

Managing Iowa Stormwater for Quantity and Quality

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August 2007

The Iowa Policy Project

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The Iowa Policy Project

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Introduction

Water and our natural resources have defined Iowa since its earliest days. Indeed, our forefathers acknowledged these “blessings hitherto enjoyed” in the 1857 Constitution, and used them to describe the state’s boundaries, a course of rivers and land that begins and ends in its southeast corner, in the middle of the main channel of the Mississippi River. These self-described “grateful” Iowans lived in a state that for many years showed a vastly different use of its natural treasures than it does now. By 1900 Iowa’s population had grown to 2,231,853¹ with those residents pretty evenly distributed among Iowa’s 99 counties. In 2006 Iowa’s population stood at 2,982,085². While the population had not changed drastically since 1900, it made a huge shift from farm to city. During this shift, growing cities and their abundance of concrete and asphalt have replaced woodlands, wetlands and fertile Iowa farm ground.

Urban Stormwater History

Historically most rainfall in Iowa was absorbed by the surrounding landscape, only becoming runoff during large storms after the soil became saturated. The hydrological function and natural water cycle of many watersheds was drastically altered as native ecosystems were replaced with streets, rooftops, driveways, sidewalks, parking lots and suburban lawns that struggle to grow on compacted sub-soil concealed by a builder’s sod.

A typical urban block generates nine times more runoff than a woodland area of the same size due to impervious surfaces such as rooftops and parking lots.

Source: epa.gov/owow/NPS/facts/point7.htm

These landscape changes prevent the infiltration of rainwater and shorten the time it takes for runoff to move across the landscape into receiving waters such as creeks, streams, rivers, lakes and wetlands.

Engineers refer to this as the “time of concentration.” There are many benefits to a longer time of concentration, one of which is the filtration of the various pollutants found in stormwater runoff. Urbanization has increased the variety and amount of pollutants transported to receiving waters via the storm drain system.

Within a matter of minutes after the onset of a hot summer’s rain, 184 trout swimming in McLoud Run, Iowa’s only urban trout stream, had died from an extreme change in water temperature. The cool-natural spring feeding McLoud Run couldn’t keep up with the sheer volume of steaming hot stormwater runoff flowing off roofs, driveways, streets, parking lots into the stream.

Source: Iowa Department of Natural Resources. 2007. McLoud Run Total Maximum Daily Load.

Hot stormwater runoff, or thermal pollution, is one of many pollutants that harm Iowa’s water quality. Typical urban pollutants include sediment from unprotected soil during construction; oil, grease, toxic chemicals and heavy metals from automobiles and manufacturing facilities; nutrients

¹ The Twentieth Century Peerless Atlas. The Crowell Publishing Company. Springfield OH 1903

² <http://quickfacts.census.gov/qfd/states/19000.html>

and pesticides from turf management and gardening; viruses and bacteria from failing septic systems; and road salt and sand used to keep roads clear of ice. Sediments and trash are the largest volume of pollution sent to receiving waters from urban areas. In older parts of many cities, polluted runoff is often released directly into the closest water body without any treatment. A myriad of problems are caused by water pollution, including contaminated drinking water, fish kills and adverse effects on outdoor activities such as fishing, swimming or just wading in local creeks.

A wake-up call for urban water quality problems came from a federal government report that studied 2,300 storms in 28 major metropolitan areas between 1977 and 1983. Titled the National Urban Runoff Program (NURP), it monitored and measured the types of urban pollutants found in stormwater runoff and revealed that most pollutants are washed off impervious surfaces during a one-inch or less rain called the “first flush.” Ninety percent of the annual precipitation in Iowa (33-inch average) comes as a one-inch or less rain, therefore 90 percent of all Iowa storms could be considered first-flush events. NURP data led to a 1987 amendment to the Clean Water Act that established regulations for polluted stormwater runoff.

The Clean Water Act

The U.S. Clean Water Act is the federal law that regulates the discharge of pollutants into the nation’s surface waters, including lakes, rivers, streams and wetlands. Passed in 1972 and amended in 1977 and 1987, the Clean Water Act is administered by the U.S. Environmental Protection Agency (EPA). Prior to the 1987 amendment, the Clean Water Act (CWA) primarily regulated point-source pollution, such as discharges from wastewater/sewage treatment plants. Regulating point-source pollution was somewhat successful.

The new focus to clean our nation’s waters became nonpoint-source pollution, which is difficult to prevent. That is because, unlike point-source pollution, it is difficult to identify origins of the pollution. The 1987 amendments to the CWA established a comprehensive national program focusing on non-agricultural sources of nonpoint-source pollution, the primary source being polluted stormwater runoff from urban areas. To address this, Congress expanded the scope of the National Pollutant Discharge Elimination System (NPDES), which regulates the discharge of pollutants into U.S. waters.

Phase I Permitting — 1990

Phase I of the stormwater permit program addressed sources of stormwater runoff that had the greatest potential to harm water quality. Under Phase I, EPA required permit coverage for the following dischargers of stormwater:



Above, sediment-laden runoff leaving a new housing subdivision, June 2007. Below, the same runoff flows quickly into a local creek.

Photos: Stacie Johnson

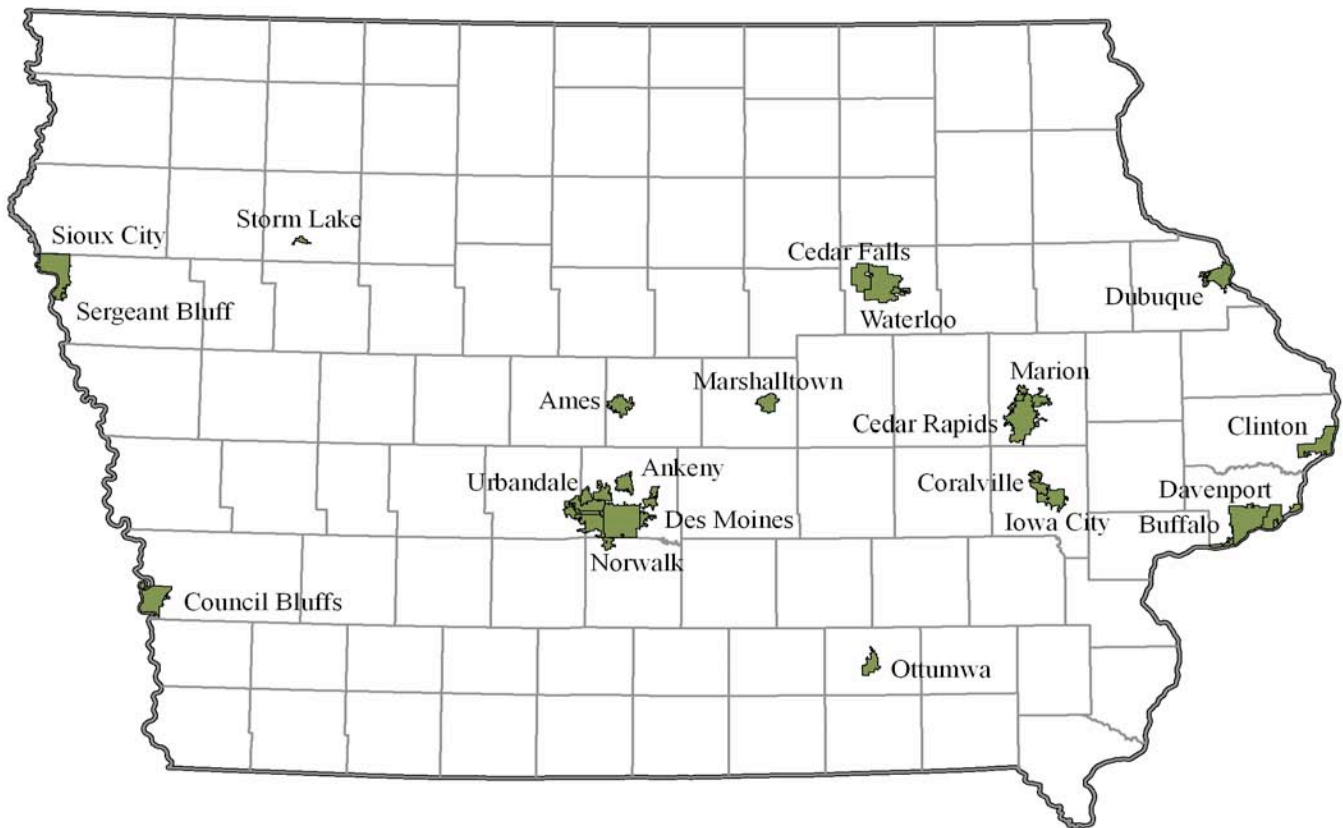


- Medium and large municipal separate storm sewer systems (MS4s) with populations of 100,000 or more (only the cities of Cedar Rapids and Des Moines in Iowa, required MS4 permits).
- Companies in one of 11 categories of industrial activity, and construction activity disturbing five or more acres of land, required one of three permits, General Permit No. 1, 2 or 3.

Phase II Permitting — 1999

Phase II regulations were signed into law in 1999. Permits were now required for smaller urbanized areas, generally cities or a combination of several neighboring areas with populations of 50,000 or more, and for construction sites disturbing one acre or more (previously five acres). In 2003, as a result of Phase II regulations, 41 additional communities and three state universities became regulated entities under Iowa’s stormwater permit program, bringing the total to 46 permitted entities.

Permitted Cities and Universities in Iowa
 (Cities and universities not labeled on map are in list below)



Altoona	Clinton	Hiawatha	Panorama Park	U. of Northern Iowa
Ames	Clive	Iowa City	Pleasant Hill	Urbandale
Ankeny	Coralville	Iowa State University	Raymond	Waterloo
Asbury	Council Bluffs	Johnston	Riverdale	Waukee
Bettendorf	Davenport	Le Claire	Robins	West Des Moines
Bondurant	Des Moines	Marion	Sergeant Bluff	Windsor Heights
Buffalo	Dubuque	Marshalltown	Sioux City	
Carter Lake	Elk Run Heights	North Liberty	Storm Lake	
Cedar Falls	Evansdale	Norwalk	University Heights	
Cedar Rapids	Grimes	Ottumwa	University of Iowa	

Active Stormwater Permits in Iowa (March 2007)

NPDES Permit Type	Authorized Activity	Issued
MS4	Cities and institutions with municipal separate storm sewer systems (MS4s)	46
GP #1	Industrial / commercial activities	1,914
GP #2	Construction activities disturbing 1 acre or more	4,801
GP #3	Asphalt plants, concrete batch plants, rock crushing plants, construction sand & gravel facilities	506

Permit Requirements

All stormwater permit holders must submit a Notice of Intent to discharge to waters of the state to the Department of Natural Resources and develop and follow a Stormwater Management/Pollution Prevention Plan. The plan is a living document that states how harmful pollutants will be prevented from being carried away by stormwater runoff into receiving waters by addressing minimum control measures. The type of stormwater permit determines which minimum control measures must be addressed as part of the plan.

Minimum Control Measure	MS4s	GP #1	GP #2	GP #3
1) <i>Public education and outreach.</i> This measure encourages an informed and knowledgeable community, which is crucial to the success of a stormwater management program.	X			
2) <i>Public participation and involvement.</i> This measure encourages public input and assistance in developing and implementing a municipal stormwater management program.	X			
3) <i>Illicit discharge detection and elimination.</i> This measure addresses non-stormwater discharges to the MS4 by eliminating illicit connections and addressing illegal dumping to the storm sewer system.	X			
4) <i>Construction site runoff control.</i> This measure requires cities to reduce pollutants in stormwater runoff from construction activities that result in a land disturbance of one acre or more.	X		X	X
5) <i>Post construction runoff control.</i> This measure attempts to minimize water quality impacts once construction is complete; this includes new development, redevelopment, and retrofitting established / built-up areas in the jurisdiction.	X	X	Only within jurisdictional boundaries of an MS4	X
6) <i>Pollution prevention and good housekeeping.</i> This measure requires cities to control and improve stormwater runoff generated on municipally owned properties.	X	X	X	X

Quantity vs. Quality

Traditionally, storm sewer conveyance in urban areas was designed to provide efficient drainage for the increased volume of stormwater runoff due to land development. This “out of sight, out of mind” philosophy was to drain excess water away from developed sites as fast as possible. With a few exceptions, a transition from efficient drainage to a controlled release of urban runoff through stormwater detention was made in Iowa during the 1990s. This change occurred due to problems with urban flooding, which is a quantity rather than quality issue. With detention, stormwater runoff is no longer conveyed directly to receiving waters. Instead, it is routed to a basin designed to control runoff release at a rate that mimics that of its pre-developed state, for large storms (such as five-year storms or storms with 4-inch rainfall in 24 hours). Two downsides come with this engineered approach to stormwater management, one of quantity and the other of quality. First, some argue that detention actually exacerbates flooding by only addressing the rate at which runoff is released. Since rainfall does not infiltrate, it is discharged more slowly than when it was flushed away, but not as slowly as if the rain had fallen on undeveloped green fields.

Second, detention does nothing for stormwater quality as these basins are typically designed for large storms and end up passing the “first flush” events quickly into receiving streams.

Conventional detention does little to improve water quality

Detention basins do not address the fact that runoff – while released at pre-development rates for large storms – is released over a longer period. As many detention basins are built within a given watershed, the total volume of water increases as more impervious surfaces are added by development. This in turn taxes the stability of the very stream being used to convey stormwater downstream, causing an array of problems, such as stream bank erosion and impaired water quality.

Stormwater management has matured in Iowa, and attention to water quality has grown stronger. Over 10 years have passed since Phase I, four years since the issuance of the first Phase II permits. The remainder of this paper takes a closer look at who is doing what to ensure improvement in urban water quality in Iowa. The paper will evaluate regulatory and non-regulatory measures in general and describe three excellent examples of quality improvement.

Regulatory Authorities

Four entities have regulatory authority for stormwater management in Iowa:

- The Iowa Department of Natural Resources (IDNR)
- The United States Environmental Protection Agency (EPA)
- Regulated Municipal Separate Storm Sewer Systems (MS4s)
- Soil and Water Conservation Districts (SWCD)

Iowa Department of Natural Resources

EPA delegated administrative power for the stormwater permit program to IDNR, Iowa’s state agency responsible for the environmental protection and management of natural resources. IDNR’s responsibilities associated with urban stormwater management include issuing and enforcing letters of authorization to discharge stormwater under the NPDES general permit. Department funding for operations and enforcement is generated through stormwater permit fees. The IDNR central office has one technical and one support person to receive, review, approve and issue letters of authorization for

stormwater discharges. Statewide enforcement is the responsibility of the six IDNR field offices that each dedicate one half-time employee to the task.

In addition to serving as the stormwater permitting authority, the department also manages the State Revolving Loan Fund, distributing dollars received from EPA for constructing municipal wastewater facilities and implementing nonpoint-source pollution control. In addition to these low-interest loans, IDNR administers Section 319 fund, grant money given to states, territories and Indian tribes by EPA to support a wide variety of activities related to nonpoint-source implementation projects.

U.S. Environmental Protection Agency

EPA oversees the national stormwater permit program, which includes administrative oversight of the IDNR stormwater permit program and regulatory inspections of stormwater permit holders in Iowa.

Municipal Separate Storm Sewer Systems (MS4s)

The 46 MS4s in Iowa have a dual role in stormwater management. They must comply with the minimum control measures in their stormwater permit and enforce the action of others operating in their jurisdictional boundaries as they relate to illicit discharge detection and elimination, construction site runoff control and post-construction runoff control.

The goal of the permitted cities and universities is to reduce pollutants being discharged into their storm sewer system to the “maximum extent practicable.” However, the term “maximum extent practicable” is yet to be defined by either EPA or IDNR.

Funding for MS4s’ stormwater programs is typically accomplished in one of two ways. In the first method, a stormwater utility is created to generate funding specifically for stormwater management. Residents and businesses alike pay a stormwater utility fee, typically based on their impervious surface area. The revenue supports maintenance and upgrade of existing storm drain systems, development of drainage plans, flood control measures, water-quality programs, and construction of major capital improvements. The second option used by other MS4s is to use general funds/property tax revenue.

Following are two case studies highlighting Iowa MS4s that are making good strides in meeting their NPDES permit requirements.



**Case Study I
ILLICIT DISCHARGE
DETECTION AND ELIMINATION (IDDE)**

Not all polluted runoff into the storm drain system results from rain. Studies have shown that dry-weather discharges from the storm-drain system may contribute a larger annual discharge amount for some pollutants than wet weather stormwater flows.

Dry weather discharges vary and may include:

- Biological pollutants from sewage coming from leaking sanitary sewer pipes and failing septic systems.
- Phosphorus pollution from washwater flows generated from fleet washing, commercial laundry facilities and shop floor drains.
- Chemical pollutants from dumping of oil and paint down the storm drain system. Landscape irrigation, when sprayed onto driveways, sidewalks and streets wash away pollutants such as oil drips and car brake dust that settle on those surfaces.

Not all polluted runoff into the storm drain system results from rain.

PURPOSE TO PARTNER

When faced with National Pollutant Discharge Elimination System (NPDES) Phase II regulations, four Polk County communities, Clive, Urbandale, West Des Moines and Waukee formed a cohesive working group to address the six minimum control measures as required in their NPDES permit. As a result of the working group’s activities, Clive adopted an ordinance prohibiting illicit discharges from entering the public storm drain system in October 2005. The ordinance allows the city to conduct inspections on private property and set forth penalties for noncompliance. West Des Moines designed a training manual and Clive made a few changes to make this training manual its “own.” The IDDE Program Manual includes a map of the storm drain system, a schedule of inspections of the storm drain system, illicit discharge management procedures, and program evaluation that is used as a comprehensive training tool and field document for municipal employees.

Odor, color and cloudiness as well as suds and sheen floating on the runoff itself are all indicators of suspicious substances that need further investigation.

SUSPICIOUS SUBSTANCES

Immediately following training, a public works employee discovered an illicit discharge and subsequently a variety of discharges were discovered. These discharges range from grease to gasoline. Unbeknownst to a restaurant owner, employees were dumping grease down a storm drain rather than disposing of it the grease dumpster. A carpet cleaner found it easier to empty his dirty water tank into the storm drain rather than a sanitary sewer. And a gas station stormwater detention basin failed, causing a plume of diesel fuel-laden water to reach the local creek.

The success of this program can be credited to a combination of four elements a well-written ordinance, a comprehensive operations manual and competently trained workers who understand what they are looking for as well as an organized protocol to follow when an illicit discharge is discovered.

Community:	Clive, Iowa, in partnership with West Des Moines, Urbandale, and Waukee, Iowa
Lead Agency:	Public Works Department
NPDES MS4:	Yes
Population:	14,125
Staff:	1 dedicated; however, it is the responsibility of all city employees
Budget:	\$315,000 for NPDES Phase II program
Contact Information	
Bart Weller Public Works Director bweller@cityofclive.com	
Doug Ollendike Community Development Director dollendike@cityofclive.com	

Public works employees have really embraced the importance of stormwater management and water quality protection through the training we provided them.

Bart Weller
Public Works Director



Case Study II CONSTRUCTION SITE RUNOFF CONTROL

Sources of pollution from unprotected construction sites are numerous. The biggest concern is accumulated sediment from soil erosion and its resulting silt build-up in streams, lakes, rivers, wetlands and even detention/retention basins. In Iowa, the No. 1 pollutant, by volume, is sediment. A major source of sediment comes from unprotected construction sites in urban areas under development. Typical sediment rates leaving construction sites without erosion and sediment control practices vary from 100 to 200 tons per acre per year and can be up to 1,100 tons per acre per year.

The No. 1 source of water pollution in Iowa, by volume, is sediment.

CAUSE OF SEDIMENT

There are two main reasons construction activities increase sediment loads in stormwater runoff. First, vegetation and topsoil are removed, leaving bare sub-soil that is vulnerable to erosion. Second, soil compaction during construction typically increases the amount (volume) and speed (rate) of runoff, allowing sediment to be quickly carried away from streets to storm drains and eventually into neighborhood streams.

Most construction site runoff control plans capture sediment rather than prevent erosion.

MODEL ORDINANCE

The City of Bettendorf added an erosion and sediment control (ESC) article to its subdivision ordinance in May 2005 to control construction site runoff. The article requires developers disturbing one or more acres of land to file and apply to IDNR for authorization to discharge stormwater, apply for an application for a local Construction Site Erosion and Sediment Control (COSESCO) permit and submit \$50 before a building permit is issued.

EDUCATION AND ENFORCEMENT

Once the erosion and sediment control article was adopted, officials met with local homebuilders to explain expectations for construction site runoff control and consequences of non-compliance. Bettendorf retained an inspection and enforcement consultant to work with contractors to encourage compliance rather than taking a heavy-handed approach to enforcement. As a result, only two contractors have been fined, none beyond a first offense. However, multiple stop-work orders have been issued as required by the COSESCO permit.

Several lessons learned would improve this program. One is to provide an exemption for building projects such as new garages, sheds, decks and fences. These projects currently need a Construction Site Erosion and Sediment Control (COSESCO) permit. Guidelines should be clearly defined for the stormwater pollution prevention plan. Permits should not be open-ended – they should include an expiration date. There are several enforcement issues that can arise: 1) when a builder wants to build on a one acre or less (the COSESCO permit is required on one acre or more); 2) if the home buyer wants to do his/her own landscaping for the property after a certificate of occupancy is issued. By city ordinance the new homeowner could become a co-permittee, but ultimately the builder is responsible if the work isn't done, leaving the builder in a bad situation.

Community:	Bettendorf, Iowa
Lead Agency:	Public Works Department
NPDES MS4:	Yes
Population:	32,000
Annual Permits:	140 per year avg since May 2005
Staff:	1 FTE supported by a stormwater utility
Budget:	Total program budget - \$515,000 COSESCO budget - \$160,000

Contact Information

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Public Works Director
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Patricia Copeland
Public Works Coordinator
pcopeland@bettendorf.org

“We have made great strides in educating developers and builders to understand the differences between controlling erosion versus sediment and encourage them to emphasize the former rather than the latter.”

Wally Mook
Public Works Director

Soil and Water Conservation Districts

SWCDs are a unique part of state government created in 1939 when the Iowa Legislature encouraged the organization of local and voluntary soil conservation districts by farmers to ensure full local control for district affairs. Each of Iowa's 99 counties has a local district office with the exception of Pottawattamie, which has two.

Each SWCD is governed by five volunteer commissioners elected at large in each county who identify resource protection needs, and coordinate and apply federal and state resources to soil conservation and water quality efforts. Districts typically work through a Memorandum of Agreement with their respective county and its municipalities. Districts have the power to investigate soil loss complaints, issue administrative orders for their correction, and, if the administrative order is ignored, petition the district court for an order demanding immediate compliance.

The only funding districts receive is a yearly allocation of Resource Enhancement and Protection (REAP) and the Iowa Financial Incentive Program (IFIP) funds (both funds combined amount to about \$50,000 per year for Linn County) to distribute to local landowners for conservation practices on a first-come, first-serve basis. Any other education and outreach projects outside the scope of REAP/IFIP is the responsibility of district commissioners to fund through outside sources, which is an ongoing struggle for most districts. The districts do receive \$2,000-2,500 annually from the Legislature for basic operation, which typically only covers a portion of the actual expenses incurred.

In addition to the regulatory side of urban stormwater management there are a multitude of agencies and organizations in Iowa who are committed to improved water quality. The following entities conduct education, provide technical assistance, do community outreach, install best-management practice demonstrations and conduct strategic planning for polluted stormwater runoff control.

Non-Regulatory Assistance

Non-regulatory assistance organizations fall into one of four categories:

- Government Agencies
- Non-Government Organizations
- Non-Profit Agencies
- Educational Institutions

Government Agencies

United States Department of Agriculture, Natural Resource Conservation Service (NRCS)

While rooted in agricultural assistance, Iowa's central NRCS office in Des Moines has supported a full-time urban conservationist since 1997. This person has been instrumental in introducing the concepts of



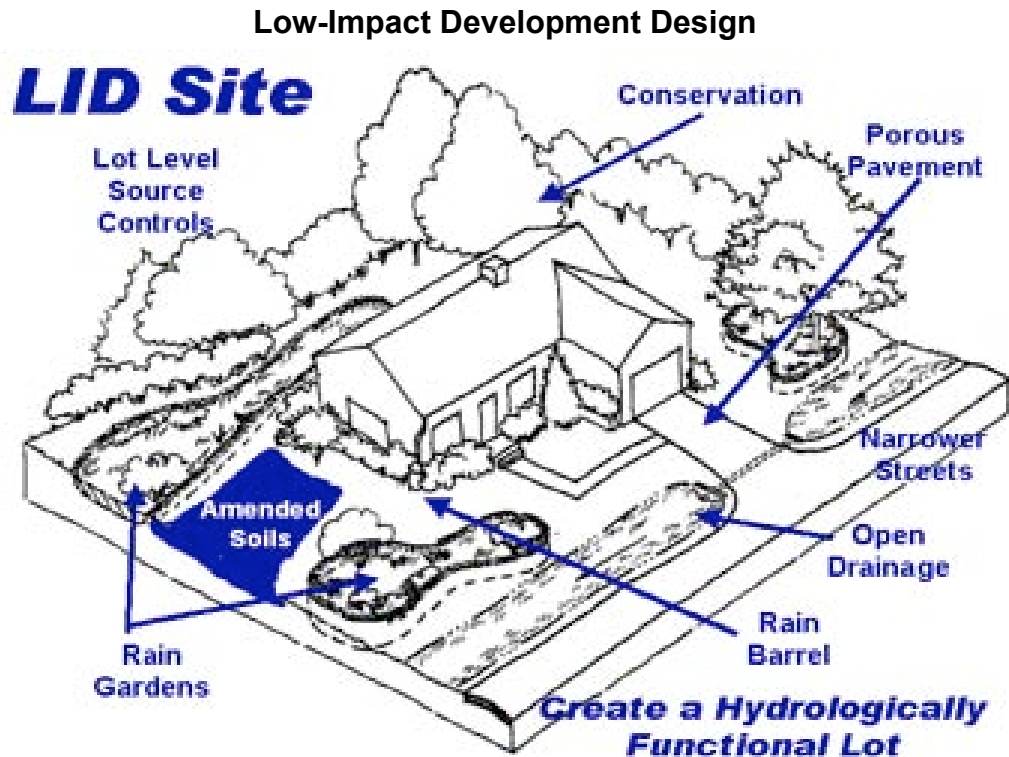
Urban stream ravaged by urban runoff.



As with any problem, fixing rather than preventing is costly.
Photos: EnviroTrax

low-impact development and infiltration-based stormwater management and has provided invaluable technical assistance to numerous groups in Iowa communities related to urban stormwater quality issues.

The NRCS has also been instrumental in developing and distributing printed materials that assist all those involved with stormwater/water quality issues with education and outreach. The most significant publications to date include Conservation Strategies for Growing Communities and a series of fact sheets on low-impact development.



Soil and Water Conservation Districts

In addition to the enforcement powers given to districts under the Iowa Code, SWCDs can also provide valuable resources on urban conservation issues to Iowa communities that must address stormwater issues. Not all SWCDs are as active as others in urban conservation since stormwater-permitted entities are concentrated in 16 of Iowa's 99 counties. Of all 100 district offices, 11 currently have an urban outreach component – Black Hawk, Dickinson, Dubuque, Johnson, Linn, West Pottawattamie, Scott and URBAN (Urban Resources & Borderline Alliance Network), which is a collective effort organized through a 28-E agreement among Polk, Dallas, Marion and Story counties.

Originally organized to address construction site runoff control, URBAN has expanded upon its original intent of becoming the lead agency in its four-county service area for technical assistance on stormwater management and land-use planning.

The Dickinson County SWCD led efforts to encourage the first ordinance requiring on-site management of runoff generated from a 1.25-inch storm. This commitment to water quality serves as proof that the “first flush” rain event can be controlled in all permitted cities and universities throughout Iowa. The following case study describes a model program with great potential to be replicated throughout Iowa.



Case Study III
POST-CONSTRUCTION RUNOFF CONTROL

The Iowa Great Lakes region covers Dickinson County, Iowa, and Jackson County, Minnesota, and consists of 10 glacial lakes covering 16,000 acres of a 90,000-acre watershed. Iowa’s Great Lakes provide drinking water, recreation and aesthetic enjoyment. Six of the 10 lakes are linked to the communities’ source of drinking water for 17,000 residents and nearly a million tourists each year. In 2002, tourism brought an estimated \$139 million dollars into the local economy.

Good water quality is vital to the region’s economy and enhances residents’ quality of life.

HISTORY OF WATER QUALITY PROTECTION

Water quality has been a priority in the region for over 100 years through the work of the Okoboji Protective Association. Additionally, in 1990 the Dickinson County Soil and Water Conservation District (SWCD) formed the Dickinson County Clean Water Alliance (CWA) to coordinate efforts of over 60 government agencies, non-profit organizations and private businesses to improve and protect their water resources. The primary focus of this collaboration was agriculture’s impacts on water quality until several years ago when the group began to include urban impacts.

Prior to 2006, the modus operandi for urban stormwater management in Iowa’s Great Lakes was “take it to the lake.”

BEGINNING STORMWATER EDUCATION & DEMONSTRATION

The Department of Natural Resources (IDNR) awarded the Dickinson SWCD a Section 319 grant for \$43,720 to conduct nine workshops on urban stormwater runoff and effects on Iowa Great Lakes water quality. The workshops were designed to gradually build awareness and comfort levels among developers and the public for the Low Impact Development (LID) concept, in which proven best-management practices are used to capture and control the “first flush” of stormwater runoff. Following the workshops, a second IDNR Section 319 grant for \$160,000 allowed for numerous high-profile/visible demonstration projects throughout Dickinson County, including rain gardens, bio-swales and a pervious pavement parking lot. These funds were leveraged with about \$200,000 in special taxes levied each year by member communities of the Dickinson County Water Quality Commission. The most recent funding received by the SWCD was a Watershed Improvement Review Board grant for \$480,000 to install LID practices within specified watersheds within the county.

OKOBOJI’S POST-CONSTRUCTION ORDINANCE: A FIRST OF ITS KIND IN IOWA

As a result of the SWCD and CWA efforts, the City of Okoboji, one of the seven Great Lakes communities, amended its zoning and subdivision ordinance in April 2006 to advocate LID provisions that promote on-site control of a 1.25-inch rainfall. In April 2009 the recommended LID provisions become mandatory. This small community has established a path for moving from the “take it to the lake” status quo to one in which individual responsibility for urban stormwater *quantity* management will improve and protect the *quality* of water in Iowa.

A convergence happened to establish Low Impact Development (LID) as the new “norm.” Elected officials and municipal staff have approved its use, property owners are demanding it, developers and builders are listening to their customer demands and engineers and landscape architects are positioning themselves as experts in the community on how to best incorporate low-impact development into new construction plans.

Community:	Iowa Great Lakes (Arnolds Park, West Okoboji, Okoboji, Wahpeton, Orleans, Spirit Lake, Milford and Dickinson County)
Lead Agency:	Dickinson County SWCD in partnership with Clean Water Alliance and Source Water Assessment Team
NPDES MS4:	No
Budget:	\$0 – lacks long-term permanent funding
Population:	Nearly 17,000 residents and 1 million tourists annually
Staff:	1 FTE funded through private-public partnership
Contact Information	
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Coordination, communication and education have been the foundation of our Iowa Great Lakes protection program.

Steve Anderson
Director, Clean Water Alliance

Iowa Department of Transportation (IDOT)

The Iowa Department of Transportation works to balance the needs of the natural and human environment with that of mobility and safety needs of the public. While this government agency doesn't provide direct technical assistance to the public, it does make decisions on a daily basis and provide technical assistance and direction to cities, towns and counties that receive state and federal transportation dollars. Two initiatives have a direct impact on water quality. The first, Context Sensitive Solutions, is a Federal Highway Administration program that provides guiding principles on how transportation-related projects can be designed and built in an environmentally sensitive manner.

The second initiative is a combination of the Living Roadways Trust Fund at IDOT and the Integrated Roadside Vegetation Management Program at the University of Northern Iowa. The bulk of funding received to support these two programs is an allocation of road use tax funds and the IDNR's Resource Enhancement and Protection (REAP) program. The two programs work together to educate, demonstrate and re-vegetate roadsides with native "prairie" for beautification as well as long-term erosion control and stormwater infiltration.

Non-Governmental Organizations (NGOs)

During the last several years, three particular Iowa NGOs have played an important role in shaping stormwater management policy and developing stormwater management resource materials that are being used on a statewide basis:

- Iowa Association of Municipal Utilities
- Iowa Stormwater Partnership
- Iowa Stormwater Education Program

Iowa Association of Municipal Utilities (IAMU)

With initial funding from the IDNR, IAMU has become the primary resource for Phase II implementation by providing statewide leadership to communities and community members affected by stormwater regulations. IAMU organizes informational workshops for MS4s and those who service MS4s, as well as cross-functional workgroups that have developed NPDES policy implementation guidance. IAMU also organizes the statewide stormwater conference each year.

Iowa Stormwater Partnership (ISP)

The ISP is a direct result of the groundwork conducted by the Statewide Urban Design and Specification (SUDAS) Corporation and IAMU. Partners besides IAMU and SUDAS include IDNR, Iowa Natural Resource Conservation Service (NRCS), Iowa Department of Transportation, URBAN, Iowa Department of Agriculture and Land Stewardship, University of Iowa, Iowa State University, and the Iowa Stormwater Education Program. Its mission is to improve Iowa water quality by promoting methods, design guidelines, standard specifications, educational activities and research and demonstration projects for the purpose of reducing stormwater pollutants in Iowa's receiving waters.

Iowa Stormwater Education Program (ISWEP)

ISWEP, managed by IAMU, is a member-driven organization. As of March 2007, 31 of the 46 MS4 communities had joined the program. Its mission is to provide educational resources and guidance to member communities about stormwater management. ISWEP members meet quarterly to collect an education and outreach toolbox that focuses on a specific stormwater management topic, and to discuss urban stormwater management issues. ISWEP also provides training and outreach throughout the year.

Nonprofit Organizations

Many nonprofit organizations are involved with stormwater management. Some work on a statewide

basis, such as the Iowa Natural Heritage Foundation (INHF), while others operate at a local level. Specific nonprofit work ranges from “big picture” issues, such as Trees Forever’s Our Woodland Legacy program that focuses on sustainable land use planning and urban growth, to individual best-management practices that property owners can adopt to improve water quality. Following are examples of two nonprofit programs working on individual best-management practices: River Action in the Quad Cities and Iowa Heartland Resource Conservation and Development (RC&D) in Des Moines. With its Retain the Rain™ program, established in early 2000, River Action took an early lead in stormwater management issues. Educational efforts have included rain barrels, rain gardens, bio-swales, native plantings and green roofs. River Action’s efforts to educate and demonstrate post-construction practices is finally beginning to take on a life of its own as evident in the City of Davenport’s decision to “green” the roof of its new police station this summer.

Iowa Heartland RC&D is a relative newcomer to stormwater management work. With funding from the NRCS, demonstration projects of various stormwater best-management practices have been installed throughout central Iowa. Iowa Heartland RC&D has one full-time employee dedicated to erosion and sediment control issues and recently received Watershed Improvement Review Board funding to reduce and improve urban stormwater runoff in the Saylor Creek watershed in Ankeny.



Example of a rain garden.

Photo: Pat Sauer

Educational Institutions

All three state universities and one private college are involved with stormwater management and are beginning to establish their areas of expertise that could potentially assist those affected by NPDES regulations throughout Iowa. Contributions to stormwater management by each educational institution are highlighted below:

- The University of Iowa’s area of expertise is in construction site runoff control in partnership with the Iowa Highway Research Board and the Department of Transportation.
- Iowa State University’s area of expertise is in both construction site runoff and post-construction runoff control. In coordination with the Iowa Stormwater Partnership and funding from the IDNR, ISU updated both the Erosion and Sediment Control manual and Statewide Urban Design and Specifications standards as well as developed the new Iowa Stormwater Management Manual, which can be found on the Center for Transportation Research and Education website.
- The University of Northern Iowa’s area of expertise is post-construction runoff control with a specific focus on pesticide reduction through its Yards for Kids program, as well as assisting small business with stormwater/environmental issues through the Iowa Waste Reduction Center.
- Coe College in Cedar Rapids has been instrumental in long-term urban water quality monitoring, specifically as it relates to drinking water safety.

Limiting Factor to NGO Success

Voluntary action has improved water quality throughout the state. The limiting factor of all these efforts is sustainable funding. Very few funding opportunities exist for non-regulatory education and outreach, technical assistance, demonstrations and monitoring for urban stormwater management in Iowa.

SWCDs, nongovernment organizations and nonprofit agencies are especially vulnerable when it comes to sustainable funding for projects that are not “project” or watershed driven. Current sources of funding for non-regulatory efforts are covered in the following section.

Funding Sources

Iowa Department of Natural Resources — Federal 319 Dollars

Historically, federal 319 grant dollars allocated to IDNR have been dedicated to water quality projects with an agricultural focus and are awarded in coordination with Water Protection Funds (WPF) and Watershed Protection Program Funds (WSPF) administered by the Iowa Department of Agriculture and Land Stewardship – Division of Soil Conservation. With few exceptions, these funds are most commonly applied for and received by local SWCD offices for projects developed in partnership with the Natural Resource Conservation Service. Watershed projects typically last three years, and extensions are sometimes granted. Utilization of these funds for urban stormwater management has been minimal, as evident in the following table of projects funded in the last five years.

Year	Rural Projects	Rural Projects w/ State Lakes	Rural Projects w/ Urban Element	State Programs*	Urban Projects
2002	67%	0%	0%	31%	3%
2003	49%	0%	9%	34%	7%
2004	53%	8%	0%	31%	7%
2005	40%	19%	2%	37%	2%
2006	46%	7%	11%	36%	0%
5 Yr Avg.	51%	7%	4%	34%	4%

*Program staff and \$50,000 for Fish & Wildlife restoration

Watershed Improvement Review Board (WIRB)

In 2005 the Iowa Legislature established the WIRB, which is administered by the Iowa Department of Agriculture and Land Stewardship – Division of Soil Conservation. The Legislature makes annual appropriations to the Watershed Improvement Fund from which the WIRB awards competitive grants. Eligible applicants for these watershed improvement grants include local watershed improvement committees, soil and water conservation districts, public water supply utilities, cities and county conservation boards. In 2005, six of 17 WIRB-funded projects had an urban stormwater component. In 2006, three of the 16 projects funded by WIRB had an urban stormwater component or focus.

State Revolving Fund (SRF)

The SRF, while not a grant program, recently set aside funding for nonpoint-source pollution projects through low-interest loans. These loans are made to private organizations, individuals and cities through participating lenders. The Iowa Department of Agricultural and Land Stewardship administers the program and participating lenders loan the funds. Over \$6 million has been loaned to nonpoint-source pollution

SRF dollars helped INHF purchase 3,500 feet of shoreline located in Anglers Bay, along Big Spirit Lake. The site’s shoreline contains the last major bulrush bed in Iowa’s Great Lakes, providing both scenic beauty and a critical “nursery” for numerous fish and wildlife species. INHF plans to transfer the property to the IDNR for public use.

projects throughout Iowa; \$5 million of it went to the previously mentioned INHF for the purchase and preservation of Iowa Great Lake shoreline property, preventing it from being sold for development purposes.

Recommendations

The majority of Iowans live in urban areas. Therefore, the typical Iowan's impact on water quality is a byproduct of his or her urban lifestyle. Urban Iowans' impacts include the lawn chemicals, sand, salt, sediment, trash, oil, grease, pet waste and other pollutants that are picked up by precipitation running off their roofs, driveways, yards and sidewalks. These pollutants are carried into storm drains and delivered to streams with little or no treatment. All Iowans can improve the state's water quality by managing the rain that falls on their property and encouraging community leaders to address the issue as well.

Despite the fact that action can be taken, the state and most local governments have historically only managed stormwater quantity. While flood control should continue to be a priority, attention must also be given to stormwater quality management.

Policy strategies for Iowa to improve the quality of its stormwater runoff should come in two areas: leadership by example and leadership that actively encourages better practices through funding, all to provide education and technical assistance, to practice implementation and enable enforcement. Changes such as the following would help property owners, developers and local government officials improve stormwater quality management.

Increase the State's Leadership

- ***Use best practices in state-assisted projects***

The state should demonstrate its commitment to water quality by requiring construction on state properties as well as construction of any facilities that receive state funding to use stormwater quality best management practices and retain at least the first inch of rain that falls on the property. This requirement would signal the state is serious about stormwater quality and result in a variety of demonstration projects that could serve as examples for potential adoption by community officials and developers.

- ***Help MS4-permitted communities reach established goals***

MS4 communities affected by federal Phase I and II requirements must protect water quality to the "maximum extent practical." However, the term *maximum extent practical* is not defined. This fact poses an interpretive challenge for MS4 communities in meeting their permit requirements. Some cities are beginning to develop effective programs while others believe they lack the necessary guidance.

The state should set goals and provide community leaders with guidance on what is expected of them under the "maximum extent practical" requirements. The information is available in the draft of the Iowa Stormwater Management Manual currently being reviewed by SUDAS members. The state could also help communities define how rainfall should be managed using stormwater best management practices.

Two Iowa communities have already established infiltration goals for new development, providing models for other communities and the state. The City of Okoboji adopted an ordinance that required all new development use infiltration practices to manage runoff from a 1.25-inch or less rainfall on the property.

Additionally the cities of Cedar Rapids, Marion, Robins and Hiawatha in Linn County require new development to detain the first inch of a rainfall on the property for 24 hours. Although they must detain the rain, infiltration is not required; new developments can detain and release. However, these cities also developed an infiltration policy that provides credits for the use of infiltration against the quantity of water to be managed. The state could help other communities to follow these examples.

- **Enforce requirements of stormwater permits**

As previously mentioned, three parties are responsible for enforcing stormwater permits; two of which are located in the state. In addition to the EPA, the IDNR is responsible for enforcement of construction site permits throughout the state. Likewise, MS4 communities are responsible for enforcing the stormwater-quality requirements on construction sites within their jurisdiction.

The state should provide leadership by adequately enforcing the requirements of stormwater permits, thus demonstrating the level of enforcement it expects of MS4 communities. By taking a stronger and more visible enforcement role, the state would raise the importance of protecting water quality and encourage the private sector to take responsibility for its water-quality impacts.

Use Funding for Stormwater Quality Management

Three state entities in particular could lead by example and use funding for stormwater quality projects: the Iowa Department of Natural Resources (IDNR), Soil and Water Conservation Districts (SWCDs) and the Iowa Department of Transportation (IDOT).

Iowa Department of Natural Resources

As stated earlier, IDNR is responsible for issuing permits, Notices of Intent, enforcing federal NPDES permit requirements and providing funding for urban water quality projects. IDNR has limited funding and staff officially dedicated to stormwater quality management. Therefore, it cannot offer much technical or enforcement support to the communities and developers that must meet NPDES permit requirements. However, the agency has access to funding that could be used for outreach, technical assistance and financial incentives for better stormwater quality management.

- **Dedicate stormwater permit fees to stormwater issues**

IDNR collects money from stormwater permit fees. Not all of the revenue is directed to stormwater issues; some is used to fund other DNR programs. If these funds instead stayed in the stormwater program, the state could play a stronger role in stormwater management to go toward education and outreach, and enforcement.

- **Continue efforts to fund urban stormwater projects**

IDNR recently changed the rules of the Clean Water Revolving Loan Fund to include funding for up to \$10 million in urban stormwater practices. At the same time, the agency made \$170,000 in federal assistance available for competitive grants for these practices. The loans and grants are for implementing stormwater practices on new developments and retrofitting developed areas. By redirecting this funding, several major demonstration projects will be accomplished without new federal or state appropriations. The IDNR should continue to make funding available for these purposes.

- **Fund pollution prevention in urban areas**

IDNR could also use money from federal Safe Drinking Water Act grants for pollution prevention in

urban areas. These funds could be used in several Iowa cities where the source of the drinking water is a stream or aquifer that has been impaired for fecal bacteria or pathogens. Using this money to prevent pollution and protect Iowans' drinking water is obviously important because the impaired segments of streams are often found in urban areas. IDNR has the potential to increase drinking water protection efforts by \$1.5 million annually using federal grants.

- ***Allow more access to funds in MS4-permitted communities***

IDNR could also change its current practice and allow MS4 communities greater access to 319 money for water protection. Currently, MS4 communities are not given 319 funding for practices that are required under their NPDES permits. IDNR should allow cities to receive 319 funding for stormwater quality management practices that go above and beyond stormwater permit requirements. Projects such as stream restorations are extremely expensive and require partners and funding from numerous sources. Cities in Iowa do not have all of the funds necessary to pay for such projects. If IDNR wants to see more effort in this type of restoration and other expensive watershed improvements, they will need to help provide funding support.

Soil and Water Conservation Districts

Some SWCDs provide leadership on urban conservation practices; however, they do not have a sustainable funding source or permanent staff employed for this purpose.

- ***Hire urban conservation specialists***

The state could use existing funding from the Water Protection Fund to hire several urban conservation specialists. As previously mentioned, staff dedicated to stormwater quality issues could assist landowners with individual projects and help MS4 communities become model communities for stormwater quality management.

- ***Allow use of REAP funds for urban projects***

Currently 20 percent of Iowa's Resource Enhancement and Protection (REAP) Program funding is dedicated to soil and water enhancement. However, the existing rules prevent this money from being spent on urban conservation; the rules only allow spending for practices on agricultural land. The rules should be changed to allow this money to be spent by urban and rural landowners on stormwater practices that are consistent with REAP. SWCDs could use this money as a match for other funding to provide technical assistance and install local demonstration projects.

The Department of Transportation

Although not responsible for providing public services for stormwater, the DOT could do more to design roads with stormwater quality impacts in mind by adopting the Federal Highway Administration's Context Sensitive Solution Design procedures.

- ***Use environmental protection funds for the environment***

Iowans currently pay an environmental protection charge of one penny for every gallon of gasoline they purchase. This money was intended to be used to correct the damage done by underground gasoline storage tanks and for other water quality improvements. However, \$4 million is put in the DOT managed Road Use Fund and not for providing water quality benefits. The Governor should promote the use of this funding for water quality protection as intended.

By taking these steps to become a leader and redirecting funding within these agencies, the state could demonstrate its commitment to water quality by significantly reducing the negative impacts of stormwater. Those agencies are not alone, however. The following entities also have significant

opportunities and means to lead by example in using funding for stormwater quality management and deserve special mention in this paper: Iowa's Regent institutions and the Iowa Finance Authority (IFA). All three state universities are MS4s and are required to address post-construction runoff control as part of their stormwater permit, and all dedicate millions of dollars toward campus improvements and new building projects each year. IFA funnels millions of dollars via the bonding process for new development projects throughout the state each year.

Conclusion

The primary substances polluting Iowa's waters are sediment, nutrients and bacteria. The majority of these pollutants come from farmland, because the majority of Iowa's land (88 percent) is used for farming. However, these substances also come from urban areas. Along with asking Iowa's farmers to be better environmental stewards, Iowa needs to ask its cities and urban residents to address their contribution to water pollution. By managing Iowa's stormwater for both quantity and quality, Iowa will help all citizens, urban and rural, be aware of their impacts and their responsibilities to improve the state's water.

Appendices

A. NPDES Regulated Industrial Activities – (General Permit #1)

The following list describes the type of entity subject to stormwater regulations.

- Facilities subject to stormwater effluent limitation guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR subchapter N except facilities with toxic pollutant effluent standards which are exempted under category (10) of this definition.
- Facilities classified as:
 - a. SIC 24 Lumber and wood products except Furniture (except 2434)
 - b. SIC 26 Paper and Allied Products (except 265 and 267)
 - c. SIC 28 Chemicals and Allied Products (except 283 and 285)
 - d. SIC 29 Petroleum Refining and Related Industries
 - e. SIC 311 Leather Tanning and Finishing
 - f. SIC 32 Stone, Clay, Glass and Concrete Products (except 323)
 - g. SIC 33 Primary Metal Industries
 - h. SIC 3441 Fabricated Structural Metal Products
 - i. SIC 373 Ship and Boat Building and Repairing
- Facilities classified as SIC 10 through 14 (mineral industry) including active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come in contact with, any overburden, raw material, intermediate products, finished products, by products or waste products located on the site of such operations.
 - a. SIC 10 Metal Mining
 - b. SIC 13 Oil and Gas Extraction
 - c. SIC 12 Coal Mining
 - d. SIC 14 Mining and Quarrying of Nonmetallic Minerals, fuels
- Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under subtitle C of RCRA.
- Landfills, land application sites, and open dumps that receive or have received any industrial wastes (wastes from any of the facilities described under this definition including those that are subject to regulation under subtitle D of RCRA.
- Facilities involved in the recycling of materials which are classified as:
 - a. SIC 5015 Motor Vehicle Parts, Used - or -
 - b. SIC 5093 Scrap and Waste Materials
- Steam electric power generating facilities, including coal handling sites.
- The portion of transportation facilities that are either involved with vehicle maintenance, equipment cleaning operations, or airport deicing operations, or which are otherwise identified as industrial activities in other sections of this definition.
 - a. SIC 40 Railroad Transportation

- b. SIC 41 Local and Suburban Transit and Interurban Highway Passenger Transportation
 - c. SIC 42 Motor Freight Transportation and Warehousing (except 4221-4225)
 - d. SIC 43 U.S. Postal Service
 - e. SIC 44 Water Transportation
 - f. SIC 45 Transportation by Air
 - g. SIC 5171 Petroleum Bulk Stations and Terminals
- Treatment works treating domestic sewage or other sewage sludge with a design flow of 1.0 MGD or more, or required to have an approved treatment program under 40 CFR Part 403.
 - Construction activity including cleaning, grading and excavation activities except operations that result in the disturbance of less than one acre of total land area which are not part of a larger common plan or development or sale. (General Permit #2)
 - Facilities where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, byproducts or industrial machinery are exposed to storm water.
 - a. SIC 20 Food and Kindred Products
 - b. SIC 21 Tobacco Products
 - c. SIC 22 Textile Mill Products
 - d. SIC 23 Apparel and Other Finished Products Made From Fabrics and Similar Materials
 - e. SIC 2434 Wood Kitchen Cabinets
 - f. SIC 25 Furniture and Fixtures
 - g. SIC 265 Paperboard Containers and Boxes
 - h. SIC 267 Converted Paper Except Containers and Boxes
 - i. SIC 27 Printing, Publishing and Allied Industries
 - j. SIC 283 Drugs SIC 285 Paint, Varnishes, Lacquers, Enamels, and Allied Products
 - k. SIC 30 Rubber and Miscellaneous Plastic Products
 - l. SIC 323 Glass Products, Made from Purchased Glass
 - m. SIC 34 Fabricated Metal Products, Except Machinery and Transportation Equipment (except 3441)
 - n. SIC 35 Industrial and Commercial Machinery and Computer Equipment
 - o. SIC 31 Leather and Leather Products (except 311)
 - p. SIC 36 Electronic and Other Electrical Equipment and Components, Except Computer Equipment
 - q. SIC 37 Transportation Equipment (except 373)
 - r. SIC 38 Measuring, Analyzing, and Controlling Instruments; Photographic, Medial and Optical Goods; Watches and Clocks
 - s. SIC 39 Miscellaneous Manufacturing Industries
 - t. SIC 4221 Farm Product Warehousing and Storage
 - u. SIC 4222 Refrigerated Warehousing and Storage
 - v. SIC 4225 General Warehousing and Storage

B. The Roles of Agencies and Organizations Involved in Stormwater Management

	Regulatory Authority	Regulatory Compliance	Technical Assistance	Program Funding	Research & Recommendations	Education & Outreach
Environmental Protection Agency, Region 7	X					
Iowa Department of Natural Resources	X			X		
Municipal Separate Storm Sewer Systems (MS4s)	X	X				X
Soil & Water Conservation Districts	X		X			X
Iowa Natural Resource Conservation Service			X			
Watershed Improvement Review Board				X		
Iowa Regent Universities / Private Colleges			X		X	X
Iowa Association of Municipal Utilities			X			X
Iowa Stormwater Education Program			X			X
Iowa Stormwater Partnership					X	X
Center for Transportation Research & Education			X			
Non-profit Organizations			X			X
Private Sector		X				

C. Online Resources

Context Sensitive Solutions	http://www.contextsensitivesolutions.org
Dickinson County Clean Water Alliance	http://www.cleanwateralliance.net/
Growing Green Communities	http://www.growinggreencommunities.com
Iowa Association of Municipal Utilities	www.iamu.org
Iowa Department of Natural Resources 319 State Revolving Fund Stormwater Waste Management	http://www.iowadnr.com/water/nonpoint/app.html http://www.iowadnr.com/water/srf/onsite.html http://www.iowadnr.com/water/stormwater/index.html http://www.iowadnr.com/waste/index.html
Iowa Living Roadways Trust Fund	http://www.iowalivingroadway.com
Iowa Waste Reduction Center	http://www.iowadnr.com/waste/index.html
Iowa Natural Heritage Foundation	http://www.inhf.org/
Iowa Stormwater Education Program	www.iowastormwater.org
Iowa Stormwater Management Manual	http://www.ctre.iastate.edu/PUBS/stormwater/index.cfm
Partners of Scott County Watersheds	http://www.pscw.org/
River Action	www.riveraction.org
Soil and Water Conservation Districts	http://www.cdiowa.org/
Trees Forever	www.treesforever.org
University of Iowa	http://www.iihr.uiowa.edu/facilities/index.html
URBAN	www.iowawaterquality.org
Natural Resource Conservation Service	http://www.ia.nrcs.usda.gov/features/Backyard.html
Watershed Improvement Review Board	http://www.agriculture.state.ia.us/IWIRB.htm
Yards for Kids	http://www.uni.edu/yardsforkids/