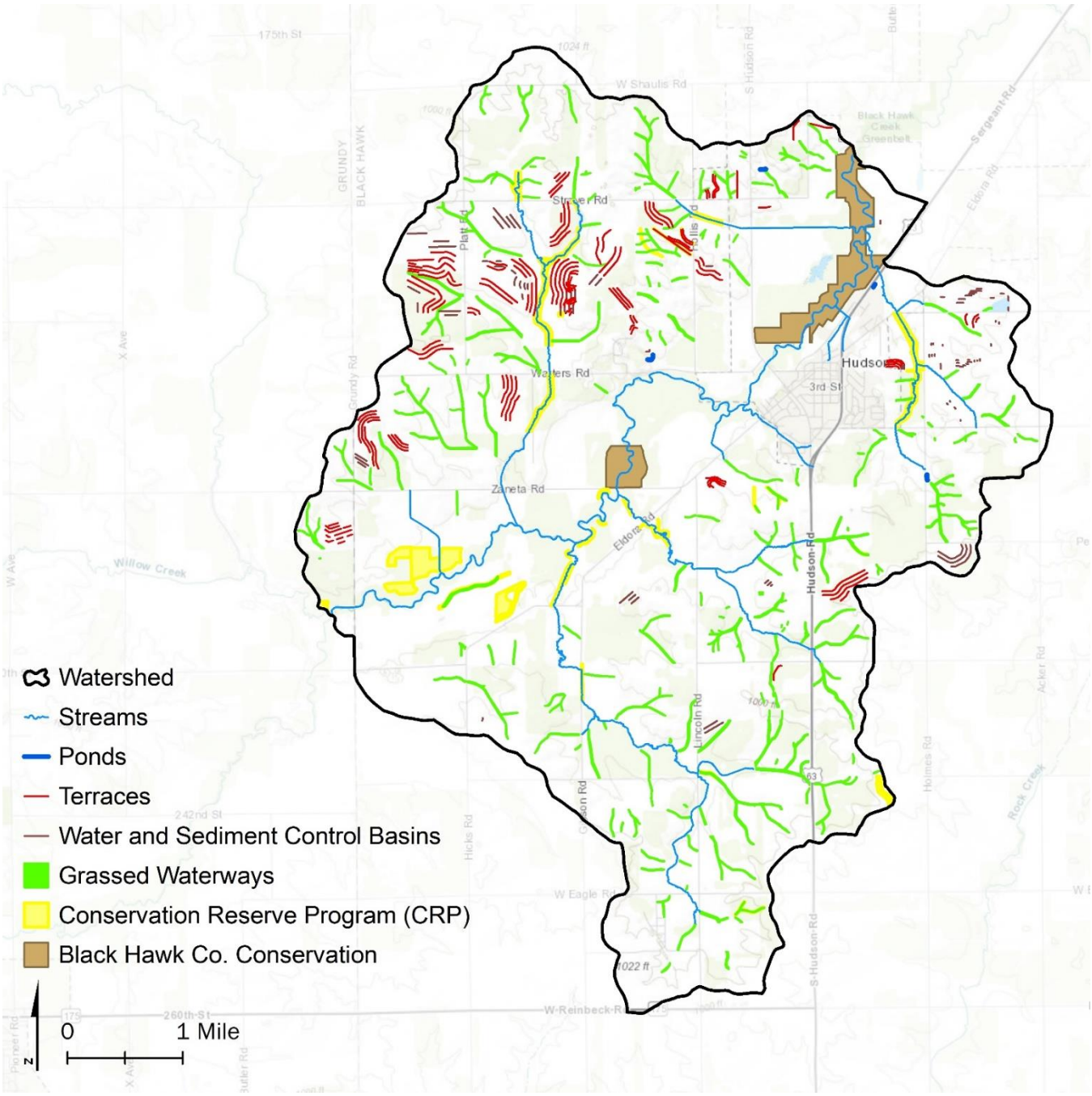
Sheet and rill soil erosion averages 3.15 tons per acre year (Daily Erosion Project) and varies by land use, tillage practices, slope and topographic features, and soil types.



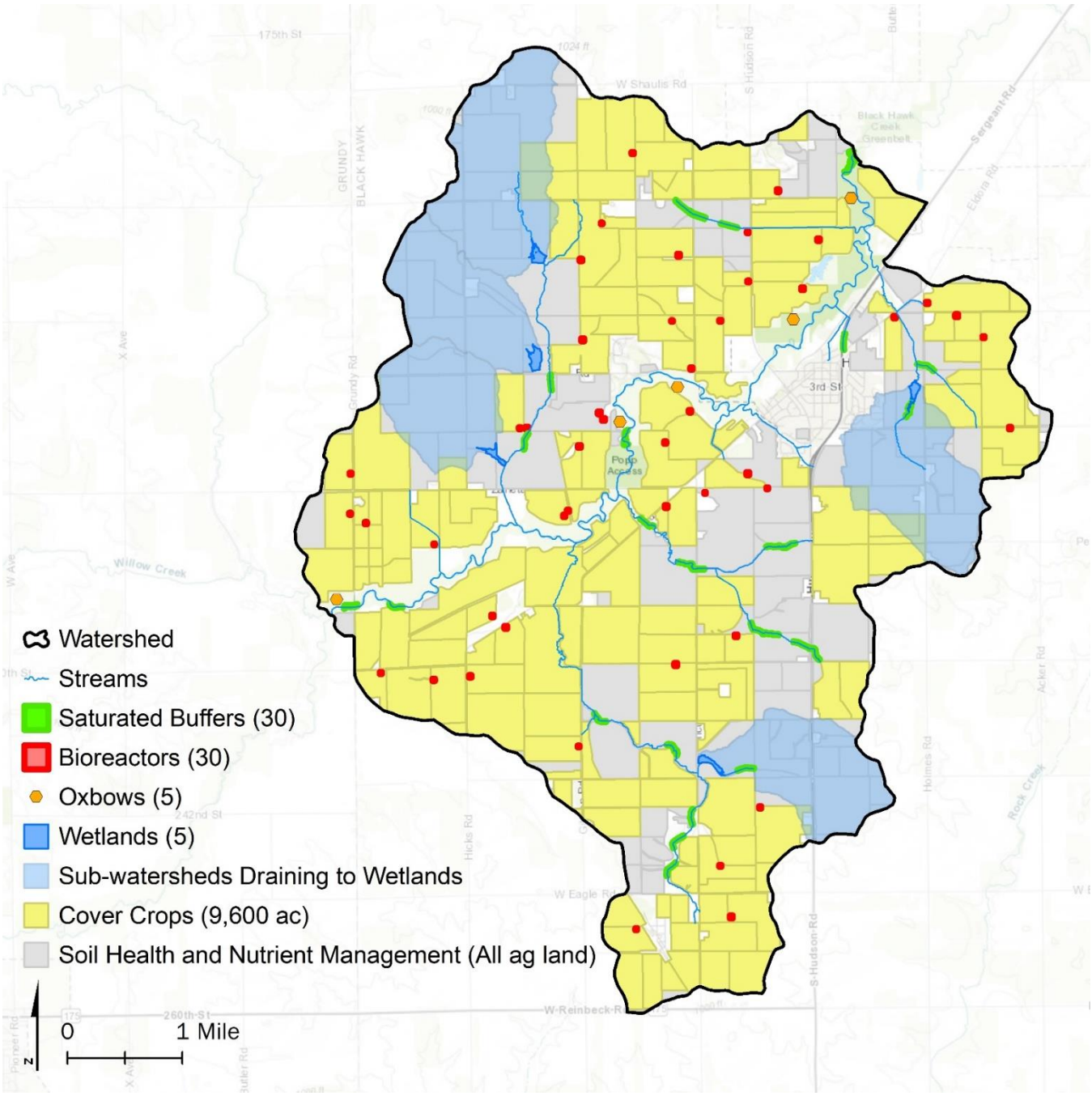
Phosphorus loss from agricultural land in the watershed averages an estimated 0.92 pounds per acre per year (USGS) and varies based on land use, soil erosion, soil fertility, and proximity to streams. Spatial estimates were derived by integrating USGS data, soil erosion rates, and sediment delivery ratio information.



Nitrate (nitrate as nitrogen) loss from agricultural land in the watershed averages an estimated 27.9 pounds per acre per year (USGS) and varies based on land use, crop rotation, nutrient management, and soil types. Spatial estimates were derived by integrating USGS data and typical relationships between land management and nitrate loss.



Many soil and water conservation practices exist in the BHCHW. Watershed-scale benefits of current conservation practices include estimated reductions of 10 percent of soil erosion, 11 percent of phosphorus loading, and 3 percent of nitrogen loading from baseline levels.



The conceptual plan for conservation practice implementation in the BHCHW includes 11,200 acres per year of no-till/strip-till, 9,600 acres per year of cover crops, 7,400 acres per year of nitrogen management, 10 wetlands or oxbows, and 60 saturated buffers or bioreactors. While actual locations of implemented practices may differ from the conceptual plan, it is important to realize that all acres should be managed with at least one conservation practice and that a combination of practices will be required at the watershed scale to accomplish goals.

Appendix B

Agricultural Conservation Planning Framework Atlas

The Agricultural Conservation Planning Framework (ACPF) provides datasets and mapping tools that can be used to identify potentially suitable locations for agricultural conservation practices. The geographic information system (GIS) tools utilize elevation, land use, and soils data as inputs to characterize watersheds and identify appropriate sites for practices that enhance soil health and water quality by improving drainage, runoff, and riparian management. The ACPF was developed by the USDA-Agricultural Research Service National Laboratory for Agriculture and the Environment.

Results

The results of applying ACPF tools to a watershed provide a suite of potential conservation practice opportunities. Results should be refined based on local input and expertise to develop actionable watershed plans that address local conditions and goals. ACPF output is therefore best utilized as scientific information to support decision making and planning in agricultural watersheds. The following atlas of ACPF result maps for this watershed displays all conservation practice outputs derived from analysis of the watershed with the GIS toolbox. Practices are mapped based on site suitability and may or may not reflect existing conservation infrastructure.

The following maps include watershed assessments of land use, tile drainage, and runoff risk derived with ACPF tools. The remaining maps are arranged into three sections: conservation drainage practices, runoff control practices, and riparian management opportunities. For each section, one map displays a watershed overview and subsequent pages contain detailed maps for each township that overlaps the watershed. Conservation drainage practices may include bioreactors, saturated buffers, saturated buffers with added carbon, constructed wetlands, controlled drainage, and topographic depressions that may present opportunities for wetland restoration, blind tile inlets, or perennial cover. Runoff control practices may include contour buffer strips, terraces, grassed waterways, and water and sediment control basins. In-field management practices such as nutrient management, no-till/reduced tillage, and cover crops are not explicitly mapped by ACPF tools because such soil health building practices are appropriate for all agricultural land. The final section of maps includes the results of applying the ACPF riparian function assessment to the stream channels in the watershed. Riparian management opportunities are classified as critical zone (high potential for runoff control and denitrification), multi species buffer (moderate potential for runoff control and denitrification), deep rooted vegetation (denitrification prioritized), stiff stemmed grasses (runoff control prioritized), and streambank stabilization.

Maps

1. Watershed Overview
2. Land Use
3. Tile Drainage
4. Runoff Risk
5. Conservation Drainage Practices
6. Runoff Control Practices
7. Riparian Management Opportunities

ACPF manual: Porter, S.A., M.D. Tomer, D.E. James, J.D. Van Horn, and K.M.B. Boomer. 2018. Agricultural Conservation Planning Framework: ArcGIS®Toolbox User's Manual, Ver. 3. USDA Agricultural Research Service, National Laboratory for Agriculture and the Environment, Ames Iowa.

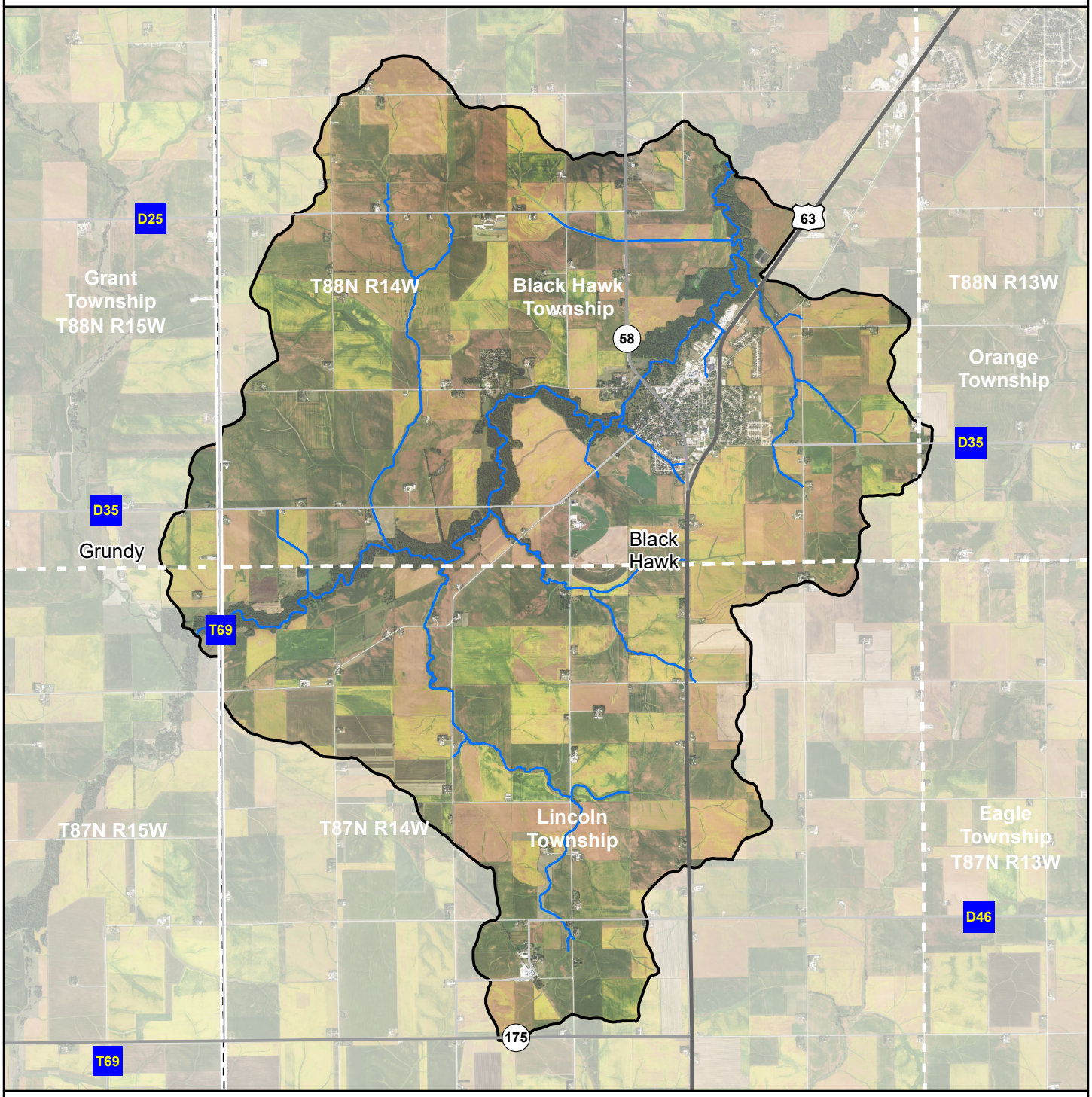
ACPF website: https://acpf4watersheds.org/

ACPF data analyzed by Iowa Flood Center

ACPF data updated and mapped by Iowa Soybean Association Environmental Programs & Services

Wilson Creek Watershed

ACPF Atlas



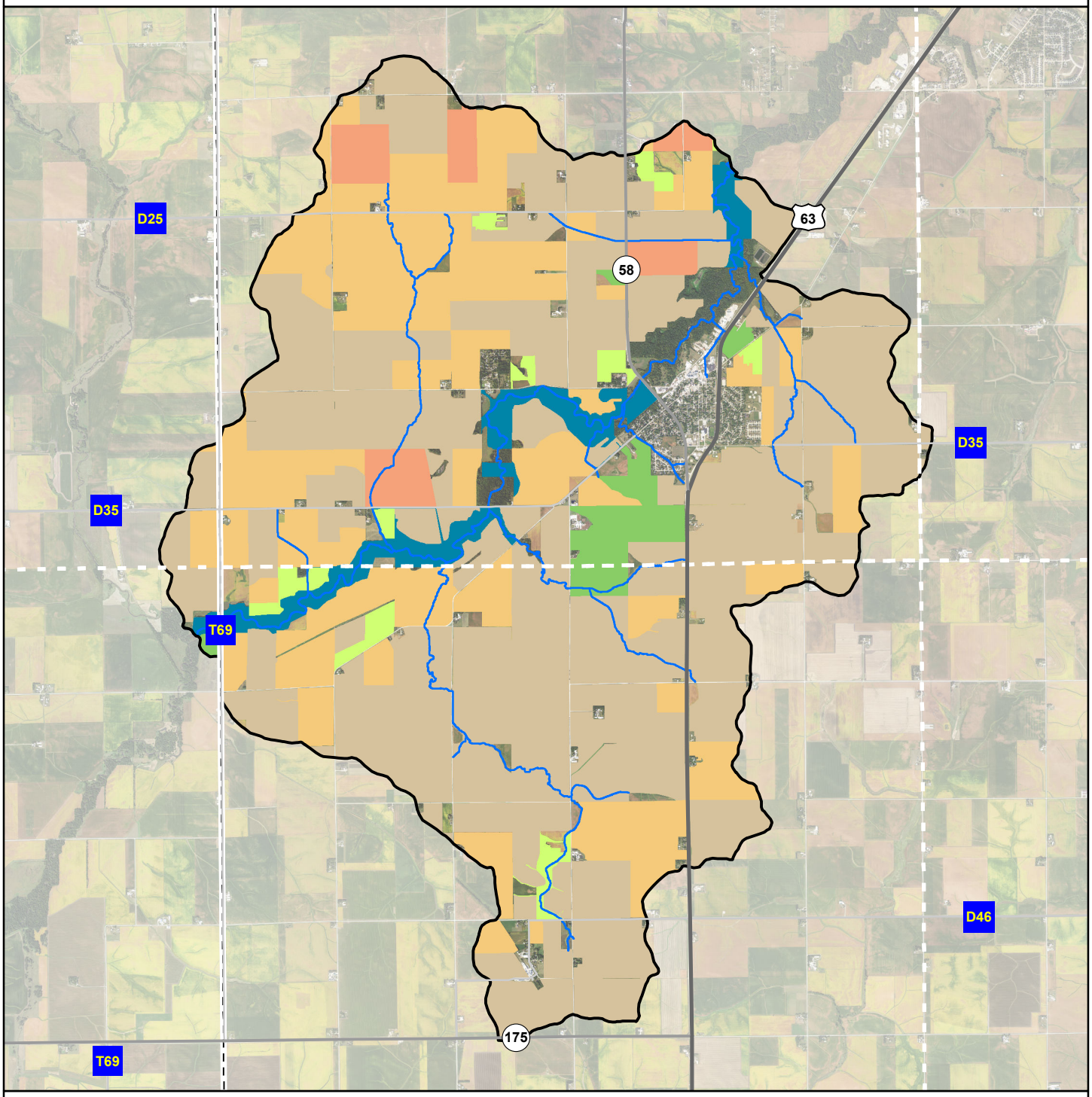
Watershed

Streams

0 1 2 Miles

Wilson Creek Watershed

Land Use



Watershed

Streams

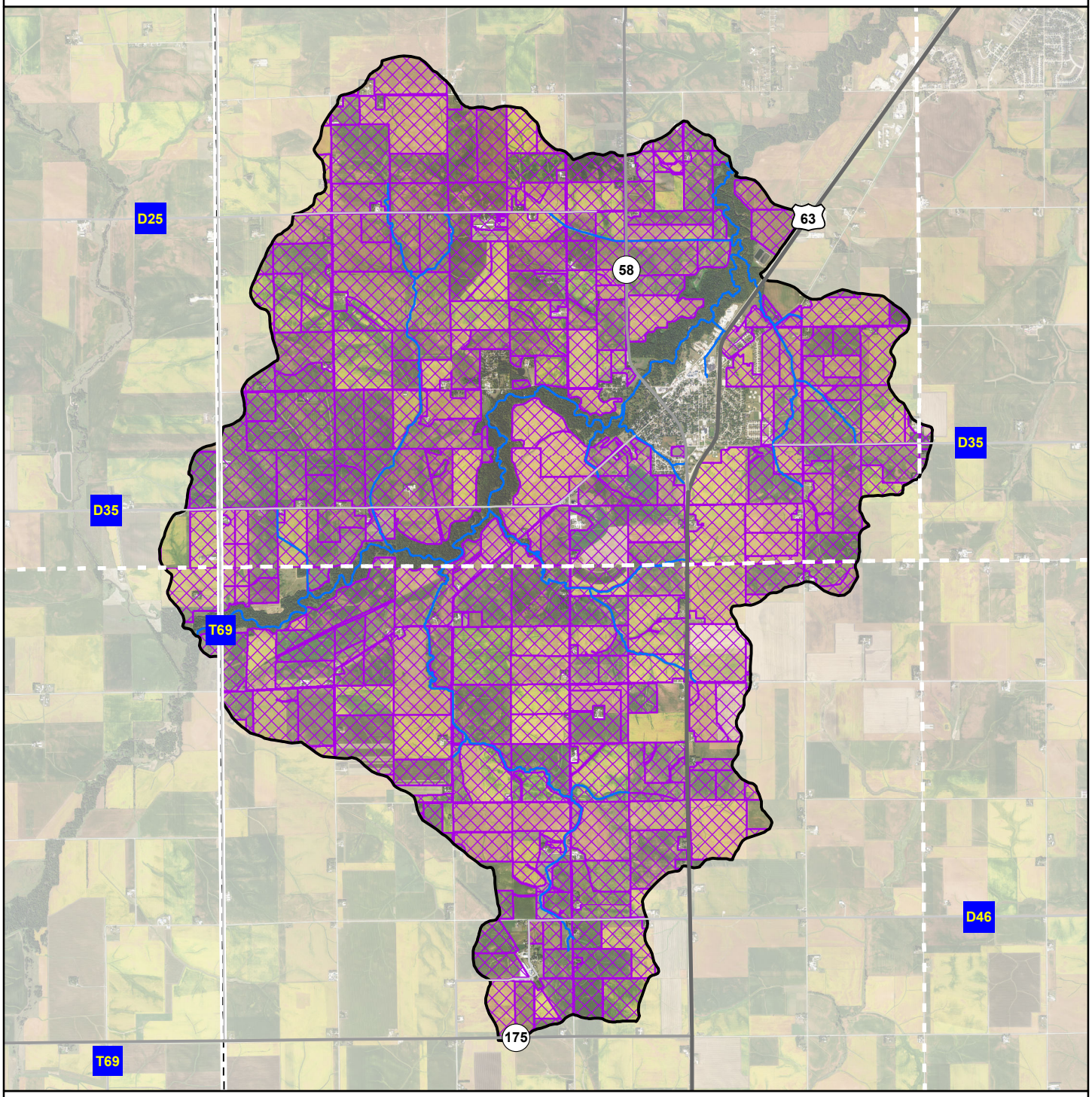
Land Use

- Corn/Soybeans
- C/S with Continuous Corn
- Continuous Corn
- Extended Rotation
- Pasture
- Forest
- Urban
- Water/Wetland

0 1 2 Miles

Wilson Creek Watershed

Tile Drainage



Watershed

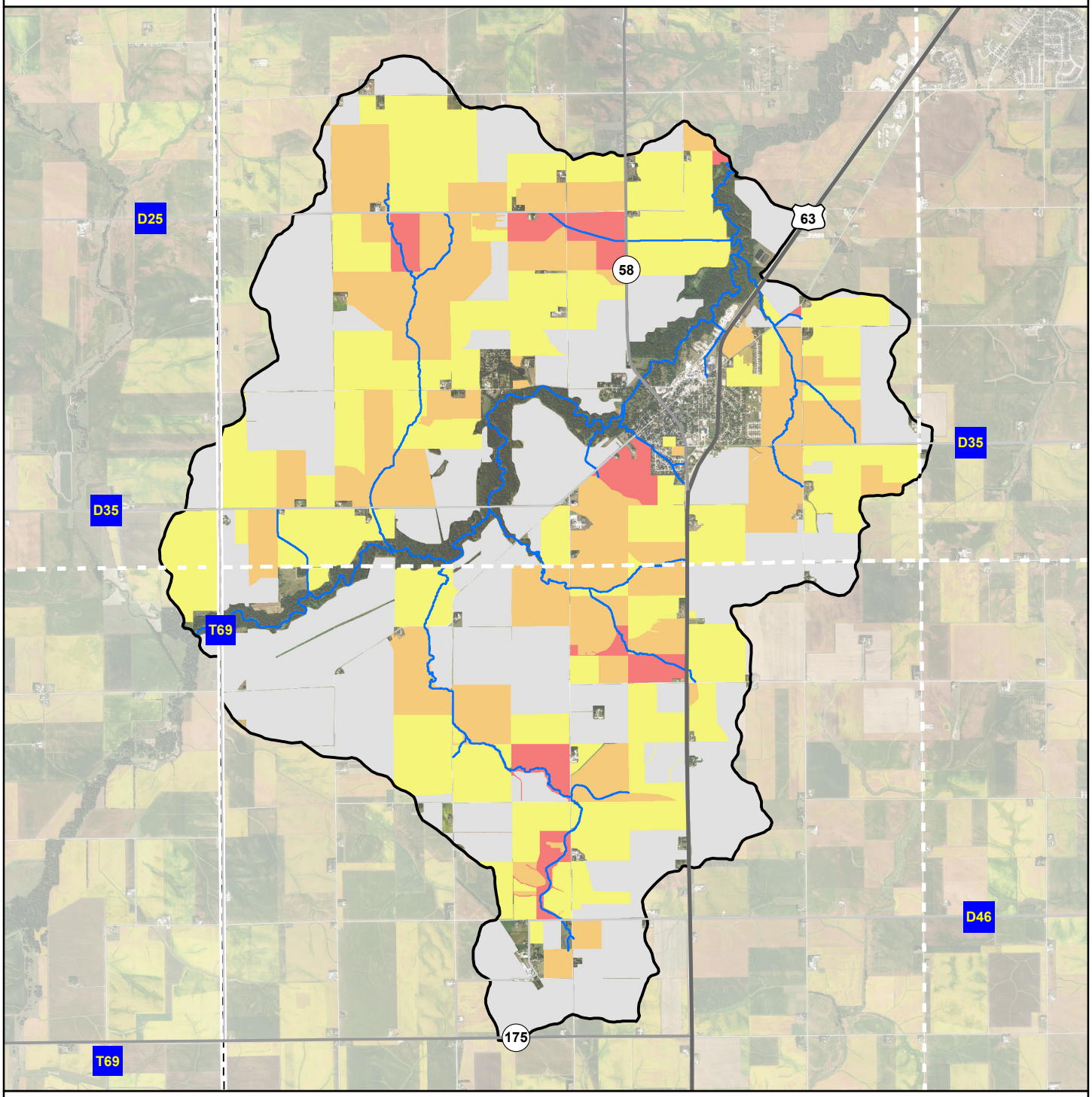
Streams

Tile Drainage Likely

0 1 2 Miles

Wilson Creek Watershed

Runoff Risk



Watershed

Streams

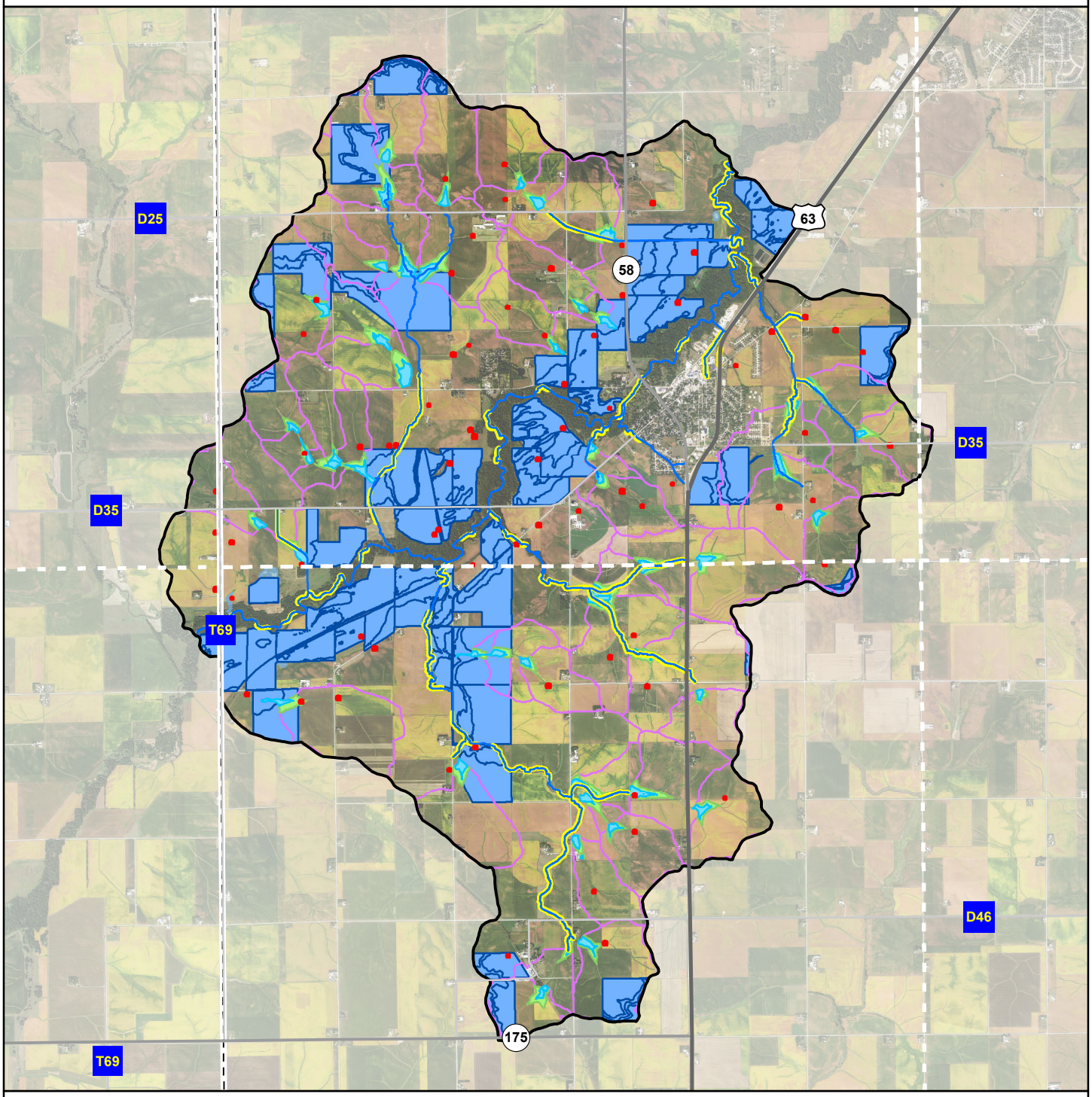
Runoff Risk

- Very High
- High
- Moderate
- Low

0 1 2 Miles

Wilson Creek Watershed

Conservation Drainage Practices



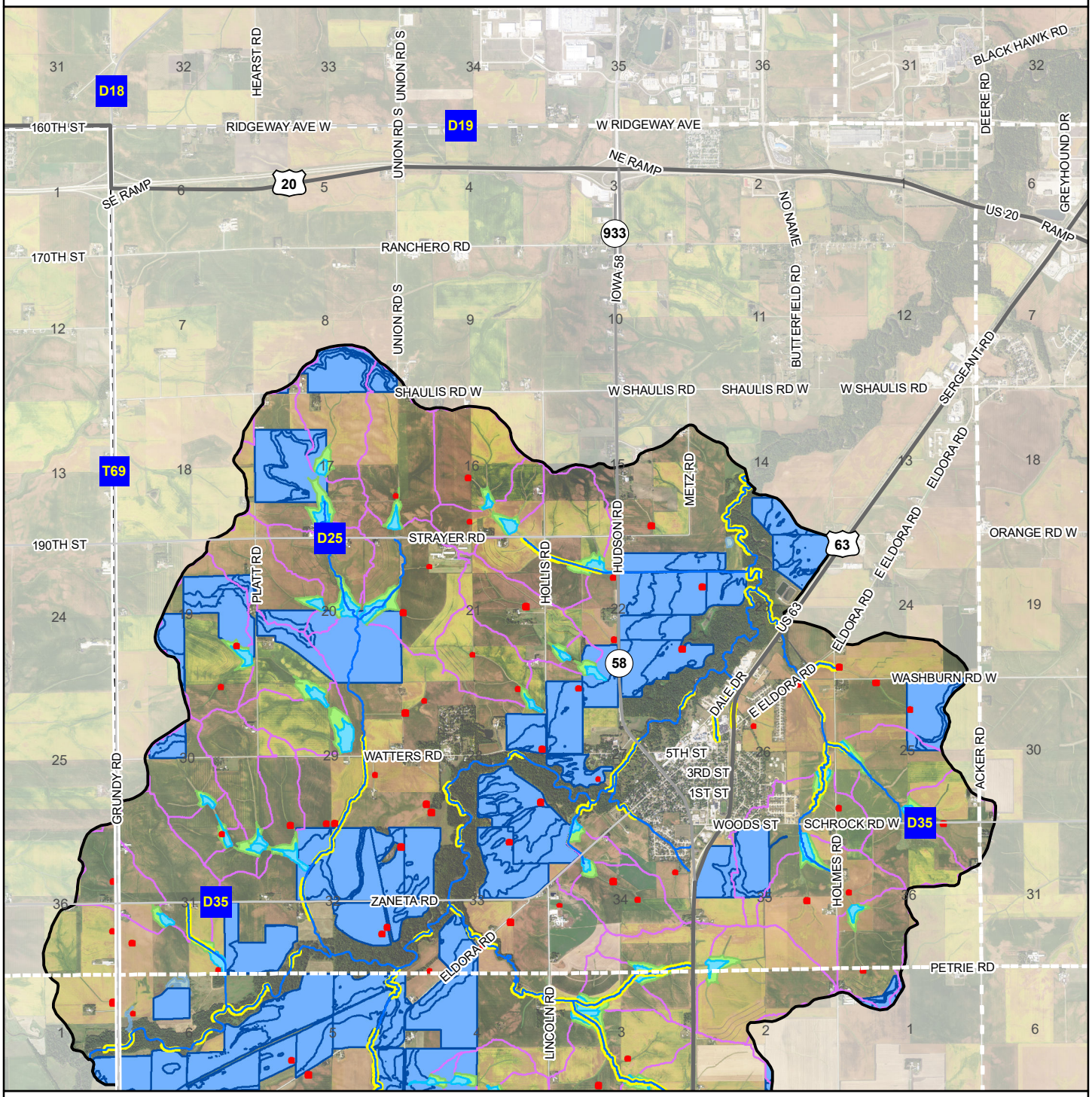
- Watershed
- Streams
- Bioreactors
- Saturated Buffers
- Wetlands
- Wetland Buffers
- Wetland Drainage Areas
- Controlled Drainage
- Topographic Depressions

0 1 2 Miles

Wilson Creek Watershed

Conservation Drainage Practices

T88N R14W



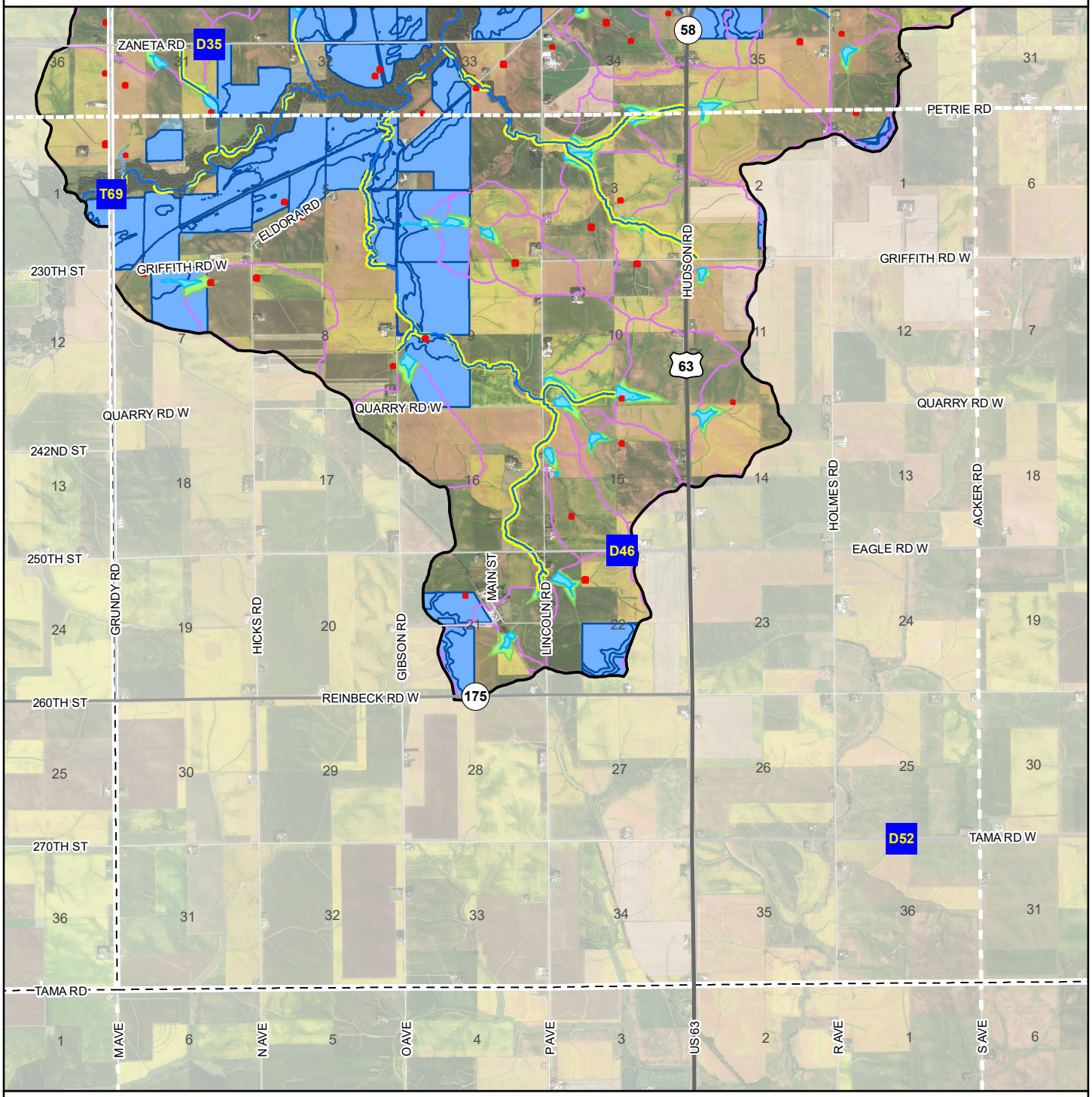
- Watershed
- Streams
- Bioreactors
- Saturated Buffers
- Wetlands
- Wetland Buffers
- Wetland Drainage Areas
- Controlled Drainage
- Topographic Depressions

0 0.5 1 Miles

Wilson Creek Watershed

Conservation Drainage Practices

T87N R14W



- Watershed
- Streams
- Bioreactors
- Saturated Buffers
- Wetlands
- Wetland Buffers
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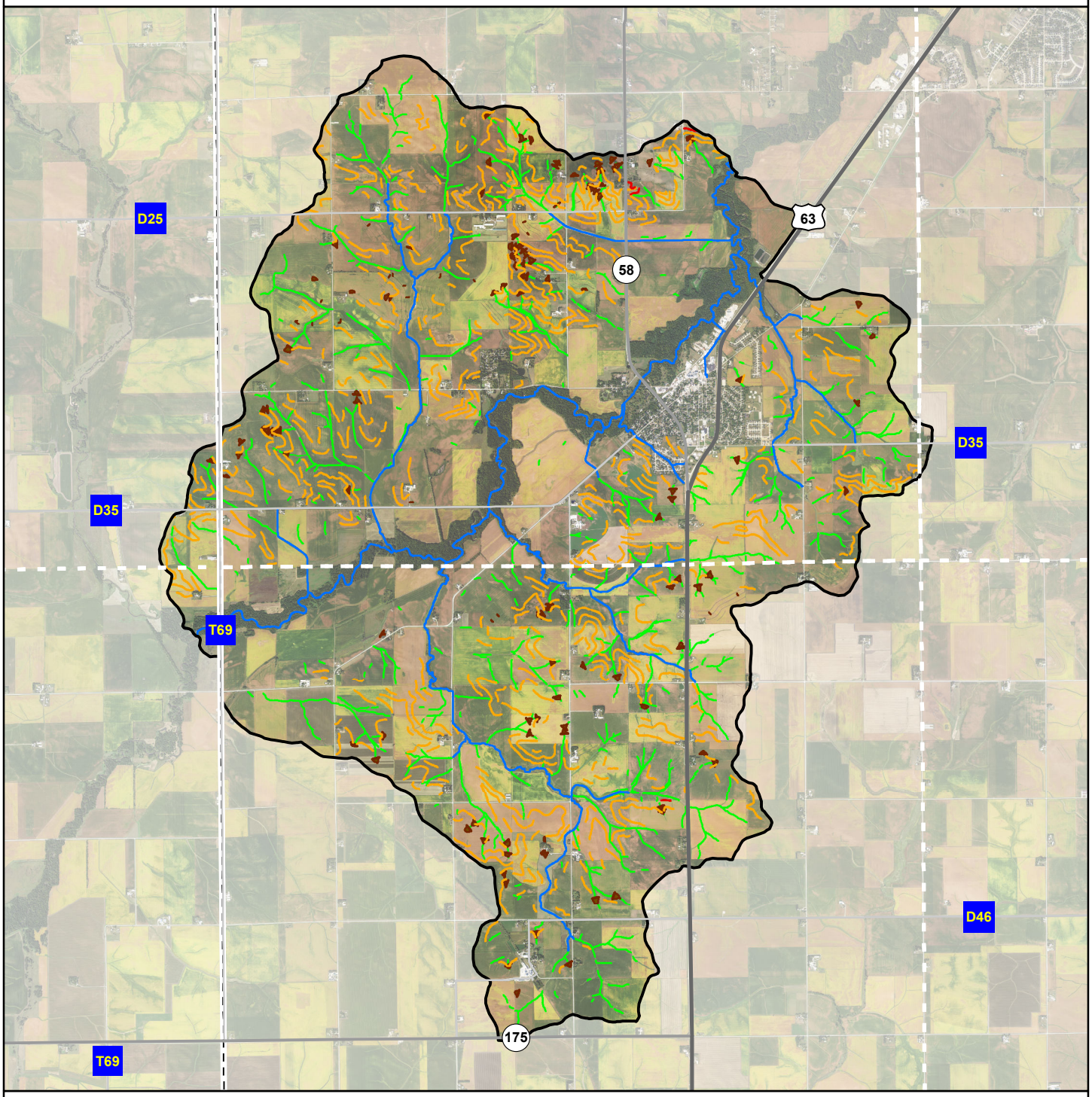
- Controlled Drainage
- Topographic Depressions

0 0.5 1 Miles

Wilson Creek Watershed

Runoff Control Practices



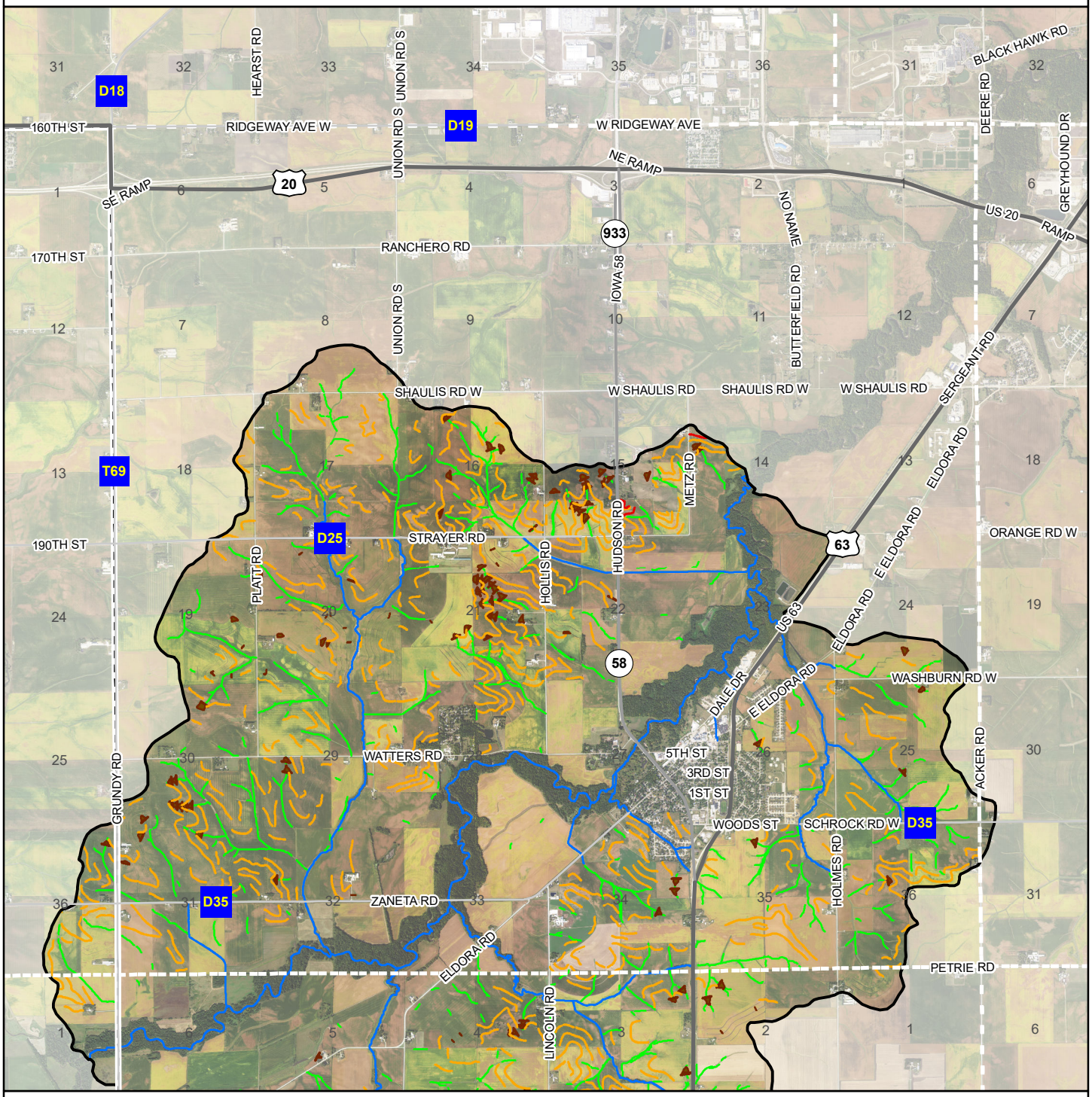
- Watershed
- Streams
- Contour Buffer Strips
- Terraces
- Grassed Waterways
- Water & Sediment Control Basins

0 1 2 Miles

Wilson Creek Watershed

Runoff Control Practices

T88N R14W



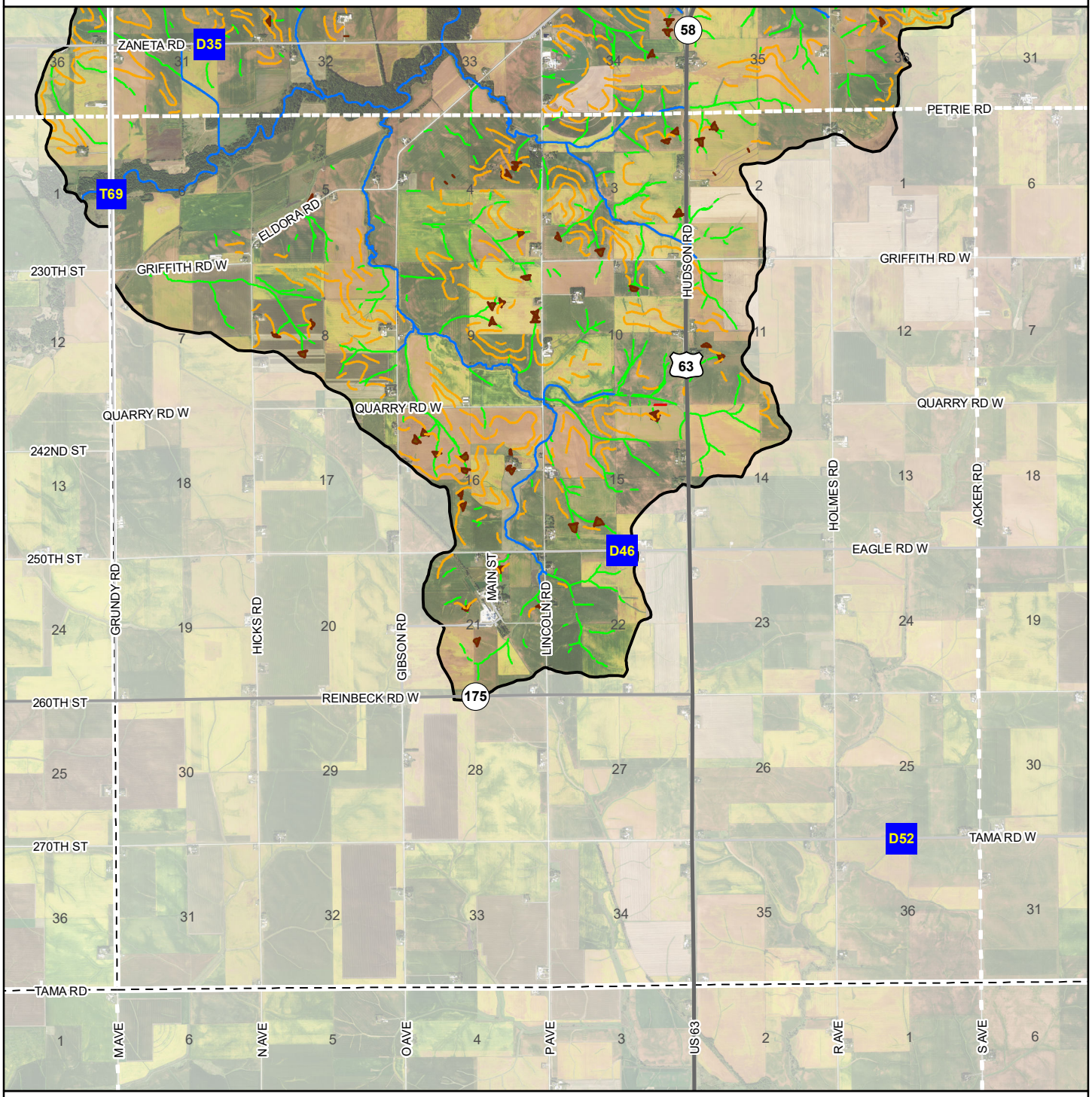
- Watershed
- Streams
- Contour Buffer Strips
- Terraces
- Grassed Waterways
- Water & Sediment Control Basins

0 0.5 1 Miles

Wilson Creek Watershed

Runoff Control Practices

T87N R14W

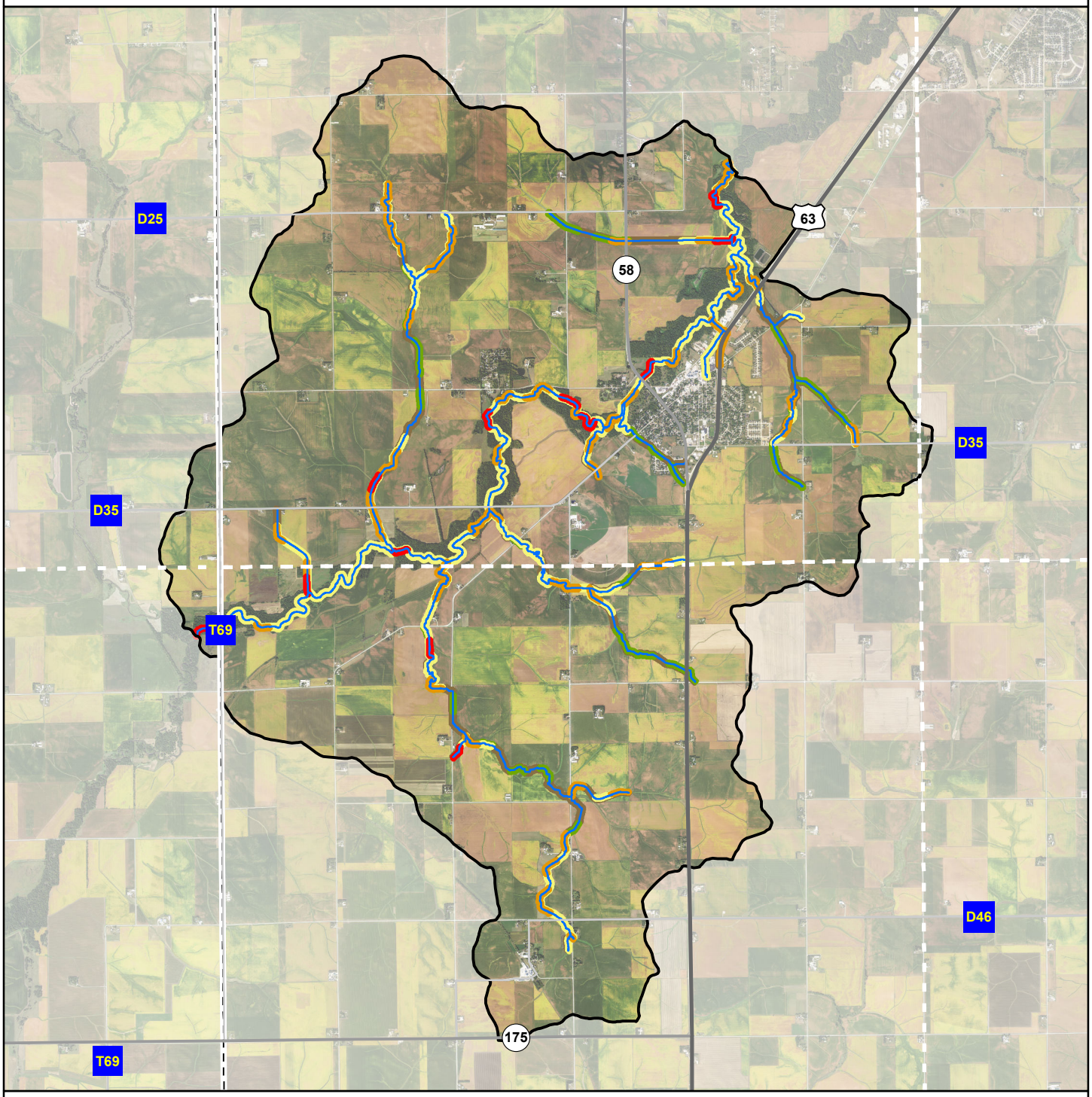


- Watershed
- Streams
- Contour Buffer Strips
- Terraces
- Grassed Waterways
- Water & Sediment Control Basins

0 0.5 1 Miles

Wilson Creek Watershed

Riparian Management Opportunities



Watershed

Streams

Riparian Function

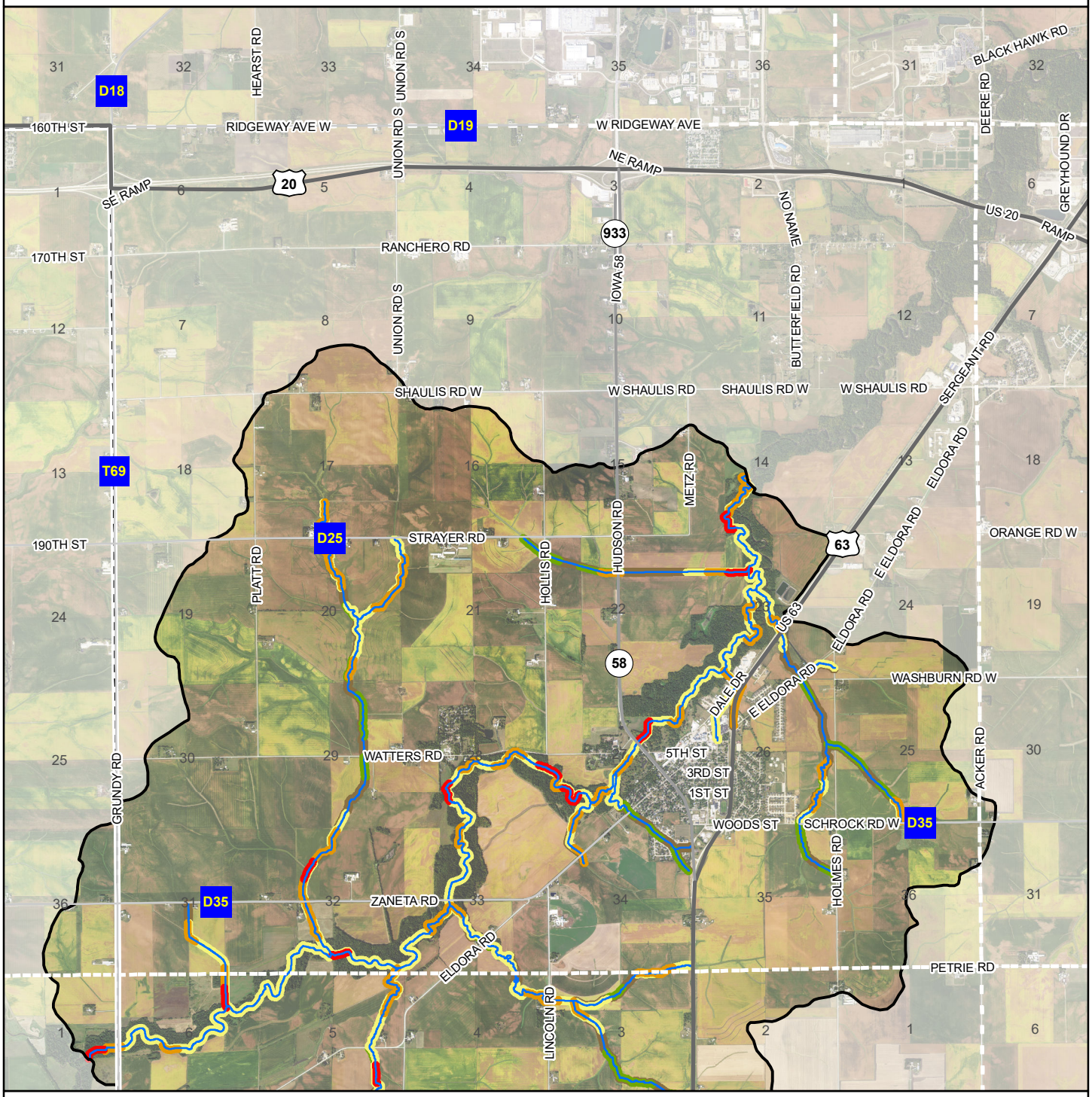
- Critical Zone
- Multi Species Buffer
- Deep Rooted Vegetation
- Stiff Stemmed Grasses
- Stream Bank Stabilization

0 1 2 Miles

Wilson Creek Watershed

Riparian Management Opportunities

T88N R14W



Watershed

Streams

Riparian Function

- Critical Zone
- Multi Species Buffer
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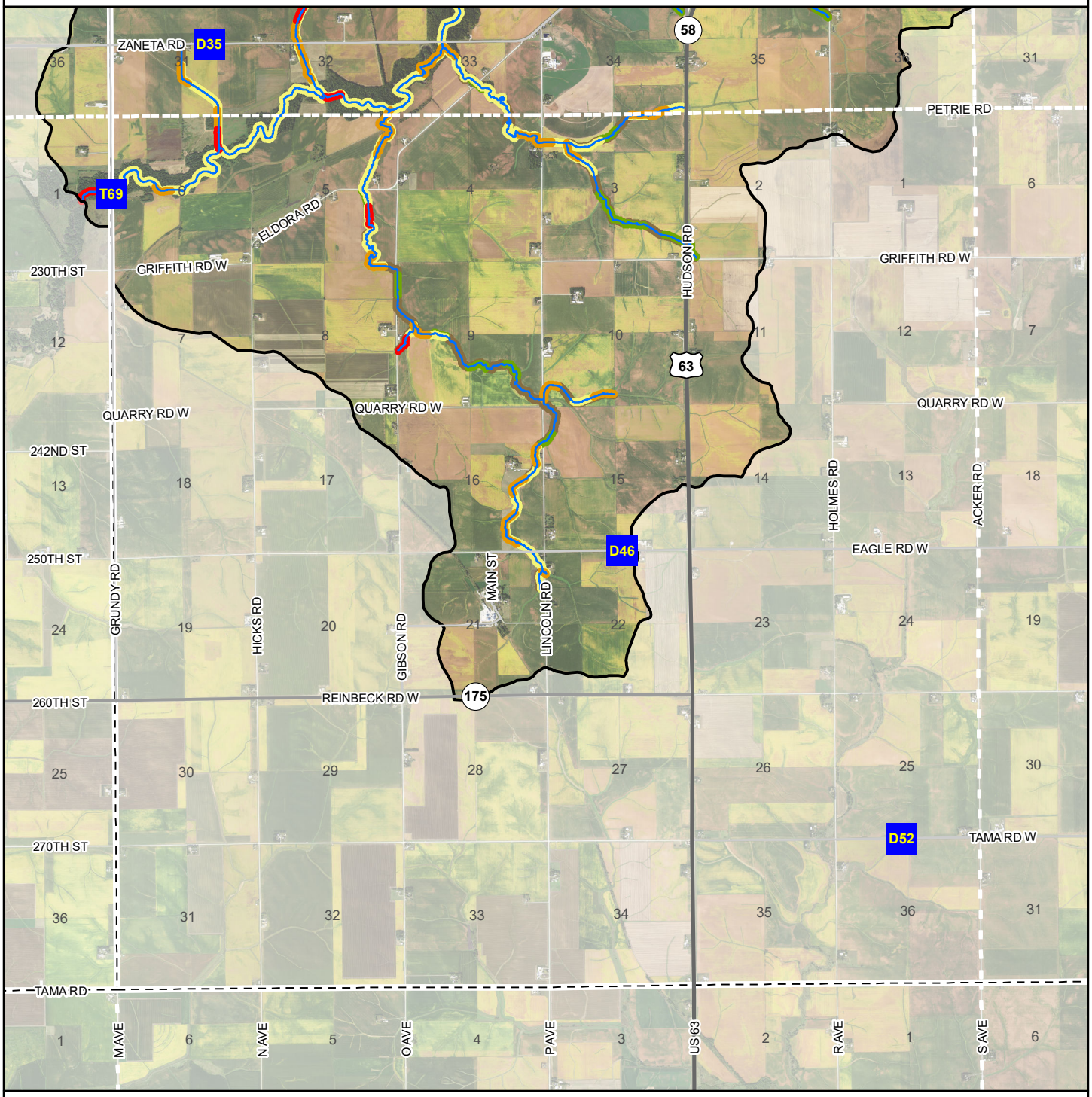
0 0.5 1 Miles

Wilson Creek Watershed

Riparian Management Opportunities

T87N R14W



Watershed

Streams

Riparian Function

- Critical Zone
- Multi Species Buffer
- Deep Rooted Vegetation
- Stiff Stemmed Grasses
- Stream Bank Stabilization

0 0.5 1 Miles

Black Hawk Creek Hudson Watershed Stewardship Plan

What is a watershed?

A watershed is an area of land that drains to a common point. The Black Hawk Creek Hudson Watershed contains 20,100 acres in Black Hawk and Grundy Counties.

Why is there a watershed plan for the Black Hawk Creek Hudson Watershed?

The watershed was identified for planning by the Middle Cedar Watershed Management Authority to help farmers, landowners and watershed stakeholders build upon current conservation efforts. The Iowa Soybean Association, with funding provided by the Iowa Agriculture Water Alliance, developed a watershed plan to identify conservation practice opportunities in the watershed. Farmers, landowners, residents and partner organizations provided input to the planning process. The watershed plan goals are to:

1. Build watershed community
2. Adopt practices to address natural resource stewardship challenges.
3. Maintain and grow economic well-being in the watershed.

What conservation practices are included in the watershed plan?

Due to the aspiration watershed plan goals, conservation practice adoption will be necessary throughout the entire watershed. The following practices along with their adoption level goals are included in the watershed plan.

No-till/Strip-till (11,200 acres)
Reducing or eliminating tillage improves soil health, reduces soil erosion and decreases phosphorus loss.

Wetlands/Oxbows (10 sites)
Restored or constructed wetlands and restored oxbows can benefit water quality by removing nitrates and sediment. Wetlands and oxbows also reduce flooding by temporarily holding excess water during and after large rainfall.

Cover crops (9,600 acres)
Cover crops sequester nitrogen when cash crops are not actively growing. Cover crops also reduce soil erosion and phosphorus loss.

Saturated buffers (30 structures)
Tile water is routed into a riparian buffer. Plants and microbes in the buffer naturally remove nitrates from water as it percolates towards the stream.

Nitrogen management (7,400 acres)
Managing the rate, timing, source and stability of nutrient applications can simultaneously improve both return on investment through increased yield and water quality through decreased nutrient loss.

Bioreactors (30 structures)
Tile water is routed into a trench filled with wood chips. Microbes living in the wood chips remove nitrates from the water through a process called denitrification. The treated water is then returned to the stream with less nitrates.

Conservation isn't cheap! How much will it cost?

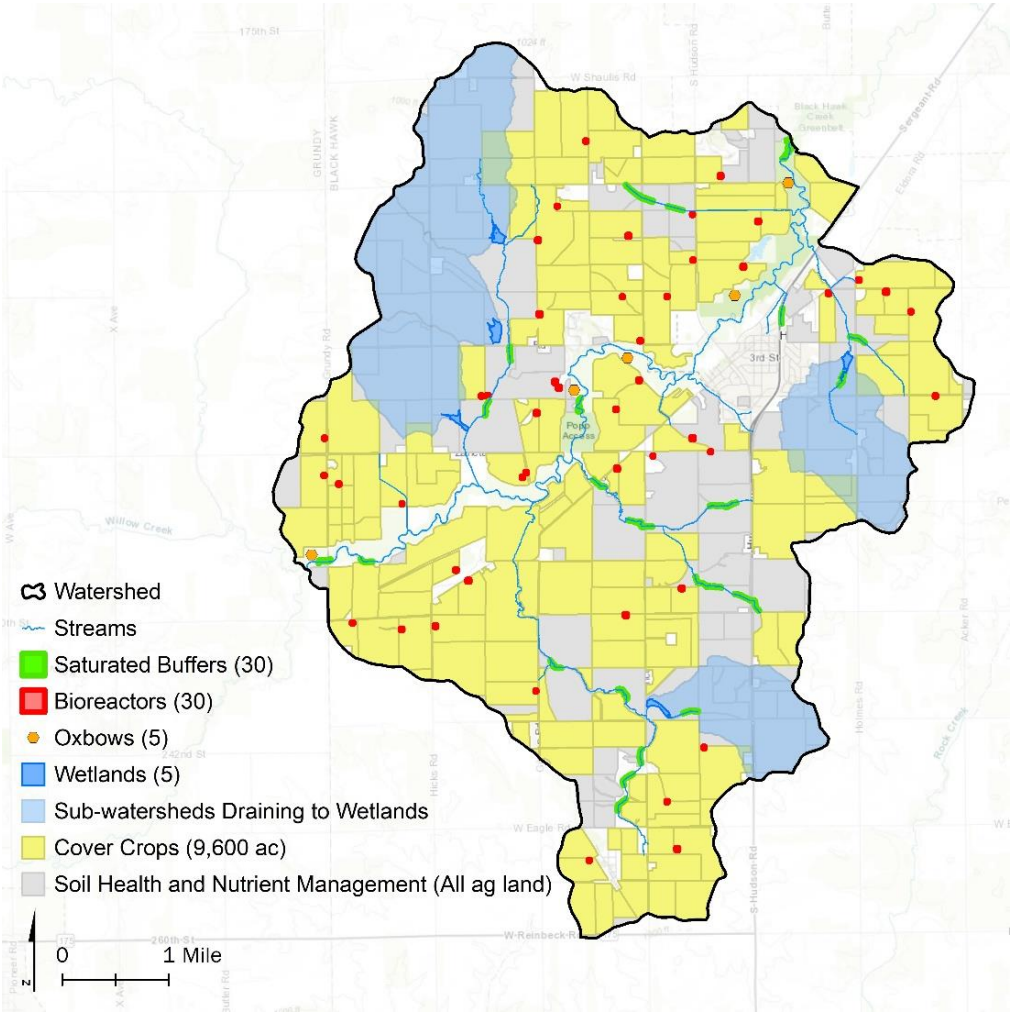
Some practices can lead to long-term financial benefits, but others can include significant initial or annual costs.

Practice	Unit	Goal	Unit cost	Total cost
No-till/Strip-till	acres/year	11,200	-$10	-$112,000
Cover crops	acres/year	9,600	$40	$384,000
Nitrogen management	acres/year	7,400	-$5	-$37,000
Wetlands	sites	5	$200,000	$1,000,000
Oxbows	sites	5	$20,000	$100,000
Saturated buffers/Bioreactors	sites	60	$10,000	$600,000

The total estimated cost to fully implement the Black Hawk Creek Hudson Watershed Stewardship Plan is $235,000 per year for management practices plus $1,700,000 for one-time infrastructure costs. Cost share is available for many practices.

Where could practices be adopted?

The conceptual plan map below illustrates a potential combination of conservation practices to reach the watershed plan goals. The locations shown on the map may be suitable for practice installation or adoption, especially the structural practices. Site surveys will be required to determine suitability.



Who do I contact for more information?

Find the Black Hawk Creek Water and Soil Coalition on Facebook @bhcwaterandsoil
Black Hawk SWCD/NRCS: (319) 296-3262
Grundy SWCD/NRCS: (319) 824-3634