



duck creek
watershed plan
2008

foreword

The Duck Creek Watershed Plan was developed through a cooperative effort between representatives of the watershed stakeholders under the coordination of River Action. A number of different entities, ranging from residents to municipal governments and county agencies, consistently attended monthly meetings during the planning process to solicit input from the stakeholder committee.

The Duck Creek Watershed Plan was developed to provide a "blueprint" for improving water quality and protecting natural resources in the watershed. The Plan is intended to assist private citizens and the local, State, and Federal units of government concerned with managing the water resources of this watershed in a cost-effective and environmentally sound manner.

The plan contains a summary of data collected for the watershed, quantifies water resource-related problems, presents goals and objectives agreed upon by the stakeholder group, and presents a list of recommended actions for effectively managing watershed resources in concert with activities such as planning and development standards. The Plan provides a basis for inter-jurisdictional communication and coordination on water resources issues.

This Plan is an advisory document for stakeholders of the watershed, but we encourage stakeholders to endorse the Plan, utilize the document as a reference, and pursue implementation. This document does not contain subwatershed regulatory requirements, but instead provides proactive guidance on opportunities to balance the uses and demands on the watershed's resources to improve the quality of life for future generations.

Quad Cities Watershed Planning Committee

December 2008

executive summary

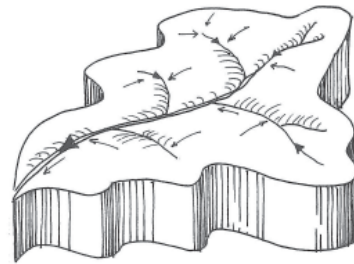
THE DUCK CREEK WATERSHED

The Duck Creek watershed is the area of land where water that falls as rain or snow flows across the landscape, enters our streams and wetlands, and ultimately drains to the Mississippi River. The Duck Creek watershed includes areas of the City of Davenport, the City of Bettendorf, and Scott County, as well as other public and private landowners.

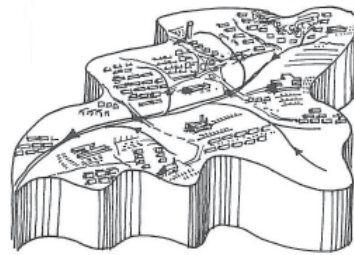
The 64 square mile (40,766-acre) watershed extends to the north to include a portion of the Davenport Municipal Airport north of I-80. East of this point, its boundary turns generally southeast to include Bettendorf and a small area of Riverdale. Turning south here, Duck Creek flows through steeper terrain before discharging into the Mississippi east of the Devils Glen Road and State Street intersection. A large portion of the western half of the Duck Creek watershed is agricultural land, while the eastern 50-60% drains the significantly urbanized cities of Davenport and Bettendorf.

The watershed includes over eighty-seven miles of stream and eighty-eight acres of wetlands. From west to east, the major named Duck Creek tributaries are: Silver Creek, Goose Creek, and Pheasant Creek. Additional minor creeks that contribute flow include Greenway Creek, Stafford Creek, Halcyon Creek, and 44th Street Creek, all in Bettendorf.

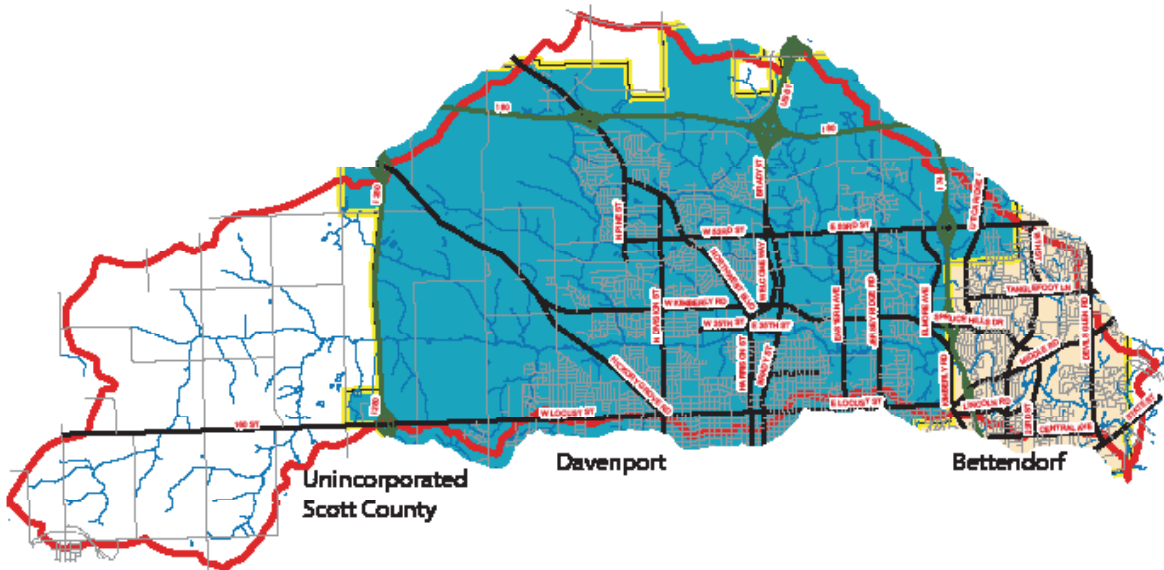
A watershed is the geographic area of land that drains water to a particular stream, lake or wetland, and is defined by the topography of the landscape. The watershed includes not just the surface of the land, but also the area below the surface where water that infiltrates into the soil flows toward the receiving stream or waterbody as underground flow.



A WATERSHED DRAINS AN AREA OF LAND



URBANIZING WATERSHED



The Duck Creek watershed is a subwatershed of and drains into the Mississippi River to the east.

executive summary

THE WATERSHED OVER TIME

In the early 1800s, the watershed landscape consisted of scattered oak trees, prairies, and wetlands. Before settlement, the Duck Creek and tributary streams flowed cool and clear, and were surrounded with dense ground vegetation and scattered trees. In the 1800's, the fertile soils and openness of the oak tree and prairie landscape attracted farmers, who converted these lands, including the draining of wetlands, for agriculture. In the early 1900's, urbanization of settlements began and continued with suburbanization following World War II. Today, approximately half of the watershed has been converted into downtown areas, older neighborhoods, and newer suburban development interspersed with commercial and industrial land uses. The rest of the watershed remains in agricultural land use.



© Conservation Design Forum

THE IMPACT OF WATERSHED DEVELOPMENT

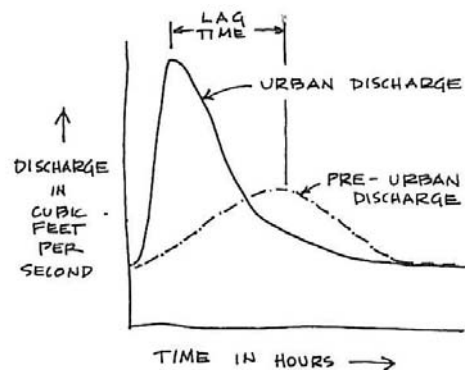
Under natural conditions, most of the water that falls on earth is used by plants, evaporates into the air, or seeps into the soil and becomes groundwater. Water that does not evaporate or infiltrate into the ground is called runoff. As a watershed develops, natural areas are converted into lawns, rooftops, roads, and parking lots. Instead of being used by plants or seeping into the ground, water that falls on these surfaces quickly flows to our streams directly or through the stormwater drainage and sewer system. As a result, streams and wetlands receive large pulses of water in shorter periods of time, resulting in erosion and destabilization of the stream channel and streambanks. When this happens, streambanks erode away, causing the loss of property and the pollution of our water with sediment. Where the landscape or the stormwater system is insufficient to contain this flush of water, flooding can occur.



© Conservation Design Forum

These landscapes have been restored to resemble presettlement condition similar to that found in the Duck Creek watershed.

Streambanks are further destabilized by the type and density of vegetation along the streambanks. Due to the introduction of plants that are not native to Iowa and to the lack of natural landscape processes such as fire, deep-rooted ground vegetation that used to stabilize stream edges have been



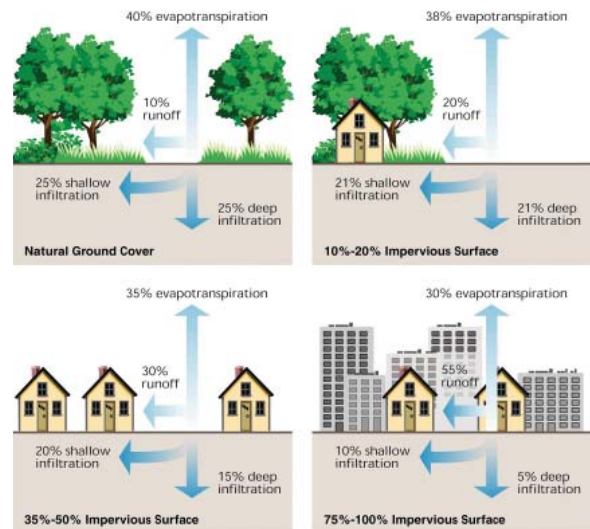
URBAN STREAM DISCHARGE AFTER A RAIN EVENT

replaced with non-native plants and dense woods that shade out good vegetation and do not adequately stabilize the stream banks.

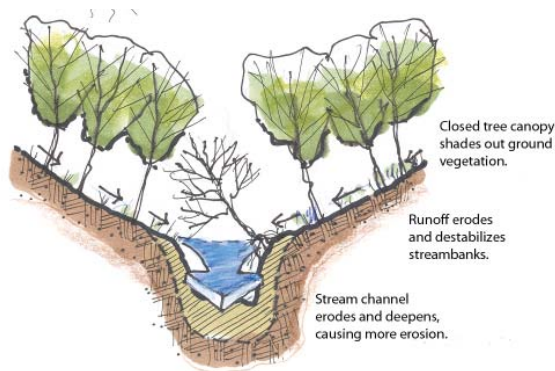
In addition to increasing the volume and rate of runoff, pollutants such as oil and grease, road salt, eroding soil and sediment, metals, bacteria from pet wastes, and excess nutrients (nitrogen and phosphorus) from fertilizers are washed from streets, buildings, parking lots, construction sites, lawns and golf courses into the streams and lake. This kind of pollution is called nonpoint source pollution. Additional pollutants include increased water temperature, altered pH, and low dissolved oxygen levels, making the river unhealthy for aquatic life.

The health of the Duck Creek system is a direct reflection of land use activities throughout the watershed such as how we develop the watershed, and how we live in and manage our urban landscape, have a dramatic effect on the condition of watershed resources. These impacts affect not only the

residents and visitors of Bettendorf & Davenport, but all of the communities that depend on the Mississippi River to provide water, recreation, food, economic well-being, or other values. Fortunately, there are proven practices for addressing these impacts, and landowners, business owners, public officials, and all who live, work, and play within the watershed can take positive action towards improving the watershed. One of the first steps in the process is to understand watershed problems and make a plan for moving forward -- a watershed plan.



Greater imperviousness results in a greater percentage of rainfall leaving as runoff and less infiltrating into the ground.



High runoff can cause erosion and incision of stream channels.



Impervious surfaces contribute pollutants to rain water runoff.

executive summary

WATERSHED PLANNING

Healthy watersheds offer many benefits including a healthy river with better water quality, enhanced opportunities for recreation and environmental education, opportunities for environmentally sustainable economic development, better wildlife habitat, reduced flood damage, and a healthier Mississippi River.

One of the first steps to rediscovering and enhancing these watershed benefits is through a process called watershed planning. The purpose of the watershed planning process is to better understand the condition of Duck Creek watershed resources, and to identify actions to prevent existing watershed problems from worsening as a result of future land use and management changes, preserve and improve water resources, reduce flood damage, protect property and infrastructure, and improve the quality of life for watershed residents. Watershed planning has the added benefit of bringing numerous communities together to plan for the greater good and to protect and improve the land and water resources they share and impact.

The following general steps were used in developing this watershed plan.

1. Conduct monthly Watershed Planning Committee meetings with watershed stakeholders and technical team members.
2. Solicit public input on watershed issues and opportunities and formulate watershed goals and objectives.
3. Review and analyze existing studies, watershed conditions, and watershed data to identify watershed problems.
4. Identify best management practices and policies to improve watershed resources.
5. Develop detailed watershed improvement action and implementation plan and recommendations.

WATERSHED ISSUES AND GOALS

During the first Watershed Planning Committee meeting, watershed stakeholders developed a list of watershed issues and opportunities and prioritized them via a voting process. These were categorized into the following topic areas, with the number of votes received shown in parenthesis:

1. Planning and Development (59)
2. Water Quality (47)
3. Stream and Riparian Management (25)
4. Stormwater Infrastructure Design and Management (18)
5. Natural Resources and Habitat (9)
6. Watershed Education and Stewardship (5)



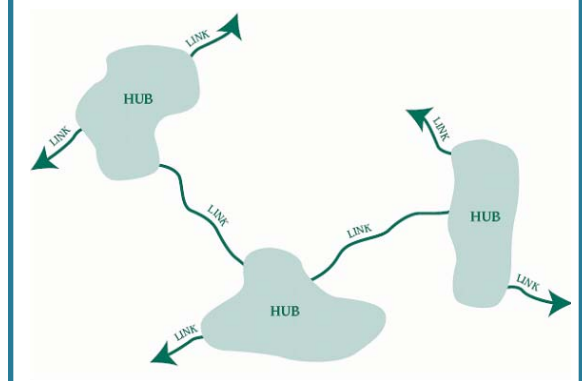
Watershed planning is a participatory process with watershed stakeholders.

Due to the similarity and proximity of the Duck Creek & Rock River Ravines watersheds, these results were combined with those of the Rock River Ravines watershed as the foundation for developing the following watershed management goals, which are further detailed in Chapter 2:

- Goal A:** Improve coordination and decision-making between public, private, and non-profit stakeholders to implement the watershed plan recommendations and improve watershed resources.
- Goal B:** Improve water quality in streams by reducing pollutants in stormwater runoff and addressing modified hydrology.
- Goal C:** Restore and manage the stream system to preserve and enhance stream and riparian health, function, and conveyance.
- Goal D:** Plan, design, install, and retrofit stormwater management infrastructure with best management practices to reduce runoff rate and volume, improve water quality, restore watershed hydrology, and stabilize the stream systems.
- Goal E:** Preserve, restore, and enhance a green infrastructure network of terrestrial and aquatic natural resources including streams, riparian corridors, wetlands, and upland resources.
- Goal F:** Watershed residents, students, and communities have adequate knowledge, skills, resources, motivation, and stewardship opportunities to take action on implementing the watershed plan.

Green infrastructure: On the local scale, municipal or neighborhood, green infrastructure consists of site-specific best management practices (such as naturalized detention facilities, vegetated swales, porous pavements, rain gardens and green roofs) that are designed to maintain natural hydrologic functions by absorbing and infiltrating precipitation where it falls.

On the regional scale, green infrastructure consists of the interconnected network of open spaces and natural areas (such as forested areas, floodplains and wetlands, greenways, parks and forest preserves) that mitigate stormwater runoff, naturally recharge aquifers, improve water quality while providing recreational opportunities and wildlife habitat.



Conservation design: A method for developing land that conserves the green infrastructure elements of a site while providing for development at full density on the remainder of the site. Conservation design typically includes the use of stormwater management measures that filter and infiltrate runoff on site.



executive summary

WATERSHED INVENTORY AND ASSESSMENT

Chapter 3 of this plan is an assessment of watershed conditions based on data, studies, and inventories, and the preparation of a series of watershed maps. The assessment included stream corridor conditions, stormwater infrastructure, flooding, water quality, land use, wetlands, and other relevant data and information. This information serves as baseline data for comparison with future watershed assessments. The most important conclusions based on this watershed assessment are summarized here.

1. The Duck Creek system exhibits rapid increases and decreases in water flow, level and velocity, which reduces water quality, reduces the quality of stream habitat, and destabilizes the stream channel, causing erosion of streambanks and damage to stormwater infrastructure.
2. Streambank erosion occurs along many reaches and requires immediate attention. Stormwater discharge points should be examined and repaired or remediated to reduce their impact on streambank erosion.
3. Water quality is impacted primarily by sediment, bacterial contamination, chlorides, high phosphorous concentrations, and other typical urban watershed non-point source pollutants.
4. Preserving and restoring the watershed green infrastructure system, including the floodplain, is critical for improving water quality and other watershed resources. Natural area restoration measures include controlling invasive species, thinning the forest canopy, and restoring natural hydrology.
5. The stream channel and riparian corridor require preservation and restoration to a natural condition. Proper management of this corridor includes halting yard waste and debris dumping and restoring a wide buffer of native vegetation.
6. The municipalities, residents, businesses, landowners, and other organizations and agencies within the watershed lack the coordination, communication, and development standards necessary to improve watershed resources.

WATERSHED BEST MANAGEMENT PRACTICE TOOLBOX

Chapter 4 of the watershed plan includes a description of best management practices and policies that can improve watershed resources. Included in this toolbox are actions that can be taken by residents, landowners, business owners, agencies, and municipalities to prevent conditions from worsening and to improve existing impaired conditions. Best management practices described in the toolbox include:

- Stabilize eroding streambanks using deep-rooted vegetation and other environmentally-friendly measures.
- Use conservation design principles for new development and retrofitting existing development with improved stormwater best management practices.
- Install vegetated swales, raingardens, and filter strips, to help slow, filter, infiltrate, cool, and cleanse stormwater before being discharged to our streams and wetlands.
- Preserve and restore green infrastructure including open space, stream corridors, wetlands, and natural areas.



Best Management Practices on residential lots may include rain barrels, rain gardens, and native landscape systems.

WATERSHED ACTION PLAN

The effectiveness of the Duck Creek watershed plan will be largely dependent on the implementation of the action plan in Chapter 5. The action plan provides the “who, what, where and when” for making watershed improvements and includes general and site-specific recommendations. The site-specific action items are tied to a particular location in the watershed or along the stream corridor, and include details such as area, length, cost, responsibility, schedule, and priority.

Correcting watershed hydrology to reduce the volume and rate of stormwater runoff is a critical key to addressing watershed problems and improving watershed resources. Restoring a more natural watershed hydrology can help address the root of these problems without significant investment of limited funding and resources. In addition to correcting watershed hydrology, the seven most important recommendations are summarized as follows:

1. Use better stormwater management, conservation design, and low impact development practices for new and existing development that slows, filters, infiltrates, cools, and cleanses stormwater runoff. This includes source controls and lot level best management practices such as vegetated swales, naturalized detention basins, rain gardens, stream buffers, and filter strips.
2. Restore and manage stream corridors by restoring native riparian buffers, reducing the density of trees, and stabilizing streambanks to reduce erosion, protect property and infrastructure, improve water quality, and improve habitat.



An eroding stream channel before (left) and after restoration (right).

3. Manage, retrofit, and stabilize the stormwater management system including detention basins and culverts, with focused attention on stormwater discharge points (pipes and ditches), to reduce runoff rate and volume and to improve water quality.
4. Preserve and restore green infrastructure and natural areas to provide natural surface water storage areas, provide space for installing best management practices, and preserve an ecologically functioning network of open space, wetlands, streams, and natural areas as part of an interconnected system.
5. Modify and use planning and development standards, policies, and capital improvement plans and budgets to protect and enhance water quality.
6. Provide public education and outreach to enhance understanding and appreciation of watershed resources and problems, to provide solutions, and to provide opportunities for people to get involved in watershed improvement activities.
7. Monitor and evaluate watershed plan implementation and physical watershed conditions to gauge progress towards watershed goals.



Monitoring is an important part of improving watershed resources.

MONITORING AND EVALUATION PLAN

A monitoring and evaluation plan was developed to provide a means of measuring progress towards watershed goals and plan implementation. This plan should be used by watershed plan stakeholders and other implementers to monitor watershed resources and to track whether meaningful progress is being made towards plan goals. The monitoring plan includes details such as the frequency of monitoring, short, medium, and long term milestones, responsible party, and mode of collection.

THE FUTURE OF THE WATERSHED DEPENDS ON ALL OF US

This plan has limited usefulness without the dedication and commitment of watershed stakeholders to the improvement, restoration, management, and stewardship of watershed resources. As the primary land use, development, and infrastructure authorities in the watershed, municipal and county officials and staff have a significant amount of the responsibility for plan implementation. County, state, and federal agencies also have a significant role in watershed plan implementation, by approving and supporting projects with funding, and by providing technical information, tools, and resources to assist local authorities and watershed organizations in their efforts. Watershed residents and landowners must also accept responsibility for managing their own land and water resources, for identifying watershed problems and opportunities, and for working with others to implement this plan.

All of these people and organizations will need to work together to successfully protect and restore the Duck Creek watershed, to ensure long-term watershed stewardship, and to share the responsibilities, costs, and benefits of watershed improvements. Plan implementation will also depend on a watershed organization to oversee, guide, coordinate and monitor watershed activities on behalf of the stakeholders. This organization typically forms as an outgrowth of the Watershed Planning Committee with support coming from a variety of state and local agencies as well as local land use authorities and decision makers. This is the

primary mechanism for the general public to be involved in watershed activities, to support the implementation of the watershed plan, and to voice their concerns and celebrate their successes in restoring watershed resources.

ECONOMIC BENEFITS OF WATERSHED RESOURCES

Improving watershed resources and implementing the recommendations contained within this plan will result in economic benefits to watershed residents, communities and the Quad Cities region as a whole. Though some of these benefits are difficult to quantify, there are numerous studies underway to assign value to environmental services. For example, reducing the flow of sediment to the Mississippi River would reduce the frequency of dredging required to keep shipping lanes open. Improving stream habitat and water quality can improve conditions for fishermen and wildlife watching, which are two significant economic drivers. Improving water quality can also reduce the treatment costs for communities that draw drinking water from the Mississippi River. And the preservation of natural and open space near neighborhoods and commercial areas can increase property values and improve marketability of homes and businesses. Economic development is an ongoing challenge in regions such as the Quad Cities, and environmental improvement is one of many tools that can help drive growth.

THIS PLAN IS A BLUEPRINT

The Duck Creek Watershed Plan provides specific guidance for addressing impacts and for preserving and enhancing the valuable resources of the watershed. It provides a source of information and recommendations for municipalities, developers, residents, county and state agencies, and others to effectively plan and conduct land use and other activities in a way that is appropriate for protecting watershed resources. It provides guidance for comprehensive planning, development standards, green infrastructure preservation, natural resource restoration, land management, and water quality improvement, with an overall focus on water resources. It also provides indirect guidance for capital improvement planning and budgeting.

acknowledgments

River Action secured the funding and provided project oversight and management. The dedication and support of the Quad Cities Watershed Planning Committee and other watershed stakeholders in the planning process made development of this plan possible. The Butterworth Center & Deere-Wiman House in Moline and the Scott County Administrative Center in Davenport graciously hosted our planning committee meetings. Conservation Design Forum and Quad Cities Geographic Information Systems assisted with data collection and plan preparation. Funding for the Watershed Plan was made available through a variety of funding sources including grants to River Action from the McKnight Foundation, Scott County Regional Authority, Moline Foundation, American Water, Cargill, and Twin States, as well as local matching funds from foundations, city, and county governments, businesses and individuals.

Contributors to the watershed plan included representatives from both the Duck Creek and Rock River Ravines watersheds:

Watershed Planning Committee

Moline Foundation

Joy Boruff
Linda Martin

Illinois

Rock Island Soil and Water
Joe Gates, District Conservationist
Mark Jackson, Project Coordinator for the USDA/
Interstate RCD
Marilyn Address, Resource Conservationist

Rock Island County Forest Preserve
Jeff Craver, Forest Preserve District Director

Rock Island County
James E. Bohnsack, County Board Chairman
Ray Ness, Director of Zoning and Building Department

City of Rock Island
Bob Hawes, Assistant City Manager/Public Works Director
Andrea Johnson, Public Works
Randy Heggen, Public Works

City of Moline
Erica Williams, Public Works
Jeff Anderson, City Planner

East Moline
Donald Mayhew, Public Works

Village of Carbon Cliff
Dawn Tubbs, Public Works

City of Silvis
Jim Grafton, Public Works

Bi-State Regional Commission
Gena McCollough

Iowa

Natural Resources and Conservation Service
Paul Viner, District Conservationist

Partners of Scott County Watershed
Amy Johannsen, Coordinator

Scott County Soil and Water Conservation District
Josh Spies, Duck Creek Agricultural Coordinator

Soil and Water Conservation District Commission
Chad Dexter, Commissioner

City of Bettendorf
Patty Copeland, Public Works Coordinator

City of Davenport
Brian Schmidt, Public Works

Scott County
Tim Huey, Scott County Economic Development Director
Roger Kean, Director of Conservation

Federal
U.S. Fish and Wildlife Service
Kraig McPeck
Heidi Woeber

U.S. Army Corps of Engineers
Dorene Bollman

Major Stakeholders/Corporate
Trinity Medical Center
Sheri Devrieze

John Deere
Nick Bond, Environmental Professional

City Officials

Dick Van Raes, City of East Moline
Jeff Anderson, City of Moline
Chris Mathias, City of Moline
Stu Smith, City of Bettendorf
Ann Corbi, Davenport Mayor's Office
Don Welvaert, Mayor of Moline
Scott Koops, City of Davenport
John Thodos, Mayor of East Moline

Local Businesses

John Mital, Missman Stanley Engineering
Mike Harnung, Missman Stanley Engineering
Matt Schramm, Natural Resources Consulting
Bill Mollison, Ament Engineering
Amber Address, Pizzo Associates
Tracy Tuftee, Preston Engineering
Fred Oelschlaeger, Cargill

Local Organizations / Individuals

River Action
Kathy Wine
Clare Kerofsky
Jeff Cornelius
Michelle O'Hara

GIS Technician
Joseph Miller

Media
Tom Saul

K.J. Rebarcak, Scott Community College

Tracy Kurowski, Congressman Bruce Braley

Kriss Wells, Quad City Progressive Action

Don Swensson, Quad City Conservation Alliance

Rich Landis, Sustainable Ecological Economic Development

Doug Riel, Rock River Valley Association

Joel Devrieze, Rock River Valley Association

Larry Thompson, IOWATER Volunteer Monitoring and Scott County Soil and Water Conservation District

Lynette Siegley, Iowa Department of Natural Resources

Molly Regan, Scott County Soil and Water Conservation District

Steve Johnson, U.S. Army Corps of Engineers

Concerned Citizens and Landowners

Greg Gackle
Mary E. Deheve
William D. Stoffhann
Rick Bohling
Lois and Jim Kuehling
Dorothy Monahan
Marsha Johnson
David and Julie Olerbroeckling
Paul Kewley
John Kealey
Robert Petersen
Art and Dixie Norris
Gary and Mary Kerofsky
Jim King
David and Susan Foss
Mike Carberry
Ken Klindt
Poulson Brothers
Steve South



© Conservation Design Forum

DUCK CREEK WATERSHED PLAN

PLANNING TEAM

River Action
Kathy Wine
Clare Kerofsky

Conservation Design Forum
Jason Navota
Tom Price
Ryan Wilson
Jason Cooper

OCGIS
Joseph Miller

table of contents

EXECUTIVE SUMMARY		i
TABLE OF CONTENTS		xiii
INTRODUCTION	1.	1
THE DUCK CREEK WATERSHED	1.1	
ABOUT THIS WATERSHED PLAN	1.2	
USING THIS PLAN	1.3	
GOALS AND OBJECTIVES	2.	15
WATERSHED ISSUES AND OPPORTUNITIES	2.1	
GOALS AND OBJECTIVES	2.2	
WATERSHED INVENTORY AND ANALYSIS	3.	23
INTRODUCTION	3.01	
WATERSHED SETTING	3.02	
CLIMATE AND PRECIPITATION	3.03	
GEOLOGY AND TOPOGRAPHY	3.04	
SOILS	3.05	
WATERSHED JURISDICTIONS	3.06	
LAND USE	3.07	
GREEN INFRASTRUCTURE AND NATURAL AREAS	3.08	
STREAM INVENTORY	3.09	
WETLANDS	3.10	
FLOODPLAIN	3.11	
TRANSPORTATION NETWORK	3.12	
SUBWATERSHED MANAGEMENT UNITS	3.13	
WATER QUALITY	3.14	
SUMMARY AND CONCLUSIONS	3.15	

WATERSHED BEST MANAGMENT PRACTICES TOOLBOX	4.	83
PRIORITIZED ACTION PLAN	5.	117
IMPLEMENTATION PARTNERS	5.1	
GENERAL RECOMMENDATIONS	5.2	
SITE SPECIFIC ACTION PLAN	5.3	
AWARENESS AND EDUCATION STRATEGY	5.4	
PLAN IMPLEMENTATION	6.	171
PLAN IMPLEMENTATION STRATEGY	6.1	
IMPAIRMENT REDUCTION TARGETS AND PROJECTIONS	6.2	
PLAN IMPLEMENTATION COST ESTIMATE AND SCHEDULE	6.3	
PLAN IMPLEMENTATION TABLES	6.4	
PLAN MONITORING AND EVALUATION	6.5	
WATERSHED RESOURCES	7.	225
APPENDICES		
STREAM INVENTORY PHOTOGRAPHS	A	
EXPANDED WATERSHED BEST MANAGEMENT PRACTICE TOOLBOX	B	
MODEL CODES AND RESOURCES	C	



DUCK CREEK WATERSHED PLAN

Prepared for:
Quad Cities Watershed Planning Committee

Prepared by:
Conservation Design Forum

