Exhibit A Executive Summary

State of Iowa

Iowa_PhaseII_ExecutiveSummary.pdf

Executive Summary: The Iowa Watershed Approach

Driving across Iowa in high summer offers a lovely vista — mile after mile of lush green rolling hills and flatlands, with tidy fields of corn and soybeans stretching toward the horizon. This beautiful landscape is home to some of the most fertile and productive land in the world, supporting an agriculture industry whose production levels are unmatched worldwide.

But Iowa's modern agriculture landscape has altered the movement of water within the state's watersheds and reduced the land's natural resiliency, which impacts peak water flows, flooding, and water quality, especially during extreme weather events. Before the first plow turned over Iowa's grassland, the tall grass prairie, with its deep root systems, stabilized the thick black topsoil. These roots held water like a sponge, slowing runoff. Today, Iowa's hydrology has been altered. Where the land once had natural resilience to storm events, the soil now erodes more easily during heavy rainfall events. As a result of landscape changes, waterways move water more quickly, which heightens flooding risks. Nutrients (nitrogen and phosphorous), too, move through the waterways, especially during flood events, unintentionally affecting water quality and drinking water supplies, recreation, tourism, and biotic diversity.

From 2011–2013, Iowa suffered eight Presidential Disaster Declarations, encompassing 73 counties and more than 70% of the state. In July 2011, more than 200 homes in Dubuque's Bee Branch neighborhood sustained severe flood damage. In 2013, hundreds of Storm Lake homes flooded. Dangerous untreated sewage backed up into homes and the nearby lake. In June 2013, two heavy rain events washed out roads across Benton County, reducing residents' access to emergency services and causing $5M in infrastructure damage; the same storm resulted in 2.5–5 *tons* of soil loss per acre in Tama County.

Devastating as these events were, 2011–2013 do not represent Iowa's worst flood years. Long-term data show that heavy precipitation and flooding events are increasing in frequency across the Midwest, and models predict this trend will continue in the future. Under these circumstances, a new paradigm for flood resilience is needed—one that decreases flood risk, improves water quality, and increases resilience. The Iowa Watershed Approach (IWA) is, at its core, a watershed-scale program based on a holistic approach recognizing that: 1) heavy precipitation and flooding events are increasing in frequency; 2) upstream activities impact downstream communities; 3) upstream and downstream communities need to voluntarily work together; 4) when possible, flooding should be addressed at its source, using science-based, reasonable, cost-effective practices; 5) improving community resilience to floods requires risk mitigation *and* community-directed initiatives and planning; and 6) program strategies must also respect, protect, and sustain Iowa's valuable agricultural economy, which provides food, fuel, and fiber for the world and sustains family incomes for many Iowans.

The State of Iowa proposes a program through which Iowans will work together to address factors that contribute to floods. This approach is consistent with other statewide programs in Iowa to reduce flooding and improve water quality, such as the Iowa Flood Mitigation Program and the Iowa Nutrient Reduction Strategy. *We will improve quality of life and health through upstream watershed investments tied to community resilience programming activities. This will result in a state-of-the-art adaptive model to make Iowa's vulnerable populations more resilient to changing flood hazard conditions, today and for the next century.*

The IWA will accomplish six specific goals: 1) reduce flood risk; 2) improve water quality; 3) increase resilience; 4) engage stakeholders through collaboration and outreach/education; 5) improve quality of life and health, especially for vulnerable populations; and 6) develop a program that is scalable and replicable throughout the Midwest and the United States.

Nine distinct watersheds representing different Iowa landforms will serve as project sites for the IWA. Each will form a Watershed Management Authority, develop a hydrologic assessment and watershed plan, and implement projects in the upper watershed to reduce the magnitude of downstream flooding and to improve water quality during and after flood events. Landowners will pay 25% of the construction cost for projects on their land, further demonstrating their commitment to land stewardship, the environment, and their downstream neighbors.

Dubuque is well into its own IWA initiative within the context of an urban watershed impacted by devastating floods (six flood-related Presidential Disaster Declarations from 1999–2011). The city's Bee Branch Creek was enclosed as a storm sewer more than a century ago. The confined system was too small, moved water too quickly, and did not filter out nutrients or allow water to infiltrate the ground. Dubuque recently daylighted the creek, returning it to a more natural state. The city now proposes an infrastructure project and the Bee Branch Healthy Homes Resiliency Program to repair flood damaged homes and make them more resilient to floods.

The IWA will also help communities prepare for, respond to, recover from, and adapt to floods. This program will assess resilience in the targeted watersheds, engage communities in discussions about their unique resilience needs, and help communities formulate and begin to act on resilience action plans. Formative and summative assessments will guide programmatic improvements, as well as monitor and encourage participation by under-represented groups.

The IWA represents a vision for Iowa's future—a future that voluntarily engages stakeholders throughout the watershed to achieve common goals, while moving toward a more resilient state. It is a replicable model for other communities where the landscape has lost its natural resilience to floods. Although the IWA targets watersheds impacted by floods from 2011–2013, the impacts will ripple downstream from Iowa to the Mississippi River to the Gulf of Mexico. This program is not only about Iowans helping Iowans, but also about demonstrating Iowans' commitment to agricultural stewardship, to the environment, to their neighbors, and to the future.

Exhibit B Threshold Requirement

State of Iowa

Iowa_PhaseII_Threshold.pdf

Threshold

The State of Iowa submits this update to MID-URN Threshold for its Phase 2 application. This is Iowa's only application to this program. The Phase 1 MID-URN threshold submission for infrastructure and environmental unmet recovery needs are still current. The Iowa Watershed Approach will include Eligible Activities to address our unmet recovery needs including: Housing Rehabilitation 105(a) (4) [see Project #1: Bee Branch Healthy Homes Resiliency Program, with activities to make homes more resilient to flooding]; Public Facilities and Improvements 105(a)(2) [see Projects #2-10: Watershed Projects and Infrastructure Projects, with activities to improve natural and community resilience to flooding]; and Planning and Capacity Building 105 (a)(12) [see Program 2, Community Resilience Programming, as incorporated into Projects #1-10, with public engagement programs designed to improve local community resilience to flooding]. These Eligible Activities are also scoped to accomplish the National Objectives of L/M Income Housing (LMH), L/M Income, Area Benefit (LMA) and Urgent Need (UN). These Eligible Activities and National Objectives are described fully in relation to the program service areas in the Soundness of Approach. The first 6 sub-county areas are additions to the MID-URN Threshold area from Phase 1. After many stakeholder engagement meetings, additional impacts and unmet recovery needs are documented. The methodology to determine most impacted and distressed sub-county areas by environmental degradation is supported by experts from the Natural Resources Conservation Service of the USDA and the Department of Agronomy at Iowa State University. See Phase 1 Iowa Environmental Degradation Determination Methodology. These eligible areas within our identified target watersheds are now included in the Phase 2 Iowa Watershed Approach.

Watersheds Projects

The target area identified as most impacted and distressed is **Fremont County**, Census Tract 9701 Block Groups 1 and 2 as a result of DR-1998 that occurred in 2011. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-1998. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-1998 Most Impacted data for maps and supporting analysis documentation This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the East Nishnabotna River - Fourmile Creek, Fisher Creek, Ledgewood Creek and Mill Creek; West Nishnabotna Spring Valley Creek, Deer Creek, Honey Creek, Lower Walnut Creek, Hunter Branch, Outlet Walnut Creek, Camp Creek, and Spring Branch-West Nishnabotna River watershed. The impairment was increased through the events that occurred in disaster DR-1998, magnifying existing problems in the watershed, and downstream of this sub-county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

The target area identified as most impacted and distressed is **Iowa County**, Census Tract 9601 - Block Groups 1, and 3; as a result of DR-4119 that occurred in 2013. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-4119. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-4119 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the Clear Creek - Upper Clear Creek and Middle Clear Creek; English River - Jordan Creek, Deep River, Middle English River, Middle South English River, Gritter Creek, Devils Run, Middle North English River, Lower North English River, Lower South English River, Outlet North English River, Deer Creek and Birch Creek watershed. The impairment was increased through the events that occurred in disaster DR-4119, magnifying existing problems in the watershed, and downstream of this sub county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

The target area identified as most impacted and distressed is **Johnson County**, Census Tract 103.01 - Block Groups 1, 2, 3 and 4; Census Tract 2 Block Groups 1-3;Census Tract 4 Block Groups 1-3 and Census Tract 23 Block Groups 1-2, and Census Tract 5 Block Groups 1-4 as a result of DR-4119 that occurred in 2013. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-4119. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-4119 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the Clear Creek - Middle Clear Creek and Lower Clear Creek watershed. The impairment was increased through the events that occurred in disaster DR-4119, magnifying existing problems in the watershed, and downstream of this sub county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

The target area identified as most impacted and distressed is **Mills County**, Census Tract 401 - Block Groups 1, 2, 3 and 4 as a result of DR-1998 that occurred in 2011. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-1998. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-1998 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the West Nishnabotna River - City of Carson, Mud Creek, Middle Silver Creek, Lower Silver Creek, Willow Slough, Farm Creek, Lower Indian Creek, Outlet Silver Creek, White Cloud, Deer Creek, Spring Valley Creek, Hunter Branch and Honey Creek watershed. The impairment was increased through the events that occurred in disaster DR-1998, magnifying existing problems in the watershed, and downstream of this sub-county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

The target area identified as most impacted and distressed is **Pocahontas County**, Census Tract 7801 - Block Groups 1, 2, 3; Census Tract 7802 - Block Group 1; Census Tract 7803 - Block Groups 1 and 3 as a result of DR-1977 that occurred in 2011. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-1977. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-1977 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the North Raccoon River - Headwaters Cedar Creek, Headwaters Little Cedar Creek, Drainage Ditch 21-Cedar Creek, Little Cedar Creek, Drainage Ditch 74-Cedar Creek, Prairie Creek, Drainage Ditch 29, Drainage Ditch 1, Upper Drainage Ditch No 9, and Drainage Ditch 37-Cedar Creek watershed. The impairment was increased through the events that occurred in disaster DR-1977, magnifying existing problems in the watershed, and downstream of this sub county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

The target area identified as most impacted and distressed is **Winneshiek County**, Census Tract 9501 - Block Groups 1, 2, 3, 4; as a result of DR-4135 that occurred in 2013. This sub-county area qualifies as impacted under Environmental Degradation. The designated sub-county area had excessive soil loss as a result of the impacts of disaster DR-4135. This soil loss resulted in increased sediment delivery to waterways in the immediate vicinity, and further downstream effects. This in turn introduced nutrients into the stream system, including nitrates and phosphorus, which would otherwise be available as nutrients required to maintain crop productivity. This adds to the Gulf of Mexico hypoxia problem, a national environmental concern. The excessive loss of topsoil during the disaster event period degraded the productive capability of the land, resulting in permanently lower crop yield potential, even with the addition of even more nutrients and other costly inputs, which places economic revitalization at risk. The reduced productive capability as a result of the loss of topsoil reduces system resilience and means that further inputs (fertilizer) will need to be introduced to help offset a portion of the degradation impacts on lost soil productivity, introducing additional economic burdens on producers in the area, and perpetuating the environmental degradation of this area and interrelated areas downstream. If another comparable event occurs, the area can expect to see accelerated loss of soil productivity, and loss of nutrients which accelerates the environmental degradation downstream. See DR-4135 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the Upper Iowa River - Bear Creek, North Bear Creek, North Canoe Creek, Canoe Creek, Freeport, Trout River, Trout Creek, Pine Creek, Cold Water Creek, Daisy Valley, Silver Creek, Martha Creek, Ten Mile Creek, Dry Run Creek and Nordness watershed. The impairment was increased through the events that occurred in disaster DR-4135, magnifying existing problems in the watershed, and downstream of this sub-county area. This watershed contains part of the sub-county area, which indicates that it is negatively affected by and also negatively affects the sub-county area.

As part of the **Threshold Update**, the following sub-counties additionally qualify under the disaster impact criteria: Environmental Degradation. They had excessive soil loss as a result of the impacts of their disaster. Their soil loss resulted in increased sediment delivery to waterways in their immediate vicinity, and further downstream effects. This in turn, introduced nutrients into the stream system, including nitrates and phosphorus (see counties above). They all have prior documented environmental distress with the presence of Category 4 or Category 5 Impaired Waters (see also prior counties). **Allamakee County**: Census Tract 9602 - Block Group 1, Block Group 2 and Block Group 3 as a result of DR-4135 that occurred in 2013. See DR-4135 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within the Upper Iowa River (Clear Creek, Waterloo Creek, Bear Creek, Paint Creek, Coon Creek, Patterson Creek, Silver Creek and French Creek watershed). **Buchanan County**: Census Tract 9506 - Block Group 1, Block Group 2, Block Group 3 and Block Group 4 as a result of DR-4135 that occurred in 2013. See DR-4135 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within in Middle Cedar River stream segments - Spring Creek, Lime Creek, Bear Creek, and McFarlane State Park; Upper Wapsipinicon River - Malone Creek, Smith Creek, Pine Creek, Winthrop-Buffalo Creek, Silver Creek-Buffalo Creek, Dry Creek, Walton Creek, Sand Creek, and Nugents Creek-Buffalo Creek. **Delaware County**, Census Tract 9504 - Block Group 3 and Block Group 4 as a result of DR-4135 that occurred in 2013. See DR-4135 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within in stream segment within the Upper Wapsipinicon River - Silver Creek-

Buffalo Creek, Nugents Creek-Buffalo Creek watershed. **Tama County**, Census Tract 2901 - Block Group 1, Block Group 2; Census Tract 2902 - Block Group 1, Block Group 2, Block Group 3; Census Tract 2903 - Block Group 1 and Block Group 2 as a result of DR-4126 that occurred in 2013. See DR-4126 Most Impacted data for maps and supporting analysis documentation. This sub-county area is an area that has prior documented environmental distress with the presence of a Category 4 or Category 5 Impaired Waters (as defined by section 303 of the Clean Water Act) stream segment within in stream segment within the Middle Cedar River - Mosquito Creek, Little Wolf Creek, Devils Run-Wolf Creek, Fourmile Creek, Twelvemile Creek, Rock Creek, Village of Reinbeck-Black Hawk Creek, Rock Creek, Deadwaters Miller Creek, Wolf Creek, Coon Creek and Rock Creek watershed.

All sub-county areas identified in this narrative above have an aggregate Unmet Recovery Need in the form of Environmental Degradation, and are the result of losses of topsoil as a direct result of eligible disaster events. Because topsoil takes generations to regenerate, the loss of this resource can be considered permanent as the needs of continued production outstrip nature's ability to replenish the soil. Utilizing a benchmark value for one potentially beneficial conservation practice program implemented to a limited degree within the state by the Iowa Department of Agriculture and Land Stewardship, it has been estimated that it would cost $69,786,201.15 to repair the damage from environmental degradation in all of these areas. For further details on the determination of this estimate, see Environmental Distress Data.

City of Dubuque / Bee Branch

Most Impacted and Distressed Threshold: The target area identified as most impacted and distressed is the City of Dubuque as a result of Severe Storms and Flooding (DR-4018) that occurred in 2011. The area is a sub-county area within Dubuque County, which was declared Major Disaster Area under the Stafford Act.

Name of Area: City of Dubuque: Dubuque exhibits Most Impacted Characteristics and Most Distressed Characteristics, which affect the ability of the area to recover from severe storms and flooding (DR-4018) that occurred in 2011, as demonstrated below:

Most Impacted Characteristics: *Housing*: Following the July 2011 storms, the City of Dubuque received reports of damage to 200+ homes concentrated in the Bee Branch Creek target area. Impacts included flooded basements, collapsed foundations, destroyed furnaces and water heaters, and other structural damages. Substantiating data includes city records of calls to pump flooded homes, as well as records of calls for volunteer assistance. See https://drive.google.com/open?id=0B4GkEW8yVGbtWXlSRlF5TFg4U2c for Dubuque records supporting the Most Impacted Characteristics criteria.

Most Distressed Characteristics: *Housing*: Census tracts 1, 4, 5, 6, and 11.02 are in the flood-prone area. Approximately 69% of the people in the flood-prone area are at less than 80% median income. Substantiating data includes percentage of low and moderate income information for Census tracts 1, 4, 5, 6, 11.02. For maps showing the most impacted area, see Phase I Attachment E, B-10 CDBG Target Areas 2014 – with Bee Branch. Dubuque routinely spends a significant portion of its CDBG resources in the area identified for disaster assistance. See https://drive.google.com/open?id=0B4GkEW8yVGbtampYV2g1NmZxd0k for Census Bureau data supporting the Most Distressed Characteristics criteria.

Unmet Recovery Needs Threshold: While Dubuque did receive earmarked CDBG Disaster Recovery funds to address the July 2011 storms, the City has Unmet Recovery Needs that have not been addressed by federal, state, or other sources, in the area(s) identified in this letter as "most impacted and distressed."

Housing: A windshield survey of the impacted Bee Branch Creek area was conducted in October and November of 2014. The windshield survey visually assessed exterior damage to housing units within the Bee Branch Watershed. The units that were inspected were identified using requests for assistance made to the City of Dubuque immediately following the 2011 floods. The preliminary windshield survey identified 22 households with remaining damage in the Bee Branch Watershed, as demonstrated in the Phase 1 application.

For the Phase 2 application, additional housing inspections were conducted August and September 2015. The goal of these inspections was to focus on the needs of those most impacted by the 2011 storms and to reach as many homeowners in the heavily affected areas as possible. To reach these homeowners, the City completed a direct-mailing effort to over 200 households that requested assistance after being inundated with water during the 2011 storms. The additional outreach resulted in a combined total of 40 identified households that remain damaged as a result of the 2011 storms. The Housing and Community Development Department's housing inspectors conducted at minimum an exterior inspection of the property, and in most cases an in-depth inspection to document damages and identify ways the properties could be made resilient to future flooding events. A list of units inspected with remaining damage can be viewed here:

https://drive.google.com/file/d/0B4GkEW8yVGbtemJ4bTU4OFJVb2s/view?pli=1

The results of the windshield survey and resiliency inspections may be viewed here:

https://drive.google.com/file/d/0B4GkEW8yVGbtQ0J1cmRMbmJUeGc/view?pli=1

The City of Dubuque's Housing Rehabilitation Inspector interviewed the owners of the surveyed properties to verify the damages were caused by the 2011 storms. Two homeowners did not own the residence at the time of the flood, the remaining owners verified the damage was related to the 2011 storms and they have been unable to make all necessary repairs due to insufficient resources from insurance.

The Iowa Economic Development Authority completed a duplicate of benefits check on 13 of the households to verify insurance and SBA assistance. These property owners confirmed damage was due to the disaster and insurance/FEMA/SBA benefits were not sufficient to complete repairs. Of the 13 households where insurance claims were verified, five received compensation for hail damage, one for personal items, and six received no compensation from insurance. No homeowners received SBA assistance and there was no FEMA individual assistance available for residents of Dubuque. The Iowa Economic Development Authority provided a letter confirming the verifications that can be viewed here: https://drive.google.com/file/d/0B4GkEW8yVGbtaS1KMG1FdWZjUTQ/view?pli=1

While many property owners made some repairs to their homes, nearly all are still at risk for infiltration during heavy rains. When repairs were made, few, if any, measures were implemented to make the homes more resilient. An integrated approach combining green infrastructure and improvements to increase health and safety of the structures is needed. The resiliency needs are identified in the housing inspections, and include: addition of sump pumps with battery back-up; installation of back-flow preventers to eliminate the risk of sewage backup; foundation repairs and water-proofing applications for basements; elevated furnaces and water heaters; and replacement of deteriorated windows/repair of window wells. The most effective efforts to increase resiliency will be achieved when improvements are made to neighboring or adjoining properties. This “neighborhood” approach to overall health, safety, and resiliency of homes will benefit residents in multiple ways. The proposed Health Homes Bee Branch Resiliency Project will increase education and outreach raising awareness of what it means to live in a watershed. The combined rehabilitation, education, and infrastructure improvements will contribute to Dubuque’s goal of preserving and rehabilitating quality, affordable housing inhabited by many of Dubuque’s low and moderate-income residents.

Access to all linked data: https://drive.google.com

User name: ResilientIowa@gmail.com Password: Hud1Iowa

Exhibit C Capacity

State of Iowa

Iowa_PhaseII_Capacity.pdf

Capacity

The Iowa Economic Development Authority is leading the State of Iowa's application to HUD's National Disaster Resilience Competition (NDRC), with three key management partners: Homeland Security and Emergency Management, the Iowa Flood Center, and the City of Dubuque. As demonstrated, these four partners have the experience and expertise to ensure the proposed Iowa Watersheds Approach is highly successful and serves as a model for the future.

a. Past Experience and Capacity of Applicant

Iowa Economic Development Authority (IEDA): IEDA has managed Iowa's Community Development Block Grant (CDBG) Program since the 1980s and has successfully administered nearly $1B in 2008 CDBG-DR funding, including the largest property buyout program in the history of the United States. Since 2011, IEDA has partnered with U. of Iowa's Iowa Flood Center and state, local, and regional partners jointly awarded $10.5M to plan, design, and implement Iowa's current CDBG-DR "Iowa Watersheds Project" (see example project below). Additional IEDA disaster recovery activities include traditional infrastructure projects, rehabilitation of nearly 600 housing units, and construction assistance for almost 5,000 new housing units in Iowa's 85 disaster-affected counties.

IEDA has disaster policies and procedures in place that are annually monitored by HUD-DR for compliance with the following: overall grant/project management, procurement of contractors and professional services, contract management, duplication of benefits, quality assurance, financial management systems drawing DR funds from the federal system, reporting to the Disaster Recovery Grant Reporting (DRGR) system, project monitoring, and other federal requirements specific to administration of CDBG-DR grants. Iowa will use the existing DR administrative structure, which includes current disaster recovery staff experienced in project management of traditional infrastructure, housing rehabilitation, and watershed projects to ensure this program's rapid launch and successful completion.

The Iowa Flood Center (IFC) of IIHR—Hydroscience & Engineering (IIHR), the University of Iowa (UI): IIHR, of which the IFC is a subprogram, is a renowned hydraulics laboratory with 95 years of expertise in river hydraulics and hydrology. Its activities encompass all aspects of the hydrologic cycle—from precipitation to surface and groundwater flow, to river processes, to water quantity and quality. IIHR manages about $20M/year in grant and contract funding. One of IIHR's hallmarks is its long history of local, national, and international partnerships.

The IFC is highly qualified to lead the scientific and technical elements of this program's watershed projects. Following the historic floods of 2008, the State of Iowa laid the groundwork for long-term disaster recovery and resilience through establishment of the IFC. Since 2009, the IFC has developed an extensive network of stream-stage sensors and rain gauges, a radar network, and other remote-sensing instruments deployed across Iowa in support of flood-related monitoring and modeling. The IFC develops detailed interactive flood inundation maps for the state's most vulnerable river communities and is working with FEMA and the Iowa Department of Natural Resources (IDNR) to recreate and improve Iowa's regulatory floodplain maps. The IFC also developed the nation's most comprehensive user-friendly, publically-accessible flood-related online platform, the Iowa Flood Information System (IFIS). Users can monitor precipitation, river and stream levels, flood warnings, and many other real-time variables in the context of their watershed (see Phase II, Soundness of Approach). All IFC activities take into consideration the impact of changing precipitation and temperature patterns in Iowa (see Phase II, Need Factor).

Example Project: The Iowa Watershed Project (2011–2016); **Primary Partners: IFC and IEDA**. IEDA incorporated a watershed resiliency program as part of its 2008 CDBG Disaster

Recovery grant. As identified in Iowa's 2008 Action Plan, the project had three components: watershed planning, watershed projects, and floodplain education. *The core of the IEDA watershed resiliency program is the Iowa Watersheds Project (IWP), which forms the foundation and serves as the model for this proposal.*

The largest component of the IWP is planning and project implementation within watersheds. In 2010, Iowa lawmakers passed legislation authorizing the creation of Watershed Management Authorities (WMAs) to improve watershed planning and to develop a more coordinated approach for flood mitigation (See Phase 2, Soundness of Approach). The IDNR worked with a consortium of local governments to establish WMAs; IEDA required frequent progress reports and created criteria to evaluate the prospective WMAs.

Formation of the WMAs was the first step of the IWP. The primary component involved working directly in the watersheds with each WMA. IEDA contracted with each WMA's lead county and provided guidance on federal procurement standards, environmental compliance, Davis-Bacon and related compliance issues, fiscal management, additional CDBG regulatory compliance, and audit responsibilities. IEDA helped each WMA's lead county hire a qualified CDBG administrator to assist with compliance. IEDA also contracted with IFC to provide technical guidance, including a detailed assessment of each watershed and assistance in selecting, siting, design, and construction of specific watershed improvements on privately owned property. IEDA worked with the lead counties to help landowners secure contracts for constructed projects.

IEDA will play a similar role as defined in the management structure for this competition. For the IWP, IEDA developed the policy and procedures for the watershed program and handled contract management with counties, IDNR, and the IFC. IEDA has staff who process draws for recipients, track fiscal compliance, evaluate project outcomes, report these outcomes to HUD via DRGR, and monitor the projects for CDBG compliance.

Under IEDA leadership, the IWP will be completed on time. Program successes to date include: all expected WMAs are formed; IFC engineers completed a hydrologic assessment for each partner watershed; researchers and stakeholders developed a plan for each watershed; projects were constructed in 2015; and monitoring instrumentation (stream-stage sensors, water-quality monitoring sensors) are in place and collecting data. The IWP is based on scientific evidence that Iowa is experiencing an increase in the frequency of high-volume precipitation events and floods (see Phase II, Need Factor). It is also based on past research experience, physically-based models, and demonstration sites that illustrate the efficacy of retaining water at multiple locations in the watershed to reduce the magnitude of downstream floods. This decreases the financial costs of flooding, reduces other flood-related risks to local community services and to individuals (water-borne disease, mental stress, injury, fatality), reduces soil erosion, and enhances environmental resilience to flooding.

Professor and IIHR Director Larry Weber, co-founder of the IFC, conceived the IWP and manages its technical elements in collaboration with IEDA and many partners. IIHR engineers with expertise in watershed processes and watershed-scale modeling conducted the watershed assessments. Key collaborators in this program include local Soil and Water Conservation Districts (SWCD), the IDNR, USDA-Natural Resources Conservation Service (NRCS), NGOs, local producers, and other local stakeholders. The partner watersheds were selected based on their applications to participate, in which they described their capacity to form a WMA and their commitment to sustainability and cooperation. Landowners and other stakeholders in each watershed made the final decisions regarding project placement and priorities. All projects are environmentally sound. Two criteria guided selection of the project sites: 1) locations with the greatest potential to reduce downstream flooding as identified by the watershed assessment and watershed plan; and 2) landowner participation. Landowners contribute a 25% cost share for projects on their land and sign a long-term project maintenance agreement. All sites were reviewed for potential cultural resources prior to project implementation or construction as appropriate.

The IWP is successful because of strong collaboration among a wide range of partners with project management skills, technical and scientific expertise, and broad experience. However, Iowa landowners and producers play a particularly important role in the IWP's success; they are eager to engage in projects that are environmentally sound and good for their land, and that improve the quality of life for Iowans.

The City of Dubuque is experienced in data analysis to mitigate and prepare for natural disasters. The city works with a multi-disciplinary team of public, private, and nonprofit partners at the state and local levels to implement large-scale infrastructure projects, create a more resilient community, and execute a community-wide disaster response and recovery.

The City of Dubuque has the necessary capacities in project and contract management, quality assurance, financial management and procurement, and internal control to quickly launch and implement major projects related to housing rehabilitation and infrastructure design and construction. The management structure defined below outlines how the Housing & Community Development (H&CD), Engineering, Sustainability & Resiliency, Neighborhood Development, Finance, Public Health, Planning Economic Development, Human Rights, Public Information, and Geographic Information Services (GIS) departments coordinate activities to ensure rapid program design and launch, continued quality control, and adequate checks and balances.

The H&CD department oversees CDBG, inspection and licensing, lead hazard control, healthy homes production, homeowner programs, rental assistance (Section 8), shelter plus care, urban revitalization, and crime-free multi-housing. H&CD staff administer programs with approximately $1.2M in federal CDBG funds each year for housing, economic development, neighborhood and public services, public facilities, and planning/administration. Engineering staff provide design, survey, and inspection services for construction projects, including bridge construction, stormwater management, and green alleys. GIS staff develop and manage the geographic information system and provide technical expertise, including the use of climate data to predict impact on infrastructure and neighborhoods. Working with NGOs, individuals, and neighborhood groups, the Human Rights Department implements programs to ensure equitable access to services and support civic engagement. The city is also involved in the Dubuque Co. Local Emergency Planning Committee and coordinates with regional entities to prepare for and respond to disasters.

Example Project: Bee Branch Watershed Flood Mitigation Project (2001–present) **Primary Partner: City of Dubuque**. Dubuque and its partners have demonstrated extensive technical capacity and community engagement and inclusiveness experience, as illustrated by the Bee Branch Watershed Flood Mitigation Project. Fifty percent of Dubuque residents live or work in the Bee Branch watershed, which encompasses historic neighborhoods and some of Dubuque's most affordable workforce housing. Buried as a storm sewer in the 1890s, Bee Branch Creek Watershed was very susceptible to flash floods.

The Bee Branch Watershed Flood Mitigation Project is a multi-phased, fiscally-responsible, and environmentally-sound program to protect at-risk neighborhoods from the regional trend toward more frequent extreme precipitation events. After severe flooding in Dubuque in 1999, especially in the Bee Branch Watershed, the city and its partners developed a Drainage Basin Master Plan to identify future vulnerabilities based on these weather patterns. Improvements associated with the Bee Branch Project are consistent with the improvements outlined in the

Drainage Basin Master Plan, which was updated in 2013. Collaborations with local stakeholders led to a shift in Dubuque's traditional disaster recovery path from urban infrastructure-centered project development to a more holistic integrated watershed systems management approach. A 16-member community advisory committee collaborated with city staff and consultants to design the pathway of the now daylighted creek, which has been returned to its natural above-ground setting. Dubuque hired a Bee Branch Communications Specialist to share information with the affected neighborhoods in a variety of formats and to gather and respond to neighborhood feedback and concerns

Dubuque has also successfully administered a HUD-funded Lead Hazard Control Program since 1997, targeted in this at-risk neighborhood. Through June 30, 2014, 413 properties were enrolled, 241 lead inspection/risk assessments conducted, and 185 properties completed and cleared. HUD has continuously rated Dubuque as high performing for meeting and/or exceeding all benchmarks and goals through the "green" designation assessed in all quarterly performance reports of both recent grant programs.

When complete, the Bee Branch Project will leverage more than $200M from federal agencies, the state, grants, private funding, stormwater utility fees, and a new State Flood Mitigation Sales Tax Increment financing program to implement green infrastructure and prevent an estimated $582M in future damage to public and private property.

<u>Homeland Security and Emergency Management (HSEMD)</u>: HSEMD has managed Iowa's Disaster Programs since the 1960s and currently oversees the daily activities of 14 open presidential disaster responses across Iowa, which include projects totaling more than $2B in Stafford and Act National Flood Insurance Act funding. HSEMD has in place policies and procedures that are annually monitored by FEMA for compliance with overall grant/project management, procurement, contract management, duplication of benefits, quality assurance,

financial management systems, project monitoring, reporting, and all other federal requirements specific to administering grants. If awarded, HSEMD will use its existing administrative structure, which includes current disaster recovery staff experienced in the project management of traditional infrastructure, property acquisitions/relocations to ensure rapid program design, implementation, and completion.

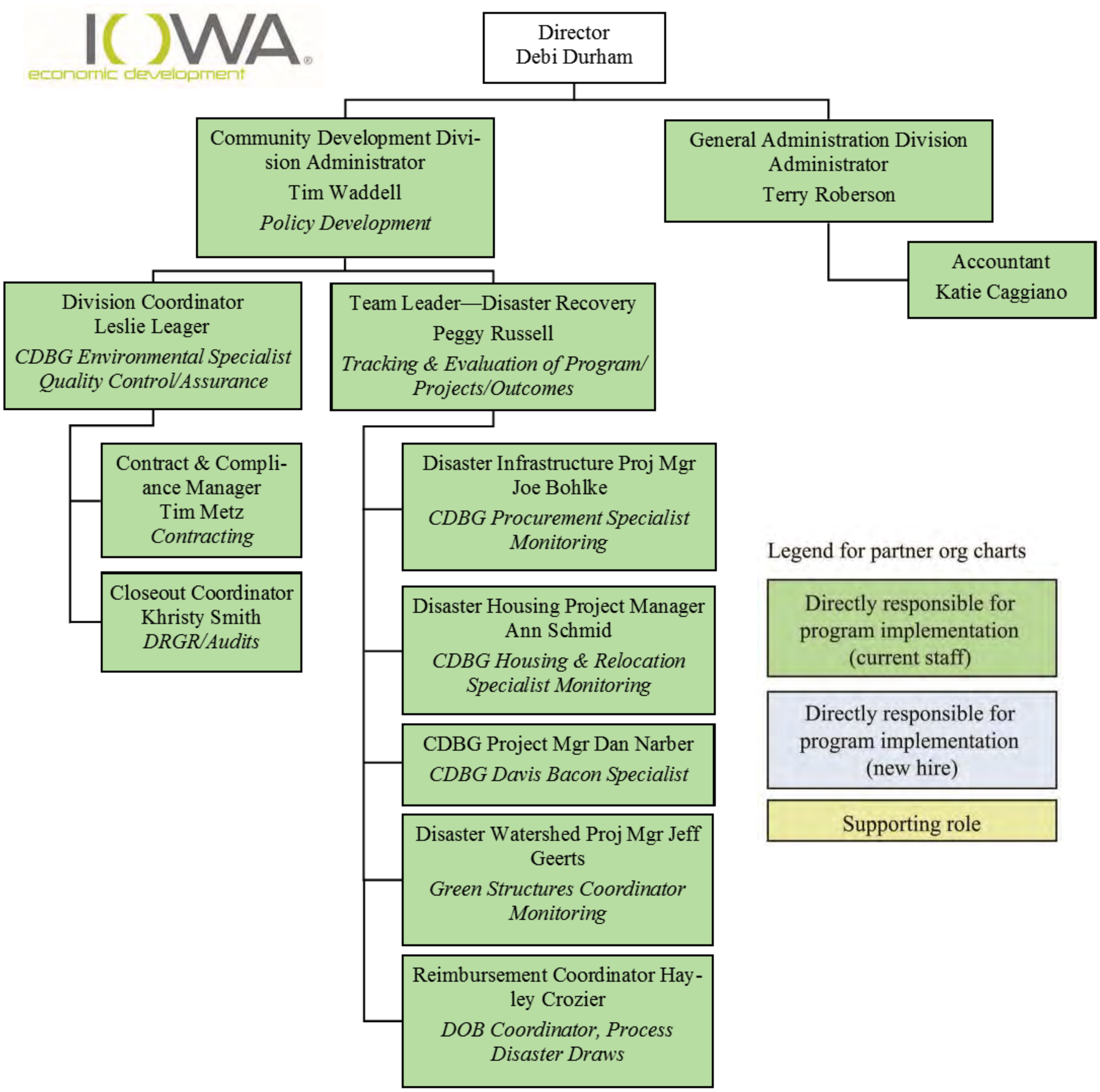
The organizational structure of the countywide emergency management commissions for response, recovery, and mitigation planning and implementation enhance HSEMD's capacity in Iowa. These commissions, made up of local leaders, provide input for the implementation of resilient recovery strategies and participate in educational and outreach opportunities for watershed-based hazard mitigation. Because disasters start locally, county emergency management coordinators and agencies play a vital role in preparation for, response to, and recovery from disasters — both natural and manmade. Local emergency management agencies are the backbone of the state's emergency management system. They provide coordination of local resources and work in partnership with HSEMD to ensure emergency management teams are well-equipped, trained, and exercised. County boards of supervisors, city councils, and county sheriffs establish a commission to carry out the provisions of Iowa law (Iowa Code, Chapter 29C). Each local commission appoints an emergency management coordinator to fulfill the commission's duties. Two or more county commissions may form a multi-county emergency management agency. HSEMD's experience and close connection with local emergency management agencies make it particularly well-suited to help lead the proposed disaster planning and technical assistance activities and the public resilience programs (See Soundness of Approach, Program 2).

<u>Example Project: City of Des Moines and WRA Flood Protection Project (2015–2035); Primary Partner: HSEMD</u>. This Iowa Flood Mitigation Program project aims to develop a flood

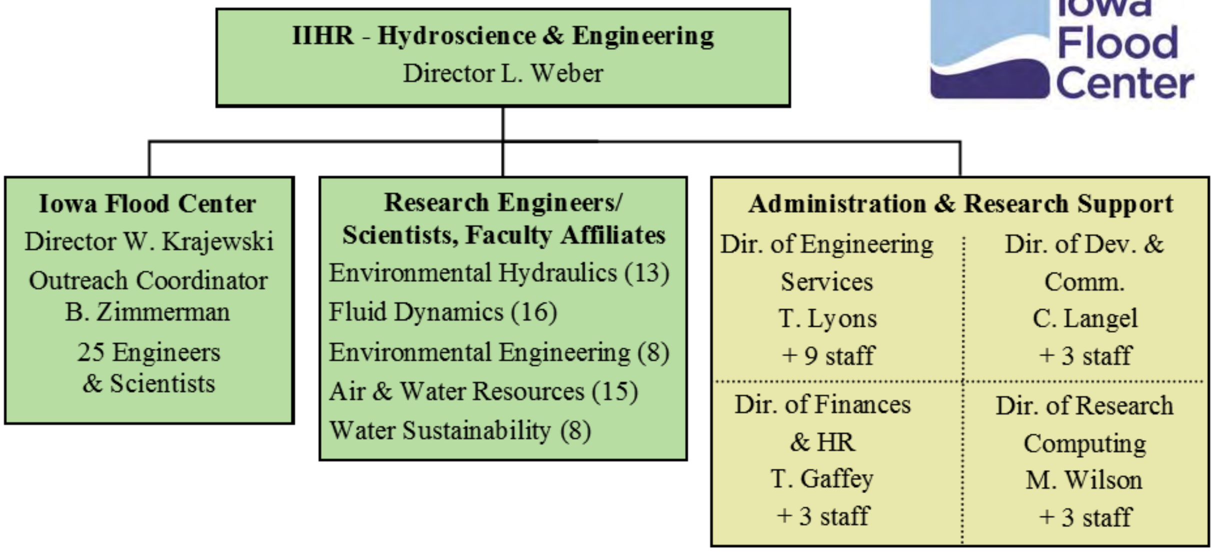
control plan to protect critical facilities and public and private property, as well as to preserve the health and safety of Des Moines residents. HSEMD was integral in the development of the proposal and (current) project implementation. Specific post-award activities by HSEMD include the solicitation, review, consolidation, validation, and submission of applicant's reports (financial, progress, and performance-oriented). HSEMD also: uses qualitative and quantitative metrics to determine how well the program is being implemented and whether it is achieving its described goals, objectives, activities, and services; and makes sure individual projects achieve overarching program goals. HSEMD will play a similar role in monitoring the technical and programmatic activities of the Iowa Watershed Approach (IWA).

b. Management Structure and Lead Personnel

Iowa Economic Development Authority: IEDA's Community Development Division operates under the leadership of Director Debi Durham, who reports directly to the Governor. If awarded an NDRC project, IEDA will be responsible for day-to-day CDBG administration, including writing policy and procedures, awarding funds, contracting, processing expenditure requests, monitoring, close-outs, and quarterly reporting in DRGR. The team will include: Tim Waddell, Community Development Division Administrator, responsible for policy development and adherence; Leslie Leager, Division Coordinator, responsible for CDBG policy and regulatory research, approval of Requests for Release of Funds (as the environmental specialist), and quality control/assurance oversight; Peggy Russell, Disaster Recovery Team Leader, responsible for tracking and evaluating program/projects/outcomes and coordinating HUD and Office of Inspector General monitoring visits and audits; Tim Metz, responsible for contract coordination and tracking allocations; Khristy Smith, responsible for DRGR data entry and action plans, QPR submittals, closing contracts, and tracking audits; Joe Bohlke, responsible for managing infrastructure projects and acting as the CDBG procurement specialist; Ann Schmid,



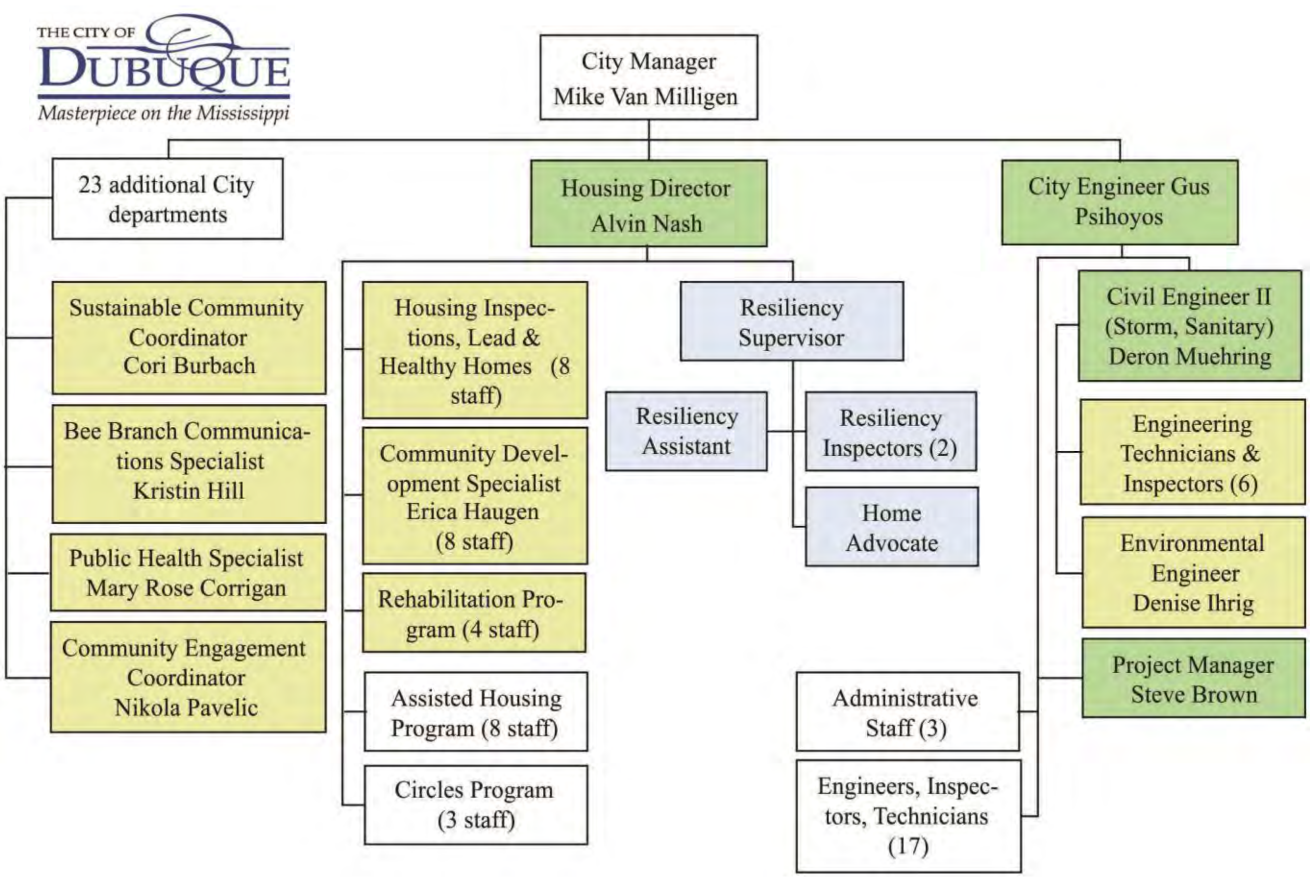
responsible for managing housing projects and serving as the CDBG acquisition and relocation specialist; Dan Narber, the CDBG Davis-Bacon Specialist; Jeff Geerts, responsible for managing watershed projects and serving as green infrastructure specialist; Haley Crozier, responsible for processing expenditure requests and completing the duplications of benefits (DOB) for awarded projects; and Katie Caggiano, Accountant, responsible for fiscal and internal audits.



The Iowa Flood Center (IFC) of IIHR—Hydroscience & Engineering (IIHR), the University of Iowa: The IFC is managed under the auspices of IIHR. The Director of IIHR reports to the Dean of the College of Engineering, who reports to the UI Provost. The provost reports to the UI President, who reports to the Iowa Board of Regents. Dr. Larry Weber, UI Professor of Civil and Environmental Engineering, will lead all IFC activities. As Director of IIHR, Weber oversees and makes final decisions regarding IIHR's overall fiscal management, personnel, and vast facilities and equipment resources. He oversees management of the IFC and the Iowa Geological Survey, both organized under IIHR. In addition to 10 years of experience as IIHR Director, Weber has managed his own portfolio of sponsored projects totaling more than $50M over the past 20 years. He is the IFC's principle investigator for the Iowa Watersheds Project. Weber's extensive background in project management will be instrumental in making sure this project is successfully completed on time. Other key IFC personnel implementing this project will include: Drs. Antonio Arenas and Marcela Politano, Engineers, leading hydraulic analysis and modeling; Drs. Keith Schilling and Chris Jones, Geologists, leading nutrient monitoring and modeling; Dr. Ibrahim Demir, Engineer, leading informatics and online visualization; Mark Wilson, Principal Engineer, leading research computing for numerical modeling exercises; Teresa Gaffey, Director of Finance and Human Resources, responsible for managing the programmatic budget; and Breanna Zimmerman, IFC Communications Coordinator, responsible for coordinating and communicating with WMAs. More than 10 additional BS- and MS-level engineers with expertise in river hydraulics, remote-sensing, numerical (computer) modeling, floodplain mapping, water quality, and informatics will help implement the program; many are certified floodplain managers.

The City of Dubuque operates under the city manager form of government. Although multiple departments will be involved in program implementation, the primary departments responsible for project management will be Housing & Community Development (H&CD) and Engineering.

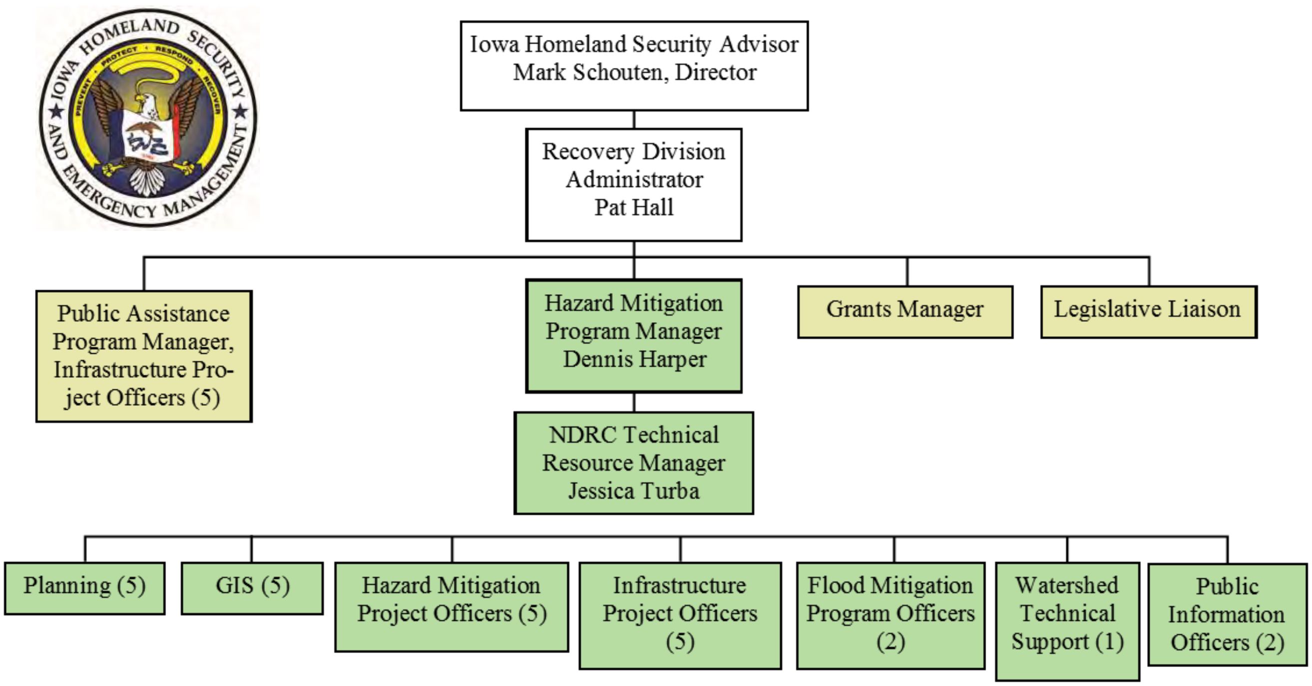
When grant funds are issued, the city will hire several new staff members who will work under the direction of Housing Director Alvin Nash: a new Resiliency Supervisor, a Resiliency



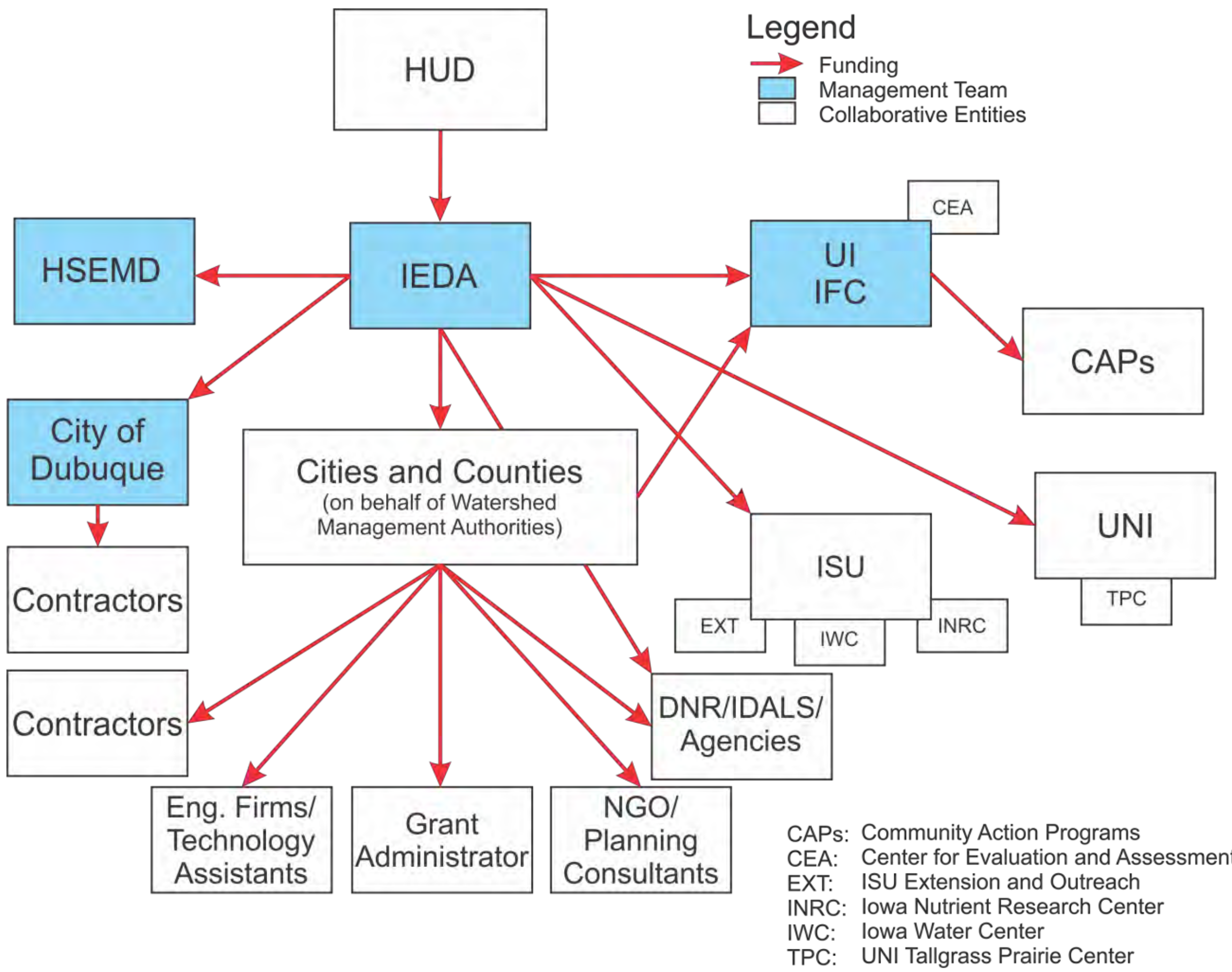
Assistant, two Resiliency Inspectors, and a Home Advocate. Director Nash currently oversees expansive inspection, rehabilitation, assisted housing, family self-sufficiency, urban revitalization, and financing programs, all of which were involved in Dubuque's recovery from previous floods. H&CD directors, inspectors, and support staff will work collaboratively with the new Resiliency Division. The Resiliency Supervisor will manage Dubuque's relationship with IEDA and act as Dubuque's program manager. The Assistant and Inspectors will coordinate to identify and inspect impacted homes, manage contractor implementation of work, and report on outcomes of the program. The Home Advocate will serve as liaison to the community and complete community education and outreach for resilient homes and neighborhoods. The H&CD Community Development Specialist and Rehabilitation Programs Inspector will support the new staff.

The Engineering Department is staffed by more than 30 people, including seven licensed Professional Engineers. In Fiscal Year 2015, the department administered $53M in capital improvements for the planning, design, and construction of streets, sanitary sewers, storm sewers, and other public improvements. The department has a long history of working with local, state, and federal agencies on permitting and funding. More recently, the department administered state and federal funding, including federal CDBG, Federal Highway Administration, EPA SRF, and TIGER programs. In addition to these departments, the following positions will be part of Dubuque's management structure: a Bee Branch Communications Specialist who will integrate the program's resiliency outreach into neighborhood-wide educational programs and engagement, including outreach to neighborhood associations, schools, and businesses; a Sustainable Community Coordinator who will lead Dubuque's climate adaptation and resiliency work, provide technical expertise, and integrate the program into the development of Dubuque's climate adaptation plan; a Community Engagement Coordinator who will assist in developing plans to engage residents in sustainable living education, targeting vulnerable or traditionally unengaged populations, and developing partnerships with nonprofit and religious service providers; and a Public Health Specialist who will monitor the health outcomes in the impacted area, serve as liaison to the health care community, and provide health oversight and education.

Homeland Security and Emergency Management: HSEMD Director Mark Schouten reports



directly to the Governor. Schouten will lead the strategic decision-making process regarding the implementation of tasks assigned to HSEMD under the IWA, with support from the department's Legislative Liaison (John Benson), Disaster Recovery Administrator (Pat Hall), and supporting Bureau Chiefs for Recovery Operations (Aimee Bartlett), Hazard Mitigation (Dennis Harper), and Public Assistance (Katie Waters). The functional tasks associated with the IWA will be accomplished through the daily activities of Public Information Officers, Hazard Mitigation Project Officers, Infrastructure Project Officers, Geographic Information Technology Specialists, Watershed Analysts, and Hazard Mitigation and Disaster Recovery planners. HSEMD maintains these positions for Hazard Mitigation and Disaster Recovery work, and they will be available to carry out resiliency program activities. The staff managing disaster recovery and hazard mitigation programs have decades of experience working with communities, developing projects, and monitoring project outcomes.



Program Management: The management organizational chart demonstrates the structure of the Iowa Watersheds Approach management team (in green) and the flow of funds (arrows). IEDA will lead and oversee all aspects of the IWA program, ensure its timely and successful completion, monitor CDBG compliance in all areas, and make all final financial decisions. The IFC and the City of Dubuque, based on their technical expertise and stakeholder connections, will lead technical and programmatic implementation. HSEMD will provide technical support in HUD programmatic implementation and coordinate disaster preparedness and hazard mitigation activities. In the rural watersheds, the WMAs will make project selection and siting decisions, based on the required criteria (See Phase II, Soundness of Approach, Program 1), and make recommendations to IEDA for contract funding for project design and construction. A WMA Advisory Board will provide technical guidance and assistance to the WMAs and advise the program management team on challenges and strategies. Each WMA will procure a COG (Council of Government) or other qualified grant administrator to oversee local distribution of CDBG funds and ensure compliance with CDBG regulations.

References

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Exhibit D Need/Extent of the Problem

State of Iowa

Iowa_PhaseII_Need-Extent.pdf

Need/Extent of the Problem

a. Unmet Recovery Needs and Target Geography

Environmental MID-URN from 2011–2013 impact 24 of Iowa's 99 counties, reflecting Iowa's primary land use—agriculture. The scattered distribution of environmental MID-URN areas is reflective of 2011–2013 storm patterns. Most of Iowa is vulnerable to, and has suffered from, significant soil loss and water-quality degradation from major (and even moderate) flood events in recent history.

As noted in Phase I and Phase II Threshold and Phase I Need, much of Iowa's most impacted and distressed rural areas suffer from environmental damages caused by soil erosion and transport during floods. In 2013, storms in Tama County, for example, resulted in an estimated loss of *2.5–5.0 tons of soil per acre*. This exceeds any conceivable sustainable annual soil loss and poses a threat to Iowa's economy and environment. This unmet recovery need distribution and extent as related to soil loss described in Phase I is unchanged, other than additional added areas (Phase II, Threshold). These areas continue to experience irreplaceable soil loss during high flow events. This also harms water quality in MID-URN areas and downstream. As also described in Phase I, much of Iowa's rural MID-URN areas also suffer environmental degradation from impaired water quality. This also remains unchanged, other than added areas (Phase II, Threshold); it poses a threat to the environment, city drinking water, recreation, and tourism. If unchecked, water quality will continue to degrade, especially during high flow events.

The Iowa Watersheds Approach (IWA) area served is narrowed to nine watersheds, including one in Dubuque (Attachment E, Map 1 and Attachment F, Census Tract List). Rural watersheds and counties include: West Nishnabotna (Mills, Fremont): East Nishnabotna (Fremont): North Raccoon (Buena Vista, Pocahontas); Middle Cedar (Tama, Benton); Clear

Creek (Iowa, Johnson); English (Iowa); Upper Wapsipinicon (Buchanan, Delaware); and the Upper Iowa (Allamakee, Winneshiek).

The IWA addresses needs by reducing future flood damage through implementation of projects to increase the land's flood resilience. IWA will significantly reduce water flow (decreasing soil loss and infrastructure damage) and water-quality degradation during high flow events. Leverage funds include 25% of construction costs (direct leverage) from all landowners and complementary projects (supporting leverage) to reduce flow, improve water quality, and protect resources. Community programming will focus on increasing local flood resilience.

The IWA will impact environmental, economic, and resilience needs at many levels. Built projects will benefit the area (*local benefit to MID-URN*) through: the retention of soil and nutrients, which benefits the landowner economically (greater yields, reduced nutrient application costs); recreational benefits (e.g., cleaner water for swimming or fishing); and environmental benefits (e.g., habitat formation, reduced erosion). The hydrologic assessments and watershed plans will provide a vision for the larger (*multi-county*) watersheds. Projects will collectively *benefit the region* by: reducing peak streamflow, which lessens environmental damage (streambank erosion) and infrastructure damage; improving water quality (e.g., for drinking water, recreational use); improving quality of life; bolstering economies (tourism activities – fishing, swimming, boating); preserving Iowa's agricultural foundation; and retaining businesses that might otherwise be damaged by floodwaters. These benefits will propagate beyond Iowa, impacting major waterways south to the Gulf of Mexico and its hypoxia zone.

The health of Iowa's agricultural resources impacts markets *globally*; Iowa ranks second nationally in the export of agricultural commodities, with about $11.3B in exports in 2012.

Direct leverage from the Iowa Flood Center ($1M) will support watershed data collection, monitoring, and modeling. Direct support from the Iowa Farm Bureau will support outreach dissemination in the target watersheds. Many collaborators have offered supporting leverage representing complementary projects, outreach, and infrastructure (Phase II, Leverage).

Infrastructure MID-URN from 2011–2013. The IWA includes projects to address significant unmet infrastructure needs in Dubuque, Coralville, and Storm Lake.

The *City of Dubuque* experienced severe flooding in July 2011, causing substantial damage, especially in the historic Bee Branch Creek Watershed. The Bee Branch Healthy Homes Resiliency Program (BBHHRP) addresses unmet recovery needs identified in Phase 1 (Attachment E, Map 2). Dubuque's 2014 windshield survey identified 23 units with damage from 2011. Few, if any, efforts have been made to make the homes more flood resilient. In 2015, 24 inspections and interviews confirmed homes damaged by the 2011 flood.

The BBHHRP is aligned with the Bee Branch Creek Restoration Project. Census tracts 1, 4, 5, 6, and 11.02 qualify as LMI (Attachment E, Map 2). The target area includes the area's most affordable housing. Direct leverage includes $800K for a Lead & Healthy Homes project. Supporting leverage ($500K) will fund micro-lending and first-time homeowners.

Dubuque's unmet infrastructure needs include three storm water management projects to safely convey water. About 900 homes remain at risk for future flooding until these projects are complete. Dubuque will leverage $21.6M in direct funds for the three infrastructure projects and $39M in supporting leverage for other watershed improvements.

A *Storm Lake* infrastructure project will help to address MID-URN in an LMI area flooded in 2011 and 2013. Flash flooding severely damaged its storm water system; water and sewage backed up into homes and were released into the environment, causing a health hazard and environmental degradation. Storm Lake commits $2,158,250 in direct leverage toward upgrading its storm sewer system. Upstream watershed projects in Outlet Creek will complement these activities and further reduce flooding in Storm Lake.

Coralville has also seen repeated flooding (including 2013) in the MID-URN area. Modifications to two storm water pump stations (the weak links in a new flood protection system) are the final step to protect more than 178 acres of businesses and multi-family residences in a vulnerable LMI area. Coralville commits $611,600 in direct leverage for project implementation.

b. Resilience Needs Within Recovery Needs

Based on soil loss estimates by an ISU agronomy professor (BCA narrative), the Iowa Department of Agriculture and Land Stewardship estimates it would cost more than $69.78M to repair environmental degradation related to soil loss caused by qualifying disasters in all the MID-URN areas in the target watersheds. IWA projects would have drastically reduced soil erosion and introduction of soil (and nutrients) into surface water.

The MID-URN areas in the target rural watersheds comprise about 90 HUC 12 watersheds out of about 1,660 statewide. The IWA proposes activities in 40. Inclusion of the remaining 50 in the target MID-URN areas would require an additional $82.7M in design and construction costs (including cost sharing); about $2.4B would be needed to implement the IWA in the rest of Iowa.

Except for the 2011 Missouri River flood, Iowa flood victims did not qualify for federal individual property damage assistance during this period. The Iowa Individual Assistance Grant Program, which allocates up to $5K to individuals making less than 200% of the federal poverty level, provided the following assistance in target county areas in 2013: Johnson, $31,500; Allamakee and Winneshiek, $164,000; Buchanan, $40,700; and Buena Vista (primarily Storm Lake), $222,700.

Infrastructure damage in the target watersheds from the qualifying events included: $2.75M in the Upper Iowa; $4.95M in the Middle Cedar; and $5.6M in the North Raccoon. Several hundred homes in Storm Lake (unofficial sources indicate up to 1,500) and 200 homes in Bee

Branch Creek reported damage. All of these areas would have experienced reduced flooding and thus reduced infrastructure damage if the watersheds projects had been in place to retain water. Infrastructure damage in Buena Vista County could have been substantially avoided with the combination of watershed projects and improvements to Storm Lake's storm sewer system.

Crop-loss data are readily available for two areas impacted by flooding in 2011. The Iowa Farm Bureau estimated $52.2M in crop loss in Fremont County (E. Nishnabotna) and $22.2M in Mills County (W. Nishnabotna).

Vulnerable populations in Iowa, including minorities (8.5%), elderly (18.4%), disabled (11.4%), and those in poverty (12.4%), are often disproportionately affected by floods. Flood impacts on vulnerable populations may include loss of affordable housing, loss of work, strained food budgets, mental and physical health impacts, and transportation difficulties.

Dubuque's Bee Branch flood-prone MID-URN area includes census tracts 1, 4, 5, 6, and 11.02, representing about 35% of Dubuque's population. About 60% of residents are renters. The city's main method of providing affordable housing for qualifying residents is the Housing Choice Voucher Program. Participants may use vouchers anywhere in Dubuque; however, usage is concentrated in the target area (Attachment E, Map 3). Dubuque has small but concentrated non-English speaking and minority populations. According to American Community Survey (ACS) estimates, 3% of Dubuque residents are non-English speaking. Of these, 27% reside in the flood-prone area. In 2015, Dubuque completed an Analysis of Impediments to fair housing. HUD considers a subarea of a micropolitan impacted if its proportion of residents of color (non-Hispanic White) exceeds 50%. No Dubuque block groups (BG) qualify. Another benchmark pertains to the percentage of residents in poverty. For micropolitan areas, this is either 40%, or a benchmark three times the average tract poverty level of the jurisdiction. HUD defines an area a Racial/Ethnic Concentrated Area of Poverty (R/E-CAP) if it exceeds benchmark values for race and poverty. Using ACS five-year (2008–2012) estimates, the average BG poverty rate was 12.58%, yielding a benchmark poverty concentration ratio of 37.7. Again, no Dubuque BG qualifies as R/E-CAP; however the 40% racial benchmark is too high for an eastern-central plains micropolitan area. Using 20%, two BGs cross thresholds for poverty and racial concentration: Tract 5- BG 4 has an estimated R/E concentration of 36.4% and a below-poverty level percent of 51.4%. Track 1 BG 1 has corresponding values of 23.7 R/E and 43.7% (Attachment E, Map 4). This is where the most vulnerable populations live, and the areas most impacted by 2011 flooding.

The Bee Branch flood mitigation project will protect nearly 1,400 flood-prone homes and businesses and prevent an estimated $582M in damage over its 100-year life. This does not include environmental, health, and other difficult-to-quantify benefits (see BCA Narrative).

The ACS reports that the median household income in the *North Raccoon River Watershed* MID-URN area is $47,589, compared to $51,843 in Iowa (2009–2013). Storm Lake has a meat packing industry and higher minority (non-white) and Hispanic populations than the rest of Iowa. In the MID-URN area, 22.4% of residents identify as Hispanic (32% in Tracts 9604 and 9605) compared to 5.1% in Iowa, and 18.6% non-white compared to 8.5% statewide. Vulnerable populations, such as the elderly, were most impacted during DR-4126 as they struggled to find help removing damaged materials from their homes.

The MID-URN areas of the *Upper Iowa River Watershed* have a median household income of $56,910. This includes L/M income areas of Allamakee County (Tract 9602), where 10.4% of the population is in poverty and the unemployment rate is higher than in neighboring areas. In 2013, homeowners faced water in their basements caused by flash flooding on saturated soils. According to community action agency partners, low income homeowners experienced a gap in resources. Many do not live in the floodplain and are not eligible for flood insurance. Like many rural LMI areas in Iowa, Allamakee County is facing declining population and loss of or lack of employers. Households with mobility have relocated; those unable to relocate remain.

The median annual household income in MID-URN areas of the *Upper Wapsipinicon River Watershed* in Buchanan and Delaware counties is $61,377. The median annual household income in MID-URN areas of the *Middle Cedar River Watershed* in Benton and Tama counties is $56,904. Tract 9604 in Benton County includes a higher population of disabled persons (18.4%) with the presence of a special needs facility. The median annual household income in MID-URN areas of the *English River Watershed* in Iowa County is $61,830.

The MID-URN area served by the *Clear Creek Watershed* project in Johnson and Iowa counties has 55.3% L/M income, but is not entirely residential. The *Coralville infrastructure* protects a qualifying LMI area (54.49%), with demographics as follows [average income / minority (non-white) percentage]: Tract 2: $39,583 / 24.2%; Tract 4: $40,381 / 33.2%; Tract 5: $50,420 / 17.7%; Tract 23: $44,300 / 12.6%, as compared to $53,424 / 14.4% countywide.

The median annual household income in MID-URN areas of the *East Nishnabotna River Watershed* in Fremont County is $55,476. The median annual household income in MID-URN areas of the *West Nishnabotna River Watershed* in Fremont and Mills counties is $54,250. The disabled population (17.3%) is larger than the state average (11.4%). One identified area served (Tract 401, BG 1) in Mills County includes 53.66% L/M income.

c. Appropriate Approaches

Flooding is the most significant and costly hazard facing Iowa. From 1960–2009, flood events were responsible for more than $12B in losses. Disaster recovery efforts must include programs within and across watersheds to reduce flood impacts and support engagement activities to make communities more resilient. *Four lines of evidence demonstrate the appropriateness of the Iowa Watershed Approach*: 1) increasing trends in precipitation and flooding; 2) the success of the current Iowa Watersheds Project and Bee Branch activities; 3) past evidence of success using upstream projects to decrease downstream flooding; and 4) community-led development of resilience strategies.

Precipitation and flooding trends: The central United States is experiencing a marked increase in the frequency of heavy precipitation and flood events. University of Iowa (UI) researchers analyzed data from 774 USGS stream gauges and found an increasing trend in flood frequency during the past 50 years, especially through a wide geographic tract from N. Dakota and S. Dakota down through Iowa and Missouri and east to Illinois, Indiana, and Ohio (Mallakpour, I., and G. Villarini, "The changing nature of flooding across the central United States," *Nature Climate Change*, 5, 250-254, 2015). This study also demonstrated a similar increase in the frequency of heavy rainfall days and in temperature data across the same region. Scientists at Iowa State University's (ISU) Climate Science Program, who have been examining precipitation and flooding trends across Iowa for decades, have reached similar conclusions. Research at UI, ISU, and other institutions is underway to develop and analyze new models incorporating recent trends into future scenarios. The models consistently demonstrate a continued upward trend in extreme precipitation and flood events in Iowa. This means that the probability of a 100-year flood occurring in Dubuque, for example, is now more than 1% each year.

In the face of changing precipitation patterns and Iowa's fragile and heavily-managed landscape, reducing flood risk requires complementary approaches that improve infrastructure resilience and counteract the impacts of intensive land use and changing precipitation patterns.

Current Iowa Watersheds Project and Bee Branch Activities: The proposed Iowa Watersheds Approach mirrors the Iowa Watersheds Project (IWP). The IWP is successful because it: engages a wide range of stakeholders; follows a logical progression; and results in a suite of projects proven to reduce flow and improve water quality. The hydrologic models used to assess each watershed and develop watershed plans can be updated over time through adjustment of precipitation and flooding patterns as observed or expected. This may result in adjustments to selection, siting, and size of future watershed projects. Dubuque's approach also considers the entire watershed and the latest climate data. The city participated in Iowa's risk and vulnerability assessment to identify optimal programs and projects to improve disaster recovery and resilience in its distressed areas. These sources framed the development of the Bee Branch Healthy Homes Resiliency Program and led the city to develop a watershed approach targeting infrastructure improvements and resiliency programs for at-risk residents.

Evidence of past success: The IWA's success can be assessed by studying a more mature project—the Soap Creek Watershed in Southeast Iowa. Stakeholders there have been working together since 1985 to reduce flood damage to farmland and roads. They developed a watershed plan and, over 30 years, built 132 water retention basins. IFC models show a 28% reduction in streamflow at the watershed outlet, with even greater localized reductions. IFC hydrologists estimate these structures also reduced downstream sediment and nutrient delivery by 20–25%. The Soap Creek WMA claims $892K/year reduction in agricultural flood damage and $155,800/year reduction in non-agricultural flood damage.

Programming to Increase Resilience: Community resilience engagement activities will help communities prepare for, plan for, respond to, recover from, and adapt to floods. This program is appropriate because: 1) local stakeholders will determine and start to address their own unique resilience needs; 2) an evaluation component will continually evaluate needs and impacts to guide programming; 3) communities will have access to the latest scientific data; and 4) programs will engage many partners, including Watershed Management Authorities, Emergency Management Coordinators, Community Action Programs, and others.

Exhibit E - Soundness of Approach

State of Iowa

Iowa_PhaseII_SoundnessOfApproach.pdf

Soundness of Approach

a. Soundness of Approach Description

As a hybrid proposal (with both programs and projects), this section is organized as follows: 1) two programmatic descriptions—the activities in the upper watersheds and community resilience programming; 2) programmatic assessment approach; and 3) project descriptions.

Program 1: The Iowa Watershed Approach

The Iowa Watershed Approach (IWA) will improve environmental and societal resilience and reduce downstream risk from major storm events through environmentally- and scientifically-sound projects in the upper watershed to increase infiltration and retain water. By addressing water-quantity and -quality issues upstream through cost-effective best practices, the IWA will realize environmental, social, and economic benefits at the project sites and downstream, including flood risk reduction for downstream housing and infrastructure projects. The IWA requires strong community support and dedicated stakeholders and landowners, because 99% of Iowa's land is privately owned. This program will help Iowa move toward its statewide goal of 30% reduction in streamflow and 45% surface-water nutrient load reduction. Specific goals are listed with each project description. *In five years, Iowa will have a well-refined, replicable program, and all participating watersheds will have a long-term vision. Communities, infrastructure, and housing will be less vulnerable and more resilient to future storm events.*

Collaborators/Feasibility: Iowa has a rich field of partners and collaborators across the state with expertise in agriculture, land management and best management practices, soil science, water quality, sustainability, education and engagement, river hydraulics, climatology, program/project design and evaluation, and assessment. In addition to the IWA management organizations, project implementation will include the following in most watersheds (see also

Phase I, Capacity): *Iowa State University* (Iowa Water Center, Extension and Outreach, and Iowa Nutrient Research Center) and *University of Northern Iowa* (Tallgrass Prairie Center) for technical support, collection and analyses of data, development and distribution of educational materials, and other support; *Iowa Department of Natural Resources (IDNR)* for technical support, capacity-building, and project design, outreach, and leadership on WMA formation; *Iowa Department of Agriculture and Land Stewardship (IDALS)* and *National Resources Conservation Service (USDA-NRCS)* for technical support, capacity-building, project design, and outreach; *County Soil and Water Conservation Districts* for technical support and outreach; and *The Nature Conservancy*, *Iowa Natural Heritage Foundation*, *Iowa Soybean Association*, *Iowa Farm Bureau*, *Iowa Agricultural Water Alliance*, local *Resource Conservation & Development* offices, *Iowa Department of Transportation*, *Iowa Association of Counties*, and *Silver Jackets Flood Risk Management Team* for technical support and guidance to the WMAs. The University of Iowa Center for Evaluation and Assessment (CEA) will conduct a comprehensive formative and summative evaluation of the IWA for program improvement and to document outcomes (see page 18). CEA provides third-party evaluation, assessment, and other services. Since 1992, CEA has successfully completed more than 150 evaluations for many clients and sponsors, including FIPSE, NSF, NIH, NIMH, the U.S. Department of Education, and others.

Program 1 includes eight specific programmatic components:

1. <u>Watershed Selection</u>: Six HUC 8 and two HUC 10 watersheds will participate in the IWA based on: 1) the location and extent of their MID-URN and LMI areas; 2) stakeholder commitment/engagement (see Attachment D and project details); 3) representation of Iowa's landforms (Attachment E, Map 5); and 4) other factors, such as watersheds prioritized by the Iowa Nutrient Reduction Strategy. Individual project descriptions include additional details for each watershed.

2. Formation of a Watershed Management Authority (WMA): Two or more eligible political subdivisions within a watershed can form a WMA through a Chapter 28E Agreement. WMA activities include: assessment and reduction of flood risk; assessment and improvement of water quality; flood risk planning and activities; educational activities; and allocation of funds for water quality and flood mitigation. The IDNR will guide WMA formation in each watershed.

The WMAs are the nucleus of the IWA. They comprise stakeholders from throughout the watershed, offering a range of perspectives and experience to achieve common goals. WMAs will be responsible for their site and project selections. A WMA coordinator will be hired for each watershed to manage activities, schedule events, facilitate communication, and assist with engagement, resilience, and assessment activities (see Program 2). One county will serve as the subrecipient from IEDA on behalf of each WMA. That county will use a qualified grant administrator to subaward funds and monitor programs. The CEA will document flood risk planning activities and monitor WMA activities. It will also collaborate with WMA coordinators to observe events and activities and collect survey data from stakeholders.

3. Producer Engagement, Outreach, and Planning: Producer engagement is incorporated program-wide. Activities related to engineered projects will include, for example, public engagement events, site tours/field days, and public presentations at municipal and county meetings. A statewide *WMA Advisory Board* will be formed with at least one advisor from each WMA and representative(s) from Dubuque Bee Branch Creek. Collaborators will represent a wide range of expertise. The board will: review progress; strategize common challenges; make implementation recommendations; discuss long-term solutions for statewide flood peak reduction and water-quality improvements; and share resilience programming strategies and successes. The board will initially meet quarterly. An annual public symposium will share information and build support.

Three Iowa State University (ISU) units and their partners will develop and deliver programming to WMA stakeholders and producers in the target watersheds. *ISU Extension and Outreach* will deliver research-based information on practice effectiveness in target areas. Communication efforts will include fact sheets, broadcast interviews, videos, and interactive webinars. Farmer champions will facilitate farmer-to-farmer learning. Content creators will also draw upon the latest information from ISU's Climate Science Program. At *ISU's Iowa Learning Farm* (a partnership among ISU, IDALS, IDNR, and USDA-NRCS), farmers, schoolchildren, and others will learn about issues in each watershed. ISU will also develop a Watershed Academy to build capacity among the WMA coordinators to improve the effectiveness and repeatability of successful practices. *Iowa Nutrient Research Center* (see Phase II, Long-term Commitment) faculty will evaluate the effectiveness of stacking practices to reduce nutrient loss to surface water in the watersheds. ISU Extension and Outreach will distribute educational materials on these practices to producers in the target watersheds.

The University of Northern Iowa's (UNI) Tallgrass Prairie Center has more than 25 years of experience in the beneficial use of native perennial vegetation. UNI will provide multiple layers of assistance to producers on the establishment and management of native vegetation across a range of agricultural practices. They will share scientifically-based information through workshops, print and online technical guides and videos, an online seed mix calculator, and consultation. Demonstration sites for teaching and learning will be the cornerstone of the effort. Simple, small-scale experiments and side-by-side contrasting practices will communicate basic principles that can be readily applied in many contexts and locations. Statewide partners include the Iowa State STRIPS Project, the Association for Integrated Roadside Management, Iowa Native Plant Society, NRCS, INRC, and the Leopold Center for Sustainable Agriculture.

The CEA will monitor a sample of events in each watershed, as well as collaborator interactions and multimedia delivery of research-based material to producers and stakeholders.

4. Watershed Monitoring: IFC researchers will deploy stream-stage sensors and water-quality sensors in each target watershed. The sensors transmit data to the IFC at set intervals (generally every 10–15 minutes), which are automatically posted to a publically-available online visualization platform (see Program 2). Sensors will collect data for the duration of the program and beyond. Researchers will deploy additional sensors following selection of HUC 12 project sites to monitor results from individual or stacked practices. A hydrologic network with rain gauges, soil moisture and temperature probes, and shallow wells will also be deployed.

5. Hydrologic Assessment: A hydrologic assessment of each watershed is necessary to understand the hydrology, assess flood and water-quality risks, and evaluate scenarios to maximize results. The selected watersheds represent Iowa's varied topography, soils, and land use. The data- and simulation-driven assessments include a review of the water cycle across each watershed and require a large amount of data from collaborators. The IFC will develop HEC-HMS hydrologic models for each basin and run simulations for each watershed. The draft hydrologic assessment will be presented to stakeholders for final public input, and its online availability will be widely promoted. *The IFC will retain the original data and models* so *each plan can be updated to reflect land use and precipitation changes, new floodplain maps, etc.*

6. Watershed Plan: The watershed plan includes an analysis of hypothetical scenarios to reduce downstream flow and improve water quality. It will incorporate stakeholder input and serve as a guide for the selection of sub-watersheds (HUC 12s) and project sites. The number of projects needed to reach water-quantity and -quality goals for each HUC 8 or HUC 10 is beyond the scope of this proposal. Instead, *each plan will be a vision for the future of that watershed*. The WMAs will use the plans to develop priorities, to support future funding requests to other

sponsors, and to monitor progress. *Data and models will be retained so the plan can be adjusted in the future to accommodate changes in key parameters, such as shifting precipitation patterns*.

7. Selection of Construction Projects and Project Design: WMAs will select several HUC 12s in each project watershed for implementation of projects. The location, type, and number of projects in each watershed will be based on the hydrological assessment, watershed plan, stakeholder input, and maximization of peak flow reductions and water-quality improvements in the MID-URN areas. *Each WMA will select the sub-watershed and site locations for project construction based on at least these very specific criteria*: 1) to maximize impact on MID-URN areas; 2) to maximize impact on vulnerable populations; 3) to collaborate with stakeholders/landowners willing to commit to a 25% cost share and a long-term (20-year) maintenance agreement; and 4) to work with landowners committed to other sustainable land use practices and BMPs to further the project goals. A local agency, NGO, or engineering firm will complete project designs. Multiple entities in Iowa have experience designing watershed projects to accepted standards.

Each WMA's lead county will hire a grant administrator (e.g., Council of Government) to oversee the distribution of CDBG funds for project design and construction. The administrator will ensure CDBG program compliance, including clearance on environmental, cultural, and Section 106 reviews; public involvement; Davis-Bacon labor standards compliance; and procurement of services, advertisement, and administration of public bid letting. The administrator will also ensure financial records are maintained and work closely with IEDA to meet all HUD regulations. When ground disturbance is expected, the administrator will be responsible for delineating the Area of Potential Effects and using sufficient methods to identify potential cultural resources, including archaeological sites. He or she will present findings to the State Historic Preservation Office (SHPO) for review and comment.

CEA will monitor collaborations among stakeholders in selecting construction projects and will survey stakeholders/landowners on their commitment to sustainable land-use practices.

8. Construction: IEDA and IFC staff, local agencies, WMA coordinators, and grant administrators will work closely with stakeholders and producers in each watershed through the contractor selection and project construction phase. Many local contractors have experience implementing and constructing these practices. HUD funds will cover 75% of the project cost; landowners will contribute the remaining 25%. Based on IFC and partner experience, there will be no shortage of interested landowners.

The practices available to the WMAs and producers (listed below) are not all equally suitable for all regions in Iowa; a hypothetical suite of projects is listed with each watershed project. A conservative lifespan of 20 years is assumed for each structure/project. Most of the noted benefits are based on data from the Iowa Nutrient Reduction Strategy (WQ = water quality improvement; SF = streamflow reduction). Benefits may vary based on size and landform.

- *Wetland Construction* slows down and filters precipitation runoff, allowing sediment and nutrients to settle out before reaching lakes, rivers, streams, and aquifers. This lowers downstream flood peaks, reduces erosion, and improves water quality. Wetlands may be restored through a variety of techniques (excavation, surface drain removal, low embankments, etc.) to restore the original hydrology. Wetland construction will be based on NRCS standards (NRCS Code 657). (WQ = 52–70%; SF = 10–20%)
- *Farm Ponds* effectively collect and hold surface flow, allow particles (soil) to settle, and remove nutrients. They are generally 0.25–20 acres and may be embankment ponds (a dammed stream) or excavation (digging out the pond or the surrounding area to form levees). Pond construction will be based on NRCS construction standards (NRCS Code 378). (Benefits are size-dependent: WQ = 30–70%; SF = 10–30%)

- *Storm Water Detention Basins* capture and detain water during a precipitation event, lessening downstream flooding. They remain dry between flood events. A storm water detention basin's construction is based on expected 10- or 20-year precipitation events for the area. (WQ = 20%; SF = 30%)
- *Terraces* are earthen embankments or combination ridges and channels constructed across a hillslope to reduce erosion, trap soil, and retain runoff to enhance infiltration. The number of acres terraced will vary. Construction will be based on accepted NRCS construction standards (NRCS Code 600). (WQ = 77%; SF = 5%)
- *Sediment Detention Basins* capture and detain sediment-laden runoff long enough for the sediment to settle out. Building techniques and benefits are similar to ponds. Unlike ponds, they are dry between precipitation events. Basin construction will be based on NRCS construction standards (NRCS Code 350). (WQ = 85%; SF = 5%)
- *Floodplain Restoration* restores flood-prone land to its original function—storing flood waters. Floodplain restoration restores, protects, maintains, and enhances the function of floodplains, while conserving natural values such as fish and wildlife habitat, water quality, flood water retention, and groundwater recharge. It typically involves removal of levees and ceasing agricultural practices in portions of the floodplain. (WQ = 85%; SF = 20%)
- *Channel Bank Stabilization* (Nishnabotna River System) involves reshaping the streambank up to 1,500 feet in length to a 2:1 slope and armoring the lower half of the banks with clean, rounded, well-graded riprap or other material. If the site has too much curve, bendway weirs help redirect the river current away from the banks. The upper half of the streambank is seeded to establish permanent vegetative cover. (WQ = 80%; SF = 5%)
- *Buffer Strips* are small strips of land with permanent vegetation (trees, shrubs, or other plants) used as environmental barriers between crop fields and other land usage. Buffers

help reduce runoff, sediment delivery, and downstream flooding; improve wildlife habitat and water quality; and contribute to productivity. (WQ = 91%; SF = 10%)

- *Saturated Buffers* direct field tile drainage into a buffer as shallow groundwater flow. As the water flows through the buffer, denitrification and uptake by the perennial plants in the buffer remove nitrate, preventing it from entering surface waters. (WQ = 50%; SF = 5%)
- *Perennial Cover* decreases soil erosion, increases biological carbon sequestration, provides wildlife and pollinator habitat, and improves water quality. (WQ = 75%; SF = 40%)
- *Oxbow Restoration* rebuilds disconnected oxbow ponds in the floodplain. Oxbows provide floodwater storage, nutrient processing, and shallow water habitat for wildlife. (WQ = 56% (N) ; SF = N/A)
- *Bioreactor*s are carbon-containing structures that intercept subsurface drains (tiles) or groundwater and improve water quality by reducing the concentration of nitrate-nitrogen. Construction will be based on NRCS standards (NRCS Code 747). (WQ = 43%; SF = 5%)
- *Prairie STRIPS* are the strategic integration of small strips of prairie in crop fields in the form of in-field contour buffer strips and edge-of-field filter strips, which can yield disproportionate benefits for soil, water, and biodiversity. (WQ = 66-90%; SF = 37%)

The CEA will monitor stakeholder involvement in project planning and execution. The CEA will also conduct surveys of downstream residents to assess their knowledge of and attitudes about improved quality of life, such as their perceptions of increased recreational opportunities and improvement of drinking water. Stakeholders will be asked to identify what has changed for them in a way that allows them to report information the team may or may not have anticipated.

<u>Programmatic Options</u>: Water quantity and quality are inextricably linked; during most flood events in Iowa, the water contains elevated nutrient loads. Thus, floods pose both a physical and health hazard at a time when people and the environment are most vulnerable. The timing of this

program is critical, as Iowa is experiencing a trend toward increased heavy precipitation events (see Phase II, Need/ Extent). The flexibility of this approach will allow Iowa to build upon this program for cumulative impacts in the future as local needs and conditions change.

Risks and Vulnerabilities: The IWA will help make Iowa's important agricultural economy more sustainable. Failure to implement the proposed (or similar) practices would likely result in continued degradation of the land and water, especially in the face of current climatological trends. This would likely result in loss of agricultural productivity, increased water treatment costs, and the loss of biodiversity, recreational opportunities, and tourism.

Scalability and Replicability: This program is scalable and replicable, appropriate for implementation at a variety of scales represented by the broad range of watersheds and infrastructure projects. Data collected throughout the program will help quantify costs of implementing this program across the Midwest for different water-quality or -quantity impacts. To this end, the *program will develop a comprehensive guide for other watersheds and communities striving to replicate the IWA*.

Goals and Metrics, Timelines, and Local Consultation are specified in each project description. Programmatic and scientific evaluation is described on pages 58-60.

Eligible Activity – NDRC Watershed Projects: Watershed Projects meet the Eligible Activity of Public Facilities and Improvements – 105(a)(2): For a century, Iowa law has recognized drainage systems as valued public facilities. Traditional flood protection/drainage infrastructure includes levees, floodwalls, and reservoirs. In rural areas, it also includes farm ponds, stream channelization tile drainage of farm fields, constructed earth terraces, debris basins, and conservation practices. Iowa proposed three pilot Iowa watershed construction projects to HUD in 2011. In June 2011, the HUD-Disaster office in D.C. approved the watershed projects, which they determined met the Eligible Activity of Public Facilities and Improvements. NDRC watershed construction projects will mirror the pilot projects. The public facilities will be constructed on private land, but will include a 20-year ownership easement to the county to maintain the structures. They meet the National Objective Urgent Need (UN).

Program 2: Community Resilience Programming

Community Resilience Programming is needed to increase community resilience to floods. The IWA proposes use of the Zurich Insurance Flood Resilience Program framework to implement the Vulnerability and Capacity Assessment (VCA) methodology to assess flood resilience in target watersheds. The International Federation of Red Cross (IFRC) and Red Crescent Societies have used the VCA methodology worldwide for more than a decade. It helps to: 1) assess risks and hazards facing communities and their capacity to manage them; 2) involve communities, local authorities, and development organizations in the assessment from the outset; 3) create action plans to prepare for and respond to identified risks; and 4) identify risk-reduction activities to prevent or lessen the effects of future hazards (www.ifrc.org/vca).

The IWA will partner with communities in the MID-URN areas to increase resilience by facilitating activities that help communities prepare for, respond to, recover from, and adapt to floods. The National Academy of Science (NAS) publication "Disaster Resilience – A National Imperative" suggests an approach to: 1) develop and encourage processes for sharing information; 2) build public awareness and understanding of risk; 3) gather community input; and 4) develop tools to monitor progress toward resilience. Floods affect more people globally than the combined effects of earthquakes, tornados, droughts, and hurricanes. Further, a focus on pre-event risk reduction, rather than post-event relief, promotes greater resilience. The Zurich resilience framework measures community resilience as functions of robustness, redundancy, resourcefulness, and rapidity, as well as the community's social, human, financial, natural, and physical environments. The IWA will pair the Zurich framework with the CEA's focus on watershed-specific needs assessments informing situated strategic planning as a comprehensive approach to needs and outcomes assessment, planning, and implementation.

Program Partners and Feasibility: The WMA coordinators will be the critical communication hubs. The IWA will work with groups like the Iowa Community Action Association and several regional *Community Action Programs (CAPs)* to leverage existing capacity-building platforms and networks for flood resiliency programming. The CAPs represent "boots on the ground," with established local relationships and trust. The *CEA* will guide the use of tools and assessment metrics to measure the effectiveness of program activities to improve resilience. *The IFC*, with expertise in data analysis and visualization, will provide watershed-monitoring tools to share and access information. *Homeland Security and Emergency Management (HSEMD),* in coordination with *local emergency management agency (EMA) coordinators*, will develop strategies and local flood preparedness.

Resilience Assessments and Tools to Guide Programming and Monitor Progress: The IWA team will work with stakeholders in each target watershed using the VCA frameworks and assessments. Preliminary activities will focus on qualitative and quantitative indicators of community resilience. The investigation will include individual or group interviews and annual surveys of selected constituents in the most vulnerable areas. Baseline data will guide WMAs as they select initial programming and interventions in the target communities. Qualitative data will clarify how stakeholders and community collaborators identify and understand the breadth of resilience issues. This will guide assessment of outcomes/impacts of programming and interventions, recognizing that: 1) the process of defining resilience goals and assessment requires collaboration and cooperation to build trust and highlight existing needs and capacities; and 2) regular monitoring of resilience can guide planning and decision making, and help assess progress toward resilience goals. A staggered annual survey will gather information from each watershed. The IWA team will refine the process annually to understand changes in community resilience and provide actionable information.

Resilience Awareness, Communication, and Planning (Primary Audience: community citizens. Secondary Audience: local decision makers, agencies): The WMA coordinators and local collaborators (e.g. CAPs) will partner with local leaders and individuals to develop community-specific activities to engage residents, especially vulnerable populations, in discussions about flood resilience. Engagement formats will vary (presentations, workshops, site visits, focus groups) until each community determines the most effective methods. Residents will be notified through existing events/groups, postings at key locations, local television and newspaper coverage, direct mail, and even door-to-door campaigns. Rural areas with low population densities will be engaged at the community scale, but also at county fairs and other regional events. Incentives will be considered to encourage participation.

Early engagement activities will focus on sharing experiences and perspectives, building participation and relationships, and discussing flood resilience. Discussion prompts might include: How did a specific flood or storm event impact individuals, and how did it vary among different people and neighborhoods? What were the greatest challenges during the event and during recovery? Who did people trust for information and help (and why)? Initial discussions will help frame subsequent activities in which participants use their experience and knowledge to plan for the future. Example program topics might include: How does an individual or community assess risk? How can individuals make their homes or businesses more flood resilient? What actions should the community, county, and watershed consider for improved resilience? The focus will ultimately shift to preparing for, planning for, responding to, recovering from, and adapting to floods.

Community programs will include opportunities for people who cannot attend to provide input (e.g., an online app and/or materials at a local library or civic center) and a means for recording and saving key programmatic outcomes. WMAs will have access to evaluation materials and event summaries, recordings, and other archived information, with highlights posted on the watershed website. *As communities work through the process of resilience assessment and planning, the WMA will facilitate the creation of a flood resilience action plan for each target community.*

Platform for Sharing Data and Experience (Primary Audience: local decision makers, EMA. Secondary Audience: Citizens): *The IWA will develop a platform to visualize hydrologic and water-quality data and to share watershed information*. As previously described, sensors in each target watershed will monitor precipitation and water quantity and quality. The IWA will share data for each watershed via a convenient information system. The system will be based on the Iowa Flood Information System (IFIS), built on the familiar Google Maps platform, which allows users to access and visualize data, including flood stages and warnings. The system will provide invaluable up-to-date information to decision makers and EMAs during a flood.

Demonstrations of the online platform at community programs will help stakeholders visualize and understand their home or business as a physical location within the watershed. It will incorporate an app for stakeholders to upload place-specific information. For example, the system might encourage users to respond to a topic of the week, current events, or other prompts to provide appropriate, actionable information. It is, in essence, a crowd-sourcing tool to collect water-related issues, photos, and stories that will be invaluable to the community and to IWA partners. It will be available at local libraries, community centers, and other public venues for users who do not have Internet access. Community input may help identify priorities to improve flood resilience. For example, EMAs might monitor this platform prior to and during an event for information about particularly susceptible groups and areas. The online platform will be just one element of the expanded WMA websites to help connect people in the watershed. The IFC will implement the visualization platform, and the WMA coordinators will manage content.

Capacity Building through Planning and Technical Assistance. Comprehensive Emergency Management Planning ensures that emergency services, local authorities, and other organizations communicate effectively and coordinate their efforts toward hazard mitigation and disaster preparedness, response, and recovery. Section 29C of the Iowa Code provides the authority for Iowa Homeland Security and Emergency Management (HSEMD) and the county emergency management commissions to plan for emergencies. HSEMD and the Emergency Management Agency (EMA) coordinators will be key partners in resilience programming, especially as communities work toward local strategies and flood resilience action plans. Their participation in the resilience program will facilitate development of a "whole community" approach and culture to disaster resilience. This will allow the IWA to tailor its efforts to engage the community, neighborhood, or individual, creating a template for future events in Iowa.

As the target communities consider their resilience needs, the EMA coordinators will provide guidance in identifying sound government policies and practices to further build disaster resilience. This may include: providing datasets for communities to analyze as part of their risk-assessment and -reduction activities; identifying critical asset inventories; building a flexible, scalable recovery structure for pre- and post-disaster decision making; and conducting loss avoidance studies for hazard mitigation, land-use, and comprehensive planning. Engagement activities and materials will be tailored to each community and its vulnerable population(s).

Assessment of future risk cannot be based solely on records of past events. *An accurate evaluation of future risk must also take into account relevant new or changing conditions, and the availability of new and refined data and tools*. The IWA's many resources will be invaluable to HSEMD and EMA's efforts to update Iowa's Enhanced Mitigation Plan and the Iowa Disaster Recovery Plan. IWA collaborators will help identify unmet needs and build a statewide science-based flood risk assessment for implementing a resilience mitigation strategy. For example, HSEMD and EMA will work closely with ISU's Climate Science Program and the IFC to understand the latest science on precipitation and temperature trends across Iowa. The WMAs will provide valuable information on the local landscape and hydrology and how these change as new practices are implemented. The IFC's new floodplain maps for Iowa (see Phase II, Long-term Commitment) will be an important resource in refining risk. The accompanying new one-meter-resolution depth grids for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year floodplains will allow planners to consider flood extent *and* depth. The IFC's flood inundation maps provide planners with an exceptional level of detail for any potential flood stage. The CEA's community resilience tools and metrics will reveal unique vulnerabilities in each partner community, feeding directly into HSEMD and EMA's planning and technical assistance activities.

State and Regional Impact: Although these key activities occur in the identified MID-URN areas, the programs provide a unique opportunity for the state to broaden its perspective to: 1) better understand communities' capacity to recover from potential future disasters; 2) refine strategies to identify the most critical disaster resilience challenges; 3) build and continue to refine this process for activities in other watersheds; and 4) develop future strategies to improve disaster resilience. *Information from these activities will support development of a vision for the future, similar to the watershed hydrologic plans, as Iowa continues to seek ways to improve disaster resilience.*

Timeline: The staggered start engages three watersheds during each of the first three years of the five-year program, with the following timeline. Year 1: Contract with CAP, conduct initial qualitative and quantitative baseline data collection of local resilience issues. Year 2: [Repeat

Year 1 for three new WMAs] *and* engagement program development and implementation, launch pilot of visualization platform, watershed-wide community engagement events to discuss resilience, initial HSEMD and EMA disaster planning events, development of resilience assessment, and annual resilience survey and reporting. Year 3: [Repeat Year 1 for final three WMAs] *and* continued engagement program development and implementation, visualization platform enhancements in response to feedback, engagement events to discuss resilience, HSEMD and EMA disaster planning events, and annual resilience survey and reporting. Year 4: Same as Year Three (no new WMAs). Year 5: Maintain visualization platform, finalize disaster resilience action plans, and final resilience survey and reporting.

Replicability: This program is scalable and replicable at a wide variety of scales (neighborhoods, small communities, or large cities). Specifically, the IWA is a replicable model to enhance the social, economic, hydrologic, and environmental resiliency of rural America and will influence future policies for rural and downstream development and urban-rural collaboration. The IWA will prepare a full program description and evaluation guide at the project conclusion. IWA staff will also share their experiences widely at public and agency events.

IWA Program and Project Assessment and Evaluation

Scientific Assessment: IFC staff will project post-construction results using a detailed, coupled surface water–groundwater model, HydroGeoSphere. Collection and analysis of sensor data will continue for one or more years after construction to verify that water-quality and -quantity improvement goals are met, to validate the hydrologic models, and to improve model performance. Analysis of field data and use of hydrologic models will guide future projects in the watershed and inform planning and policy decisions in watersheds throughout the Midwest.

The Iowa Water Center (IWC) at ISU will use its Daily Erosion Project (DEP), along with field measurements, to monitor the success of built projects to reduce erosion and water runoff and to develop and distribute informative materials on practices to reduce soil loss in modern agricultural operations. DEP is an erosion model that generates daily estimates of soil erosion and water runoff at the HUC 12 watershed level using high-resolution National Weather Service NEXRAD radar data to estimate precipitation, and remotely-sensed soil and land management data to parameterize the model. The IWC will perform a detailed assessment of each selected HUC 12 before, during, and after the completion of built projects.

Programmatic Assessment: The CEA will design and implement methodologies to describe and document the environmental, social, and economic benefits of the IWA as informed by preliminary needs assessments and ongoing interactions with local and program stakeholders. In conjunction with a stakeholder needs assessment, CEA will facilitate stakeholder development of an initial logic model for program activities. The collaborative needs assessment and preliminary logic models within each watershed will lay the groundwork for defining success by identifying the information needs or "evaluation questions" and will also facilitate future program replications in other watersheds. Evaluation processes based on community-defined indicators of success will inform program improvements.

CEA staff will conduct interviews and focus groups with local stakeholders, surveying people directly involved in engagement programming, and observing a large sample of programs over the program's duration in Dubuque and rural watersheds. This qualitative and quantitative information, aligned with community-defined success indicators, will provide formative information for the purposes of project improvement and monitoring, as well as summative findings to inform scale-up and provide evidence of project value. CEA will provide rapid-response evaluation information to project staff, regular formal and informal reports to project personnel and the WMA Advisory Board, and annual reports. Along with the annual reports, CEA will conduct a systematic internal formative quality control and assurance review to ensure the evaluation remains responsive to users and collaborators and adapts to the needs of the program and individual watersheds. CEA will also produce a final report for project sponsors and a replicable plan to evaluate similar future projects.

b. Benefit Cost Analysis

The total IWA benefit is $1,224,507,991 with a benefit-cost ratio of 7.07 (see Attachment F).

c. Scaling/Scoping

	Full Request	**Alternative 1**	**Alternative 2**	**Alternative 3**
Dubuque Healthy Homes	$11,091,767	$9,124,460	$8,427,665	$8,318,826
Dubuque Infrastructure	$28,100,000	$28,100,000	$23,100,000	$11,500,000
Coralville Infrastructure	$1,834,800	$1,834,800	$1,834,800	$1,834,800
Storm Lake Infrastructure	$6,474,750	$6,474,750	$6,474,750	$6,474,750
Watershed Projects	$50,055,000	$41,352,713	$31,459,292	$22,422,409
Data Collection/Modeling/etc.	$8,400,000	$6,972,000	$5,303,179	$3,440,000
WMA Coordinators	$3,000,000	$3,000,000	$2,250,000	$1,500,000
Planning + Admin	$22,037,911	$20,484,957	$17,937,491	$13,066,199
TOTAL	**$130,994,228**	**$117,313,680**	**$96,787,177**	**$68,556,984**
Overall BCA	**7.07**	**6.41**	**5.36**	**5.12**

The table above shows three additional scenarios. Planning projects would retain as much of the assessment, stakeholder education, and resiliency programming as possible. For the Bee Branch Healthy Homes Resiliency Program, alternative one proposes to reduce the scope to 400 units in

36 months. Alternative two reduces the scope to 320 units in 30 months. Under alternative three, IWA proposes 375 units, but at 25% budget scale-back for each structure in 36 months. For Dubuque infrastructure, in alternative two, the Bee Branch 17th Street/West Locust Storm Sewer Improvements would be started by 2019, but only the first 3,100 feet of the 3,700-foot-long project could be completed. Under alternative three, construction of the Bee Branch 22nd Street/Kaufmann Avenue Storm Sewer Improvements would be limited to an initial proportionate section until additional funds are secured. The West Locust improvements would be delayed until the city is able to budget for the improvements. Reduced funding for the watershed projects reflects a reduction in the number of HUC 12s in the target watersheds. Priority would be given to retaining HUC 12s that serve vulnerable areas. Goals/metrics for the selected HUC 12s would not change. In alternative two, the WMA coordinator would be shared in the E. and W. Nishnabotna Rivers and between the English River and Clear Creek. In alternative three, each watershed would have a half-time coordinator.

Scaling/Scoping alternatives two and three meet the 50% LMI requirement.

d. Program Schedule

Project descriptions include schedules. The IWA will be complete in Sept 2021 (see waiver).

e. Budget Table

See bottom of next page for total budget request from CDBG.

f. Consistency and Other Planning Documents

See Attachment D, Consultation Summary, pages D-122 to D-124; Attachment C, Certifications.

Ten Iowa Watershed Approach Projects

Background for Projects 1-2: City of Dubuque, Bee Branch Creek

Dubuque is one of the oldest cities in the Midwest. With a population just under 60,000, Dubuque is set along the Mississippi River and serves as a commercial, industrial, educational, and cultural hub for the Tri-States Area. Dubuque is known for its hilly terrain, unique architecture, and picturesque river setting.

IWA activities in Dubuque will focus in the Bee Branch MID-URN area. The Bee Branch Creek Watershed is critical to the city; nearly 50% of Dubuque's residents live and work in the historic 6.5-square mile basin. The watershed is a highly developed urban area, with just 3% agricultural land and 23% open space. The Bee Branch watershed is relatively steep, with an average terrain slope of approximately 37%. The overall slope of the main channel in the upland areas is approximately 2%, while the slope of the main channel in the flat Couler Valley area to the outlet is approximately 0.5%. Elevations in the basin range from 594 feet NGVD at the Mississippi River to 962 feet NGVD in the upper reaches. The drainage system consists of both natural channel and closed conduit sections. Storm water runoff moves through the watershed

Budget Table						
Activity Type	Natl. Obj.	CDBG Budget	City Direct	Producer/ Other Direct	Dates	Accomplish.
Watershed Cons.	UN	$61,455,000		$15,876,250	07/16–09/21	25% flow ↓
Watershed Plan.	N/A	$15,635,491		$1,067,951	07/16–09/21	↑ resilience
Infrastructure	LMA	$36,409,550	$24,369,850		12/16–07/20	↓ flood risk
Housing Rehab	LMH	$8,871,667	$800,000		07/16–09/21	400 units
Housing Rehab	UN	$2,220,100			07/16–09/21	100 Units
Application	NA	$164,600				
Admin.	NA	$6,237,820				
Total		**$130,994,228**	**$25,169,850**	**$16,944,201**		

primarily via storm sewer systems. The lower reaches of the Bee Branch Creek were confined to a buried storm sewer from the turn of the 20th century until recently.

Between 1999 and 2011, the Bee Branch received six Presidential Disaster Declarations for floods, with total damage of nearly $70M. The residents, homeowners, and business owners have suffered trauma, health impacts from occupying flood-damaged structures, depreciated home values, and loss of economic prosperity. (From 2004–09, commercial property values grew by 39% citywide, but fell 6% in flood-prone areas.)

The series of flooding events, combined with aging housing, has contributed to lower housing and commercial property values. This has taken a toll on neighborhood residents, many of whom are unable to find quality, affordable housing outside this area. The neighborhood is primarily residential; about 60% of residents live in rental units. An estimated 1,300+ Dubuque homes and businesses in the watershed are prone to flooding, including 70 businesses that employ more than 1,400 people and have more than $500M in annual sales.

The Bee Branch Watershed is entirely within city limits. Work in the Bee Branch Watershed during the past 14 years represents an urban strategy to watershed management that mirrors the comprehensive IWA. In 2001, the Drainage Basin Master Plan for the Bee Branch Creek was developed to “daylight” the creek to an expanded open channel waterway, creating a more natural and resilient environment. The goals were to reduce flooding, preserve historic and affordable housing, maintain affordability, preserve neighborhood and community resources, minimize health and safety risks, and create an environment promoting higher quality of life. During heavy rain, flood waters remain in the green space along the creek instead of flooding streets and homes. The project has progressed quickly. In 2003, the Carter Road Detention Basin was created, followed by another in 2009. A series of permeable alleys was installed throughout the flood-prone area of the Bee Branch; more are planned.

The Disaster (DR-4018): The Bee Branch Creek Watershed has experienced significant flooding, particularly in recent years. In July 2011, a storm event stalled over Northeast Iowa and dropped more than 14 inches of rain in less than 12 hours on parts of the city. The aftermath was devastating. The city's storm drains were unable to handle the water, and substantial flash flooding occurred, tearing up roads and bridges, flooding homes and businesses, and claiming two lives. The reports included 32 sewer back-ups, 259 requests for basement pumping, and 47 sanitary/storm sewer maintenance requests. The Bee Branch watershed was hit hardest.

Project Description #1: Bee Branch Healthy Homes Resiliency Program

With Bee Branch Creek improvements in place to reduce and slow floodwaters and run-off, Dubuque is now able to turn its attention and resources to the nearly 1,300 homes and businesses that have suffered damage from numerous recent flooding events. Many homeowners have experienced flooding on such a regular basis that they have fallen behind on repairs, suffer from chronic mold and mildew problems, and live with the residual structural effects of flood waters that climbed to their basement ceilings. Little if any support exists for residents and small businesses struggling to recover from this devastation. The Bee Branch Healthy Homes Resiliency Program (BBHHRP) is designed to support residential properties with flood damage from the 2011 storms in the low to moderate income areas of Dubuque that are strategically aligned with and extending to and from the Bee Branch Creek restoration project.

National Objective, MID-URN, and Vulnerable Populations: The program will provide homeowner rehabilitation for 160 units under the Low Moderate Housing (LMH) CDBG National Objective, homeowner rehabilitation for 100 units under the Urgent Need National Objective, Residential Rehabilitation for 96 units under the Low Moderate Housing Objective, and rehabilitation for 144 small multi-family housing structures within the target areas of the BBHHRP [Eligible Activity: Housing Rehabilitation – 105(a)(4)]. Each home will be assessed through a Healthy Home Resiliency Approach, which aims to reduce or avoid potential losses from hazards, ensure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. The project will help government, businesses, nonprofits, and residents plan for and reduce the impact of disasters, react during and immediately after a disaster, and take steps to recover after a flood.

The BBHHRP will use four basic strategies to increase resiliency in the homes and neighborhoods: 1) Preventive measures – minimizing the effects of disaster; 2) Preparedness – planning response during disaster; 3) Response – minimizing the hazards created by disaster; and 4) Recovery – returning the community to its pre-disaster state or better. Each housing unit will be inspected to identify the seven principles of a healthy home (dry, clean, pest-free, safe, contaminant-free, ventilated, and maintained), and resiliency work will be completed to address: foundation repairs, foundation raising or shifting to accommodate water levels, water and sewage services, furnace replacement, basement windows, mold and mildew remediation, lead remediation, water heater replacement, soil modification, lateral connection repairs, asbestos, sidewalk and curb cuts, sump pumps, and downspouts. A variety of community resources will improve housing, repair damages, and make homes more resilient to future flooding.

The program will address individual homeowners' needs by increasing education, awareness, and resources needed to live in an urban watershed. Like the community resilience programs in the rural communities, CEA will work with the Bee Branch Healthy Homes Advocate to assess general resilience needs and challenges faced by residents and businesses in the Bee Branch Watershed. From this information, the Homes Advocate will work one-on-one with residents to complete a comprehensive assessment at the household level. The Homes Advocate will assist with education and referrals to increase understanding of what it means to live in a watershed, and what resources and services are available to support development, employment, and neighborhood revitalization.

Clear and compelling evidence shows that unsafe, unhealthy housing leads to wealth depletion, abandoned properties, housing instability, potential homelessness, and increased risk of housing-based illnesses. Evidence also shows that healthy and safe hosing in the most distressed and impacted communities improves health, social, and economic outcomes for families – ultimately creating safer neighborhoods. Dubuque will partner with the Community Foundation to inform, motivate, and educate residents, homeowners, and businesses on how to break the links among unhealthy housing, unhealthy families, and unhealthy neighborhoods. An informed and engaged community is a healthy community.

<u>Current and Future Risks</u>: Work to date in the watershed has decreased the residents' flood risk. But failure to implement BBHHRP leaves people at continued exposure to risks associated with living or working in unsafe, unhealthy structures. Work in the structures will make them more resilient to future flood events; community resilience programming will help people be more prepared for and resilient to future floods.

<u>Vulnerable Populations</u>: The target area contains some of Dubuque's oldest and most affordable housing. More than 66% of the households qualify as LMI. More than 21% of residents in the area received Supplemental Nutritional Assistance Program (SNAP or Food Stamps) in the past 12 months, and 28% of households contain one or more persons with a disability. Fifteen percent of the residents belong to racial or ethnic minority groups, which is more than double the representation of R/E minority groups for all of Dubuque County (7%).

<u>Metrics</u>: *Resiliency Value:* At least one improvement in each home will increase the home's resilience to flooding (e.g., stronger foundation, relocation of furnace). *Social Value:* This neighborhood is inhabited by the most at-risk residents, who often cannot afford to miss work or

find new housing after flooding. Home improvements will result in increased opportunities for resilient, affordable housing for these populations and reduced mental stress associated with the life disruptions common during flood events. *Economic Value:* Improvements to housing structures will lead to measurable increases in property values. *Environmental Value:* Reduction of mold and mildew will lead to improved indoor air quality and reduced asthma rates among residents. The CEA will help to evaluate the activities and metrics.

Replicable Model: Dubuque's approach to extreme flooding in the Bee Branch Watershed represents a forward-thinking, holistic, and replicable strategy that will result in reduced local flood risk, healthier and more resilience structures, and more resilient residents.

Timeline: July–August 2016: Hire and train/certification of inspection and support staff; August–October 2016: Identify benchmarks, goals performance indicator; develop/refine policies and procedures; August 2016–December 2018: Outreach/recruitment/enrollment of 400 residential property owners, home inspections, individual property owners' contracts executed; October 2018–April 2021: BBHHRP units completed and cleared; September 2016–April 2021: Home advocacy interventions in enrolled BBHHRP units; April 2021–September 2021: Close out and completion of contracts, final completion clearance on any remaining units, evaluation; October 2017–September 2021: Home advocacy post-evaluation of BBHHRP interventions.

Budget: The BBHHRP budget of about $11M represents: Rehabilitation of 160 single-unit resident properties at about $16K/structure (LMH Objective); rehabilitation of 100 single-unit resident (homeowner) properties at about $32K/structure (Urgent Need); rehabilitation of 96 single-unit resident properties at about $16K/structure (LMH Objective); and rehabilitation of 144 multi-unit/multi-family properties at about $16K/structure (LMH Objective). Delivery of the Healthy Homes programmatic core by the Home Advocate is included in project delivery costs.

Benefit Cost Analysis: 2.38.

Project Description #2: Bee Branch Watershed Infrastructure Improvements

Imagine waiting out a tornado warning in the apparent safety of your basement. Suddenly, heavy rains produce flash flooding, and floodwaters start pouring in around you. Should you stay in a flooded basement or take your children upstairs? Unfortunately, Bee Branch Watershed residents have faced situations such as this repeatedly since 1999, most recently during the July 2011 rainstorm that prompted a Presidential Disaster Declaration.

The National Climatic Data Center lists 65 flood events in Dubuque County from 1950–2012. Prior to 1973, when construction of a 6.4-mile-long earthen levee and concrete floodwall system was completed along the Mississippi River, the flooding experienced by Dubuque residents was primarily related to the Mississippi River and usually forecast well in advance. Flash flooding, however, occurs with little or no warning. Disasters related to the Mississippi River are rare since 1973. However, intense rainstorms have caused six disasters in Dubuque since 1999.

In addition to private infrastructure damage in 2011, the storm overwhelmed and damaged Dubuque's storm sewer system tasked with conveying the burgeoning creek through the city's at-risk neighborhoods. The damage extends from the Lower Bee Branch Creek just south of Garfield Avenue through the flood prone area, crossing under Garfield Avenue, Rhomberg Avenue, Lincoln Avenue, and E. 22nd Street, all the way to W. 32nd Street. The system includes significant contributing limbs, from west at E. 22nd Street and from the east at E. 24th Street.

The damaged portion of the system, twin 10-foot wide by 12-foot high pipes, occurred where the storm sewer system outlets into the Lower Bee Branch Creek just south of Garfield Avenue, where the sewer crosses under an active Canadian Pacific railroad yard. The 20-foot end section of the storm sewer partially collapsed. Repaired to its pre-disaster condition, the system remains inadequate to handle even storms that are much smaller than the 2011 event. *Based on an* *engineering study by Strand Associates, more than 900 properties are likely to be flooded on average once every 10 years.*

The current capacity of the lower watershed's storm sewer system is limited to handling minor nuisance rains, such as the once-in-five-year events. Based on the 2011 Presidential Disaster Declaration and the five that preceded it, the system clearly does not provide adequate drainage. As a result, flooding has repeatedly damaged hundreds of properties. Strand Associates determined that improvements to the existing system could significantly reduce the flood-prone area to only a handful of properties, which would experience less severe damage.

Using the same principles associated with the Iowa Watersheds Approach, a plan for the Bee Branch Watershed was developed as part of the Drainage Basin Master Plan. The watershed plan reflects a holistic and fiscally responsible approach to increasing the resiliency of the community, mitigating flooding and improving water quality, stimulating investments, and enhancing the quality of life in the flood-prone neighborhoods in the MID-URN area. The watershed plan includes two upstream detention basins, pervious pavement in alleys, and daylighting the buried Bee Branch Creek to allow storm water to move safely through the area. The system has two remaining shortcomings: 1) getting the floodwaters safely into the newly restored creek; and 2) getting the floodwaters from the upper reach of the Bee Branch Creek through an active, multi-track railroad yard to the lower reach of the Bee Branch Creek.

Three Projects: The proposed mitigation strategy has three components. The most important Bee Branch infrastructure improvement is the *Bee Branch Railroad Culvert Infrastructure Improvement Project*, which will augment the storm sewer drainage system damaged in July 2011 that currently conveys storm water through the Canadian Pacific railroad yard at 506 Garfield Avenue. The improvement involves the installation of six 8-foot-diameter culverts using tunneling methods from the Lower Bee Branch Creek approximately 165 feet through Canadian

Pacific Railroad right-of-way to a proposed junction box. It also includes the construction of five 12-foot wide by 10-foot high box storm sewers from the proposed junction box 200 feet north toward Garfield Avenue and the Upper Bee Branch Creek.

The second most important infrastructure improvement is the *Bee Branch Kaufmann Avenue Storm Sewer Improvements Project*. Based on Strand's hydraulic modeling of the existing system using XPSWMM, the storm sewer between Hempstead and Central Street has less than a 10-year storm capacity. It is clearly the "bottleneck" of the Kaufmann Avenue drainage system. The proposed new system will comprise a 10-foot by 6-foot reinforced concrete box culvert designed to handle the 25-year storm through the Kaufmann Avenue Project Corridor. The layout allows for all storm water to be conveyed through the storm sewer just west of Kane Street. During a 25-year event, some overland flow from the upstream portions of the watershed will drain along Kaufmann Avenue into the project corridor. Large high-capacity inlets (three were assumed for the construction cost) will be placed in the terrace along Kaufmann Avenue to capture this overland drainage. In addition, 80 standard single-grate inlets will be provided with the local storm sewer and connecting to the new box culvert. The project requires the reconstruction of the street and the relocation of existing underground utilities along the right-of-way.

The third most important infrastructure improvement is the *Bee Branch West Locust Storm Sewer Improvements Project*. Based on the results of Strand's modeling, no portions of the existing West Locust Street storm sewer systems have the capacity for a 25-year event, which would require the replacement of the entire system with new piping. The proposed West Locust Street corridor storm sewer will be a 10-foot by 5-foot RCBC from 17th Street to approximately 280 feet west of Angella Street; 10-foot by 4-foot RCBC from 280 feet west of Angella Street to 400 feet west of Kirkwood Street; and 8-foot by 4-foot RCBC from 400 feet west of Kirkwood

Street to Rosedale Avenue. This layout allows for all storm water to be conveyed within the storm sewer just west of Rosedale Avenue. During a 25-year design storm, excess overland flow from upstream portions of the watershed will drain along Rosedale Avenue into the West Locust Street project corridor. Large high-capacity inlets will be placed in the terrace along West Locust Street near Rosedale Avenue to capture the overland drainage. In addition, 100 standard single grate inlets and 28 high-capacity inlets will be provided with the local storm sewer and connecting to the new storm sewer system. The project requires the reconstruction of the street and the relocation of existing underground utilities along the right-of-way.

National Objective, MID-URN, and Vulnerable Populations: These infrastructure projects meet the National Objective of L/M Income Area Benefit (LMA). The projects help address unmet needs in an area that was subject to a Presidential Disaster Declaration in 2011. The target MID-URN area of Bee Branch Creek, which is also an LMI area, will have significantly reduced flood risk following completion of these projects.

Consultation: In response to the repeated disasters, the City of Dubuque engaged engineering consultants, state and federal partners, citizen advisory committees, and the general public to help create, fund, and implement a watershed plan to address the flooding. The plan outlines multiple improvements throughout the Bee Branch Watershed that will benefit upstream and downstream properties. Dubuque hired a full-time communications specialist to develop and implement communication plans to inform and engage residents and stakeholders impacted by the various Bee Branch Watershed improvement projects. The plan identifies goals, messages, and objectives for communicating with the residents, schools, businesses, churches, daycares, and community centers most impacted by construction. The proposed improvements through Canadian Pacific property reflect input of Canadian Pacific engineers and staff.

Metrics: *Resiliency Value*: Infrastructure improvements will hold water onsite for slow release, as opposed to quickly flushing it downstream. This will lead to a measurable reduction in peak storm water flow. A reduction of expected property damages from future flash flooding events is also expected. *Social Value*: As a STAR certified community, Dubuque aims to ensure that at least 85% of residents live within a half-mile walk of a park or other green infrastructure. Completion of these infrastructure projects will help meet this goal. *Economic Value*: Measureable increases in property values are expected in the Bee Branch neighborhood to rates that are more in line with the rest of Dubuque. *Environmental Value*: Detention of water onsite will lead to a measurable improvement in water quality downstream as the water is captured and cleaned via permeable surfaces.

Timeline: The City of Dubuque will manage the design and the hiring of a contractor to construct the improvements on the following schedule:

Railroad Culvert Infrastructure Improvement Project: July 2016–December 2016: Establish agreements with landowners, selection of contractors; January 2017–March 2017: Contractor submittal review and construction preparatory work: April 2017–September 2018: Construction.

Kaufmann Avenue Storm Sewer Improvements Project: July 2017–December 2017: Selection of contractor; April 2017–September 2017: Construction.

West Locust Storm Sewer Improvements Project: July 2020–December 2020: Selection of contractor; April 2021–September 2021: Construction.

Budget: The estimated construction cost of the Railroad Culvert Infrastructure Improvement Project is $17,900,000. The estimated construction cost of *Bee Branch Kaufmann Avenue Storm Sewer Improvements Project* is $11,500,000. The estimated construction cost of *Bee Branch West Locust Storm Sewer Improvements Project* is $7,600,000.

Benefit Cost Analysis: 2.10

Project Description #3: Upper Iowa River Watershed

The 1,000-square-mile (640,900 acres) Upper Iowa River, a tributary of the Mississippi River, originates in Minnesota, but 78% of its watershed is in Northeast Iowa (Attachment E, Map 6). The Upper Iowa River Watershed (UIRW) is part of the Driftless Region of Iowa. Its karst topography features limestone bluffs that rise 250 to 450 feet above the valley floor, dozens of coldwater trout streams, nearly 3,000 sinkholes and waterfalls, and hundreds of springs. Cropland accounts for more than 40% of the watershed, which also includes grassland (35%) and hardwood forests (19%). The EPA and Iowa recognize the UIRW as a *Priority Watershed*. Iowa designates 244 miles of the Upper Iowa River as *High-quality Resource Waters* or *High-quality Waters,* and the Upper Iowa was among the initial rivers included in the *National Wild and Scenic River* System.

The UIRW is a popular tourist destination. It has excellent walleye and bass fishing, but is best known for its 152 miles of coldwater trout streams, which lure anglers from around the world. A study conducted by Trout Unlimited found recreational angling in the Driftless Area generates more than $1B in annual economic benefit to local communities. The Upper Iowa is a popular water trail: *National Geographic Adventure Magazine* listed canoeing the Upper Iowa as one of the top 100 adventures in the United States. More than 150 protected species of animals and plants live in the watershed, which also harbors endangered ecosystems. Unfortunately, frequent flooding and severe erosion are causing serious damage to the streams and river.

<u>Additional Mitigating Information:</u> NE Iowa Resource Conservation and Development, SWCDs in Iowa and Minnesota, state and federal agencies, NGOs, businesses, and landowners formed the UIRW Alliance in 1999 to improve water quality and watershed health. Since then, they have conducted one of the longest water monitoring projects in Iowa, documenting the water-quality benefits of their projects, which include reforestation and CRP plantings on highly

erodible slopes, animal feedlot renovation, stream bank stabilization, wetland restoration, and other practices. The group is now working toward a WMA to strengthen the partnership.

Northeast Iowa RC&D published the “Upper Iowa River Watershed: Assessment and Management Strategies” in 2004 to document the watershed’s condition and guide actions to improve water quality. Parts of the report are dated, but will provide foundational information for the IWA’s new hydrologic assessment and watershed plan.

The North Bear Creek (NBC) Project, a UIRW subwatershed, demonstrated reduction of storm water discharge by constructing 18 small retention structures in the upper reaches of the NBC watershed. Four structures use the road as a detention structure or dam, improving the width, visibility, and safety of the road while also protecting downstream creeks, the river, and infrastructure from flash floods, sedimentation, and nutrient loading. Partners are eager to carry out similar projects using roads in other strategic locations of the UIRW.

The Disaster (DR-4135): Torrential rains on June 21, 2013, triggered flash flood warnings for more than half of Iowa’s 99 counties. Another major storm followed on June 23. Flash flooding and rapid runoff damaged road networks, homes, and businesses; caused the evacuation of campgrounds; and damaged trout habitat. Storm damage severely impacted the tourism industry, which is the second largest area employer.

The most impacted region includes Tracts 9601, 9602, 9603, and 9604 in Allamakee County, where infrastructure damage totaled $2,752,381 (Phase I, Exhibit B). Overland and creek flooding washed out more than 10 miles of roadway in the UIRW. Many rural roads remain closed today because of flood damage that occurred in 2013 and more recently. Repeated flooding has strained county budgets; county officials cannot keep up with the need to replace bridges and culverts.

Environmental degradation has also occurred in distressed regions of the watershed in Winneshiek and Allamakee counties. Nearly the entire UIRW suffers from environmental distress, with the presence of Category 4 or Category 5 Impaired Waters as defined by section 303 of the Clean Water Act. Nutrient and sediment loading of streams and rivers increased through disaster DR-4135, magnifying existing problems in the watershed and downstream. The impaired waters include the main stem of the river and multiple tributaries. Impairments include the presence of bacteria (*e. coli*), nitrates, and turbidity, all with detrimental effects for the river's ecosystem (particularly trout) and the region's tourism economy.

In addition to environmental and infrastructure damages, this disaster directly impacted individuals throughout the watershed. DR-4135 did not trigger federal individual assistance programs, so Allamakee County organized an assistance program funded by donations to help low income populations recover. The program received applications from more than 40 homeowners and 10 businesses to replace water heaters, furnaces, carpet, drywall, and other materials in their residences or businesses. The county only had funds to fulfill 30% of requests. The Iowa Individual Assistance Grant Program also made 194 awards totaling $164K for personal property and home repair assistance in the area.

The Iowa Department of Agriculture and Land Stewardship (IDALS) estimated that it would cost $9,247,220 to repair the damage from environmental degradation.

<u>National Objective, MID-URN, and Vulnerable Populations</u>: The project meets the National Objective of Urgent Need. The project will help address unmet needs in an area subject to a Presidential Disaster Declaration in 2013. As a result of DR-4135, the MID-URN area of the UIRW encompasses nearly the entire watershed in Winneshiek and Allamakee counties, as demonstrated in Phase I, Exhibit B. The entire HUC 8 is compromised by water-quality issues and is vulnerable to flash flooding and erosion. No selected service area qualifies as LMI, but

several census tracts in western Allamakee County include L/M income populations; at least two HUC 12s will be selected for projects with a direct benefit to these populations.

Perennial Cover/Grass	28	Prairie STRIPS	5
Floodplain Restoration	10	Terrace	10
Small Farm Pond (0.25–2 acres)	10	Buffer Strips	10
Medium Farm Pond (2–5 acres)	30	Bioreactor	5
Large Farm Pond (5+ acres)	3	Small Wetland	10
Sediment Detention Basin	20	Large Wetland	4
Storm Water Detention Basin	10	Saturated Buffer	4

The UIRW is no stranger to flood events similar to DR-4135. According to the NWS, *all or parts of the UIRW have experienced flooding in each of the past eight years*. In 2013 alone, the NWS issued 13 flash flood warnings for the watershed. Thus, while the proposed projects in Winneshiek and Allamakee counties will target the unmet needs from DR-4135, they will also help to address annual flooding and water-quality challenges in the watershed. The WMA will select up to six HUC 12 watersheds for project implementation. An example distribution of the types and numbers of likely projects appears above. The WMA will finalize selection and distribution of projects. Resilience programming will especially focus in the vulnerable tracts in western Allamakee County.

Consultation: A public engagement event on August 20, 2015, in Winneshiek County drew representatives from Winneshiek and Allamakee County Boards of Supervisors, agencies and NGOs (NRCS, NE Iowa RC&D, SWCD offices, Farm Bureau, Seed Savers), and landowners/private citizens. The Fillmore County, Minn., SWCD District Administrator noted that this project complements watershed projects in the Minnesota reaches of the UIRW. Minnesota has partnered with Iowa in the UIRW for more than a decade. Landowners and others expressed their enthusiasm for more retention structures and for preservation of natural resources. Participants expressly stated that farmers should drive this program.

Metrics: *Resiliency Value*: Activities in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes) at the outlet of each HUC 12. *Environmental Value*: Project water-quality goals call for the reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved resilience to flooding, especially in the L/M income area, through programs to promote awareness and develop a community-wide flood resilience action plan. *Economic Revitalization*: This project will have an (unquantifiable) benefit to the local economy through preservation of coldwater fishing streams. Researchers will evaluate these metrics by collecting hydrologic data with support from the CEA.

Timeline: July 2016–March 2017: Meetings, forums, submission and acceptance of Chapter 28E Agreement documents for formation of new WMA; April 2017–September 2020: Social Resilience Programming core activities (community engagement, networking, needs assessment); April 2017–December 2017: Collection of data and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; October 2018–March 2019: Establish agreements with landowners, select contractors; April 2019–September 2020: Design and construct projects; October 2020–September 2021: Post-construction data collection and analysis, work with WMA members to help them define future steps.

Budget: The estimated costs associated with the construction and design in the UIRW totals \$9,207,500 (\$6,990,000 from HUD, \$2,217,500 in landowner contribution). Other items include: \$350,000 for hydrologic assessment and watershed plan; \$375,000 for WMA coordinator; and \$1,200,000 for data collection, modeling, and analysis. Benefit Cost Analysis: 7.34

Project Description #4: The Upper Wapsipinicon River Watershed

Although the Upper Wapsipinicon River Watershed (UWRW) begins in Southeast Minnesota, most of this long narrow watershed is in the northeast corner of Iowa, encompassing 991,980 acres and portions of 11 Iowa counties (Attachment E, Map 7). The watershed lies in the Iowan Surface Region, characterized by broad, gently-rolling slopes and heavily wooded floodplains. This agricultural watershed, of which more than 85% is in row crops, pasture, or grass, is also heavily used for recreation, including fishing, canoeing, hunting, and wildlife watching. According to a survey by ISU's Center for Agriculture and Rural Development, visitors made approximately 226,801 trips to the Wapsipinicon River in 2009 and spent $6M on outdoor recreation activities.

Additional mitigating information: The Wapsipinicon River is a State of Iowa Protected Water Area (PWA) known for its public greenbelt corridor, which includes floodplain forests and wetlands, steep bluffs, and wildlife habitat, all with associated water-quality benefits. The Iowa DNR found the Wapsipinicon River to have the longest continuous stretch of natural and scenic river corridor in the Iowan Surface Region. Voluntary public lands acquisition in response to flood damage, water-quality issues, and recreational interests over the last several years has enhanced the river's riparian ecosystem. In Buchanan County alone, the local County Conservation Board manages 10 areas adjoining the river, and the Iowa DNR manages five riverside areas. Sixteen of the 27 communities in the watershed are located on, or adjacent to, a stream or river, providing recreational and economic opportunities that are impacted by flooding.

There are currently 159 miles of impaired waters in the UWRW, including 17 segments of impaired streams, most of which are on the Wapsipinicon River or Buffalo Creek (main tributary to the Wapsipinicon). In September 2014, 13 communities, eight counties, and nine Soil and Water Conservation Districts united to form the Upper Wapsipinicon River Watershed

Management Authority (WMA). Many of these partners report being motivated by the declining water quality and increased in-stream sedimentation in the Upper Wapsipinicon River and its tributaries. Because the watershed is long and narrow, most of the communities are on or close to river or stream corridors and are therefore concerned about the increased frequency and extent of flooding. At a recent WMA meeting, the Independence representative expressed frustration with the sedimentation in the river and the constant threat of flooding, potentially so destructive to downtown infrastructure. The Independence representative reminded the WMA partners that the city has already physically buried the main floor of their downtown businesses in an attempt to deal with flooding issues.

One of the first actions of the UWR WMA was to plan, fund, and implement a comprehensive, watershed-wide, water-quality testing effort. The UWR WMA now monitors 20 sites. With assistance from Coe College and NE Iowa Resource Conservation and Development Inc., water-quality data are recorded and analyzed, and will soon be published on the Upperwapsi.com website. The WMA communities are also meeting as a committee of the larger group to share information, learn about what other communities are doing to deal with storm water runoff and water-quality issues, and to inform WMA planning. These efforts demonstrate a commitment to achieving, measuring, and sharing long-term success in the UWR WMA.

The Disaster (RD-4135): Torrential rains that began on June 21, 2013, caused the National Weather Service (NWS) to issue flash flood warnings for more than half of Iowa's 99 counties. Parts of the northern end of the UWRW received up to six inches of rain overnight; by morning, residents of Independence, the largest community in the watershed, were sandbagging around businesses and homes. Iowa's wettest spring on record had left the region with already saturated soils; with the latest heavy rains, the NWS forecasted that the UWR in Independence would crest at record levels. Multiple businesses and residences were evacuated, and community members spent the night filling sandbags and building sandbag levees. However, the flat topography and nature of flash floods created forecasting challenges with this event. The river eventually crested above flood stage, but not as high as forecasters had projected. IDALS estimated that it would cost $9,228,674 to repair the damage from environmental degradation; the Iowa Individual Assistance Grant Program made 50 awards totaling $40,700 for personal property and home repair assistance in the area.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need. The project will help address unmet needs in an area subject to a Presidential Disaster Declaration in 2013. The flood hit portions of lower Buchanan County, Tract 9506, in the UWRW the hardest; these areas qualified as impacted under criterion D of Appendix G–Environmental Degradation. In the community of Quasqueton, eight inches of rain fell in less than three hours. The designated sub-county area had excessive soil loss as a result of the heavy rains, resulting in increased sediment delivery to waterways in the immediate vicinity, as well as additional downstream effects. If another event occurs, the area can expect to see further loss of nutrients and soil, which will reduce farmland productivity, impact the local economy, and accelerate environmental degradation downstream.

The sub-county area, Tract 9506 in Buchanan County, has prior documented environmental distress in the form of a Category 5 Impaired Waters. The presence of nutrients increased because of the heavy rainfall that occurred in Disaster DR-4135, magnifying existing problems in the watershed and downstream of this sub-county area. Buffalo Creek is impaired as the result of its declining freshwater mussel population. (Freshwater mussels are important filter feeders. Their decline in species diversity is likely from siltation, destabilization of stream substrate, stream flow instability, and high in-stream levels of nutrients.)

Perennial Cover/Grass	15	Prairie STRIPS	5
Oxbow Restoration	5	Terrace	9
Floodplain Restoration	3	Buffer Strips	25
Small Farm Pond (0.25–2 acres)	14	Bioreactor	5
Medium Farm Pond (2–5 acres)	25	Small Wetland	4
Large Farm Pond (5+ acres)	2	Large Wetland	2
Sediment Detention Basin	20	Saturated Buffer	5
Storm Water Detention Basin	7		

A sample distribution of the types and numbers of projects for the Upper Wapsipinicon River is listed (left). The WMA will finalize the selection and distribution of projects based on the selection criteria. Projects in the UWRW will target practices that focus on runoff reduction to lessen flooding and retain topsoil and sediment; these practices could include farm ponds and retention ponds, which capture and store water temporarily, allowing it to be released downstream more slowly.

Resilience programming will include both Buchanan and Delaware counties, with the initial assessment helping to identify the most vulnerable areas for programmatic focus. This will likely include the communities of Quasqueton, Rowley, and/or Robinson.

Consultation: During the community engagement meeting held on August 5, 2015, watershed residents demonstrated their support for the IWA. Discussion centered on ways to communicate information on current efforts, which focus on protecting the corridor and reducing flood risk. Residents emphasized the strong engagement the watershed receives from stakeholders and producers in the area. Meeting attendees showed enthusiasm and dedication for implementing the project, as well as eagerness to provide assistance and resources.

Metrics: *Resiliency Value*: This approach in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes) at the outlet of the selected HUC 12s. *Environmental Value*: Project water-quality goals include reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of the HUC 12s. *Social Value*: This project will result in improved resilience to flooding, especially in the MID-URN areas, through programs to promote awareness and a community-wide flood resilience action plan. *Economic Revitalization*: Expected economic revitalization includes increased use (and associated tourism income) of the river as a source of recreation (See BCA, unquantifiable benefits). Further, implemented projects will help to retain soil on the land, preserving Iowa's agricultural economy. Researchers will evaluate these metrics through the collection of scientific data, and through the activities of the CEA.

Project Timeline: July 2016–March 2017: Collection of data (topography, soil conditions, etc.) and development of hydrologic assessment of the full HUC 8 watershed; April 2017–September 2017: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–June 2021: Implementation of Resilience Programming in the project area (community engagement, networking, needs assessment); October 2017–December 2017: WMA selects final sites and projects for implementation; January 2018–June 2018: Establish agreements with landowners, selection of contractors; July 2018–June 2020: Construction of projects. July 2020:–June 2021: Post-construction data collection and analysis; July 2021–September 2021: Final reports, work with WMA members to help define future steps and funding.

Budget: The estimated costs associated with the construction and design in the UWRW totals $6,122,500 ($4,660,000 from HUD, $1,462,500 in landowner contribution). Other items include: $550,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $800,000 for data collection, modeling, and analysis.

Benefit Cost Analysis: 18.93

Project Description #5: Middle Cedar River Watershed

The Middle Cedar River Watershed (MCRW) is a 1.5M-acre watershed that spans parts of 10 counties in Eastern Iowa (Attachment E, Map 8). It encompasses primarily the Iowan Surface landform, characterized by long, gently rolling hills and well-developed stream networks. The MCRW is part of the Cedar River Basin that stretches from Minnesota to Southeast Iowa, where it meets the Iowa River. The MCRW includes some of the richest farmland in the nation. Seventy-three percent of the land is dedicated to row crop agriculture and seed corn production. The MCRW also supports a substantial portion of Iowa's urban areas, including Cedar Rapids (the second largest city in Iowa), Waterloo, and Cedar Falls. The river runs through these metropolitan areas and provides a sense of place. Each community is exploring opportunities to invest in river enhancements and reduce environmental impacts, from policy changes that disallow development in the floodplain and integration of green infrastructure (Cedar Falls) to consideration of recreational amenities such as whitewater parks (Waterloo). The river is of particular interest to Cedar Rapids, which uses shallow groundwater under the influence of the river for its municipal water supply.

Additional Mitigating Information: Interest in opportunities to mitigate flood risk and improve water quality runs high in the MCRW. The Cedar River Watershed Coalition formed in response to the 2008 flood and brought together concerned citizens, farmers, soil and water commissioners, and local governmental staff and elected officials. The County Conservation Boards organized another large-scale initiative to develop the Cedar River Watershed Education Program. The program produced television and radio PSAs to educate homeowners and farmers about ways to reduce runoff. The IWA will complement and enhance these programs.

In 2013, the MCRW was identified as a priority watershed under the Iowa Nutrient Reduction Strategy. The statewide Water Quality Initiative (WQI) selected five HUC 12s in the

Middle Cedar for initial implementation of projects aimed at improving water quality. The City of Cedar Rapids led a 2015 effort to organize the Middle Cedar Partnership Project (MCPP) to directly support WQI watershed projects. The MCPP received $2M from USDA-NRCS through the Regional Conservation Partnership Program (RCPP) and leveraged another $2.3M in partner contributions. The MCPP has drawn support from 16 partners, including state agencies, agribusinesses, nonprofits, local conservation districts, and universities. The WQI and MCPP projects in the Middle Cedar will complement IWA projects, further reducing downstream flooding and improving water quality. WQI and MCPP projects will benefit from the hydrologic assessment and watershed plan developed by the IWA.

An effort is currently underway to form a WMA for the MCRW that would unite 47 cities, 10 counties, and 10 soil and water conservation districts. The group will pursue an aggressive timeline for WMA formation. Several counties and cities in the MCRW have indicated support, and those already active in other WMAs will provide leadership and assistance.

<u>Two Disasters (DR-4126, DR-4135):</u> Portions of the MCRW were impacted by two severe weather events that resulted in Presidential Disaster Declarations in 2013. The most significant and damaging of these occurred in 2013, when severe storms produced more than 10 inches of rain in late May and early June. Locals feared river levels would reach those of the historic 2008 flood. Cities deployed HESCO barriers, and residents filled and placed sandbags to protect their homes and businesses. The Cedar River at Vinton crested at 18.5 feet, the fourth highest crest at this location, causing widespread damage throughout the community and rural areas. Three weeks later, severe storms hit the region again; the area experienced significant runoff from agricultural fields and urban infrastructure into already high streams and rivers.

While river levels fell short of the 2008 flood, damages were significant. In Benton County alone, infrastructure damages totaled $4,955,844 (Phase I, Attachment B). Widespread overland flooding washed out gravel roads throughout the county as well as several recreational areas, including many miles of a rails-to-trails park maintained by Benton County Conservation. In Vinton a deteriorating wood truss bridge was inundated for 72 hours, closing a main link between the community and rural residents. The lost bridge and multiple road washouts required significant detours and additional travel time for emergency responders, threatening the health and safety of rural residents.

In adjacent Tama County, which was hit by the same events, the loss of valuable topsoil trumped infrastructure damage. Heavy rains on saturated soils resulted in significant runoff, leading to the loss of tons of topsoil and the leeching of nutrients into the drainage network across the entire watershed. In the MCRW within Tama County, soil losses from DR-4126 were estimated at *2.5–5.0* tons of soil per acre. IDALS estimated that it would cost $27,426,813 to repair the damage from environmental degradation.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need. It will help address unmet needs in an area subject to two Presidential Disaster Declarations in 2013. The MID-URN area of the MCRW, impacted by flooding, includes portions of Benton, Tama, and Buchanan counties, as demonstrated in Phase I and Phase II, Exhibit B. The population in Census Tracts 9602, 9603, and 9604 in the Hinkie, Mud, Opossum, and Wildcat Creek watersheds, within the MID-URN area in Benton County, represent an LMA area, but the area is not primarily residential; proposed projects in those four HUC 12s will have a direct benefit to this area. The project will reduce flood damages to infrastructure, agricultural lands, and urban areas of Vinton and improve water quality for local residents. Local homes will benefit from flood risk reduction.

Local transportation infrastructure will incur less damage (in the four identified HUC 12s, flooding washed out gravel roads, making them impassable at more than 25 locations and causing dangerous loss of public and emergency access).

The WMA will select six additional HUC 12s in Benton and Tama counties for a total of 10 HUC 12 watersheds. An example distribution of the type and number of projects likely to be implemented in the MCRW is listed above. The WMA will finalize the project sites and types based on the selection criteria. The cumulative impact of MCRW activities will also include improved municipal water for Cedar Rapids.

Perennial Cover/Grass	60	Oxbow Restoration	4
Floodplain Restoration	5	Terrace	10
Small Farm Pond (0.25– 2 acres)	20	Buffer Strips	30
Medium Farm Pond (2–5 acres)	50	Bioreactor	5
Large Farm Pond (5+ acres)	20	Small Wetland	10
Sediment Detention Basin	20	Large Wetland	20
Storm Water Detention Basin	20	Saturated Buffer	7

Resilience programming will include Tama, Benton, and Buchanan counties, with the initial assessment helping to identify the most vulnerable areas for programmatic focus. This will likely include the communities of Vinton and Traer.

Metrics: *Resiliency Value*: This approach in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes), at the outlet of each HUC 12. *Environmental Value*: Water-quality goals call for the reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved resilience to flooding, especially in the Vinton L/M income area, through programs to promote awareness and a community-wide flood resilience action plan. *Economic Revitalization*: IWA projects will help reduce future soil loss and erosion, helping to preserve agricultural productivity. Metrics will be evaluated by the collection of scientific data, and activities of the Center for Evaluation and Assessment.

Local input: IFC staff participated in a Benton County Board of Supervisors meeting on Sept. 1, 2015, and a Black Hawk County Conservation Board meeting on August 26, 2015. Both groups expressed enthusiasm for the program; they particularly appreciated the fact that participation is voluntary and that they could hire a WMA Coordinator. Participants suggested that these efforts might include levees and voluntary land acquisition as possibilities. (Levees are currently not part of this program, but land acquisition may be considered.)

Project Timeline: July 2016–March 2017: Meetings, forums, and the submission and acceptance of Chapter 28E Agreement documents for formation of new Watershed Management Authority; July 2016–June 2019: Social Resilience Programming core activities (community engagement, networking, needs assessment); April 2017–December 2017: Collection of data (topography, soil conditions, etc.) and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; October 2018–March 2019: Establish agreements with landowners, selection of contractors; April 2019–September 2020: Construction of projects; October 2020–September 2021: Post-construction data collection and analysis, work with WMA members to help them define future steps.

Budget: Estimated costs associated with the construction and design totals $16,800,000 ($12,775,000 from HUD; $4,025,000 in landowner contributions). Other items include: $550,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $2,000,000 for data collection, modeling, and analysis.

Benefit Cost Analysis: 12.79.

Project Description #6: Clear Creek Watershed with Coralville Infrastructure

The Clear Creek Project includes projects in the upper watershed (Attachment E, Map 9) to reduce flooding and improve water quality, and infrastructure projects in Coralville to protect commercial and residential property from flooding. The impact of these two activities will be cumulative in Coralville, which will have flood protection by infrastructure to the 500-year flood, and upstream measures that will reduce flood flow and provide additional protection.

The Clear Creek Watershed (CCW) covers 66,132 acres (104 square miles), spanning parts of Iowa and Johnson counties in Southeast Iowa. Clear Creek empties into the Iowa River at Coralville. The watershed lies entirely within the Southern Iowa Drift Plain, comprised of glacial deposits broken up by many small creeks that have molded the landscape into rolling hills and valleys. Abundant rainfall and fertile soils allowed the conversion of the natural prairie and forested landscape to large-scale intensive agriculture, consisting mainly of a corn-soybean rotation. Eighty-four percent of cropland in the upper portions of the watershed is classified as highly erodible. Intensive agriculture on these soils in a moist climate, coupled with stream channelization in the headwaters and increasing urbanization in the lower portions of the watershed, contribute to flash flooding and water-quality degradation after intense spring storms.

Additional Mitigating Information: A WMA is in the final stages of formation in the CCW, led by the cities of Coralville, Iowa City, North Liberty, Tiffin, and Oxford; Johnson County; and the Soil & Water Conservation Districts (SWCD) in both Johnson and Iowa counties. These groups agreed to work together to improve and protect the CCW. The Clear Creek Watershed Enhancement Board (CCWEB) has also been active since 1998.

Two Disasters (DR-4119, DR-4126): Torrential rains on April 17, 2013, resulted in the declaration of DR-4119. Coralville reported six inches of rain in 24 hours. Following Iowa's wettest spring on record, these storms created significant runoff. A USGS gauge near Coralville reported a crest of nearly 7,000 cfs (normally 100 cfs). Flooding caused severe washouts and loss of roadway materials on 60 road sections in Johnson County at a cost of $114K. More severe weather hit the area in late May and early June 2013. Impacts from the second disaster focused more on flooding of the Iowa River. Coralville and Iowa City, at Clear Creek's outlet to the Iowa River, braced for potentially historic flooding. Volunteers filled sandbags to protect public facilities and private homes, and the University of Iowa deployed seven miles of HESCO barriers along its riverfront campus. Meanwhile, Clear Creek in Coralville experienced backwater effects as the Iowa River reached its fourth highest crest in history. Damage to Coralville recreational trails totaled $374K. Numerous homes took on water, including many that had never before flooded. Federal assistance was not available for individual assistance for property damage. The Iowa Individual Assistance Grant Program made 47 modest awards totaling $31.5K for personal property and home repair assistance in Johnson County after these floods. IDALS estimated it would cost $4,676,492 to repair damage from soil loss.

<u>Coralville Infrastructure</u>: The City of Coralville is set along Clear Creek where it joins the Iowa River — a position that leaves it particularly vulnerable to flooding. Flooding originates from either (or both) Clear Creek and backwater from the Iowa River. Recent floods (from 1993 to 2013) have had a devastating impact on the local economy, causing many businesses to relocate. Unprotected storm sewer discharge points along the creeks and river leave systems vulnerable to backwater. The city determined that it was imperative to construct flood mitigation projects, especially for the existing storm sewer system, to protect businesses and residents from future floods. Today Coralville is finished or nearly finished implementing most of these flood protection improvements, but two major projects remain incomplete: a flood wall on the south side of Clear Creek and the reconstruction of Stormwater Pump Stations (PS) 7 and 8. *These pump stations are now the "weak links" in Coralville's Flood Protection System*. Failure to

update these pump stations may allow flood water to bypass the other flood protection improvements and cause catastrophic flooding. The proposed infrastructure project in Coralville is to modify PS 7 and 8 to the same design level as all other Coralville flood mitigation projects. This is the most cost-effective solution to provide consistent flood protection throughout Coralville (the city regulates to the 500-year flood plus one foot freeboard) to minimize property risks. Without these improvements, flood risk in these regions remains unchanged from 2013.

The flood-vulnerable area includes 178 acres of developed land with 116 properties, including commercial buildings and multi-family residences, critical infrastructure, U.S. Highway 6 (a major transportation corridor), an AT&T Point of Presence building (covering communications for all of Southeast Iowa), and a Mediacom Internet switch gear. PS 7 protects about 42.8 acres of developed property and PS 8 protects about 135.9 acres. This project will benefit every property owner and tenant within these regions (Attachment E, Maps 10-11, Diagrams 1-2).

National Objective, MID-URN, and Vulnerable Populations: *Infrastructure*: The project will help address unmet needs in an area subject to Presidential Disaster Declarations in 2013. The project meets the National Objective of L/M income, Area Benefit (LMA). This area qualifies as most impacted and distressed due to continued flood damage, including two 2013 floods (DR-4119, DR-4126). It qualifies as an unmet recovery need; the pumps remain unmodified and unable to protect previously impacted areas from future flooding.

Watershed Projects: Portions of Johnson County, Tract 103.01, and Iowa County, Tract 9601, were hardest hit in the CCW, suffering environmental degradation from DR-4119. The project meets the National Objective of Urgent Need (UN). The service area represents an LMA area, but the area is not primarily residential. The sub-county area had excessive soil loss as a result of the heavy rains. An estimated 0.16–0.30 tons of soil were lost per acre, resulting in increased sediment delivery to waterways. Excessive topsoil loss degraded the productive

Perennial Cover/Grass	10	Prairie STRIPS	5
Oxbow Restoration	2	Terrace	5
Floodplain Restoration	3	Buffer Strips	7
Small Farm Pond (0.25–2 acres)	10	Bioreactor	5
Medium Farm Pond (2–5 acres)	24	Small Wetland	5
Large Farm Pond (5+ acres)	5	Large Wetland	3
Sediment Detention Basin	15	Saturated Buffer	5
Storm Water Detention Basin	10		

capability of the land, endangering the local agricultural economy. The event also introduced nutrients into the streams, including nitrates and phosphorus.

IWA projects will be realized in Upper and Middle Clear Creek based on the distribution of MID-URN. Examples of the types and numbers of projects are listed in the above table. The WMA will finalize project selection and distribution based on criteria (see Soundness of Approach, Program 1). The IWA will provide resources to existing partners and stakeholder groups and build on current collaborations. Community resilience programming (see Soundness of Approach, Program 2) in the CCW will help improve local flood resilience.

Metrics: *Resiliency Value*: The watershed projects will reduce flood flows at the outlet of Middle Clear Creek by 25%, thereby reducing damage to repetitive loss sites (agricultural lands, roads, infrastructure, homes). The Coralville infrastructure project will protect at least 116 properties. *Environmental Value*: Project water-quality goals call for reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of Middle Clear Creek. *Social Value*: This project will result in improved resilience to flooding, especially in the Coralville LMA, through programs to promote awareness and a community flood resiliency action plan. *Economic Revitalization*: IWA projects will reduce future soil loss and erosion, preserving agricultural productivity. Infrastructure mitigation will also create an estimated 16 jobs in Coralville in year one (see BCA). These metrics will be evaluated by the collection of hydrologic data, and through the activities of the CEA.

Local Input: An August 2015 event at the Johnson County Administration Building featured community discussion of the IWA and inclusion of the CCW in the proposal. The Johnson County Board of Supervisors supports IWA for the resources it will provide to CCW residents and the connections it will build among urban and rural communities. Participants noted the need for funding to apply practices to retain soil health, improve water quality, and reduce flooding.

Timeline: *Watershed Projects*: July 2016–March 2017: Meetings with partners, construction of shovel-ready practices; April 2017–December 2017: Collection of data (topography, soil conditions, etc.) and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; July 2018-June 2021: Social Resilience Programming core activities; October 2018–March 2019: Establish agreements with landowners, selection of contractors; April 2019–September 2020: Construction of projects; October 2020–September 2021: Post-construction data collection and analysis, work with WMA members to define future steps. *Infrastructure*: July–October 30, 2016: Engineering design plans and specifications; November 2016–December 2016: Permitting; January–February 2017: Construction and Letting; March 2017–October 2018: Construction; November–December 2018: Acceptance and Closeout.

Budget: *Watershed Projects*: Estimated costs associated with construction and design total $6,148,750 ($4,660,000 from HUD; $1,488,750 from landowner contributions). Other items: $375K for hydrologic assessment and watershed plan; $375K for WMA coordinator; and $800K for data collection, modeling, and analysis. *Infrastructure*: $2,446,400 (HUD + direct leverage).

BCA: 6.81 (4.77 for Watershed Projects and 12.89 for Infrastructure).

Project Description #7: English River Watershed

The English River Watershed is a 639-square mile watershed that encompasses parts of six counties in Southeast Iowa (Attachment E, Map 9). The English River Watershed (ERW) is part of the Lower Iowa River and is characteristic of an agricultural watershed within the Southern Iowa Drift Plain. This landform is typified by an undulating landscape with tabular uplands and a complex dendritic network of incised river and stream valleys.

The ERW is an agricultural watershed that is home to about 21,700 people, the majority of whom live in several small communities. Most of the farmland has been modified with tile drainage and two-thirds of the landscape is row crop. A quarter of the area is grassland or pasture, and approximately 6% is timber.

Additional Mitigating Information and Unique Partners: The English River Watershed Management Authority (ERWMA) was formed in 2013 to address flooding and water-quality issues. The IDNR awarded the ERWMA a grant through the Section 319 program to develop a comprehensive watershed management plan to develop a roadmap for future mitigation efforts. The watershed plan is out for public comment and will be finalized in late 2015.

The watershed plan identifies two key natural resource concerns: water quality and flooding. As with most Iowa watersheds, nutrient loss is problematic in the ERW. As part of the comprehensive watershed plan development process, the Iowa Soybean Association performed water-quality testing three times in 2014 at 20 sites in the watershed. Results indicated seven of subwatersheds in the English River Valley had elevated nitrate levels (greater than 10 ppm). Significant spikes were observed in April and July, which may correlate to heavy rain events. The highest nitrate levels were found in the Upper North English, Camp, and Deer Creek subwatersheds across multiple seasons. Phosphorus is also of concern in the ERW, causing nuisance algal blooms in Lake Iowa in the ERW.

The IFC conducted a hydrologic analysis of the ERW as part of the watershed plan development. According to the analysis, flood events have occurred in one-third of the last 75 years; 13 of those floods occurred between May and July. The hydrologic analysis also provided information on areas of the watershed most vulnerable to high runoff or high flood potential, and identified areas where increased filtration, through practices like ponds, could provide the most potential flood relief. Areas with high average runoff were generally located in the upper and middle portion of the watershed.

The comprehensive watershed plan also includes a survey of ERW residents, both urban and rural. Of the 688 randomly sampled watershed landowners, nearly 25 percent participated in the survey, providing their unique perspectives as farmers, urban homeowners, business owners, and taxpayers. Nearly 42% of responders had watershed properties that were impacted by flooding in the last 10 years, but only 33% indicated that they were concerned about future flooding. In addition, 42% of respondents indicated that they were unsure whether enough was being done to address flooding in Iowa, and 27% felt that not enough was being done. In general, respondents agreed (either "strongly" or "somewhat") with the following statements: 1) We need to improve water quality (85%); 2) We need to improve soil health (84%); 3) We need to provide more education for landowners on water-quality issues (76%); and 4) We need to increase incentives for farmers to protect soil and water (71%).

<u>The Disaster (DR-4119)</u>: Heavy rains in April 2013 resulted in the English River at Kalona cresting at 22.47 feet, the second highest crest for the river at that location. In Iowa County, the MID-URN area of this watershed, nearly *38 miles* of roads in the ERW were washed out.

The heaviest rains from this storm moved through the southern half of Iowa County in the ERW, where some areas experienced up to eight inches of rain during the event (Phase I, Attachment B-17). These rains in April came on the heels of Iowa's wettest spring on record and resulted in significant runoff and loss of valuable topsoil on agricultural fields. An estimated 0.5 tons of soil for every acre of farmland was lost during this disaster. Valuable carbon and nitrogen that crops rely on for production washed away with soil. These soils help make Iowa (and the Midwest) the agricultural breadbasket of the country; soil loss threatens the economic vitality of this watershed.

As a result of the overland flooding and the loss of topsoil, ditches filled to capacity because of the significant amount of soil moving with the runoff. Locations throughout the county required assistance and unanticipated costs to remove the topsoil from the ditches so waters could properly drain. Additional societal costs included sedimentation of downstream water bodies and heightened turbidity, which interrupted the natural cycles of aquatic life and reduced the aesthetic value for recreation in the watershed. IDALS estimated that it would cost $3,211,683 to repair the damage from environmental degradation.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need. The project helps address unmet needs in an area subject to a Presidential Disaster Declaration in 2013. The MID-URN area of the ERW is in the upper reaches of the watershed, with unmet needs located in southern Iowa County because of the localized heavy rain and significant topsoil loss from DR-4119. Projects will be implemented in this area because of the damages sustained during DR-4119 and the long history of flooding challenges in this watershed.

An example distribution of the types and numbers of likely projects for the ERW is listed below. Projects and practices in the ERW will target practices, such as retention ponds, that focus on runoff reduction to decrease flooding and retain topsoil and sediment; these can be used to capture and store water temporarily, allowing it to be released more slowly downstream. The

WMA will finalize the exact selection and distribution of projects based on the selection criteria. These practices will have long-term flood reduction and water-quality benefits for landowners, nearby residents, and downstream residents. The target area served does not qualify as LMI, but Iowa County Tract 3705 Block Group 1 in North English represents an L/M income area that will directly benefit from this project.

Perennial Cover/Grass	20	Prairie STRIPS	6
Oxbow Restoration	3	Terrace	10
Floodplain Restoration	5	Buffer Strips	10
Small Farm Pond (0.25–2 acres)	10	Bioreactor	5
Medium Farm Pond (2–5 acres)	30	Small Wetland	10
Large Farm Pond (5+ acres)	10	Large Wetland	5
Sediment Detention Basin	20	Saturated Buffer	5
Storm Water Detention Basin	10		

The initial assessment will be used to help identify the most vulnerable areas for the resilience programming focus. This will likely include the communities of North English and Millersburg.

Consultation: Information on the IWA was presented at a public Iowa County Board of Supervisors meeting on August 28, 2015. After describing the program, participants reiterated that they are interested in project implementation funding (not just planning and monitoring). Iowa County participants were also concerned about the role of a "Watershed Management Authority," how their community would benefit from projects, and whether other groups, such as NRCS and USACE, were involved. Questions were answered to their satisfaction.

Metrics: *Resiliency Value*: This approach in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes) at the outlet of each HUC 12. *Environmental Value*: Project water-quality goals call for the reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved resilience to flooding, including the English River LMI area, through programs to promote awareness and a community-wide flood resilience action plan. These metrics will be evaluated by the collection of scientific data (water quality and quantity), and activities of the CEA.

Project Timeline: July 2016–March 2017: Collection of data (topography, soil conditions, etc.) and development of a (refined) hydrologic assessment of the full HUC 8 watershed; April 2017–September 2017: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–June 2021: Implementation of Resilience Programming (community engagement, networking, needs assessment) in the project area; October 2017–December 2017: WMA selects final sites and projects for implementation; January 2018–June 2018: Establish agreements with landowners, selection of contractors; July 2018–June 2020: Construction of projects. July 2020–June 2021: Post-construction data collection and analysis; July 2021–September 2021: Final reports, work with WMA members to help define future steps and funding.

Budget: The estimated costs associated with the construction and design in the ERW totals $9,208,750 ($6,990,000 from HUD; $2,218,750 in landowner contributions). Other items include: $250,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $1,200,000 for data collection, modeling, and analysis.

Benefit Cost Analysis: 5.17

Project Description #8: North Raccoon River and Storm Lake Infrastructure

The North Raccoon River in Central Iowa is a tributary of the Des Moines River, flowing mainly through the Des Moines Lobe landform, which retains imprints of glacial occupation, such as abundant moraines and shallow wetland basins (potholes) (Attachment E, Map 12). This "prairie pothole" landscape is dominated by flat land and poor surface drainage. The North Raccoon River Watershed (NRRW) is heavily tiled. Row crop production (corn and soybeans) accounts for 85% of its land area. The North Raccoon is used for swimming, canoeing, and fishing. The NRRW landscape is considered the most important and threatened waterfowl habitat in North America, supporting more than 300 migratory bird species.

Additional Mitigating Information: The 2011 Raccoon River Watershed Water Quality Master Plan informs and guides efforts to improve environmental conditions and maintain the vigor of local agricultural production. The plan will provide foundational information for the hydrologic assessment and watershed plan. In 2013, the Iowa Nutrient Reduction Strategy named the NRRW a priority watershed. Many organizations are currently active in the Water Quality Initiative (WQI) project in the NRRW watershed. This project and others, such as a recent Department of Energy award to Antares Group Inc., will complement IWA projects, resulting in significant data sharing among groups.

Two Disasters (DR-1977, DR-4126): In May 2013, Buena Vista County experienced high winds, tornadoes, and heavy rainfall countywide, with an average of seven inches of rain. Some areas received 8–10 inches in 48 hours. Spring 2013 was the wettest on record statewide, and soils were already saturated. The storms resulted in runoff from agricultural fields and urban infrastructure into streams and rivers already flowing high. In Buena Vista County alone, these storms resulted in $5,635,426 in infrastructure damages (see Phase I, Threshold). More than 30 secondary roads were washed out, and nearly five miles of roads had to be replaced at a cost of

$.5M. Many properties in the City of Storm Lake were impacted. The Iowa Individual Assistance Grant Program made 242 awards (less than $5K each) totaling $222,700 for personal property and home repair assistance in Buena Vista County after the 2013 flood.

April 2011 storms caused major topsoil loss in Pocahontas County (see Phase II, Threshold) and increased sediment delivery to waterways, introducing nutrients into the stream system that would otherwise have been available for crops. IDALS estimated that it would cost $8,123,344 to repair the damage from environmental degradation.

Watershed Projects: Outlet Creek, which includes Alta and Storm Lake, will be selected as a target HUC 12 to minimize the impact of heavy rains on these communities, to mitigate damage to secondary road networks and agricultural land, and to improve water quality. This will complement proposed infra-structure work in Storm Lake. Headwaters Cedar Creek in Pocahontas will be selected as one HUC 12 to support and complement the WQI in that watershed. The WMA will select two more HUC 12s in Buena Vista and Pocahontas counties. A sample distribution of the type and number of likely projects in the NRRW is listed above. The WMA will finalize selection and distribution of projects based on selection criteria.

Perennial Cover/Grass	28	Buffer Strips	10
Oxbow Restoration	10	Bioreactor	4
Small Farm Pond (0.25–2 acres)	8	Small Wetland	15
Medium Farm Pond (2–5 acres)	4	Large Wetland	7
Sediment Detention Basin	5	Saturated Buffer	4
Storm Water Detention Basin	5		

Infrastructure: Storm Lake is prone to flooding, resulting in frequent damage to public and private property (Attachment E, Maps 13-24). The city is undertaking a multifaceted approach to make the community more flood resilient. This includes a sanitary sewer flood mitigation upgrade to the wastewater treatment plant and conveyance system to reduce sewer backups into homes and avoid release of untreated wastewater into the environment. These projects are necessary before subsequent work can move forward. The effort comprises eight phases.

Activity 1: Spooner and Seneca Street storm sewers are inadequate to convey a typical two-inch rainfall event. Heavy rains in 2011 and 2013 caused system deterioration and damage to private residences. The city will reconstruct the roadways with pervious (or permeable) pavement and a storm water quality system, which stores and conveys storm water to the former railroad line controlled by the city. The system will include a treatment train with bio-swales and other features to improve water quality. **Activity 2:** 4th Street and Oates Street experienced severe flooding contaminated with high concentrations of *e. coli.* Storm water improvements to the area will include installation of pervious pavers along with bio-retention cells and rain gardens to reduce flooding and nutrient load entering the lake.

Activity 3: The trunk sanitary sewer on 7th and Geneseo will be replaced. The current 10" sanitary sewer line is undersized, causing severe surcharging during two-year rain events. This causes significant backups and flooding in the neighborhood. It also requires localized bypass pumping. The project would replace the undersized system with a 15" sewer line from the intersection of 7th and Ontario to the trunk sewer by Highway 7. **Activity 4**: Storm water improvements in the Memorial Park area directly above the lake inlet will reduce flooding on Highway 7. Flooding has damaged retail establishments to the detriment of Storm Lake's economy. Improvements include a treatment train of bio-swales in conjunction with pervious pavement at the ballfield parking lot to collect, treat, and convey the storm water to the lake.

Activity 5: The area near Mae and 1st Street east to the Memorial Street Lift Station is very susceptible to surcharging and bypass events, as well as frequent, significant backups and floods. A cured-in-place pipe (CIPP), a lining of the 24" and 18" sanitary trunk sewers, will be put in place from Mae and 1st Street east to the Memorial Street Lift Station to help to prevent release of raw sewage directly into the lake and avoid sewer backups into homes. **Activity 6**: Flooding of the 10th and Ontario storm water system impacts numerous LMI property owners. The addition of storm water capacity on city-owned property across from the Field of Dreams (FOD) sports complex will reduce flooding. Bio-swales and retention basins along the FOD parking area and a storm water basin north of the field will protect the area from a 100-year storm.

Activity 7: 4th Street from Western to Barton Streets experiences flash flooding that inundates homes during nearly all rain events. Reconstruction of the streets with pervious pavement and replacement of the existing storm sewer will reduce flooding and significantly improve the quality of the storm water runoff to the lake. **Activity 8:** Construction of wetland ponds will complement projects partially funded by the Hazard Mitigation Grant Program and help settle out nutrients before the water is released to the Raccoon River.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need and will address unmet needs in areas subject to 2011 and 2013 Presidential Disaster Declarations. The target MID-URN area of the NRRW is in Buena Vista and Pocahontas counties. Buena Vista County qualifies under significant remaining infrastructure damage, especially in Storm Lake. The infrastructure projects meet the National Objective of LMA. Pocahontas County qualifies under environmental damage.

Local Input: A community meeting in Storm Lake on Sept. 22, 2015, brought together representatives from NRRW city and county entities. Participants expressed concerns about water-quality degradation and recognized the IWA's potential. This project will help stakeholders protect and enhance their natural resources.

Metrics: *Resiliency Value*: The IWA in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes) at the outlet of each HUC 12. Infrastructure updates in Storm Lake will increase local property values. *Environmental Value*: Water-quality goals call for the reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved flood resilience, especially in Storm Lake, by promoting awareness and a community-wide flood resilience action plan. *Economic Revitalization*: IWA projects will reduce future soil loss and erosion, preserving agricultural productivity. In Storm Lake, this project will help prevent flooding of homes and businesses.

Project Timeline: *Watershed Projects*: July 2016–March 2017: Meetings, forums, submission and acceptance of Chapter 28E Agreement documents for formation of new WMA; April 2017–September 2020: Social Resilience Programming; June 2018–June 2021: Collection of data and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; October 2018–March 2019: Establish agreements with landowners, selection of contractors; April 2019–September 2020: Projects construction; October 2020–September 2021: Post-construction data collection and analysis, work with WMA members to help them define future steps. *Infrastructure*: July 2016–December 2017: Phases 2–7 (simultaneous); July 2017–December 2018: Phases 1 and 8.

Budget: *Watershed Projects*: Estimated construction/design costs total $6,146,250 ($4,660,000 from HUD; $1,486,250 in landowner contributions). Other items include: $350,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $800,000 for data collection, modeling, and analysis. *Infrastructure*: Phase 1: $1,787,000; Phase 2: $895,000; Phase 3: $295,000; Phase 4: $430,000; Phase 5: $1,228,000; Phase 6: $1,943,000; Phase 7: $780,000; Phase 8: 1,275,000.

BCA: 14.71 (30.68 for Watershed Projects and 1.17 for Infrastructure)

Project Description #9: East Nishnabotna River Watershed

The East Nishnabotna Watershed (ENW) encompasses 696,400 acres and touches 10 counties in Southwest Iowa (Attachment E, Map 25). The ENW is part of the Nishnabotna Basin that drains to the Missouri River, a crucial water body that provides feeding, breeding, and resting areas for hundreds of species of birds and fish. Located in the Southern Iowa Drift Plain Region with broad rolling uplands and deep valleys, the ENW's adjoining woodland areas provide abundant habitat for wildlife and are frequently used for recreation. Abundant archaeological sites and artifacts from the area provide insight into pre-historic life in the region.

In the early 1900s, farmers began to transform the landscape from prairie to farmland. Channel straightening during this time altered the naturally meandering streams. About 75% of the lower 100 miles of the East Nishnabotna River were straightened. The fertile loess soils are intensively farmed and susceptible to erosion and streambank degradation. The predominant land use is for row crops; about 76% of the watershed is in corn and soybeans.

<u>Additional Mitigating Information and Unique Partners</u>: In 2011, a comprehensive plan was developed for seven counties in the Loess Hills region in Western Iowa, including Fremont County in the East Nishnabotna. The plan looked at changes in the area during the last 20 years and set goals for the future. It found that from 1992–2006, cropland in the Loess Hills region increased by more than 50,000 acres, and impervious surfaces increased by 30,000 acres. The Loess Hills Alliance is one local group working to restore woodland and prairie areas. The IWA will build upon the 2011 comprehensive plan and complement work of the Loess Hills Alliance.

The ENW was selected by the Iowa Water Resources Coordinating Council as a high priority area for implementing conservation practices outlined in Iowa's Nutrient Reduction Strategy. The Bluegrass and Crabapple Project in the ENW received $1.2M in project funds to demonstrate practices to improve water quality, network with landowners, and provide education and outreach opportunities.

The IWA will also build upon existing assessment and modeling work completed by the U.S. Army Corp of Engineers (USACE). The USACE will share site information for practices that are "shovel ready" to help mitigate flooding and improve water quality. The IFC and the USACE will partner to ensure consistent hydrologic assessment and modeling in the ENW.

East Nishnabotna IWA projects will also build upon the current work of the Golden Hills Resource Conservation and Development (RC&D). The RC&D's Hungry Canyon Alliance (HCA) is dedicated to working with landowners to implement streambank stabilization structures. The HCA estimates that for every $1 invested in streambed stabilization structures, about 0.98 tons of soil are protected from erosion. The IWA will provide additional resources to help implement streambank stabilization structures that will serve the dual purpose of benefiting soil health and improving water quality by decreasing sediment transportation.

The Disaster: In 2011, the Missouri River experienced record-setting floods, affecting six Southwest Iowa counties, including the East Nishnabotna in Fremont County. Above average rain in the fall of 2010, followed by record-setting winter snowfall and spring rain, caused the flooding. Super-saturated soils were unable to absorb the immense amount of precipitation. Intense flooding covered roads and bridges with debris, undermined roads and culverts, and damaged bridges. In a report released by the Iowa DOT, estimated costs to repair flood damage to transportation infrastructure on primary and secondary roads in the affected counties in Southwest Iowa totaled $63.5M. The Iowa Farm Bureau calculated damage to fields and lost crop income at $52.2M in Fremont County alone.

Moving flood waters carry with them hazardous chemicals and diseases, and currents also carry materials that can cause personal injuries. Standing, stagnant water following a flood event also poses a threat to public health and wildlife. The degradation of water quality in Fremont County in the ENW following the 2011 Missouri River floods led to its Presidential Disaster Declaration in June 2011. IDALS estimated that it would cost $1,932,648 to repair the damage from environmental degradation.

Proposed Project in the East Nishnabotna: Based on the distribution of environmental MID-URN, the project will target two HUC 12s (Mill and Ledgewood creeks) in Fremont County to implement built projects. Practices will be aimed at protecting the soil and increasing its water holding capacity, channel bank stabilization, reducing runoff and downstream flooding, and improving water quality. The presence of impaired waters in Fremont County threatens recreation, tourism, and wildlife, and thus could have an economic impact on the watershed. This project will work to make the distressed area more resilient to future flood events that can compromise water quality and impact public health during floods.

Channel Bank Stabilization	15	Prairie STRIPS	5
Perennial Cover/Grass	8	Terrace	5
Oxbow Restoration	5	Buffer Strips	4
Floodplain Restoration	2	Bioreactor	1
Small Farm Pond (0.25–2 acres)	2	Small Wetland	1
Medium Farm Pond (2–5 acres)	2	Large Wetland	1
Sediment Detention Basin	2	Saturated Buffer	1
Storm Water Detention Basin	2		

An example of the suite of practices to be installed in the watershed is listed left). Implemented practices substantially lessen flood impacts on the watershed, which will directly reduce the amount of runoff leading to water-quality impairments. Residents downstream of installed practices will benefit from reduced peak flows during flood events, safer drinking water for communities dependent on shallow groundwater, and recreation opportunities. Conservation practices will provide habitat for many unique species of plants and animals residing in the diverse ecology found only in this part of Iowa.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need. The project will help address unmet needs in an area subject to a Presidential Disaster Declaration in 2011. The presence of water-quality 303d impairments resulted in the MID-URN classification for Tract 9701 in Fremont County. Several segments of the East Nishnabotna are listed on Iowa's 303d impaired waters list per the Clean Water Act—including the entire 28-mile stretch of the river that runs east to west and spans the full width of Tract 9710. This stretch of the East Nishnabotna is impaired due to heightened levels of *e. coli* and does not support recreational uses. The MID-URN areas of the watershed are located in Fremont County, where four HUC 12s will be identified to implement practices designed to reduce flood risk, improve water quality, and improve resiliency to future disaster events. The IWA will address the needs of the East Nishnabotna Watershed in response to the 2011 Missouri River floods. The project will create a replicable model that the East Nishnabotna Watershed can rely on to secure additional funding and resources to carry out project implementation for years to come.

The initial assessment will be used to help identify the most vulnerable areas for the resilience programming focus. This will likely include Farragut.

Consultation: A Phase II community engagement meeting was held on Sept. 14, 2015. Participants recognized an immediate correlation between the current needs of the watershed and the work proposed by the IWA. Residents of the county embraced the project description for the multiple benefits it will provide to their livelihood and for protection of the natural resources they enjoy and rely upon.

Metrics: *Resiliency Value*: This approach in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past at the outlet of each HUC 12. *Environmental Value*: Project water-quality goals are reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved resilience to flooding, especially in the MID-URN areas, through programs to promote awareness and develop a community-wide flood resilience action plan. *Economic Revitalization*: IWA projects will help reduce future soil loss and erosion, helping to preserve agricultural productivity. These metrics will be evaluated through the collection of scientific data and the activities of the Center for Evaluation and Assessment.

Project Timeline: July 2016–March 2017: Meetings, forums, submission and acceptance of Chapter 28E Agreement documents for formation of new Watershed Management Authority; April 2017–June 2020: Social Resilience Programming (community engagement, networking, needs assessment); April 2017–December 2017: Collection of data (topography, soil conditions, etc.) and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; October 2018–March 2019: Establish agreements with landowners, selection of contractors; April 2019–September 2020: Construction of projects; October 2020–September 2021: Post-construction data collection and analysis, work with WMA to define future steps.

Budget: The estimated costs associated with the construction and design in the ENW totals $3,076,250 ($2,330,000 from HUD, $746,250 in landowner contributions). Other items include: $350,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $400,000 for data collection, modeling, and analysis.

Benefit Cost Analysis: 25.51

Project Description #10: West Nishnabotna River Watershed

The West Nishnabotna River in Southwest Iowa is a tributary of the Missouri River (Attachment E, Map 25). The watershed includes 489,500 acres within the Southern Iowa Drift Plain Region, with its steeply rolling uplands and wide valleys. This area consists of thick loess deposits with underlying glacial till and is highly erodible and susceptible to severe stream degradation. The river is used heavily for recreation, tourism, provides many historic and cultural resources, and includes the only state-designated water trail in Southwest Iowa. Currently, 80% of the watershed is cropland.

Prior to the 1900s, the West Nishnabotna River meandered naturally, with gently sloping stream banks and wet prairies. Channel straightening in the early 1900s affected about 90 percent of the lower 100 miles of the river. An estimated $1.1B in damage has since accrued from damaged bridges, utility lines, culverts, farmland, and sediment deposition from post-channelization streambank erosion. Today, the West Nishnabotna River Water Trail is one of the most physically altered state water trails in Iowa, with 15-foot high banks and no riparian zone.

Additional Mitigating Information: The West Nishnabotna River provides numerous recreational opportunities—paddling, canoeing, camping, fishing, hunting, and wildlife watching. Besides the Missouri River, the West Nishnabotna is the most heavily used recreational river in the area. A report by ISU's Center for Agricultural and Rural Development ("Iowa Rivers & River Corridors Recreation Survey") showed 134,755 trips reported and total spending of $3,654,920 in 2010. In May 2014, the West Nishnabotna River Trail Plan was created, examining existing conditions of the water trail and providing recommendations for improvements. This plan will provide information for the IWA hydrologic assessment.

In 2013, the Iowa Nutrient Reduction Strategy identified the West Nishnabotna River Watershed (WNRW) as a high priority area for implementing best management practices

(BMPs) for reducing nitrogen and phosphorous loads. The Walnut Creek Watershed Project encompasses three HUC 12s in the watershed that receive Water Quality Initiative funding. The project includes $1M to be used for building partner relationships and demonstrating BMPs. These projects will complement the IWA by increasing awareness of watershed management, building upon existing producer relationships, and continuing momentum for implementing environmentally-sound land management practices.

There are several strong partners in the WNRW, including the Golden Hills Resource Conservation and Development (RC&D). The RC&D's Hungry Canyons Alliance Project provides state and federal money to 23 counties in Western Iowa, including those within the WNRW. Since 1992, the program has provided $20.5M for technical assistance for grade control structures and streambed stabilization practices. Local stakeholder groups, including Mills and Fremont County Conservation Boards, Boards of Supervisors, and local NRCS Service Centers will be essential resources for project development. The IWA hydrologic assessment and watershed plan will build upon existing hydrologic modeling and inundation mapping projects recently completed by the U.S. Army Corps of Engineers.

The Disaster (DR-1998): From late May through August 2011, the Missouri River Basin experienced widespread record flooding that severely impacted six counties in Western Iowa. As the Missouri River swelled, a levee near Hamburg, Iowa, broke, sending an immense amount of raging water toward the small town and to the north, displacing about 300 residents from their homes and businesses. The extreme flood caused five fatalities and major damage to communities, livelihoods, infrastructure, transportation, agriculture, and public health. Flooding closed more than 100 miles of secondary roads in Iowa, as well as several interchanges along Interstate 29 (I-29). Bridges, roads, and culverts were washed out or left covered with a thick layer of mud and debris. The estimated cost of the damages was more than $2B. The Iowa DOT estimated that repairs to flood damaged transportation infrastructure on primary and secondary roads in the affected Iowa counties would cost $63.5M. The Iowa Farm Bureau calculated damage to fields and lost crop income at $22.2M in Mills County alone.

The MID-URN classification for Tract 401 in Mills County is based on water-quality impairments. Several segments and tributaries of the West Nishnabotna are listed on Iowa's 303d impaired waters list—including a 15.5-mile stretch of the West Nishnabotna and the 5.5-mile long Mud Creek, both in Mills County. This stretch of the West Nishnabotna is impaired due to high levels of *e. coli* and thus cannot currently support recreational uses. Mud Creek is impaired due to the lack of biological diversity. DR-1998 exacerbated both of these impairments, making the already dangerous floodwaters an even greater risk to health and the environment. IDALS estimated that it would cost $5,939,324 to repair the damage from environmental degradation.

Two HUC 12s in Mills County, including a portion of Mud Creek and Willow Slough-West Nishnabotna River, have been selected as project watersheds because the service area (Census Tract 401, Block Group 1) is also an LMA area, though it is not residential. This area has many remaining challenges since the 2011 flood, including both a displacement of families after the flood, not all of whom have returned, and a shortage of affordable housing.

National Objective, MID-URN, and Vulnerable Populations: The project meets the National Objective of Urgent Need. The project will help address unmet needs in an area receiving a Presidential Disaster Declaration in 2011. It will address environmental MID-URN. The two selected HUC 12s in Mills County will directly benefit vulnerable populations through decreased flow and improved water quality, and may also improve local shallow wells. Channel bank stabilization, oxbow reconnection, and floodplain restoration will help slow erosion. The WMA will select four additional HUC 12s based on the required criteria. An example of the type and number of practices to be implemented in the WNRW is listed below. The project will set a precedent for future work in the watershed to help communities become more resilient to disasters, connecting the watershed, reducing flood risk, and improving water quality and environmental resilience.

Resilience programming will include both Fremont and Mills counties, with the initial assessment helping to identify the most vulnerable areas for programmatic focus. One focus area will include the Mud Creek HUC 12 in north Mills County.

Channel Bank Stabilization	52	Prairie STRIPS	10
Perennial Cover/Grass	20	Terrace	10
Oxbow Restoration	5	Buffer Strips	10
Floodplain Restoration	9	Bioreactor	3
Small Farm Pond (0.25–2 acres)	5	Small Wetland	3
Medium Farm Pond (2–5 acres)	5	Large Wetland	1
Sediment Detention Basin	5	Saturated Buffer	2
Storm Water Detention Basin	10		

Consultation: A community engagement event was held on Sept. 14, 2015. Participants recognized an immediate correlation between the current needs of the watershed and the work proposed by the IWA. Residents embraced the project description for the multiple benefits it will provide to their livelihood and to protect the natural resources upon which they rely.

Metrics: *Resiliency Value*: This approach in the targeted watersheds will reduce flood flows by 25%, thereby reducing damage to repetitive loss sites of the past (agricultural lands, roads, infrastructure, homes) at the outlet of each HUC 12. *Environmental Value*: Project water-quality goals call for the reduction of nitrate loads by 30% and phosphorus loads by 20% at the outlet of each HUC 12. *Social Value*: This project will result in improved resilience to flooding, especially in the LMI area, through programs to promote awareness and a community-wide flood resilience action plan (See Soundness of Approach, Program 2). *Economic Revitalization*: Soil erosion is a significant problem in the WNRW and a threat to agricultural productivity. IWA projects will help reduce soil loss and erosion, maintaining Iowa's important agricultural economy. We will evaluate these metrics by the collection of hydrologic data (water quality and quantity), and with assistance from the Center for Evaluation and Assessment.

Project Timeline: July 2016–March 2017: Meetings, forums, submission and acceptance of Chapter 28E Agreement documents for formation of new Watershed Management Authority; April 2017–September 2020: Social Resilience Programming core activities (community engagement, networking, needs assessment); April 2017–December 2017: Collection of data (topography, soil conditions, etc.) and development of hydrologic assessment of the full HUC 8 watershed; January 2018–June 2018: Development of hydrologic plan for eligible areas, modeling of different project scenarios; July 2018–September 2018: WMA selects final sites and projects for implementation; October 2018–March 2019: Establish agreements with landowners, selection of contractors; April 2019–September 2020: Construction of projects; October 2020–September 2021: Post-construction data collection and analysis, work with WMA members to help define future steps.

Budget: The estimated costs associated with the construction and design in the ENW totals $9,221,250 ($6,990,000 from HUD; $2,231,250 in landowner contributions). Other items include: $350,000 for hydrologic assessment and watershed plan; $375,000 for WMA coordinator; and $1,200,000 for data collection, modeling, and analysis.

Benefit Cost Analysis: 16.11

Exhibit F Leverage

State of Iowa

Iowa_PhaseII_Leverage.pdf

Leverage

Iowa's application includes $42,114,051 in direct and $158,309,984 in supporting leverage.

Watershed	Direct	Supporting	Use	Letter
All Rural	$15,876,250		Projects	State of Iowa
Bee Branch	$800,000		H. Homes	City of Dubuque
Bee Branch	$21,600,000	$37,719,000	Infrast.	City of Dubuque / Iowa DNR
Bee Branch		$400,000	H. Homes	City of Dubuque
Bee Branch		$100,000	H. Homes	City of Dubuque
Bee Branch		$1,447,000	Infrast.	Iowa DNR
All Rural	$1,000,000		Planning	Iowa Flood Center/IIHR
All Rural		$3,620,000	Planning	Iowa Natural Heritage Fndn
All Rural	$67,951		Planning	Iowa Farm Bureau
All Rural		$112,500	Planning	Iowa Corn
Upper Iowa		$51,595	Projects	Ia Dept. of Ag and Land Stewardship
U. Wapsi		$300,000	Infrast.	Iowa DNR
M. Cedar		$586,859	Infrast.	Iowa DNR
M. Cedar		$350,000	wetland	Iowa DNR
M. Cedar		$62,955,894	Infrast.	Cities of Cedar Rapids + Cedar Falls
M. Cedar		$2,020,938	Projects	City of Cedar Rapids
M. Cedar		$286,235	Projects	Iowa Soybean Association

M. Cedar		$77,500	Projects	Iowa Agricultural Water Alliance
M. Cedar		$526,755	Projects	Ia Dept. of Ag and Land Stewardship
Cedar		$436,690	Projects	Iowa Soybean Association
M. Cedar		$155,000	Projects	Iowa Soybean Association
M. Cedar		$83,563	Projects	The Nature Conservancy
English		$100,000	Infrast.	Iowa DNR
N. Raccoon		$82,000	Infrast.	Iowa DNR
N. Raccoon		$26,049,743	Infrast.	City of Des Moines
N. Raccoon	$2,158,250	$883,060	Infrast.	City of Storm Lake
N. Raccoon		$713,000	Outreach	Iowa Soybean Association
N. Raccoon		$500,000	Projects	Antares Group, Inc.
N. Raccoon		$34,500	Projects	Iowa Agricultural Water Alliance
N. Raccoon		$238,000	Projects	Ia Dept. of Ag and Land Stewardship
C. Creek		$125,000	Park	Iowa DNR
C. Creek	$611,600	$17,482,801	Infrast.	Cities of Iowa City + Coralville
E. Nish		$71,078	Wetlands	Iowa DNR
W. Nish		$46,430	Wetlands	Iowa DNR
W. Nish		$109,966	Infrast.	Iowa DNR
Other		$644,877	Projects	Ia Dept. of Ag and Land Stewardship
TOTAL	**$42,114,051**	**$158,309,984**		

Exhibit G Regional Coordination and Long-term Commitment

State of Iowa

Iowa_PhaseII_RegionalCoord-Commitment.pdf

Regional Coordination and Long-term Commitment

Iowa is on a path of discovery and forward-thinking research, programs, and actions related to flood research, mitigation, and resilience. The IWA will build on existing flood-related programs, helping to establish a new chapter in the way Iowa considers and prioritizes science-based strategies to address water-quantity and -quality issues.

Lessons Learned (Subfactor: general): The Iowa Watersheds Approach (IWA). Lawmakers recently established the Iowa Flood Center (IFC) at the University of Iowa as the nation's first center devoted solely to flood-related research and education. The state funds the IFC at $1.5M/year. Early IFC successes include: more than doubling the number of stream-stage sensors in the state; developing an easy-to-use online visualization platform for monitoring precipitation and flooding in real time; updating floodplain maps for most of the state using high-resolution LiDAR data (complete in 2016); and developing flood inundation maps for many vulnerable river communities. IFC's success is due in large part to collaborations with the Iowa DNR, Iowa DOT, Iowa Economic Development Authority, U.S. Geological Survey, National Weather Service, U.S. Army Corps of Engineers, and many communities, counties, and NGOs.

In 2010, using $8.8M from a HUD Disaster Recovery Enhancement Fund award, Iowa initiated the Iowa Watersheds Project (see Phase II, Capacity) under the IFC as a means of reducing flood risk, reducing soil erosion, and improving water quality. The IWA builds on the experiences and success of the Iowa Watersheds Project and will increase the number of participating watersheds from three to twelve. At the conclusion of this program, all participating watersheds will have a vision for prioritizing future projects.

Raising Standards (Subfactor: resilience actions): Watershed Management Authorities (WMA): In 2010, Iowa passed legislation authorizing the creation of WMAs as a mechanism for cities, counties, Soil and Water Conservation Districts (SWCDs), and other stakeholders to engage in cooperative watershed planning and management, especially as related to decreasing flooding and improving water quality. The IDNR helps WMAs through formation and with other assistance. Over the past three years, the IDNR has provided $500K in direct financial assistance to help WMAs develop comprehensive watershed management plans. IDNR staff members also help develop proposals, interpret data, give presentations, and offer GIS and mapping services.

Raising Standards (Subfactor: resilience actions): The Iowa Flood Mitigation Board. The Iowa General Assembly created the Flood Mitigation Board, and Governor Branstad signed it into law in 2012. The board is charged with creating a *Flood Mitigation Program* for Iowa. This program allows certain governmental entities to submit flood mitigation projects to the board for review and possible funding. *To date, Iowa has allocated $660M to the Iowa Flood Mitigation Board for flood mitigation activities across Iowa*.

Lessons Learned, Subfactor: General (Improving Knowledge Base). The IFC and Iowa Department of Natural Resources (IDNR) began updating 100- and 500-year floodplain boundaries throughout Iowa in 2010. In many counties, these data are being used to create new Flood Insurance Rate Maps (FIRMs) for use with the National Flood Insurance Program (NFIP). In areas where FEMA does not have capacity to review and adopt the data, the IDNR and other stakeholders are using floodplain boundaries for management and planning. The IFC and the Iowa Natural Heritage Foundation have also used the statewide floodplain mapping data to develop a series of enhanced data products, including one-meter-resolution depth grids for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year floodplains and floodplain scour data. These data better demonstrate and communicate risk, helping communities and property owners make informed land-management and disaster response decisions.

Raising Standards: All Iowa communities that participate in the NFIP observe the state standard of the 100-year water surface elevation plus one foot. Several communities in the target watersheds have adopted higher requirements. In the *Upper Wapsipinicon*, Black Hawk County adopted an additional three foot freeboard requirement; the city of Independence also has a three foot freeboard requirement. In the *Middle Cedar*, Cedar Falls requires that all development must be above, or protected to, the 500-year flood. Palo and La Porte Cities have a two foot freeboard requirement. In *Clear Creek,* Coralville has a one foot above the 500-year flood elevation.

Resilience Actions: Four of the target watersheds have new planning documents to better prepare for future flooding. The Middle Cedar, North Raccoon, and East and West Nishnabotna Watersheds all finished the drafts or final versions of their "Flood Risk Reports" in 2015. These reports provides non-regulatory information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their flood risk, take steps to mitigate risks, and communicate those risks.

Resilience Actions: Iowa is one of only 12 states with a FEMA-approved *Enhanced State Mitigation Plan*, demonstrating that Iowa has developed a comprehensive state-wide mitigation program and is capable of managing increased funding to achieve mitigation goals (see Consistency with other Documents, Attachment D, Consultation Summary, D-122 to D-124).

Resilience Actions Related to Financing and Economic Issues: Iowa Nutrient Research Center (INRC). Most areas in Iowa with environmental MID-URN from 2011–2013 experienced water-quality degradation. Iowa finalized its Iowa Nutrient Reduction Strategy in 2013. Iowa also passed new legislation that year forming a new Iowa Nutrient Research Center (INRC). The state funds the INRC at 1.3M/year to evaluate the performance of current and emerging nutrient management practices. In addition to applied research projects, INRC supports the operation of a real-time continuous water-quality monitoring network and online information system to distribute nutrient data to the general public, producers, and agencies. This network and information system ensures that programmatic funding invested in conservation practices in

Iowa will measurably benefit water-quality improvement. INRC research will inform IWA projects to maximize their benefits to water-quality issues, especially during storm events.

Raising Standards (Subfactor: resilience actions): The Iowa Nutrient Reduction Strategy. The Iowa Nutrient Reduction Strategy (INRS), developed in 2013 as a science-based approach to nutrient management, further demonstrates Iowa's commitment to the improvement of water quality, especially in response to the Gulf Hypoxia Action Plan's goal of 45% reduction in riverine N and P load. State- and federally-funded projects are underway in nine priority watersheds. In 2015, the state allocated $9.6M to the Iowa Department of Agriculture and Land Stewardship for its Water Quality Initiative (WQI). This program offers cost-sharing to farmers trying new water-quality practices, continues work in priority watersheds to achieve water-quality improvements, and expands urban conservation efforts.

Resilience Actions Related to Plan Updates or Alignment (Federal Highway Administration's Climate Change Vulnerability Assessment Program). The Iowa DOT participates in the FHWA's pilot program to assess and evaluate the vulnerability of six highway/bridge locations in central Iowa using 19 global climate change models. Iowa State University (ISU) led the research in partnership with the IFC. The models were used to simulate peak discharges using a hydrologic model that creates future flowrates for consideration of design guidelines or methodologies. Researchers conducted a detailed hydraulic analysis for the replacement of I-35 South Skunk River bridges and associated roadway to improve the interstate's resiliency to overtopping. Bridge updates to be constructed in 2016 will feature a design that increases resiliency to increasing patterns of extreme weather events. Other states recently expressed interest in working with the IDOT, ISU, and IFC to apply this methodology.

Resilience Actions: Iowa is a leader in the production of renewable energy—both wind energy and biofuels—and the state has a long history of supporting innovation in clean energy through a suite of state policies. For example, tax credits are available for eligible facilities that produce and/or sell wind energy. Iowa ranks 3rd in the U.S. in wind production; over 28% of the energy produced in Iowa comes from wind turbines. Iowa is also the nation's leading biofuels producer. In 2013 Dubuque adopted its 50% by 2030 *Community Climate Action Plan*, a strategic plan to reduce greenhouse gas emissions 50% from 2003 levels by 2030. In August 2015, the City Council adopted the creation of a citizen Resiliency Commission to provide oversight and guidance regarding resiliency planning as a top priority. Dubuque will also develop and begin implementation of a climate adaptation strategy by 2018.

Lessons Learned (Subfactor: general): City of Dubuque. Dubuque is committed to a more resilient future and is putting in place infrastructure, policies, and funding mechanisms to meet these goals. This combination of policy and investment, informed by the development of the city's Drainage Basin Master Plan, disaster experiences, and data from the IFC, form the basis of Dubuque's watershed approach to flood management. Dubuque received $98M from the Iowa Flood Mitigation Board. This is part of the $200M committed to the Bee Branch Creek flood mitigation project, which will protect nearly 1,400 homes and businesses. It will prevent an estimated $582M in damage over its 100-year design life. Dubuque adopted policies and created funding streams to ensure that the project continues to protect homes and businesses. For example, a storm water detention policy prevents developments from creating new flooding problems. Property owners pay fees based on their property's impervious ground coverage area; these fees finance storm water management investments. Property owners who implement storm water best management practices are eligible for credits and incentives.

Dubuque is part of the Catfish Creek WMA. The board adopted its Watershed Management Plan in 2014, a 20+ year commitment focused on flood control structures, managing habitat, preserving and creating wetlands within the floodplain, managing natural green infrastructure, and encouraging best agriculture practices. With $1.4M from the State Revolving Fund, the WMA will implement streambank and riparian restoration on the South Fork of Catfish Creek to reduce total suspended solids by 2,186 tons/year, total phosphorous by 1,858 lbs/year, and total nitrogen by 3,716 lbs/year. The CCWMA also created a cost-share program for property owners to develop practices that focus on water quality/flood reduction on their land.

Watershed planning is part of the Dubuque County Regional Comprehensive Plan, adopted in 2013 as a policy document. Additional support through countywide storm water ordinances, developed in partnership with the Dubuque SWCD, further their work.

Raising Standards: City of Dubuque. Dubuque has implemented improved and consistent design standards and specifications for infrastructure, including storm drainage and sanitary sewer systems. The Statewide Urban Design and Specification Standards (SUDAS), as adopted in 2014, provide engineers, developers, and contractors with tools to increase sustainability and strengthen infrastructure. The standards are subject to annual review and amended to reflect increased understanding of storm events and best practices.

Raising Standards: City of Dubuque. In 2014, The Community Foundation of Greater Dubuque (CFGD) joined The Funders' Network Philanthropic Preparedness, Resiliency, & Emergency Partnership (PPREP). The group's purpose is to build community foundation leadership and capacity to create more resilient communities. The CFGD already prepared five disaster preparedness workbooks for Dubuque County and four affiliate counties. CFGD staff attended multiple events and learned alongside peer organizations about disaster preparedness and response. As a result of this work, CFGD's understanding, skill, and capacity have helped to position them to assist local communities as they prepare for, respond to, and recover from potential natural disasters.

Attachment D – Consultation Summary

State of Iowa

Iowa_PhaseII_ConsultationSummary.pdf

Consultation Summary Chart Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
City of Coralville	Public - Municipal Governments - Clear Creek Watershed	Phone	Requested and received commitment from city to discuss NDRC program and Clear Creek Watershed project with city staff and Council of Government.
City of Coralville	Public - Municipal Governments - Clear Creek Watershed	Email	Submitted response to request for Clear Creek Watershed infrastructure projects.
City of Iowa City	Public - Municipal Governments - Clear Creek Watershed	Email	Delivered NDRC summary and Clear Creek Watershed proposal for community consideration.
East Central Iowa Council of Governments	Public - County Governments - Clear Creek Watershed	Meeting	Delivered NDRC summary and Clear Creek Watershed proposal for community consideration.
Johnson County	Public - County Governments - Clear Creek Watershed	Phone	Presented NDRC overview and encouraged county participation as sub-recipient for Clear Creek Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Johnson County	Public - County Governments - Clear Creek Watershed	Meeting	Delivered NDRC summary and Clear Creek Watershed proposal for community consideration.
City of Shenandoah	Public - Municipal Governments - East and West Nishnabotna River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for East and West Nishnabotna Watershed project.
Fremont County	Public - County Governments - East and West Nishnabotna River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for East and West Nishnabotna Watershed project.
Mills County	Public - County Governments - East and West Nishnabotna River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for East and West Nishnabotna Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Valley News Today	Media - East and West Nishnabotna River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for East and West Nishnabotna Watershed project.
City of Kalona	Public - Municipal Governments - English River Watershed	Meeting	Discussed NDRC proposal and inclusion of the English River Watershed
East Central Iowa Council of Governments	Public - County Governments - English River Watershed	Meeting	Discussed NDRC proposal and inclusion of the English River Watershed
English River Watershed Management Authority	Public - Multi-Jurisdictional - English River Watershed	Phone	Discussed NDRC proposal and inclusion of the English River Watershed
Iowa County	Public - County Governments - English River Watershed	Meeting	Discussed NDRC proposal and inclusion of the English River Watershed
Benton County	Public - County Governments - Middle Cedar River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Middle Cedar Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Black Hawk County	Public - County Governments - Middle Cedar River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Middle Cedar Watershed project.
City of Cedar Rapids	Public - Municipal Governments - Middle Cedar RiverWatershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Middle Cedar Watershed project.
City of Vinton	Public - Municipal Governments - Middle Cedar River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Middle Cedar Watershed project.
Vinton Cedar Valley Times	Media - Middle Cedar River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Middle Cedar Watershed project.
Antares Group Inc	Private - Renewable Energy - North Raccoon River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for North Raccoon Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Buena Vista County	Public - County Governments - North Raccoon River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for North Raccoon Watershed project.
City of Storm Lake	Public - Municipal Governments - North Raccoon River Watershed	Email	Submitted response to request for North Raccon Watershed infrastructure projects.
Pocahontas County	Public - County Governments - North Raccoon River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for North Raccoon Watershed project.
Sac County	Public - County Governments - North Raccoon River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for North Raccoon Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Allamakee County	Public - County Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
City of Decorah	Public - Municipal Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
City of New Albin	Public - Municipal Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
City of Preston, MN	Public - Municipal Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
City of Waukon	Public - Municipal Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Howard County	Public - County Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
Northeast Iowa Resource Conservation & Development	Public -Non Profit - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
Turkey River Watershed Management Authority	Public - County Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged participation as sub-recipient for Upper Iowa Watershed project.
Winneshiek County	Public - County Governments - Upper Iowa River Watershed	Meeting	Presented NDRC overview and encouraged county participation as sub-recipient for Upper Iowa Watershed project.
Black Hawk County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Bremer County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Buchanan County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Chickasaw County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
City of Central City	Public - Municipal Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
City of Elma	Public - Municipal Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
City of Independence	Public - Municipal Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
City of Quasquetan	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
City of Tripoli	Public - Municipal Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Delaware County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Iowa Northland Regional Council of Governments	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Linn County	Public - County Governments - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.
Upper Wapsipinicon Watershed Management Authority	Public - Multi-Jurisdictional - Upper Wapsipinicon River Watershed	Meeting	Discussed NDRC proposal and inclusion of the Upper Wapsipinicon Watershed project.

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
City of Dubuque (Planning, Housing & Community Development, Engineering, Health, Sustainability, Economic Development Departments)	Public - Municipal	Meetings	Multiple meetings which took place in person and by phone regarding the BBHHRP. Grant application and project materials provided.
Community Foundation of Greater Dubuque	Philanthropic organization - foundation	Meetings	Invitation to develop home outreach program. Shared project scopes, narratives, budgets
East Central Intergovernment	Public - Council of Governments	Meetings	Multiple meetings to develop BBHHRP. Materials focused on budget, watershed, and BCA development
Dubuque residents	N/A - residents of disaster affected areas	In-person home inspections, neighborhood association meetings, post cards, social media, website, public hearing	Posted opportunities on City website, email listservs, social media, delivered hard copy materials to service providers in neighborhoods. Online survey regarding outstanding needs marketed through City and partner electronic correspondence

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Dubuque Community Development Advisory Commission	Public - Citizen commission	Public hearing	Public notice (newspaper, hard copy, electronic) of hearing to present proposed projects and gather feedback
Hawkeye Area Community Action Program, Inc.	Nonprofit dedicated to empowering and improving the lives of families living with the everyday barriers of poverty	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters
West Central Community Action	Nonprofit to enhance the quality of life for communities, families and individuals	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters
Upper Des Moines Opportunity	Nonprofit to build stronger communities by addressing the effects of poverty on individuals and families	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
Operation Threshold	Nonprofit to provide energy assistance, WIC, weatherization, family development, affordable housing services to eligible families and individuals	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters
North Iowa Community Action Organization	Nonprofit to strengthen low income people become more self-sufficient, strengthen families and improve living conditions	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters
United Way of Eastern Iowa	Nonprofit to create positive community change by investing in effective solutions that improve peoples lives	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters
Iowa Community Action Association	Nonprofit committed to helping low-income Iowans	Phone call and email(s)	Discussed the IWA community resiliency programming, sought input, and requested information about local qualifying disasters

Consultation Summary Chart

Figure 1

1	2	3	4
Agency or Stakeholder Group (if applicable)	**Agency Type - Target Population (If applicable)**	**Type of Outreach**	**Method of Notification (if applicable) - Materials Provided**
National Academy of Sciences	The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide expert advice on some of the most pressing challenges facing the nation and the world.	Phone Meeting	Discussed the IWA community resiliency programming and especially metrics and measurements. NAS provided information on the Zurich model.
Iowa Residents	Public - State Government - Iowa Economic Development Authority	Public hearing	Public notice (newspaper, hard copy, electronic) of hearing to present proposed projects and gather feedback

JOHNSON COUNTY IOWA

BOARD OF SUPERVISORS MEETING

AGENDA ● AUGUST 27, 2015

Second Floor Boardroom	Informal Meeting	9:01 AM

JOHNSON COUNTY ADMINISTRATION BUILDING
913 SOUTH DUBUQUE STREET
IOWA CITY, IA 52240

PHONE: 319-356-6000
www.JOHNSON-COUNTY.com
www.JOHNSONCOUNTYIA.IQM2.com

MEETINGS OF THE BOARD OF SUPERVISORS

JOHNSON COUNTY, IOWA
ELECTED OFFICIALS

Supervisor Mike Carberry
Chairperson Pat Harney
Supervisor Terrence Neuzil
Supervisor Janelle Rettig
Vice-Chairperson Rod Sullivan

Attorney Janet Lyness
Auditor Travis Weipert
Recorder Kim Painter
Sheriff Lonny Pulkrabek
Treasurer Tom Kriz

COUNTY DEPARTMENTS

Ambulance
City Assessor
Conservation
County Assessor
Emergency Management
Finance
Human Resources
Information Technology
Medical Examiner
Mental Health/Disability Services
Physical Plant
Planning & Zoning
Public Health
SEATS
Secondary Roads
Social Services
Veterans Affairs

Location

Meetings are generally held in the Johnson County Administration Building Second Floor Boardroom, 913 South Dubuque Street, Iowa City, Iowa 52240. However, meeting locations do vary. Please view each agenda to confirm the correct location.

Agenda Packets

To be in compliance with *Iowa Code* Section 21.4, Board of Supervisors meeting agendas are posted on the bulletin board outside the Board Office a minimum of 24 hours prior to the scheduled meeting. After such time has passed, the posted agenda will not change; however, agenda packet attachments may be modified or added until the start of the meeting.

Order of Discussion

Board members reserve the right to move items from the order listed on the agenda.

A person may address matters not on the agenda during the "Inquiries and Reports from the Public" item. Please be aware that the Board is limited in their ability to respond to such inquiries and the *Iowa Code* prohibits the Board from deliberating or acting on items not appearing on the agenda.

Additional Information

Supplemental documents to agenda items are public record and are attached to the online agenda packet, with the exception of those corresponding to executive sessions. Minutes of formal meetings are published in accordance with the *Iowa Code*.

The Board of Supervisors regular weekly formal and informal meetings are recorded and televised on Cable Television City Channel 4 and can be viewed via webcast on www.johnsoncountyia.iqm2.com. Assistance will be provided to those requiring accommodations for disabilities, in compliance with the Americans with Disabilities Act of 1990. Please request accommodations in advance by contacting Board Secretary Angela Laffey at 319-356-6000.

INFORMAL MEETING - AGENDA

A. CALL TO ORDER FOLLOWING THE FORMAL MEETING

B. SECONDARY ROADS

1. Review/discuss quotes received for Fall 2015 Crack Sealing Program
2. Other

C. SOIL & WATER CONSERVATION

1. Clear Creek Watershed Management Authority, including, but not limited to, the proposed Clear Creek Watershed Coalition (CCWC) Articles of Agreement and by-laws
2. National Disaster Resilience Competition through the U.S. Department of Housing and Urban Development for Clear Creek Watershed
3. Other

D. ATTORNEY'S OFFICE

1. Reports and Inquiries

E. EXECUTIVE ASSISTANT ANDY JOHNSON

1. Reports and Inquiries

F. BOARD OF SUPERVISORS

1. Reports and Inquiries
2. Other

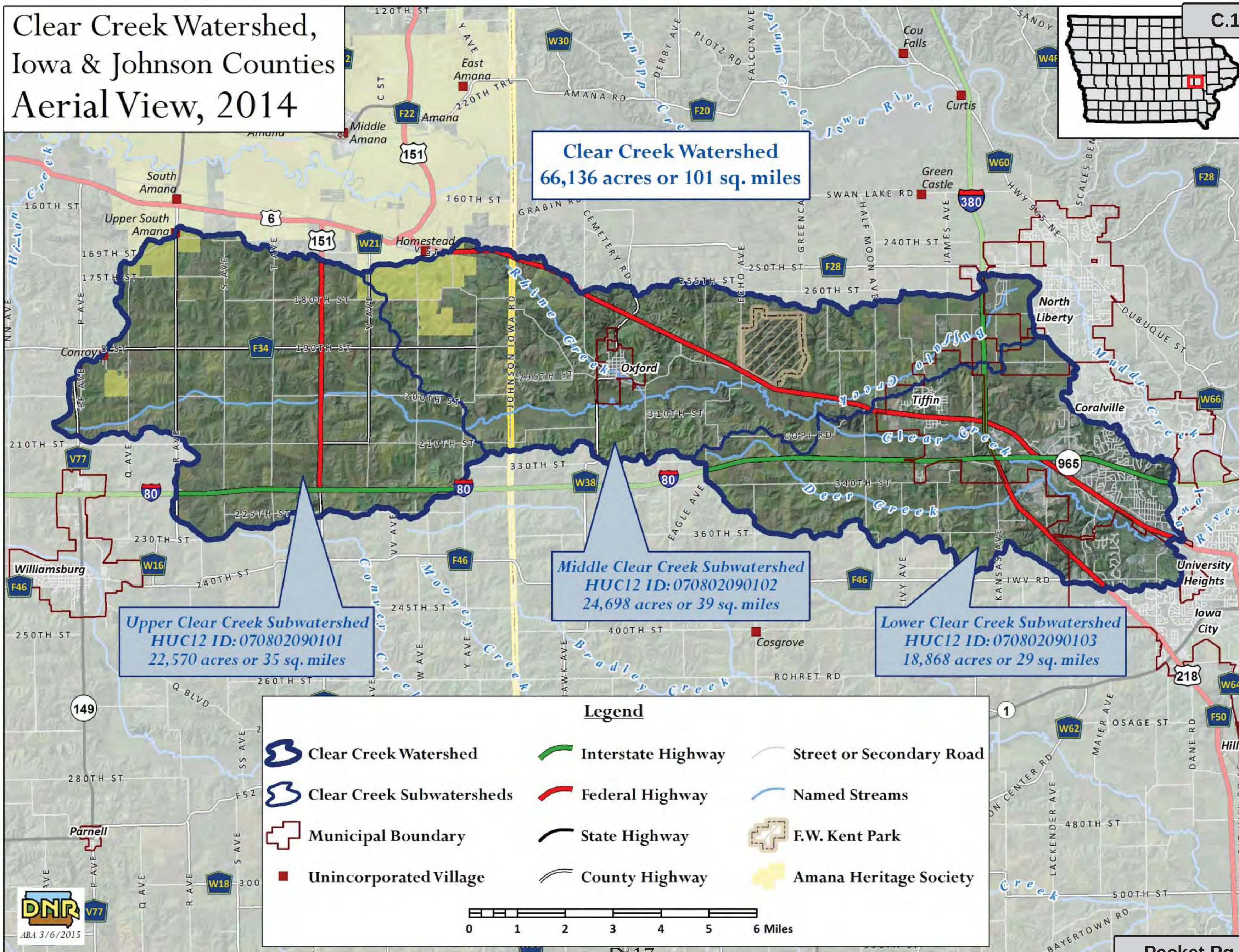
G. DISCUSSION FROM THE PUBLIC

H. ADJOURNMENT

Clear Creek Watershed Management Authority

Approving the Agreement

July - August 2015



Clear Creek Watershed,
Iowa & Johnson Counties
Aerial View, 2014
Clear Creek Watershed
66,136 acres or 101 sq. miles
Upper Clear Creek Subwatershed
HUC12 ID: 070802090101
22,570 acres or 35 sq. miles
Middle Clear Creek Subwatershed
HUC12 ID: 070802090102
24,698 acres or 39 sq. miles
Lower Clear Creek Subwatershed
HUC12 ID: 070802090103
18,868 acres or 29 sq. miles
Legend
Clear Creek Watershed
Clear Creek Subwatersheds
Municipal Boundary
Unincorporated Village
Interstate Highway
Federal Highway
State Highway
County Highway
Street or Secondary Road
Named Streams
F.W. Kent Park
Amana Heritage Society
0 1 2 3 4 5 6 Miles
Williamsburg
Oxford
Tiffin
North Liberty
Coralville
University Heights
Iowa City
Cosgrove
Conroy
Homestead
South Amana
Upper South Amana
Middle Amana
East Amana
Amana
Green Castle
Curtis
Parnell
Rhine Creek
Buffalo Creek
Clear Creek
Deer Creek
Iowa River
Bradley Creek
Mooney Creek
Muddy Creek
ABA 3/6/2015

Highlights of CCWC Agreement

- Watershed Management Authority created and named Clear Creek Watershed Coalition (CCWC)
- Cooperative organization NOT separate legal entity
- Agreement language based on existing examples
- Reviewed by counsel for Johnson County, North Liberty, Oxford/Tiffin, and SWCDs

Possible Members

- Iowa County
- Johnson County
- Cities of Coralville, North Liberty, Tiffin, Oxford, Iowa City
- Iowa Soil & Water Conservation District
- Johnson Soil & Water Conservation District

FAQ about CCWC Agreement

- Agreement does not bind any member to do anything in particular except communicate
- There is no fee structure built into the agreement
- Any action the CCWC wants to undertake would require a member entity to initiate on their behalf
- This agreement shows a willingness of the members to consider conditions outside their boarders

Clear Creek Watershed Coalition

- Seeking participants to the CCWC
- Need signed documents and appointment of a representative and an alternate to the CCWC board of directors
- Hold first CCWC Board meeting to approve by-laws
- Coralville contract w/ ECICOG to apply for watershed planning grant on behalf of the CCWC

Questions?

Jennifer Fencl

East Central Iowa Council of Governments

319-365-9941 ext. 131

jennifer.fencl@ecicog.org

CLEAR CREEK WATERSHED COALITION
ARTICLES OF AGREEMENT

THIS AGREEMENT is made and entered into pursuant to Iowa Code Chapter 28E by and between the eligible political subdivisions that adopt these Articles of Agreement (hereinafter "Agreement"), including the cities of Coralville, Iowa City, North Liberty, Oxford and Tiffin; the counties of Iowa and Johnson; the Iowa County Soil & Water Conservation District; and the Johnson County Soil & Water Conservation District (hereinafter "Members").

WHEREAS, Chapters 28E and 466B of the Code of Iowa (2015), as amended, authorize the Members to establish a Watershed Management Authority to enable cooperation in watershed planning and improvements for the mutual advantage of the Members; and

WHEREAS, pursuant to Section 466B.23 of the Code of Iowa (2015), said Watershed Management Authority may perform any or all of the following activities:

1. Assess flood risks in the watershed;
2. Assess the water quality in the watershed;
3. Assess options for reducing flood risks and improving water quality in the watershed;
4. Monitor federal flood risk planning and activities;
5. Educate citizens regarding water quality and flood risks;
6. Allocate monies made available to the authority for the purposes of water quality and flood mitigation; and
7. Make and enter into contracts and agreements and execute all instruments necessary or incidental to the performance of the duties of the authority; and

WHEREAS, the Members have determined it is in their mutual best interest to enter into an agreement pursuant to Chapter 28E of the Code of Iowa (2015) to establish a Watershed Management Authority and to outline the responsibilities of the parties.

NOW, THEREFORE, IN CONSIDERATION OF THE MUTUAL COVENANTS AND CONDITIONS CONTAINED HEREIN, THE MEMBERS AGREE AS FOLLOWS:

SECTION 1 – IDENTITY OF THE MEMBERS AND WATERSHED

1.1 The counties of Iowa and Johnson are each a political subdivision of the State of Iowa. Their respective addresses are:

Iowa County, 970 Court Avenue, Marengo, IA 52301

Johnson County, 913 South Dubuque Street, Iowa City, Iowa 52240

1.2 The cities of Coralville, Iowa City, North Liberty, Oxford, and Tiffin are each a political subdivision of the State of Iowa. Their respective addresses are:

City of Coralville, 1512 7th Street, PO Box 5127, Coralville, IA 52241

City of Iowa City, 410 E Washington Street, Iowa City, IA 52240

City of North Liberty, 3 Quail Creek Circle, P.O. Box 77, North Liberty, IA 52317

City of Oxford, PO Box 481, Oxford, IA 52322

City of Tiffin, 300 Railroad Street, PO Box 259, Tiffin, IA 52340

1.3 The Soil and Water Conservation Districts of Iowa and Johnson counties are each a political subdivision of the State of Iowa as defined in Iowa Code Section 161A.3(6) and a soil and water conservation district established pursuant to Iowa Code Section 161A.5(1). Their addresses are:

Iowa County Soil & Water Conservation District
435 N Highland Street, Williamsburg, IA 52361

Johnson County Soil & Water Conservation District
51 Escort Lane, Iowa City, IA 52240

1.4 The Clear Creek Watershed (the "Watershed"), the district which is the subject of this Agreement, is depicted on the graphic attached hereto as Exhibit "A".

SECTION 2 - NAME

2.1 The official name of this entity shall be the "Clear Creek Watershed Coalition" (hereinafter "CCWC").

SECTION 3 - LEGAL STATUS

3.1 The CCWC shall be a voluntary joint undertaking of the political subdivisions within the Watershed pursuant to the provisions of Chapter 466B and 28E of the Code of Iowa.

3.2 It is the intention of this Agreement that there be no new or additional legal or administrative entity created by this Agreement, nor that the inherent governmental powers of any Member be affected in any way beyond the terms of this Agreement.

SECTION 4 – GOVERNING BODY

4.1 A joint board of the Members known as the Clear Creek Watershed Coalition Board of Directors (hereinafter "Board") shall be responsible for fulfilling the purpose of the CCWC.

4.2 Each Member shall be entitled to appoint one representative to serve on the Board and an alternate to serve in the place of the appointed representative in their absence.

4.3 The specific powers and duties of the Board shall be defined in the CCWC's by-laws to address Board officers, terms, meetings, and administrative functions.

SECTION 5 – DURATION

5.1 This Agreement shall be in effect in perpetuity until or unless terminated pursuant to Section 11.

SECTION 6 – PURPOSE OF THE CCWC

6.1 The Members generally will cooperate with one another with respect to the Watershed and engage in the activities authorized by Section 466B.23. CCWC's activities will include, but not be limited to, the following:

a. Utilizing watershed level assessments and planning;

b. Increasing communication and coordination among the Members in addressing flooding and water quality in the Watershed;

c. Supporting the Members' efforts to manage storm water runoff to prevent erosion, increase infiltration, promote groundwater recharge and mitigate flooding;

d. Promoting efforts to protect and enhance beneficial uses of waterways within the Watershed such as fish and wildlife habitat and water recreation;

e. Promoting uniform policies for surface and groundwater management;

f. Increasing public education regarding flooding and water quality;

g. Seeking funding opportunities to support the mission of the CCWC; and

h. Providing a forum for the exchange of ideas among the Members.

SECTION 7 – POWERS AND DUTIES OF MEMBERS

7.1 The Members of this Agreement shall retain all powers and duties conferred by law and shall assist each other in the exercise of such powers and the performance of this Agreement. Any Member may accept a specific responsibility to assist with achieving the goals of the CCWC. Said responsibilities include, but are not limited to:

a. Identifying opportunities for funding or in-kind support for the undertaking of watershed planning, assessments, and improvements within the Watershed;

b. Serving as the fiscal agent for the CCWC when it receives funding;

c. Identifying opportunities for infrastructure development and planning capable of assessing and mitigating flood risks and improving water quality in the watershed;

d. Identifying best management practices for water quality improvements and to prevent erosion, increase infiltration, promote groundwater recharge and mitigate flooding;

e. Participating in educational and outreach programs regarding water quality and flood risks;

f. Providing support for the administration of projects, as agreed to by the Members;

g. Securing financing, including grants, loans and issuance of bonds or loan agreements as deemed necessary to achieve the objectives of the CCWC;

h. Coordinating with local utilities; and

i. Designing and bidding of projects and administration of contracts.

SECTION 8 – MANNER OF FINANCING

8.1 With a Member(s) acting as the fiscal agent, the Board may solicit, accept and receive donations, endowments, gifts, grants, reimbursements and other such funds or in-kind contributions, as necessary to support work pursuant to this Agreement. It is agreed and understood by the Members hereto that no financial obligations upon any Member are intended to be created hereby.

8.2 No action to contribute funds by a Board member of the CCWC is binding on the Member that he or she represents without official approval by the governing body of that Member. No Member may be required to contribute funds to the CCWC.

8.3 The Board will review each opportunity for funding or in-kind support. After review of the opportunity, a fiscal agent will be nominated. The fiscal agent shall be a Member or other organization meeting the fiscal agent standards outlined by the funding source.

SECTION 9 – EMINENT DOMAIN & OWNERSHIP OF PROPERTY

9.1 The CCWC shall not have the power of eminent domain and shall not own any interest in real or personal property. All interests in property shall be held in the name of a Member.

SECTION 10 – AMENDMENTS

10.1 This Agreement may be amended at any time by the Members. All amendments shall be in writing, adopted by resolution and signed by all Members, and filed in an electronic format with the Iowa Secretary of State as required by Iowa Code Section 28E.8.

10.2 Eligible political subdivisions may request to join the CCWC by filing written notice with the CCWC and adopting this Agreement by resolution. The request to become a new Member will be considered approved when the additional signature page has been filed in an electronic format with the Iowa Secretary of State as required by Iowa Code Section 28E.8.

10.3 Withdrawal of any Member may be accomplished by filing written notice with the CCWC and the other Members 60 days before the effective date of withdrawal. No Member may withdraw from this Agreement until the withdrawing Member has met its full obligations as of the effective date of withdrawal.

SECTION 11 – TERMINATION

11.1 This Agreement may be terminated upon a majority vote of the Members. If the Agreement is to be terminated, a notice of the intent to terminate the CCWC shall be sent to all Members at least 90 days before the date of termination.

SECTION 12 – GENERAL PROVISIONS

12.1 Entire Agreement: This Agreement contains the entire agreement and integrates all of the terms and conditions contained in and incidental to such Agreement. No modifications or waiver of any provision in this Agreement shall be valid unless in writing and signed by all of the Members. If, for any reason, any provisions of this Agreement shall be inoperative, the validity and effect of the other provisions shall not be affected thereby.

12.2 Severability: If any provision of this Agreement is found to be invalid by any court, administrative agency or tribunal of competent jurisdiction, the invalidity of any such provision shall not affect the validity of the remaining provisions hereof.

12.3 Assignment: This Agreement shall be binding upon and inure to the benefit of the Members and their respective successors and assigns. Members are limited by law to counties, cities, and soil and water conservation districts.

SECTION 13 – GOVERNING LAW

13.1 This Agreement shall be governed by and interpreted under the laws of the State of Iowa.

SECTION 14 – EFFECTIVE DATE, EXECUTION OF DOCUMENTS AND RECORDATION

14.1 This Agreement shall take effect upon execution by the Members as required by law and filing in an electronic format with the Iowa Secretary of State as required by Iowa Code Section 28E.8. The Members agree to timely execute any documents necessary to carry out the terms of this Agreement. The Members further agree that this document may be executed outside the presence of the other Members and in separate counterparts.

SECTION 15 – AUTHORIZATION AND SIGNATURE PAGES

15.1 Each party to this Agreement shall supply to the CCWC a signed original of the resolution or approved minutes from the Soil & Water Conservation Districts which adopted this Agreement.

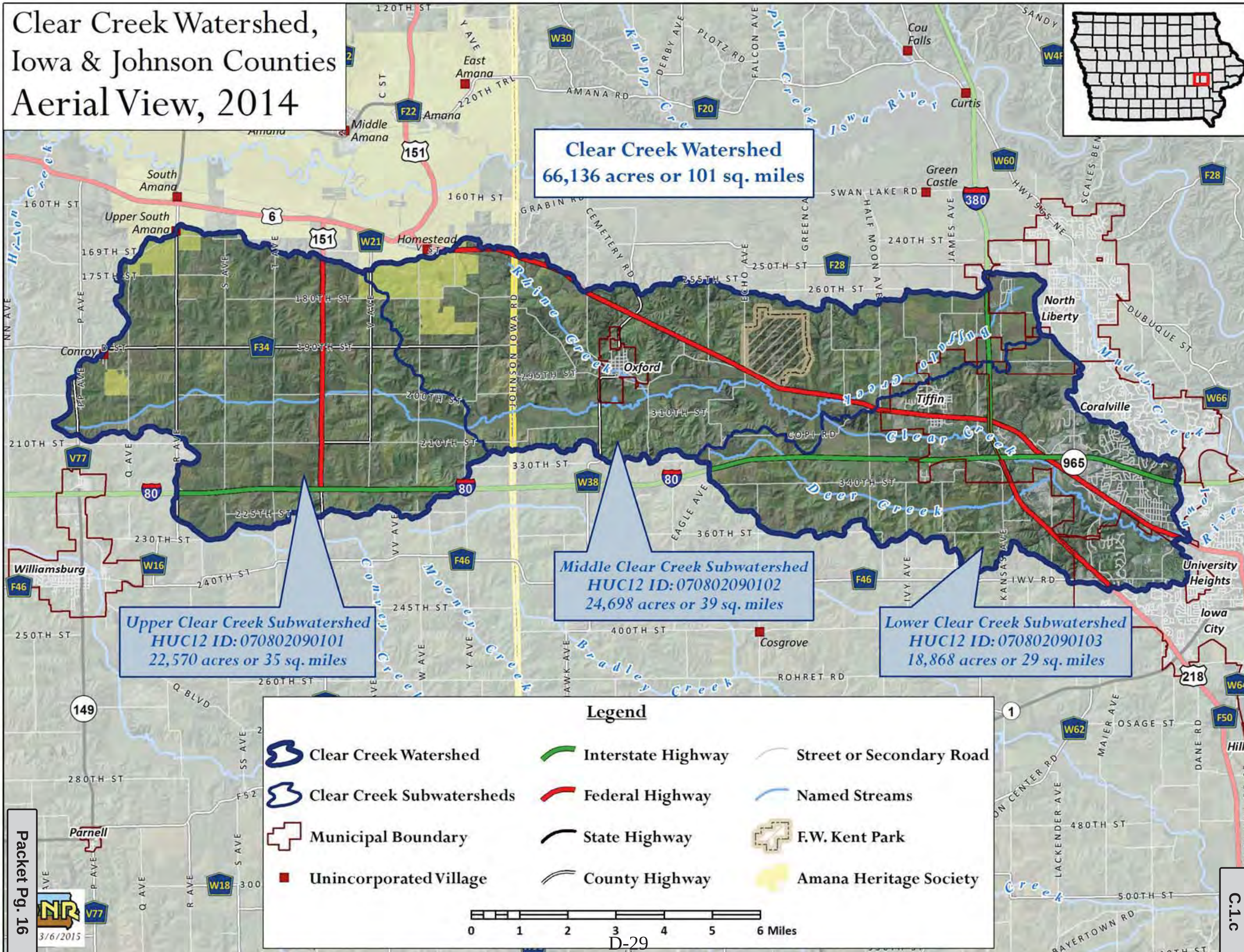
15.2 The Members agree that this Agreement has attached to it signature pages which shall be assembled and filed together with the Agreement and shall together constitute one and the same instrument. A completed copy of the Agreement with executed signature pages shall be sent to each Member.

Dated this ______________ day of ________________________, 2015

Johnson County, Iowa

BY: ____
Chair, Board of Supervisors

ATTEST: ____
County Auditor


Clear Creek Watershed,
Iowa & Johnson Counties
Aerial View, 2014
Clear Creek Watershed
66,136 acres or 101 sq. miles
Upper Clear Creek Subwatershed
HUC12 ID: 070802090101
22,570 acres or 35 sq. miles
Middle Clear Creek Subwatershed
HUC12 ID: 070802090102
24,698 acres or 39 sq. miles
Lower Clear Creek Subwatershed
HUC12 ID: 070802090103
18,868 acres or 29 sq. miles
Legend
Clear Creek Watershed
Clear Creek Subwatersheds
Municipal Boundary
Unincorporated Village
Interstate Highway
Federal Highway
State Highway
County Highway
Street or Secondary Road
Named Streams
F.W. Kent Park
Amana Heritage Society
0 1 2 3 4 5 6 Miles
North Liberty
Coralville
Tiffin
Oxford
University Heights
Iowa City
Williamsburg
Homestead
South Amana
Upper South Amana
Middle Amana
East Amana
Amana
Conroy
Cosgrove
Parnell
Green Castle
Curtis
Cou Falls
Hills
Rhine Creek
Buffalo Creek
Clear Creek
Deer Creek
Muddy Creek
Iowa River
Knapp Creek
Plum Creek
Mooney Creek
Bradley Creek
Hilton Creek
3/6/2015

D-29

Board of Directors
Clear Creek Watershed Coalition
Administrative By-Laws

1. ADOPTION OF BY-LAWS

These administrative by-laws are hereby established for the Clear Creek Watershed Coalition in accordance with Section 4.3 of the 28E Agreement establishing the Clear Creek Watershed Coalition, which was filed with the Secretary of the State of Iowa on DATE. The Clear Creek Watershed Coalition shall be governed by a Board of Directors, as stipulated in Article 4 of the 28E Agreement.

2. PURPOSE

The Clear Creek Watershed Coalition will enable cooperation in pursuit of the activities outlined in Article 6 of the 28E Agreement for the mutual benefit of the Political Subdivisions involved. The by-laws create an organized structure to manage the activities of the Clear Creek Watershed Coalition and to serve as a communications link with participating Political Subdivisions.

3. DEFINITIONS

A. Political Subdivisions – A city, county, or soil and water conservation district. For the purposes of these by-laws, a political subdivision shall be limited to the County of Iowa, the County of Johnson, the City of Coralville, the City of Iowa City, the City of North Liberty, the City of Oxford, the City of Tiffin, the Iowa County Soil & Water Conservation District, and the Johnson County Soil & Water Conservation District.

B. Coalition – The organization, known as the Clear Creek Watershed Coalition, is a Watershed Management Authority created by the 28E Agreement referenced herein. It is a voluntary joint undertaking of the Political Subdivisions within the Clear Creek Watershed pursuant to the provisions of Chapters 466B and 28E of the Code of Iowa.

C. Board – The Board of Directors of the Coalition comprised of authorized representatives from each participating Political Subdivision.

D. Member – A Political Subdivision that has adopted the 28E Agreement that forms the Clear Creek Watershed Coalition.

E. Director – Authorized representative of a participating Political Subdivision (Member).

F. 28E Agreement – Legal document (Iowa Intergovernmental Agreement) signed by each participating Political Subdivision to form a Watershed Management Authority pursuant to the provisions of Chapters 466B and 28E of the Code of Iowa.

4. GOVERNANCE

The affairs of the Coalition shall be conducted by the Board. Each Member shall appoint one representative to serve as a Director, and all Directors comprise the Board. Each Director has one vote. A designated alternate or proxy may vote in the Director's absence.

The Directors shall serve staggered four year terms. The initial Board shall determine, by lot, the initial terms to be shortened and lengthened, as necessary, to achieve staggered terms. Representatives selected to serve on the Board may succeed themselves and there shall be no limit on the number of terms that a person may serve.

If a Director resigns or is removed, a successor shall be appointed for the duration of the unexpired term of that Director.

5. POWERS AND DUTIES OF BOARD

The Clear Creek Watershed Coalition is created and established by the 28E Agreement pursuant to Iowa Code Chapters 466B and 28E. Its powers and duties shall be those established in said 28E Agreement. Membership in the Coalition and voting representation on its Board is limited to Political Subdivisions within the Clear Creek Watershed that have adopted the 28E Agreement.

The Board may exercise all powers necessary and incidental to further the aims and objectives of the Coalition as set forth in the 28E Agreement and/or agreed upon by the Board. The Board may establish work committees which shall act in an advisory capacity to the Board. These committees may contain persons who are not members of the Coalition.

The Board shall not make a policy that would require a Member to change its policies or require a Member to contribute funds without official action of approval by that Member's governing body. No Member may be required to contribute funds to the Coalition and no action to contribute funds by a Director appointed by the Member is binding on the Member without approval by the governing board of that Member.

6. OFFICERS

The officers of the Board shall consist of Chairperson, Vice Chairperson (Chair Elect), Secretary, and Treasurer. The offices of the Secretary and Treasurer may be combined and held by the same person. The officers shall be elected by the Board. The terms of the officers shall be for one year or until their successors are elected.

The Chairperson and the Vice Chairperson (Chair Elect) shall rotate between a representative from a city and a representative from either a county or a Soil & Water Conservation District. The Secretary and/or Treasurer need not be but may be a Director of the Board. A recording secretary and/or a deputy treasurer, which need not be a Director, may be appointed by the Board.

7. DUTIES OF THE OFFICERS

Chairperson: The Chairperson shall:

1. Preside at the meetings of the Board and prepare an agenda in consultation with others.
2. Decide all points of order or procedure unless otherwise directed by a majority of the Directors in session at the time.
3. Appoint any committees that may be deemed necessary.
4. Represent the Coalition where attendance is requested or where attendance is deemed necessary to further the aims and objectives of the Coalition.
5. Sign documents of the Clear Creek Watershed Coalition.
6. Perform other duties as deemed necessary.

Vice-Chairperson: The Vice-Chairperson shall:

1. Assume the duties of the Chairperson in the event of the absence or disability of the Chairperson.
2. Succeed to the position of Chairperson for the unexpired term in the event said position becomes vacant, in which case the Board of Directors shall select a successor to the position of Vice-Chairperson for the unexpired term.

Secretary: The Secretary, or designee, shall:

1. Attend all meetings of the Board and act as Clerk by recording votes, keeping minutes, managing correspondence, and making said records available to all Members of the Coalition and the public.
2. Send out all notices required by these by-laws and by the Code of Iowa.
3. Attend to any other duties as directed by the Board of Directors.

Treasurer: The Treasurer, or designee, shall:

1. Attend all meetings and make a report at each Board meeting.
2. Assist in preparation of the budget, help develop fund raising plans, and make financial information available to the Members and the public.
3. Attend to any other duties as directed by the Board of Directors.

In the event that both the Chairperson and Vice Chairperson are absent, the Secretary shall serve as the pro-tem Chairperson and, if necessary, a temporary secretary shall be appointed. The pro-tem chair shall be authorized to conduct the meeting and to sign any documents requiring signatures when said documents were the result of any action by the Board at the particular meeting.

8. MEETINGS

A. Regular Meetings

The Board shall generally meet quarterly at such time and place as may be designated by the Chairperson, and said meetings shall be known as the regular meetings of the Board. A majority of the Directors of the Board shall constitute a quorum. No official business of the Coalition shall take place in the absence of a quorum.

Directors and/or their alternates (proxies) are expected to attend meetings whenever possible. Absences in excess of three consecutive, regularly scheduled meetings will result in notification to the Member that they may wish to consider a reappointment.

The annual meeting of the Board shall take place in the first quarter of the calendar year. The election of the Chairperson and Vice-chairperson shall take place at the annual meeting. The treasurer and the secretary for the Board shall be elected by the Board.

B. Special Meetings
Special meetings may be called by the chairperson or at the written request of two members of the Board. Notice of the special meeting shall be given by the secretary to the members of the Board at least 72 hours prior to such meeting and shall state the purpose of the meeting.

C. Public
All regular, special, and committee meetings, records and accounts shall be open to the public in accordance with the Code of Iowa. All meeting agendas shall be posted per the Members usual procedure. All meetings of the Board and its committees shall be conducted according to the latest edition of Robert's Rules of Order unless otherwise provided in these by-laws.

D. Motions
Any member of the Board of Directors may make motions. The Chairperson or the Secretary shall restate the motion, after having been seconded, before a vote is taken. Discussion on the motion will be held prior to the vote.

E. Voting
The concurring vote of not less than a majority of the full Board shall be required to reach a decision. Minutes will show members who are absent. All members of the Board in attendance, including the chairperson, are required to cast a vote for each motion, unless a member has a conflict of interest.

If a member elects to abstain from voting due to a conflict, he or she shall indicate the reason for doing so on the record at the meeting.

Elections shall be by ballot or in such manner as the Board determines. Successful candidates shall be elected by a majority of the Board.

For Committee meetings, a majority of those present shall constitute a quorum of the Committee.

F. Unfinished Business
Where all matters cannot be disposed of on the day set for meeting due to length of the meeting or extenuating circumstances, the Board may adjourn until a subsequently specified meeting date.

Electronic Meetings
Iowa Code Chapter 21.8, addressing Electronic Meetings, requires the following when a majority of the Directors participating in a meeting are participating by phone and/or conference call:

> Iowa Code Chapter 21.8
> A governmental body may conduct a meeting by electronic means only in circumstances where such a meeting in person is impossible or impractical and only if the governmental body complies with all of the following:

1. The governmental body provides public access to the conversation of the meeting to the extent reasonably possible.
2. The governmental body complies with sections 21.4. For the purposes of this paragraph, the place of the meeting is the place from which the communication originates or where public access is provided to the conversation.
3. Minutes are kept of the meeting. The minutes shall include a statement explaining why a meeting in person was impossible or impractical.
4. A meeting conducted in compliance with this section shall not be considered in violation of this chapter.
5. A meeting by electronic means may be conducted without complying with paragraph “a” of subsection 1 if conducted in accordance with all of the requirements for a closed session contained in section 21.5.

9. FINANCE

A financial report shall be approved at the annual meeting. The Board may solicit, accept and receive donations, endowments, gifts, grants, reimbursements and other such funds as necessary to support work pursuant to this 28E Agreement.

1. No action to contribute funds by a Director of the Coalition is binding on the Member that he or she represents without official approval by the governing board of that Member. No Member may be required to contribute funds to the Coalition, except to fulfill any obligation previously made by official action by the governing body of the Member.
2. All funds received for use by the Coalition shall be held as a special fund by the fiscal agent designated by the Board of Directors of the Coalition. When funds are provided as a grant or loan directed to a Member of the Coalition for a project administered by that Member, the funds shall be retained and administered by that Member.

10. ENFORCEMENT PROCEDURES

Disputes that arise concerning violations of policies and guidelines or concerning the terms of the 28E Agreement shall be heard by the Board.

11. AMENDMENTS

Amendments to the bylaws may be proposed by any member of the Board. Amendments can be proposed and discussed at a meeting of the Board, but such amendments cannot be adopted until the subsequent meeting. All amendments shall be in writing and shall be provided to all Board members at least seven days prior to the meeting when a vote will be taken to adopt the amendment. A majority vote of all of the Board members shall be required to adopt an amendment. The amendment shall take effect immediately upon adoption, unless otherwise specified by the Board.

Adopted this _______ day of ________________, 2015.

Signed: ______________________________ Chairperson

Attest: ______________________________ Secretary

Johnson County Board of Supervisors Meeting – Clear Creek Watershed

Johnson County Administration Building
8/27/2015
11:15am

Participants:
Participants in attendance included Supervisors Terry Neuzil, Mike Carberry, Pat Harney, Janelle Rettic and Executive Assistant, Andy Johnson; Larry Weber and Breanna Zimmerman with the University of Iowa's, Iowa Flood Center; Mary Beth Stevenson with IDNR; Jennifer Fencl with East Central Iowa Council of Governments (ECICOG); Kate Giannini with Johnson County; and Jessica Rilling with Iowa Valley Resource Conservation and Development (RC&D).

Discussion:
The Iowa Flood Center (IFC) was invited to attend a meeting with the Johnson County Board of Supervisors to discuss the National Disaster Resilience Competition (NDRC) funding opportunity on August 27, 2015. IFC approached the Johnson County BOS to ask them to serve as the lead partner for the proposed project in the Clear Creek Watershed. A large portion of the CCW is located in Johnson County and the county is very involved in the CCW, making it the most likely entity to serve as the lead partner.

Jennifer Fencl with East Central Iowa Council of Governments (ECICOG) attended the meeting to let the board know that the Clear Creek Watershed is near the end of the formation of their Watershed Management Authority (WMA), or better known as the Clear Creek Watershed Coalition (CCWC). Fencl is waiting to hear from Iowa County as to whether or not they wish to join the newly formed CCWC. Larry Weber, representing the University of Iowa - Iowa Flood Center, was invited to present to the Supervisors following Fencl and invited a liaison for the Johnson County BOS to attend a meeting the following day with the Iowa County BOS to discuss the National Disaster Resilience Competition (NDRC) funding proposal. Weber will present to the Iowa County BOS to ask for their participation in the CCWC and the proposed project in the English River Watershed, since each watershed touches Iowa County. Supervisor Pat Harney noted they would identify which board member is the liaison for Iowa County and notify IFC.

Prior to the meeting, Breanna Zimmerman had provided a document summarizing the NDRC proposal and a link to the Phase 2 Fact Sheet to share with the supervisors. Larry Weber began his presentation by providing some additional background on the NDRC funding proposal. Weber noted that IFC is working in a partnership with Homeland Security and Emergency Management (HSEMD) and Iowa Economic Development Authority (IEDA) to submit an application for the State of Iowa. There is currently $1B available to states with counties that experienced a declared presidential disaster between 2011, 2012, and 2013. The funding source is made available through the U.S. Housing and Urban Development (HUD) and the Rockefeller Foundation. Iowa submitted a phase I application and was invited to submit to phase II, along with approximately 40 other applicants.

Weber said the proposed project will focus on improving resiliency in watersheds selected based on certain qualifying criteria. Watersheds were selected based on their environmental and infrastructure MID-URN and their proximity to LMI areas. The project will look to form a WMA or work with existing WMA's in each identified watershed. The WMA's will be critical in helping to advance resiliency and gain momentum for each watershed project. The project will include a hydrologic assessment of the entire watershed, watershed planning and modeling, implementing conservation practices, and pre and post construction monitoring. Conservation practices implemented may have a primary water quality benefit with a secondary benefit to flood resiliency, or have a primary benefit to flooding with a secondary benefit to water quality. The total request will be between $100 to $130M.

Current selected watersheds include the Upper Iowa, Upper Wapsipinicon, Dubuque, East Nishnabotna, West Nishnabotna, North Raccoon, Clear Creek, English River, and Middle Cedar. Dubuque will receive a large portion of the overall allocated funding. It is unlikely that the requested amount will be awarded, but HUD will negotiate the total funded amount. In order to include the CCW in the application, a lead partner needs to be identified that will help administer the project if funded. In order to include Johnson County as the sub-recipient for the project, a letter of intent to participate and a partnership agreement will need to be completed within the next few weeks to include Johnson County and the Clear Creek Watershed in the proposal.

Weber referred back to the original HUD project IFC received funding for. IFC, the nation's only state-funded flood center, received $8.8M from HUD for the Iowa Watersheds Project in 2010. The current Iowa Watersheds Project is a great demonstration for the NDRC proposal and shows the ability and experience the State of Iowa has to effectively coordinate and manage a project of this magnitude.

Questions/Comments:
Upon informing Supervisors of the NDRC proposal, Weber opened up the meeting for questions or comments. Below is a list of the discussion that took place:

- Janelle Rettic (Supervisor): Who would select project types and locations?
    - Weber stated that local soil and water conservation districts (SWCDs) and IFC modeling will help define areas to implement practices that would provide the most benefit.
- Rettic: Would the Clear Creek Watershed Coalition (CCWC) select practices?
    - Weber noted that the CCWC would propose projects for specific locations and present them to the BOS for final review. The BOS would lead the procurement and bidding process. The local SWCD's would help get landowner interest.
- Kate Giannini (Johnson County): Would there be administrative funds for a watershed coordinator housed out of an SWCD or county office?

        - Weber stated there is a 5% allocation for administrative expenses. Some of these funds are kept by IEDA and some funds are allocated to sub-recipients to support administrative costs for the county.
- Rettic: Supports the NDRC funding proposal and having Johnson County as the lead entity. “It would be great for the State of Iowa if we could win this competition and bring home some projects.”
- Weber: It is vital for the state to keep WMAs going. HUD will select between 15-20 projects out of 40 to receive funding.
- Mike Carberry (Supervisor): It would be interesting to see if money would be available to help fund research on energy crops, like the miscanthus project, that retain water.

The general consensus by all Supervisors was to serve as the fiscal agent for the project. Weber noted that Zimmerman would be sending a template for the partnership agreement and letter of intent to participate that would need to be completed and returned in the next few weeks.

RESOLUTION ______

RESOLUTION APPROVING THE ARTICLES OF AGREEMENT
CREATING THE CLEAR CREEK WATERSHED COALITION

WHEREAS, the City/County/SWCD of BLANK desires to enter into an Agreement that would establish a Watershed Management Authority within the Clear Creek Watershed to enable cooperation in watershed planning and improvements pursuant to Iowa Code Chapter 466B.23 and;

WHEREAS, Chapter 28E of the Code of Iowa provides the authority for public agencies to enter into agreements for their mutual advantage and;

WHEREAS, this Agreement is made and entered into by the eligible political subdivisions that adopt these Articles of Agreement, including the cities of Coralville, North Liberty, Tiffin, Oxford, Iowa City; the counties of Iowa and Johnson; and the Iowa County Soil & Water Conservation District and the Johnson County Soil & Water Conservation District;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY/COUNTY/SWCD OF BLANK, IOWA:

1. The Board Chair/Mayor/District Chair and the Auditor/City Clerk/Secretary are hereby authorized to sign and execute the Articles of Agreement for the Clear Creek Watershed Coalition, a copy of which is attached hereto and incorporated herein by this reference.

2. Said Agreement is hereby approved as to form and content and is found to be in the best interest of the City/County/SWCD of BLANK, Iowa and the eligible political subdivisions that adopt these Articles of Agreement, including the cities of Coralville, North Liberty, Tiffin, Oxford, Iowa City; the counties of Iowa and Johnson; and the Iowa County Soil & Water Conservation District and the Johnson County Soil & Water Conservation District.

3. The Auditor/City Clerk/Secretary is hereby authorized to file a copy of this Resolution and Agreement with the Secretary of State, as required by Chapter 28E, Iowa Code.

It was moved by ________________ and seconded by _____________ the Resolution be adopted.

PASSED and APPROVED this _______ day of ___________, 2015.

_________________________ ATTEST: ________________________

TITLE TITLE

        - Asked for letter of intent to participate; need within the next few weeks to include in proposal

- Background on IFC
    - Nations only state-funded flood center
    - Received $8.8 million from Housing and Urban Development (HUD) for the Iowa Watersheds Project in 2010
    - Current Iowa Watersheds Project is a great demonstration for the NDRC

<u>Questions/Comments:</u>

- Janelle Rettic (JR): Who would select project types and locations?
    - LW: Local soil and water conservation districts (SWCDs) and IFC modeling will help define areas to implement practices that would provide the most benefit
- JR: Would the Clear Creek Watershed Coalition (CCWC) select practices?
    - LW: The CCWC would propose projects for specific locations to the BOS. The BOS would lead the procurement and bidding process. The local SWCD's would help get landowner interest.
- Kate Giannini (KG): Would there be administrative funds for a watershed coordinator housed out of an SWCD or county office?
    - LW: There is a 5% allocation for administrative expenses. Some of these funds are kept by IEDA and some funds are allocated to sub-recipients to support administrative costs for the county.
- JR: Supports NDRC funding proposal and Johnson County as the lead entity. "It would be great for the State of Iowa if we could win this competition and bring home some projects."
- LW: It is vital for the state to keep WMAs going. HUD will select between 15-20 projects out of 40 to receive funding.
- Mike Carberry (MC): It would be interesting to see if money would be available to help fund research on energy crops, like the miscanthus project, that retain water.
- General consensus from all BOS's to be the fiscal agent from the project. HUD has a template for the letter of intent to participate that will be shared with them.

From: Resilience [HSEMD]
Sent: Monday, April 13, 2015 11:59 AM
To: Allamakee03Cnty [HSEMD County]; Benton06Cnty [HSEMD County]; Buchanan10Cnty [HSEMD County]; Buenavista11Cnty [HSEMD County]; Cedar16Cnty [HSEMD County]; Cherokee18Cnty [HSEMD County]; Clay21Cnty [HSEMD County]; Clinton23Cnty [HSEMD County]; Delaware28Cnty [HSEMD County]; Deutmeyer, Kelley [DOT Contact]; Dickinson30Cnty [HSEMD County]; doug.elliott@ecia.org; Dubuque31Cnty [HSEMD County]; gyouell@mapacog.org; Ida47Cnty [HSEMD County]; Iowa48Cnty [HSEMD County]; Jasper50Cnty [HSEMD County]; Johnson52Cnty [HSEMD County]; kblanshan@inrcog.org; Lang, Dwight [DOT Contact]; Lee56Cnty [HSEMD County]; Lyon60Cnty [HSEMD County]; Marion63Cnty [HSEMD County]; Marshall64Cnty [HSEMD County]; mnorris@seirpc.com; Pocahontas76Cnty [HSEMD County]; Pottawattamie78Cnty [HSEMD County]; Poweshiek79Cnty [HSEMD County]; rhowe@uerpc.org; rhunsaker@region12cog.org; Sac81Cnty [HSEMD County]; Tama 86Cnty [HSEMD County]; ted.kourousis@nwipdc.org; Weldon, Cliff [DOT Contact]; Winneshiek96Cnty [HSEMD County]; Wymore, Marty [DOT Contact]
Subject: National Disaster Resilience Competition - PLEASE DISTRIBUTE ASAP!

NATIONAL DISASTER RESILIENCE COMPETITION
Iowa Phase II Application

Request for Information

Description

The Iowa Department of Homeland Security and Emergency Management is seeking information from local jurisdictions interested and capable of building a more resilient State as a component of Iowa's application to the U.S. Department Housing and Urban Development's (HUD) Community Development Block Grant National Disaster Resilience Competition (CDBG-NDRC).

THIS IS A REQUEST FOR INFORMATION (RFI) ONLY. This RFI is issued solely for information and planning purposes. Respondees are advised that Iowa Homeland Security and Emergency Management will not pay for any information or administrative costs incurred in response to this RFI; all costs associated with responding to this RFI will be solely at the interested party's expense. Not responding to this RFI does not preclude participation in any future RFP, if issued.
It is the intent of the Iowa NDRC Application Team to use an RFI process to identify potential infrastructure projects that could be integrated into a Phase II application, as well as to gather relevant information regarding building resilience in the state.

Background

The National Disaster Resilience Competition is a HUD-sponsored program, which will allocate $999,108,000 to a pool of 67 approved applicants to build post-disaster resilience throughout the

United States. $180 million has been set aside for Super Storm Sandy impacted communities. The remainder of the funding will be made available to approved applicants that had presidentially declared disasters in 2011, 2012 or 2013, including some predefined communities and 48 states. With eight presidentially declared disasters during that time, the State of Iowa is an approved applicant and submitted a Phase I application on March 23, 2015.

Phase I was the "framing" phase of the competition in which applicants needed to demonstrate that they met specific threshold criteria, had capacity to effectively administer funds, and exhibited continued need from a qualified disaster. During Phase I, the State of Iowa identified target areas according to the requirements of the National Disaster Resilience Competition, established an approach toward resilience, and discussed intended process for developing Phase II projects and programs. The Iowa Phase I application can be found in its entirety at Iowa - NDRC - Phase I Application

HUD's NOFA criteria were utilized to identify the following twenty-six Iowa counties as potential National Disaster Resilience Competition target areas for "infrastructure-related projects":

Allamakee	Benton	Buchanan	Buena Vista	Cedar
Cherokee	Clay	Clinton	Delaware	Dickinson
Dubuque	Ida	Iowa	Jasper	Johnson
Lee	Lyon	Marion	Marshall	Pocahontas
Pottawattamie	Poweshiek	Sac	Sioux	Tama
Winneshiek				

HUD is expected to announce which applicants are invited into a Phase II application process at the end of May 2015. Once announced, applicants will have 120 days to prepare a Phase II application. Because of the quick timeline for Phase II application preparation, a Request for Information process is being launched prior to Phase II announcements to permit ample time to work with project partners to prepare the most compelling and competitive application that can create transformational progress toward disaster resilience in Iowa.

The State of Iowa NDRC Application Team has established the following timeline for preparation of a Phase II application:

Date Beginning	Date Ending	Milestone
April 13, 2015	May 13, 2015	RFI Accepted
May 13, 2015	May 31, 2015	Evaluation of potential projects by Resilience Steering Committee
June 1, 2015	July 31, 2015	Project application development and consultations with project partners
August 1, 2015	August 31, 2015	Public comment period on Phase II application
September 2015	TBD	Submission of Phase II application (exact date TBD by HUD)

Responses

Interested parties are requested to respond to this RFI by no later than 4:00 pm CDT on Wednesday, May 13, 2015.

The attached RFI form (pdf) must be used to submit responses to the Iowa NDRC Application Team. Submit responses to resilience@iowa.gov. Please be advised that all submissions become the property of the Iowa NDRC Application Team and will not be returned.

The Iowa NDRC Application Team may or may not choose to meet with interested parties.

Questions and Technical Assistance

Questions and/or requests for technical assistance regarding this announcement shall be submitted in writing to resilience@iowa.gov by 4:00 pm CDT on Thursday, April 23, 2015.

HUD has put together a number of resources regarding community resilience and the NDRC. Materials include the White House Fact Sheet, Competition Overview, and the Notice of Funding Announcement (NOFA). Training materials, webinars, and Community & Economic Resilience resources can be found at https://www.hudexchange.info/cdbg-dr/resilient-recovery.

Summary

THIS IS A REQUEST FOR INFORMATION (RFI) ONLY to identify potential infrastructure projects for inclusion in the State of Iowa's National Disaster Resilience Competition Phase II application and to better define resiliency opportunities and challenges in the State. The information provided in the RFI is subject to change and is not binding. No commitment has been made to procure any of the items discussed, and release of this RFI should not be construed as such a commitment or as authorization to incur cost for which reimbursement would be required or sought. All submissions become the property of the Iowa NDRC Application Team and will not be returned. Information contained in RFI responses may lead to potential partnership in a final NDRC application. RFI responses may be made public and should not include sensitive information.

Distribution

We ask that the county emergency management coordinators and councils of government forward this information to the communities in their service area to achieve the widest distribution possible.

Iowa NDRC Application Team

Organization Name:	City of Coralville
County:	Johnson
Address:	1512 7th Street, Coralville, IA
Phone:	319.248.1720
POC:	Dan Holderness, P.E., City Engineer
Contact Email:	dholderness@ci.coralville.ia.us
Project Name:	Stormwater Pump Stations #7 and #8 - Iowa River-Lower (HUC 8)

Project Summary

The proposed mitigation project will modify two of the City's existing stormwater pump stations (Nos. 7 & 8) along Clear Creek to provide flood protection to levels equivalent to the 2008 flooding plus one foot (same design level as all other City flood mitigation projects constructed since the 2008 flooding). The proposed improvements will raise weir walls and add backflow prevention; add a shared and elevated back-up power supply, gate operators, and motor controls; reinforce baffles; replace internal flap gates with sluice gates; add duckbills at discharge pipes; and improve level measurements.

Project Goals and Main Activities

The goal of this proposed mitigation project is to construct the final piece of the City's overall flood mitigation plan after the 2008 floods which will protect the significant areas impacted by previous year's flooding. The remainder of the city impacted by the 2008 flood along the Iowa River, Clear Creek and Biscuit Creek have been protected to the 2008 flood elevation plus 1 foot.

The main activities of this project are proposed improvements that will raise weir walls and add backflow prevention; add a shared and elevated back-up power supply, gate operators, and motor controls; reinforce baffles; replace internal flap gates with sluice gates; add duckbills at discharge pipes; and improve level measurements.

Anticipated Project Start and Completion Dates:	1Q16	3Q16
Project Location (Lat/Long):	41.6698	-91.573
Project Engineering and Design Percent Completion Range:	60%	80%

Geographic Area and Population Served by this Project

The geographic area protected by Stormwater Pump Station No. 7 is 42.89 acres. The population protected by Stormwater Pump Station No. 7 is 500 people of which 34% are non-white according to 2010 Census data.

The geographic area protected by Stormwater Pump Station No. 8 is 135.92 acres. The population protected by Stormwater Pump Station No. 8 is 470 people of which 30% are non-white according to 2010 Census data.

Project Tie-back to Any Unmet Recovery Needs

The Stormwater Pump Stations #7 and #8 Improvements Project will complete the flood mitigation plan developed for the city after the 2008 floods. $75 million of flood mitigation projects have been completed to date with another $10 million of mitigation projects ongoing. This project is the final phase of the flood mitigation plan to provide flood protection to Coralville residents and businesses to the 2008 flood elevation plus one foot.

Project Benefits Vulnerable Populations

Our project benefits a significant concentration of ethnic businesses, and low to moderate income persons - including students - that reside and live in the area that will be protected by this flood mitigation project. 2010 Census data indicate 34% of the population protected by Pump Station No. 7 and 30% of the population protected by Pump Station No. 8 are non-white.

Project Creates Greater Resilience in the Target Area

The target area of our proposed project - the developed portion of Coralville affected by Clear Creek - has been impacted by floods in 1990, 1991, 1993 and 2008. After the 1993 flood, 20% of the existing businesses did not return to their original locations. After the 2008 flood, 40% of the existing businesses did not return to their original locations. The city council determined that it was imperative to construct flood mitigation projects such that businesses and residents residing in this impacted area would be assured that their investments in their businesses and homes would be protected from future floods.

Data that Demonstrates Approach will Build Greater Resilience
The developed portion of Coralville affected by Clear Creek has flooded in 1990, 1991, 1993 and 2008. The 1990 and 1991 floods were floods caused by excessive rainfall in the Clear Creek watershed, while the 1993 and 2008 floods were caused by backup on Clear Creek associated with floods on the Iowa River. These floods have caused excessive damage to surrounding commercial and residential properties. Stormwater Pump Stations #7 and #8 require improvements to provide flood protection to levels equivalent to 2008 flooding plus one foot. The 2008 flood waters overtopped the interior weirs, surging behind the flood protection and into the interior storm sewer systems these pump stations were designed to protect. Flood mitigation projects that were constructed after the 2008 flood and prior to the 2013 and 2014 high water events on the Iowa River have performed as designed and prevented flood waters from entering private and public properties and causing damage.

Project Innovation
Our project is innovative and sustainable because we will be reusing the existing concrete pump station structures, and stormwater pumps at Pump Station No. 8.

Project Partners	Roles
IDOT	Original construction cost of Pump Station No. 7 as an essen
HSEMD	Original construction of Pump Station No. 8 in 2001 with fun
NA	NA
NA	NA

Committed Funding Source(s)	Amount(s)
Coralville Local Funds	$478,640
NA	NA
NA	NA
NA	NA

Anticipated funding request:	**$1,914,560**

From: Zimmerman, Breanna R
To: "Karla.Focht@ia.usda.gov"; "Kayle.Ausdemore@ia.nacdnet.net"; "brian.gross@ia.usda.gov"; "Kevin.Seevers@ia.nacdnet.net"; "daniel.case@ia.nacdnet.net"; "David.Brand@ia.nacdnet.net"; "michelle@goldenhillsrcd.org"; "john@goldenhillsrcd.org"; "engineer@millscoia.us"; "ddavis@co.fremont.ia.us"; "rcrouch@millscoia.us"
Cc: "Bob.Waters@Iowaagriculture.gov"; Langel, Carmen M; Weber, Larry J; Mary Beth Stevenson (Marybeth.Stevenson@dnr.iowa.gov)
Subject: RE: National Disaster Resilience Competition - East & West Nishnabotna
Date: Wednesday, August 26, 2015 3:42:00 PM
Attachments: NDRC_Summary.docx
Capture.JPG
Importance: High

All,

I would like to invite you all to participate in a conference call that has been scheduled for **Friday, August 28th at 2:30pm** to discuss the **National Disaster Resilience Competition** funding opportunity the State of Iowa is applying for with coordination from the Iowa Flood Center. See below for call in information:

Conference Dial In: **1-888-619-1583**
Participant Conference Entry Code: **9330437928**

The State of Iowa has been invited to phase II of the NDRC funding opportunity. The U.S. Department of Housing and Urban Development (HUD) and the Rockefeller Foundation have made resources available to communities to help them become more resilient to disasters. In Iowa, our funding proposal is focused on flooding and working within select watersheds to help them manage water and reduce flood impacts on areas with unmet recovery needs and low to moderate income communities. This project is entirely voluntary and will address the special needs of each watershed selected. The purpose of the conference call is to discuss the proposed project in the East and West Nishnabotna Watersheds and schedule a public meeting as soon as possible to obtain input and community feedback.

Attached is the NDRC summary and a map for your reference. Follow this link for more information about phase II.
http://portal.hud.gov/hudportal/documents/huddoc?id=NDRCFactSheetFINAL.pdf

This is a very unique opportunity for Iowa. Our objective is to create a state program that can be replicated and that will have long-term, lasting effects. Please feel free to invite others to participate in the call that I may have missed.

Please let me know if you are planning to join the call on Friday at 2:30pm. If you have questions before the meeting, feel free to contact me, as I realize this is a lot of information to digest. I can be reached via this email or by phone at 319-384-1729.

I look forward to your participation in the call on Friday and talking with you more about the project.

Thank you!

Breanna R. Zimmerman
Iowa Flood Center Outreach Coordinator
Iowa Flood Center | University of Iowa
133-7 C. Maxwell Stanley Hydraulics Laboratory
Iowa City, Iowa 52242
Ph: 319-384-1729
www.iowafloodcenter.org

East and West Nishnabotna Conference Call

8/28/15 @ 2:30pm
Topic: NDRC Proposal

Participants:
Iowa Flood Center – Larry Weber, Breanna Zimmerman, Carmen Langel
On call – Bob Waters (IDALS), David Brand (SWCD), Michelle Franks (Golden Hills RC&D), John Thomas (Golden Hills RC&D), Grimm Jenkins (Red Oak Field Office), Kevin Seevers (SWCD)
Brain Gross (SWCD)

Discussion:
- Larry Weber (LW) introduced IIHR – Hydroscience and Engineering and the Iowa Flood Center (IFC)
- LW introduced the background information on the NDRC
- States with Declared Presidential Disasters between 2011-2013 are eligible to compete for $1 billion in available funding
- Watersheds were selected based on environmental and infrastructure unmet recovery needs (URN) and low to moderate income communities (LMI); URN data was collected using impaired waters data and soil loss data
- We will ask for approximately $100 - $125 million; 50% of funds must be used to benefit LMI communities
- Watersheds currently included in the project: Upper Wapsipinicon, East Nishnabotna, West Nishnabotna, Upper Iowa, Middle Cedar, North Raccoon, Clear Creek, English River, and Dubuque; Dubuque will receive a certain percentage of funds due to URN and LMI areas
- Planning to spend $6.75 million in the West Nishnabotna for the construction of practices; Will spend $2.25 million in the East Nishnabotna for project construction
    - Money for planning, hydrologic assessment, deploying sensors, etc. is not included in the above amounts. These items will be funded out of a separate budget for the project.
- The budget includes $75,000/year/watershed
- Constructed projects will include: wetlands, ponds, streambank restorations, terraces, sediment basins, bioreactors, grassed waterways, etc.; Practices would be based on a one-time payment; Practices implemented will have a primary flood reduction benefit with a secondary benefit to waters quality, or can have a primary benefit to waters quality with a secondary benefit to flood reduction

Questions/Comments:
- How is LMI determined?
    - Carmen Langel (CL): Must spend 50% of the funds on LMI communities. LMI is defined based on census data collected from Homeland Security.
- Bob Waters (BW): Can you only work in areas with URN?
    - LW: Correct. Areas with URN are the only areas we can spend money in.
- Can a local SWCD be a sub-recipient?
    - LW: No, typically a county. We need to verify this information.
- Could money the county receives be given to a SWCD for assistance?

        - LW: SWCD's will be vital partners in this project. We need to verify this information as well.
    - BW: Happy to help move the project forward and offer support.
    - John Thomas (JT): Landowners currently have been doing streambank restoration projects at a 0% cost share rate.
        - LW: We would offer a 75% cost share rate, with 25% landowner contribution.
    - JT: We have already held a few restoration meetings with landowners to address some of the issues in the watersheds.

Sign-in Sheet

NDRC - East and West Nishnabotna

9/14/2015

Name	Affiliation	Email	Address & Phone
Glen Stenzel	NIO Atchison City of Harlan Iowa	gdstenzel@gmail.com	3353 310st Harlan Iowa 712-370-3042
Michelle Franks	Golden Hills RC&D	michelle@goldenhillsrcd.org	712 S Hwy 6 PO Box 189 Oakland IA 712-482-3029
Bob Waters	IDALS - DSCWQ	bob.waters@iowaagriculture.gov	c/o NRCS 3302 18th St. Spirit Lake 51360 515-336-7012
Robbie Kromminga	Fremont County Eniginer	rkromminga@co.fremont.ia.us	2014 290th Ave Sidney IA 51652 712-374-2613
Earl [illegible] Hendrickson	Fremont Co. Supv	ehendrickson@fremont[illegible].us	108 Fox Circle Hamburg IA 51640 712-382-1563
Lonnie Mahlberg	Mills Co. Supervisor Land Surveyor	landsurveying@msn.com	12 N. Walnut St. Box 408 Glenwood Ia. 51534 712-527-3509
Jim Davey	Shenandoah City Admin	jdavey@shenandoahiowa.net	500 W. Clarinda, P.O. Box 338 Shenandoah, IA 51601
Nick Johance	Valley News Reporter	nick.johancen@valleynewstoday.com	617 W. Sheridan Ave. Shenandoah IA 51601

Zimmerman, Breanna R

From: Zimmerman, Breanna R
Sent: Thursday, September 10, 2015 1:19 PM
To: 'rcrouch@millscoia.us'; 'rkohn@millscoia.us'; 'lmayberry@millscoia.us'; 'rhickey@co.fremont.ia.us'; 'ehendrickson@co.fremont.ia.us'; 'cmorgan@co.fremont.ia.us'; 'mark.e.nelson@usace.army.mil'; 'Karla.Focht@ia.usda.gov'; 'Kayle.Ausdemore@ia.nacdnet.net'; 'brian.gross@ia.usda.gov'; 'Kevin.Seevers@ia.nacdnet.net'; 'daniel.case@ia.nacdnet.net'; 'David.Brand@ia.nacdnet.net'; 'michelle@goldenhillsrcd.org'; 'john@goldenhillsrcd.org'; 'engineer@millscoia.us'; 'ddavis@co.fremont.ia.us'; 'rcrouch@millscoia.us'; 'Bob.Waters@Iowaagriculture.gov'
Subject: Meeting Monday, September 14th @ 10am - East & West Nishnabotna
Attachments: NDRC_Summary.docx

All,

A meeting has been scheduled for Monday, September 14th at 10am at Hamburg City Hall (1201 Main St, Hamburg, IA 51640).

The meeting will begin with a presentation from the USACE regarding updates on their current project in the Nishnabotna's looking at hydrologic modeling, assessment, and inundation mapping.

Following a presentation by Mark Nelson with USACE, I will give a presentation on the National Disaster Resilience Competition (NDRC) funding proposal. This proposal involves both the East and West Nishnabotna, and primarily the counties of Mills and Fremont.

Please let me know if you are able to attend this meeting. I apologize for the short notice, but as many of you know, we are in the process of wrapping up the proposal the end of this month.

If you have questions, please let me know.

I look forward to meeting many of you in person and continuing discussions about these two watersheds.

Thank you!

Breanna R. Zimmerman
Iowa Flood Center Outreach Coordinator
Iowa Flood Center | University of Iowa
133-7 C. Maxwell Stanley Hydraulics Laboratory
Iowa City, Iowa 52242
Ph: 319-384-1729
www.iowafloodcenter.org

NDRC community engagement meeting – E. and W. Nishnabotna

Hamburg, IA City Hall
8/14/2015
10:00am

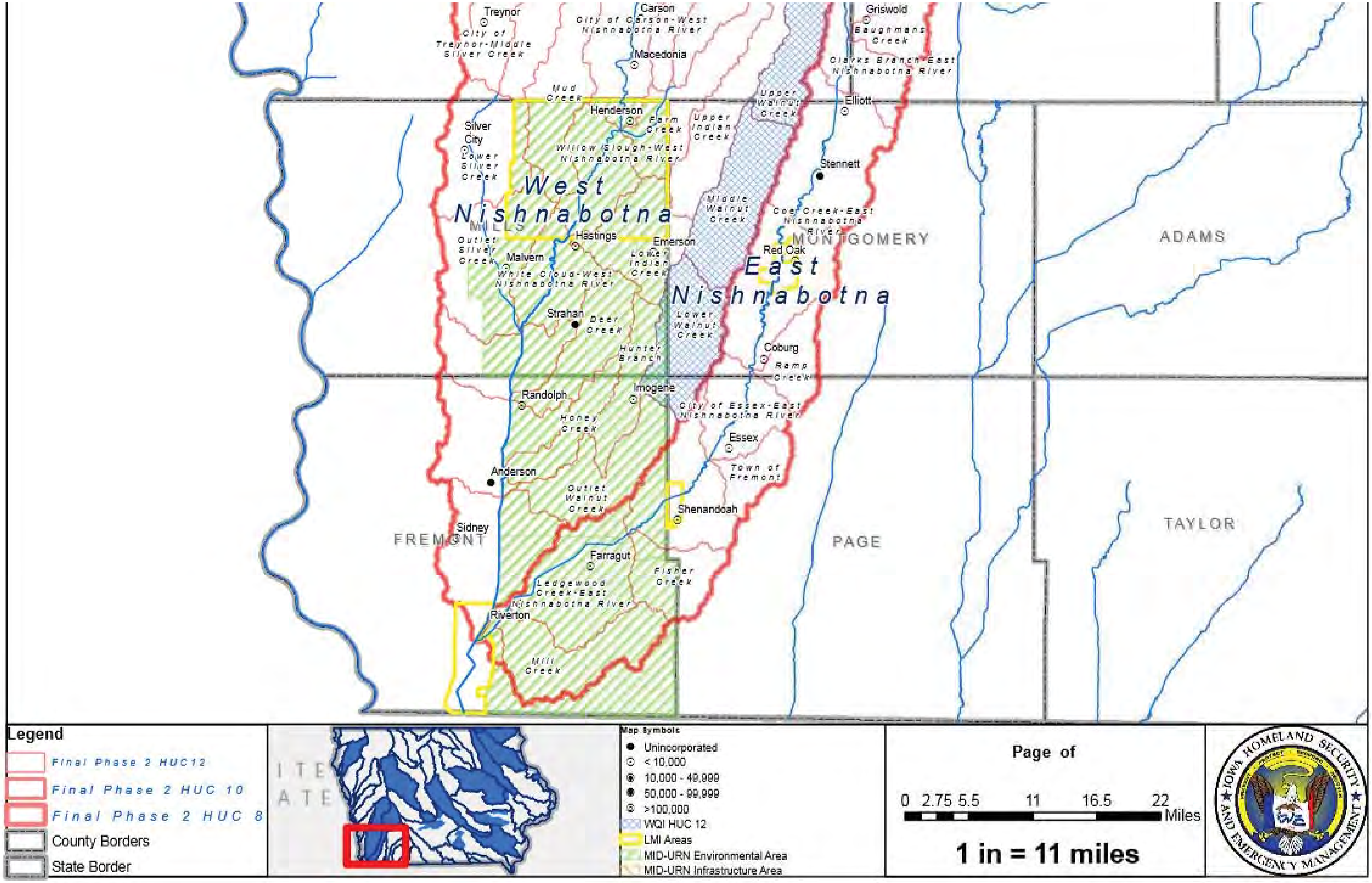
Participants:
Breanna Zimmerman – Iowa Flood Center
*See sign-in sheet

Discussion:

- Mark Nelson (MN) with USACE gave a presentation about a project in the Nishnabotna Basin looking at hydrologic assessment work and inundation mapping.
- Following MN's discussion, Breanna Zimmerman (BZ) gave a presentation regarding the NDRC funding proposal as it relates to the E. and W. Nishnabotna.
    - Background on IFC and current Iowa Watersheds Project
    - IFC is assisting with a proposal for the State of Iowa in coordination with HSEMD and the IEDA
    - $1billion available through HUD for States with counties that experienced a Declared Presidential Disaster between 2011-2013
    - 40 applicants were invited to submit a phase II proposal; 15-20 are expected to be funded
    - Project will focus on resiliency and helping communities adapt to changes in weather patterns
    - Watersheds were selected based on MID-URN and presence of LMI; MID-URN and LMI identified in Phase I; MID-URN selected looking at damages to infrastructure, soil loss data, and impaired waters data
    - Project will begin with WMA formation, hydrologic assessment/modeling for the entire HUC 8 watershed, practice implementation, and monitoring before and after practice implementation
    - Practices will have a primary water quality benefit with secondary flood reduction benefit, or primary flood reduction benefit with secondary water quality benefit
    - Request: $100-$125 million
    - Current watersheds: Upper Iowa, Upper Wapsi, English River, Clear Creek, Middle Cedar, Dubuque (Catfish Creek), N. Raccoon, E. Nishnabotna, W. Nishnabotna
    - Requesting $6.75 in W. Nishnabotna; $2.25 in E. Nishnabotna
    - Separate funds for watershed coordinator; $75,000 requested for each year of the project
    - County serving as sub-recipient will receive 2% of funds to assist with administrative costs; will be required to contract with local COG
    - Proposed Mills County to be the sub-recipient for the W. Nish; Fremont County serve as sub-recipient for the E. Nish; Both county's serve as the only areas with MID-URN or LMI
    - Asked for letter of intent to participate and partnership agreement; will need a quick decision from counties

Questions/Comments:

- MN: Hamburg, IA experienced significant effects from 2011 Missouri River floods. How do they not meet MID-URN?
  - BZ: Eligible areas to receive funding were defined in Phase I of the proposal by HSEMD. Although Hamburg is not eligible to directly receive funding through this project, it is located downstream of the service area where practices will be implemented. The City of Hamburg will still benefit from the project since practices will be implemented upstream aimed at flood reduction and water quality improvement.
- Michelle Franks (MF): What role can RC&D play in the project?
  - BZ: The RC&D will be an important partner in the project because of the existing knowledge of the watersheds and partnerships with other organizations, stakeholders, and landowners. The COG selected to administer funds will be able to provide sub-awards to RC&D's, SWCD's, NRCS, etc. to help carry out the project.
- BZ: Looking at the proposed list of potential projects, are there any that the group feels we should prioritize more over others?
  - MF: Proposed practices all seem reasonable. Streambank stabilization practices are going to be important for the project.
- Bob Waters (BW): Could we include water drainage management to the list of practices?
  - BZ: Yes, that could be done. We can also likely include grade control structures. The WMA will ultimately have the decision on what types/amounts of practices to fund.
- MN: Was glad to hear the presentation about the funding opportunity. Thought the presentation added a lot of value to the meeting.
  - Thanked Mark and the other USACE staff for allowing IFC to join their meeting.
- BZ: Are there any comments regarding the proposal to have Fremont and Mills County be the sub-recipients for the project?
  - Earl Hendrickson (EH): Fremont County will sign the letters. This project would be a great opportunity for us.



Treynor
City of Treynor-Middle Silver Creek
Carson
City of Carson-West Nishnabotna River
Macedonia
Griswold
Baughmans Creek
Clarks Branch-East Nishnabotna River
Mud Creek
Henderson
Farm Creek
Upper Indian Creek
Upper Walnut Creek
Elliott
Silver City
Lower Silver Creek
Willow Slough-West Nishnabotna River
Stennett
West Nishnabotna
MILLS
Middle Walnut Creek
Coe Creek-East Nishnabotna River
MONTGOMERY
ADAMS
Outlet Silver Creek
Hastings
Emerson
Lower Indian Creek
Red Oak
East Nishnabotna
Malvern
White Cloud-West Nishnabotna River
Strahan
Deer Creek
Lower Walnut Creek
Hunter Branch
Coburg
Ramp Creek
Randolph
Imogene
City of Essex-East Nishnabotna River
Honey Creek
Essex
Town of Fremont
Anderson
Outlet Walnut Creek
Shenandoah
Sidney
FREMONT
PAGE
TAYLOR
Farragut
Fisher Creek
Ledgewood Creek-East Nishnabotna River
Riverton
Mill Creek
Legend
Final Phase 2 HUC12
Final Phase 2 HUC 10
Final Phase 2 HUC 8
County Borders
State Border
Map Symbols
Unincorporated
< 10,000
10,000 - 49,999
50,000 - 99,999
>100,000
WQI HUC 12
LMI Areas
MID-URN Environmental Area
MID-URN Infrastructure Area
Page of
0 2.75 5.5 11 16.5 22 Miles
1 in = 11 miles
IOWA HOMELAND SECURITY AND EMERGENCY MANAGEMENT

IOWA COUNTY BOARD OF SUPERVISORS
970 COURT AVE
MARENGO IA 52301
(319) 642-3041

AGENDA
Friday, August 28, 2015 -- 9:00 A.M.

Approve the Agenda
Approve the Minutes
Communications
Open Forum

9:30 a.m. – Nick Amelon, County Engineer
1. Set Public Hearing for vacation of N Ave.

10:00 a.m. – Aaron Sandersfeld, Transportation Director
1. Approve new driver
2. Monthly Update

10:30 a.m. – Larry Weber
1. HUD Funding

OTHER
1. Tabled Items
2. Liquor License
3. Appropriations
4. Building Maintenance
5. Payroll and Claims
6. Manure management plans
7. Mental Health Advocate
8. Courthouse Security
9. Fireworks Permit Application-Travis Messer, Applicant

****All times on the agenda are approximate and subject to change, with the exception of Public Hearings**

Iowa County Board of Supervisors Meeting – English River Watershed

970 Court Ave. | Marengo, IA
8/28/2015
10:30am

Participants:
Participants in attendance included Iowa County Supervisors Ray Garringer, Dale Walter, Kevin Heitshusen, Vicki Pope, and John Gharing; Larry Weber and Breanna Zimmerman with the University of Iowa's, Iowa Flood Center (IFC); Mary Beth Stevenson with IDNR; Jennifer Fencl with East Central Iowa Council of Governments (ECICOG); and Ryan Schlabaugh, City Administrator for the City of Kalona.

Discussions:
On August, 28, IFC staff were invited to attend a meeting with the Iowa County Board of Supervisors to discuss the National Disaster Resilience Competition (NDRC) funding opportunity. IFC approached the Iowa County BOS to ask them to agree to serve as the lead partner for the proposed project in the English River Watershed. A large portion of the ERW is located in Iowa County and only area in this county meets the eligibility criteria to be included in the proposal.

Larry Weber with the University of Iowa introduced IIHR-Hydroscience & Engineering and IFC to meeting attendants. IFC has been providing research and information to communities on flood mitigation and resiliency since its establishment in 2009 following the 2008 floods. Weber provided details pertaining to the original Iowa Watersheds Project that began in 2010. IFC received $8.8M from HUD and selected four watersheds to perform hydrologic assessment work, modeling, monitoring, and the implementation of practices. The four watersheds identified were Soap/Chequest, Turkey River, Upper Cedar, and Middle South Raccoon. The project emphasized working with WMA's. The project included a hydrologic assessment, modeling and planning work, and constructing practices aimed at reducing stream flow and retaining water in the upper portion of the watersheds to prevent downstream flooding. Practices are currently in the construction phase. Landowner participation was completely voluntary and includes a 75 percent cost share rate, with 25 percent of costs covered by the landowner. This current project is a great demonstration for the NDRC.

Weber continued on to provide background on the NDRC proposal. In September 2014, the NDRC was announced, making $1B available for disaster recovery and resiliency in the U.S. States with a declared presidential disaster from 2011, 2012, or 2013 were eligible to submit a Phase I application. IEDA and HSEMD submitted the pre-application for the state of Iowa and was one of 40 other applications selected to submit a Phase II proposal. A small team working on the Phase II proposal attended a 2.5 day resiliency academy workshop in Chicago. The team described the proposed project for the competition and its unique watershed approach with local community involvement. Weber stated that he felt the proposal was among the best upon leaving the workshop.

The requested amount for the proposal will be around $100 to $125M. Watersheds across the state have been selected based on the presence of environmental and infrastructure MID-URN and LMI communities. The project must show at least a 51 percent benefit to LMI. For every dollar spent that benefits LMI, we are able to spend $1 in an area with MID-URN, but no LMI presence. MID-URN was determined in Phase I by HSEMD and eligible areas are defined by data collected on soil quality and impaired waters.

Weber announced the current watersheds included in the proposal are the Middle Cedar, Upper Iowa, Upper Wapsipinicon, North Raccoon, West Nishnabotna, East Nishnabotna, Clear Creek, English River, and Dubuque. The project will include a hydrologic assessment of each watershed, hydrologic modeling, construction of practices, and pre and post construction monitoring. IFC will assist with technical assessment work, outreach and education, and attending routine watershed meetings. The local soil and water conservation district (SWCD) offices, will be important partners for practice implementation and the landowner connections that are already established.

The entire Clear Creek Watershed qualifies under MID-URN. In the English River Watershed, the only eligible area that qualifies lies in Iowa County. Weber noted a strong interest in including both watersheds in the proposal. The funding request for Clear Creek would be around $4.5M. In the English River, we will request an amount somewhere near $6.75M. It is unlikely that the project will be awarded for the full amount, but funding amount is negotiable. HUD will likely fund between 15 and 20 proposals. Weber emphasized the benefit of having a WMA to bridge the urban and rural communities. Iowa County needs to participate in both watersheds and show support for the WMA's or Clear Creek Watershed Coalition. Weber noted that the formation of a WMA will demonstrate the ability to work together as a cohesive unit. The formation of WMAs make grant opportunities more competitive and are recognized for bringing people together in a watershed.

Weber reviewed the project timeline. The proposal will be released for a 15 day public comment period at the end of September. The Phase II application is due the end of October. Awards will be notified in January or February. Funding will likely be allocated in July, upon when project construction may begin. The proposal is for a five year project. IFC has been traveling and presenting to each watershed that has been identified as being the lead partner.

In order to serve as the lead partner for the project, Iowa County will need to submit a letter of intent to participate and a partnership agreement within the next few weeks. HUD has provided a template to be used for letters and agreements will be drafted for each county.

<u>Questions/Comments:</u>

- Kevin Heitshusen (Iowa County Supervisor): What can the money be spent on?
    - Weber noted that practices that have a primary benefit to water quality with a secondary benefit to flood reduction, or practices that have a primary benefit to

flood reduction with a secondary benefit to water quality, are eligible. Practices would include retention ponds, wetlands, grassed waterways, saturated buffers, etc. These will be one time payments for practices, so cover crops, WRP, CSP programs would not be eligible. Practices would follow NRCS specifications.

- Heitshusen: Why isn't money flowed through the SWCD office?
    - Weber explained that money originates through HUD and follows CDBG requirements. The Sub-recipients typically become the county and the county contracts with a local COG to help facilitate the project. A total of $75,000/year has been budgeted for the life of the project for a watershed coordinator to help promote the project, work with landowners, and implement practices.
- Ray Garringer (Iowa County Supervisor): Does the county act as the fiscal agent?
    - Weber stated that the county that agrees to participate would help administer the project and any funds received. These counties may be eligible to receive 5% of the overall funds given to their watershed to help with administrative costs.
- Heitshusen: If Clear Creek were to receive $20 million, how would the money be divided per county?
    - Weber described how the CCW consists of 3 HUC 12s. The overall hydrologic assessment and plan will show the best areas to implement practices that will provide the greatest benefit. In Clear Creek, there is money available across the entire watershed. We will need to work with local SWCDs to sell practices and gather landowner participation.
- John Gharing (Iowa County Supervisor): Is the NRCS on board with this project?
    - Weber explained that we have their support and the SWCDs. It is important to have their partnership.
- Gharing: Is the Corp of Engineers involved?
    - Weber noted that they are much less involved.
- Gharing: Does Kalona have an invested interest?
    - Ryan Schlabaugh (Kalona City Administator): Not necessarily, but the English River Watershed is interested. ERWMA just completed their comprehensive watershed plan and it is currently open for public comment. The plan includes Iowa County, regardless of the fact that Iowa County is not currently participating in the ERWMA. Kalona feels that if entities above it are improved, Kalona will benefit. RS stressed that they want Iowa County to be a partner. Iowa County would play a key role in this project for the English River because money will only be able to be spent in Iowa County. RS noted that the groundwork has been completed with the comprehensive watershed plan and they are ready to move forward with the English River Watershed project.
- Jennifer Fencl (ECICOG): Jennifer noted she is still working on wrapping up the CCWC agreement. She encouraged Iowa County's participation to partner and join the coalition. The agreement will be filed in September and at that time Fencl will begin working on a grant to receive some watershed development and planning assistance dollars. The NDRC would help create a hydrologic assessment for the watershed.

    - LW: Encourages BOS to look at the long-term benefits of joining the WMA and participating in the NDRC proposal.
- Weber: If Iowa County choses to participate in the NDRC, we need a letter of intent to participate within the next few weeks before the end of September. We need to know where we can spend money and whether or not that will be in Iowa County.
- Schlabaugh: Noted that he would be willing to help facilitate things with the ERWMA and Iowa County for this project.

The Iowa County BOS stated they would be in touch to notify IFC of their decision to serve as the lead partner for the NDRC proposal and the ERW.

BOARD OF SUPERVISORS MEETING

September 1, 2015 at 9:00 a.m.

Benton County Board of Supervisors Room

9:00 A.M. Call to Order

2. 9:05 a.m. Barb Greenlee: Set land use hearing date for Pat and Nancy Jorgensen part SW ¼ SW ¼

Sec 32-86-10

3. 9:15 a.m. Marc Greenlee Re: Land use hearing for Robert Moore part of N ½ of NE ¼ Sec 2-85-9

4. 9:30 a.m. Conservation Board re: management of county-owned property in SE1/4 of the SE1/4 of Sec 18-82-10 and Creation of Water Management Authority in Benton County

5. 10:10 a.m. Update on county website and designation of global administrator(s)

6. Approve minutes

7. 10:20 a.m. Engineer Re: Utility Permit for Mediacom in Canton Twp

Resolution: Bridge Embargo removal on new bridge

8. Approve payment for squad car(s)

9. Approve hire of part-time communication specialists; approve change from part-time to full-time status for communication specialist and correction officer; approve change of Whitney Stout from full-time to part-time Communication Specialist

10. Approve Class B Liquor License for Blairstown Sauerkraut Days Beer Tent

11. Accept resignation of Connie Pickering from Pioneer Cemetery Commission

12. Appoint Coleen Dickerson, Dan Johnson & Elana Johnson as Medical Examiner – Investigators; Remove Trey Meyers as Medical Examiner- Investigator due to resignation

13. Discussion on initial draft of ATV/UTV ordinance

14. Approve Annual TIF Report for FY15

15. Work Session – Employee Handbook

16. Reports – committee meetings, liaison, Etc.

17. New Business/Public Interest Comments

18. Adjourn

Benton County Board of Supervisors Meeting – Middle Cedar Watershed

Vinton Courthouse
9/1/15
9:30am

Participants:

Participants in attendance included Supervisors Terry Hertle, Todd Wiley and Jason Sanders; Benton County Auditor, Jill Marlow; Larry Weber and Breanna Zimmerman with the University of Iowa's, Iowa Flood Center (IFC); Matt Purdy, Benton County Conservation Board Executive Director; Chris Ward, Vinton City Administrator; John Watson, Mayor of Vinton; Jim Brown, NRCS; Russ Lindberg, Benton County SWCD Commissioner; Jim Morrison, Press; Zach Parmater, Benton County Conservation; and Logan Hahn, Benton County Conservation.

Discussion:

The Iowa Flood Center (IFC) was invited to attend a meeting with the Benton County Supervisors to discuss the National Disaster Resilience Competition (NDRC) funding opportunity on September 1, 2015 at 9:30am. IFC approached Benton County Supervisors to ask them to serve as the lead partner for the proposed project in the Middle Cedar River Watershed. A large portion of eligible work area is located in Benton County, making it the most ideal choice to help administer the proposed project in the Middle Cedar.

Matt Purdy, Executive Director with the Benton County Conservation Board, gave a brief introduction to begin the meeting. Purdy was approached by Mary Beth Stevenson with IDNR about the NDRC funding proposal and the creation of a WMA. The WMA is a 28E agreement that seeks support and participation from county, city, and government agencies such as the local soil and water conservation districts. Purdy displayed a map of the watershed and identified four main HUC 12's that could be included in the NDRC; Mud, Hinkle, Opossum, and Wildcat.

Larry Weber introduced the NDRC proposal and the inclusion of the Middle Cedar River Watershed. In September 2014, HUD, in coordination with the Rockefeller Foundation, announced $1B available for states with declared presidential disasters between 2011 and 2013 to compete for funding. About 55 states applied to Phase I and 40 were selected to participate in Phase II. IFC is working in coordination with HSEMD to submit a Phase II proposal for the state of Iowa. The funding request will be around $100 to $125M. If funded, about $30M would automatically be allocated towards the City of Dubuque because of the large MID-URN in the area.

The proposed project will include a hydrologic assessment for the entire watershed, planning, construction or practices, and pre and post construction monitoring. Areas where practices will be implemented are dependent on the presence of environmental and infrastructural MID-URN and must provide at least a 50 percent benefit to LMI communities. There are currently nine watersheds that have been identified; Upper Iowa, Upper Wapsipinicon, Middle Cedar, Clear Creek, English River, East Nishnabotna, West Nishnabotna, North Raccoon, and Dubuque. In the Middle Cedar, $12.375M has been budgeted for the construction of conservation practices. Practices would include retention ponds, streambank stabilizations, bioreactors, saturated buffers, grassed waterways, wetlands, and other practices aimed at soil and water quality improvements and benefits to flood reduction. There would also be money available for small urban communities, like Vinton, for urban conservation practices what would help reduce runoff and improve water quality.

<u>Questions/Comments:</u>

Upon providing background information on the proposal, the meeting was opened up for discussion to allow for comments or questions. Below is the discussion that took place:

- Todd Wiley (Supervisor): What does this project mean for Benton County?
    - Weber stated that Benton County would be the most likely sub-recipient for the project because of the location of eligible HUC 12s where we are allowed to construct practices. IEDA will submit the proposal on behalf of the State of Iowa. IFC's role will be to assist with the hydrologic assessment and community outreach in the watersheds. The sub-recipient needs to be a county and IEDA will require that the county work with a local COG with CDBG experience to help administer the project.
- Terry Hertle (Supervisor): Are the programs voluntary?
    - Weber informed participants that the program will be entirely voluntary. The program will seek out volunteer landowners to implement practices. In the current Iowa Watersheds Project, there is more interest in implementing practices that there is funding available to landowners.
- Jill Marlow (Auditor): Do you have the authority to condemn land?
    - Weber stated that there will be no authority for anyone to condemn land, nor is there an interest in doing so for this project.
- Weber: There will be money available for a watershed coordinator at the amount of $75k/year. We want to have a strong relationship with local SWCD offices and will be looking to them for guidance. Money for the coordinator can draw upon existing resources in the county to fill a coordinator position or can be used to recruit a new coordinator. The county will have the decision to select the coordinator to fill the position. There is a separate budget item for a watershed coordinator.
- Weber: HUD will fund approximately 15-20 teams and no team should expect to receive the full amount requested. Our team will put together a few different packages of requested funds for the project.
- Wiley announced he had a conversation with Jennifer Fencl with ECICOG about the proposal. Fencl commented that they would be interested in helping administer a project like this. Wiley noted that Fencl seemed very supportive of the proposal. Wiley stated that it makes sense to have Benton County be the lead for the project since that is where the eligible work areas are. The supervisors need to find out the expenses associated with involving the COG.

- Mayor: The City of Vinton should be very interested in this proposal and what it could do for the community. Mud and Hinkle Creek both run through the City. The Mayor commented on the conservationists who serve on the City Council and hopes that the supervisors will help take the lead on the project. The Mayor thinks they would be interested in signing the 28E agreement and forming a WMA.
- Wiley: Can the WMA be formed over a period of time, or does it need to be formed before the project is submitted?
    - Weber: No, the WMA does not need to be formed before we submit the proposal. With the timeline of the project, we will not know whether or not we will receive funding until February or March of 2016 and will not start projects until the next summer. A good goal would be to have it formed within the next 6 months.
    - Wiley stated he thinks the WMA is necessary to move the project forward and involve partners. Even though participation in the WMA is voluntary, Wiley believes they will receive nearly 100 percent participation.
    - Mayor: I hope that Benton County will take the lead.
    - Purdy (Benton County Conservation Board): The WMA meetings could be held at the Nature Center.
- What does the landowner get from voluntary participation in the project?
    - Weber: In Soap Creek, landowners have been implementing retention ponds in the watershed for years. They came together and recognized the need to take action on their own. Many of these landowners now enjoy the recreational benefits of the pond. They can also use the pond for watering livestock and people are also starting to think about using the structures for irrigation.
- Weber: We will create a plan for the Middle Cedar and the selected HUC 12s we choose to work in, but also will have a plan for the communities in these watersheds. This plan would show what we want to do over a long period of time and will be able to be used for future years.
- Russ Lindberg (Benton SWCD Commissioner): Farmers don’t have to participate, however many of them are becoming more conscientious of benefits to water quality and conservation. It will be important to hire someone who can help the program run efficiently. It will be important to hire a qualified coordinator.
- Jim Brown (NRCS): The voluntary approach is important. You don’t want landowners to feel like something is mandatory.
- Wiley: Are you short on volunteers to participate in programs, or short on money?
    - Brown: Short on money.
- Weber: The project won’t receive any funding until the start of the fiscal year. Projects that are ready to go can be implemented prior to having hydrologic assessment completed.
- Wiley: This project gives us access to funds for planning. When other funding opportunities become available, we will be ready to apply and will be more competitive.
- Weber: Before the proposal is submitted, we will need a letter of intent to participate and a partnership agreement from the sub-recipient.

After good discussion regarding the proposal and the responsibilities of the lead partner, the meeting adjourned. Zimmerman (IFC) will be in contact with Benton County to discuss the letter and partnership agreement in greater detail. Templates for both documents are being created for each county.

Middle Cedar Meeting

Black Hawk County Conservation Board
10 am – 11:30 am

Participants: See attached sign-in sheet

Discussion:

- Sherm asked for some initial background on the project parameters; MBS provided an overview of the regions / watersheds eligible for the proposal
- Sherm provided background on WMAs in general and the overall benefits of WMAs, including flood mitigation and water quality improvement
- John Miller asked about the timing of the NDRC proposal
- Larry provided broader context and overview on the NDRC opportunity
    - A leading reason why IA is a top contender for the NDRC is because of WMA formation – WMAs that work with SWCDs, NRCS, landowner involvement, and thereby provide benefit to downstream communities
    - Also the university involvement that provides assessment and analysis of mitigation and resiliency opportunities
    - IFC is providing leadership on proposal development in partnership with HSEMD and IEDA
    - The funding will be in the range of $125 - $145 million, with the understanding that the budget would likely be revised / negotiated downward; IEDA will be the recipient of the funding. A significant portion of that will be directed to Dubuque (~$30 million).
- Questions:
    - Vern Fish (VF): can land be acquired through this project for wetlands creation or other practices be put on public land?
        - Larry Weber (LW): Acquiring land is an option. But the key thing is to be strategic.
    - Sherm Lundy (SL): Can payments be made out over a number of years? We need flexibility and time in how money can be used in order to realistically put projects on the ground.
        - LW: It's a 2-year project. But there is a waiver that can be requested (and IA already has done so) to extend the project out to 6 years. All funds will be swept by September 30 2022. The IA waiver has requested 5 years, for completion 9/30/2021. All projects will need to have both a flood mitigation and water quality benefit. A nutrient removal wetland for example could be created, even saturated buffers, biocells.
    - John Miller (JM): Levees?
        - LW: Possibly… we'll need to consider that carefully. Soil retention needs to be an important part.
    - Matt Purdy (MP): Benton County is starting at ground level. We need a plan that we can sell to the public, akin to what Storm Lake just completed for green stormwater management.

    - LW: Planning / assessment will be a component. Not more than 20% can be used for planning. Some admin funds will be available for local admins. $75,000 for a project coordinator is being included in the budget.
- JM: Can there be an opportunity for one coordinator for two WMAs? Thinking about Upper Wapsi.
    - LW: The budget tentatively has slated $10-$12 million for Middle Cedar, which may not stretch very far. And we need to keep in mind that not all watersheds are eligible for us to work in.
- JM: Regarding levies. Local communities may advocate for them thinking that they will be the best solution. We should be cautious about putting money towards levy building.
    - LW: This project is about resiliency. This includes education, awareness, how a community responds to a disaster. Levies tend to encourage people to build in floodplains, which is not always in line with a resiliency-based approach.
- JM: What about removing structures from the floodplain?
    - LW: That is probably more in line with a FEMA funded program. Doesn't necessarily add much for resiliency in terms of storage.
    - VF: Removing structures may be necessary for putting in a wetland, which could be in line with this…
- VF: Question about which watersheds are eligible.
    - LW shared targeted watershed map and described the eligibility requirements of LMI and unmet recovery need. Benton, Tama, parts of Buchanan County qualify based on this. Project funds need to be spent in UMR areas that directly benefit LMI. That's 75% of Benton County. Hinkle, Mud, Wildcat, Opossum Creeks in Benton provide LMI benefit. URN: The 3 WQI watersheds (with the possible exclusion of Pratt Creek due to LMI challenges); Coon Creek, Devils Run – Wolf, 12-mile and 4-mile Creeks (all US Laport City); also Lime Creek in Buchanan County
        - Note that while not every HUC-12 will benefit now from this, putting in place the WMA framework will help set the table for future projects and funding.
- SL: And we need to think about pooling resources / funding to increase work in all parts of the watershed.
- VF: Having the project coordinator is critical…
- MP: the creeks in Benton County that are direct benefit to LMI are places where there is already interest in doing a watershed development project / plan.
    - LW: leverage and capacity is important. This could help that. If working in urban area, must show leverage of 2:1. In rural areas, could be a leverage of 1:1. The project is looking at Flood Mitigation board funding, WQI, DNR funding, etc…
- MBS: What is the definition for urban vs. rural? Some communities in IA are considered 'rural' communities based on the census.
    - CW: But Benton County is part of the Cedar Rapids Metro Statistical Area (MSA) so may be considered urban… may need clarification.
- LW: specific project locations won't be identified for the projects, but the proposal will lay out the criteria for project selection under a broader program of watershed resiliency. Benefit-Cost Analysis needs to be a part of the proposal which includes environmental benefits, eco services
- VF: Black Hawk owns land in Tama County, could they acquire land in the Wolf Creek watershed to add to their existing complex?

        - LW: possibly yes.
    - VF: Could Spring Creek be added, in Benton County?
        - LW: Yes.

- Next Steps:
    - Local partners need to assist with communicating the project.
    - Need to have the partnership letter, ideally signed by Benton County
        - Matt Purdy expects the Benton BOS next meeting, September 1, to have a discussion. Vinton has a council meeting tomorrow night and this could be discussed to show support for Benton County stepping up
        - SL: Need to include the commissioners
        - JM: if Benton can't do it, Black Hawk and Linn should discuss who would step up
        - SL: Also need to set the date for an organizational WMA meeting
    - Next Middle Cedar Meeting:
        - Possibly hold in Benton County / Vinton, September 16th 5:30 pm
        - MBS to help coordinate next meeting

From:	Stevenson, Marybeth [DNR] <Marybeth.Stevenson@dnr.iowa.gov>
Sent:	Thursday, August 13, 2015 2:15 PM
To:	Langston, Linda; Sandy Pumphrey; Vern Fish; Sherman Lundy; jmiller@co.black-hawk.ia.us; Zimmerman, Breanna R; tlhjkh@southslope.net; donaldcheryl@southslope.net; watsonjohnr@yahoo.com; City Vinton; tdwiley@fmtcs.com; Benton Co Auditor - Jill Marlow; Benton County [County Engineer]; Weber, Larry J; Langel, Carmen M
Subject:	RE: National Disaster Resilience Competition - Middle Cedar

Hello everyone,

A meeting has been set for **Wednesday, August 26th at 10:00 am at the Black Hawk County Conservation Board administrative office** in Waterloo (1346 West Airline Hwy, Waterloo, Iowa 50703) to discuss this potential funding opportunity. If you or other representatives from your city / county are able to attend, we'd appreciate it.

The meeting agenda will include:

- Background, timeline, targeted areas, and additional details on the overall funding opportunity
- Partner agreement
- Public meeting requirement
- Middle Cedar WMA
- Any follow-up questions or discussion from the group

Please feel free to share this with others who should receive it.

Thanks, and look forward to speaking with everyone further.

Mary Beth Stevenson

MARY BETH STEVENSON Iowa-Cedar River Basin Coordinator

Iowa Department of Natural Resources
P 319.325.8593
marybeth.stevenson@dnr.iowa.gov
323-4 Stanley Hydraulics Laboratory | Iowa City, IA 52242-1585

WWW.IOWADNR.GOV

On Aug 7, 2015, at 3:53 PM, Stevenson, Marybeth [DNR] <Marybeth.Stevenson@dnr.iowa.gov> wrote

Linda and Sandy,

> I am touching base regarding a funding opportunity the State of Iowa is applying for (with strong support from the Iowa Flood Center) through the National Disaster Resilience Competition being offered through HUD. I have attached a summary document explaining the funding source and a bit about the proposed project. I had a chance to talk to Sandy already about this, and Linda, I worked through your staff to set up a quick call for Thursday afternoon at 1 pm.

As described in the attachment, the proposed project targets watersheds where there are "unmet disaster recovery needs" from the 2011, 2012, and 2013 Presidential Disaster Declarations, as well as low to moderate income (LMI) communities. The Middle Cedar watershed meets those criteria. If the proposal is successful, then the project would entail the development of a watershed plan and assessment and constructing flood mitigation projects that would have the greatest impact on LMI areas as possible.

In order to be included in the proposal, two things need to happen: 1 – there must be a partner agreement signed by a local governmental entity (county) within the affected area; and 2 – a public meeting that is documented, where public input on the proposed program is sought. There is no financial match required, but we are hoping to leverage other existing watershed / flood recovery / resilience activities to demonstrate commitment at the local level.

Within the Middle Cedar, Benton County and Linn County also have LMI areas and unmet disaster recovery needs. I'm going to be contacting them as well to let them know, and I'd like to plan a conference call or meeting for all the potential partners next week or the week after to discuss our next steps to include the Middle Cedar.

At this time no further action is needed from you, but please feel free to contact me with questions. I'll be in touch again soon with details on a follow-up meeting that will involve all the relevant parties. Please feel free to forward this information on to whomever else in Linn County should receive it.

Thanks in advance, look forward to talking more with you.

-Mary Beth

MARY BETH STEVENSON Iowa-Cedar River Basin Coordinator
Iowa Department of Natural Resources
P 319.325.8593
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<image001.jpg> 323-4 Stanley Hydraulics Laboratory | Iowa City, IA 52242-1585
WWW.IOWADNR.GOV **<image002.jpg><image004.jpg>**
Leading Iowans in Caring for Our Natural Resources.

<NDRC_Summary.docx>

Sign-in Sheet
NDRC & Middle Cedar WMA Planning Meeting
8/26/2015

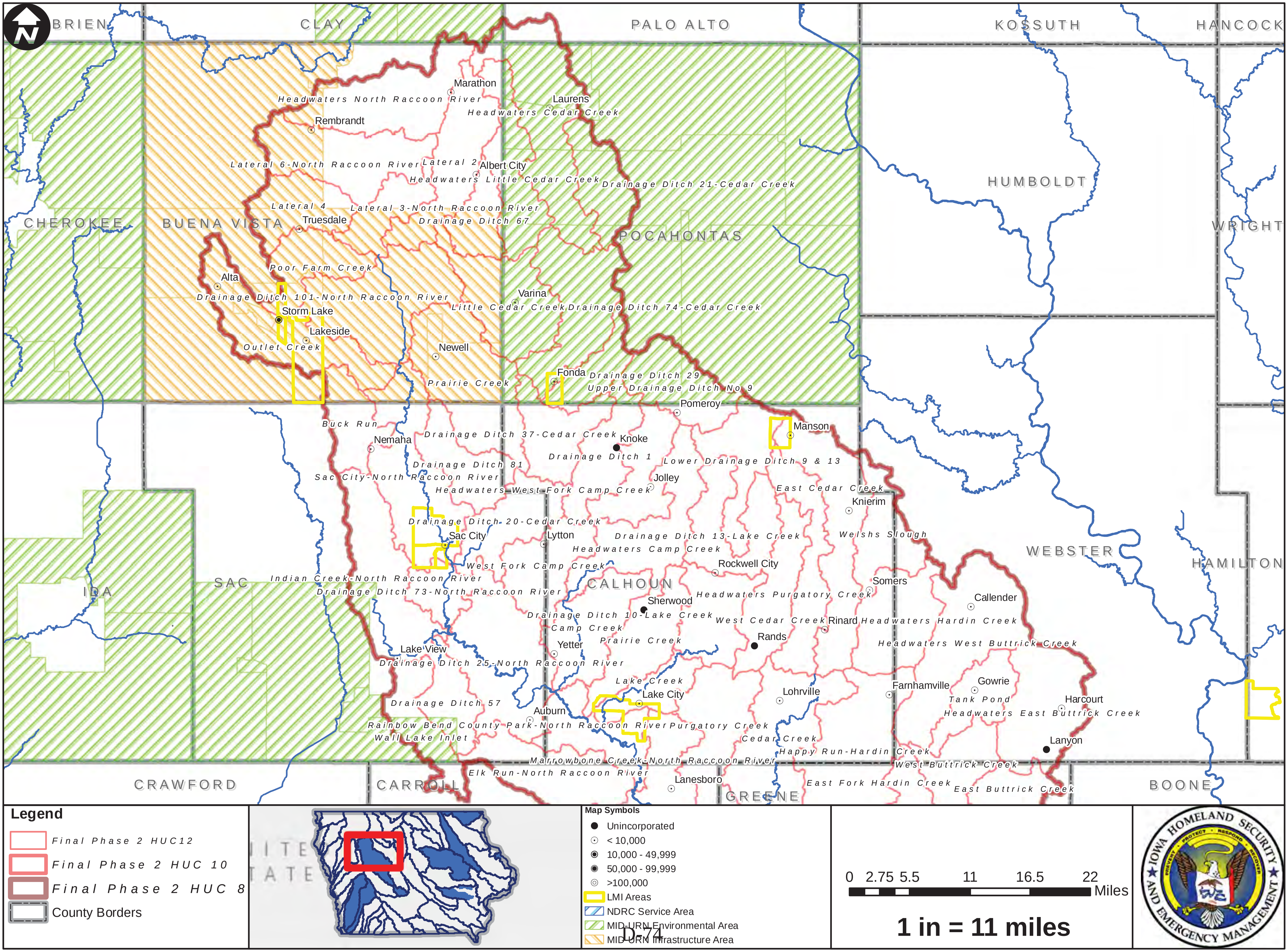
Name	Affiliation	Email	Address & Phone
Mary Beth Stevenson	IDNR	marybeth.stevenson@dnr.iowa.gov	323-4 SHL Iowa City IA 52242 319-325-8593
Shane Wolf	Black Hawk SWCD - Miller Creek WQI	shane.wolf@ia.nacdnet.net	2950 Southland Drive, Suite 2 Waterloo, IA 50701
Josh Balk	BHSWCD - Dry Run Creek Watershed Improvement Project	joshua.balk@ia.nacdnet.net	2950 Southland Drive, Suite 2 Waterloo IA 50701
VERN FISH	BLACK HAWK COUNTY CONSERVATION BOARD	VERNFISH@AOL.COM	1346 W AIRLINE HWY WATERLOO, IOWA 50703
Sherman Lundy	B.H. Cnty SWCD Dist	sherml@bmcaggregates.com	319 7595803 (c) 1103 Ellen St. CF 50613 (H)
Matthew Purdy	Benton County Conserv. Board	mpurdy@bentoncountyparks.com	319-560-9806
Zach Parmater	Benton County Conservation Vinton City Council	zparmater@bentoncountypark.com	319-560-9807
Chris Ward	City of Vinton	cward@vinton.org.net	110 W. 3rd St, PO Box 529 319-472-4707
Sandy Pumphrey	City of Cedar Rapids	s.pumphrey@cedar-rapids.org	500 15th Ave SW Cedar Rapids, 52404
John Miller	BLACK HAWK COUNTY SUPERVISOR	JMILLER@CO.BLACK-HAWK.IA.US	316 E. 5th STREET WATERLOO, IA 50613
Larry Weber	Iowa Flood Center	larry-weber@uiowa.edu	300 S. Riverside Dr. Iowa City, IA 52242
Breanna Zimmerman	" "	breanna-zimmerman@uiowa.edu	" "

Sign-in Sheet
NDRC - North Raccoon River Watershed
9/22/2015

2pm - Storm Lake Courthouse

Name	Affiliation	Email	Address & Phone
Derek Namanny	IDALS	derek.namanny@ia.nacdnet.net	3302 18th Street, Suite 2 Spirit Lake, IA 51360 712-336-3782 Ext. 3
Bob Waters	IDALS	bob.waters@iowaagriculture.gov	Same as above
Anita Patrick	BV SWCD + Pocahont	anita.patrick@ia.nacdnet.net	1617 N. Lake Ave Storm Lake IA 50588 712-732-3096 x3
Larrette Kolbe	NRCS BV + Pocahon	larrette.kolbe@ia.usda.gov	" "
Bill Belden	Antares Group Inc	bbelden@antaresgroupinc.com	6123 270th Pl Moravia, IA 52571
Russ Jergens	Pocahontas County EMA	rjergens@pocahontasco.ia.us	99 Court Sq, Pocahontas, IA 50574 712-335-3188
Louis Stauter	Pocahontas Supervisor	—	12887 130th Ave Fonda Ia 50540
Ed Dewey	Pochontas Supervisor	ed.dewey@[illegible]	209 1st Ave SW Pocahontas IA 515 689 1512
Aimee Barritt	B.V. Co EMA	aimee.barritt@bvema.com	PO Box 276, Storm Lake IA 50588 712-749-2705
Kim Johnson	B.V. Co Zoning	kjohnson@bvcountyiowa.com	PO Box 301 Storm Lake 712-749-2555
Dale Arends	BV Co Sup	arendsdale@yahoo.com	5775 210th Ave Newell 50568 712-299-3629
Bret Wilkinson	B.V. Co Engineer	bwilkinson@bvcountyiowa.com	712-299-1430
Margene Bunda	Poca Co. Auditor	mbunda@pocahontas co.ia.us	712-335-3361

Phase 2 Watersheds - North Raccoon



NDRC community engagement meeting – North Raccoon

Storm Lake, IA Courthouse
9/22/2015
2pm

Participants:
Participants included Larry Weber with the University of Iowa, Iowa Flood Center, and interested stakeholders (see attached sign-in-sheet).

Discussion:
The Iowa Flood Center (IFC) attended a meeting at the Storm Lake Courthouse on September 22, 2015 to discuss the National Disaster Resilience Competition (NDRC) funding opportunity. Interested stakeholders attended the meeting, including representatives from both Buena Vista and Pocahontas County. These two counties have been identified as the two areas in the North Raccoon River Watershed (NRRW) that meet certain eligibility requirements of the NDRC. Larry Weber with IFC approached interested stakeholders from Buena Vista and Pocahontas to gain support for the NDRC proposal and identify a lead partner for the proposed project in the NRRW. Prior to the meeting, a conference call was held on September 4, 2015 to discuss the project with a small group of interested stakeholders in the watershed. Participants had access to a summary of the NDRC, a map of the watershed, and a link to the Phase 2 Fact Sheet.

Weber began the meeting by providing background information about IFC. IFC was founded in 2009 in response to the 2008 flooding disaster. Legislation recognized a need to gather research on flooding to allow us to be better prepared for future disasters. In 2010, IFC was awarded \$8.8M from HUD for the Iowa Watersheds Project that funded the construction of conservation practices aimed at flood risk reduction in four watersheds in Iowa; Soap/Chequest, Turkey River, Middle Raccoon, and Upper Cedar. The projects are currently construction practices.

Weber went on to discuss the NDRC proposal and the inclusion of the NRRW. IFC is working with Homeland Security to submit the NDRC proposal for the state of Iowa. There is currently \$1B in funding available to all states with a declared presidential disaster between 2011 and 2013. New York and New Jersey will automatically receive \$120M for Superstorm Sandy disaster recovery. Iowa submitted the Phase I application and was invited to submit Phase II, along with 40 other applicants. Approximately 15 to 20 proposals are expected to receive funding.

Weber explained the focus of the project is centered on resiliency and helping communities prepare for future disasters. Watersheds across the state of Iowa were selected to be included in the proposal based on qualifying criteria, including the presence of environmental or infrastructural MID-URN and at least a 50 percent benefit to LMI. Qualifying criteria were based on soil loss and impaired waters data, as well as documented damages from a presidentially declared disaster.

Buena Vista and Pocahontas County have been identified as the two areas in the NRRW that meet these eligibility requirements. The project will focus on the formation of a WMA, hydrologic assessment and modeling work, practice implementation, and pre and post construction monitoring. The WMA would invite all county, city, and SWCD's to participate. Practices implemented will address primary flood concerns with a secondary benefit to water quality, or primary water quality concerns with a secondary benefit to flooding. At least 75 percent cost share assistance will be available for landowners who volunteer to participate. The remaining 25 percent will be the landowner's responsibility. Practices like bioreactors could receive upwards of 90 percent cost share since there is no direct benefit for the landowner. Practices may include terraces, buffers, grassed waterways, bioreactors, wetlands, or farm ponds. Any practice that does not have an annualized and provides the necessary benefits may be eligible.

Nine different watersheds across Iowa are currently included in the proposal. They include the North Raccoon, East Nishnabotna, West Nishnabotna, Dubuque, Clear Creek, English River, Middle Cedar, Upper Iowa, and Upper Wapsipinicon. A small team working on the proposal attended a workshop in Chicago to discuss the NDRC. The team from Iowa was encouraged to ask for around $100. The request in the NRRW will be around $4.5M that will be used for practice implementation. Additionally, $75/year will be budgeted for a watershed coordinator that will help facilitate the project. The county that agrees to serve as the lead partner for the project in the NRRW will receive 2 percent of funds to help with administrative costs. The lead county will need to contract with a local COG with CDBG experience to help administer the project. From the lead county, a letter of intent to participate and a partnership agreement will need to be completed in order to include the watershed in the proposal. Because of the large LMI area in Storm Lake, it is proposed that Buena Vista County be the sub-recipient of any funds that may be awarded for the NRRW.

<u>Questions/Comments:</u>

Weber opened the meeting up for further discussion and encouraged the audience to ask questions or provide comments in response to the proposal.

- Bill Beldon (Antares Group):What is the expected length of the project?
    - Weber: The project originally had a timeline of 2 years. We are asking for an extension that would make the project last 5 years. The project money's will have to be spent by September 30, 2021.
- Beldon: Will the agreement with the landowners have maintenance agreements?
    - Weber: Yes, the projects will follow NRCS specifications and landowners will be required to sign maintenance agreements.
- Anonymous: Are farm ponds open to the public fishing?
    - Weber: There could be an easement put in place that would allow for public use of some of the practices implemented. However, this decision would be entirely up the landowner.
- Anonymous: Can you "redo" existing ponds?

    - Weber: Only if providing maintenance to existing practices would have a benefit to flood reduction or water quality.
- Bob Waters (IDALS): In order to get credit for the LMI dollars, does the HUC have to be directly above that area?
    - Weber: We are requesting a waiver to re-define how LMI is interpreted so that we can expand our service area.
- Derek Namanny (IDALS): If you can devise plans in LMI areas, does that mean you can use the moneys in other areas, such as the City of Storm Lake?
    - Weber: For every $1 we spend in an area that benefits LMI, we are able to spend $1 in an area with no LMI benefit, but that has environmental or infrastructure MID-URN.

Buena Vista expressed interest in serving as the lead partner. Weber stated that a member from the NDRC team would be in contact to provide a template for the letter and partnership agreement that will be needed to submit the proposal. Weber noted that the letter and partnership need to be completed as soon as possible.

North Raccoon River Watershed – Conference Call
9/4/15
8am

Participants:
Iowa Flood Center – Larry Weber, Breanna Zimmerman, Carmen Langel
On call:
Bob Waters
Zac Anderson – Sac County
Larrette Kolbe
Anita Patrick
Brett Wilkinson
Antares Group – Bill Belden

Discussion:

- Larry Weber (LW) gave an introduction over IIHR – Hydroscience & Engineering and the Iowa Flood Center.
- LW gave participants on the call some background information on the current Iowa Watersheds Project; IFC received $8.8 million in funding and it was used in four watersheds across the state, the Upper Cedar, Turkey River, Soap/Chequest, and Middle Raccoon. The funding was used to conduct a hydrologic assessment of each watershed and create a hydrologic model; $4.5 million was used to implement conservation practices aimed at water retention and flood reduction, including ponds and wetlands.
- LW gave background information on the current National Disaster Resilience Competition (NDRC) funding proposal. Only states with Declared Presidential Disasters from 2011-2013 were eligible to submit a phase 1 application. Funding is available through Housing and Urban Development (HUD). There is $1 billion available in funding, with $180 already obligates to New York and New Jersey for Super Storm Sandy recovery. $820 million is available to all other states.
- 40 teams were selected to submit a phase II proposal
- A few team members working on the proposal attended a conference in Chicago to work on their proposal. The people from HUD were impressed with the Iowa story and the "working together," tone of our proposal. LW felt it was one of the strongest proposals leaving the conference.
- At the conference, the team was advised to ask for a request between $100-$125 million.
- Watersheds included in the proposal are the North Raccoon, Dubuque, East Nishnabotna, West Nishnabotna, Clear Creek, English River, Middle Cedar, Upper Iowa, and the Upper Wapsipinicon.
- The project would be similar to the original Iowa Watersheds Project, and will include a hydrologic assessment, modeling, monitoring, and construction of practices.

- We must work in areas with environmental or infrastructure unmet recovery needs (URN); 50% of funding must be spent to benefit low to moderate income (LMI) communities.
- Our team has been making calls or attending meetings in each of the watersheds to inform potential partners about the project.
- We are anticipating asking for $4.5 million for the North Raccoon; Funds would have to be spent in Buena Vista and Pocahontas counties.

<u>Questions/Comments:</u>

- Bill Belden (BB) with the Antares Group noted that they were just awarded $9 million from the Department of Energy. Much of the work that will be done will include modeling from a sustainability perspective.
  - LW: We may have data of value to the project. IFC might be able to help with monitoring/modeling. There is a lot of common interest between the DOE funding and NDRC funding.
- BB: Can you help with DOE project as it relates to water quality? Where could sensors be located?
  - LW: Most of our water quality sensors are located on the perimeter of Iowa. Others target WQI projects.
- BB: Would like to continue dialogue about the possibilities with these two projects sooner rather than later.
  - LW: We will chat later in September.
- LW: Noted that there would be a 75/25 percent cost share rate for practices. Practices would included ponds, wetlands, terraces, bioreactors, saturated buffers, etc.
  - BB: Could a third party cover the remaining 25% landowner contribution?
  - LW: There is no required match. We need to demonstrate leverage at the federal, state, and private level. We would like to know what funding will go towards BV and Poahontas counties that we can use as leverage.
- Who would do the engineering work (anonymous):
  - LW: We have technical assistance dollars included in the budget. The funding could go to local NRCS-SWCD offices, local engineering firms that follow NRCS specs, or local, recently retired NRCS field staff who could be contracted out.
- In the current WQI projects, there is money for perennial energy crops, bioreactors, and filter strips.
  - LW: Practices like bioreactors may be eligible for 90/10 or 100 percent cost share incentives since the landowner is not receiving a direct benefit.
- If someone could help cover the landowner contribution portion of the practices, that would be helpful.
- LW: The project will be submitted for public comment at the end of September. Following a 15-day public comment period, we will make any changes based off comments and submit the final draft approximately one week before it is due on October 27th. A decision will be made in

January (likely February or March), and around 15-20 projects will be selected. Funding for projects will be available beginning next summer and money should be received at the start of the fiscal year in July.

- LW: At this point, we are looking for sub-recipients for each of the watersheds who can help administer the projects. The sub-recipients need to be a City of County. The County who receives funds can distribute to other groups, such as a COG with CDBG experience that can help with administration. Two percent of funds received in each watershed will be available for administration costs.
- CL: We are looking at projects in Storm Lake since there is a large LMI population there. We haven't been able to reach the 50% benefit yet.
- LW: Would Buena Vista or Pocahontas be willing to help with the project? There is slightly more are of URN in Buena Vista.
    - o Either county would have the capacity to assist with the project.
    - o Someone will reach out to a Board of Supervisor in each county.
- LW: Both counties should be proposed about the project. We will need a letter of intent to participate from whichever county agrees to be the sub-recipient. We will also need a partner agreement. Both of these documents will be put together by Iowa Economic Development Authority (IEDA).
- LW: We have identified 3 HUC 12's to focus practice implementation. We will look for local decision to help decide which areas to work in.
- CL: We are working on writing 5 page narratives for each of the watersheds. In our draft, we will describe which areas are most likely to be selected. We can have the draft for the North Raccoon sent out for input on the proposed project.
- LW: In the 5 page narrative, we want to include places of impact, personal stories, cultural resources, vulnerable populations, or LMI areas that were most impacted by a disaster between 2011-2013. We need help from the locals to tell each of these watersheds stories.
- LW: We will limit work in the North Raccoon to 3 or 4 HUC 12s. We don't want to spread our funding too thinly.
- Anita Patrick (AP): The HUC 12's outlined on the map are good options for practice implementation.
- LW: We need to focus on community in these areas. We will need to tie Storm Lake into the narrative.
- LW: WQI projects are more about outreach and education and do not supply as many dollars for putting practices on the ground.
- What kind of pond projects will be implemented?
    - o LW: Shallow water ponds and farm ponds. In our existing watersheds, the ponds are used for recreation by the landowner.
- IFC will provide a bulleted list of what is needed by BV and/or Pocahontas County.
    - o IFC will help reach out to Supervisors in the area to explain the project and help determine who the sub-recipient will be.

From: Resilience [HSEMD]
Sent: Monday, April 13, 2015 11:59 AM
To: Allamakee03Cnty [HSEMD County]; Benton06Cnty [HSEMD County]; Buchanan10Cnty [HSEMD County]; Buenavista11Cnty [HSEMD County]; Cedar16Cnty [HSEMD County]; Cherokee18Cnty [HSEMD County]; Clay21Cnty [HSEMD County]; Clinton23Cnty [HSEMD County]; Delaware28Cnty [HSEMD County]; Deutmeyer, Kelley [DOT Contact]; Dickinson30Cnty [HSEMD County]; doug.elliott@ecia.org; Dubuque31Cnty [HSEMD County]; gyouell@mapacog.org; Ida47Cnty [HSEMD County]; Iowa48Cnty [HSEMD County]; Jasper50Cnty [HSEMD County]; Johnson52Cnty [HSEMD County]; kblanshan@inrcog.org; Lang, Dwight [DOT Contact]; Lee56Cnty [HSEMD County]; Lyon60Cnty [HSEMD County]; Marion63Cnty [HSEMD County]; Marshall64Cnty [HSEMD County]; mnorris@seirpc.com; Pocahontas76Cnty [HSEMD County]; Pottawattamie78Cnty [HSEMD County]; Poweshiek79Cnty [HSEMD County]; rhowe@uerpc.org; rhunsaker@region12cog.org; Sac81Cnty [HSEMD County]; Tama 86Cnty [HSEMD County]; ted.kourousis@nwipdc.org; Weldon, Cliff [DOT Contact]; Winneshiek96Cnty [HSEMD County]; Wymore, Marty [DOT Contact]
Subject: National Disaster Resilience Competition - PLEASE DISTRIBUTE ASAP!

NATIONAL DISASTER RESILIENCE COMPETITION
Iowa Phase II Application

Request for Information

Description

The Iowa Department of Homeland Security and Emergency Management is seeking information from local jurisdictions interested and capable of building a more resilient State as a component of Iowa's application to the U.S. Department Housing and Urban Development's (HUD) Community Development Block Grant National Disaster Resilience Competition (CDBG-NDRC).

THIS IS A REQUEST FOR INFORMATION (RFI) ONLY. This RFI is issued solely for information and planning purposes. Respondees are advised that Iowa Homeland Security and Emergency Management will not pay for any information or administrative costs incurred in response to this RFI; all costs associated with responding to this RFI will be solely at the interested party's expense. Not responding to this RFI does not preclude participation in any future RFP, if issued.
It is the intent of the Iowa NDRC Application Team to use an RFI process to identify potential infrastructure projects that could be integrated into a Phase II application, as well as to gather relevant information regarding building resilience in the state.

Background

The National Disaster Resilience Competition is a HUD-sponsored program, which will allocate $999,108,000 to a pool of 67 approved applicants to build post-disaster resilience throughout the

United States. $180 million has been set aside for Super Storm Sandy impacted communities. The remainder of the funding will be made available to approved applicants that had presidentially declared disasters in 2011, 2012 or 2013, including some predefined communities and 48 states. With eight presidentially declared disasters during that time, the State of Iowa is an approved applicant and submitted a Phase I application on March 23, 2015.

Phase I was the "framing" phase of the competition in which applicants needed to demonstrate that they met specific threshold criteria, had capacity to effectively administer funds, and exhibited continued need from a qualified disaster. During Phase I, the State of Iowa identified target areas according to the requirements of the National Disaster Resilience Competition, established an approach toward resilience, and discussed intended process for developing Phase II projects and programs. The Iowa Phase I application can be found in its entirety at Iowa - NDRC - Phase I Application

HUD's NOFA criteria were utilized to identify the following twenty-six Iowa counties as potential National Disaster Resilience Competition target areas for "infrastructure-related projects":

Allamakee	Benton	Buchanan	Buena Vista	Cedar
Cherokee	Clay	Clinton	Delaware	Dickinson
Dubuque	Ida	Iowa	Jasper	Johnson
Lee	Lyon	Marion	Marshall	Pocahontas
Pottawattamie	Poweshiek	Sac	Sioux	Tama
Winneshiek				

HUD is expected to announce which applicants are invited into a Phase II application process at the end of May 2015. Once announced, applicants will have 120 days to prepare a Phase II application. Because of the quick timeline for Phase II application preparation, a Request for Information process is being launched prior to Phase II announcements to permit ample time to work with project partners to prepare the most compelling and competitive application that can create transformational progress toward disaster resilience in Iowa.

The State of Iowa NDRC Application Team has established the following timeline for preparation of a Phase II application:

Date Beginning	Date Ending	Milestone
April 13, 2015	May 13, 2015	RFI Accepted
May 13, 2015	May 31, 2015	Evaluation of potential projects by Resilience Steering Committee
June 1, 2015	July 31, 2015	Project application development and consultations with project partners
August 1, 2015	August 31, 2015	Public comment period on Phase II application
September 2015	TBD	Submission of Phase II application (exact date TBD by HUD)

Responses

Interested parties are requested to respond to this RFI by no later than 4:00 pm CDT on Wednesday, May 13, 2015.

The attached RFI form (pdf) must be used to submit responses to the Iowa NDRC Application Team. Submit responses to resilience@iowa.gov. Please be advised that all submissions become the property of the Iowa NDRC Application Team and will not be returned.

The Iowa NDRC Application Team may or may not choose to meet with interested parties.

Questions and Technical Assistance

Questions and/or requests for technical assistance regarding this announcement shall be submitted in writing to resilience@iowa.gov by 4:00 pm CDT on Thursday, April 23, 2015.

HUD has put together a number of resources regarding community resilience and the NDRC. Materials include the White House Fact Sheet, Competition Overview, and the Notice of Funding Announcement (NOFA). Training materials, webinars, and Community & Economic Resilience resources can be found at https://www.hudexchange.info/cdbg-dr/resilient-recovery.

Summary

THIS IS A REQUEST FOR INFORMATION (RFI) ONLY to identify potential infrastructure projects for inclusion in the State of Iowa's National Disaster Resilience Competition Phase II application and to better define resiliency opportunities and challenges in the State. The information provided in the RFI is subject to change and is not binding. No commitment has been made to procure any of the items discussed, and release of this RFI should not be construed as such a commitment or as authorization to incur cost for which reimbursement would be required or sought. All submissions become the property of the Iowa NDRC Application Team and will not be returned. Information contained in RFI responses may lead to potential partnership in a final NDRC application. RFI responses may be made public and should not include sensitive information.

Distribution

We ask that the county emergency management coordinators and councils of government forward this information to the communities in their service area to achieve the widest distribution possible.

Iowa NDRC Application Team

Organization Name:	Storm Lake
County:	Buena Vista
Address:	620 Erie Street, Storm Lake, IA
Phone:	712.732.8000
POC:	James Patrick, City Manager
Contact Email:	patrick@stormlake.org
Project Name:	Storm Lake Flood Mitigation Projects - Raccoon River (HUC 8)

Project Summary

This is a multifaceted project that addresses several disaster damaged areas and areas that require enhancement to make the City more disaster resilient. The City of Storm Lake has a history of storm water flooding. The City is just finishing a $27 million sanitary sewer flood mitigation upgrade to the treatment plant and conveyance system to avoid backups in homes and bypass events throughout the community. As a result of the 2011 and 2013 disasters, it became evident that there still are significant repairs and disaster mitigation measures that need to be addressed. The City is currently spending over $6 million to mitigate some of the most significant flooding and damage resulting from the 2011 and 2013 disasters. During the 2013 disaster, the City received significant volumes of water that caused additional damage to sewer pipes, streets, and culverts. This project is broken down into six critical projects or phases requiring funding to continue the disaster repair and make the community more resilient to future events. These projects are no less critical than the ones the City is currently addressing but they require funding before they can be remedied. The current construction was necessary to be accomplished first since most of these projects are up stream.

Storm water modeling and engineering investigations completed in 2012 determined that significant improvements were needed to alleviate flooding in the North Central portion of the City. This area is generally bounded by 10 Street on the south, 13th Street on the north and Erie Street on the west and Seneca Street on the east. The city has proceed to implement approximately $2,100,000 of improvements in this corridor to alleviate flooding and repair infrastructure damaged by major storm events. The first phase of the repairs are scheduled for construction in 2015. The improvements will be creation of a storm water system to provide an outlet for the flood waters that occur frequently in this corridor. The proposed improvements are generally identified with the report titled “Storm water Management and Water Quality Improvements: North Central Watershed”. The first part of the project addresses repairs needed to Spooner Street and Seneca Street and is ready for construction. The 2nd part of this project would be repairs to Seneca and Spooner Streets once the downstream storm water improvements are completed. Storm sewer for this area was provided by small field tile and storm sewer that was not adequate to convey typical 2 inch rainfall events causing major surface flooding and sewer backups in the corridor. The heavy rains in 2012 and 2013 caused Seneca and Spooner Streets to further deteriorate and further damaged private residents. To alleviate these issues, it is proposed to reconstruct the roadways with a pervious pavement and storm water quality system that stores and conveys storm water from the corridor to the former railroad corridor controlled by the city. The city system to be constructed in 2015 will be a treatment train with bio-swales, and other water quality features to treat and convey storm water to Poor Farm Creek. This proposed Phase of the project is a continuation of a major storm water mitigation project called the North Central Storm Water Mitigation Project (part of the $6 million improvements). Funding in the amount of $1,930,000 is needed to complete this project.

Phase (2) is a CIPP lining of 24” and 18” Sanitary Trunk Sewers from Mae and 1st Street east to the Memorial Street Lift Station. This area of the city was part of the early developed area of the community. Over the years, two separate trunk sanitary sewers were constructed to provide conveyance to the original treatment plant that was later abandoned and converted to a large Lift Station (Memorial Lift Station) that originally conveyed all sanitary flow to the wastewater treatment plant relocated to a point on the south east side of the lake. This area is very susceptible to surcharging and bypass events and significant backups and flooding in a residential neighborhood along Mae Street during 2 year rain events. This releases sewage directly to Lake Storm Lake and causes backups in homes. This area receives significant flooding of private property. The surcharging of this line has caused damage to the sewer interceptors that cause the backup/bypass events.
An alternate would be to replace the existing lines but based on their alignments across private property, depths and the extent of other utility conflicts, it is recommended that the lines receive CIPP lining. Due to higher priority projects and limited budget, this project is waiting for funding of approximately $1,235,000.

Phase (3) Erie Street and Parking Lot Reconstruction, Milwaukee to 6th Street. Erie Street sustained considerable damage caused by significant rain events in recent years, especially the disasters of 2011 and 2013. Repairs in the amount of $23,500 were made to the road and parking lots to make them usable on a short term but repaving is required due to the damage sustained. The roadway corridor is without storm sewer and drains to an overloaded storm sewer system along Milwaukee Avenue (Hwy 7) north of the business corridor. In order to make the necessary permanent repairs it is necessary to design and construct a storm water and pavement system that has low impact on the downstream system at Milwaukee Avenue. The design will include pervious pavements, bio-swales, tree wells and other water quality improvements that clean and slow the release of storm water along the corridor.
Funding is hoped to be received for a portion of the work in June 2015. Should funds not be received, the repairs will need to be delayed until some future date when funds are available. The estimated cost is $1,600,000.

Phase (4) is to replace the box culvert under Business Highway 71 north of the City. Poor Farm Creek flows through this box culvert. Due to the 2013 flood damage, a 4 foot diameter sinkhole was discovered in the west shoulder of the highway. Upon further observation, the walls near the floor of the structure have fully deteriorated, exposing holes as well as severely corroded/failing reinforcement mats. The holes in the walls showed evidence of roadway fill material spilling into the barrel and onto the floor leaving large voids behind the culvert walls. Estimated cost is $500,000.

Phase (5) 7th Street and Geneseo Street Sanitary Sewer Replacement. The City experienced significant bypass events from the manhole at 7th Street and Geneseo Street due to storm damage as a result of the 2011 and 2013 disasters. This project consists of the replacement of a 10” sewer from the intersection of 10th and Geneseo north on Geneseo approximately 460 feet to a connection with the 18” Trunk Sewer located at the south edge of the former railroad ROW north of Hwy 7 (Milwaukee Ave.). The new line is a 15” sanitary sewer pipe. The work includes street removal/replacement, 420’ of gravity 15” pipe, bore and jack with casing of Hwy 7, structures and bypass pumping at an estimated cost of $221,000.

Phase 6 East Central Storm Water Improvements addresses issues at the main entrance into the City. Highway 7 (Lakeshore Dr.), during a 5 year rain event, will be 2 feet under water and limit vehicle traffic into/out of the City. During the 2011 and 2013 disasters damage was done to private property (businesses) as well as to the highway. It contributed untreated nutrient laden run off to the Lake. The work consists of two separate pieces of work, the first is the extension of the East Central improvements from where it ends on the north side of east 4th at the former railroad ROW north and west with storm water quality and storm sewer to its intersection with Geisenger Road. Improvements would be made from Memorial Road south of the Armory west across private property to the ball fields and includes construction of bio-swale, storm sewer, pervious parking lot and other work with connection to existing storm sewer on south side of ball fields.
To alleviate this flooding requires retention ponds/basins to be constructed upstream of this area to retain storm water, treat it, and allow a slow release to the lake. Estimated cost is $660,000.

Project Goals and Main Activities

The City is trying to improve the health safety and well being of our residents and businesses. The City is prone to flooding and has experienced substantial damage to public and private property. In the last five years, the City has concentrated on correcting storm related issues with substantial investment to improve the sewer collection system and wastewater treatment capacity to reduce basement backups and other bypass events that significantly affect City residents. The City created a storm water and waste water best management template, with the assistance of Iowa Economic Development Authority, to identify the areas of concern, look at best management practices, and prioritize the phasing of mitigation efforts. As a result, the City is currently spending $6 million in storm water management projects to further reduce flooding in neighborhoods and the industrial park that has caused significant damage to personal property. The goal of this project request is to continue the progress that has been made to fix disaster damage and improve the City's resiliency to future storm events. This will protect the health of residents and protect property from damage. There is still significant work that needs to be accomplished to mitigate the flooding and to make the community more resilient to future disasters. The City cannot bond further right now, nor can the community with over 60% LMI afford increased debt payments. The City needs this funding to fix existing damage and correct the most critical storm water issues.

Anticipated Project Start and Completion Dates:	3Q15	1Q18
Project Location (Lat/Long):	42.64049	-95.19693
Project Engineering and Design Percent Completion Range:	20%	40%

Geographic Area and Population Served by this Project

The project will serve the greater Storm Lake community, a community of 10,600 based on 2010 census numbers. Storm Lake is the most ethnically diverse city in Iowa with at least 27 different ethnic groups represented. The community is a regional hub for a population of approximately 80,000. Storm Lake is a growing rural community and the economy is primarily agricultural based. There are 3123 houses in Storm Lake and in a recent LMI survey of 496 homes with an 81% response (401 households), the community is 60% LMI and 40% non-LMI.

Project Tie-back to Any Unmet Recovery Needs

This is a multifaceted project that addresses several disaster damaged areas and areas that require enhancement to make the City more disaster resilient. The City of Storm Lake has a history of storm water flooding in isolated pockets of the City. The City is spending over $6 million in attempts to mitigate some of the most significant flooding and damage. During the 2013 disaster, the City received a 100 year event that caused additional damage to sewer pipes, streets, and culverts. As a result of the 2011 and 2013 disasters, it became evident that there still are significant repairs and disaster mitigation measures that need to be addressed. The City has is currently spending over $6 million since the 2011 and 2013 disasters to mitigate some of the most significant flooding and disaster damage. During the 2013 disaster, the City received a 100 year event that caused additional damage to sewer pipes, streets, and culverts. These six critical major projects or phases require funding to continue the disaster repair and make the community more resilient to future events. These projects are no less critical than the ones the City is currently addressing but require funding before they can be remedied. The current projects must be finished first since they are all down stream of these next phases. Phase (1) addresses repairs needed to Spooner Street and Seneca Street. This is a follow on project of a major storm water mitigation project called the North Central Storm Water Mitigation Project (part of the $6 million improvements). This area receives ponded water up to the bottom of cars during a three inch rain event. This part of the project was not included due to the scope and lack of finances. The North Central Project had to be completed first to manage this upstream storm water. After the 2013 rains and substantial damage there is a need to elevate the importance of this project. Phase (2) addresses damage to sewer interceptors caused by surcharging during the 2011 and 2013 significant rain events. These interceptors are susceptible to surcharging and bypass events and cause significant basement backups and flooding in residential neighborhoods along Mae Street. Sewage shoots three feet in the air from manholes and is released directly into Lake Storm Lake. Phase (3) addresses damage sustained on Erie Street, one block east of central downtown. Erie Street has sustained considerable damage caused by the significant rain events of 2011 and 2013 to the travel surface and gutters. Ninety percent of the damage can be attributed to the rains of 2013. The Street has had temporary repairs to make it usable in the short term until funding sources can be identified. Reconstruction is required due to the damage sustained. This project aims to replace a deteriorated street while also providing storm water volume and pollutant load reductions within the downtown district and downstream subdivisions. Phase (4) is to replace the box culvert under Business Highway 71 north of the City. Poor Farm Creek flows through this box culvert. Due to the 2013 flood damage, a 4 foot diameter sinkhole was discovered in the west shoulder of the highway. Upon further observation, the walls near the floor of the structure have fully deteriorated, exposing holes as well as severely corroded/failing reinforcement mats. The holes in the walls showed evidence of roadway fill material spilling into the barrel and onto the floor leaving large voids behind the culvert walls. Phase (5) The City experienced significant bypass events from the manhole at 7th Street and Geneseo Street due to storm damage as a result of the 2011 and 2013 disasters. This pipe needs to be replaced due to substantial damage. This is one of the City's highest priorities and is waiting on funding. Phase (6) addresses issues at the main entrance into the City. Highway 7 (Lakeshore Dr.), during a 5 year rain event, will be 2 feet under water and limits vehicle traffic into/out of the City. During the 2011 and 2013 disasters damage was done to private property (businesses) as well as to the highway. It contributes untreated nutrient laden run off to the Lake. To alleviate this flooding requires retention ponds/basins to be constructed upstream of this area to retain storm water, treat it, and allow a slow release to the lake.

Project Benefits Vulnerable Populations

Storm Lake is the most ethnically diverse city in Iowa with at least 27 different ethnic groups represented. The community is a regional hub for a population of approximately 80,000. There are 3123 houses in Storm Lake and in a recent LMI survey of 496 homes with an 81% response (401 households), it showed that the community is 60% LMI and 40% non-LMI.

Project Creates Greater Resilience in the Target Area

The damage experienced during the 2011 and 2013 disasters was a direct result of insufficient capacity to properly manage storm water resulting in flooding, infiltration into sanitary sewer creating bypass events and backups into private homes, and damage to public infrastructure. The City, with the assistance of the Iowa Economic Development Authority and the technical skills of Conservation Design Forum, created a water, storm water, and waste water Best Management Practices Plan which reviewed each of these project areas and recommended green infrastructure approaches to manage storm water. The plan placed an emphasis on green infrastructure practices that mimic natural processes to restore natural hydrology, improve water quality, and increase biodiversity. This approach is intended to provide multiple benefits in addition to water quality improvements and flood attenuation, and will maximize the value of every dollar invested in the capital improvements. In particular, these projects allow the City to better manage and treat storm water and waste water thereby reducing the impacts on public and private property.

Data that Demonstrates Approach will Build Greater Resilience
Both the Study and Green Infrastructure Plan for Storm Lake Water and the Engineer's evaluation. The Water, storm water, and waste water Best Management Practices Plan studied the City of Storm Lake evaluating the storm damage and areas that needed improvements to build resiliency in the City. These projects are derived from the master list of projects addressing issues and damage in the City.

Project Innovation
This project is innovative first of all since it is derived from a pilot Green Infrastructure Plan, the first in the State in which capital projects were designed using innovative approaches to water management. In the on-going storm water projects, bio-swells, rain gardens, treatment trains, micro settling pools are used with reductions in the amount of piping. The use of native vegetation to absorb water and reduce the velocity have also been incorporated. The City has two sewer interceptor projects listed in this request which will be lined at a significantly reduced cost from replacement. Most of all, water quality is taken into consideration for each storm water management practice the City undertakes due to our proximity to the lake.

Project Partners	Roles
IEDA	Plan development
IDALS	Funding and technical assistance
Buena Vista University	Assist with bio-swells & storm water sampling
Storm Lake United	Coordinates business and industry

Committed Funding Source(s)	Amount(s)
IDALS	$80,000
Bonding	$5,000,000
Capital Budget	$1,500,000
NA	NA

Anticipated funding request:	**$6,146,000**

- Q. I noticed on the map that the Decorah Area might not be eligible based on the criteria. Is Decorah Area eligible? A. No but they can benefit from upstream activity. Also as a part of the watershed management authority, they will be part of planning process that helps them.
- C. I don't think we're talking about resilience. Resilience is getting back to where you were before after a disaster, but we need to be "anti-fragile", which means we need to be stronger than we were before the disaster. My wife and I see the need to do this because we live along Canoe Creek in the Upper Iowa River Watershed and in the 8 years we have lived there we have had 3 severe floods that have wiped out the county road bridge over the creek right by our property. We see the erosion that occurs during the flooding exacerbating the problem, making the floods worse as we go on.
- I agree that a comprehensive program, water quality and water quantity, needs to be developed. Issues start at the top of the hill, not at the bottom and so we need to address issues at the top of the landscape.
- The Upper Iowa Drainage District, which is at the end of the Upper Iowa River, notices the sedimentation occurring in the UIR. Back in the late 1950s people/farmers got tired of getting flooded all the time, so they straightened the last 6 miles of the river or so of the river. That and the associated levees allowed us to safely farm the fields adjacent to the river. However, today where we are supposed to have an 8 foot deep channel we are lucky if it is 6 inches deep in some places and we have lost 10-15 feet on either side.
- As the Fillmore Co SWCD District Administrator I can give you a Minnesota perspective on the UIRW. This is good timing for us as we are in the midst of preparing a watershed plan for the Root and the Upper Iowa is being included in that process. By the end of this year we hope to have a draft watersheds plan that includes the UIRW. Minnesota SWCDs have been partnering with Iowa SWCDs in the UIRW for over a decade. The development of an Iowa WMA and the planning will help us continue this work at a time when the MN partners are just ramping up.
- Q. Why not Howard County? Why wouldn't they be eligible? A. Larry explained there were threshold values for unmet need and LMI that were decided upon by the state. Q. But if MN and Winneshiek Co are doing things why would we leave out Howard County, which is right in the middle. A. Howard County can and should still participate in the WMA as the Disaster Resilience funding is just one type of funding that WMAs and partners can access. Development of policy and proposed voluntary actions can also impact the entire watershed.
- Is the main objective to stop the water where it falls, not stop it later? I'm a landowner and I have 5 structures. Five for holding storm water runoff and my cattle also access some of them for water. Because I have put these structures in, seldom does the water move down into Trout River. It stays where it falls. That is what we need to do more of.
- I'm a commissioner with the Pioneer Cemeteries of Winneshiek Co and on the Winneshiek County Preservation Committee. I see great opportunities for flood prevention projects to help protect and preserve historic sites along the

river. I can think of several but one I would note in particular is the Spillville Mill but there are many cultural and historic sites along the UIR river that are battered by flooding and could be saved through flood prevention.

- A number of years ago the UIR was almost included in the National Wild and Scenic River System. Anything the citizens and people can do to bring attention and/or money to help protect and restore this beautiful resource is something that all of us here today are willing to put in time and resources to see accomplished. We need to see what we can do sooner rather than later.
- Even though Decorah may not qualify for funding it appears that there are areas "up north" that might qualify and benefit Decorah.
- Q. If 51% has to be spent on low-income housing… (A. Larry– corrected with a discussion of low to moderate income categories. – explained that if the retention ponds are built upstream of a LMI area then they would qualify etc.)
- When you look at the map (developed to determine eligible areas for the Disaster Resilience Competition), they are dominated by "census tracks", which have absolutely no relation to water and that is what is confusing the issue.
- Its important to look at this (Disaster Resilience funding) as just one block of money. If we form a watershed authority there are other partners and opportunities waiting for us. We can partner with many partners that already know us like the RC&D, TUDARE, NRCS and other entities that can get allot of projects funded and are already concentrating on water quality. This map may show limitations but there are a lot of other entities that can get funding to us and becoming a WMA will put us higher on everyone's list. We need to show everyone that we are working together on in the Upper Iowa River Watershed, because we have and we do.
- Q. Is this just looking at structural practices or are you looking at management practices also like cover crops etc? (Larry explained current program rules. One-time money results in one-time capital investments. Might build a pond and put a terrace upstream of a structure but there aren't reoccurring funds for things like cover crops in the Nat Dis Resl funding. IDALS and others have been implementing the recurring programs.)
- Q. What are the next steps A. John – get all the political entities that are ready and willing, to sign the 28E. Then we will be a WMA and be on the radar and we can have these people with their ears to the ground to go after available funding. Anyone that wants to take the draft 28e back to their group can do that (passed out draft 28e). County Attorneys will want to look this draft over. If they find language they don't like then we can change it but everyone must approve the revisions.
- How do we create a management authority? What are our next steps? A. Lora explained the process again. Noted that WMAs can inform policy.
- The UIR Watershed has a long history of working together, SWCDs, TU, PF, Counties and dozens of other groups. We know how to do it and this puts us in a good position to move forward.
- Do we need all the towns in the WMA to participate?

- Just need two entities. It could be just a community and a county or a county and an SWCD.
- Some of the towns may come on board others may think that because they don't flood this isn't relevant. There are some of the towns on the periphery of the watershed that aren't worried about flooding but they can be key players in help everyone else. We need to make sure they understand that because they are further up in the watershed they are even more important to this effort.
- In the TRW several of us went to dozens of communities and explained the process. The TRWMA had a cutoff date for joining and then they have not invited entities in after that. The Upper Wapsi had an initial sign-on but then all the members that signed-on initially went out and recruited more and there was a second sign-on.
- Q. How is the WMA Board formed? Who gets to sit on the WMA Board. Who decides who is on the WMA Board? A. Invitation, appointment and each member selects their own representative. UIR is looking at 13 legal entities that must and have been invited but we only actually are required to have 2.
- Q. How is the Executive Committee formed and represented. A. In the TRWMA the Board included criteria in their Bylaws regarding the make-up and duties of the E.C. etc. The Entire WMA committee meets quarterly. The E.C. meets as needed.
- Q. If you join, what are you committed to? A. Attending meetings.
- Q. Is there any match money required for grants. A. Yes, some grants require match but others do not.
- Q. Is this a local board or will there be state/DNR people on it telling us what to do? A. Local – each member appointed by member entity.
- Eventually I would like to see this be farmer driven. There are some 32 watersheds in the UIR. It could be divided into 4 segments where everyone would know everyone else. Winneshiek Co could be divided into three areas.
- A large contributor of the water is the ag land and water quality.
- We should strive for farmer participation. We have gotten up to 75 % participation in the watershed in some type of practice.
- IN the TRW – we surveyed 1500 people and included producers and communities to get a viewpoint from each. We had a 30% response rate. Best feedbacks were in the comments and for the last question, which was "Would you be willing to do something on your land?" 60% in both ag and urban groups said they would do something. It was a statistically valid survey with a 95% confidence rate that the response would be the same in the entire TRW. We need people to provide technical assistance - because we have 60% of 30,000 people that want to do something but who is there to go out and connect with those thousands of people to do something.
- Winneshiek County Board of Supervisors will put the UIR WMA 28e agreement on their agenda for Monday the 24th of August and consider writing the letter for the national resilience competition on Monday.

Public Meeting: National Disaster Resilience Competition - Upper Iowa River Watershed
Thursday, August 20 2015 - Winneshiek County Courthouse

Name	Organization	Address	City	Sign Up for Information?	Email
Rod Marlatt	TRWMA	Elgin IA	Elgin	No	
Dean Thompson	Win Co. BOS		Decorah		
Amber Seitz					
Jim McIntosh					
Lora Friest	NEIA RC&D	Postville	Decorah		
Larry Weber	IFC				
Paul Berland	NEIA RC&D	Postville	Decorah		
Brad Crawford	NEIA RC&D	Postville	Decorah		
John Beard	Win Co. BOS		Decorah		
Jerri Osenga	Decorah Prairie				jerrineo@sncglobal.net
Don Arendt	Decorah City				mayor@decorahia.org
[illegible]	citizen	2526 235 Ave.	Decorah	—	[illegible]@hotmail.com
[illegible]	NEIA RC+D				
Donna Rasmussen	Fillmore SWCD	900 Washington St. NW	Preston MN	—	donna.rasmussen@fillmoreswcd.org
Dean Thompson	Winneshiek Count		Decorah	✓	

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Public Meeting: National Disaster Resilience Competition - Upper Iowa River Watershed
Thursday, August 20 2015 - Winneshiek County Courthouse

Name	Organization	Address	City	Sign Up for Information?	Email
Glenn Larson	Self		Decorah		glarson@wildblue.net
Jim Edgrington	Seed Savers		Decorah		jim@seedsavers.org
John Lubke	Winneshiek SWCD				
Kevin Lee	Winn Co. Pioneer Cemetery	2526 173rd Ave	Decorah		
Amber Seitz	Self		Decorah		
Andy Carlson	City Council		Decorah		
Jim McIntosh	none	607 S. Mill	Decorah		plmcinto87@gmail.com
Bernie Wetli	citizen	410 E Water	Decorah		
Rick Vermiller	Upper Iowa Wat. Shed		New Albin	✓	RVermiller@Hotmail
Tim Reburn	Upper Ia watershed		New Albin		TLReburn@acegroup.cc
Alverna Hauber	NRCS Comm	2165 Rd - W-14	Ridgeway		
Ron Ludeking	Farm Bureau mim	1421 200th St	Decorah		
Todd Duncan	NRCS	2296 Oil Well Rd	Decorah		todd.duncan@ia.usda
Sara Berges	Allamakee SWCD	635 9th St NW	Waukon		sara.berges@ia.nacdnet.net
Natalie Byrnes	none	1044 Hwy 76	Waukon		
DAN BYRNES	ALLAMAKEE CO SUPERVISORS	1044 HWY 76	WAUKON		DBYRNES@NEITEC.NET
William J Pardee	citizen	1552 Manawa Trail Rd	Decorah	Yes	william.pardee@gmail
Catherine E. Pardee	Citizen	1552 Manawa Trail Rd	Decorah		
John Rodecap	Land owner	2244 Middle Calmar Rd	Decorah	Yes	
Cathy Evelsizer	citizen	2526 235th Ave	Decorah		cevelsizer@hotmail.com

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August 5th 2015

NAME	ENTITY REPRESENTED	EMAIL ADDRESS	DELAGATE OR ALTERNATE
Dustin Sage	Black Hawk SWCD		Delegate
John Andersen	Chickasaw County BOS	johnandersenbos@gmail.com	Delegate
Ralph Kramer	Guest		
Kevin Blanshan	INRCOG	kblanshan@inrcog.org	Guest
Jean Kivell	Aurora	jean@eastiowaplastics.com	Delegate
Don Shonka	~~Independence~~ Buchanan County	dLShonkA@gmail.com	Chair
Ron Lenth	Bremer SWCD	rlentha@iastate.edu	delegate
Julie Althaus	Buchanan SWCD	julie.althaus@ia.nacdnet.net - sub	
Bonita Davis, Mayor	Independence	mayor@indytel.com	alternate
Ron Lenth	City of Tripoli	rlenth@iastate.edu	alternate

August 5, 2015

NAME	ENTITY REPRESENTED	EMAIL ADDRESS	DELAGATE OR ALTERNATE
Lora Friest	NEIA RC&D	lora.friest@northeastiowarcd.org	No
Shannon Fehes	City of Elma	elmacityclerk@iowatelecom.net	Delegate
Dan Cohn	Buchanan Co Conservation	bccbdan@iowatelecom.net	
Kip Ladage	Bremer Cnty & Reach	kladage@co.bremer.ia.us	Del
Brian Moore	Chickasaw Co. Cons	cccb_19@iowatelecom.net	
Dennis Goemaat	Linn County Cons.	dennis.goemaat@linncounty.org	Del
Gary Gissel	Buchanan Co	ggissel@buchanan.co.ia.us	Alt
John Klotzbach	Independence BJ.	editor@bulletinjournal	
Jane McGovern	Howard Co.	jmgovern@co.howard.ia.us	Del
Dave Mack	Delaware Co - NRCS	David.Mack@IA.USDA.gov	
Frank Magsamen	BHC BOS	fmagsamen@co.black-hawk.ia.us	

August 5, 2015

NAME	ENTITY REPRESENTED	EMAIL ADDRESS	DELAGATE OR ALTERNATE
Elaine Hughes	City of Quasqueton	daihehug@gmail.com	Delegate
Don GRAY	CITY OF CENTRAL CITY	djbgray@FMTCS.Com	DELAGATE
Chuck Ungs	Linn County Conservation	Chuck.Ungs@LinnCounty.org	

NDRC community engagement meeting – Upper Wapsipinicon

8/5/2015
1:30pm – 3:30pm

Participants:
Lora Friest with Northeast Iowa Resource Conservation and Development (RC&D) and interested stakeholders (see attached sign-in sheet).

Discussion:
A meeting was held on August 5, 2015 to discuss the National Disaster Resilience Competition (NDRC) funding proposal and the inclusion of the Upper Wapsipinicon River Watershed (UWRW) in the project. Lora Friest with the Northeast Iowa RC&D approached interested stakeholders to explain the proposed project in the UWRW. In order to include the watershed in the proposal, a lead partner needs to be identified that will agree to help administer the project. Howard County has been identified as the most likely lead partner to assist with the project.

Friest provided a summary explaining the NDRC proposal and used a PowerPoint presentation to describe the project (see attached). After the presentation, the meeting was opened up for discussion and an opportunity was provided to attendees to ask questions or provide comments.

Questions/Comments:
- What can the funding be used for?
- Should we show the dedication of the watershed by giving them information about what we have already done? In particular, protection of the corridor but also other things we have done to reduce flood risk?
- There is a DVD with stories from the Cedar River in Cedar Rapids that could be helpful for the application.
- Will some of the funding be used to slow the water down? Talking to SWCD Commissioners, they have used a lot of funding to catch water outside of the cities in swales and ponds, etc. We have a lot of pasture in the Upper Wapsi Watershed that are sitting empty and could be used as water reservoirs to hold water.
- Central City policy requires developers to set aside a certain amount of land per development as a retention basin for storm water runoff. This might be a model for other communities in our watershed or in the State. It helps hold back storm water until it can drain down slowly.
- In the process of holding the water back, you are also filtering out the solids and the water that is released is cleaner and that is a big factor. This is really important because as river water levels raise higher due to siltation, the flooding spreads out further.
- Unique to our watershed is that we have extensive educational programming in nature centers and other education with private landowners. We are unique in

eastern Iowa with more educational programming and facilities that operate. The Upper Wapsi WMA could have a great model for outreach.

- In the Upper Wapsi Watershed, we have many landowners that are open to voluntary implementation of practices that slow down water and improve water quality. We have better participation and support from landowners than other parts of the state.
- The Upper Wapsi WMA will be engaging many stakeholder groups including producer groups and others.
- There are four or five council of governments, serving at least 14 or 15 of our communities, involved in the Upper Wapsi that could bring resources to the table and we want to be involved.

The group was informed of the next steps that would need to be taken. A letter of intent to participate and a partnership agreement would need to be approved by the county that agrees to be the lead entity. A member of the NDRC proposal team will be in touch with the representative from Howard County to send them a drafted letter and partnership agreement to be put on an upcoming Board of Supervisors meeting for approval.

National Disaster Resilience Competition (NDRC)

Applicant: State of Iowa
Funder: US Dept. of Housing and Urban Development (HUD), in collaboration with the Rockefeller Foundation.
Funding Level: The National Disaster Resilience Competition (NDRC) will make nearly $1 billion available to communities that have been impacted by natural disasters in recent years.
Applicants: 40 applicants were invited to submit a full proposal to compete for these funds. HUD indicated that 15-20 applicants would likely be funded in this competition, so the odds for each applicant are reasonable.

Program Goals

- Help communities recover from prior disasters and improve their ability to withstand and recover more quickly from future disasters, hazards, and shocks.
- Consider future risks and vulnerabilities in planning and decision-making.
- Help communities better understand their risks and identify ways in which they can protect the long-term well-being and safety of residents.

Iowa will propose a project designed to enhance disaster resilience. The project will fully articulate resilience-enhancing disaster recovery or revitalization projects and programs addressed in their Phase I proposal.

Background

Cities and towns face significant economic and social risks from extreme weather events. These risks are projected to increase substantially due to climate change, sea level rise, and increased development in coastal areas and other vulnerable locations. In spite of advances in disaster preparedness, extreme weather is now affecting the safety, health, and economies of entire regions. American communities cannot effectively reduce their risks and vulnerabilities without considering future extreme events and the effects of climate change in their everyday planning and decision-making.

The competition will encourage communities to not only consider how they can recover from a past disaster but also how to avoid future disaster losses. Applicants will need to link or "tie- back" their proposals to the disaster from which they are recovering, as well as demonstrate how they are reducing future risks and advancing broader community development goals within in their target geographic area(s)

Eligible Applicants

All states with counties that experienced a Presidentially Declared Major Disaster in 2011, 2012 or 2013 were eligible to submit Phase 1 applications that address unmet needs as well as vulnerabilities to future extreme events, stresses, threats, hazards, or other shocks in areas that were most impacted and distressed as a result of the effects of the Qualified Disaster.

Defining Resilience

A resilient community is able to resist and rapidly recover from disasters or other shocks with minimal outside assistance. Reducing current and future risk is essential to the long-term vitality, economic well-being, and security of all communities. By identifying future risk and vulnerabilities, resilient recovery planning can maximize preparedness, save lives, and bring benefits to a community long after recovery projects are complete.

This competition encourages American communities to consider not only the infrastructure needed to become resilient, but also the social and economic characteristics that allow communities to quickly bounce back after a disruption.

For example, applicants need to consider how their projects will promote community development goals, ensure meaningful public engagement and participation, and build collaborations with neighboring jurisdictions and stakeholders who are critical partners in preventing, mitigating, and recovering from disasters.

Objectives of the National Disaster Resilience Competition

The NDRC will build on the successful model of Rebuild by Design, which emphasized innovative designs and community engagement to develop resilient projects to recover from Hurricane Sandy. The NDRC expands the reach of that approach to a national scale. Through the NDRC, HUD seeks to meet the following six objectives:

1. Fairly and effectively allocate the CDBG Disaster Recovery funds.
2. Create multiple examples of modern disaster recovery that applies science-based and forward-looking risk analysis to address recovery, resilience, and revitalization needs.
3. Leave a legacy of institutionalizing the implementation of thoughtful, sound, and resilient approaches to address future risks in state and local decision making and planning.
4. Provide resources to help communities plan and implement disaster recovery that makes them more resilient to future threats or hazards, including extreme weather events and climate change, while also improving quality of life for existing residents and making communities more resilient to economic stresses or other shocks.

5. Fully engage and inform community stakeholders about the impacts of climate change and assist in developing pathways to resilience based on sound science.
6. Leverage investments from the philanthropic community to help communities define problems, set policy goals, explore options, and craft solutions for local and regional resilient recovery strategies.

Phase I: The Framing Phase

Iowa demonstrated how their concept helps Iowa communities recover from the effects of the covered disaster (flooding), advances community development objectives such as economic revitalization, and improves the community's ability to absorb and rapidly recover from the effects of future extreme rainfall events.

(Constraint – address unmet recovery needs stemming from the effect of the community's Presidentially-declared major disaster from 2011, 2012, or 2013 and proposal must primarily benefit the most impacted and distressed areas related to the Qualified Disaster.)

Phase 2: The Implementation Phase

Draft synopsis statement:

We propose a program through which Iowans will work together to address factors upstream that contribute to downstream floods. *We will improve quality of life and health statewide through upstream watershed improvements tied to community revitalization efforts. This will result in a state-of-the art adaptive model to make Iowa's vulnerable populations and environment more resilient in changing climate today and for the next century*.

Funding Request: Around $100 - Million

Plan Components:

Unmet Housing and Infrastructure Needs
Watershed Approach

Through this program, we will engage 10-12 watersheds in Iowa that were identified as having unmet recovery needs from the 2011-2013 disasters. With each watershed, we will go through a process similar to the Iowa Watersheds Project (formation of WMA, hydrologic assessment, watershed plan, selection of sub-watersheds for constructed projects, project construction, and monitoring/evaluation). Watersheds that have already progressed through some of these steps will be further along in the process and will reach the project construction phase sooner.

As per the proposal notice, we must meet certain criteria. So watershed (and sub-watershed) selection criteria will include:

- The extent and location of unmet recovery needs
- The extent and location of LMI and other vulnerable communities/groups in the watershed
- Community interest and engagement
- Potential for leveraging other related projects in the watershed

We are currently seeking input on the criteria above, and specifically:

- What is the local interest and enthusiasm for forming a WMA in this watershed?
- We seek help identifying the most vulnerable populations in your watershed who may benefit from this program. This may be based on a wide range of criteria from socio-economic to ethnicity, age, education level, etc. Are there any groups who are especially susceptible to flooding?
- As we develop the proposal, what is the best way to stay in touch with folks in this watershed and to garner their opinion/input?

Leveraging Dollars

Planning Partners will be working with State of Iowa leadership to identify state dollars that can be used for leverage.

Prioritization of Watersheds

If your watershed qualifies and is selected to part of the Iowa proposal application, a partner agreement with a local governmental agency must be executed prior to the proposal submittal. This governmental agent should be identified soon so the partner agreement can be discussed and developed.

Phase II Fact sheet

http://portal.hud.gov/hudportal/documents/huddoc?id=NDRCFactSheetFINAL.pdf

Iowa's Phase II application will be available online for public review and comment in mid to late September.

NATIONAL DISASTER RESILIENCE COMPETITION

An Iowa Perspective

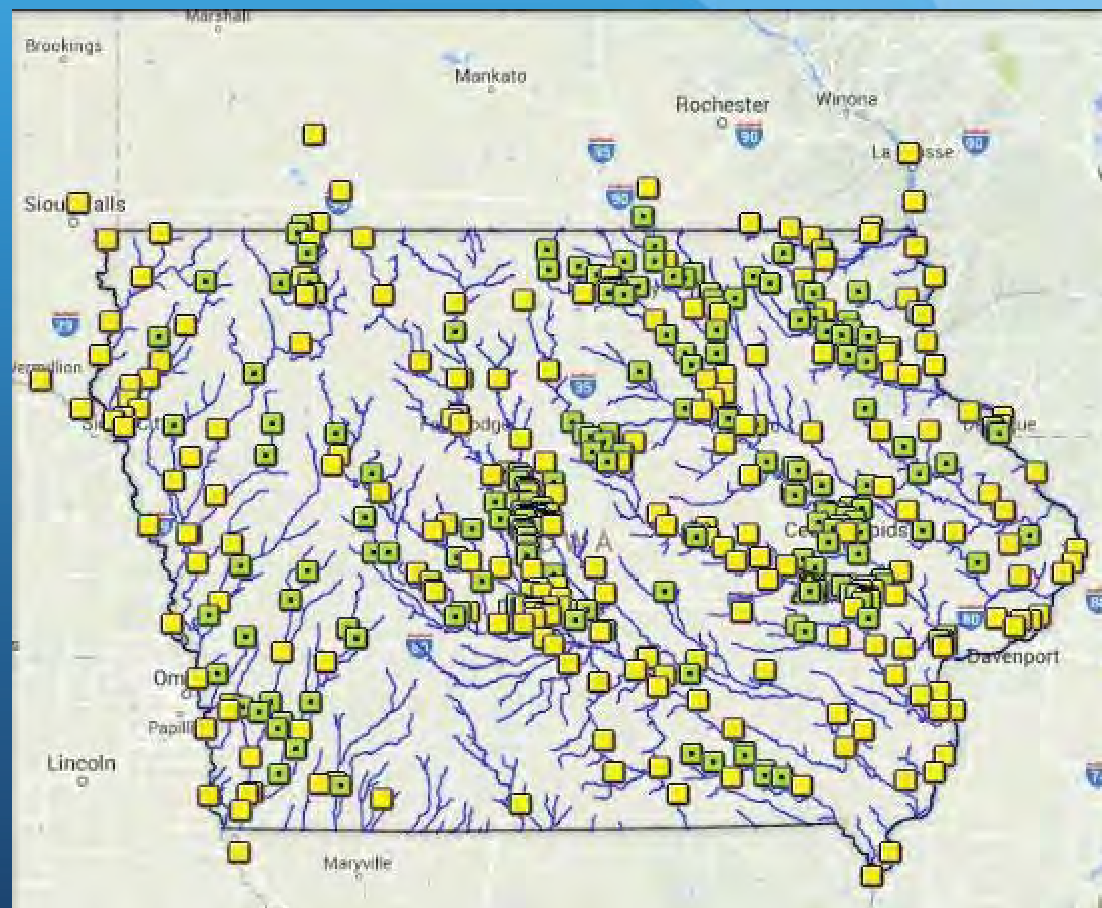
Breanna Zimmerman
University of Iowa – Iowa Flood Center
Outreach Coordinator
Iowa City, Iowa
319-384-1729

Iowa Flood Center

IIHR Hydroscience & Engineering

- IIHR is a unit of the U of I College of Engineering
- Founded in 1920 – leading fluids-related research and engineering labs
- IFC Funded at IIHR in ‘09
- IFC is nation’s first university-based center for research related to floods

IOWA FLOOD INFORMATION SYSTEM



IOWA WATERSHEDS PROJECT

- Award $8.8M from HUD for project
  - Goals: maximize soil water holding capacity, minimize erosion and sedimentation, manage runoff upstream, reduce flood damage
- Current projects: Soap/Chequest, Middle Raccoon River, Turkey River, Upper Cedar
- Phase 1: Hydrologic assessment/modeling
- Phase II: Construction of projects in three HUC 12s (Otter Creek, Beaver Creek, South Chequest Creek)

NDRC

- Funder: US Dept. of Housing and Urban Development (HUD), in collaboration with the Rockefeller Foundation
- $1 billion funds available
- Applicant: State of Iowa
- Phase II Applicants: 40 applicants invited; 15-20 expected to be funded
- IFC working with HSEMD and IEDA

PROGRAM GOALS

- Help communities recover from prior disasters and improve their ability to withstand and recover more quickly from future disasters, hazards, and shocks
- Consider future risks and vulnerabilities in planning and decision-making
- Help communities better understand their risks and identify ways in which they can protect the long-term well-being and safety of residents

JUSTIFICATION

- Cities and towns face significant economic and social risks from extreme weather events
- These risks are expected to increase substantially due to climate and environmental factors beyond the control of the vulnerable populations
- We can not effectively reduce our risks and vulnerabilities without considering future extreme events in planning and decision-making

PROGRAM QUALIFICATIONS

- Applicants must link or “tie-back” their proposals to the disaster from which they are recovering
- Eligibility includes states and counties that experienced a Presidential Declared Major Disaster in 2011, 2012, 2013
- Need to show 50(+)% benefit to LMI communities
- Areas with environmental or infrastructure URN’s are eligible to receive funds

RESILIENCE

- A community is able to resist and rapidly recover from a disaster with minimal outside assistance
- Consideration should include infrastructure needs, as well as the social and economic characteristics that allow communities to recover quickly from disruptions

RESILIENCE

- Applicants must consider how projects
  - Promote community development goals
  - Ensure meaningful public engagement and participation
  - Build collaborations with neighboring jurisdictions and stakeholders who are critical partners in preventing, mitigating and recovering from disasters

NDRC OBJECTIVES

- Fairly and effectively allocate federal CDBG Disaster Recovery funds
- Create multiple examples of modern disaster recovery that applies science-based and forward-looking risk analysis to address recovery, resilience, and revitalization needs
- Provide resources to help communities plan and implement disaster recovery that make them more resilient to future threats including extreme weather events

NDRC OBJECTIVES

- Improve quality of life for exiting residents
- Make communities more resilient to economic stresses or other shocks
- Leverage investments from the philanthropic community to help communities define problems, set policy goals, explore options, and craft solutions for local and regional resilient recovery strategies

PROPOSED PROJECTS

WMA FORMATION

WMA FORMATION

- Conduct planning on a watershed scale, which has greater benefits for water quality improvement and flood risk reduction
- Foster multi-jurisdictional partnership and cooperation
- Leveraging resources such as funding, technical expertise
- Facilitate stakeholder involvement in watershed management
- Better communication about priorities, projects, and resource concerns
- **Invite all cities, counties, and Soil and Water Conservation Districts to participate in the WMA**

http://www.iowadnr.gov/Environment/WaterQuality/WatershedManagementAuthorities.aspx

HYDROLOGIC ASSESSMENT

- Hydrologic assessment of each entire watershed
- Iowa Flood Center will develop hydrologic models for each basin and run simulations to understand the potential effectiveness of various hypothetical mitigation strategies
- The hydrologic assessments will include a comparison of the water cycle across the watersheds and an analysis of hypothetical watershed scenarios that seek to reduce flood damages including changes to infiltration in the watershed and increased storage on the landscape

INPUT NEEDED

- What is the local interest and enthusiasm for forming or continuing to work with a WMA in this watershed?
- Who are the most vulnerable populations in your watershed who may benefit from this program? This may be based on a wide range of criteria from socio-economic to ethnicity, age, education level, etc.
- Are there any groups who are especially susceptible to flooding?
- As the proposal is developed, what is the best way to stay in touch with folks in this watershed and to garner their opinion/input?

NEXT STEPS

- Input to the State
- If your watershed qualifies and is selected to part of the Iowa proposal application, a partner agreement with a local governmental agency must be executed prior to the proposal submittal. This governmental agent should be identified soon so the partner agreement can be discussed and developed.
- A fact sheet is available and the application will be available for public review and comment in mid to late September at:
- http://portal.hud.gov/hudportal/documents/huddoc?id=NDRCFactSheetFINAL.pdf

PUBLIC COMMENTS

Comment Summary

The State of Iowa's Phase II Application for the National Disaster Resiliency Competition was released for Public Comment on October 5, 2015. The public comment period for the document ran from October 5 through October 19, 2015. The posting of the application was hosted on the Iowa Economic Development Authority's website and a media advisory was distributed for publication. In addition to the above, a public hearing was hosted by the Iowa Economic Development Authority on October 12, 2015 at 10:00 AM. at their office in Des Moines, Iowa.

No questions or comments were received from the public on Iowa's Phase II Application.

Consistency with Other Planning Documents

1) Consolidated Plan: See HUD 2991 with Attachment C, Certifications

2) Mitigation Plan:

Iowa is one of only 12 states with a FEMA-approved *Enhanced State Mitigation Plan* (see attached letter), demonstrating that Iowa has developed a comprehensive state-wide mitigation program, including all of the target MID-URN areas.

U.S. Department of Homeland Security
Region VII
9221 Ward Parkway, Suite 300
Kansas City, MO 64114-3372

FEMA

July 1, 2014

Mr. Mark Schouten, Director
Iowa Homeland Security & Emergency Management
7105 NW 70th Avenue
Camp Dodge, Building W-4
Johnston, Iowa 50131

Re: Approval of the Iowa State Enhanced Hazard Mitigation Plan

Dear Mr. Schouten:

Thank you for submitting the Iowa State Enhanced State Mitigation Plan for consideration and review. I am pleased to inform you that the Enhanced State Mitigation Plan is approved as of July 1, 2014. The State Mitigation Plan was reviewed pursuant to the requirements of 44 CFR Part 201 – Hazard Mitigation Planning and the Multi-Hazard Mitigation Planning Guidance under the Disaster Mitigation Act of 2000, dated January 2008.

This letter also informs you of a change to the approval period for State Mitigation Plans. On April 25, 2014, the Final Rule amending the Mitigation Planning regulations (44 Code of Federal Regulations (C.F.R.) Part 201), specifically 44 C.F.R. §§ 201.3(b)(5), 201.3(c)(2), 201.3(c)(3), 201.3(e)(3), 201.4(d), 201.5(a), 201.5(c)(1), and 201.5(c)(2), was published in the Federal Register (80 FR 22873). The Rule reduces the frequency of Standard State and Enhanced State Mitigation Plan updates by extending the update requirement from three (3) to five (5) years. This change became effective May 27, 2014. Therefore, the Iowa State Mitigation Plan will be extended for a period of two years for a total of five (5) years through September 18, 2018

Based on this approval, for disaster declarations after this date, Iowa is to receive increased funds under the Hazard Mitigation Grant Program (HMGP) of up to twenty percent of the total estimated eligible Stafford Act disaster assistance. In accordance with the five-year revision requirement, your enhanced plan and status is in effect until September 18, 2018—five years from the date of FEMA's approval of the Standard Plan.

FEMA approval of your Enhanced State mitigation plan ensures the continued availability within your State of non-emergency Stafford Act funding (Hazard Mitigation Assistance planning and project grants, Fire Management Assistance, and Public Assistance categories C-G). All requests for funding, however, will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted.

Although the Enhanced status is approved, the approval is based upon continued demonstration of improvement to the grants management performance capability and the requirement in 44 CFR 201.6(d)(1) that requires local plans be submitted to the State for initial review and coordination.

The next review and update of your Hazard Mitigation Plan must be approved by FEMA and adopted by the State no later than September 18, 2018. During that review, we expect the State to address any data limitations noted in the plan, and to document progress made on the implementation of the State's mitigation strategy and the Planning Process. In addition, FEMA approval of your Enhanced State mitigation plan is based partially on a review of your mitigation program management performance [44 CFR 201.5 (b)(2)(iii A-D)]. It is important to be aware that when you submit your updated plan for FEMA approval, in accordance with our regulatory requirement, the review of your mitigation program management performance will cover the full period of time between this approval and the next submission of your plan.

If you have any questions or concerns, please contact Michael Scott, Director, Mitigation Division at (816) 283-7004.

Sincerely,

Beth Freeman

Beth Freeman
Regional Administrator

Enclosure

Attachment F – Benefit Cost Analysis

State of Iowa

Iowa_PhaseII_BCA.pdf

MID-URN Target Geography: Eligible target counties and subcounty areas

Upper Iowa River Watershed: Winneshiek County (Census Tract 9504, Block Groups 1, 2, 3, and 4; and Census Tract 9501, Block Groups 1, 2, 3, 4) and Allamakee County (Sub- Census Tract numbers 9601, 9602, 9603, and 9604).

Upper Wapsipinicon River Watershed: Buchanan County (Census Tract 9506, Block Groups 1, 2, 3, and 4) and Delaware County (Census Tract 9504m Block Groups 3 and 4).

Middle Cedar River Watershed: Benton County (Census Tract numbers 9601, 9602, 9603, and 9604) and Tama County (Census Tract 2901, Block Groups 1 and 2; Census Tract 2902, Block Groups 1, 2, and 3; Census Tract 2903, Block Groups 1 and 2)

Lower Iowa River, Clear Creek: Johnson County (Census Tract 2, Block Groups 1, 2, and 3; Census Tract 4, Block Groups 1, 2, and 3; Census Tract 5, Block Groups 1, 2, 3, and 4; Census Tract 23, Block Groups 1 and 2; Census Tract 103.1, Block Groups 1, 2, 3, and 4) and Iowa County (Census Tract 9601, Block Groups 1 and 3; Census Tract 9604, Block Groups 2 and 3).

Lower Iowa River, English River: Iowa County (Census Tract 9604, Block Groups 2 and 3; Census Tract 9603, Block Groups 1, 2, and 3).

North Raccoon River Watershed: Buena Vista Co (Census Tract numbers 9602, 9603, 9604, 9605, and 9606) and Pocahontas Co (Census Tracts 7801, 7802, and 7803).

East Nishnabotna River Watershed: Fremont County (Census Tract 9701, Block Groups 1 and 2).

West Nishnabotna River Watershed: Fremont County (Census Tract 9701, Block Groups 1 and 2) and Mills County (Census Tract 401, Block Groups 1, 2, 3, and 4)

City of Dubuque: Dubuque County (Census Tracts 1, 4, 5, 6, and 11.02)

Benefit-Cost Analysis

Quantifiable Calculations

This proposal and the Benefit-Cost Analysis were created with inputs from and data analysis by all the proposal partners and collaborators. The authors enlisted the support of environmental scientists familiar with the costs of flood mitigation and nutrient reduction practices, environmental economic experts, and the published economic reports and studies for these types of projects. The project investigators were significantly involved in preparing the costs and estimating the benefits throughout this process.

Dubuque Data: The Dubuque projects will eliminate future flooding of housing and businesses located along the Bee Branch Creek in the city's lower-income north end neighborhood. This area has experienced seven major flash floods since 1999 with six Presidential Disaster Declarations. The Dubuque BCA uses HUD, FEMA, and Circular A-94 default values for all calculations where available. Thus, housing projects use a life expectancy of 30 years; three 10-year flood events are assumed in the next 30 years. The BCA accounts for avoided damages to housing and businesses based on actual past flood events and resultant damages. The BCA uses the same IMPLAN software and data as the Storm Lake and Coralville program to generate an analysis of the economic impact resulting from the projects, with discounts applied per Circular A-94 based on the anticipated years of construction. IMPLAN input-output (I-O) models are composed of government-collected data for Dubuque County and projects the impact based on the specific type of project. The benefits are non-duplicating for any project, and costs are 2015 estimates.

Water-quality Data: Keith Schilling and Chris Jones of the Iowa Geological Survey (part of IIHR—Hydroscience & Engineering at the University of Iowa) prepared the cost-benefit ratio based on the proposed work's impact on water quality in target watersheds. The projected environmental value of this project is based on water and soil resources, wildlife and ecosystem biodiversity, and predicted benefits for human health. The variables considered for the purpose of this study included the water-quality parameters (nitrate treatment and treatment for microbial pathogens such as Cryptosporidium and Giardia), loss of soil resources (soil erosion through tillage, cultivation, and land left bare after harvest), loss to the Louisiana fishing industry because of hypoxia in the Gulf of Mexico), and damages to wildlife and ecosystem biodiversity. Homeland Security and Emergency Management (HSEMD) staff conducted additional analyses using this data; they extend the benefit-cost analysis for the projected lifetime of the structures.

Soil Loss: IWA partner Dr. Rick Cruse of the Iowa Water Center at Iowa State University prepared the benefit cost ratio of the effects of mitigating soil erosion in the target watersheds. Homeland Security and Emergency Management (HSEMD) staff performed additional analyses using this preliminary data.

Reduced Stream Stage: IIHR Director and Professor Larry Weber and Nathan Young, Research Engineer at IIHR/IFC, projected the anticipated stream flow reduction and resulting stream stage reduction in the target watersheds. Homeland Security and Emergency Management (HSEMD) staff calculated the impact of the reduced flow on structures for the projected lifetime of the structures.

Infrastructure Projects: David Swenson, an Associate Scientist in the Department of Economics at Iowa State University prepared the economic impact BCA of the infrastructure in Coralville and Storm Lake using IMPLAN software and information provided by the IWA proposal team.

Mark Schneider of the East Central Intergovernmental Association completed the economic impact BCA of the infrastructure for the City of Dubuque.

The BCA includes the full project costs, including direct leverage.

Current Situation and Problem to be Solved

The State of Iowa is subject to many hazards, including flooding, tornadoes, damaging straight line winds, and ice and winter storms. Iowa's most impacted and distressed areas suffer from impaired water quality due to soil erosion, nutrient runoff, and bacterial contamination, especially during extreme precipitation and flooding events. Phase 2, Need/Extent of the Problem, contains detailed information of the geographic makeup and populations served by the communities with the most need and therefore selected as part of this grant application.

The impacts of significant flooding in Iowa's watersheds include damages to homes, businesses, and infrastructure. Agricultural practices within the state, as well as a trend toward increasing intensity and frequency of precipitation events, contribute to the magnitude of these floods. To address the issue of persistent severe flooding, soil erosion, and nutrient loss/redeposition, this proposal recommends a combination of construction, conservation, and rehabilitation/restoration projects in select HUC 12 watersheds throughout Iowa (See Phase II, Soundness of Approach, Project 1). These projects will demonstrate the effectiveness of planned, concentrated activities on reducing flooding and the associated environmental and societal costs of disaster events.

Environmental conditions at the project sites vary by location. Qualified sites were chosen based on the presence of impaired streams as categorized by the Iowa Department of Natural Resources under the criteria established by Section 303(d) of the Clean Water Act. Traditional habitats (tallgrass prairie, lowland wood) have been converted to open fields for agricultural uses, and many streams and rivers have been straightened, accelerating the delivery of water, sediment, and nutrients downstream. Row crop farming is the predominate use of land in Iowa, and the sites chosen reflect this primary use.

Intensive row crop agriculture contributes excess nutrients in Iowa's waterways, as do impervious surfaces in urban areas that increase the amount and rate of water runoff. In rural areas, row cropping practices create vast empty fields that no longer possess the ability to absorb the quantity of water that they once could because of the loss of organic materials, microorganisms, fauna, and flora (soil tilth). The urban and rural growth trends contribute directly to increasing flood risk, which directly and negatively affects the related housing stock, businesses, transportation and utility infrastructure, and entire communities that developed along rivers.

The Iowa Economic Development Authority, the Iowa Flood Center, Homeland Security and Emergency Management, and the City of Dubuque propose a multi-faceted approach to reducing flood risk and increasing individual and community flood resiliency through a suite of practices aimed at reducing flow during extreme hydrologic events. These practices include rehabilitation of floodplains and surrounding neighborhoods through the implementation of green engineering techniques, and watershed planning and construction activities that strategically target areas that can best serve flood reduction goals for entire HUC 12 watersheds. Specifically, the IWA will accomplish six goals: 1) reduce flood risk; 2) improve water quality; 3) increase resilience; 4) engage stakeholders through collaboration and outreach/education; 5) improve quality of life and health, especially for vulnerable populations; and 6) develop a program that is scalable and replicable throughout the Midwest and the United States.

The IWA will accomplish these goals through; 1) a progression of built projects, including projects in the upstream portions of endangered Iowa watersheds, infrastructure projects, and Healthy Homes Resiliency Approach; and 2) engagement of stakeholders in programs at all levels to guide decisions and inform programs to increase flood resilience. The development of data-driven systems, methodologies, metrics, and reporting will enhance, guide, and refine these programs. In the majority of watersheds identified under the IWA proposal, WMAs will choose a slate of strategies based on the individual needs of the watershed based on slope, soils, land use, and location within the watershed.

More “traditional” projects are proposed as well, including a storm sewer system retrofit project in Storm Lake (Project 8) and storm water pump stations retrofit in Coralville (Project 6). Each project will work in combination with the other projects in the watershed to increase resiliency and reduce risk both locally and throughout the watershed.

Many of the proposed actions in the upper watersheds could remain in place in perpetuity with little or no additional support; however, a conservative 20-years project life is assumed, based on the 20-year maintenance agreement with landowners.

The proposed projects will directly affect the amount of water entering the streams during and after a precipitation event; the proposed project implementation will spread this benefit across a large geographic area. However, the greatest effect will be felt in the immediate area of the smallest streams (in this case, HUC 12s) with a diminishing flooding effect as the streams join into larger rivers. However, project components also reduce environmental degradation, which will also have a significant impact downstream.

The timeline for completion is included in each project description. The discount rate used in the benefit cost analysis calculations is the standard 7% rate established by OMB Circular A-94 through the Federal Emergency Management Agency’s benefit cost analysis toolkit.

Risks: Research has shown a trend toward more frequent, intense precipitation events (Phase II, Need/Extent of the Problem). The primary result of these precipitation changes is flooding causing minor to severe damage to transportation and utility infrastructures and environmental degradation (erosion and transportation of soil, nutrients, etc.). Without remediation, flooding of homes and basements along the Bee Branch Creek in the City of Dubuque, for example, will continue. Homeowners in these low-income areas are unable to fully repair their houses. In addition, the continued effects of soil erosion will degrade farmland in rural areas, requiring the use of more chemical fertilizers to maintain production, increasing nutrient concentrations in surface water and ultimately resulting in increased costs of water treatment for downstream communities and loss of habitat and biodiversity from Iowa to the Gulf of Mexico.

Benefits and costs of this proposal: The benefit cost analysis estimates that $1,224,507,991 in costs can be avoided in the event of an equivalent qualifying disaster event by implementing the proposed projects. For each project type evaluated, a unique set of costs and benefits were used. See the attached BCA table for each analysis conducted.

Lifecycle Costs

These costs include: Project/Investment costs.

Resiliency value

Dubuque: The following calculations assume three 10-year flood events in the next 30 years.

Utility treatment Outage: An average outage per event as per table below: 2.5days/6 events = .417 days/event

Date	# of People Impacted	Duration (days)
05/17/99	1250	0.5
06/08/99	1250	0.25
06/04/02	1250	0.5
06/16/04	1250	0.25
05/30/08	1250	0.5
07/23/10	1250	0.5
	Total Days	2.5

Loss of Wastewater treatment for hypothetical 3 floods over 30 years: .417 days/event * 1250 people * 3 events * $126/day (loss of wastewater utility/day) = $197,032.50

Loss of Electricity for hypothetical 3 floods over 30 years: .417 days/event * 1250 people * 3 events * $41/day (loss of electric utility/day) = $64,113.75

Road Closures: Average days per event as per table below: 0.708 days/6 events = .12 days/event

Date	Name of Road Closed	Duration (days)	Additional Miles of Detour	Additional Time of Detour (minutes)	Detour Route
05/17/99	East 22nd Street	0.125	0.80	5.00	22nd & Jackson south to 20th, 20th north to Garfield, Garfield
06/08/99	East 22nd Street	0.083	0.80	5.00	North to Windsor, Windsor west to 24th, 24th south to Jackson
06/04/02	East 22nd Street	0.125	0.80	5.00	Jackson east to 22nd & reverse route
06/16/04	East 22nd Street	0.083	0.80	5.00	
05/30/08	East 22nd Street	0.125	0.80	5.00	
07/23/10	East 22nd Street	0.167	0.80	5.00	
	Total days	0.708			

Iowa DOT records show 22nd Street carries 2200 cars/day. Detour is 0.8 miles. Mileage is $0.55/vehicle/mile (FEMA default rate). Average additional travel time is 5 minutes. Total time is $38.15/vehicle/hour.

Detour time costs: (2200 cars * 0.12 days) / (60 minutes * 5 minutes * 3 events) = $66

Mileage Costs: 2200 cars * 0.12 days * 5 miles * $0.55 = $726/event * 3 events = $2178

Loss of Life: FEMA default value = 0.32 lives/event. Application default value for loss of life = $6,600,000. Assume three events. 3 events * 0.32 per flood * $6,600,000 = $6,336,000

Asthma Health Care: 25,900,000 people with asthma at an annual cost of $56B = $2,162/person/year (US EPA 3/13 fact sheet and AAFA.org). Univ of CA - Berkley Study 2010 - general population experiences 4% asthma rate. Flooded properties experience 8% asthma rate. Project area beneficiaries include 1,250 people. General population with asthma = 1250*.04 = 50. Flood properties with mold/mildew = 1250*0.8 = 100. Project area will have 50 more people than average with asthma. 50 people * $1262 * 3 events = $324,300.

Mental Stress and Loss of Productivity represent FEMA standard values.

Watersheds: The authors used the FEMA Benefit Cost Analysis (BCA) Tool, Full Data Flood module (drainage improvement project category) to calculate the benefits to residential, commercial, and agricultural structures in the floodplains. In addition, they used standard FEMA depth damage functions in all cases, and selected a 20-year useful project life so that the BCA is congruent with maintenance agreements for various structures.

The following data inputs were used:

- *Generic Residential Structure*: Information about a generic residential structure in Iowa was determined by analyzing more than 1,100 residences located in the Special Flood Hazard Area (SFHA) or 100-year floodplain, which were acquired through the FEMA Hazard Mitigation Grant Program (HMGP). Average square footage was found to be 1,298. Data from the International Code Council (ICC) indicate that a conservative construction cost (building replacement value) per square foot is $125. Residential structures in Iowa have basements more commonly than not, so the presence of a basement was assumed. Single-story structures are also the most common, and the most conservative input for the FEMA BCA tool in calculating benefits.

Generic residential structure location within each watershed was chosen based on where data were available, and where actual residences exist. Structure location is necessary to obtain data from the FEMA Flood Insurance Study (FIS).

Where FIS data were not available, flood volume reduction data were used in its place. Where flood volume reduction data and/or FIS data were not available, the authors substituted average benefits per residential structure, calculated using benefits within the studied watersheds where FIS/reduction data are available.

- *Generic Commercial Structure*. The authors determined information about a generic commercial structure in Iowa by analyzing more than 40 commercial properties located in the SFHA acquired through the HMGP. Conservative average square footage is 3,400, and ICC data indicate $140/sq. ft. construction cost is reasonable. The type of structure was assumed to be engineered, and primary use of building was assumed to be "office one-story," the combination thereof provides the most conservative level of benefits possible. Using this data, a figure of $19,627 in benefits for each commercial structure was used, regardless of the project/watershed in question. This was necessary to complete the analysis conservatively and on time, while avoiding over-complication.
- *Generic Agricultural Outbuilding*. Generic agricultural structure data were determined by measuring several standard farm outbuildings located in the SFHA. Square footage averaged 9,775, and ICC data indicated $55/sq. ft. construction costs. Type of structure used is pre-engineered and primary use of building is "warehouse, non-refrigerated" to reflect reality as closely as possible. Using this data, the authors used a figure of $14,490 in benefits per farm

outbuilding regardless of the project/watershed in question. This was necessary in the interest of completing the analysis conservatively and on time while avoiding over-complication.

- *Motel Structure*. One watershed included three motels. Benefits for the motels were used in place of standard commercial structure benefits. Buildings were measured and averaged to 19,450 square feet, and ICC data were used to validate $145/sq. ft. construction cost. The building was assumed to be engineered, primary use "motel."
- *Mental Stress and Anxiety Benefits*. For residential structures, two persons were used in calculating treatment costs for mental stress and anxiety. Average occupancy of a residential structure in Iowa is 2.5 persons.
- *Lost Productivity Benefits*. For residential structures, one worker was used to calculate productivity loss costs. The assumption is that each residence houses at least one worker who would be unable to work for a short period immediately following damage to his or her residence. For commercial/motel structures, two workers unable to work for the period of time following a flood were assumed for each commercial operation. Agricultural structures used one worker for this element of the analysis.
- *Elevation and Discharge Data*. Information from FEMA Flood Insurance Studies (FIS) and Flood Profiles, as well as Hydrology/Hydraulics reduction data provided by Larry Weber and Nate Young, were used where stream and flood data were required (before-mitigation and after-mitigation elevation and discharge data were based on FIS and Weber/Young flow reduction data). Where a percent reduction to flood volumes is expected, discharges were reduced by that percentage, and elevations were reduced by a factor of the reduction to discharge reduction.

All benefitting structures are located within the SFHA, so grade elevation or first floor elevation must be equal to or lower than base flood elevation. To remain conservative, the first floor elevation was assumed to equal the base flood elevation. In reality, first floor elevations will be lower than base flood elevations in nearly all cases. Had an assumption of "less than base flood elevation" been made where first floor elevation data were required, benefits would have been considerably higher for this portion of the BCA. Where streambed data were unknown, the base flood elevation minus 10 feet was used.

In order to calculate benefits per watershed, the number of each type of structure within the SFHA of each watershed was required. These were determined using one or more of the following techniques:

- GIS: Where GIS data are available (SFHA and Structures), analysts and local Emergency Management Coordinators/Floodplain Administrators tallied the number of each structure type.
- FEMA RiskMAP: Where available, FEMA RiskMAP data were used to arrive at the number of NFIP policies within each watershed. Policyholders were assumed to be within the SFHA or an area that would benefit from reduction in flood volume.
- Preliminary Flood Maps: Effective flood maps were not available for several watersheds. In this case, preliminary flood maps or surface water flood risk overlays were used. Best available data were used in all cases.

Environmental Value

Water Quality (non-soil): Projected environmental value of this project is based on water and soil natural resources, wildlife and ecosystem biodiversity, and human health predicted benefits. The calculations used to estimate the value of these improvements as they pertain to water quality are based on a study conducted by Tegtmeier and Duffy at Iowa State University (Tegtmeier, Erin and Michael Duffy. "External Costs of Agricultural Production in the United States," *International Journal of Agricultural Sustainability*, Vol. 2, No. 1, 2004). Tegtmeier and

Duffy estimate the costs of U.S. agricultural production based on the approximately 168.8 million hectares in production. Each external cost of production was divided by 168.8 million hectares and then multiplied by the acreage of each watershed as determined by GIS mapping. The study considered water-quality parameters (nitrate treatment and treatment for microbial pathogens such as Cryptosporidium and Giardia), loss to the Louisiana fishing industry, and damages to wildlife and ecosystem biodiversity. The results presented in the table below represent one year under normal flow conditions. The BCA numbers are calculated over 20 years based on landowner maintenance agreements and using a 7% discount rate. These numbers could increase dramatically under high flow conditions.

HUC Name	Total Crop Area (Hectare)	Nitrate Treatment Cost	Contrib. to Gulf	Pathogen Treatment
Clear Creek	32730.000	$36,003	$1,027,722	$22,584
East Nishnabotna	205888.545	$226,477	$6,464,900	$142,063
English River	95329.050	$104,862	$2,993,332	$65,777
Middle Cedar	459957.745	$505,954	$14,442,673	$317,371
North Raccoon	495288.907	$544,818	$15,552,072	$341,749
Upper Iowa	86980.065	$95,678	$2,731,174	$60,016
Upper Wapsipinicon	289558.247	$318,514	$9,092,129	$199,795
West Nishnabotna	328677.400	$361,545	$10,320,470	$226,787

HUC Name	Wildlife/ Ecosystem	Total Cost (One Year)
Clear Creek	$229,110	$2,820,999

East Nishnabotna	$1,441,220	$17,745,534
English River	$667,303	$8,216,411
Middle Cedar	$3,219,704	$39,643,758
North Raccoon	$3,467,022	$42,688,951
Upper Iowa	$608,860	$7,496,812
Upper Wapsipinicon	$2,026,908	$24,957,025
West Nishnabotna	$2,300,742	$28,328,705

- *Environmental Value (soil loss):* Dr. Richard Cruse, Professor in the Agronomy Department at Iowa State University, prepared information to quantify the impact of soil erosion and transportation. Dr. Cruse is also director of the Iowa Water Center. His specific research focuses on: soil physical properties; soil and water conservation; soil and crop management; applied soil physics; and soil fertility.

Benefits associated with reduced sediment delivery are based on estimated hillslope soil erosion rates, delivery of that soil offsite, and sediment removal costs from offsite locations. Period-specific soil erosion rates for selected HUC 12s within the project area were obtained from the Daily Erosion Project (DEP) (http://www.dailyerosion.org). The DEP is a Water Erosion Prediction Project-based program (WEPP) estimating hillslope soil loss daily for each HUC 12 in Iowa. The project uses spatially and temporally specific precipitation, land management, and soil input data. Hillslope soil loss obtained from DEP for a landscape dominated by corn and soybeans is adjusted for perennial cover based on the cropping factor (C) ratios used in the Revised Universal Soil Loss Equation. Soil eroded from hillslopes (DEP derived and C factor adjusted) was multiplied by a Sediment Deliver Ratio (SDR) used by the Iowa Department of Natural Resources (IDNR) to estimate offsite sediment delivery. Trapping efficiencies of structures used in this proposal were also based on values used by the IDNR. The SDR to structures was set to 0.7, which equals the highest SDR of the HUC 8s in this project; this relatively high value was selected because structures are typically in field or close to sediment sources. Offsite sediment removal costs are based on sediment excavation costs obtained from the Iowa Department of Transportation; these are estimated as $10.00 per ton of sediment.

Dr. Cruse's data were shared with professional staff with Homeland Security and Emergency Management (HSEMD) for calculation of the benefit cost analysis.

Social Value

See non-quantifiable benefits.

Economic Revitalization

Regional Flood Protection and Watershed Project Economic Effects.

Terminology: Because the accompanying tables contain information that may be new to readers, a short introduction to input-output terminology is in order. The types of economic impact data are as follows:

- Output. This is the value of industrial productivity over the course of a year. It represents the worth of what was produced whether it was sold or not. For public institutions, output is usually represented by annual expenditures. In this instance, output represents the annual value of the construction projects and other supporting payments to engineering firms or local government agencies.
- Labor income. These are wage and salary payments to workers, including employer-provided benefits. Management payments to proprietors are also counted as labor income payments.

- Value added. This includes all labor income (mentioned above), plus payments to investors (dividends, interests, and rents), and indirect tax payments to governments. Value added is the equivalent of Gross Domestic Product (GDP), which is the standard measure of economic activity nationwide.
- Jobs. There are many kinds of jobs. I-O models measure the annualized job value in different industries. Many industries have mostly full-time jobs, but many others have part-time and seasonal jobs. I-O models do not convert jobs into full-time equivalencies, but they do convert them into annualized equivalencies. As many people have more than one job, there are always more jobs in an economy than there are employed persons.

The levels of economic impact data are as follows:

- Direct values. These are the aforementioned data types for the industry being evaluated. In this evaluation, the annual project related expenditures in the project counties are the direct values.
- Indirect values. All direct firms require intermediate inputs into production. They must buy supplies, utilities, fuels, other agricultural or manufactured inputs, transportation, and services, just to name a few.
- Induced values. When the workers in the direct industry (in this case, primarily civil engineering construction) and those in the supplying sectors (as described above) convert their labor income into household spending, they induce a third round of economic activity. Induced values are sometimes called the household values.
- Total values. The sum of direct, indirect, and induced activity constitute the total economic effect being measured. In short, it gives us the economic sums of the studied industry or project, its suppliers, and all affected households.

Findings Project #1 Dubuque Housing Rehabilitation Impacts

The housing component of the project will cost $11.89M. The project will be completed in four years, 2016–2019. Construction of the housing component of the project will employ 82.1 workers making $3.78M in labor incomes and will result in direct economic output of $10.6M. These businesses will require $2.6M in regionally sourced inputs that will require 23.9 jobs making $965K in labor incomes. When direct and indirect workers spend their paychecks, they will buy $3M in goods and services, which will support 29.3 jobs and $1M in labor income. The table below displays the results of the analysis.

Dubuque Housing Construction/Rehab Impacts

	Jobs	Labor Income	Value Added	Output
Direct	83.1	$3,829,172	$4,763,429	$10,716,983
Indirect	24.2	$976,959	$1,515,564	$2,594,455
Induced	29.6	$1,044,653	$1,832,591	$3,057,646
Total	136.9	$5,850,785	$8,111,585	$16,369,084

Findings Project #2a Dubuque Railroad Culvert Infrastructure

The estimated cost of the railroad culvert component of the project is $18M. The project will be competed in two years, spring 2018 to September 2020. Construction of the culvert component of the project will employ 84.4 workers making $4.1M in labor incomes and will result in direct economic output of $16.2M. These businesses will require $4.6M in regionally sourced inputs that will require 46.5 jobs making $1.8M in labor incomes. When direct and indirect workers spend their paychecks, they will buy $3.7M in goods and services, which will support 36.1 jobs and $7.2M in labor income. The table below displays the results of the analysis.

Culvert Construction Impacts

	Jobs	Labor Income	Value Added	Output
Direct	84.4	$4,117,892	$5,289,748	$16,207,456
Indirect	46.5	$1,808,366	$2,827,365	$4,621,230
Induced	36.1	$1,273,774	$2,231,847	$3,726,562
Total	167.0	$7,200,032	$10,348,959	$24,555,247

Dubuque Storm Water Improvements—E. 22nd St./Kaufmann Ave.

The estimated cost of the E. 22nd St. Kaufmann Ave storm sewer is $11.5M. The project will be completed in 18 months, April 2018 to September 2020. Construction of the project will employ 51.2 workers making $2.5M in labor incomes and will result in direct economic output of $9.8M. These businesses will require $2.8M in regionally sourced inputs that will require 28.2 jobs making $1.1M in labor incomes. When direct and indirect workers spend their paychecks, they will buy $2.26M in goods and services, which will support 21.9 jobs and $4.4M in labor income. The table below displays the results of the analysis.

East 22nd St./Kaufmann Ave. Storm Sewer Construction Impacts

	Jobs	Labor Income	Value Added	Output
Direct	51.2	$2,496,577	$3,207,044	$9,826,183
Indirect	28.2	$1,096,368	$1,714,162	$2,801,738
Induced	21.9	$772,258	$1,353,114	$2,259,323
Total	**42.2**	**$4,365,203**	**$6,274,320**	**$14,887,244**

Dubuque Storm Water Improvements—W. 17th St./W. Locust St.

The estimated cost of the W. 17th Street/W. Locust Street Storm Sewer component is $20.2M. The project will be completed in 18 months, April 2016 to September 2017. Construction of the project will employ 98.8 workers making $4.8M in labor incomes and will result in direct economic output of $18.96M. These businesses will require $5.4M in regionally sourced inputs that will require 54.5 jobs making $2.1M in labor incomes. When direct and indirect workers spend their paychecks, they will buy $4.3million in goods and services, which will support 42.2 jobs and $1.5M in labor income. The table below displays the results.

West 17th St./West Locust St. Storm Sewer Construction Impacts

	Jobs	Labor Income	Value Added	Output
Direct	98.8	$4,819,647	$6,191,206	$18,969,468
Indirect	54.5	$2,116,541	$3,309,194	$5,408,762
Induced	42.2	$1,490,846	$2,612,189	$4,361,629
Total	**195.5**	**$8,427,034**	**$12,112,589**	**$28,739,859**

Findings Storm Lake Flood Infrastructure (Part of Project 8)

The regional economic effects attributable to the Storm Lake Flood Protection Project were evaluated using an IMPLAN, Inc., input-output modeling system populated with a Buena Vista County dataset. This civil engineering construction project will take two years to complete. The model treats all activity completed by fall 2016 as year one of the project, and all activity to be completed by fall 2017 as project year two. The results, therefore, represent the expected annual number of jobs and amounts of income, value added, and total industrial output supported in the region for the duration of the project.

The total economic effects for year one of the Storm Lake infrastructure projects (eight phases) are displayed below. In the first year, the project will cost $5.415M in primarily civil engineering construction activity. That sector of the local economy will require 27.3 jobs earning $1.007M in labor income. The direct construction activity will require $1.34M in inputs from the regional economy. The supplying firms will therefore require nine jobholders earning $530,035 in labor income. When the direct and indirect jobholders convert their labor income into household spending, they will induce another $646,402 in output in the region, which in turn will pay $194,411 in labor income to an additional 5.9 jobs. Summed, this activity will boost the regional economy in year one by $7.4M in total output and create $2.26M in value added (or regional GDP), of which $1.731M would be labor income to 42.2 job holders.

Storm Lake Flood Protection Project Economic Effects: Year 1

	Jobs	Labor Income	Value Added	Output
Direct	27.3	$1,006,736	$1,126,655	$5,415,000
Indirect	9.0	$530,035	$761,210	$1,340,445
Induced	5.9	$194,411	$372,708	$646,402
Total	**42.2**	**$1,731,182**	**$2,260,573**	**$7,401,848**

The table below**Error! Reference source not found.**contains the expected economic effects for the second year of the project, with construction-related spending of $3.218M. After all effects are multiplied through, the project will sustain $4.4M in total output and contribute $1.343M in value added (or regional GDP) to the area economy, of which $1.029M will be labor income to 25.1 jobholders.

Storm Lake Flood Protection Project Economic Effects: Year 2

	Jobs	Labor Income	Value Added	Output
Direct	16.2	$598,278	$669,543	$3,218,000
Indirect	5.4	$314,987	$452,368	$796,593
Induced	3.5	$115,534	$221,491	$384,141
Total	**25.1**	**$1,028,799**	**$1,343,403**	**$4,398,734**

Findings Coralville Flood Control Project (Part of Project 6)

This is similar to the Storm Lake project; however, all activity is to be completed in 18 months. For modeling purposes, that means two-thirds of the economic effects will occur in year 1, and one-third will occur in year 2. The tables are displayed below.

Coralville Flood Protection Project Economic Effects: Year 1

	Jobs	Labor Income	Value Added	Output
Direct	9.1	$566,841	$606,813	$2,038,667
Indirect	4.0	$180,401	$312,313	$569,881
Induced	3.1	$104,363	$209,672	$354,422
Total	16.2	$851,606	$1,128,798	$2,962,970

Coralville Flood Protection Project Economic Effects: Year 2

	Jobs	Labor Income	Value Added	Output
Direct	4.6	$283,421	$303,407	$1,019,334
Indirect	2.0	$90,201	$156,157	$284,941
Induced	1.6	$52,182	$104,836	$177,211

Total	8.1	$425,803	$564,399	$1,481,485

Risks to Ongoing Benefit: The proposed watershed projects are designed to decrease downstream flooding and improve water quality to help offset land management practices and trends toward increased precipitation and flooding. The unique nature of the proposed projects means that as long as they are designed properly (see design standards for each project type in Phase II, Soundness of Approach, Program 1) and allowed to continue to function to designed capabilities, the majority of these projects should make the landscape more resilient to future events of greater intensity and magnitude.

Challenges with Implementation: There are few risks to the proposed program. Participation is voluntary, and landowner interest is high. The proposed projects are proven effective. The IFC participated in public engagement events and/or board of supervisors meetings in all the target watersheds (East and West Nishnabotna meeting was joint). Most groups were already familiar with the success of the current Iowa Watersheds Project. Some are starting to work toward a WMA or have some similar program upon which their WMA will be based.

The Iowa Watersheds Project BCA: 7.07

Projects: The BCA for each of the separate ten projects:

1. Bee Branch Healthy Homes	2.38		6. Clear Creek	4.77
2. Bee Branch Infrastructure	2.1		7. English River	5.17
3. Upper Iowa	7.34		8. North Raccoon	30.68
4. Upper Wapsipinicon	18.93		9. East Nishnabotna	27.66
5. Middle Cedar River	12.79		10. West Nishnabotna	15.34

Scaling/Scoping: *Alternative 1*: 6.41; *Alternative 2*: 5.36; Alternative 3: 5.01

Non-quantifiable Benefits

Economic Revitalization (Tourism): Natural resources, associated outdoor recreation, and tourism generate billions of dollars in Iowa, supporting job creation in the state. A 2013 study found that traveler spending in Iowa totaled $7.6B during 2012 and supported 64,400 jobs. Of the total Iowa tourism dollars, the watersheds targeted in this project are responsible for approximately $200M. The largest contributor is the Upper Iowa River Watershed, where Allamakee and Winneshiek counties were responsible for $68M in tourism expenditures, much of it related to fishing. Changes to the watershed as a result of large-scale flooding such as the events of 2008 and 2013 adversely affects local residents dependent on tourism income. The IWA will not only improve downstream conditions during a flood, but will also improve water quality during regular flow conditions. This may result in impaired waters becoming habitable again for fish species requiring cold clear water. This, in turn, will benefit the local tourism economy (and local recreation).

Environment: It is difficult to quantify the value of the quality-of-life benefits of natural resource amenities. The resulting improved water quality from this project will enhance biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. Some of the specific implemented projects, such as prairie STRIPS, will provide habitat for a range of birds, mammals, and insects, such as the monarch butterfly, which is declining in numbers due to loss of milkweed. Re-established wetlands in the North Raccoon River Watershed (NRRW) will provide habitat for migrating waterfowl. (In 2011, the participation rate of wildlife viewers in Iowa was among the highest in the nation at 44%. The Prairie Pothole region is home to more than 50% of North America's migratory waterfowl and a favorite area for birdwatchers.) Thus, new wetlands in the NRRW may provide benefits to birds and increase local tourism. The values and linked benefits between them are endless.

A 2007 study at Iowa State University (Otto, M., Manchuk, D., Jintanakul, K., and Kling, C., "The Economic Value of Iowa's Natural Resources," Iowa State University Department of Economics, December 2007) estimated the economic value of these resources beyond tourism expenditures and calculated the net economic benefits of new investments in resource preservation. The economic value is determined from the difference between what consumers would be willing to pay for the experience and what they actually pay. The study found that this value is $1.1B dollars for Iowa. *We expect strong positive impacts on the environment (++) based on the number of projects to be implemented and past impacts of these types of projects*.

Social Value (Community Resilience): The IWA, especially the community resiliency programming, will result in improved resilience to flooding, especially for vulnerable populations, through programs to promote awareness and community-wide flood resilience action plans. The field of community resilience and metrics to measure them is still a developing area, led in part by the National Academy of Science and the Rockefeller Foundation. Initial and ongoing assessment and benchmarking will help to ensure the program's success. Expected specific outcomes will include greater understanding of: community geographical context within a watershed; specific actions a community can take to increase resilience; local social services available to help in the event of a flood; how to stay safe in the event of a flood; how to make homes and businesses more resilient; and the impact on flood risk of increasing trends in precipitation and flooding. All of these outcomes, in concert with the many proposed activities to decrease flood risk, will help Iowans anticipate, prepare for, and adapt to changing conditions, as well as to withstand, respond to, and recover rapidly from a flood. *We expect strong positive impacts (++).*

Social value (Health): There is an undeniable link between home environment, income, and health. A holistic approach as presented in the BBHHRP is aimed at breaking the cycle of substandard housing, poor health, and unemployment/underemployment. It is more than a healthy home; it is turning a green and healthy home into a successful household. Since the late 1970s, Dubuque has worked to remove lead and lead-based paint from historic homes and has significantly decreased the incidence of lead poisoning in children. The economic impact can also be measured: for every 1 microgram per deciliter of lead in the blood, an individual experiences $2,552 in costs. Environmental risks such as mold and mildew, currently in some homes affected by the 2011 flood and recurring rain events, can affect health, productivity, development in children, and viability in the elderly. These risks are usually not visible. Cockroaches, moisture, and dust mites, found in many affected homes, are triggers for half of the 25 million Americans who have asthma.

Twenty-five percent of health risks come from the home environment. Therefore, programs such as the BBHHRP that impact housing quality are the perfect scenario for primary preventions. *Overall, we expect strong positive health impacts (++) based on improvements to infrastructure that lessen the likelihood that homes will take on rainwater, and improvements that will leave the affected homes more resilient and healthy.*

<u>Social value (Cultural)</u>: Iowa has a rich archaeological record, with sites across the state ranging in age from Paleoindian (as early as around 11,000 B.C.) through the late prehistoric and historic. A common denominator for most known sites in Iowa is their proximity to water. The closer you are to a water source, especially within 100 meters, the more likely you are to find an archaeological site. The IWA will not only take appropriate measures to identify and protect archaeological sites during project implementation (Soundness of Approach, Program 1), but its activities will also help prevent site destruction due to erosion. Both identified and yet-to-be identified archaeological sites will benefit from decreased streambank erosion, which damages and destroys archaeological sites.

BCA Costs and Benefits: Full Budget Request

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Housing Rehab	Soundness of Approach Project 1		Estimated cost based on number of expected units, includes direct leverage	$11,891,767	1
City of Dubuque Culvert Project	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$18,000,000	1
City of Dubuque Storm Sewer Kaufman	Soundness of Approach Project 2		Estimated project cost	$11,500,000	1
City of Dubuque Storm Sewer 17th & W. Locust	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$20,200,000	1
Winneshiek County - Upper Iowa	Soundness of Approach Project 3		Cost of project design + construction, including landowner direct leverage	$10,782,500	1
Howard County - Upper Wapsi	Soundness of Approach Project 4		Cost of project design + construction, including landowner direct leverage	$7,297,500	1
Benton County - Middle Cedar	Soundness of Approach Project 5		Cost of project design + construction, including landowner direct leverage	$19,175,000	1
Johnson County - Clear Creek	Soundness of Approach Project 6		Cost of project design + construction, including landowner direct leverage	$7,323,750	1
City of Coralville - Pump Station Infrastructure Project	Soundness of Approach Project 6		Estimated project cost, includes direct leverage	$2,446,400	1
Iowa County - English River	Soundness of Approach Project 7		Cost of project design + construction, including landowner direct leverage	$10,783,750	1
Buena Vista County - North Raccoon	Soundness of Approach Project 8		Cost of project design + construction, including landowner direct leverage	$7,321,250	1
City of Storm Lake - Infrastructure Projects	Soundness of Approach Project 8		Estimated project cost, includes direct leverage	$8,633,000	1

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Fremont County - East Nishnabotna	Soundness of Approach Project 9		Cost of project design + construction, including landowner direct leverage	$3,851,250	1
Mills County - West Nishnabotna	Soundness of Approach Project 10		Cost of project design + construction, including landowner direct leverage	$10,796,250	1
Planning Costs	Soundness of Approach			$16,868,042	1
Total Admin (includes pre-award expenses)				$6,237,820	1
TOTAL COSTS				**$173,108,279**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$197,033	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$64,114	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$2,178	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$66	2
City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$6,336,000	2

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City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$324,300	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$572,571	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$2,709,714	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$756,568	2
City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$7,329,000	2

BCA Costs and Benefits: Full Budget Request

City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$26,208,000	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,908,791	2
Winneshiek County - Upper Iowa - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 7-10 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$24,671,632	1

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Howard County - Upper Wapsi - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$7,025,664	1
Benton County - Middle Cedar - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$33,264,816	1
Johnson County - Clear Creek - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$5,811,422	1

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Iowa County - English River - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$1,122,391	1
Buena Vista County - North Raccoon - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$11,398,387	1
Fremont County - East Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,338,477	1

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Mills County - West Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$9,165,302	1
TOTAL RESILIENCY BENEFITS				$143,206,425	
Environmental Value					
City of Dubuque City of Storm Lake Infrastructure	BCA Narratve, Pages 22-24	Reducing the flooding will prevent flooded sanitary sewers from discharging untreated wastewater into local creeks.	N/A	++	
Upper Iowa River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$17,478,460	1

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Upper Wapsipinicon - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$7,837,632	1
Middle River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$16,190,302	1
Clear Creek - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$15,210,843	1

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English River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$14,026,951	1
North Raccoon River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$2,327,600	1
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$33,051,534	1

BCA Costs and Benefits: Full Budget Request

Upper Iowa - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$37,033,801	2
Upper Wapsipinicon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$123,286,209	2
Middle Cedar - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$195,837,788	2
Clear Creek - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$13,935,564	2

English River - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$40,588,577	2
North Raccoon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$210,880,858	2
East Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$87,661,872	2
West Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$139,942,105	2

BCA Costs and Benefits: Full Budget Request

Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$955,290,096	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Dubuque - Economic Impact - Housing	BCA Narrative, Page 15-16	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$16,169,663	2
City of Dubuque - Economic Impact - Culvert	BCA Narrative, Page 17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$24,555,247	2

BCA Costs and Benefits: Full Budget Request

City of Dubuque - Economic Impact - Storm sewer Kaufmann Ave.	BCA Narrative, Page 16-17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$14,887,244	2
City of Dubuque - Economic Impact - Storm Sewer 17th & W. Locust	BCA Narrative, Page 17-18	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$28,739,859	2
City of Coralville - Pump Station	BCA Narrative, Page 21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Johnson County dataset was used.	$31,538,032	1
City of Storm Lake - 8 Infrastruct	BCA Narrative, Pages 20-21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Buena Vista County dataset was used.	$10,121,425	2
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$126,011,470	
TOTAL BENEFITS				**$1,224,507,991**	
BENEFIT-COST RATIO				**7.07**	

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Housing Rehab	Soundness of Approach Project 1		Estimated cost based on number of expected units, includes direct leverage	$9,124,460	1
City of Dubuque Culvert Project	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$18,000,000	1
City of Dubuque Storm Sewer Kaufman	Soundness of Approach Project 2		Estimated project cost	$11,500,000	1
City of Dubuque Storm Sewer 17th & W. Locust	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$15,200,000	1
Winneshiek County - Upper Iowa	Soundness of Approach Project 3		Cost of project design + construction, including landowner direct leverage	$7,946,000	1
Howard County - Upper Wapsi	Soundness of Approach Project 4		Cost of project design + construction, including landowner direct leverage	$7,030,394	1
Benton County - Middle Cedar	Soundness of Approach Project 5		Cost of project design + construction, including landowner direct leverage	$17,543,787	1
Johnson County - Clear Creek	Soundness of Approach Project 6		Cost of project design + construction, including landowner direct leverage	$7,148,380	1
City of Coralville - Pump Station Infrastructure Project	Soundness of Approach Project 7		Estimated project cost, includes direct leverage	$2,446,400	1
Iowa County - English River	Soundness of Approach Project 8		Cost of project design + construction, including landowner direct leverage	$9,368,013	1
Buena Vista County - North Raccoon	Soundness of Approach Project 9		Cost of project design + construction, including landowner direct leverage	$5,962,422	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

City of Storm Lake - Infrastructure Projects	Soundness of Approach Project 10		Estimated project cost, includes direct leverage	$8,633,000	1
Fremont County - East Nishnabotna	Soundness of Approach Project 11		Cost of project design + construction, including landowner direct leverage	$3,493,935	1
Mills County - West Nishnabotna	Soundness of Approach Project 12		Cost of project design + construction, including landowner direct leverage	$9,080,531	1
Planning Costs				$15,936,542	1
Total Administration				$5,616,946	1
TOTAL COSTS				**$154,030,810**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$157,624	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$51,292	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$2,176	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$66	2

BCA Costs and Benefits: Scaling/Scoping Alternate 1

City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$6,336,000	2
City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$259,440	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$572,572	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$2,709,712	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$756,568	2

BCA Costs and Benefits: Scaling/Scoping Alternate 1

City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$5,863,200	2
City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$20,966,400	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,127,032	2
Winneshiek County - Upper Iowa - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 7-10 Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$18,503,724	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Howard County - Upper Wapsi - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$5,269,248	1
Benton County - Middle Cedar - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$26,611,853	1
Johnson County - Clear Creek - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$5,811,422	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Iowa County - English River - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$934,952	1
Buena Vista County - North Raccoon - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$8,548,790	1
Fremont County - East Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$1,753,858	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Mills County - West Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$7,634,697	1
TOTAL RESILIENCY BENEFITS				$115,870,626	
Environmental Value					
City of Dubuque City of Storm Lake Infrastructure	BCA Narratve, Pages 22-24	Reducing the flooding will prevent flooded sanitary sewers from discharging untreated wastewater into local creeks.	N/A	++	2
Upper Iowa River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$13,108,845	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Upper Wapsipinicon - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$5,878,224	1
Middle River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$12,952,242	1
Clear Creek - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$13,689,759	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

English River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$11,684,450	1
North Raccoon River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$1,745,700	1
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$24,788,651	1

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Upper Iowa - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$27,775,351	2
Upper Wapsipinicon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$92,464,657	2
Middle Cedar - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$156,670,230	2
Clear Creek - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$13,935,564	2

BCA Costs and Benefits: Scaling/Scoping Alternate 1

English River - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$33,823,814	2
North Raccoon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$158,160,644	2
East Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$65,746,404	2

BCA Costs and Benefits: Scaling/Scoping Alternate 1

West Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$116,618,421	2
Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$749,042,955	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
Economic Revitalization					

BCA Costs and Benefits: Scaling/Scoping Alternate 1

City of Dubuque - Economic Impact - Housing	BCA Narrative, Page 15-16	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$12,559,870	2
City of Dubuque - Economic Impact - Culvert	BCA Narrative, Page 17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$24,555,247	2
City of Dubuque - Economic Impact - Storm sewer Kaufmann Ave.	BCA Narrative, Page 16-17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$14,887,244	2
City of Dubuque - Economic Impact - Storm Sewer 17th & W. Locust	BCA Narrative, Page 17-18	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$28,739,859	2
City of Coralville - Pump Statio	BCA Narrative, Page 21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Johnson County dataset was used.	$31,538,032	1
City of Storm Lake - 8 Infrastru	BCA Narrative, Pages 20-21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Buena Vista County dataset was used.	$10,121,425	2

BCA Costs and Benefits: Scaling/Scoping Alternate 1

Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A		2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$122,401,677	
TOTAL BENEFITS				**$987,315,258**	
BENEFIT-COST RATIO				**6.41**	

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Housing Rehab	Soundness of Approach Project 1		Estimated cost based on number of expected units, includes direct leverage	$9,227,665	1
City of Dubuque Culvert Project	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$18,000,000	1
City of Dubuque Storm Sewer Kaufman	Soundness of Approach Project 2		Estimated project cost	$11,500,000	1
City of Dubuque Storm Sewer 17th & W. Locust	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$15,200,000	1
Winneshiek County - Upper Iowa	Soundness of Approach Project 3		Cost of project design + construction, including landowner direct leverage	$7,033,222	1
Howard County - Upper Wapsi	Soundness of Approach Project 4		Cost of project design + construction, including landowner direct leverage	$5,329,469	1
Benton County - Middle Cedar	Soundness of Approach Project 5		Cost of project design + construction, including landowner direct leverage	$14,050,450	1
Johnson County - Clear Creek	Soundness of Approach Project 6		Cost of project design + construction, including landowner direct leverage	$5,435,846	1
City of Coralville - Pump Station Infrastructure Project	Soundness of Approach Project 6		Estimated project cost, includes direct leverage	$2,446,400	1
Iowa County - English River	Soundness of Approach Project 7		Cost of project design + construction, including landowner direct leverage	$6,716,740	1
Buena Vista County - North Raccoon	Soundness of Approach Project 8		Cost of project design + construction, including landowner direct leverage	$4,589,075	1
City of Storm Lake - Infrastructure Projects	Soundness of Approach Project 8		Estimated project cost, includes direct leverage	$8,633,000	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Fremont County - East Nishnabotna	Soundness of Approach Project 9		Cost of project design + construction, including landowner direct leverage	$2,395,457	1
Mills County - West Nishnabotna	Soundness of Approach Project 10		Cost of project design + construction, including landowner direct leverage	$6,569,712	1
Planning Costs	Soundness of Approach			$14,396,529	1
Total Administration				$4,639,493	1
TOTAL COSTS				**$136,163,058**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$118,314	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$39,047	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$2,043	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$61	2
City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$5,944,752	2

BCA Costs and Benefits: Scaling/Scoping Alternate 2

City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$194,736	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$537,215	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$2,542,389	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$709,850	2
City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$4,400,918	2

BCA Costs and Benefits: Scaling/Scoping Alternate 2

City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$15,737,380	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,347,151	2
Winneshiek County - Upper Iowa - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 7-10 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$15,419,770	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Howard County - Upper Wapsi - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,512,832	1
Benton County - Middle Cedar - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$19,958,890	1
Johnson County - Clear Creek - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,632,139	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Iowa County - English River - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$654,354	1
Buena Vista County - North Raccoon - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$6,417,292	1
Fremont County - East Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$1,169,239	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Mills County - West Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$4,582,651	1
TOTAL RESILIENCY BENEFITS				$87,921,023	
Environmental Value					
City of Dubuque City of Storm Lake Infrastructure	BCA Narratve, Pages 22-24	Reducing the flooding will prevent flooded sanitary sewers from discharging untreated wastewater into local creeks.	N/A	++	
Upper Iowa River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$10,924,038	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Upper Wapsipinicon - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$3,918,816	1
Middle River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$9,714,181	1
Clear Creek - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$9,506,777	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

English River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$8,177,712	1
North Raccoon River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$1,310,439	1
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$16,525,767	1

BCA Costs and Benefits: Scaling/Scoping Alternate 2

Upper Iowa - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$23,146,126	2
Upper Wapsipinicon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$61,643,104	2
Middle Cedar - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$117,502,673	2
Clear Creek - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$8,709,728	2

BCA Costs and Benefits: Scaling/Scoping Alternate 2

English River - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$23,676,670	2
North Raccoon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$118,620,483	2
East Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$43,830,936	2
West Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$69,971,052	2

Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$527,178,502	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Dubuque - Economic Impact - Housing	BCA Narrative, Page 15-16	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$12,559,870	2
City of Dubuque - Economic Impact - Culvert	BCA Narrative, Page 17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$24,555,247	2

BCA Costs and Benefits: Scaling/Scoping Alternate 2

City of Dubuque - Economic Impact - Storm sewer Kaufmann Ave.	BCA Narrative, Page 16-17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$14,887,244	2
City of Dubuque - Economic Impact - Storm Sewer 17th & W. Locust	BCA Narrative, Page 17-18	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$21,626,032	2
City of Coralville - Pump Station	BCA Narrative, Page 21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Johnson County dataset was used.	$31,538,032	1
City of Storm Lake - 8 Infrastruct	BCA Narrative, Pages 20-21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Buena Vista County dataset was used.	$10,121,425	2
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$115,287,850	
TOTAL BENEFITS				**$730,387,375**	
BENEFIT-COST RATIO				**5.36**	

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Housing Rehab	Soundness of Approach Project 1		Estimated cost based on number of expected units, includes direct leverage	$8,318,826	1
City of Dubuque Culvert Project	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$18,000,000	1
City of Dubuque Storm Sewer Kaufman	Soundness of Approach Project 2		Estimated project cost	$6,400,000	1
City of Dubuque Storm Sewer 17th & W. Locust	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$8,700,000	1
Winneshiek County - Upper Iowa	Soundness of Approach Project 3		Cost of project design + construction, including landowner direct leverage	$5,037,562	1
Howard County - Upper Wapsi	Soundness of Approach Project 4		Cost of project design + construction, including landowner direct leverage	$3,788,667	1
Benton County - Middle Cedar	Soundness of Approach Project 5		Cost of project design + construction, including landowner direct leverage	$11,315,647	1
Johnson County - Clear Creek	Soundness of Approach Project 6		Cost of project design + construction, including landowner direct leverage	$4,937,281	1
City of Coralville - Pump Station Infrastructure Project	Soundness of Approach Project 7		Estimated project cost, includes direct leverage	$2,446,400	1
Iowa County - English River	Soundness of Approach Project 8		Cost of project design + construction, including landowner direct leverage	$3,757,333	1
Buena Vista County - North Raccoon	Soundness of Approach Project 9		Cost of project design + construction, including landowner direct leverage	$2,627,714	1
City of Storm Lake - Infrastructure Projects	Soundness of Approach Project 10		Estimated project cost, includes direct leverage	$8,633,000	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Fremont County - East Nishnabotna	Soundness of Approach Project 11		Cost of project design + construction, including landowner direct leverage	$1,780,240	1
Mills County - West Nishnabotna	Soundness of Approach Project 12		Cost of project design + construction, including landowner direct leverage	$3,101,715	1
Planning Costs				$10,869,532	1
Total Administration				$3,295,198	1
TOTAL COSTS				**$103,009,115**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$197,033	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$64,114	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$2,178	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$66	2
City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$6,336,000	2

BCA Costs and Benefits: Scaling/Scoping Alternate 3

City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$324,300	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$572,571	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$2,709,714	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$756,568	2
City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$7,329,000	2

City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$26,208,000	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,908,791	2
Winneshiek County - Upper Iowa - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 7-10 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	1+E33:E3712996 08	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Howard County - Upper Wapsi - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,634,624	1
Benton County - Middle Cedar - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$13,305,926	1
Johnson County - Clear Creek - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,632,139	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Iowa County - English River - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$327,738	1
Buena Vista County - North Raccoon - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$3,567,695	1
Fremont County - East Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$876,929	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Mills County - West Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,676,268	1
TOTAL RESILIENCY BENEFITS				$75,429,653	
Environmental Value					
City of Dubuque City of Storm Lake Infrastructure	BCA Narratve, Pages 22-24	Reducing the flooding will prevent flooded sanitary sewers from discharging untreated wastewater into local creeks.	N/A	++	
Upper Iowa River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$8,005,135	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Upper Wapsipinicon - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$2,939,112	1
Middle River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$6,476,121	1
Clear Creek - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$9,506,777	1

BCA Costs and Benefits: Scaling/Scoping Alternate 3

English River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$4,095,870	1
North Raccoon River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$728,539	1
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$9,651,048	1

Upper Iowa - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$16,973,825	2
Upper Wapsipinicon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$46,232,328	2
Middle Cedar - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$78,335,115	2
Clear Creek - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$8,709,728	2

BCA Costs and Benefits: Scaling/Scoping Alternate 3

English River - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$11,838,335	2
North Raccoon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$65,900,268	2
East Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$32,873,202	2
West Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$40,816,447	2

BCA Costs and Benefits: Scaling/Scoping Alternate 3

Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$343,081,849	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Dubuque - Economic Impact - Housing	BCA Narrative, Page 15-16	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$11,450,911	2
City of Dubuque - Economic Impact - Culvert	BCA Narrative, Page 17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$24,555,247	2

BCA Costs and Benefits: Scaling/Scoping Alternate 3

City of Dubuque - Economic Impact - Storm sewer Kaufmann Ave.	BCA Narrative, Page 16-17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$8,285,075	2
City of Dubuque - Economic Impact - Storm Sewer 17th & W. Locust	BCA Narrative, Page 17-18	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$12,117,857	2
City of Coralville - Pump Station	BCA Narrative, Page 21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Johnson County dataset was used.	$31,538,032	1
City of Storm Lake - 8 Infrastructu	BCA Narrative, Pages 20-21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Buena Vista County dataset was used.	$10,121,425	2
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$98,068,547	
TOTAL BENEFITS				**$516,580,049**	
BENEFIT-COST RATIO				**5.01**	

Project #1: Bee Branch Healthy Homes Resiliency Program

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Housing Rehab	Soundness of Approach Project 1		estimated cost based on number of expected units	$11,891,767	1
TOTAL COSTS				**$11,891,767**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$49,258	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$16,028	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$545	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$17	2
City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$1,584,000	2

Project #1: Bee Branch Healthy Homes Resiliency Program

City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$81,075	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$143,143	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$677,429	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$189,142	2
City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$1,832,250	2

Project #1: Bee Branch Healthy Homes Resiliency Program

City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$6,552,000	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$977,198	2
Community Development / Social Value					
Increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
Economic Revitalization					
City of Dubuque - Economic Impact - Housing	BCA Narrative, Page 15-16	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$16,169,663	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$16,169,663	
TOTAL BENEFITS				**$28,271,747**	
BENEFIT-COST RATIO				**2.38**	

Project #2: Bee Branch Infrastructure

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
City of Dubuque Culvert Project	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$18,000,000	1
City of Dubuque Storm Sewer Kaufman	Soundness of Approach Project 2		Estimated project cost	$11,500,000	1
City of Dubuque Storm Sewer 17th & W. Locust	Soundness of Approach Project 2		Estimated project cost, includes direct leverage	$20,200,000	1
TOTAL COSTS				**$49,700,000**	
Resiliency Value					
City of Dubuque - Loss of Waste Water utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reducing flooding will prevent storm water from flooding the sanitary sewer system.	FEMA BCA Tool was used to monetize. Loss of wastewater service was calculated	$147,774	2
City of Dubuque - Loss of Electric utility - FEMA BCA default rate	BCA Narrative, pages 6-7	Reduced vulnerability of electrical infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize. Loss of electrical service was calculated	$48,085	2
City of Dubuque - Road Closures (mileage)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$1,634	2
City of Dubuque - Road closures (time)	BCA Narrative, pages 7-8	During flooding events experienced if infrastructure improvements are not made, road closures will impact community mobility.	FEMA BCA Tool was used to monetize. Data sources include Iowa DOT traffic counts and locally-identified detour routes.	$50	2

Project #2: Bee Branch Infrastructure

City of Dubuque - Loss of Life (flash flood) - FEMA BCA default rate	BCA Narrative, page 8	Prevention of loss of life caused by repeated, future flooding		$4,752,000	2
City of Dubuque - Asthma - health costs	BCA Narrative, page 8	Mold and mildew present in affected homes lead to resident asthma and related health care costs.	FEMA BCA Tool used to monetize. US EPA and University of California Berkley Study (2010) used to determine asthma rates. Annual treatment costs established by Visiting Nurses Association and American Lung Association.	$243,225	2
City of Dubuque - NPV Business flood damages	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$429,428	2
City of Dubuque - NPV loss of revenue (businesses)	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$2,032,286	2
City of Dubuque - NPV Public Infrastructure costs	FEMA BCA Tool was used to monetize.	Reduction in expected property damages due to future disasters. Reduced vulnerability of waste water infrastructure due to future, repeated disasters.	FEMA BCA Tool was used to monetize.	$567,426	2
City of Dubuque - Mental Stress	BCA Narrative, page 8	Mental stress is a known result of natural disasters as residents cope with unexpected economic costs, relocation, disruption of daily schedule, potential loss of income, etc.	FEMA standard value.	$5,496,750	2

Project #2: Bee Branch Infrastructure

City of Dubuque - Loss of Productivity	BCA Narrative, page 8	Loss of productivity is a community and individual outcomes as businesses are closed, residents need to rebuild, do not have access to services, etc.	FEMA standard value.	$19,656,000	2
City of Dubuque - NPV future flood damages - 7% discount rate	FEMA BCA Tool was used to monetize.	Reducing flooding impact to homes via infrastructure and home improvements will increase property values and avoid recovery costs to taxpayers	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,931,593	2
Environmental Value					
City of Dubuque City of Storm Lake Infrastructure	BCA Narratve, Pages 22-24	Reducing the flooding will prevent flooded sanitary sewers from discharging untreated wastewater into local creeks.	N/A	++	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2

Project #2: Bee Branch Infrastructure

Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Dubuque - Economic Impact - Culvert	BCA Narrative, Page 17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$24,555,247	2
City of Dubuque - Economic Impact - Storm sewer Kaufmann Ave.	BCA Narrative, Page 16-17	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$14,887,244	2
City of Dubuque - Economic Impact - Storm Sewer 17th & W. Locust	BCA Narrative, Page 17-18	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Dubuque County dataset was used.	$28,739,859	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$68,182,350	
TOTAL BENEFITS				**$104,488,601**	
BENEFIT-COST RATIO				**2.10**	

Project #3: Upper Iowa

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Winneshiek County - Upper Iowa	Soundness of Approach Project 3		Cost of project design + construction, including landowner direct leverage	$10,782,500	1
TOTAL COSTS				**$10,782,500**	
Resiliency Value					
Winneshiek County - Upper Iowa - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 7-10 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$24,671,632	1
Environmental Value					
Upper Iowa River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$17,478,460	1

Project #3: Upper Iowa

Upper Iowa - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$37,033,801	2
TOTAL ENVIRONMENTAL BENEFITS				$54,512,261	
Community Development / Social Value					
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
Retention of soil/agricutural productivity. Increased revenue from tourism, especially coldwater fishing	BCA Narrative, Pages 23-24	Non-quantifiable value	N/A	++	2
TOTAL BENEFITS				**$79,183,893**	
BENEFIT-COST RATIO				**7.34**	

Project #4: Upper Wapsipinicon

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Howard County - Upper Wapsi	Soundness of Approach Project 4		Cost of project design + construction, including landowner direct leverage	$7,297,500	1
TOTAL COSTS				**$7,297,500**	
Resiliency Value					
Howard County - Upper Wapsi - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$7,025,664	1
TOTAL RESILIENCY BENEFITS				$7,025,664	
Environmental Value					

Project #4: Upper Wapsipinicon

Upper Wapsipinicon - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$7,837,632	1
Upper Wapsipinicon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$123,286,209	2
Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$131,123,841	
Community Development / Social Value					
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					

Project #4: Upper Wapsipinicon

Retention of soil/agricutural productivity.	BCA Narrative, Pages 23-24	Non-quantifiable value	N/A	++	2
TOTAL BENEFITS				**$138,149,505**	
BENEFIT-COST RATIO				**18.93**	

Project #5: Middle Cedar

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Benton County - Middle Cedar	Soundness of Approach Project 5		Cost of project design + construction, including landowner direct leverage	$19,175,000	1
TOTAL COSTS				**$19,175,000**	
Resiliency Value					
Benton County - Middle Cedar - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$33,264,816	1
TOTAL RESILIENCY BENEFITS				$33,264,816	
Environmental Value					

Project #5: Middle Cedar

Middle River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$16,190,302	1
Middle Cedar - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$195,837,788	2
Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$212,028,090	
Community Development / Social Value					
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					

Project #5: Middle Cedar

Economic Revitalization					
Retention of soil/agricutural productivity.	BCA Narrative, Pages 23-24	Non-quantifiable value	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$0	
TOTAL BENEFITS				**$245,292,906**	
BENEFIT-COST RATIO				**12.79**	

Project #6: Clear Creek / Coralville

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Johnson County - Clear Creek	Soundness of Approach Project 6		Cost of project design + construction, including landowner direct leverage	$7,323,750	1
City of Coralville - Pump Station Infrastructure Project	Soundness of Approach Project 6		Estimated project cost, includes direct leverage	$2,446,400	1
TOTAL COSTS				**$9,770,150**	
Resiliency Value					
Johnson County - Clear Creek - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$5,811,422	1
TOTAL RESILIENCY BENEFITS				$5,811,422	
Environmental Value					

Project #6: Clear Creek / Coralville

Clear Creek - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$15,210,843	1
Clear Creek - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$13,935,564	2
TOTAL ENVIRONMENTAL BENEFITS				$29,146,407	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2

Project #6: Clear Creek / Coralville

TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Coralville - Pump Station	BCA Narrative, Page 21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Johnson County dataset was used.	$31,538,032	1
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$31,538,032	
TOTAL BENEFITS				**$66,495,861**	
BENEFIT-COST RATIO				**6.81**	

Project #7: English River

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Iowa County - English River	Soundness of Approach Project 7		Cost of project design + construction, including landowner direct leverage	$10,783,750	1
TOTAL COSTS				**$10,783,750**	
Resiliency Value					
Iowa County - English River - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$1,122,391	1
TOTAL RESILIENCY BENEFITS				$1,122,391	
Environmental Value					
English River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$14,026,951	1

Project #7: English River

English River - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$40,588,577	2
TOTAL ENVIRONMENTAL BENEFITS				$54,615,528	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2

Project #7: English River

TOTAL ECONOMIC REVITALIZATION BENEFITS				$0	
TOTAL BENEFITS				**$55,737,919**	
BENEFIT-COST RATIO				**5.17**	

Project #8: North Raccoon River / Storm Lake

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Buena Vista County - North Raccoon	Soundness of Approach Project 8		Cost of project design + construction, including landowner direct leverage	$7,321,250	1
City of Storm Lake - Infrastructure Projects	Soundness of Approach Project 8		Estimated project cost, includes direct leverage	$8,633,000	1
TOTAL COSTS				**$15,954,250**	
Resiliency Value					
Buena Vista County - North Raccoon - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$11,398,387	1
TOTAL RESILIENCY BENEFITS				$11,398,387	
Environmental Value					

Project #8: North Raccoon River / Storm Lake

North Raccoon River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; Daily Erosion Report.org; Mesonet; Iowa Department of Transportation	$2,327,600	1
North Raccoon - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$210,880,858	2
TOTAL ENVIRONMENTAL BENEFITS				$213,208,458	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2

Project #8: North Raccoon River / Storm Lake

TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
City of Storm Lake - 8 Infrastructure Projects	BCA Narrative, Pages 20-21	Impact on the local economy based on job creation and value added to the economy during project construction.	IMPLAN software with Buena Vista County dataset was used.	$10,121,425	2
Economic Revitalization in North Raccoon River	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$10,121,425	
TOTAL BENEFITS				**$234,728,270**	
BENEFIT-COST RATIO				**14.71**	

Project #9: East Nishnabotna

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Fremont County - East Nishnabotna	Soundness of Approach Project 9		Cost of project design + construction, including landowner direct leverage	$3,851,250	1
TOTAL COSTS				**$3,851,250**	
Resiliency Value					
Fremont County - East Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$2,338,477	1
TOTAL RESILIENCY BENEFITS				$2,338,477	
Environmental Value					
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$8,262,884	1

Project #9: East Nishnabotna

East Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$87,661,872	2
TOTAL ENVIRONMENTAL BENEFITS				$95,924,756	
Community Development / Social Value					
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					
Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$0	
TOTAL BENEFITS				**$98,263,233**	
BENEFIT-COST RATIO				**25.51**	

Project #10: West Nishnabotna

Costs and Benefits by Category	Page # in Factor Narratives or BCA Attachment	Qualitative Description of Effect and Rationale for Including in BCA	Quantitative Assessment (basis / methodology for calculating Monetized Effect with data sources)	Monetized Effect	Uncertainty
Life Cycle Costs					
Mills County - West Nishnabotna	Soundness of Approach Project 10		Cost of project design + construction, including landowner direct leverage	$10,796,250	1
TOTAL COSTS				**$10,796,250**	
Resiliency Value					
Mills County - West Nishnabotna - Reduction of Expected Property Damages and Displacement	BCA Narrative, Pages 8-11 - Flow Reduction & Structures in Floodplains	Reducing floodwater volume will reduce damages to properties located in the floodplain during flood events.	FEMA BCA Tool was used to monetize. Data sources include FEMA Flood Insurance Studies, Flood Profiles, Flood Insurance Rate Maps, HUD Stage Changes Data from Larry Weber & Nate Young, GIS Data, Emergency Management Coordinators, Floodplain Administrators, FEMA RiskMAP Reports, Preliminary Flood Maps and International Code Council.	$9,165,302	1
TOTAL RESILIENCY BENEFITS				$9,165,302	
Environmental Value					
West/East Nishnabotna River - Reduction in sediment delivery	BCA Narrative, Pages 13-14 - Reduction in Sediment Delivery	Reduction of sediment based on estimated hill slope soil erosion rates, delivery of that soil offsite, and sediment removal costs from, offsite locations.	FEMA BCA Tool 5.1 was used to monetize. Data sources include: Richard M. Cruse, Professor & Director Iowa Water Center Iowa State University; Larry J. Weber, Director IIHR Hydroscience, The University of Iowa; DailyErosionReport.org; Mesonet; Iowa Department of Transportation	$24,788,651	1

Project #10: West Nishnabotna

West Nishnabotna - Damage to Water Resources, Wildlife & Ecosystem Biodiversity	BCA Narrative, Pages 11-13 - Water Quality Benefits	Improvement in water quality (nitrate and microbial pathogen treatment) will reduce damage to wildlife and ecosystem biodiversity.	Net present value of benefits was calculated using Microsoft Excel and a discount rate of 7%. Data was provided by Keith Schilling and Chris Jones, Research Geologists at the Iowa Geological Survey within IIHR - Hydroscience & Engineering at the University of Iowa.	$139,942,105	2
Environmental: Enhanced biotic diversity, including aquatic macroinvertebrates, fish, reptiles, and amphibians. New habitat for birds, mammals, insects.	Pages 24-24 - BCA Narrative - Unquantifiable environmental benefits	Non-quantifiable value of environmental impacts	N/A	++	1
TOTAL ENVIRONMENTAL BENEFITS				$164,730,756	
Community Development / Social Value					
City of Dubuque, City of Storm Lake, and City of Coralville Infrastructure	BCA Narrative, Pages 23-24	Prevention of loss of life and the reduction in human suffering as a result of wastewater and mold exposure caused by repeated, future flooding. Benefits low and moderate income persons.	N/A	++	2
Community increase resilience in each target community (Program 2, Community Resilience)	BCA Narrative, Pages 23-24	Non-quantifiable value of increased resilience	N/A	++	2
TOTAL COMMUNITY DEVELOPMENT/SOCIAL VALUE BENEFITS					
Economic Revitalization					

Project #10: West Nishnabotna

Economic Revitalization in each Target Watershed	BCA Narrative, Page 23	Non-quantifiable value of improving water to enhance recreation, sport, and related future tourism	N/A	++	2
TOTAL ECONOMIC REVITALIZATION BENEFITS				$0	
TOTAL BENEFITS				**$173,896,058**	
BENEFIT-COST RATIO				**16.11**	