

Exhibit D

Need / Extent of the Problem

State of Iowa

## Unmet recovery needs and the characteristics and location of geographic most impacted and distressed areas.

From 2011-2013, Iowa received eight Presidential disaster declarations, encompassing 73 of Iowa's 99 counties. Hundreds of communities, representing more than 70 percent of the state's geography, were impacted by severe storms, tornados, straight-line winds, and flooding. These disaster events reflect an increase in the frequency and intensity of weather events and leave communities with depleted resources, while the cost of maintaining critical assets increases. Through the framing process of this application, the State of Iowa conducted a risk and vulnerability assessment specific to the qualified events to determine the most impacted and distressed areas. From that analysis, unmet recovery needs were identified and used as the basis for developing Iowa's approach to disaster resiliency.

The State of Iowa is submitting threshold information for the City of Dubuque and 42 sub-county areas. Through the process of collecting and analyzing the best available data for hundreds of potentially eligible sub-county areas eligible under these eight disaster events, it is evident that the targeted areas are substantially negatively impacted because of these events, and are at further risk for greater damage in subsequent events due to the unmet recovery needs. Additionally, these areas offer the best opportunity for the State of Iowa to begin to effect change in the disaster resiliency process.

As demonstrated in Exhibit B, the following unmet recovery needs were identified in the most impacted and distressed areas as a result of the eight qualifying disasters:

- Structural damage to low-income households housing in Dubuque;
- Damage to permanent public infrastructure that has not yet been repaired due to inadequate resources was found in eight counties, including Lyon, Buena Vista, Pottawattamie, Tama, Benton, Allamakee, Dubuque and Lee Counties.
- Environmental degradation (significant loss of topsoil) was found in 18 rural counties, including Sioux, Cherokee, Ida, Clay, Pocahontas, Sac, Marion, Marshall, Tama, Jasper, Poweshiek, Iowa, Buchanan, Winneshiek, Clinton, Johnson, Cedar, and Delaware Counties.

In Dubuque, more than 200 homes concentrated in the Bee Branch Creek target area (Census tracts 1, 4, 5,

6, and 11.2) reported damage following the July 2011 storms. Approximately 69% of the people in the flood-prone area are at less than 80% median income. Eight sub-county areas defined as most impacted and distressed still have significant infrastructure challenges. Unmet infrastructure needs are estimated at \$[38,711,633], as determined by FEMA Project Worksheets and/or Engineering Reports. These costs include the inclusion of resiliency measures that will protect this infrastructure from future disaster events.

### Most Impacted and Distressed

To determine the impact of the qualified events on environmental degradation, soil erosion was used as the leading indicator. The loss of soil is a significant economic impact to the affected area, and contributes to downstream effects through increased sedimentation and increased nutrient pollution which leads to deteriorating conditions downstream of the impacted area. Impacted and distressed rural areas suffered significant soil erosion and soil loss during the storms and flooding events that far exceeded any established sustainable annual limit for maintaining soil health and productivity.

The State of Iowa and its partners will assess projects and activities using the following factors:

- Through the hazard mitigation planning process, local communities are engaged in understanding risk based on historic occurrence intervals. This information will be gathered from a variety of sources, including the National Climatic Data Center (NCDC) and other reporting mechanisms, to determine the how the threat of future occurrences relates to the proposed resiliency measures.
- More than 70 percent of the state now operates under updated mapping and hydrology. In addition, parcel data is now readily available for input into HAZUS level 2 modeling, which will provide a graphic basis for understanding future risk in activity and project selection.
- Climate and other environmental considerations will be included in the rating factors through collaboration with IFC, DNR, IDALS, and Iowa State University's Iowa Water Center. These considerations include water quality and quantity impacts of agricultural subsurface drainage as a percent of change. Consideration will also be given to prioritized watersheds within the nutrient reduction strategy.

- Lessons learned and best management practices from the Watershed Demonstration Project (HF 2459 and HF 2459) will be applied to proposed projects. This previous experience will help Iowa maximize soil holding capacity, minimize severe scour erosion and increased sedimentation during floods, manage runoff in uplands, and mitigate structural and non-structural flood damage.

Once the specific project areas are determined, all partner entities will do an evaluation of the area's financial and technical resources to add surrounding watershed areas to the project area. One potential avenue to identify these areas includes an analysis of the surrounding area and how their hydrology and risk correlates with the target area. If there are co-benefits that could be achieved through expansion of the area, a cost-benefit analysis will be utilized to support the expansion decision.

The State of Iowa, through an analysis of the qualified disaster events, chose to focus on flash and riverine flooding. Flash and riverine flooding produces harmful urban and rural impacts. In Dubuque, flood disasters have repeatedly impacted residents and employees of the businesses within the watershed. Historically, the Mississippi River flooded Dubuque's low-lying riverfront areas. In 1973, an earthen levee and concrete floodwall system was completed, and disasters related to the Mississippi River have largely been avoided. However, Dubuque's recent disaster events are unrelated to the Mississippi River. These disasters were caused by flash flooding as a result of localized, intense rainstorms. Unlike Mississippi River flooding, flash flooding occurs with little or no warning, with water levels rising at extremely fast rates.

Across the remaining impacted and distressed sub-county areas, riverine flooding has resulted in both infrastructure damage and environmental degradation. This threatens rural Iowa's farm economy. Soil erosion following significant storm and flooding events is occurring at an unprecedented rate, and continued damage to public infrastructure impairs farmers' ability to efficiently bring food to market.

An analysis of the State of Iowa's historic data related to disaster events overwhelmingly concludes that flooding is the most significant and costly hazard facing communities. Iowa's mitigation strategy for the last 10 years prioritizes funding to implement activities involving flood risk reduction. Through the implementation of these projects, it is clear that in addition to mitigating structures in the floodplain, more needs to be done

upstream to arrest water where it initially lands.

Project partners also identify flooding as the paramount disaster threat. Flash flooding in Dubuque's Bee Branch Watershed has repeatedly posed a clear danger to the lives and livelihood of citizens based on six Presidential Disaster Declarations between 1999 and 2011. The City commissioned an engineering study in 1998 to look into the nature of the flooding and identify solutions to mitigate or eliminate the flash flooding experienced in the Bee Branch Watershed. The 2001 Drainage Basin Master Plan outlined improvements throughout the watershed to mitigate future flash flooding disasters.

Every county in Iowa is covered by one of the 1,660 stream watersheds identified by the United States Geological Survey's 12-digit Hydrologic Unit Code (HUC), and as shown by the supporting documentation in Attachment E, DR-1977 through DR-4135 Most Impacted supporting documentation, the primary determinant for impacts from flooding is the location in which the rain falls. Therefore, it can be argued that Iowa's entire population is vulnerable to the risk of flooding dependent on the location of any given rainfall event.

The problem of soil erosion is not limited to extreme rainfall or flooding events, either; soil degradation occurs during normal rainfall events or through poor land- management practices. Poor soil holds less water and erodes more quickly than healthy soil. Because of this, the risk for greater damage from flooding is compounded due to water being delivered more quickly into the watershed.

Flooding will also continue to affect Iowa's urban population. In Dubuque, flood disasters have repeatedly impacted the 3,190 people who live within the flood prone area, including the Washington, Point and North End Neighborhoods. These three neighborhoods contain the community's oldest housing and are among those least able to recover from flood loss and devaluation after such events. The majority of the residents in these neighborhoods are low- to moderate-income and racially and ethnically diverse compared to the city as a whole. Extreme flash flooding within the Bee Branch Watershed also has a great impact on public infrastructure, City services and citizens residing both within and outside the flood impacted area. The financial impact that an average flood event has on the City of Dubuque is \$561,311.

The State of Iowa and its partners identified the unmet recovery needs in the target areas using the

hydrology at work in the area, the topography and composition of soils, transportation infrastructure, economic activity, recorded precipitation from qualifying events, and the age and composition of housing. This analysis was conducted in late February 2015, and included data sets from the last four years.

The City of Dubuque's 2001 Drainage Basin Master Plan was used to determine risk at the micro urban level. That Plan established that there are more than 1,100 properties at risk of flood damage due to flash flooding. A 2009 FEMA study also identified a flood prone area with 1,373 properties.

All statewide data sets were gathered from partners that employ hydrologists, engineers, soil scientists, and housing specialists who actively engage in long-term disaster recovery. The City of Dubuque's Drainage Basin Master Plan was prepared by a professional engineering firm utilizing NOAA and other national climate change resources. The hydraulic and hydrologic models used in the Plan comply with FEMA and U.S. Army Corps of Engineers standards.

Agricultural producers risk losing the production value of the soil they work for crop production. As soil erosion continues to escalate with flooding events, additional chemical fertilizers will need to be applied to maintain productivity. These additives will be washed off during flooding events into streams and rivers, affecting water quality for all communities downstream.

Rural communities face costly infrastructure upgrades to meet the challenges of water quantity and water quality. Most rural communities cannot bare these additional costs and could un-incorporate. Businesses will also likely shut down and relocate, accelerating the decline of rural Iowa.

In urban communities like Dubuque, continued flash flooding will pose significant risks to people living in flood prone areas, particularly low-income residents. Accelerated disaster events as a result of climate change will lead to increased infrastructure costs, economic disruption, displacement, and loss of life.

The risks facing Iowa are serious and growing. Communities across the state are experiencing more frequent and intense disaster events. In Dubuque alone, historical rain data shows that the community has had three 100-year storm events, two 50-year storm events, one 25-year storm event, and one 10-year storm event since 1999. In May 1999 the record rainfall for a 24-hour period was 6.4 inches. That amount was equaled in 2002 and later

surpassed in 2011 when 10.2 inches of rain fell in a 12-hour period. Rain during the months of May and June 2008 totaled 15.7 inches, the highest on record. These trends are expected to continue.

The secondary and tertiary impacts from the identified risks carry serious local and downstream impacts, and are already present within many areas of the state. Most recently, a lawsuit was filed against the agriculturally-based counties of Sac, Buena Vista, and Calhoun by Des Moines Waterworks over the excessive amount of nitrates present in the raw water treated for use in the Des Moines Metropolitan Area. Other communities across the state are grappling with decisions of how to improve their water management systems to deal with the intensity of water flow and the quality of water flowing downstream. There is not enough public funding to support this need. A 2005 Report from the Iowa Policy Project cites 139 incorporated communities and 600 unincorporated communities without sewage service, generating approximately 1.2 billion gallons of inadequately treated or untreated sewage a year.

Flooding of homes also impacts people's health. Of the 21.8 million people reported to have asthma in the U.S., approximately 4.6 million cases are estimated to be attributable to dampness and mold exposure in the home. Asthma causes 2 million emergency room visits, 500,000 hospitalizations and more than \$56 billion in economic costs. In Dubuque, during 2013, 2,385 asthma-related emergency room visits totaled over \$868,140.

While the problem of flooding is well known across the state, and the multi-faceted solution of asset protection and water arrest within the watershed has been identified, it is not yet clear exactly what activities will provide the most benefit in any given area. The identified target areas all require a level of analysis to determine which activities will be most beneficial to the overall goal of future hazard risk reduction. This will most likely be a combination of activities including structural elements, landowner outreach, and constituent buy-in from landowners.

Statewide, data is not readily available. In urban Dubuque, data is not readily available for private buildings, improvements, and residences other than City-owned property. Buildings and improvements owned by the City are adequately insured through commercial insurance and participation in a local government risk pool.

Several factors affect community participation in the National Flood Insurance Program (NFIP). Of the 721

Iowa communities that have been identified by FEMA as having special flood hazard areas (SFHA), 620 or 86 percent are currently participating. Cited reasons communities are not participating include 1) because the identified SFHA is small and/or do not affect any existing structures, 2) there is no perceived need to do so by the constituency, 3) the governments feel incapable of complying with NFIP's requirements due to lack of resources and personnel. Individual decision factors include: 1) cost is too high, 2) lack of awareness of program or individual risk, or 3) lack of access to policies. In addition, most agents do not market.

By implementing activities that address Iowa's flooding vulnerability, the State will address a number of unmet needs. In rural areas across the state, projects will rebuild soil health, reduce peak flood flows, increase soil productivity (and subsequently reduce the amount and costs of inputs), boost economic activity, diminish future costs from infrastructure damage, and decrease the costs to society for cleanup of degraded natural resources (surface water). In urban areas like Dubuque, implementation of the Bee Branch Healthy Homes Resiliency Plan will repair flood damaged dwellings; replace furnaces, water heaters, and other key appliances; improve weatherization and energy efficiency; mitigate mold, radon, lead-based paint, and other household hazards; and enhance quality of life for residents.

To reduce flooding risks, the State will endeavor to reduce peak flood flows by keeping water in the fields for longer, which allows for existing infrastructure and infrastructure previously improved through disaster recovery funding functioning within its designed level for all but the most extreme events. Efforts to improve low-income housing impacted by disasters in Dubuque also support long-term recovery. Helping homeowners who have been unable to address their unmet housing needs will improve health outcomes, safety, livability, and affordability in the Bee Branch Watershed.

The impacts of flooding create challenges for vulnerable populations. Frequently transportation routes are disrupted, water utility systems are compromised, and homes are inundated with contaminated water. Iowa in partnership with the Iowa Disaster Human Resource Council and United Way's 211 program will work to identify social vulnerability in potential project areas. Dubuque's Bee Branch Healthy Homes Resiliency Plan will work across multiple agencies and jurisdictions, and across separate silos and sources of funding. This will

help to identify and remove barriers to holistic, efficient and household centric approaches to improving the health, safety, livability and affordability of housing in the watershed. As such, the risks of disproportionate effects on any population group are minimized significantly.

A number of conditions exacerbate vulnerability for communities within the state as well as outside of its' borders downstream. It is apparent from the condition of Iowa's streams that excessive amounts of fertilizer are being deposited in waterways. The pollution caused by this fertilizer negatively affects the surrounding areas and areas downstream of the sources of the pollution. The continued existence of this pollution and the negative environmental impacts created by it are a result of soil loss and degradation, which if properly addressed, can significantly improve both the environmental condition of the immediate and downstream areas, and also contribute to economic growth through increased productivity and decreased costs of production in the agricultural sector.

Significant progress has been made in flood risk reduction for urban communities. State Agencies in partnership with local leaders plan, design, and implement hazard mitigation activities to protect people and infrastructure from future harm. The Flood Mitigation Board has committed over \$450 million dollars for the future implementation of urban flood risk reduction solutions. Addressing soil degradation is fundamental to building a comprehensive resiliency strategy in this primarily agrarian state. Traditional funding solutions, through the USDA, have been limited and oversubscribed in Iowa for many years. By approaching the solution holistically, the State is recognizing that water systems, both rural and urban, are joined and cannot be dealt with individually.

Over 4,500 feet of buried Bee Branch Creek is being excavated and restored to mitigate flash flooding, improve environmental quality, and create a daylight creek and park space for Dubuque's most at-risk neighborhoods. Over 1,150 homes and businesses are benefiting from the project, which includes the conversion of 240 green alleys and totals over \$200 million in construction and restoration.