

## **Executive Summary**

### **Introduction**

Floods are a natural part of Fourmile Creek’s history and have been occurring for thousands of years. Floods have periodically occurred on Fourmile Creek throughout recent times and tend to occur in the months of June through August. In recent years, flooding on Fourmile Creek has affected numerous property owners throughout the watershed, such as during the floods of 2008 and 2010. Residents of communities within the watershed have expressed particular concern about flooding, streambank erosion, and the adverse effects of urban development. In response to these challenges, Snyder & Associates, Inc. was commissioned to study the Fourmile Creek Watershed (see Watershed Map) with the intent of improving the understanding of the watershed and preparing a stormwater management plan that addresses resident’s concerns. In fulfillment of the study, Snyder & Associates has: produced new and updated hydrologic and hydraulic models of Fourmile Creek for existing (2010) and future (2030) land use conditions; assessed opportunities for stormwater management; prepared recommendations for flood reduction, water quality improvements, and watershed management; and engaged the public through informational meetings and other communications throughout the project. Additionally, this study developed a comprehensive watershed management plan that sets the framework to foster sustainable watershed management, building on both existing and new programs and interinstitutional cooperation.

This Fourmile Creek Watershed Study report includes a summary of the findings, covering the watershed characteristics, the hydrologic and hydraulic assessment; the watershed concerns; the stormwater management assessment; and the stormwater master plan. The results of this study reflect the cooperation of many individuals and institutions, including:

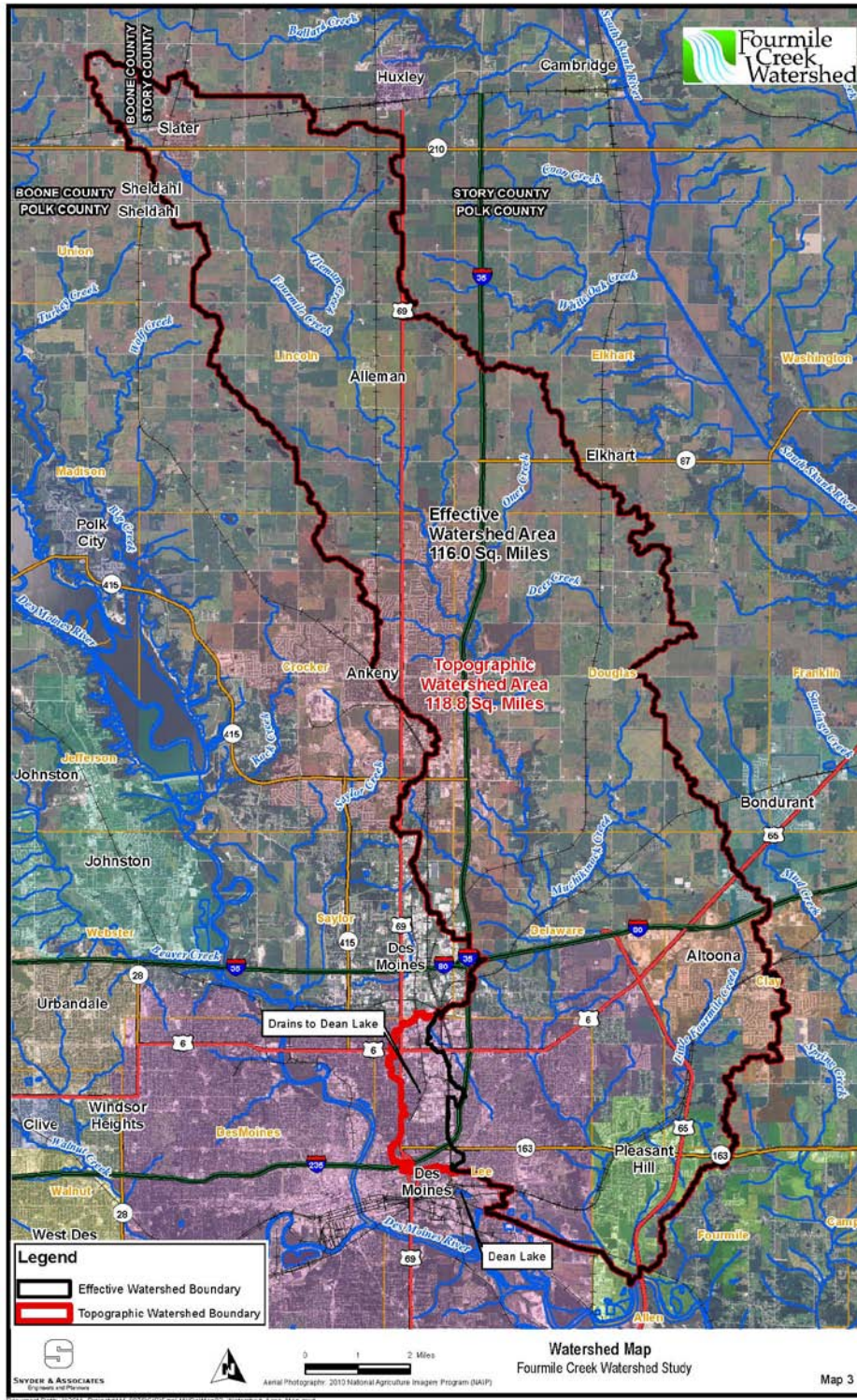
- The Steering Committee, with members of Polk County and the cities of Ankeny, Des Moines, and Pleasant Hill.
- The Technical Advisory Committee, with members from federal, state, and local agencies and universities.
- The watershed residents that participated in public meetings and through individual communications.

### **Hydrologic Assessment**

Previous to the study conducted by Snyder & Associates, the hydrology of Fourmile Creek has been investigated in 1988, 1999, 2000 and 2009 flood insurance studies as well as a 2005 US Army Corps of Engineers (USACE) flood reduction study. Hydrologic methods used in these previous studies only took into account current period land use and typically grouped the entire watershed into one basin for modeling purposes or used simplified regression equations.

A more detailed look at the watershed’s hydrology was undertaken by Snyder & Associates in this study. For planning purposes, existing (year 2010) and future (year 2030) land use plans

were used to develop existing and future conditions hydrologic models. Each model broke the 116 square mile watershed into 115 sub basins with hydrologic parameters for maximum modeling accuracy. Using US Geological Survey (USGS) stream gage data, the model was calibrated to the 2010 and 2008 flood events.



Model results indicate increases in peak flow rate from previous studies for all locations along Fourmile Creek. The 1% annual exceedance probability flow rate (a.k.a. 100-yr flood), which is often used for planning and design purposes, increased from 8,290 cfs in the 2005 USACE study to 11,300 cfs in this study.

## **Hydraulic Assessment**

The hydraulic model developed for this study utilizes the 2005 USACE model from the mouth to E. Douglas Avenue. Snyder & Associates extended the model north to the Polk-Story County line. The USACE portion of the model was updated in the Easton Boulevard area to account for a 2010 bridge replacement project.

Peak flow rates from the hydrologic model were used in the hydraulic model to predict the creek's response to flood events of varying magnitude and recurrence. A profile was established that predicts water surface elevations along Fourmile Creek. Using this profile, LiDAR data, and ArcGIS software, inundation maps were created. Inundation maps for current and future land use conditions are provided in this report and provide a good estimate of flood risk along Fourmile Creek.

## **Public Involvement**

A fundamental goal of the project has been to engage the public in the study and watershed management process. This goal was achieved through a series of public meetings, as well as other communications to receive feedback and recommendations. The initial public meetings helped to gather information, concerns, and opportunities. Following public meetings concentrated in sharing study findings and providing draft stormwater management elements to welcome feedback to strengthen the master plan developed as part of this study.

## Stormwater Master Plan

The overall goal for the future direction and management of the Fourmile Creek Watershed is summarized by the study’s vision statement:

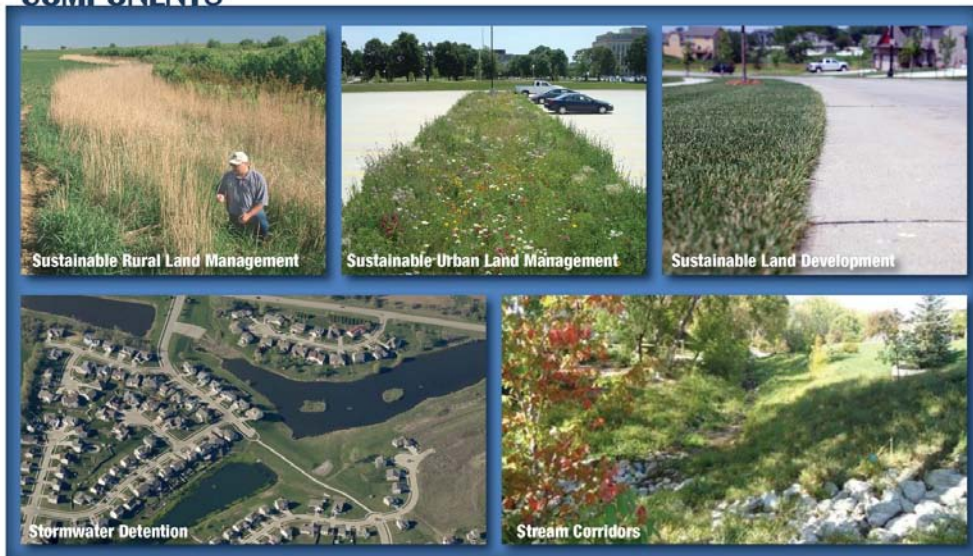
*To foster land stewardship and sustainable watershed management that reduces flood risk, improves water quality, and supports socioeconomic and environmental functions.*

### GOALS



In order to achieve this vision and goals, a stormwater management plan was developed and organized into five components:

### COMPONENTS



## SUMMARY OF RECOMMENDATIONS

### SUSTAINABLE RURAL LAND MANAGEMENT

- Create Fourmile Creek Watershed Management Authority technical and stakeholder committees on sustainable rural land management.
- Annually measure the amount of conservation practices within the watershed.
- Complete an assessment of prairie potholes and wetland areas and target highest priority areas for acquisition.
- Provide staff to coordinate rural efforts.



### SUSTAINABLE URBAN LAND MANAGEMENT

- Investigate locations for stormwater retrofits.
- Work with property owners to implement matching grants.
- Work with Iowa Stormwater Education Program and local jurisdictions on educational opportunities.



### SUSTAINABLE LAND DEVELOPMENT

- Create a Fourmile Creek Watershed Management Authority committee to establish consistent development standards for all jurisdictions.
- Analyze subwatersheds in developing areas to determine concepts of regional stormwater improvements.
- Acquire property so that regional improvements can be constructed on public lands.
- Develop a maintenance program for regional improvements.



### STORMWATER DETENTION

- Provide at least 1,200 Ac-Ft of stormwater detention in the upper watershed.



### STREAM CORRIDORS

- Continue voluntary buyout program to remove vulnerable structures and establish stream corridor in Des Moines and Pleasant Hill.
- Protect existing stream corridors as development occurs.
- Plan and implement sustainable stream restoration projects.

