

Problem Assessment: The Bee Branch Watershed, where over 50% of Dubuque's residents either live or work, has been hit hard with flash flooding that inundates basements and rushes down streets. In the early 1900s, the Bee Branch Creek was buried (in a storm sewer). As Dubuque grew, the capacity of the storm sewer was regularly overwhelmed during major rain events. Six Presidential Disaster Declarations were issued between 1999 and 2011 due to flash flooding and logged estimated damages of \$69.8 million. Based on a 2009 FEMA study, 1,373 homes and businesses, including 70 businesses that employ over 1,400 people and have over \$500 million in annual sales, are prone to flooding. The watershed encompasses historic neighborhoods that have a mix of affordable, workforce housing, small businesses, and neighborhood schools along with some of Dubuque's oldest housing with over 86% built prior to 1940. For over a decade, businesses and homes have suffered losses from water damage and disinvestment. From 2004 to 2009, commercial property values rose 39% citywide – but fell 6% in the watershed. The more we learned about the watershed flooding patterns, the more we realized the impacts this shift has had on these at-risk neighborhoods.

Contributions of Local Government: The Bee Branch Watershed Flood Mitigation project (BBWFMP) is innovative. Most communities see flooding as strictly stormwater management, and remediate through conveyance, detention, and levees. That approach does not address the entire watershed, water quality, healthy homes, preservation of neighborhoods, and community development. The BBWFMP accomplishes all of these through interconnected infrastructure improvements including sensitive creek restoration, “green alley” reconstructions with permeable pavers, and

stormwater capacity improvements. The BBWFMP's single most important achievement was the **removal of "silos" by** engaging stakeholders at every level. We brought together citizens, businesses, and City staff to identify and understand existing strengths. At the State and Federal levels, we brought together environmental, economic, community development, flood management, and legislative interests to develop a collective and collaborative solution that lead to leveraged funding. Key to this was common understanding that the BBWFMP is not just about removing over 1,300 properties from the threat of repeated flooding; it also is about community outcomes. How do we manage stormwater, improve water quality, prevent and reverse neighborhood decline, preserve community culture, the built environment and native species? How do we promote a balanced local economy? Through this shift in approach we have a more resilient project and designed a more sustainable process.

Project Description, Implementation, Impact and Lessons Learned: BBWFMP is a green infrastructure investment to mitigate flooding, improve water quality, stimulate development, and enhance quality of life. The project catalyzes community economic, social, and environmental capital to create resilient neighborhoods, foster economic opportunities, and balance resources. The BBWFMP involves the daylighting of 4,500 feet of buried storm sewer devoid of aquatic life and wildlife, to a stream and linear park capable of sustaining biodiversity to reduce the risk of flash flooding to private and public property. The project consists of the creation of an open waterway and the creation a linear parkway connecting Dubuque's historic riverfront and urban core to reduce stormwater runoff within the watershed by up to 80%. The restored creek includes a hike/bike trail, rain gardens/bioswales, lighting, benches, pervious pavement,

an amphitheater, and over 1,000 trees and other plantings. The BBWFMP is a model of how community visioning and system change alters everything about how a city responds to issues, challenges, and opportunities in a viable, livable, and equitable manner. Through a citizen engagement process, residents and stakeholders designed the solution, selected the alignment, and also designed/recommended the local funding by establishing a stormwater utility. This project uses green infrastructure improvements to reduce the volume of stormwater, slow the rate of flow, and increase the safe conveyance of stormwater. The following are key milestones in the project:

- May 1999 - 2001 an engineering study determines that approximately 1,150 homes and businesses are at risk of flood damage during heavy rains. Flood mitigation became a City Council top priority.
- In 2003, the Bee Branch Citizen Advisory Committee (BBCAC) endorses establishing a stormwater utility fee. The Carter Road Detention Basin is constructed and reduces the peak flow of runoff from a 100-year flood event by 98%.
- November 2004 after extensive public engagement, the City Council adopted the alignment recommended by the BBCAC.
- 2008, the City Council contracts for provide engineering and design services.
- February 2009 final restoration, landscaping and design plans presented
- 2009 - West 32nd Street Detention Basin is expanded.
- 2011 – Construction of the Lower Bee Branch complete expanding the capacity from a 3-year flood event to a 100-year event.
- 2013 – Project is awarded \$98.5 million from the Iowa Flood Mitigation Board
- 2014 to 2016 – Over 79 green alleys constructed.

- 2015 – Construction of the Upper Bee Branch Creek
- 2016 –Awarded \$31.5 million from Housing and Urban Development
- 2017 – Completion of Upper Bee Branch Creek construction

Project Cost and Financing: The BBWFMP grew from an initial \$60 million creek restoration project to a \$219 million multi-phased, green infrastructure investment project. Because of our innovative approach, we were able to secure over \$160 million grant dollars from State and Federal agencies including: \$98.5 million through the State Flood Mitigation Program and \$31.5 million in disaster resiliency funds for the Bee Branch Healthy Homes Resiliency Program and stormwater infrastructure improvements. The Iowa Environmental Protection Commission (EPC) contributed to the construction of the W. 32nd Street Detention Basin; the construction of the Lower Bee Branch Creek Restoration Project; and the construction of green, pervious alleys as part of the Impervious Surface Reduction.

Agencies & Companies Involved: The City of Dubuque received support from business, health, environmental, and economic organizations, and neighborhood associations for the BBWFMP. The business community believes the project will provide opportunities for economic growth. Health organizations believe the project will improve the livability and vitality of the downtown and neighborhoods. Environmental agencies support the use of green infrastructure to mitigate flooding, improve water quality, and enhance biodiversity. The North End Neighborhood Association represents the area that has been most impacted by the six Presidential Disaster Declarations and knows firsthand the need to complete the project. They have shown their support for over 15 years through participation in the Bee Branch Creek Advisory Committee,

neighborhood meetings, public hearings, and infrastructure input sessions. The Washington Neighborhood has also showed their support for the project. The BBWFMP also enjoys the support of Iowa Department of Natural Resources, Iowa Department of Homeland Security, Iowa Department of Cultural Affairs, Iowa Department of Transportation, Iowa Department of Agriculture and Land Stewardship, Vision Iowa, Iowa Flood Mitigation Board, US Environmental Protection Agency, US Economic Development Administration, US Department of Transportation, US Department of Agriculture, US Department of Housing and Urban Development, and US Army Corps of Engineers. They see this project as a replicable model for other cities, both in design and financing. This project was one of the first of its kind to remove funding “silos” and “braid” funding streams and permitting processes. Dubuque has partnered with 57 communities in the Mississippi River Cities & Towns Initiative to work towards “improved water quality, flood and floodplain management and river economy and environmental protection.” In 2013, the City entered a first of its kind partnership with the State of Iowa Flood Mitigation Program to leverage \$98.5 million State Sales Tax Increment financing on Green Infrastructure improvements and to think beyond traditional flooding “fixes” and invest in citizen-led, citizen-designed replicable solutions. This is a significant, and crucial, shift for cities. Traditional flood mitigation involves buyouts and demolitions, sewers and levees. Dubuque could have constructed a concrete ditch or massive storm sewer. Instead, Dubuque citizens and our partners embraced the Sustainable Dubuque framework to restore the Bee Branch Creek. This \$219 million project addresses the severe and frequent flash flooding experienced in the watershed. It will prevent an estimated \$582 million in damages over the project’s 100-year design life.