

LOWER FOURMILE CREEK

September 19

2017

Greenway Master Plan

Overview

The Lower Fourmile Creek Greenway Master Plan is one of the first steps in implementing the Fourmile Creek Watershed Management Plan's vision. Greenways are an integral part of a community fabric. They provide connections between neighborhoods and local destinations. They can provide vibrancy to a community, which attracts and retains people of all ages. They encourage alternative transportation and access to recreational resources and the natural environment. They also play a critical role in protecting and enhancing a community's water quality, as well as reducing flood risk and damage. This master plan will address these critical components and identify potential recreational and educational amenities the greenway system can offer.

Report Format

Due to the scale and complex amount of (Geographic Information System) GIS based data compiled from previous studies and for this master planning process, a web based Story Map application was used to communicate the details and needs assessment of the master plan. The story map summarizes the master planning journey and reveals the final master plan developed from regional collaboration. The story map can be found through multiple locations, particularly on each jurisdiction's websites. The primary location however is located on the Fourmile Creek Watershed website managed by greenway coordinator Polk Soil and Water Conservation District.

<https://fourmilecreekwatershed.org/greenway-plan/>



GOAL: Through regional collaboration create a comprehensive master plan for the lower half of the Fourmile Creek Watershed. The plan shall serve as a guide for implementation of a greenway system within the 500-Year Floodplain in accordance with goals set forth in the Fourmile Creek Watershed Management Plan.

The report is organized into three chapters:

Chapter 1: Discovery

This chapter includes the site analysis summary and needs assessment. The first steps in the journey included the process of collecting inventory of existing site conditions and data available for a site analysis. This also included reviewing past and current related planning efforts within the surrounding communities. The site analysis helped guide the decision making process for greenway needs and boundaries.

Chapter 2: Exploration

Based upon information discovered in the needs analysis and inventory stage, in Chapter 2 we took the next steps exploring and identifying potential improvements and master plan components.

Chapter 3: Blue Print for the Future

This chapter provides an implementation and action plan report outlining the final master plan, as well as, key steps and responsibilities in the on-going process.

CHAPTER 1: Discovery



This chapter of the story map investigated the following as part of the site analysis and needs assessment:

Adjacent Land Use:

As part of the master planning process, it was important to recognize how the system can foster commercial growth and become a positive advantage to local businesses. Recent comprehensive plans for both the City of Des Moines and Pleasant Hill were reviewed and links included in the story map. The study area is primarily urban with a mixture of high, medium, and low density development. A small amount of land is still used for agricultural purposes.

Important commercial areas to note along the corridor are at the following locations:

- *E 38th Street - Douglas Avenue* and the Northeast Economic Development District Community Commercial Mixed Use with adjacent Medium Density Residential.
- *Easton Boulevard Neighborhood Mixed Use* adjacent to the existing Four Mile Park Community Center.
- *E. University Avenue* Key access point from Highway 65 into the City of Des Moines and Pleasant Hill. Mix of Community, Regional, and Neighborhood Commercial areas with adjacent Medium to Higher Density Residential.
- *Between Scott Avenue and Vandalia Road* Also a key access point from Highway 65 into the City of Des Moines and Pleasant Hill. This area is a mixture of industrial and business development. Large portions of this area were recently re-identified as potential future green space due to impacts from the 500-year floodplain by the City of Pleasant Hill and Des Moines. Future transportation plans also call for the Southeast Connector By-Pass to bi-sect this area north of Vandalia Road.

Local Food Deserts:

Local food deserts were also identified using the US Dept. of Agriculture (USDA) data. Food deserts are areas where access to high quality fresh food is limited or unavailable. These areas are typically found in lower income and sometimes lower density populations of the community. Currently, there are several initiatives and a growing number of resources to address this need through urban agricultural practices and sustainable city efforts. Greenway systems can provide a critical resource for sustainable farming opportunities within an urban core.

Existing Topography:

A map was provided showing areas with grades 5% or greater, 2-5% in slope and areas 0-2% in slope. The areas with 0-2% slope were primarily in the 500-year floodplain and are often difficult to drain or wetter sites.

Water Quality:

Improving water quality in Fourmile Creek is one of the primary needs identified in the watershed study and management plan. The Fourmile Creek Watershed Management Plan (FCWMP) provides several implementation goals for addressing this need.

Fourmile Creek Classification

Streams are given class ratings according to Iowa Administrative Code 567, Chapter 61. Fourmile Creek is designated as a Class A2, A3, and B(WW-2).

What does that mean? It means Fourmile Creek is used for recreational uses which may bring an individual or child into contact with the water. It also means the water flows or has physical characteristics capable of supporting a resident aquatic community, including a variety of native non-game fish and invertebrate species.

Priority Pollutants

Sediment loading and bacteria levels were prioritized in the management plan as the primary pollutants in the Fourmile Creek Watershed. These pollutants effect the viability of the stream to support aquatic life and can affect human health if one comes into contact directly or indirectly with the water. Secondary pollutants, phosphorous and nitrogen, were also identified. These nutrients at high levels can cause an overgrowth of plants and algae, causing a decrease in dissolved oxygen levels in the stream, blocking light to deeper water, and clogging water intakes. These nutrient levels should also be monitored and high level contributors addressed.

Monitor for Success

One of the goals is to increase monitoring of water quality. There is currently a lack of monitoring data, making it difficult to verify the nature and extent of water quality concerns or ability to make recommendations on Best Management Practices (BMPs). The FCWMP established a subcommittee and identified ideal locations for monitoring. Three of the twelve proposed monitoring sites are located within the study area: Monitoring Site 9, Site 11, and Site 12. Stream flow data is maintained by two United States Geological Survey (USGS) gages. One of the USGS gages is located on Easton Boulevard in Des Moines.





Existing Land Cover and Runoff Risk:

The Lower Fourmile Creek watershed is characterized by a gently to moderately rolling landscape. A map in the story map application provides an overview of existing areas with high stormwater runoff risk. The stormwater runoff risk was determined using the Agricultural Conservation Planning Framework software for the Fourmile Creek Watershed Management Plan. This method takes into account easily erodible soil types, land use, proximity to stream, and terrain to determine which areas are at greatest risk of generating runoff.

The Fourmile Creek Watershed Management plan identified sediment loading and bacteria levels as the primary pollutants affecting water quality in the Fourmile Creek Watershed. Phosphorous and nitrogen are also a concern. Excessive stormwater runoff and streambank erosion can increase sediment loading in the stream and harm aquatic organisms. Areas showing high runoff risk should be considered for implementation of best management practices or potential conservation improvements to help reduce water quality impacts from heavy runoff.

Daily Erosion Project

An active project which produces an interactive map showing an archive of daily and yearly estimates of soil displacement for Iowa. The map is updated daily and produced by Iowa State University. Website: https://dailyerosion.org/map/#20160719//avg_delivery/-93.55/41.62/12//0/

Impervious surfaces increase runoff into the creek for interactive map showing precipitation levels, anticipated runoff, and sediment detachment rates within the Lower Fourmile Creek Watershed. The site also provides an estimate of anticipated sediment delivery to water bodies within the watershed.

Land Cover

Land cover is one of the key factors affecting runoff. Lack of vegetative cover increases sediment loads in the stream and impervious surfaces increase peak flows in the stream.

Streambank Erosion:

Accelerated streambank erosion is occurring along Fourmile Creek. Streambank erosion is a natural process, as a stream seeks to re-establish a stable size and pattern when flows and velocities increase. Several factors can contribute to higher rates of streambank erosion; such as, land use changes, impervious surfaces, and lack of stream-side vegetation. The Polk County Soil and Water Conservation District (Polk SWCD) completed a comprehensive stream assessment in 2006. Most of the streambanks along Fourmile Creek show large portions of erosion with very few stable streambanks.

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Riparian Buffer Vegetation

The proposed riparian buffers identify the best riparian treatment based on the existence of surface runoff, shallow groundwater, or both within a specific area. Four types are identified on the story map:

- Multi-Species Buffers (areas in purple) are recommended where water uptake from shallow groundwater and nutrient and sediment trapping is needed due to adjacent runoff.
- Stiff-Stemmed Grasses (areas in light green) are recommended where nutrient and sediment trapping are needed due to adjacent runoff.
- Deep Rooted Vegetation (areas in dark green) is recommended where soils are anticipated to be saturated from shallow groundwater making them susceptible to erosion.
- Streambank Stabilization (areas in grey) is recommended where opportunities don't exist to capture shallow groundwater, nutrients, or sediment. Emphasis should be placed on streambank stability. Riparian plantings or bioengineered methods can be used to help stabilize banks.

Sever Erosion

Areas with severe erosion were identified and should be considered priority areas for streambank restoration. As part of the Polk SWCD study, a list of top ten priority areas were set for restoration. Three of these are within the master plan area (Site 5, 8, & 9), see restoration priority plan. Since then, several locations have been slated for stabilization projects in 2016 and 2017, see current restoration projects plan accessible through the story map for additional information.



1. Example of streambank erosion



2. Recently completed stream restoration



Potential Wetland and Sedimentation Basin Sites:

As mentioned previously, the Agricultural Conservation Planning Framework Software for the Fourmile Creek Watershed Management Plan was used to calculate runoff risk and potential riparian buffers. It was also used to identify potential sedimentation basin sites and wetland restoration sites within the watershed. The story map shows the locations which were identified within the study area, as well as, the locations of existing wetlands identified in the National Wetlands Inventory provided by the U.S. Fish & Wildlife Service. The areas that have been identified should be reviewed further for potential acquisition sites or locations for working with private landowners to implement best management practices.

National Wetlands Inventory

This data represents the potential extent, location, and type of existing wetlands based on data delineated using the aerial extent of wetlands and surface waters as defined by Cowardin, et al., 1979. The data is being used to better understand the types of and potential locations of existing wetlands for conservation, restoration, or enhancement efforts. The map provided is not designed or intended to represent legal or regulatory jurisdiction. Field verification is required to determine actual location and extent of wetlands within any given project site. For more information about the inventory program see their website <https://www.fws.gov/wetlands/nwi/Overview.html>.

Natural Resource Inventory:

The story map shows an analysis using Iowa DNR land cover data for Polk County, particularly the areas with tree canopy cover. This analysis shows us where potential older growth woodland establishments may be. The City of Des Moines completed a more detailed Natural Resource Inventory of their parks and conservation land in 2013. Additional information can be found on their website <https://www.dm.gov/Departments/Parks/Pages/NaturalResourcesandWildlife.aspx>.

Connectivity:

A critical component of a greenway network in a community is connectivity to different uses and areas. A successful urban greenway often provides connections to different uses and areas making it useful for everyday activities. Creating an interconnected network of trails between park facilities, neighborhoods, and community features, is a critical component in creating vibrant and healthy communities. The Gay Lea Wilson Trail currently travels through the Lower Fourmile Creek Greenway study area. The trail connects users to a larger network of trails to the north, and northeast toward Bondurant and Altoona. Additional trails are planned, which will provide more connectivity to the west and southwest.

Various plans have been created over the last few years addressing trail connectivity and a more diversified transportation system. For more information, see the following plans:

- CONNECT Central Iowa Bicycle and Pedestrian Transportation Action plan 2020
- 2011 City of Des Moines Bicycle and Trail Master Plan
- 2015 City of Pleasant Hill Bicycle, Pedestrian and Transit Plan
- 2015 City of Pleasant Hill Proposed and Existing Trails Plan

Current Related Project: The Des Moines Area Metropolitan Planning Organization (MPO) is currently undergoing a planning effort for The Greater Des Moines Water Trails and Greenways Plan. This effort includes Fourmile Creek. Coordination with this effort is critical in making and implementing a successful greenway master plan. For more information, see the Des Moines Area MPO Water Trail Plan.

- Des Moines River Water Trail Section between Harriet Street and Yellow Banks Park: includes the confluence of Fourmile Creek. The Pleasant Hill Boat Ramp provides the closest access and is currently identified in the draft as an activity hub with paved parking, restrooms, and fishing access improvements recommended.
- Fourmile Creek Water Trail: Due to water level fluctuations and frequent log jams, the stream has less opportunity for in-water activities; however, the MPO plan called for increasing access for wading and interacting with the water, as well as views to the creek itself. Interpretive signage, integrated with public art, could provide user insight into the water quality and flooding challenges the watershed currently faces. Sargent Park is currently the only designated location where access to the water's edge is provided. Similar water access and fishing access improvements are recommended in the draft plan near Copper Creek Lake Park, Four Mile Creek Park and Community Center, and Mally's Weh-Weh-Neh-Kee Park near the Chichaqua Valley Trail.
- Fourmile Creek's Future Recreation Use: In 2016 the MPO started the Water Trails Engineering Study. This is the first phase of implementing the Greater Des Moines Water Trails and Greenways Master Plan. Some of the first implementation steps along Fourmile Creek are anticipated to include trail nodes with views of the creek, wading and fishing access. As the water quality and stream restoration improvements are undertaken, the overall recreation opportunities will also increase. Imagine a day when paddling down Fourmile Creek is possible or fishing is a favorite past time along it's banks. Imagine riding down Gay Lea Wilson Trail to your favorite picnic or birding spot!

Existing Park and Recreation Amenities

The story map provides a tour of adjacent park sites and particular private sites with existing or potential compatible uses.

Existing Park and Recreation Amenities

The story map provides a map identifying existing public and private property within and adjacent to the 500-year floodplain.

Needs Assessment Summary:

01 / FLOOD MANAGEMENT: Concerning flood management, several properties have already been acquired within the 500-year floodplain by various jurisdictions. Providing an overall strategy for adding to and managing these flood prone properties will be a critical step in the success of the future greenway system.

PROPERTY ACQUISITIONS & GREENWAY BOUNDARY: Several properties within the 500-year floodplain are still private, as identified in the previous map. Acquisition priorities are explored in Chapter 3 of the report. Items affecting priority were based primarily on water quality and flood mitigation improvements with consideration to economic impact, private development, and recreation opportunities.

02 / WATER QUALITY : A series of steps in identifying potential water quality improvements have been made through prior studies. It will be important to take these into consideration. Key elements already identified included: potential nutrient wetland improvement locations, sedimentation basin locations, and existing streambank restoration priorities. Water quality monitoring locations were also identified. Additional or alternative locations may need to be identified once key project sites are identified throughout the corridor. Monitoring current conditions and future improvements will help evaluate performance of improvements and provide critical data for making future recommendations on Best Management Practices (BMPs) and restoration activity investments. Current local resources for BMPs include the Iowa Stormwater Education Partnership and Rainscaping Iowa.org.

03 / MAKING CONNECTIONS: A strong regional trail system currently exists or is currently proposed for the region. However, there are additional connections and alternative routes identified in the Master Plan section of the report. Regional trail connections to the existing Gay Lea Wilson trail system on the south and north end should be considered. Additional neighborhood trail connections to the regional trail system should also be considered. Furthermore, an internal greenway trail system should also be considered that offers a variety of trail types and experiences.

03 / PUBLIC ACCESS: Several existing recreational amenities exist within or nearby the greenway system. Many of the recent properties acquired within the greenway system are currently undeveloped with minimal recreation opportunities or public access provided. Potential opportunities for additional services and access are provided in the Master Plan so improvements can be implemented as properties are acquired and funding becomes available.

04 / EDUCATION: Water quality monitoring sites were identified in the Watershed Management Plan and should be utilized consistently to collect and provide valuable data on water quality factors affecting area improvements. Educational opportunities can be provided throughout the greenway system through interpretive signage, public art, and programming opportunities.

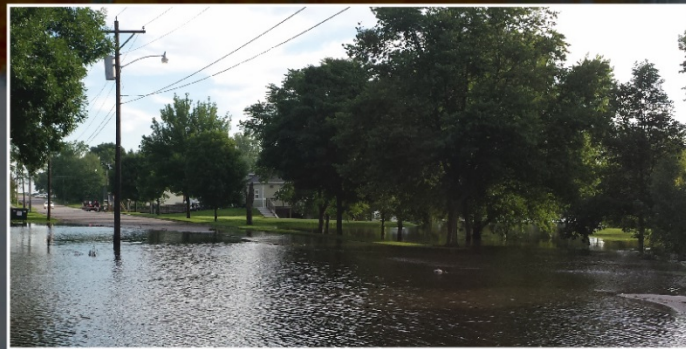
05 / HABITAT PROTECTION AND MANAGEMENT: The greenway corridor would have a natural look with minimal mown and manicured areas. Maintaining the greenway corridor in a more conservation based fashion will help increase biodiversity in our urban areas and enhance water quality. Several areas have existing wetlands and woodlands which could benefit from restoration and management efforts. The greenway corridor would benefit from habitat re-establishment improvements as well; such as, prairies and savannas.

06 / ECONOMIC RESILIENCY: Existing commercial centers and economic hubs were identified on the proposed land use plan. These locations identified should be considered for compatible improvements that will foster desirable growth and economic sustainability. Urban food deserts were also identified within the corridor and region. Encouraging urban agriculture strategies could help improve economic vitality, sustainability, and address food access needs.

Highlights

DISCOVERY OF NEEDS

01 | FLOOD MANAGEMENT



- **HISTORIC FLOODING:** Flooding impacts are the number one concern expressed by property owners and citizens. Property acquisitions in flood prone areas and flood management strategies will need considered.

02 | WATER QUALITY



- **WATER:** Prior studies have identified water quality is one of the top priorities. Existing poor water quality will need to be addressed to improve aquatic habitat and to protect human health.

03 | CONNECTIVITY & ACCESS



- **MULTIPURPOSE CORRIDOR:** Implementing public access through a diversity of trails and recreational amenities is desirable. A multipurpose corridor can help encourage economic growth, improve community health and livability.

04 | EDUCATION



- **EDUCATION:** Effective communication and education will be critical to the greenways success.

05 | HABITAT MANAGEMENT



- **HABITAT:** The corridor could benefit from habitat restoration and native habitat re-establishment.

06 | ECONOMIC RESILIENCY



- **ECONOMIC HUBS:** Key economic development areas have been identified and improvements should promote desirable and sustainable growth.

CHAPTER 2: Exploration



Key Master Plan Components:

These components are broken down further over the next several pages.

Highlights

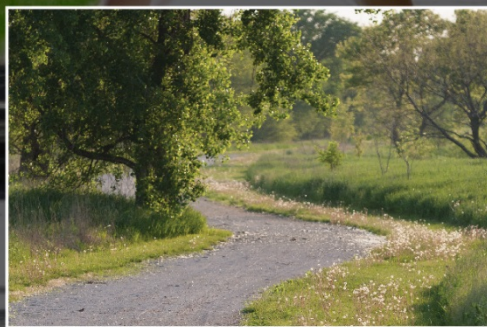
EXPLORATION OF KEY MASTER PLAN COMPONENTS

01 | NATURAL RESOURCES



- HABITAT RESTORATION AND ESTABLISHMENT
- WATER QUALITY IMPROVEMENTS
- EDUCATIONAL OPPORTUNITIES

02 | TRAIL IMPROVEMENTS



- TRAIL CONNECTIONS
- DIVERSITY OF TRAIL TYPES
- DESTINATION

03 | ECONOMIC RESILIENCY



- FLOOD MANAGEMENT
- RECREATION IMPROVEMENTS
- MULTIMODAL TRANSPORTATION
- POLICY AND ZONING PROVISIONS
- RE-ENVISION LOCAL FOOD

04 | DESIGN STANDARDS



- SUSTAINABLE PRACTICES
- STYLE GUIDE AND CORRIDOR BRANDING

Natural Resource Management:

Three key categories of improvements within the greenway were identified for natural resource management. Those three categories are:

- Habitat Restoration
- Water Quality Improvements
- Educational Opportunities

Protection and restoration of key habitat types are vital to the improvement of water quality and ecological function within the Fourmile Creek Watershed. Restoration of the stream, riparian buffer, and historic oxbows have been identified as critical water quality improvements. Providing education opportunities about the importance of greenways and monitoring water quality improvement efforts will be another critical component of the greenways success.

01 | Habitat Restoration

The greenway is made up of various wildlife habitats. Due to the urban and agricultural nature of the corridor, the diversity, quantity, and quality of habitats is limited. One of the first steps that should be taken after the development of the master plan should be to complete a natural resource inventory of the greenway corridor. This will build upon the existing data that has been collected to date during the needs assessment and the inventory information Des Moines has collected within their park properties.

Linked Natural Corridors

Developing a system of linked natural corridors provides better habitats for wildlife, provide opportunities for natural stormwater utility systems, and help protect water bodies, rivers, and streams. This type of linked system has been identified as a desirable goal by the local communities and the region.

Natural Resource Management

EXPLORATION OF KEY COMPONENTS

01 | HABITAT RESTORATION



- **NATURAL RESOURCE INVENTORY:** A natural resource inventory should be conducted within the greenway boundary to further establish existing locations and qualities of natural resources. This inventory will help refine costs anticipated for restoration and habitat re-establishment efforts.
- **THE LANDSCAPE:** Minimal space should be allotted for open lawn and mown areas. The landscape should be made up of native vegetation which helps create a diverse system and larger wildlife corridor.
- **PRIORITIZE EFFORTS:** It will require less financial resources to restore and protect existing habitat areas identified in a natural resource inventory than re-establishing them from scratch. Restoration priorities should be set based on existing natural resources available and beneficial effects on water quality and flood control. The needs assessment took the first steps in identifying these critical areas.

02 | Water Quality

Water Quality and Quantity Management

The greenway should help set the standard for stormwater management requirements. These requirements should address concerns due to the quantity and quality of water. Standards should be in line with those set in the Watershed Management Plan for water quality volume management and channel protection volume management.

Stream Restoration

Restoration of a stream should take into account the stream as a system. This system includes: the bottom of the stream, water flowing in the stream, the stream’s banks, and the riparian area surrounding the stream.

The goals of stream restoration in the Fourmile Creek Watershed are to:

- Reduce the impacts of flooding by working to return the stream and its surrounding areas to the most natural state possible.
- Restore natural function of the stream by;
- Removing barriers that impede movement of aquatic species; however, leave logjams that function as habitat and slow the stream’s water velocities.
- Restore stream flow levels impacted by irrigation, stormwater diversion and other uses.
- Remove invasive plants that effectively outcompete native species working to hold streambanks in place and filter water.
- Reduce biological, chemical, and water temperature impairments.
- Repair streambank erosion as a means to reduce sediment loading in the stream.
- Increase public awareness of the importance of stream systems by making the stream an asset for the public.

Riparian Buffer Restoration

The vegetated area that linearly follows the edge of a stream is called a riparian buffer. A riparian buffer vegetated with high quality native vegetation serves many water quality and environmental benefits to the stream they encompass. Most importantly, the vegetation found in the buffer works to stabilize and hold streambank soil in place. Trees and shrubs in the buffer also shade the stream’s water and minimize the effects of water temperature fluctuations that can cause algal blooms and harm to aquatic species. Additionally, riparian buffers intercept non-point pollutants carried by water before they can flow into the stream. Finally, many species of animals utilize these buffers for finding food and as a corridor for movement.

The width of a riparian buffer along Fourmile Creek is dependent on many factors. Generally, the buffer should be as wide as possible. The goal would be to maintain a minimum buffer of 100 feet from the top of bank along the entire length of the stream. However, where feasible a greater buffer should be provided to help create a habitat corridor for wildlife. The buffer should be a diverse mixture of native species. The Watershed Management Plan provided specific riparian buffer recommendations as noted in the previous needs assessment and analysis. These recommendations can be used as a starting point, but each site should be handled on a case-by-case basis.

Natural Resource Management

EXPLORATION OF KEY COMPONENTS

02 | WATER QUALITY IMPROVEMENTS

- **WETLAND AND SEDIMENTATION BASINS:** These areas, identified in the needs assessment, should be considered priority acquisition sites based on the potential restoration opportunities and water quality impacts. Funding should be acquired to restore or establish these types of improvements within the greenway.
- **STREAM RESTORATION:** Streambank restoration and stabilization efforts should be another priority within the greenway. Plans should be developed to continue to build on the priorities set by earlier assessments of the stream. The 2006 stream assessment identified critical areas and project sites have already been identified along the corridor. However, additional funding should be acquired to address the remaining sites with moderate to severe erosion. Oxbow restoration, riparian buffers and grassed waterways should also be implemented throughout the greenway.
- **STORMWATER MANAGEMENT:** Best management practices (BMPs) should be followed for all development within the greenway and surrounding watershed.

Oxbow Restoration

An oxbow is a U-shaped body of water that forms when a stream meander is cutoff from the main channel. Oxbows are important to stream systems for many reasons. First, oxbows serve as prime habitat for many aquatic species. Topeka shiners, a federally listed endangered species, and other fish species seek refuge in oxbows and utilize them as spawning habitat. Second, oxbows function as a nutrient processing site. Nitrates and other water contaminants can be reduced or removed by vegetation and other processes within an oxbow. Finally, oxbows work to reduce the impacts of flooding. The close proximity of oxbows to streams allows them to serve as a site to hold excess water during high water events. Potential oxbow restoration locations are identified in the story map.

The goals of oxbow restoration are to;

- Remove excess sediment by excavating,
- Reconnect the site to the water table and the nearby stream during high flow periods,
- Provide habitat,
- Re-vegetate the banks.



Water Access

Access to Fourmile Creek can be achieved by opening up views and providing modifications to the streambank to provide access down to the water's edge. As water quality improves, the desire to increase access to the water's edge will be desirable for recreational uses, such as, fishing and wading. This is best accomplished in areas of the stream that are the most stable and have minimal meandering tendencies.

03 - EDUCATION

Sharing why the greenway and its infrastructure are important and continuing to learn from each other is essential. The following monitoring and education goals were set within the Watershed Management Implementation Plan and should be implemented within the greenway.

- Monitor for Success (Goal 1): Understanding the current conditions and evaluating the performance of current and future Best Management Practices (BMPs) and restoration investments is critical to the success of the greenway and associated watershed. A monitoring plan needs to be formally developed as one of the first initial steps in managing the greenway. The FCWMA shall work with the Iowa DNR and designate Polk County Conservation Board as the record keeper for all data. This data will be critical in identifying future success stories and for seeking grant funding for water quality improvements.
- Designate Outdoor Teaching Facilities (Goal 4, Task 2): Teaching and model sites are needed to provide education and best practice guidance on the implementation and maintenance strategies for green infrastructure improvements. These can be implemented throughout the greenway, but a central hub would provide a unique opportunity to showcase multiple practices. The Master Plan identifies a catalyst site for implementing a central hub.
- Best Management Practice Documentation (Goal 4, Task 3): Documenting these practices within the watershed and greenway is critical to better understanding which practices are providing the most benefit.
- Establish Effective Means of Education and Communication (Goal 8): Effective communication and education will be essential to the ability to build partnerships within the greenway and create more efficiency to enable faster implementation. An integrated GIS can be helpful in sharing information and collecting data. An example of this type of system is the MARC's GIS Program in Kansas City.

Natural Resource Management

EXPLORATION OF KEY COMPONENTS

03 | EDUCATIONAL OPPORTUNITIES



- EDUCATIONAL CENTER: The greenway provides a unique opportunity for creating an outdoor teaching lab(s) showing and educating the public on innovative and best management practices; as well as, the benefits of our natural resources. Interpretive signage should also be incorporated throughout the corridor.
- MONITORING & DOCUMENTATION: The Watershed Management Plan recommended the creation of a monitoring program and the continued documentation of best management practices implemented throughout the watershed. This monitoring and documentation provides critical on-going information for identifying what is working and what needs still need addressed. These resources will also help provide critical information needed for grant funding. Keeping this information current and accessible will define it's relevancy. Integrating GIS systems and data similar to the Regional Vision administered by the Mid-America Regional Council (MARC) in Kansas City. Continue to build upon what has the Des Moines Area MPO and the Fourmile Watershed Management Authority has started.

Trail Improvements:

Three key categories concerning trail establishment within the greenway were identified. Those three categories are:

- Trail Connectivity
- Diversity of Trail Types
- Trails as a Destination

Trail Improvements

EXPLORATION OF KEY COMPONENTS

01 | TRAIL CONNECTIONS



- **REGIONAL NETWORK:** As described in The Tomorrow Plan a regional network of trails provides us with an alternative transportation choice, helps develop a resilient economy and healthy and vibrant community.
- **GAY LEA WILSON WEST:** Provide a connection to the north along Fourmile Creek from NW 54th up to Mally's Weh-Weh-Neh-Kee Park and the Chichaqua Valley Regional Trail.
- **GAY LEA WILSON:** Provide a connection to the south and across the Des Moines River at SE 45th Street. An old bridge was removed from this location. A new pedestrian bridge should be considered to provide connection to parks, trails, and communities south of the river.
- **LOCAL NETWORK:** Provide connections to neighborhoods, commercial areas and parks. The local network should continue to build on existing initiatives to create a multimodal community.

02 | DIVERSITY OF TRAIL TYPES



- **PAVED MULTI-USER:** Paved surface and shared use trail with a preferred width of 12' (10' minimum). These make up the core trail system and connectivity to adjacent commercial areas, parks and neighborhoods.
- **CRUSHED AGGREGATE OR ASPHALT MILLINGS SURFACE:** This type of surface can still accommodate multiple users and meet federal accessibility requirements. Typically still considered a multi-user trail, but best suited for hikers and runners. Width can vary, but a 10-12' minimum for multiple user groups is preferred.
- **SOFT SURFACE:** Typically a natural surface trail or mulch trail for walking, hiking and trail running. They are intended to provide a more intimate setting in nature. Boardwalks can be implemented in sensitive areas, such as wetlands.
- **SINGLE TRACK BIKE TRAILS:** A growing trend in Iowa is to provide natural surface trails, which can be shared use, or designated for mountain bikers. They typically have a range of trails from easy to challenging in order to accommodate various skill levels.

03 | DESTINATION



- **BEYOND THE TRANSPORTATION CORRIDOR:** Trails provide critical connections and alternative transportation routes within our community. However, the trails themselves should also be considered as potential destinations that encourage local or regional use. The High Trestle Trail bridge in Boone County is a local example of this.
- **ART AND CULTURE:** Art along the trails is another opportunity to attract trail users, generate a sense of place and culture within the community. Similar trails have implemented this in Decorah, Clive and West Des Moines. Public art can also be used as an educational tool or even integrated into a pathway designed to encourage play.

Why trails are so important?

Trails equal better health, more resilient economies, stronger communities, and greater appreciation for the environment.

Additional Information can be found at: <http://www.americantrails.org/resources/benefits/index.html>

Economic Resiliency:

"Place is becoming the central organizing unit of our economy and society." - Richard Florida, Rise of the Creative Class

Iowa has already seen the benefits of trail infrastructure to the economy. Development trends have already begun to factor in the importance of place making in our society. Greenways can help increase that sense of place, quality of life factor, and increase property values.

Several key factors in establishing a resilient economy can be provided or enhanced by greenways.

Three of those factors are:

- Flood Management
- Recreation Improvements
- Multimodal Transportation

One of the key goals of the greenway is flood control. Prior studies have shown that the best way to mitigate flood damage and control is to acquire properties affected by flooding for habitat conservation, natural stormwater utilities, and recreation purposes. The key properties under consideration are impacted by the 500-year floodplain. The Master Plan further defines the priorities used and identifies potential acquisitions needed to create the greenway corridor.

Economic Resiliency

EXPLORATION OF KEY COMPONENTS

01 | FLOOD MANAGEMENT



- **PROPERTY ACQUISITIONS:** Earlier studies conducted through the watershed study showed that property acquisitions were the most economical solution for reducing flood impacts. Reducing the amount of infrastructure and structures affected by flooding means fewer repair costs. The acquired land will help accomplish another regional goal of building a region-wide natural resource system and well connected corridor.
- **PRIORITY OF ACQUISITIONS:** Due to the cost of managing a greenway system and acquiring the land, it is important to prioritize the pieces of land providing the most beneficial and effective green infrastructure network. It is far easier to enhance an existing wetland as an improved natural stormwater utility than to build one from scratch. Existing natural resources and the level of infrastructure damage caused by flooding should play the greatest role in setting priorities for acquisitions.

02 | RECREATION IMPROVEMENTS



- **HEALTHY COMMUNITIES:** A goal of the local communities is to become leaders who value a healthy population. Healthy communities means less healthcare costs and more spending power. Natural areas can provide a place to simply escape the bustle of an urban environment and renew the human spirit. The need for access to these natural places in our urban environments is becoming more and more culturally recognized. These spaces can also provide recreational amenities that encourage citizens to live a healthier life style.
- **LIVABLE COMMUNITIES:** A robust and well maintained park system can increase the local communities attractiveness and appeal to desired workforce and desired employers. Provide primary greenway access and points of interest near designated economic development areas. Plan for future development growth by acquiring property that can protect natural resources, reduce stormwater impacts and provide neighborhood and regional park needs.

03 | MULTIMODAL TRANSPORTATION



- **A CHANGE TO AUTO-ORIENTATED STYLE DEVELOPMENT:** A healthy economy provides a diversity of transportation options. A greenway such as this plays a critical role in providing a multimodal community. As fuel and transportation costs increase corridors such as these will become more critical. This style of development is in line with The Tomorrow Plan, and the recent comprehensive plans completed by the City of Des Moines and the City of Pleasant Hill.
- **TRAIL CORRIDOR:** The greenway trail corridors and connections help create a network of trail infrastructure, making the local communities more bikeable and walkable. Trails which provide access to targeted economic hubs or nodes can help encourage desirable redevelopment growth particularly for local restaurants, lodging and retail stores.

Other key factors that will affect redevelopment within and adjacent to the greenway are:

Policy and Zoning Provisions:

A goal of the Watershed Management Plan is to acquire as much of the 500-year floodplain as feasible for flood control and water quality enhancements. However, it has been recognized that acquisition of all the properties may not be feasible or make fiscal sense, particularly those parcels only partially impacted by the floodplain. Policy and zoning provisions can help further provide desired protection to the greenway's natural system while allowing private development in keeping with the goals of the Watershed Management Authority and those set in the Watershed Management Plan. Successful stormwater management ordinances and floodplain development policies and standards throughout the watershed and the region should be reviewed by a WMA subcommittee for possible inconsistencies and synergies. Many of the model ordinances that should be reviewed can be found on the Iowa Storm Water Education Program's website (IowaStormWater.org). A few examples: The City of Coralville's Post-Construction Stormwater Ordinance, Cedar Falls Flood Prone Ordinances, and Clive's Post-Construction Stormwater Management Ordinance and Clive Stormwater Management Manual. Once this review is complete, a model ordinance tailored for the Fourmile Creek Watershed should be presented to the full FCWMA for comment. Once a final ordinance has been drafted, it should be shared with member jurisdictions for adoption consideration.

Economic Resiliency

EXPLORATION OF KEY COMPONENTS

04 | POLICY & ZONING PROVISIONS



- 1. CONSIDER A NATURAL RESOURCE OVERLAY DISTRICT:** Consider using a Natural Resource Overlay District to provide guidelines and strategies for development in and adjacent to the 500-year floodplain. A successful greenway system is based on the consistent and successful protection of the essential natural resources while remaining multi-functional. A natural resource overlay district as mentioned in The Tomorrow Plan and the Watershed Management Plan can help provide consistent regional guidelines and standards.
- 2. REGIONAL COORDINATION:** Due to the nature of the jurisdictional boundaries in Central Iowa, coordination on a regional basis is critical to the overall success of the adoption of consistent policies. The establishment of the watershed management authorities in the region provides a great opportunity for communication on a regional level.
- 3. CONSISTENT STORMWATER MANAGEMENT REQUIREMENTS:** In accordance with the 2015 Fourmile Creek Watershed Management Plan, jurisdictions should work together to adopt consistent stormwater management requirements for both water quality and quantity.

05 | RE-ENVISION LOCAL FOOD



- FOOD:** Access to local food is a growing trend that can encourage diverse and resilient economic vitality and address local needs for access to healthy inexpensive food. A key goal should be to support urban agriculture through special zoning provisions, overlay districts and incentives. Promote the use of food trucks to encourage developing entrepreneurs and build community.

The City of Des Moines, with the help of the Iowa State University Community Design Lab and their Agricultural Urbansim Toolkit, recently studied the potential opportunities for such endeavors within their boundaries. The study looked at local food deserts and needs. Tactics were considered for potential catalyst projects throughout the City. One of the 'nodes of opportunity' identified was located in the northern half of the greenway. The City of Pleasant Hill is currently working with the Community Design Lab to identify potential nodes within their jurisdiction as well.

The access to healthy regionally based food is also an important strategy identified in The Tomorrow Plan for furthering the health and well-being of residents. The development of a greenway system provides a unique opportunity to create a location for learning about sustainable agricultural practices and addressing local food needs. The use of edible landscapes, community gardens and private agricultural practices are all potential compatible uses within or adjacent to the greenway based on local regulations.

Water Quality Volume Management:

all communities within the watershed should adopt standards that require infiltrating the water quality volume on site (as opposed to detaining and releasing that volume). Infiltration practices have a high removal rate for suspended solids which may include metals, bacteria, hydrocarbons and phosphorus. The water quality volume in central Iowa is defined as the runoff that occurs during a 1.25" rainfall event.

Consistent Stormwater Management Requirements:

Channel Protection Volume Management: adopt standards that require the detention of the channel protection runoff volume and release this volume slowly over a 24-hour period. The channel protection volume is defined as the runoff that occurs from a 2.4" rainfall event. Detaining this additional runoff volume and releasing it slowly allows for a reduced, although sustained, flow that would otherwise be released into a drainage-way. This helps reduce the depth of flow in the channel. This, in turn, reduces the saturated condition of the channel banks and thereby decreases the likelihood of channel bank sloughing. Therefore, runoff control practices reduce stream bank erosion.

Re-Envision Local Food Initiatives:

Providing access to locally grown and healthy food are initiatives of the local communities, as can be seen in their comprehensive plans and regionally developed Tomorrow Plan. Portions of the greenway have been identified as areas within the metropolitan food desert. The greenway offers unique opportunities to build public and private partnerships as well as education on sustainable agricultural practices. Examples include Cherry Glen Learning Farm in Ankeny. The water found in the quarries could be used for fish farms and recycled for agricultural use.



Design Standards:

Best Management Practices:


As mentioned previously, the greenway should be a showcase for Best Management Practices (BMPs). Consideration for best practices is often not a single treatment or application and is site based. Many factors should be taken into consideration and sustainable practices should be considered in all aspects of the design. Everything from energy consumption, waste produced, construction practices, land use decisions, green infrastructure, and effects on water quality and quantity.

Best Management Practices should also take into consideration long term costs and maintenance needs. Educating the public, especially those who are installing and maintaining green infrastructure and sustainable systems, is critical to their success.

Design Standards - BMPs


EXPLORATION OF KEY COMPONENTS

01 | WATER & ENERGY CONSERVATION




- **WATER:** Promoting water conservation within the greenway can be accomplished in a number of ways. One example is the use of dual flushing toilets in any new restrooms or upgrades to existing facilities. This system, versus a single flushing toilet, dual flushing systems can reduce costs and usage of water.
- **WASTE:** Promote people to refill their water bottles vs. throwing them away. Provide drinking fountains that include bottle filling stations. Install recycling bins at the park locations and in main entrances to the greenway trail system as well. In addition, solar powered trash compactors are another growing trend to help reduce the amount of maintenance trips required to empty trash in heavy use areas.
- **ENERGY:** Promote the use of green energy, such as solar, along the corridor. LED lighting should also continue to be promoted within the corridor to reduce energy costs. However, with any lighting take special precautions to prevent light pollution and adverse to wildlife. See the International Dark-Sky Association for more information. <http://darksky.org/about/>

02 | CONSTRUCTION PRACTICES




- **EROSION AND SEDIMENT CONTROL:** Erosion caused by construction activity can have large on-site and off-site environmental and economic impacts. Excess nutrients and sediment caused by erosion, add to the degraded water quality of Fourmile Creek Watershed. Local, State and Federal requirements for erosion and sediment control should be met. It will be important throughout the construction process to provide adequate inspection and monitoring of installed Best Management Practices (BMPs). Prompt corrective action should be taken to address any improperly installed or ineffective erosion control measures.
- **SOIL QUALITY:** Construction activities can degrade the soil quality on site. Activities such as grading and filling can disturb the existing biological structure of the soil, reducing the amount of topsoil or increasing soil compaction. This type of disturbance can reduce soil's infiltration and water holding capacity. The result is poor growing conditions for desired plant material and increased runoff. Steps should be taken to reduce impacts from construction activities.

03 | GREEN INFRASTRUCTURE



- **TOOLBOX:** Green infrastructure should be considered an integral part of the stormwater management system. The Iowa Stormwater Management Manual provides design guidelines for Best Management Practices (BMPs) Some examples include:
 - Infiltration Systems,
 - Detention Systems and Stormwater (Sedimentation) Basins
 - Constructed Wetlands (Nutrient Removal Wetlands)
 - Filtration Systems and Vegetated Systems (i.e. Bioswales)
 - Minimizing Directly Connected Impervious Surfaces (DCIA)
 Another resource is the Iowa Rain Garden Design and Installation Manual.
- **MAINTENANCE:** As with any installation, when considering green infrastructure careful thought needs to be given to the on-going maintenance requirements. Like traditional systems this form of infrastructure requires proper installation and maintenance over time to function as intended. An understanding of perpetual maintenance cost for all infrastructure improvements is critical.



Corridor Branding:

Branding of the corridor helps create a sense of place. It is important that the system reflect a distinct character.

The Great Rivers Greenway in St. Louis provides a website where media information can be downloaded and used to promote the greenway and the region. This helps create a way public and private partnerships can work together to promote each other.

Branding is also established in a sense of consistency across the system. This can occur through consistent signage, site amenities and facilities, helping define the corridor's character. The greenway will most likely be developed over a period of time and by multiple jurisdictions.

Setting design standards can help with the following:

- Establish consistent character, construction, and application of facilities throughout the corridor.
- Ensure greenway meets environmental stewardship and conservation, recreation, and transportation goals.
- Ensure new facilities meet goals for sustainability, user experience, durability, reasonable maintenance, and safety.
- The Final Master Plan and Action Plan helps to define these standards.

Design Standards - Branding

EXPLORATION OF KEY COMPONENTS

01 | SIGNAGE



- **CENTRAL IOWA TRAIL SYSTEM:** A reference guide has already been created and implemented in some locations along the Gay Lea Wilson Trail. This guide should continue to be utilized for trail directional signs, information panels and information hubs along regional trail connections. Consideration should be given to the inclusion of the Fourmile Creek Watershed logo or a new logo specifically designed for the greenway on related signage.
- **ADDITIONAL SIGNAGE:** A reference guide shall be used to set standards for other types of trail and greenway signage. Examples include interpretive signage, distance markers and wayfinding signage for the non-regional trail types.

Standards could also be put in place for signage identifying key points of entry; such as, trailheads.

02 | SITE AMENITIES



- **SITE AMENITIES:** Benches, litter receptacles and bike racks are some of the site amenities that can be utilized within the greenway to help define its character. The greenway runs through various jurisdictions. Specific design standards could help provide guidance for the style and desired level of maintenance to be followed for specific amenities along the corridor.
- **BOUNDARIES:** Standards should be followed for how boundaries of the greenway are marked. In some locations identifying the boundary between public, private uses or jurisdictions will need to occur. This can be a soft boundary defined by landscaping or hard boundary such as a short wall or fence.

03 | FACILITIES



- **TRAILS:** The design and layout of the physical trail should meet all regulatory standards. However, a consistent set of standards across jurisdictions does not exist. Consideration should be given to develop such a set of standards within the greenway network.
- **TRAILHEADS:** Designated major entry points to the greenway system. These represent the first interaction many users have with the greenway system. As the initial interface, several amenities could be considered standard. Examples include parking, trail information, benches and litter receptacles. Additional features could include restrooms and drinking fountains.
- **ACCESS POINTS AND TRAIL NODES:** Intermediate trailhead facilities at small public access points can also have a consistent character. Trail nodes such as overlooks, resting areas and key connection points are also opportunities to implement a set of design standards.



CHAPTER 3: Blue Print for the Future



IMPLEMENTATION AND ACTION PLAN

The adoption of the Lower Fourmile Creek Greenway Master Plan is the first step to implementation. However, the full implementation of the plan is part of a long-term strategy and may take decades to fully accomplish. The next series of pages will outline key steps and responsibilities in the on-going process. This section of the plan is divided into three parts:

Master Plan Development: This section outlines phasing and prioritization of the various greenway segments and ultimate build out. It describes methodology and guidelines for property acquisition, design, engineering and construction priorities. There is acknowledgement circumstances may arise including land availability and funding opportunities which may modify this prioritization. However, this should be used as a general guide in the ongoing coordination and development of the greenway master plan.

Maintenance and Operations: This section provides an overview of administrative, maintenance and coordination tools. These items are not specifically related to design, engineering or construction type activities, but are still essential to a successful implementation of the plan. These are items, such as, administrative functions, maintenance needs and coordination of city regulatory tools.

Action Plan: This section provides a summary of the overall plan recommendations and highlights the key implementing partners, potential funding strategies, action type and timeline for completion.



GOAL: *Through regional collaboration create a comprehensive master plan for the lower half of the Fourmile Creek Watershed. The plan shall serve as a guide for implementation of a greenway system within the 500-Year Floodplain in accordance with goals set forth in the Fourmile Creek Watershed Management Plan.*

MASTER PLAN DEVELOPMENT

An ambitious vision for the greenway has been put in place by the master plan. The plan provides an outline for 46-miles of potential trail improvements and 1,696-acres of land set aside for public use and flood hazard mitigation. Implementing and developing such a complex and comprehensive large-scale plan required the establishment of key steps and priorities as part of the planning process. Priorities are based on the following criteria...

Project Already in Design or Construction

- Several parcels and easements have already been acquired along the greenway primarily for trail and streambank stabilization projects.
- Recent streambank stabilization projects have been completed and two are currently under design. Priorities for additional stabilization projects were provided in the Watershed Management Plan.
- Grant Funding was recently awarded for a sediment basin forebay and stormwater wetland improvements near Grandview Park.

Completion of a Greenway

- Does the acquisition or improvement help create or enhance existing park facilities.
- Would it provide a significant connection between other related facilities?
- Does the acquisition help create an easily maintainable and defensible boundary.

Resources Available

- Are the resources (i.e. funding, property) needed already in secured or highly likely to be made available.

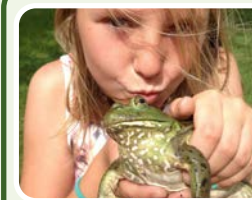
Community Support

- Has the improvement been identified as a community priority through comprehensive planning and other community-based planning efforts

Step 1: Catalyst Site Designation

CATALYST SITE

With long-term plan, such as this, designating a catalyst site where the various goals and components of the greenway master plan can be demonstrated is beneficial. The catalyst site would be the primary location for demonstrating the future breath of the greenway potential. This would not preclude any other opportunity-based improvements within the larger greenway. The catalyst site provides a chance to showcase and set in place standards for the remaining greenway corridor. It also provides an educational and public outreach opportunity concerning the aesthetic and use of the greenway corridor. The selection of the catalyst site was evaluated by its proximity to the various impacted communities and ability to showcase all of the master plan components:



01 | Natural Resources

- Water Quality Improvements
- Habitat Management, Restoration and Establishment
- Educational Opportunities



02 | Trail Improvements

- Trail Connections
- Diversity of Trail Types
- Destination



03 | Economic Resiliency

- Flood Management (i.e. Policy and Zoning Provisions)
- Recreation Improvements
- Multimodal Transportation
- Re-Envision Local Food



04 | Design Standards

- Sustainable Practices and Performance Based Measures
- Corridor Branding and Signage

The catalyst site was identified through the needs assessment and master planning process as a potential location for multiple natural resource improvements including wetland and oxbow restoration, streambank stabilization and habitat enhancements. The site's proximity to Fourmile Creek Park Community Center, Straser Woods, Copper Creek Lake Park and four schools make this a distinctive location for providing complimentary educational and recreational improvements. See Appendix Exhibit E showing potential catalyst site improvements.

Step 2: Acquisition Priorities



PROPERTY ACQUISITION

One of the most critical aspects to completing the greenway vision is land acquisition. This was identified early on in the master planning process as a necessary step in achieving the Watershed Management Plan’s goal of water quality improvement and flood hazard mitigation.

Specific criteria were used to identify acquisition needs. The criteria were also used to help establish a tier system for acquisition priorities.

Additional Criteria Used for Prioritization:

- Located in 500-year floodplain
- Environmental benefits and water quality improvements through habitat enhancements, stormwater infiltration, flood storage and conveyance
- Helps ensure health safety and welfare; as well as, threat reduction to residents and first responders from flood events
- Reduce or prevent future property damage/losses
- Minimize need for infrastructure that would be required to support isolated properties and those areas prone to flood damage. (i.e. streets, storm sewer, sanitary sewer, water, electrical etc.)
- Properties should be acquired in a manner that creates a large unified parcel to help reduce maintenance and operation costs and creates clearly identifiable and defensible boundaries
- Provides community benefit through recreation and open space enhancements

ACQUISITION PRIORITIES

- **Tier 1 (0 to 5 Years):** Set in place funding for the acquisition of all Tier 1 properties over the next five years. Actively seek out willing sellers.
- **Tier 2 (6 to 10 Years):** properties shall be acquired within the next ten years. These properties should generally be actively sought after Tier 1 properties are acquired unless they become available for purchase at an earlier date.
- **Tier 3 (11-25 Years):** properties shall be acquired within the next twenty-five years. These properties should generally be actively sought after Tier 2 properties are acquired unless they become available for purchase at an earlier date.

Note: Property acquisition is anticipated to be primarily based on willing sellers. The use of eminent domain is only anticipated as a last resort for critical parcels needed to accomplish the greenway’s primary goals and objectives.



ACQUISITION TIER PRIORITIES

The sheer number of acquisitions needed to complete the greenway is substantial and a significant public investment that offers immense public benefit. The total number of properties is expected take decades to acquire, as funding and opportunity become available.

The acquisition priorities maps, see Appendix Map 1.0, provides a breakdown of the various tier designations and their locations along the greenway. Due to the large scale and long-term nature of this project, the tiers themselves have been broken down further into a phasing plan for acquisition to assist with budgeting and planning. These are located on Appendix Maps 1.1 through 1.3B.

The phasing plan does not preclude acquisitions from future phases if opportunity and funding are available. This is intended to a working document and may be updated to accommodate changes to each community’s comprehensive plans, stormwater and recreation goals.

SITE MANAGEMENT TYPE

In order to further define the greenway boundary, a management type was assigned to each parcel based on the type of use anticipated. The greenway boundary was defined by the areas designated for conservation management. These parcels form the primary linear corridor along Lower Fourmile Creek. The remaining parcels designated for acquisition and adjacent to the primary corridor are designated for recreation and city park management.

GREENWAY - Conservation Management: Primary Use conservation, flood hazard mitigation, water quality enhancement and passive recreation activities.

PARK NODES - Recreation Management: These are parcels within the 500-year floodplain identified for acquisition which will be developed and managed by the individual jurisdiction. These sites will be managed more like a typical city park and may have more active recreation activities. Although these will provide compatible services to the greenway, they will be managed and maintain separately.

- Related Maps & Exhibits in Appendix:
- Map 1.0 - Acquisition Tier Priorities
 - Map 1.1 to Map 1.3B - Acquisition Tier Phasing Maps
 - Map 1.4 - Lower Fourmile Creek Greenway Site Management Type Map
 - Exhibit C: Greenway Boundary

Step 3: Potential Improvements



DEVELOPMENT IMPROVEMENTS

As land is acquired, improvements will need to be made early on to reduce maintenance needs, provide safe public access and meet the goals for water quality improvements and flood hazard mitigation. The master plan provides a vision for the future use and development of the greenway. The potential projects identified will often require collaboration between the various jurisdictions and the Watershed Management Authority. The full build out of the plan will also take decades to accomplish. While not a formal checklist, the prioritization of the proposed master plan improvements is broken down into two key categories:

1. Natural Resource Improvements
2. Recreation and Public Access Improvements

Related Exhibits in Appendix:

- Master Plan Exhibit A – Natural Resources
- Master Plan Exhibit B - Recreation

KEY CATEGORIES

1. Natural Resource Improvements:

- Water Quality Improvements
- Habitat Management, Restoration and Establishment
- Educational Opportunities & Outreach

2. Recreation and Public Access Improvements:

- Trail Improvements
- Trailheads and Trail Nodes
- Water Access for Wading and Fishing
- Outdoor Teaching Facilities
- Other Recreational Opportunities



NATURAL RESOURCE GOALS

The prior Watershed Management Plan and master plan needs assessment identified several key natural resource improvement opportunities.

See Appendix: Exhibit A – ‘*Master Plan – Natural Resource Improvements*’ further defines potential improvements throughout the greenway and adjacent park nodes.

Criteria Used for Prioritization:

- Flood Management: Helps ensure the health, safety and welfare; as well as, threat reduction to residents and first responders from flood events
- Benefits to water quality
- Existing habitat and vegetation
- Proximity to other natural resource areas and improvements

NATURAL RESOURCE PRIORITIES

- **Top Priority (Short Term Goal 0 to 5 Years):**
 - Site Stabilization and Seeding
 - Stream Restoration and Streambank Stabilization
 - Program for Water Quality Monitoring
 - Study for Identifying Major Sources of Preventable Bacteria
 - Plan for Addressing Preventable Bacteria in Stream
- **Mid-Term Priority (Medium Term Goal 6 to 10 Years):**
 - Wetland Restoration/Establishment & Oxbow Restoration
 - Sedimentation Basin Construction
 - Native Riparian Vegetation Establishment and Enhancement
 - Undesirable Bacteria Prevention & Reduction Projects
- **Long-Term Priority (Long Term Goal 11 to 25 Years):**
 - Other Habitat Restoration
(i.e. Prairie/Woodland/Savanna Restoration and Reconstruction)



RECREATION AND PUBLIC ACCESS GOALS

The prior master plan needs assessment identified several key recreation and public access improvement opportunities.

See Appendix: Exhibit B – ‘Master Plan – Recreation Improvements’ further defines potential improvements throughout the greenway and adjacent park nodes.

This is intended to a working document and may be updated to accommodate changes to each community’s comprehensive plans and recreation goals. It is anticipated each community will hold additional public information and input sessions to determine the specific desired recreation improvements within and adjacent to the greenway.

Criteria Used for Prioritization:

- Enhances existing economic hubs and parks
- Consistent with water quality and flood mitigation goals
- Provides unique recreational feature
- Cost share benefit with other improvement(s)
- Provides amenities to an underserved area
- Helps achieve related community based initiatives and comprehensive plan goals

RECREATION AND PUBLIC ACCESS PRIORITIES

- **Top Priority (Short Term Goal 0 to 5 Years):**
 - Gay Lea Wilson Trail Extensions and Regional Trail Connections
 - Critical Crossings (i.e. Safe Roadway Trail Crossings)
 - Water Access for Wading and Fishing
 - Signage at Existing Trailheads
- **Mid-Term Priority (Medium Term Goal 6 to 10 Years):**
 - Neighborhood, Community and Park Trail Connections
 - Trail Nodes (i.e. small grouping of boulders or natural seating areas along the trail, area may be mown and vegetation maintained to enhance views of the stream)
 - Trailheads (i.e. Parking, Restrooms, Access Points, Signage)
- **Long-Term Priority (Long Term Goal 11 to 25 Years):**
 - Interior Trail Development (Soft Surface & Paved Trails)
 - Interpretive Trails and Educational Signage
 - Other Recreational Improvements
 - Outdoor Teaching Facilities

2 MAINTENANCE AND OPERATIONS

In order to best implement the greenway, all project partners will be responsible for some level of services, resources and funding. Successful implementation and coordination of the greenway operations and maintenance will be critical to the greenways success. In order to implement a successful and well-coordinated plan, a single entity must be charged with following up on the plans recommendations. Services, resources and funding by each partner shall be further and clearly defined through a Memorandum(s) of Understanding (MOU) or Cooperative Service Agreement(s). The following section provides initial recommendations for the following tasks, which shall be further defined in these agreements...

Greenway Operations

- Greenway Oversight Structure
- Rules and Regulation
- Winter Operations

Maintenance Needs

- Understanding Greenway Function
- Key Maintenance Needs
- Frequency of Maintenance and Maintenance Level Expectations

Monitoring and Data Management

- Implementation of Water Monitoring Program as part of the Master Plan natural resource and water quality improvement goals.
- GIS Data Management
- Greenway Website Management

Education Programming and Outreach

- Public Outreach
- Environmental Education Programming

Greenway Operations

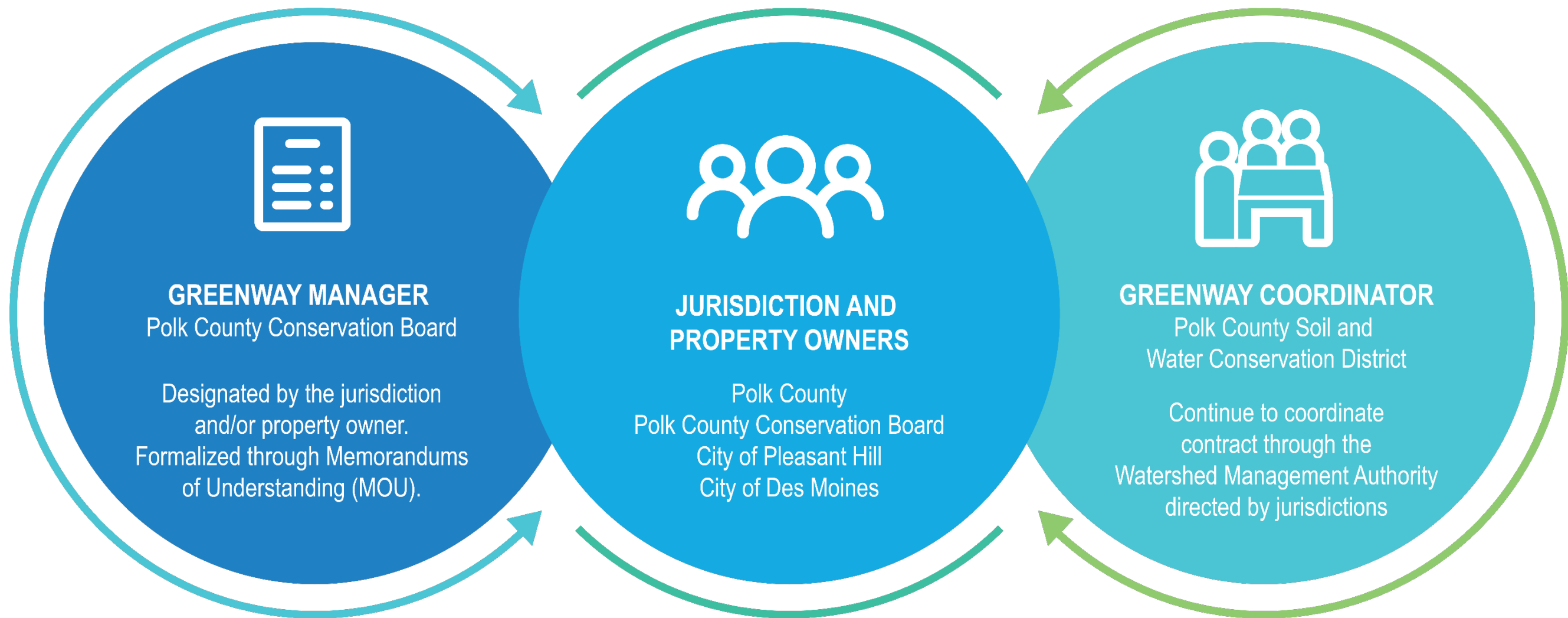
GREENWAY OVERSIGHT STRUCTURE:

The existing public properties within the greenway are currently owned and maintained by various jurisdictions and owners. Establishing a set of guidelines and recommendations for the oversight of the plans implementation; as well as, the greenway is managed and maintained will help provide a successful, consistent and well-coordinated greenway system.

RECOMMENDATIONS:

- Assign a Greenway Coordinator: A single entity should be charged with oversight of the master plans implementation. Polk County Soil and Water Conservation District (SWCD) has already been designated by the Fourmile Creek Watershed Management Authority to oversee the implementation of the Fourmile Creek Watershed Management Plan. They are responsible for the coordination of extensive work being done throughout the larger 76,000-acre watershed draining to Lower Fourmile Creek and are already coordinating with the impacted jurisdictions and other partners to help achieve the Watershed Management Plan goals. Polk County SWCD is a natural fit for coordinating the implementation of the master plan. Their responsibilities would include:
 1. *Master Plan Coordinator:*
 - ✓ Oversee the implementation of the Lower Fourmile Creek Greenway Master Plan. The coordinator is the central contact responsible for helping maintain a high level of communication and collaboration between the various partners. Services would include coordination of development improvements, planning, design and construction projects.
 - ✓ Ensure that the goals and tasks proposed in the master plan are achieved and updated as the partners mutually agree.
 - ✓ Ensure that the goals are consistent with the overall goals and strategies set forth in the Watershed Management Plan and Fourmile Creek Watershed Management Authority.
 2. *Story Map and Website Manager:*
 - ✓ Designated maintainer of the Story Map and website for the Fourmile Creek Watershed and Lower Fourmile Creek Greenway. In order to keep the plan current, all partners will need to provide any proposed updates to Polk County SWCD.
- Assign a Primary Greenway Manager: A single entity should be charged with overseeing and providing the primary municipal resources for the entire greenway system. The manager would be responsible for the primary greenway maintenance and operation of services including public safety. The Polk County Conservation Board is recommended for this position because of their familiarity with successfully managing and balancing similar restoration, conservation and recreational resources.

Greenway Oversight Structure Matrix:



OVERSIGHT PROCEDURE RECOMMENDATIONS

- **ESTABLISH A GREENWAY REVIEW PROCESS:** Due to the complexity of projects and activities that will affect the development of the greenway, a review procedure should be institutionalized that requires review and approval by the Greenways Coordinator on any private or city projects that will have a direct or indirect impact on the greenway system and properties.



RULES AND REGULATIONS

There has been a growing request from commuters and the multi-modal transportation movement to open up regional trail connections like this to 24-hour access or extended hours in the winter months. There are legitimate reasons for this extension and legitimate concerns about impacts to safety along dark unlighted trails. Having set hours' aids enforcement of rules and making sure certain activities do not occur during these evening hours. Coordination with the greenway and adjacent jurisdiction's park and trail hours should be considered in order to provide consistency and promote greater public safety.

RECOMMENDATIONS:

- Establish an Hours of Operation Agreement: The greenway partners should continue to work with each other, the community and public safety officials to develop the most appropriate set of hours. Any changes to the hours of operation should be reviewed and discussed at a regional level in order to provide consistency across the region and various sections of the greenway. Any changes may require policy changes within an impacted jurisdiction.
- Establish a Rules and Regulations Agreement: The greenway bisects several jurisdictions. Currently the Gay Lea Wilson Trail runs the majority of the greenway length. Polk County Conservation Board currently manages and maintains the existing trail and has a set of existing rules and regulations policies they use for their existing park and trail sites. The partners should establish a consistent set of rules and regulations throughout the greenway in order to eliminate potential discrepancies and confusion from greenway visitors.
- Utilize Consistent Signage: Providing consistent signage at key access points and throughout the greenway will help define the greenway boundary and provide aid in visitor's wayfinding. At minimum, signs should be provided for rules and regulations, directional information and trail-related services. The signage using the "Central Iowa Trails Communication Master Plan" developed in 2006 has already been implemented along the Gay Lea Wilson trail. This should continue to be used as a design guide for future trail signage within the greenway. The Greenway Manager should be clearly defined on the signage and provided as the primary contact for the public to report maintenance and safety concerns.
- Develop and Use a Greenway Logo: A Lower Fourmile Creek Greenway logo should be developed and used on greenway signage, funding applications, outreach and promotional material. This helps create a sense of place and brand for the corridor while helping to define the greenway's boundaries for visitors.



WINTER OPERATIONS

Similar to other community parks the greenway is anticipated to be used year around for recreation, commuting, health and fitness. Ensuring year-round use of trails is growing with the bicycle culture as more individuals choose to use the growing system of trails for commuting. Currently snow and ice removal does not occur along the Gay Lea Wilson Trail. After snow events the trail is left open for cross-country skiing on an un-groomed trail.

RECOMMENDATIONS:

- Develop a Winter Maintenance Policy: A clear and concise policy or agreement should be put in place outlining trails dedicated for snow and ice removal. Clearly advertise which trails will receive this treatment. Outline the priority and timelines expected for snow removal on these routes. The primary Gay Lea Wilson trail should be highly considered for snow removal within the more developed areas for commuters. Consideration could be given to providing separate groomed trails at strategic locations where walkers, runners and bicyclists are not allowed for designated snowshoe and snow skiing activities.
- Promote Winter Recreation Activities: Polk County Conservation should continue to promote trails not scheduled for snow removal for cross-country skiing and snowshoes activities. They currently have a rental program out of Jester Park. Consideration could be given to encouraging this type of rental through a local business or public entity closer to the greenway corridor.

Maintenance Needs

GREENWAY FUNCTION

Successfully maintaining such a large area of public land requires a well-defined understanding of the primary function and design intent of the greenway system. It also requires a strong understanding of the physical setting of each particular segment of the greenway. All the greenway functions are interconnected; however, each segment may have a primary function or design intent. For example, certain segments of the greenway will have higher concentrations of visitors and some areas will only be used primarily for seasonal recreation activities. Other segments and areas have been primarily designated for flood mitigation and water quality enhancement; therefore, land management and conservation will drive the key maintenance needs and strategies.



The following pages provide recommendations for on-going maintenance activities based on the type of maintenance and frequency. These recommendations should be further reviewed and refined in the formal agreements with the Greenway Manager.

KEY MAINTNENACE NEEDS:

- Determine Trail Management and Maintenance Expectations
- Determine General Maintenance Expectations for Support Facilities and Amenities
- Develop a Vegetation Maintenance and Management
- Establish a Waterbody Maintenance and Management
- Develop Strategies for Implementing an Action Plan for Access Control, Safety and Emergencies
- Establish Timing and Priority of Maintenance Activities
- Determine Staffing and Personal Needs



Recommendations for: TRAIL MANAGEMENT AND MAINTENANCE

1. Weekly Inspection(s): Greenway trails should have a visual inspection once a week at minimum. High traffic areas should include a second weekly inspection. During the inspection, facilities and trails should be checked and level of urgency determined for any matters discovered along the trail.
 - This should include driving or walking the entire length of trail system and observing the conditions along the trail.
 - Visual Inspections should identify:
 - Physical condition of trail surfaces (i.e. damage to surface)
 - Conditions of homeless populations' presence, illegal dumping or other issues that should be coordinated with local jurisdictions code enforcement officials.
 - Fallen tree or debris (i.e. broken glass, litter) near or on trail
 - Erosion or drainage concerns

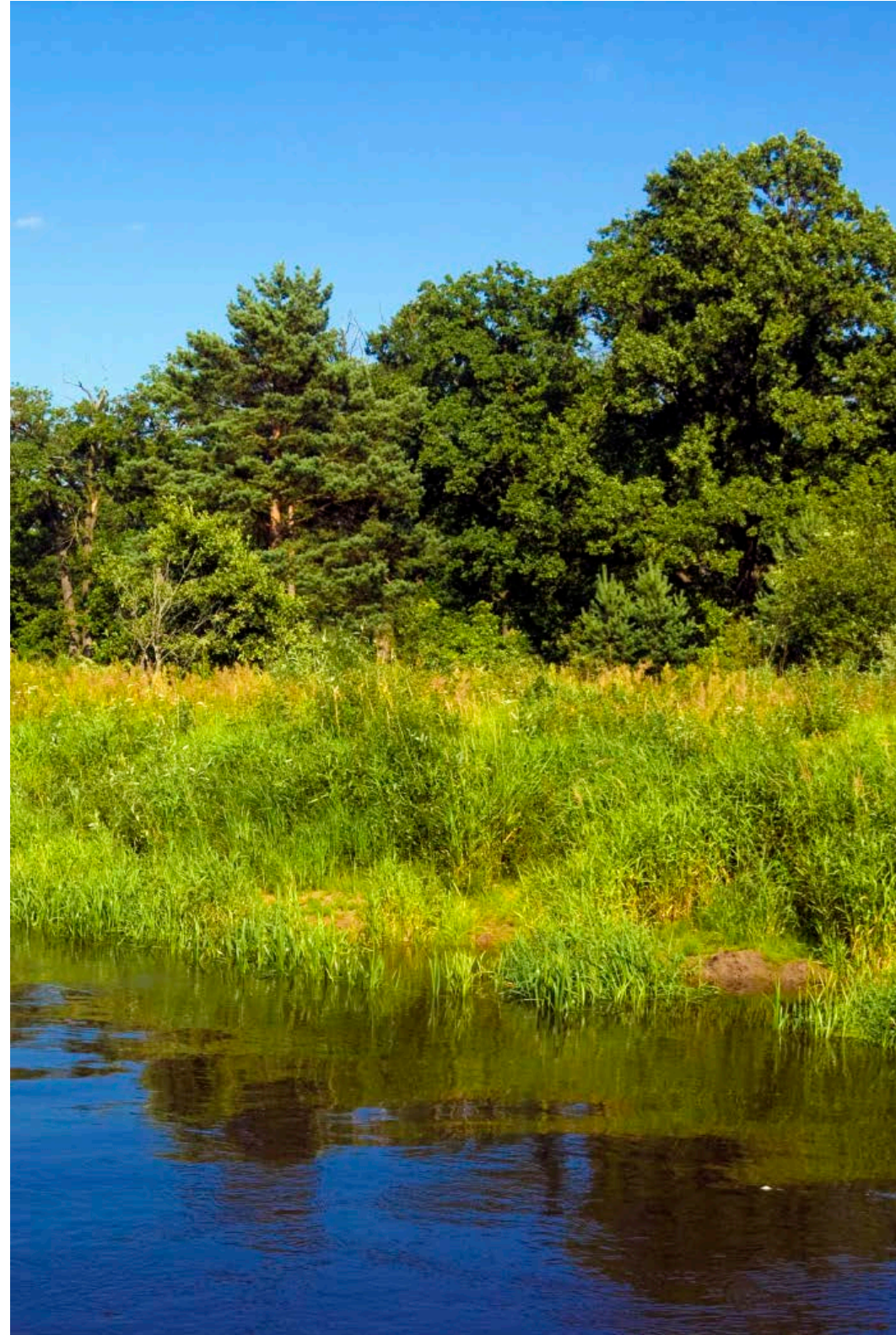
2. Conditions Requiring Immediate Maintenance: Some tasks will need to be identified as critical to the safe use and operation of the trail system. These should be performed as soon as they are reported.
 - Have a plan in place for what requires immediate attention and whom to contact if immediate maintenance needs are reported. Examples include:
 - Removal of trees or branches that have fallen across the trail
 - Broken glass or debris on trail that could be harmful to users or damage bicycles
 - Trail washouts, infrastructure damage to bridges or other crossings

3. Seasonal Maintenance, Clearing or Sweeping: The need for snow removal, snow grooming, clearing and sweeping should be defined based on the designated trail type, intended use and frequency of use.
 - Any trail designated as a regional trail or commuter route should be swept and cleared at least bi-weekly. Additional clearing may be necessary during the Fall months in areas with heavy tree cover. Access trails should be swept and cleared monthly or as conditions warrant.
 - Any trial designated for snow removal should be given a priority rating. Heavy use and commuter routes should be given first priority and cleared within 24 hours of the end of a snow event.
 - Any trails designated for grooming for cross-country skiing should follow Polk County Conservation's standard policies. Currently, trails are groomed after a 6-inch snowfall.



Recommendations for: MANAGEMENT AND MAINTENANCE OF GENERAL SUPPORT FACILITIES AND AMENITIES

1. Daily or Weekly Inspection(s): Similar to greenway trails, and preferably during the same visit, support facilities should have a visual inspection once a week at minimum. High traffic areas should include a second weekly or daily inspection. During the inspection, facilities should be checked and level of urgency determined for any matters discovered.
 - This should include visiting all restrooms and other structures within the greenway, parking/trailheads, trail nodes, creek access points, recreational amenities and site amenities (i.e. litter receptacles, signage, bike racks, benches etc.)
 - Visual Inspections should identify:
 - Damage to physical condition (i.e. vandalism or storm event)
 - Damage or missing signage
 - Conditions of homeless populations' presence, illegal dumping or other issues that should be coordinated with local jurisdictions code enforcement officials
 - Fallen tree or debris (i.e. broken glass, litter) near facility or amenity
 - Erosion or drainage concerns
 - Ensure restrooms or other structures are clean and functioning well. Restrooms in higher-use months and areas should be cleaned and inspected daily.
2. Conditions Requiring Immediate Maintenance: Some tasks will need to be identified as critical to the safe use and operation of the trail system. These should be performed as soon as they are reported.
3. Seasonal Maintenance: During the winter months some facilities and amenities may be closed or unavailable (i.e. restrooms and drinking fountains). They require seasonal winterization and must be re-opened in the spring.
4. Trash Collection: Trash collection will likely vary long the trail system depending on use. On high-volume trails trash collection should occur daily or as needed in high-use months (May-October). At a minimum, litter receptacles should be checked and trash removed on a weekly basis during high-use months and bi-weekly during the winter months.



**Recommendations for:
VEGETATION MAINTENANCE AND MANAGEMENT**

1. Ecology Management Plan: A natural resource inventory should be conducted of existing properties and when properties are acquired within the greenway boundary to further establish existing locations and qualities of existing natural resources. An inventory would also help develop a habitat suitability model for defining habitat construction and restoration focus areas.
2. Mowing: Designated turf areas and a minimum 3-foot width mowed trail edge should be mowed regularly during the growing season. Mowing needs will vary depending on seasonal conditions and rain events. Turf areas and trail edges should be mowed when turf reaches 5-inches in height. For a typical year mowing is anticipated to be a weekly maintenance activity primarily from April thru June and a bi-weekly activity from July thru September. Choosing drought tolerant and short growing varieties of grasses for designated mowing areas, such as Buffalo Grass, can reduce mowing and maintenance needs.
3. Trimming and Pruning of Woody Plant Material: Trimming and pruning of plant material will be needed to help maintain the health of plants and provide safe and user friendly trails.
 - o Normal trimming and pruning is recommended once a year in accordance with best practices established for a particular type of plant material.
 - o Trimming and pruning to ensure safe use of trails and provide clear sightlines for trail users should occur as needed.
 - o Broken branches and unhealthy/hazardous trees should be removed or cleanly pruned as needed.
4. Invasive Species Control: a plan for identifying and monitoring invasive species growth throughout the greenway should be developed. Aggressive invasive species (i.e. honeysuckle and garlic mustard) should be removed as quickly as possible to prevent their spread. Invasive species removal near designated restoration sites and higher quality native vegetation sites should be given a higher priority than more disturbed locations along the greenway.

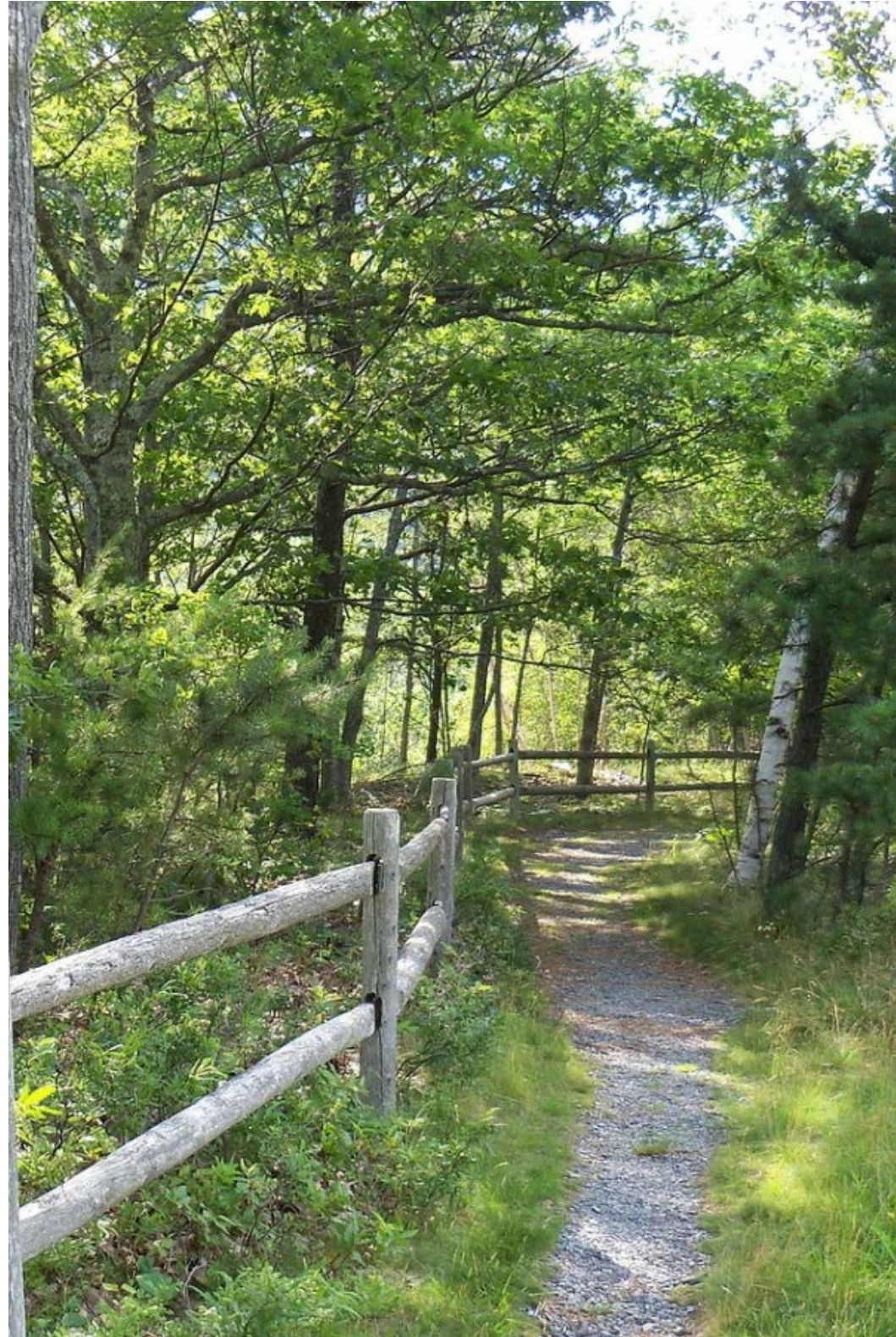


Recommendations for: WATERBODY MAINTENANCE AND MANAGEMENT

1. Stream Maintenance and Log Jam Removal: As improvements are made, streambanks stabilized and volatility of the watershed is reduced, the streams water quality and habitat will improve. Log jams that currently obstruct the channel will likely be reduced from the reduction in tree fall along banks from erosion and flooding. Until then, log jams will continue to be a concern. Some log jams are beneficial and provide habitat. However, log jams that cause immediate safety concerns or anticipated to cause infrastructure damage should be removed. General maintenance of the stream shall be coordinated with the Greenway Manager, Polk County Conservation.

2. Stream Wading Access: The greenway master plan further layouts a broad vision for potential water access points for wading and fishing. The Des Moines Area Metropolitan Planning Organization (MPO) and their Water Trails and Greenways Advisory Committee are currently leading an engineering study that will further refine proposed locations and specific improvements. The MPO's plan is a significant investment from several generous donors through a public-private partnership. As the greenway master plan is developed coordination with the MPO's "*Greater Des Moines Water Trails and Greenways Master Plan*" and the current "*Water Trails Engineering Study*" should be highly considered. The engineering study is anticipated to be completed in 2018 and will provide conceptual designs and cost estimates for these types of improvements along Fourmile Creek. As these areas are developed the maintenance and management is anticipated to be primarily by the Greenway Manager, Polk County Conservation.
 - Sargent Park: The existing access point at Sargent Park has some proposed improvements already in the final design stages. These improvements are anticipated to be completed by Fall 2017. They are also anticipated to be maintained and managed by the City of Des Moines because of its location within an existing city park and not the greenway boundary.

3. Fish Habitat and Fishing Access:
 - Stream Access: As the greenway is developed, proposed stream restoration improvements should consider fish habitat structures. Angler access points will also be further defined by the MPO's study. Coordination with this plan for these types of improvements is also recommended.
 - Pond Access: Several ponds are part of the greenway master plan. Some of them are proposed water quality sedimentation basins and others are existing quarry sites with ponds that will require extensive restoration. As part of the greenway improvements fish habitat construction and stocking should be considered. As well as, a management plan, by the Greenway Manger, implemented for stocking and monitoring pond health.



Recommendations for:

• **STRATEGIES FOR ACCESS CONTROL, SAFETY AND EMERGENCY ACTION PLAN**

1. Access Control: One of the acquisition goals is to develop a greenway with defensible boundaries. This means the ideal boundary of the greenway is easy to identify, manage and maintain. The easiest way to do this is for the edge of the greenway property to abut an existing public roadway. However, this may not always be feasible. If the greenway boundary abuts up against private property, the boundary should be made identifiable using vegetation or fencing.
2. Develop and Implement a Safety and Emergency Action Plan: Protocols and procedure for responding to reports of potentially hazardous conditions within the greenway boundary should be implemented. The Greenway Manager should be the designated contact for non-emergency concerns. In emergencies, existing Polk County Conservation protocol and services should be utilized (i.e. Park Ranger & Park Advocacy Patrol Services). Signage and promotional materials for the greenway should provide clear direction to the public who they should contact for emergency, safety and maintenance concerns.
3. Use Signage and Technology: Utilize technology platforms to improve navigation and location-based mapping applications for reporting concerns. Provide consistent wayfinding signage throughout the corridor to help encourage exploration and improve safety.
4. Provide Access Routes for Emergency Vehicles Where Applicable: As improvements are made for public access. Consideration should be given to how emergency service providers will access the site and reach greenway visitors.

Maintenance Frequency and Policy Matrix:

MAINTENANCE ACTIVITY			TIMING OF MAINTENANCE ACTIVITY								
			Immediate Attention	As Needed	Daily	Weekly	Bi-Weekly	Seasonal Weekly	Seasonal Bi-Weekly	Monthly	Yearly
TRAIL AND FACILITY MANAGEMENT	Weekly Greenway Inspections	DAMAGE TO TRAIL SURFACE (i.e. Wash Outs)	X	X							
		DRAINAGE AND EROSION CONCERNS	X	X							
		DAMAGED OR MISSING SIGNS	X	X							
		REMOVAL OF FALLEN TREES OR BRANCHES ACROSS TRAIL	X	X							
		BROKEN GLASS OR OTHER DEBRIS	X	X							
		VANDALISM REMOVAL AND/OR REPAIR (i.e. Graffiti)	X	X							
		CODE ENFORCEMENT ISSUES (i.e. Access Control)	X	X							
	Other Needs	DAILY RANGER PATROLS AND SAFETY CALL		X	X						
		CLEARING / SWEEPING OF TRAIL SURFACE		X					X		
		SNOW REMOVAL		X							
		TRASH COLLECTION						X	X		
		CLEANING OF FACILITIES (i.e. Restrooms)						X			
		FACILITY WINTERIZATION									X
NATURAL RESOURCE MANAGEMENT	MOWING						X	X			
	TRIMMING AND PRUNING PLANT MATERIAL		X							X	
	CONSERVATION AREA VEGETATION MANAGEMENT (i.e. Prairie Burning, Spraying, Invasive Species Removal)									X	
	STREAM MAINTENANCE (i.e. Log Jam Removal)	X	X								

GENERAL MAINTENANCE POLICY RECOMMENDATIONS

- The master plan outlines some significant investment in trail and recreation infrastructure; as well as, natural resource improvements. The success of the plan will require a similar level of investment and attention to the proper level of maintenance and management. Maintaining the system should be considered as important as building the system. Devoting the appropriate resources, staffing and funding will be critical. Above is a matrix summarizing the recommendations outlined in this section for various activities relating to greenway maintenance.
- This is an anticipated matrix of maintenance needs and frequency of need. The full impact and need will be revealed over time. As particular areas develop maintenance levels may change based on the number of visitors, the types of activities/amenities and expectations of the community.
- As the greenway develops, it will be important to monitor and seek input from the public. Create partnerships to help with monitoring and identifying qualitative and quantitative data on greenway use.
- Identify potential partners and expand the existing Polk County Conservation volunteer program to assist with maintenance activities where applicable.

Monitoring and Data Management

MONITORING PROGRAM

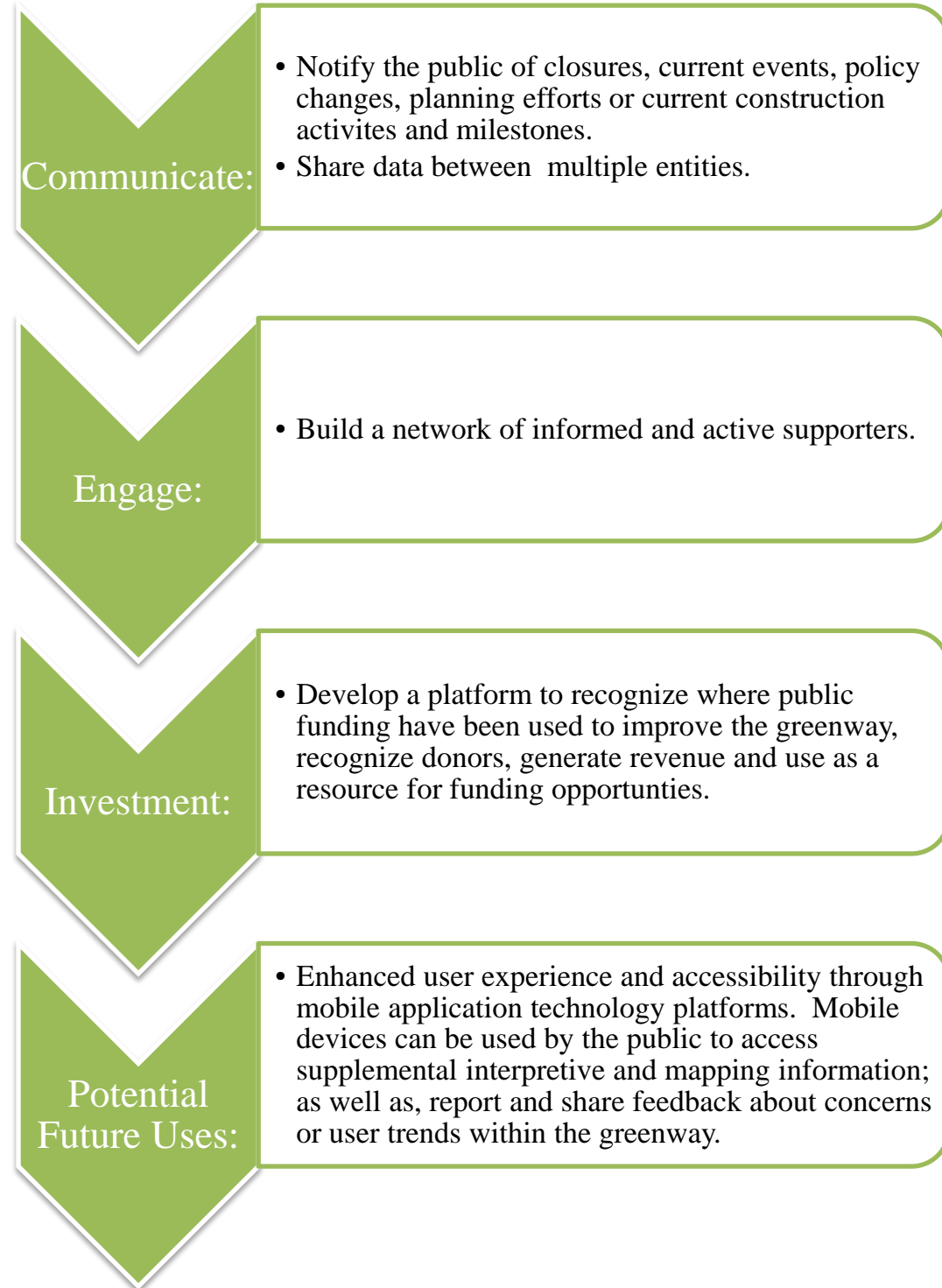
Successfully implementing a monitoring plan to further understand current water quality conditions is critical to the success of future improvements and identifying the best solutions for restoration and water quality investments. ‘Monitor for Success’ was a key goal in the Fourmile Creek Watershed Management Plan.

RECOMMENDATIONS:

- Monitoring Locations: Monitoring sites were designated in the Watershed Management Plan. These locations were identified in the greenway ‘Needs Assessment’ portion of the Story Map report. Any changes to these locations should be clearly identified and communicated to the greenway partners and entities involved in data collection and analysis.
- Continue to Facilitate the Polk County Conservation Water Quality Monitoring Program (PCCWQMP): The PCCWQMP was started in spring 2015. The program is managed by Polk County Conservation Board and includes a series of biweekly monitoring events assessing water quality of watersheds throughout Polk County, including Fourmile Creek. PCC should continue to be the primary record keeper for all data collected and share findings with their project partners and the public (i.e. IOWATER database and Water Quality Monitoring Program Annual Reports). The assessments should continue to monitor stream health based on chemical, physical, habitat and biological parameters.
- Partnerships and Volunteers: As monitoring needs grow, it will be important to continue to foster relationships and develop new monitoring partners such as universities and non-profit organizations.
- Consistency and Frequency: The current PCCWQMP conducts assessments at selected locations twice per month, during the first and third full weeks of each month. It is important for the monitoring to be consistent and allow for the data from all sites to be compared. The monitoring frequency may need to be assessed and modified depending on the information being collected and as the program is further implemented.



TECHNOLOGY PLATFORM OBJECTIVES:



GEOGRAPHIC INFORMATION SYSTEM (GIS)

DATA MANAGEMENT

Another key resource for providing the best management and development strategies for the greenway system is to keep the complexity of spatial and geographic data collected organized and accessible to the various entities proposing improvements throughout the system. Providing effective storage, management and distribution of this data can be an extremely useful tool for future greenway planning efforts and improvements.

RECOMMENDATIONS:

- The Greenway Coordinator should be the GIS data administrator for the greenway.
- All project partners are responsible for providing their most current GIS data related to the greenway to the Greenway Coordinator.

GREENWAY WEBSITE

The internet has become a primary resource for the public to seek additional information about community offerings, places and policies. The existing Fourmile Creek Watershed website is currently managed by Polk County Soil and Water Conservation District and is the recommended domain for the Lower Fourmile Creek Greenway Master Plan. As the Greenway Coordinator, Polk County SWCD, should continue to take the lead on keeping the website current. The master plan report format was chosen for this specific reason. The online Story Map can easily be linked to the website and provides an interactive resource that can be updated as new information becomes available and improvements are made within the greenway.

RECOMMENDATIONS:

- Provide a user friendly website as a definitive source of information pertaining to the greenway
- Ensure web resources are mobile friendly
- Provide access to greenway and watershed studies, long range plans and current improvements
- Promote partnerships and provide interconnectivity between the local jurisdictions websites for parks and recreational activities.
- Continue to maintain and consider increasing social media presence and public engagement opportunities.
- Consider the use of or expansion of a technology platform that provides interactive and printable mapping, location-based mapping and navigation, supplemental interpretive information, alternative language and visually impaired support resources, problem hotline for reporting non-emergency concerns and enhanced emergency alert system.

Education Programming and Outreach

ENGAGING THE PUBLIC

Successfully engaging the public through technology platforms, environmental programming and community outreach opportunities can have huge impact on the success of the greenway.



RECOMMENDATIONS:

- Environmental and Ecological Programming: The greenway will provide immense opportunity for educational programming. A host of opportunities will exist to continue the education plan goals set forth in the Watershed Management Plan. Designating outdoor teaching facilities and opportunities should be considered throughout the greenway. The catalyst site provides a unique location for a primary outdoor teaching facility with its proximity to local schools and the Four Mile Creek Community Center. Polk County Conservation Board already considers educating the public about conservation and outdoor recreation as one of the key components of their mission. The implementation of the greenway should continue to expand their programming and education goals.
- Promote Stewardship Opportunities: Sometimes hands on learning can provide the greatest impact. Encourage volunteer and stewardship programs within the greenway.
- Employ Technology: Increase and ease the accessibility of greenway information using technology. The greenway website, apps, QR scans on interpretive signage, digital kiosks and bird cams are a few ways to encourage more in-depth public interaction with the amenities the greenway offers.
- Continue to Foster Partnerships: Seek out opportunities to collaborate with public and private organizations, individuals and businesses to further strengthen research, funding and educational opportunities.
- Continue to Emphasize the Three P's: A healthy watershed and active greenway system enhances the livability and economic resiliency of our communities through Profit, People and Planet.

3 ACTION PLAN

This section outlines anticipated budgetary costs for proposed improvements, recommendations for funding opportunities, potential policy and regulatory tools and techniques for measuring the greenways success.

Budgetary Project Costs

- Acquiring the Greenway Property
- Primary Stream Restoration and Water Quality Improvement
- Primary Facilities, Trails and Infrastructure
- Primary Habitat Restoration and Enhancements

Funding Strategies

- Responsible Parties
- Partnerships
- Capital Funds
- Federal and State Funds
- Grants

Policy and Regulatory Tools

- Policy Changes (Regional Coordination and Stormwater Requirements)
- Urban Agriculture
- Strategic Greenway to Business Connections
- Design Standards

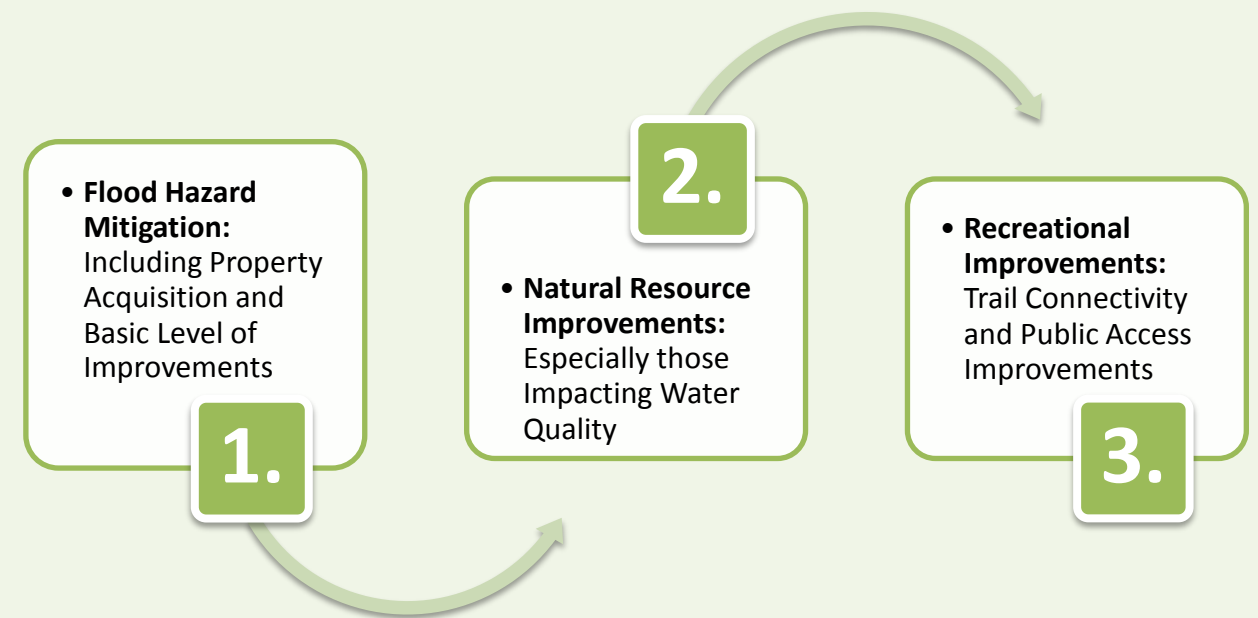
Measuring Success

- Biodiversity
- Resiliency and Water Quality
- Public Support and Services

Budgetary Project Costs

PROJECT COSTS

The initial cost impact is anticipated to be the property acquisitions required to create the greenway proper and critical natural resource improvements such as stabilizing Fourmile Creek streambanks. The properties acquired will have initial costs to transition the acquisitions into manageable greenway properties and address any potential safety concerns. Recreational improvements are anticipated to occur in conjunction with other park and trail project, in accordance with current local comprehensive plans and as related funding becomes available.



SUMMARY OF COSTS

Below is a summary of the initial anticipated costs for completing the Lower Fourmile Creek Greenway Master Plan. It is important to note this is a robust and evolving plan. The cost summary below provides an overview of potential costs associated with the proposed acquisitions and improvements. Funding a vision, such as this, will require joint efforts and will take place over the next twenty-five years through a series of public and public/private partnerships. A more detailed summary is located in the Appendix.

Overall Acquisitions Costs (\$62.1 Million)

- Tier 1: \$8.32 Million
- Tier 2: \$16.85 Million
- Tier 3: \$36.87 Million

Overall Anticipated Natural Resource Restoration (\$11 – 40 Million)

Overall Potential Recreation Improvements (\$30 - 50 Million)

Note: Costs based on 2017 pricing.

Funding Strategies

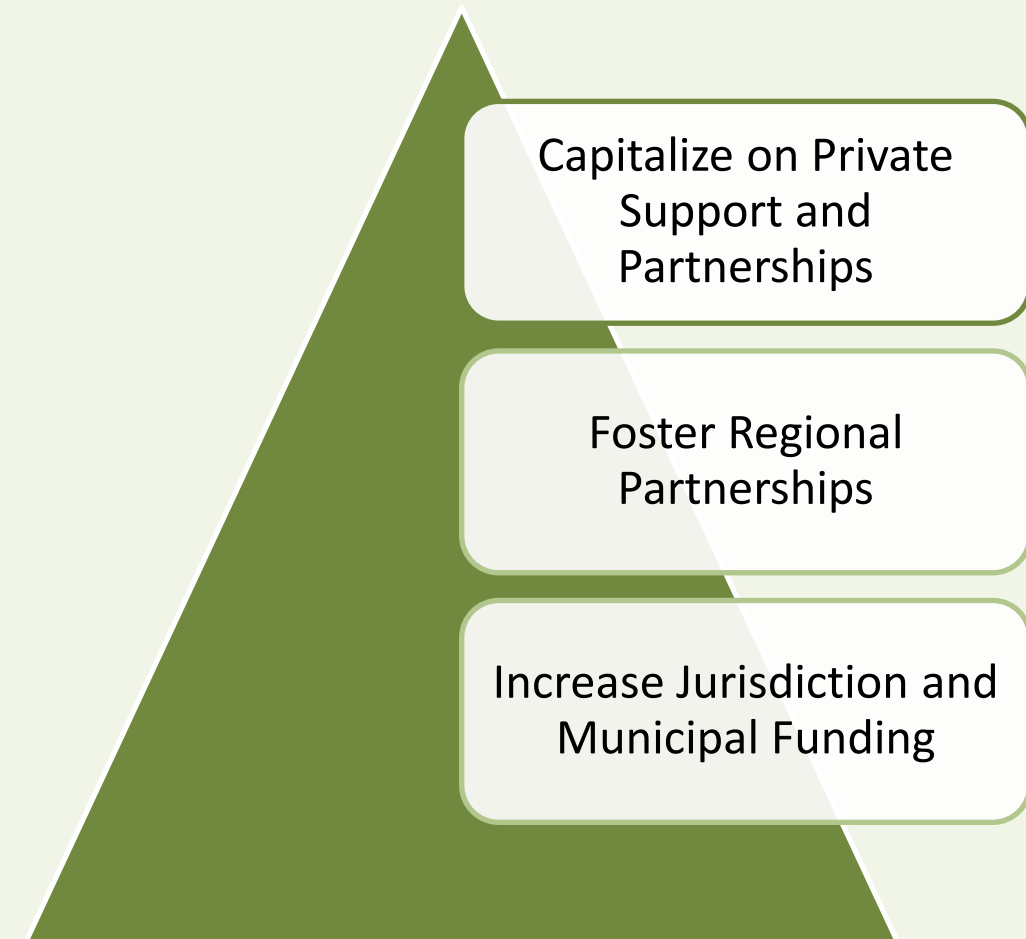
RESPONSIBLE PARTIES

The sheer level of investment and quantity of projects identified in the master plan will require multiple funding sources. Implementation of a plan of this scale will include significant public investment supplemented by grant funding and public-private partnerships.

The Greenway Coordinator is responsible for coordinating the improvement and implementation efforts and the Greenway Manager is responsible for managing and maintenance of the constructed greenway improvements. All partners will be asked to seek and administer funding for implementation of the capital improvement projects. However, the primary responsibility for leading the implementation and funding of capital improvement projects will fall to the individual jurisdictions.

FUNDING STRATEGIES

Several strategies are provided within this section for potential funding opportunities.



**Recommendations for:
FUNDING STRATEGIES**

- Adoption of the Plan: Individual jurisdictions are asked to integrate the master plan into their long-range plans and capital improvement budgets.
- Increase Park, Recreation and Natural Stormwater Utility Funding: A goal of the greenway master plan is to spur economic resiliency and vitality. Well implemented greenways help encourage new development and redevelopment resulting in increased property tax base. The use of the greenway as a natural stormwater utility can also reduce the need and cost for other public infrastructure costs. Cities should consider leveraging and allocating infrastructure savings and additional tax revenue towards parks and recreation improvements that will continue to support the community’s livability goals, health and wellness initiatives and multimodal connection opportunities.
- Continue to Engage Regional Partners: The greenway is a regional asset. The entire Fourmile Creek Watershed and the greater Des Moines River will benefit from the greenway improvements. Development within the entire watershed will have environmental impacts on the greenway and its success. Regional and statewide attractions, such as the Sleepy Hollow Sports Park and Iowa State Fair Grounds, can benefit from potential greenway improvements.
- Encourage Private Sector Participation and Funding Resources: The greenway will continue to be impacted by private development within the watershed. Projects that may fully funded or partially funded by private partners include stream stabilization and restoration, stormwater management improvements, recreation amenities and trails.
- Create a Wetland Development Bank: Establish a wetland development bank program and sell wetland bank credits to developers as a way to monetize the wetland’s natural resource and water quality improvements.
- Continue to Foster and Develop Partnerships: A project of this scale will likely require many partnerships and creative funding strategies. It will be important to continue to develop new partnership opportunities. It will also be important to seek out new funding opportunities as they continue to evolve. Greenways promote environmental and human health. Utilize partnerships with the Healthiest State Initiative and Polk County Public Health to promote public health. Continue to foster and build relationships with infrastructure partnerships such as the Metro Waste Authority (WRA) for stream restoration, the Metropolitan Planning Organization (MPO) for water trail improvements, and MidAmerican Energy for improvements along the Fourmile and Des Moines River confluence.
- Leverage Joint Partnerships and Planning Efforts to Capture Grant Funding: There are a few grant funds available through state and federal programs. Highlighting the joint efforts and regional impact will help provide a stronger story for capturing grant funding. Some of the grants available include the State REAP (Resource Enhancement and Protection) fund, Vision Iowa’s Community and Tourism Grants, The Land and Water Conservation Fund through the Iowa Department of Natural Resources (Iowa DNR), and the Recreational Trails Program through the Iowa Department of Transportation (Iowa DOT).
- Continue to Build Community Support: Private contributions, endowments and volunteer efforts can help support general greenway operations and help fund the implementation of proposed improvements. Public support is critical in helping form support for increased local appropriations for city parks and recreation operations. Some individuals and businesses may consider providing funding for improvements that can offer donor acknowledgement, dedication or naming rights. Continue to educate and empower citizens through educational and volunteer programming. Volunteers can assist with general greenway litter cleanup and ecological restoration efforts, such as invasive species removal.



Policy and Regulatory Tools

Recommendations for: POLICY AND REGULATORY TOOLS

- **Regional Coordination:** Due to the nature of the jurisdictional boundaries in Central Iowa, coordination on a regional basis is critical to the overall success of the adoption of consistent policies. The establishment of the watershed management authorities in the region provides a great opportunity for communication on a regional level.
 - Successful stormwater management ordinances and floodplain development policies and standards throughout the watershed and the region should be reviewed by a WMA subcommittee for possible inconsistencies and synergies. Many of the model ordinances that should be reviewed can be found on the Iowa Storm Water Education Program's website (www.iowastormwater.org).
 - Consider using a Natural Resource Overlay District to provide guidelines and strategies for development in and adjacent to the 500-year floodplain.
 - A few examples: The City of Coralville's Post-Construction Stormwater Ordinance, Cedar Falls Flood Prone Ordinances, and Clive's Post-Construction Stormwater Management Ordinance and Clive Stormwater Management Manual.
 - Once this review is complete, a model ordinance tailored for the Fourmile Creek Watershed should be presented to the full FCWMA for comment. Once a final ordinance has been drafted, it should be shared with member jurisdictions for adoption consideration.
- **Consistent Stormwater Management Requirements:** In accordance with the 2015 Fourmile Creek Watershed Management Plan, jurisdictions should work together to adopt consistent stormwater management requirements for both water quality and quantity.
 - *Water Quality Volume Management:* all communities within the watershed should adopt standards that require infiltrating the water quality volume on site (as opposed to detaining and releasing that volume). Infiltration practices have a high removal rate for suspended solids which may include metals, bacteria, hydrocarbons and phosphorus. The water quality volume in central Iowa is defined as the runoff that occurs during a 1.25" rainfall event.
 - *Channel Protection Volume Management:* adopt standards that require the detention of the channel protection runoff volume and release this volume slowly over a 24-hour period. The channel protection volume is defined as the runoff that occurs from a 2.4" rainfall event. Detaining this additional runoff volume and releasing it slowly allows for a reduced, although sustained, flow that would otherwise be released into a drainage-way. This helps reduce the depth of flow in the channel. This, in turn, reduces the saturated condition of the channel banks and thereby decreases the likelihood of channel bank sloughing. Therefore, runoff control practices reduce stream bank erosion.



Recommendations for: POLICY AND REGULATORY TOOLS

- **Encourage Urban Agriculture:** The partners agree that urban agricultural activities can be allowed within or adjacent to the corridor. Urban agriculture within the greenway and greenway fringe should follow current jurisdiction requirements and ordinances. Each jurisdiction shall update and revise their ordinance requirements as they see best meets their community needs. When allowed, sustainable agricultural practices shall be encouraged so not to negatively impact the water quality and flood management goals of the master plan.
- **Encourage Strategic Greenway to Business Connections:** Allow for policies that leverage cohesive opportunities businesses and the greenway can offer the community. Encourage policies that allow for pop up businesses, like food trucks, wine bars or farm stands to help increase greenway use, community livability and economic vitality.
- **Develop Greenway Design Standards:** Develop a set of design standards for greenway improvements. Design standards help provide a consistent feel and expectation from the public along the greenway. Standards could provide guidelines for trail nodes and trailheads, trail widths, infrastructure materials, signage and marketing materials.

MEASURING SUCCESS

Recommendations for: MEASURING SUCCESS

- **RESILIENCY AND WATER QUALITY:** Continue to model and monitor the success of the greenways ability to mitigate flood hazards and improve water quality so the best practices can be utilized.
- **BIODIVERSITY:** As restoration efforts continue throughout the greenway it will be important to monitor biodiversity improvements. Programs like BioBlitz can encourage collaboration between scientists, naturalists and volunteers in conducting intensive field studies, while encouraging public interest in the greenway's health.
- **PUBLIC SUPPORT AND SERVICES:** As the greenway develops it will be important to collect public feedback and input. Identify qualitative and quantitative measures for tracking the use and appreciation of the greenway. Online and drop box surveys, technological apps and installed counters are just a few of the ways feedback can be collected. Continue to hold public meetings in local jurisdictions to identify specific desired recreational and public access improvements.

The Ultimate Success of a Greenway

This master plan is just one of the initial steps in developing a bold vision for this greenway. A vision that will have a lasting impact on the surrounding communities it serves. The vision and successful implementation will require considerable amount of continued support and multiple actors. The large-scale ideas put in place within this plan will continue to be interpreted and developed further as each community and the region continue to strategically decide the best methods to improve the places we live and natural systems that influence them.

APPENDIX