

**CITY OF SAINT PAUL**

Mayor Melvin Carter

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## **Hidden Falls / Crosby Farm Regional Park Master Plan Advisory Committee - Meeting #1**

### **Meeting Notes**

October 16, 2018

6:30 – 8:00 PM

The Wellington Senior Living - 2235 Rockwood Avenue, St. Paul MN 55116

*Goal: Introduce the group. Explain the purpose of the meeting, expected outcome from master plan process. Present overview of the parks and parameters for project, engagement to date and previous studies. Determine priorities. Discuss upcoming timeline and next steps.*

1. Welcome & Introductions
  - a. Metropolitan Council Master Plan
  - b. Importance of this place culturally, ecologically, spiritually, socially
    - i. Native American culture celebrates Bdote site – confluence of the two rivers as central to their spirituality
  - c. Consider the park and uses
  - d. Individual introductions – name and who they are representing
    - i. Hank Carlson YMCA- leads youth groups
    - ii. Adam Brunner – fishes the banks
    - iii. Shawn Sheely natural trails advocate – Mississippi River gorge committee. Led efforts to build natural trails
    - iv. Sandra Macguire Lutz – hiking walking
    - v. Barb Lehn – lives on the river – resident
    - vi. Paige DeWees – considers Crosby her church
    - vii. Emily Northy - Fort Road Federation
    - viii. Alicia Uzarek - Friends of The Mississippi River
    - ix. Becky Amidon – resident of Highland – at Hidden Falls every day since teenager
    - x. Gary Bruggeman – lifelong resident, Minnesota historian. Remembers the Crosby Farm. Sibley Caves. His wife Jackie also participated in the meeting.
    - xi. Rebecca Ryan – lives by Beaver Lake now but grew up in Highland– father was on park board when Crosby was designed. Banding bats.
    - xii. Tyler Teggatz – Highland District Council, lives by HF North Gate
    - xiii. Becky Rice – Highland resident 20 years – regular user of the park. Director of MetroBlooms non-profit restores ecology of urban environment



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- xiv. Kristine Gill – transportation committee Metro Council. Ramsey County day job
  - xv. Holly Larson, NPS RTCA
  - xvi. Renee Campion – Sleepy Hollow Montessori – getting ready to open junior high that will be centered on the River.
  - xvii. Karin Misiewicz, St. Paul Parks & Rec Maintenance and Operations
  - xviii. Ellen Stewart - St. Paul Parks & Recreation
  - xix. Barett Steenrod, NPS RTCA
2. Committee role and expectations (provided on agenda)
- a. Role is to provide feedback and input
  - b. Bring information back and forth between this group and those you represent as part of the process so that we get a well-rounded understanding/perspective on the community's desires for the park
3. Project overview – creation of report that will be submitted to MetCouncil
- a. Timeline, context and location, goals
    - i. November committee meeting
    - ii. Open house in January to verify that we got it all
    - iii. Production of document
    - iv. Reviews and approvals
    - v. Funding requests to follow over the years
  - b. Regional Parks – 7 county metro
    - i. 530,000 visitors at HF/CF RP per year
    - ii. Required to look at development projects, access, attraction of more people to come to the parks
    - iii. 1970s master plan completed
  - c. Funding for the development of the Master Plan from State Legacy Amendment
  - d. Hidden Falls – 130 acres – 1880s Horace Cleveland encouraged city to set aside natural areas for public use
    - i. Variety of structures and facilities within the park
    - ii. Deferred maintenance
    - iii. Access issues
    - iv. Erosion
  - e. Crosby Farm
    - i. was a farm until 1960s.
    - ii. Feels remote
    - iii. Lake, restored prairie, tree/forest replanting, invasive removals
    - iv. Seasonal flooding, lack of wayfinding
  - f. Cultural Resources (history, site significance)
    - i. Two Rivers Overlook acknowledges cultural significance, but we should seek to take this cultural acknowledgement further into the park to recognize the significance of the land
  - g. Natural Resources Inventory required for both HF and CF
    - i. Preliminary findings shows that no areas are in excellent habitat quality currently
      - 1. Invasive plants
      - 2. Not native ecosystem

- 3. Great River Greening updating the inventory for HF, City of St. Paul Natural Resources is updating inventory for CF (in progress, will be shown at next meeting)
- h. Partners
- i. Investments
- 4. Engagement to-date
- 5. Online Survey (closes end of October) 703 responses to date
  - a. Walking, running, biking
  - b. Upgrade bathrooms
  - c. Improve trail surfaces
  - d. Improve river access
- 6. Great River Passage 2010-2012
  - a. More Natural, More Urban, More Connected
  - b. Saint Paul's long-term plan to Connect neighborhoods, communities and people to the 17 miles of Mississippi River that runs through the city
  - c. Interdisciplinary team of consultants
  - d. 56 members of Community Advisory and Technical Advisory team
  - e. 28 community meetings
  - f. 5 focus groups
  - g. 2012 adopted by the City Council into the City's Comprehensive Plan
- 7. Questions:
  - a. Who owns the land near Ford, along the river? Not owned by the City – private property?
  - b. Considering the Ford Dam as part of that discussion?
    - i. Will be something that is part of the City's planning?
    - ii. Leaving as an option to acquire land but not getting into detail; we are reserving the ability to acquire land by putting it in the plan
    - iii. Shoreline changes due to removal of the dams – removal impact is unknown at this time. No hydrological engineers on this project. If anything, it will make the river narrower. No firm commitments to anything around that.
  - c. Watergate? How much will be part of that project?
    - i. Environmental Learning Center part of Great River Passage
    - ii. Division in our Department and more in-depth plans and details will be worked on through that division. We will be working with and around that.
  - d. Shoreline
- 8. Break-out groups
  - a. 4 groups of 5 max guided by Anne, Barett, Holly, and Liz
  - b. Create big idea statement for the park – beyond improvements.
    - i. Looking to know and understand what this place should be
    - ii. What gives it its identity?
  - c. Review GRP plans and discuss
  - d. Review priorities from GRP master plan
  - e. Report back to committee
    - i. GROUP 1
      - 1. Trash cans
      - 2. Limit parking
      - 3. Restoration of staircase

4. Improving the falls – daylighting the water feature
- ii. GROUP 2
  1. Big idea – nature preserve – keep it wild
  2. Signage and safety
  3. Resilient trails
  4. Invasive species removal
  5. History – Rumtown and Fort Snelling connection
  6. History – indigenous
  7. Clean and renovate the Hidden Falls Pavilion
  8. Stabilize creek bank at Hidden Falls
- iii. GROUP 3
  1. End to end hiking and cycling trails
  2. Sustainable.natural surface trails
  3. Native culture -more prominent
  4. Consistent signage
  5. Boat dock access – improvements and more of it
  6. Police/DNR presence above and below the bluff
  7. Bluff stabilization -especially at Marina
  8. Challenge area for kids – bike pump track near marina
  9. Quiet spaces in the flats should also be a priority
  - 10.Improving pavilion in Hidden Falls
  - 11.Bathrooms
- iv. What we have heard before
  1. Shelter that can accommodate groups
  2. Improve entry and enhance safety
  3. Wayfinding
  4. Nature based play area in Hidden Falls
  - 5.
9. Wrap up, next steps

Next meeting will be in November 2018. Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information and details on upcoming meetings.

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## **Hidden Falls / Crosby Farm Regional Park Master Plan Advisory Committee - Meeting #2**

### **Meeting Notes – DRAFT –**

November 27, 2018

6:30 – 8:00 PM

The Wellington Senior Living - 2235 Rockwood Avenue, St. Paul MN 55116

*Goal: Review the priorities and input received from focus groups, the online survey, and pop-up meetings, for improvements and amenities to add to the park and incorporate in the Master Plan Document. Summary of the Natural Resources Inventory. We will leave this meeting with a clear sense of priorities to be listed in the Master Plan Document (draft in January 2019).*

*Enhance access and safety to and through the urban floodplain “wilderness” while respecting the cultural heritage and natural resources of this place*

#### 1. Welcome & Introductions (6:35 pm)

- a. Recognition of the significance of this place - Hidden Falls and Crosby Farm Park (HFCFP) are within indigenous sacred land. Also, this is significant ecological area for the twin cities region.
- b. Individual introductions
  - Shawn Sheely natural trails advocate – Mississippi River gorge committee. Led efforts to build natural trails
  - Emily Jarrett Hughes - Nibi Water Walks
  - Ed Heimel- Resident and NPS volunteer
  - Whitney Clark - Friends of The Mississippi River
  - Sandra Macguire – hiking walking
  - Barb Lehn – lives on the river – resident
  - Edric Lysne- Ice Climber and outdoor recreation enthusiast
  - Thabiso Rowan - Disability Hub MN
  - Shirley Erstad- Friends of Ramsey County Parks and Trails
  - Kristine Gill – transportation committee Highland District Council
  - Mike Lindsay- Highland District Council Board Vice President
  - Jeff Burton – resident, lives close to the park
  - Emily Dunlap – Parks and Rec- Natural resources
  - Maggie Barnick- Parks and Rec- Natural resources
  - Emily Northey - Fort Road Federation
  - Becky Rice – Highland resident 20 years – regular user of the park. Director of MetroBlooms non-profit restores ecology of urban environment
  - Devin Olson - Minneapolis resident, Mountain bike rider, loves these parks
  - Paige DeWees – resident, lives above Crosby Farm Park
  - Tyler Teggatz – Highland District Council, lives by HF North Gate



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- Steve Pope - neighbor, frequent parks visitor and hiker
- Joe Landsberger – resident, historian, runs the West 7<sup>th</sup> Garden Tour
- Adam Brunner – resident, lives above HF South Gate, fishes the banks
- JP Lindrud - Watergate Marina, Allied Management Company
- Holly Larson, NPS RTCA
- Barett Steenrod, NPS RTCA

2. Presentation (6:45 pm)

- a. Meeting guidelines- Agenda states rules for the meetings- respect each other and assume everyone is coming from a positive place. Work collaboratively and respectfully.
- b. There was an email claim that discriminatory comments were made at the meeting, which was addressed and handled appropriately by the Highland District Council.
  - City of Saint Paul, Department and Parks and Recreation goals and mission are to give equitable access for all.
  - St. Paul Parks and Recreation is running this project, but this regional park this serves the whole metro area. Reminder that St. Paul Parks is mandated to serve everyone equally and increase equity within the city. We also remind everyone that we should assume everyone has good intentions and work together in this process. If you have questions or concerns, please talk to Anne or Liz.
- c. Cultural significance of HFCFP- Presentation of map showing the significant Dakota land and sites of current Parks projects.
  - The department has a cultural resources study underway for Indian Mounds.
  - Relationship and process will be developed out of this to inform how HFCFP will proceed.
  - For this project, outreach is ongoing and inclusive but considerate of parallel cultural resources study.
  - Nibi (water) Ceremony led by Sharon Day every Sunday in HF (north lot). Anne participated in one to understand the ceremony and see how the park was used.
- d. Meeting 1 Review -
  - Derived from the input and discussions of our first meeting, we established the Big Idea for the project:

*Enhance access and safety to and through the urban floodplain “wilderness” while respecting the cultural heritage of this place.*

- We reviewed the Great River Passage Plans
  - Presentation of a short list of some of the priorities that were identified in discussion
- e. Engagement Overview
  - Many meetings and events attended, 940 respondents to online survey, many meetings with city departments, 3 focus groups held, more to come.
- f. Community Input Summary
  - Online Survey Results and Pop-Up Meeting
    - When asked what do you like about the park, many people responded with words indicating joy, and that they saw the park as an oasis. Some asked us not to make significant changes.
    - Dependent on cars or bike/foot to reach the park. Would like to see more transit access and will try to improve this.
    - Many people use these parks to bike or run, few online survey respondents fish or picnic.

- In contrast, the pop-up meeting results indicated more fishers and picnickers.
- Pop-up meeting responses also indicated a desire for more programming and winter activities
- Permitting and Park Use Data
  - Crosby used for smaller events, typically (birthdays, barbecues)
  - Hidden Falls used for larger events, and more frequently permitted
  - Even when controlling for repeat events (deer hunting, Barebones performances), Hidden Falls is still permitted more frequently

g. Natural Resources Inventory – summary

- Work to finalize the inventory is nearly complete.
- Map shows habitat quality, which is used by our Natural Resources management team to plan maintenance activities and volunteer group projects
- Introduced Emily Barnick and Maggie Dunlap, City of St. Paul Natural Resources. Maggie and Emily spoke about the work they do, with a team of three to manage the city's 2,300 of acres of parks. Within the last two years 310 acres within Hidden Falls and Crosby Farm has been worked on by their crews, using money from a DNR Conservation Legacy amendment grant. Most of the funding to support natural resource management activities comes from grants like this.
- Habitat quality map is an assessment by ecologists. Good or poor quality gets defined by presence of invasive species versus what a healthy plant community should be. The maps show abrupt changes between good and poor quality, and some of this is due to topography, or areas of lawn (not a true native habitat). Some of these areas are mapped plant community types, and the assessment of good or bad quality relates to the status of the plants within that community type.

h. Updated Map

- Revised the map for the two parks to show more accurate trails and features, this will be the base for our master plan map that shows future improvements planned for the park
- We overlaid the Great River Passage icons and lines on this map to show you how they align
- We studied the regulatory flood zones in the area, and the map indicates a red line that separates the floodway and flood fringe. The flood fringe is an area where some construction and park improvements are allowed but still subject to rules.
- Areas for future consideration are shown with circles, as this is a draft of some of the recommendations we are making.
  - Due to many questions about this, we are inserting a post-meeting addition. As a note, the River Learning Center (RLC) / NPS Headquarters:
    - Is a part of the Great River Passage Master Plan, and as a part of that planning process City staff conducted extensive community engagement surrounding the Saint Paul River Learning Center.
    - The Great River Passage Initiative has reviewed that community input and is working with partners to determine whether they will proceed with the project.
    - If the City decides to move forward, staff will begin the design process. This will include engaging the public to determine what the River Learning Center will look like, what programming will be offered at the site, and more.

i. Questions:

- *The “big idea” and the listed priorities do not mention the river, which is typical of St. Paul to ignore the Mississippi. Why is the word river not in the big idea?*

- A: We can revise it, this is a draft and we are looking for your feedback. We felt that the word floodplain implied the presence of the river.
- Are we responding to Emerald Ash Borer and the threat of that?  
A: yes, we are proactively removing trees. Our Natural Resources Inventory identifies areas of concern. St. Paul Natural Resources is already working to remove infected Ash trees and plant other native species.
  - The summary of priorities does not include what my group talked about in last meeting, can you elaborate on how priorities are decided? In particular we feel like neighborhood connections and safer road crossings to both parks are a priority.  
A: We are taking feedback from a number of groups and trying to distill them down and simplify. In the activity coming up soon you will see that full list. The summary shown from the previous meeting may have been overly simplified.
  - Is this master plan taking into account the Mississippi River Corridor Critical Area regulations?  
A: Yes we are doing our best to incorporate all regulatory requirements. We are aware of MRCCA rules.
  - The “big idea” seems to use objective language, and really the whole presentation does this. Instead this process should be about relationship building and bringing people together. Can the big idea be modified to incorporate this?  
A: Yes, we can. If you have suggestions like this, please contact Anne or Liz.
  - We would like the City to consider traffic calming/control for Mississippi River Blvd in anticipation of more population as new developments occur. Existing traffic on these roads is a barrier to bike/ped access to parks. While this may be beyond the scope of what Parks & Rec can do, it underpins the present and future issues as they pertain to equitable access, and the group wants Parks & Rec to communicate this to the other city departments that have a bigger say in road improvements.
  - A: Parks & Rec can communicate this to Public Works and other relevant city departments.
  - Transitioned into activity (7:15 PM)

### 3. Help Us Prioritize (Activity)

- a. Meeting attendees broke into smaller groups of up to 7 people.
- b. We discussed a list of future improvements and recommendations for the park, this list was drawn from various public engagement, city staff recommendations, and items listed in Great River Passage.
- c. Each group took one topic area:
  - Management and Recreation Improvements / Use Areas
  - Structures and Related Improvements
  - Roads and Trails
  - Landscape Improvements
- d. We discussed in groups for about an hour, and each individual group covered different topics.
  - Instead of wrapping up, we ended the meeting with the discussion groups. Thank you to everyone who came and stayed until the groups dispersed at 8:30 PM

Next meeting will be an Open House in January 2019, to review the draft report. City staff will continue to have meetings internally and with partnership organizations. The written document will be prepared for presentation and review in January, 2019.

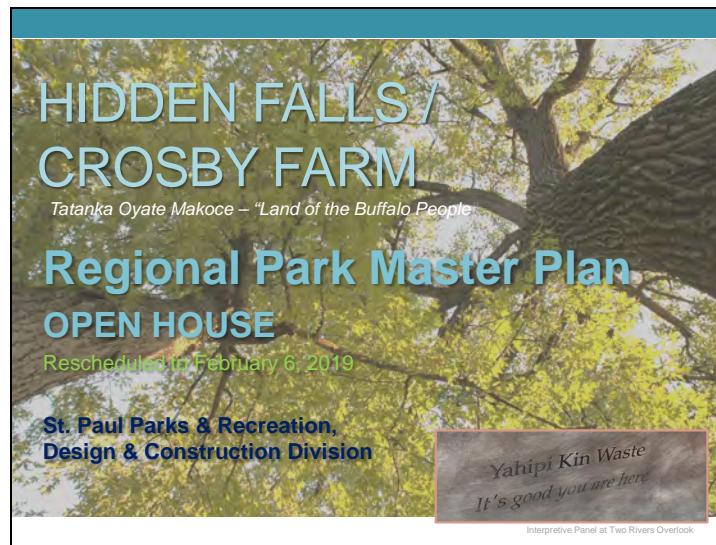
Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.

Hidden Falls Crosby Farm Regional Park Master Plan

**Open House** – February 6, 2019

*Draft* Meeting Minutes

Slide 1



Anne Gardner, project manager for Hidden Falls / Crosby Farm Regional Park Master Plan, gave the presentation. The purpose of the presentation was to provide an overview of the process to date and review the list of improvements and priorities that have been identified from the community engagement sessions and research on the park.

To open the meeting, we welcomed the Nibi Walks / Water Walks group, led by Sharon Day who leads a weekly Sunday morning water ceremony at Hidden Falls.

Sharon described her 2013 walk along the entire Mississippi River, and the evolution of the Nibi Walks group. Everyone is welcome to join every Sunday morning, 9 am at the Hidden Falls boat launch area. From Sharon “You may have seen a small circle of people there. We believe that every living thing has a spirit, but that the water has a spirit that connects us all. We take a small amount of water and keep it during the ceremony, then return it to the river. Water is very important and must be protected.”

Sharon, Emily, and Paul sang an Ojibwe song that speaks of the sacred nature of water.

# Agenda

- Welcome & Acknowledgements
- Project review
  - Meeting 1 & 2 Review
  - Community Engagement Overview
  - Updated Map
  - Priorities
- Next steps
- Questions?

*Don't forget to vote on a construction project  
and fill out a comment card!*



## PROJECT TEAM

### **City of Saint Paul Parks and Recreation Staff**

*Design & Construction  
(Landscape Architects):*

Anne Gardner  
Liz Hixson  
Ellen Stewart

*Natural Resources:*  
Adam Robbins  
Maggie Barnick  
Emily Dunlap

*Operations:*  
Karin Misiewicz  
Joe Buzicky  
Tom Hagel

### **National Park Service:**

Holly Larson, RTCA  
Barett Steenrod, RTCA

**Great River  
Greening:**  
Todd Rexine

The agenda and project team were mentioned: Staff from the City of St Paul, Dept of Parks and Recreation (Design and Construction, Operations, and Natural Resources), staff from National Park Service, and Great River Greening (prepared the Natural Resources inventory for Hidden Falls)

## Project Summary

### Purpose of the Plan

- ensure that Hidden Falls and Crosby Farm park is meeting the local and regional needs
- adoption of the master plan with the Metropolitan Council
- provides a framework for future improvements and funding requests
- sustain public use and enjoyment of the park

### Guiding Principles

Respect the sacredness of his region. Acknowledge and celebrate the indigenous history of this location on the Mississippi River near the site of the Bdote (confluence) the birth of the Dakota nation

Preserve and sustain the ecological functions of these parks by managing and enhancing the critical habitat area

Upgrade park facilities for public use (bathrooms, signage, trails, lighting), improve safety features, and add new recreational opportunities to encourage healthy active lifestyle for all ages in balance with the “natural” character of the park.

Recommend and enhance pedestrian and multi-modal connections to draw regional and local users to the park space

Support partnerships with organizations who assist in bringing new user groups to the park and river and assist in building the ecological resilience of park adapting to a changing climate



### Why do we need a master plan

- Required by the Metropolitan Council
- Allows city to request funding
- Respond to nearby development pressure
- Identify and reach out to new park visitors

Met council asks that every 10-20 years they review a plan that lists:

- boundaries and acquisition, stewardship, demand forecast, park development, potential conflicts, operations, public engagement, public awareness, accessibility, natural resources

As we began work on this park, we needed to

- Respect the sacredness and cultural history of this site near the Bdote
- Also preserve and sustain the ecological functions (MNRRA) and bluff habitat for animals, plant communities, and human enjoyment
- Upgrade facilities for safety and improved recreation use
- Acknowledge the changing trends with transportation and recreation and adapt the plan and connectivity of the park to the region
- Continue the relationships and partnerships with all of the organizations who know, love, use, and care of this park both to bring people here and to care for the environment

## Community Advisory Committee- THANK YOU!

- Shawn Sheely- Trails Advocate
- Emily Jarrett Hughes - Nibi Water Walks
- Ed Heimel- Resident and NPS volunteer
- Whitney Clark - Friends of The Mississippi River
- Sandra MacGuire – hiking walking
- Barb Lehn – lives on the river – resident
- Edric Lysne- Ice Climber and outdoor recreation enthusiast
- Thabiso Rowan - Disability Hub MN
- Shirley Erstad- Friends of Ramsey County Parks and Trails
- Kristine Gill –Highland District Council
- Mike Lindsay- Highland District Council Board Vice President
- Jeff Burton – resident, lives close to the park
- Emily Northey - Fort Road Federation
- Becky Rice – Highland resident
- Devin Olson - Minneapolis resident, Mountain bike rider
- Paige DeWees – resident, lives above Crosby Farm Park
- Tyler Teggatz – Highland District Council
- Steve Pope - neighbor, frequent parks visitor and hiker
- Joe Landsberger – resident & historian
- Adam Brunner – resident and avid fishermen
- JP Lindrud - Watergate Marina, Allied Management Co
- Hank Carlson, YMCA
- Gary Bruggeman, resident
- Becky Amidon, resident
- Renee Campion, Sleepy Hollow Montessori



We formed a community advisory committee after soliciting volunteers and interest through partner groups, public mailings, website postings and communication with neighborhood groups.

Two meetings were held in October and December 2018 - thank you to those who volunteered time and participated in the project.

## Meeting #1 Review – October 16, 2018

- Introduction of the Master plan and project process
- Review of previous planning efforts – Great River Passage
- Regional park user groups and regional data (382,600 visitors per year)
- Discussion of the Big Idea:

*Enhance access and safety to and through the urban floodplain “wilderness” while respecting the cultural heritage and natural resources of this place*

- Priorities identified in the meeting:

- improve signage and safety
- keep the sense of wild, nature preserve
- improve trails end to end
- upgrade facilities for ADA access
- habitat restoration/preserve natural areas
- signs to signify cultural heritage  
offer more programs (add winter)
- support River (Environmental) Learning Center
- resilience of nature to floods
- maintain quiet spaces
- larger / better pavilion for groups
- potable/drinking water fountain

For meeting presentations and notes, visit the project website:  
<https://www.stpaul.gov/hidden-falls-crosby-farm-master>

A summary (detailed information on the website) of the information reviewed at meeting #1 was shared. In general, the Great River Passage (GRP) was the beginning point for this work and we utilized the base map, suggested improvements, and priority list and built off of those materials.

## Meeting #2 Review- November 27, 2018

- Summary of Survey Results
- Summary of Natural Resources Inventory by Natural Resources Staff
- Review of Project priorities lists developed from Great River Passage and revised by focus group discussions
- Small group discussion on priorities (reflected in current Priorities Boards 1 & 2)
- Big Idea revised to a Vision Statement:
  - *"At the place where the Minnesota and Mississippi Rivers join together, Hidden Falls/Crosby Farm Regional Park brings people and nature together. The master plan honors the cultural significance of this area to the Dakota people, increases access to the parks in a way that strengthens wellness of people, plants, animals, and water and will maintain this place of healing and restoration for people and ecology, including those of the City of Saint Paul and the broader Metropolitan region."*

For meeting presentations and notes, visit the project website:  
<https://www.stpaul.gov/hidden-falls-crosby-farm-master>

A summary (detailed information on the website) of the information reviewed at meeting #2 was presented including review of survey results, natural resources inventory, and an in-depth review and discussion of project priorities.

## Community Engagement Overview

- Online survey - 940 responders
- National Public Lands Day Pop-up Meeting 133 responders, 200 popsicles
- 6 community meetings and parks ambassador gatherings attended
- 4 focus groups (water, trails, gov. / non-profit, camps)
- 4 internal city meetings (rec centers, operations & maintenance, and Great River Passage division)
- Participation in water ceremonies with Nibi Walk and discussion
- WCCO and Fraser School Pulling Together event brings thousands of people to Hidden Falls
- This process is building on the momentum of Great River Passage, which was in 2012 and had 28 public meetings and 5 focus groups
- The City's Great River Passage Initiative continues to hold events and advocate for projects identified in the plan



An overview of the community engagement process was shared. Generally, parks staff worked through numerous venues to reach users and potential user groups at events, outings, and meetings to gather community feedback.

## Related Projects

- Ford Redevelopment
  - <https://www.ryancompanies.com/news/ryan-presents-vision-development-ford-site>
  - <https://www.stpaul.gov/departments/planning-economic-development/planning/ford-site-21st-century-community>
- River Learning Center
  - <https://greatriverpassage.org/projects/environmental-learning-center/>
- Lexington Parkway Realignment
  - <https://www.ramseycounty.us/residents/roads-transit/future-road-construction-projects/lexington-parkway-west-7th-street-reconfiguration>
- Pedestrian Plan
  - <https://www.stpaul.gov/departments/public-works/transportation/walking-saint-paul>
- Tribal Engagement and Cultural Resources Strategy at Indian Mounds Regional Park
  - <https://www.stpaul.gov/departments/parks-recreation/design-construction/current-projects/indian-mounds-regional-park>



The related projects listed will have an indirect or direct impact on the park space. They are listed above and can be accessed via the website link. They are operating on various timelines and have different funding sources- we will maintain awareness of the projects and work towards understanding the impacts to Hidden Falls and Crosby Farm.

Two additional projects that should be added to the project - Highway 5 potential changes via public works (<https://www.stpaul.gov/departments/planning-economic-development/planning/highway-5-shepard-road-study>) and the Dam Removal study-  
<https://www.mvp.usace.army.mil/MplsLocksDisposition/>

# Hidden Falls Crosby Farm Regional Park Master Plan

**Open House – February 6, 2019**

*Draft Meeting Minutes*

Slide 9

9

## Natural Resources Inventory

**INVENTORY, MAPPING, AND MAINTENANCE:**

- Identify and protect habitat for rare and endangered species
- Address stormwater, bluff erosion, and flooding concerns – and recognize the dynamic floodplain and river bluff ecology
- Strategies for maintenance – address invasive species, shelterwood planting, cottonwood regeneration, targeting Emerald Ash Borer
- Volunteer coordination – 248 people volunteered in both parks in 2018 (as recorded by St. Paul Parks & Recreation Natural Resources)



Goats grazing buckthorn  
Regenerative shelterwoods  
Hidden Falls Creek  
Great River Greening, 2018

**NATURAL RESOURCES**

Saint Paul's Environmental Services Unit protects, enhances, and preserves natural resources in the city's parks and preserves. The Unit monitors and assesses the quality of natural resources in parks, the restoration and management of vital and unique ecosystems, and the provisions of interpretation and education. The Unit also works with citizens, non-profits, and governmental agencies to coordinate efforts that enhance the natural environments of Saint Paul.

<https://www.stpaul.gov/departments/parks-recreation/natural-resources>



GI: Great River Greening, 2018      St. Paul Natural Resources, 2018  
This is a composite of two maps produced for the master plan. At left is a map created by Great River Greening that assesses the habitat quality at Hidden Falls. We stitched in a map at right created by St. Paul Natural Resources showing the same data for Crosby Farm.

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 feet

• Endangered species (Threatened: Paddlefish, Mucket, and Purple Wartyback)

• Importance of the Mississippi Flyway to bird species

• Stormwater, bluff erosion, and flooding concerns – the dynamic floodplain and river bluff ecology

• Strategies for maintenance – shelterwood planting, cottonwood regeneration, targeting Emerald Ash Borer

• 248 people volunteered in both parks in 2018 (recorded by St. Paul Parks & Recreation Natural Resources)

A quick overview of the Natural Resources report was given. The inventory was prepared by Great River Greening (Hidden Falls) and the Natural Resources group. The images on the board show current efforts, including goats grazing buckthorn and shelterwood plantings

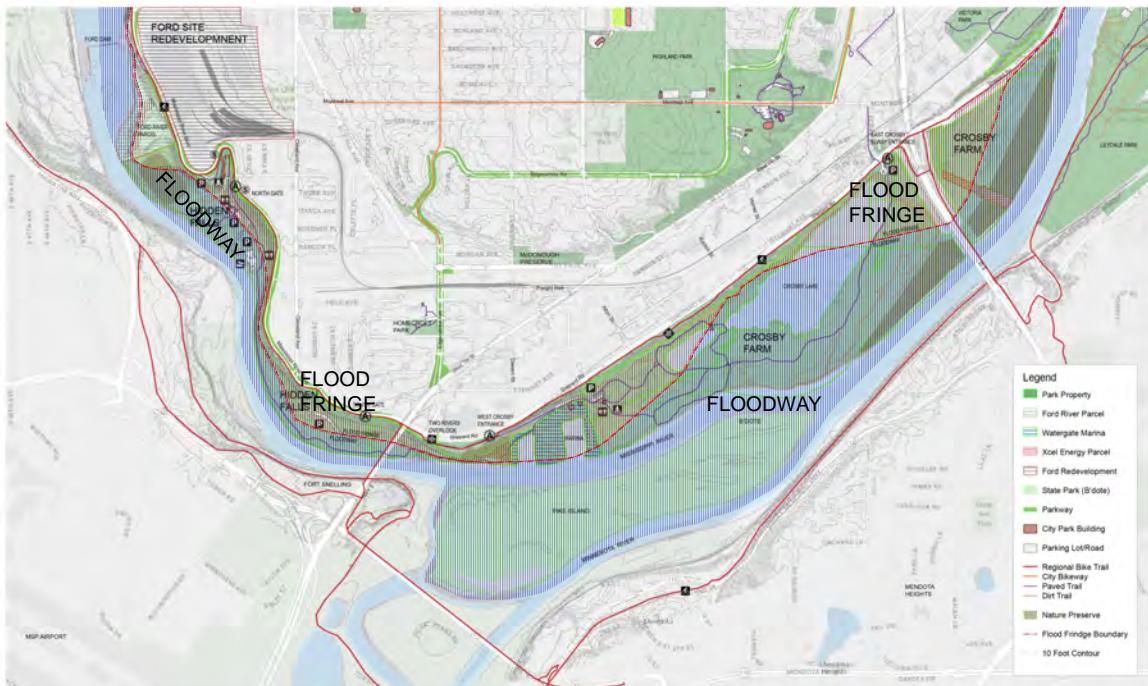
This is a dynamic floodplain and the river bluff has a unique ecology.

The inventory guides the following:

- Propose strategies for maintenance
- Identify volunteer coordination and partnerships
- Identify habitat for rare and protected species
- Address stormwater runoff, bluff erosion, flooding concerns

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## Updated Map – Existing Conditions



Hidden Falls / Crosby Farm Regional Park - 2019 Master Plan DRAFT - City of St. Paul Parks & Recreation

0 1/8 1/4 1/2 Miles



The study of existing conditions builds upon the Great River Passage map and has added more detail representative of what exists at the park. The floodway shows the limit of where structures can be built as it is the zone for flooding. (see presentation PDF for detailed existing conditions map)

# Hidden Falls Crosby Farm Regional Park Master Plan

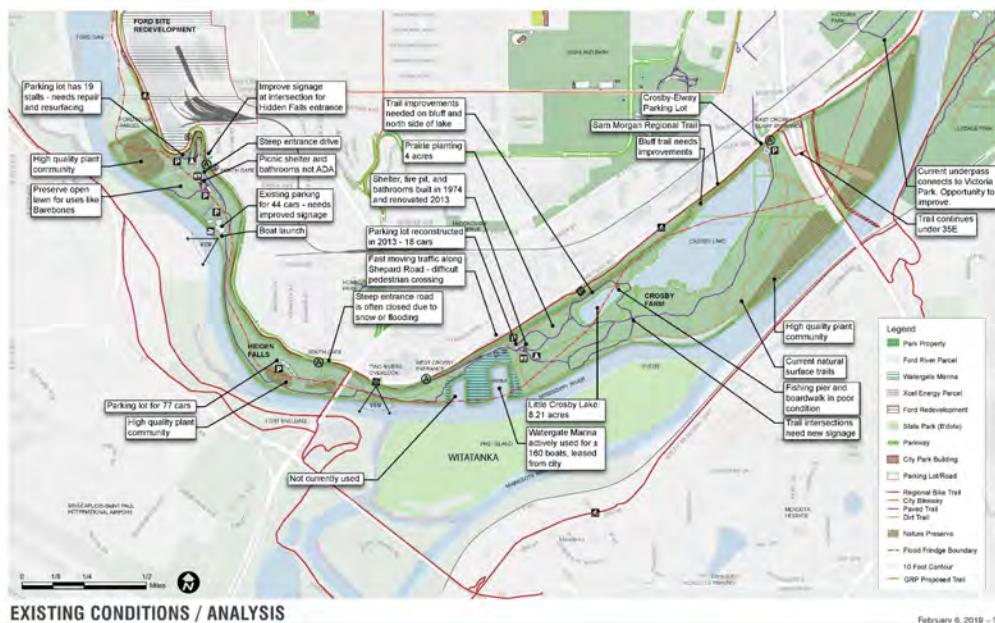
**Open House – February 6, 2019**

*Draft Meeting Minutes*

Slide 11

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## Updated Map – Existing Conditions



Notes on existing conditions map reflect what the project team observed and noted, and heard from community conversations and input.

11

# Hidden Falls Crosby Farm Regional Park Master Plan

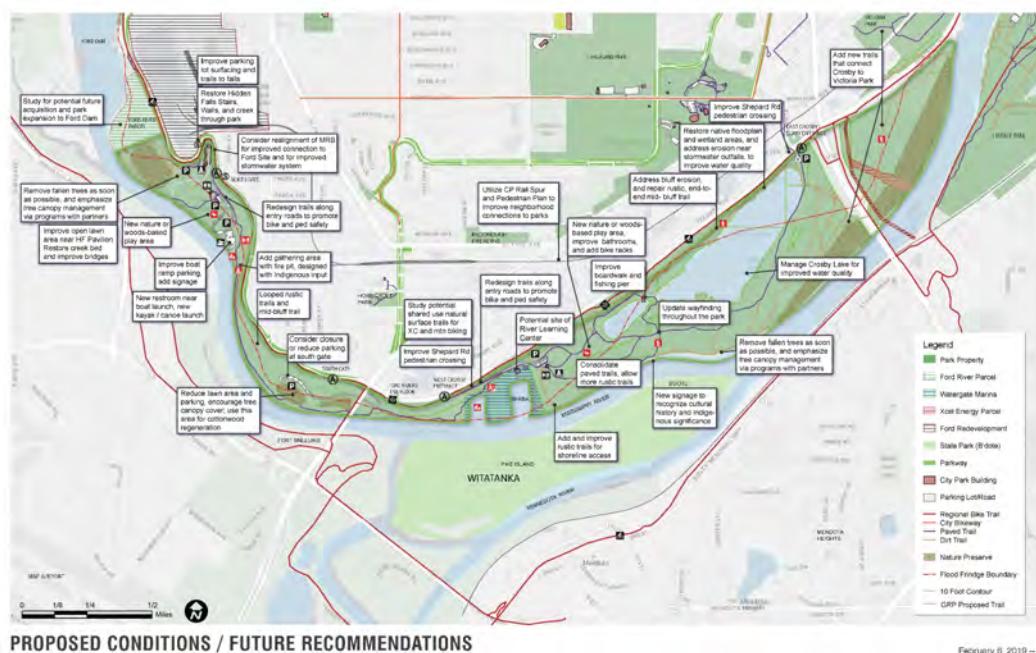
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## Updated Map – Recommendations



Notes on the trail improvement and proposed recommendation show the intended improvements to the park. (see open house boards PDF for detailed map)

# Hidden Falls Crosby Farm Regional Park Master Plan

**Open House – February 6, 2019**

**Draft Meeting Minutes**

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## Project Priorities

**Priority Key**

- High - near term, very important
- Med-High - within 5 years (+/-), significant
- Medium - within 10 years (+/-), desired but not top priority
- Low-Med - within 10 to 15 years (+/-), preferred
- Low - must be sequenced with other improvements

Management		HF = Hidden Falls CF = Crosby Farm
Priority	Proposed Priorities	
High	Increase budget for invasive species management and coordination. [both]	
High	Continue to program cultural events such as "Barbecues Halloween Puppet Show." [both] <span style="color: red;">(I)</span>	
High	Address the off-leash dog problem by signs and education. [both]	
Med-High	Add more bluff-top land to the park, from Ford Site by curve at Mississippi River Blvd. [HF]	
Med-High	Install video surveillance to reduce theft from parked vehicles and increase safety. [both]	
Med-High	Continue exploring development of a River Learning Center at Watergate location, with partners including the National Park Service, Indigenous communities, and nearby neighborhoods [CF]	
Med-High	Acquire adjacent riverfront land and inholdings as they become available. [both]	<span style="color: red;">(A) <span style="color: blue;">(H)</span></span>
Med	Add programming on flooding and water safety. [both]	<span style="color: blue;">(F)</span>
Med	Additional surveillance via police and parks security patrol. [both]	
Low-Med	Improve transit access by working with adjacent neighborhoods and Melvin Transit. [both]	

Roads and Trails		HF = Hidden Falls CF = Crosby Farm
Priority	Proposed Priorities	
High	Improve trails and paths, including the mid-bluff trail, that provide a varied experience and connect to areas of new focus. [both] <span style="color: red;">(I)</span>	
High	Add rustic trails with access to shoreline (shorter/more trails). [both] <span style="color: red;">(B)</span>	
High	Alleviate the tall ridges; improve accessibility throughout, and provide easier access and signage to trail heads. [both]	
High	Add new park paths from Watergate to Lower Crosby Farm (west side), connect to new parking areas and to Victoria Park. [CF]	
High	Improve bike access path trail at Hidden Falls; improve fire line from pavilion to falls area. [HF]	
High	Replace paved paths and琴道 along Army roads. [both]	
High	Improve Shepard Rd. crossings. [CF]	
High	Improve all pedestrian access points, drive consideration to neighborhood access, and connections from Victoria Park and renovated Ford Site / WPA era (Works Progress Administration) staircase.	
Medium	Improve safety and sight lines at Mississippi River Boulevard entrances. [both]	
Medium	Improve boardwalk and fishing pier. [CF]	
Low	Improve parking areas at Hidden Falls (especially near pavilion, which is not emergency vehicle accessible). [HF]	
Low	Reduce pavement, by removing some of the loose roadway at Hidden Falls at both entrances. [HF]	

Construction Projects/Events/Use Areas		HF = Hidden Falls CF = Crosby Farm
Priority	Proposed Priorities	
High	Developing the boat launch pit designed to accommodate and recognize Native American heritage and culture. [HF] <span style="color: red;">(I)</span>	
High	Develop linear mountain bike trails using International Mountain Bicycling Association best practices. [both] <span style="color: red;">(M)</span>	
Med-High	Add Cross Country (XC) skiing trails to accommodate classic-style skiing (use grooming equipment from park system or partner). [both] If feasible, design to maximize natural surface trails. <span style="color: red;">(D)</span>	
Med-High	Improve boat ramp and trailer parking. Separate canoe/kayak users and cars without trailers from boat ramp area. [HF] <span style="color: red;">(I)</span>	
Med-High	Provide more shade near Hidden Falls Pavilion to allow passive recreation and play areas for large and small groups. [HF]	
Med	Construct a new nature-based or woodsy play area (non-traditional). [HF] <span style="color: red;">(H)</span>	
Med	Add (2) canoe/kayak landing areas (separate from boat ramp) at Hidden Falls South Gate and Crosby. [both]	
Low-Med	Develop rustic group tent camping areas for permitted events with a potable water source. [CF]	
Not ranked	* Only feasible after River Learning Center is built. Sticky feasibility of climbing and running access for ice climbing	

Landscaping Improvements		HF = Hidden Falls CF = Crosby Farm
Priority	Proposed Priorities	
High	Redevelop signage for boat safety, natural history, and cultural history of Native American presence. [both] <span style="color: red;">(I)</span>	
High	Improve signage at boat ramp parking lot, provide directions to nearby launches, designate area for boat trailer parking only. [HF]	
High	Implement signage and wayfinding systems in Crosby Farm and Hidden Falls (directs short walking tour with clear and easy to follow signs). [HF]	
High	Add native vegetation in new areas next to parks (West Crosby Entrance, and along Mississippi River Blvd; Hidden Falls North and South Firehouses). [both]	
Medium	Improve Hidden Falls pavilion and make restrooms accessible. [HF]	
Low-Med	Construct two small boat storage areas at Hidden Falls Park. [HF]	
Low	Built a weather shelter for summer grills. [HF] * Could be eliminated if pavilion at River Learning Center built	
Low	Year-round, minimal maintenance bathroom (composting if footprint rules allow). [both]	

The list of priorities is expanded from the Great River Passage.

- 1 management category (red)
- 4 construction categories

The priorities also show a column with the rankings of priorities.

- high- near term- very important,
- med-high- within 5 years,
- med- within 10 years,
- low-med within 10 years,
- low-med within 10-15 low- need to sequence with other projects

The priorities are written out with pictures nearby that illustrate some of the priorities, both existing conditions we want to maintain and new ideas brought up throughout our planning process.

# Hidden Falls Crosby Farm Regional Park Master Plan

**Open House – February 6, 2019**

*Draft Meeting Minutes*

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## Activity: vote on a construction project

The City of Saint Paul has requested \$500,000 for "Hidden Falls-Crosby Farm Master Plan Implementation" from Parks and Legacy funds (\$100,000 in 2019 and \$400,000 in 2020)

**What should the City do with the first \$500,000?**

- Add cultural signage and develop wayfinding signage plan
- Trail system: improve rustic trails at bluff and shoreline
- Trail system: redesign bike and pedestrian connections at entry roads
- Add gathering space for indigenous culture events and recognition
- Reduce lawn area and redesign parking area at Hidden Falls north lot

Voting exercise – the meeting participants are asked to vote on construction priorities, these are five items we consider buildable with the first round of grant funding from the Met Council.

Results from the voting:

1. Trail system: redesign bike and pedestrian connections at entry roads- 49 votes
2. Trail system: improve rustic trails at bluff and shoreline- 37 votes
3. Add gathering space for indigenous culture events and recognition- 22 votes
4. Add cultural signage and develop wayfinding signage plan-18 votes
5. Reduce lawn area and redesign parking area at hf north lot- 13 votes



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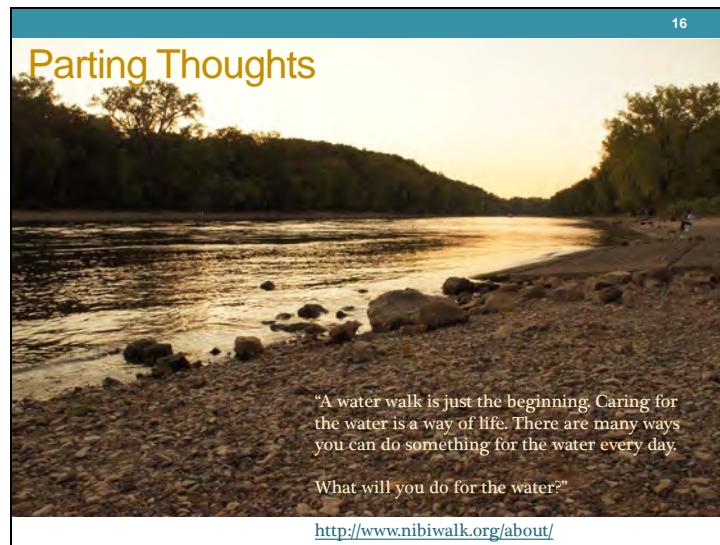
## Wrap Up / Next Steps

- Open House January 2019 to review the draft report
- **Plans Available February 7 online**
- **Draft report available Feb 23 - March 22 for public comment**
- Submit report to Parks Commission in early March
- Submit report to City Council in mid-March
- Submit report to Metro Council in early April 2019
- Complete report approved June 2019

Please discuss this project with your representative groups and email us with responses or comments

**THANK YOU!**

- For up to date information, visit the project website:  
<https://www.stpaul.gov/hidden-falls-crosby-farm-master>



Questions:

Q - Trails, what do you mean in the description/priorities "rustic" and "engineered"?

A- "*Rustic*" means non-paved trails: earthen, gravel, or rock surface. "*Engineered*" trails will be designed and built with sustainable details and will address erosion and runoff but does not mean all trails are paved.

Q - Marina, how does it fit in the city, if River Learning Center moves forward, are there private slips left at the site, what happens to all the investments made at the marina, would that open the gates to the public?

A-*This is to be determined. We do not have information on this at this time. Reference the Great River Passage (GRP) website (<https://greatriverpassage.org/>) and sign up for the newsletter for updates.*

Key Points from the Great River Passage Initiative:

- As a part of the Great River Passage Master Plan process, City staff conducted extensive community engagement surrounding the Saint Paul River Learning Center(formerly Environmental Learning Center).
- The Great River Passage Initiative has reviewed that community input and is working with partners to determine whether they will proceed with the project.
- If the City and partners decide to move forward, the GRP Initiative will begin the design process. This will include engaging the public to determine what the River Learning Center will look like, what programming will be offered at the site, and more.
- Saint Paul Parks and Recreation is currently in discussion with the existing contract partner at Watergate Marina to reach a 2-3 year contract extension agreement.

Q - Marina has problems with security already, and controlling access. People walking up and using our lawn chairs to go fishing. Anyone can just walk in, what is City doing about security and safety?

A-*Signage is in place on site. The plan does not intend to create new paths into the marina area during the current use in which the site is fenced off. This does not propose to make the marina less secure.*

Hidden Falls Crosby Farm Regional Park Master Plan

**Open House** – February 6, 2019

*Draft Meeting Minutes*

Additional Information since the open house: The management agreement with Allied Management Company specifically states, “3.10 ALLIED will provide and be responsible for security coverage for the Property.”

Q - Great River Passage, if they are leading the River learning center process, will they have public meetings? When?

*A - If the City and partners decide to move forward, the GRP Initiative will begin the design process. This will include engaging the public to determine what the River Learning Center will look like, what programming will be offered at the site, and more.*

Q - Are you taking possible Dam Removal into account, what would that change about the plans?

*A- We know this is a possibility and are tracking discussions. The Army Corps of engineer website states that it is in Phase II of the disposition study and will release a draft report in June 2019*

Q - If GRP and RLC move forward, and you have "improve trail access to the marina" listed on your plans, that makes us feel unsafe. We want to understand how "public" this area will be.

*A- We do not have information on this at this time. Reference the Great River Passage website and sign up for the newsletter for updates.*

Q - What are you doing about Shepard road and Crosby Farm exit? We want a framework that addresses traffic safety. Bikers don't yield even though they have a stop sign. Want improved safety at road crossings.

*A-This is on the list of priority improvements to redesign the intersections and improve safety.*

Q - Intersections are very difficult for both parks. Can they be improved? Should be a study of the whole area to figure out. Should be a safe system for peds, bikes, cars. We want safety first.

*A- We are proposing that intersections are improved for safe connections for pedestrians and bikers. Some of these projects require a multi-department approach working with PED and Public Works.*

Q - The trails are beat up, in rough shape. Is there money to fix them?

*A- Trail improvements are a top priority for this park. We will request funding in the future for trail improvements.*

Q - How do volunteers sign up? I saw you have 248 last year in the parks

*A - Maggie Barnick from St. Paul natural resources answered that there are numerous opportunities to volunteer in the park. Contact the volunteer coordinator for opportunities:*

*<https://www.stpaul.gov/departments/parks-recreation/natural-resources/volunteer-resources>*

Q - I saw a note "manage lakes for water quality" on the map. What does this mean?

*A- Capitol Region Watershed District has been monitoring the lake in Crosby for water quality. They have provided recommendations for improving water quality by addressing stormwater outflow from adjacent neighborhoods. Some work has been completed (infiltration basins along Sam Morgan Regional Trail), but still need more can be done. The Watershed district is a great partner and we will work with them to find opportunities to fund and implement projects that improve water quality in the park and for the river.*

Hidden Falls/Crosby Park Master Plan

1/13/19 Meeting Notes by Ellen & Liz (edited by Anne)

9am Nibi Water Ceremony at Hidden Falls Regional Park (Anne and Liz attended)

After the ceremony, a group convened at the Quixotic Coffee Shop in Highland neighborhood.

Participants:

Emily Jarret-Hughes

Kathryn Sharpe

Sandy Spieler

Tracy Roloff

Nicole Christian

Paul Eaves

Sharon Day

City Staff:

Reena Petrich

Anne Gardner

Peg Furshong

Liz Hixson

Lloyd Hanson

Ellen Stewart

Tara Norcross

Resources:

Healing Stories Collaborative

MRPB – Lake Hiawatha (engagement run by MPRB, had meeting recently with lots of discussion on cultural healing. Dakota Language Table is involved)

Notes on discussion:

Park Staff introduced themselves and the project. Spoke briefly of the process and timeline for the project. The project report is underway and will be submitted to the Metropolitan Council in early Spring/Summer. Park Staff wanted to hear from this group and set up the meeting to listen to what the park means to them, how they use the space, and what they prefer to see in the master plan for improvements.

Nibi Water Walk and Ceremony Background.

Indigenous-led extended ceremonies to pray for the water. Every step is taken in prayer and gratitude for water, our life-giving force. Ojibwe Ceremonial Water Teachings. Honor the river and all water and speak to the water spirits so that there will be healthy rivers, lakes and oceans for our ancestors in the generations to come.

IMRP, Cultural Landscape Study – given Sharon Day's name initially by Mona Smith, Allies, Inc. sub consultant to Quinn Evans (Brenda Williams). Ten x Ten also sub consultant and served on the team for the Fort Snelling, Bdote master planning work.

The first part of that establishing trust. Developing relationships, understanding

Emily - HFCF RP important access to the river – drive down and walk 20feet to get to the river. Near the Confluence. Coming together. What she experiences on water walks. Reconciliation, healing, heal invisibility of the indigenous people

Sandy - Layers of story, grounding history, important "primal" ripe with not doing too much. So much of the special thing of the place is the wildness. The river has been asked, besides being a life giving force and connected to all of the water in the world, to do many things that have been really nasty. Carrying genocidal exiles, poison. If there is some way to be able to see the significance of the work that Sharon has been bringing forward – coming forward in prayer to have a sense of what that means in terms of

healing. How do you do that in a public way? Would like to see the 're-wilding' of the park. She loves to see the eagles, protect their habitat. Part of the team that has worked on Bde Mkska – honor to be part of that. Less is more. Open hearts and vision.

Nicole – recently moved here. Not as familiar with the area and the river. Peacefulness. Always an eagle. Recognize that there is an airport.

Sharon – motorboat – disruptive. Usually doesn't start until March. Peaceful and quiet. Smell of gas. Noise. Move that activity closer to the parking lot? As many as 60 people at events. Going toward the path south - have that a quieter space large enough for groups of that size but away from the boats. Newcomers who have only been here since 1800s – still tension. Dakota and before other people. We are on Dakota Land here in MN. Moved at 16 and worked at MNHS as a student. Caves are not separate from the place. Laying down weapons before going into the cave. Access. Individual fences around each mound. They are imprisoned. Tributaries underneath. Mystery. Lived on Mounds Park – Bates Avenue – but has never felt as at home anywhere but Highland Park. Geography. Negative ionization of the water makes the water so important. Sharon is Ojibwe, she considers it that this is Dakota land. The Ojibwe came in 900 AD that's when their migration to this area began. Really all north, central, south America is indigenous land.

What else would affirm the feeling of belonging in the space. Rectangular shelter – ski bench. Area where larger groups gather. Fire pit would be a good place for full moon gatherings. Hard because of the timing of that. Cannot see the moon until late because of the shelter. Simplify. Leave ground natural. Place for a firepit with a roof structure for rain. Doesn't have to be like the other shelter. Problematic about parks system – Permitting so early. Some benefit to it as well. Put up a sign or something to signify that this is a sacred space.

Hidden falls is a jewel. Not Como Park. Want it to stay a hidden jewel.

Could go to the south end of Hidden Falls, but looking at Highway 5 and powerlines. Gate is closed often. Maybe boat landing should be moved over there. Access to river at Crosby – have to walk a little way. Maybe boat access could be there. Moving south makes sense because there is no reason to go north.

Peg Furshong – I don't want to figure Commissioner for MRPT.? Siloed that we are a City park. Opportunity with this park – lift up and educate constituents to talk about the awesome responsibility of this as a public trust for all of the region. Number of Visitors Drove 2.5 hours for ceremony. Not just people who live here who value it. Yes, tax dollars involved. No one owns the water. We are here to take care of it for future generations. Introduce meetings to reflect that this is a process that we need to look both forward and back.

Lloyd – Three things that come to mind.

- Attitude that you bring towards this. Water is sacred. So few things are considered sacred. And if it's not, it is for sale. Not sure how to convey that but City staff attitudes are really important. Honoring the water, protecting the water, incredible reverence and respect for life. SO few places we can honor the place.
- Another attitude is gratitude. Expressed by everyone for the water. Living river. Gratitude for each other.

- Relationship. Reasons we can do such horrible things to each other and to Mother earth is because we consider ourselves as separate. How do we allow and encourage the possibility and relationship as we consider this sacred space

Bear Butte – Fools Crow great holy man. Visitors center. Plains Tribes have open access to the park. Have prayer ceremonies there. Instructions when you enter the park. Don't disturb anything you find there.

Tara – How sacred this place is to our people. Garden of Eden. It is a church is to us. Being able to relate to that area – what can ancestors relate to. How do people relate to what the ancestors felt here? Elders speaking softly in their tongue and the boats are extremely disruptive. Keep minimal and relatable to being a place of sacredness and prayer. Shelter would be great. Not a place where people are picnicking or for family gatherings. STAY SACRED for our children. This is a healing place. Animals and trees all part of it. Bathrooms need to be more sanitary.

Kathryn – Ally. Wishes we would turn the care of the land back to the indigenous people. They are as central in planning this as possible. Publicly acknowledging that this is Dakota Land. Sacred space. NOT just birthday party space. National Cemeteries have language that this is a place of honor. Sunrise church service locations. Chapels in National Cemeteries. We have so much healing work to do, so much to do to fix ourselves and mother earth.

Tracy – works for the state of MN. To promote equity in policy and program and practice. As white people in positions of power. Not our land. How to partner authentically, rather than going out and getting input and coming back. Regarding sacredness, these are not “resources” and not “ours”. Decisions about this park now. Spirits of how you do anything is how you do everything. How do we make these decisions in a different way. Partner equitably and authentically to move forward.

Paul – Three

- Country ignores history. Any opportunity to give history whether signage or open ceremonies or storytelling. Peacefulness of voices should be central. Australia. Governmental meetings start with acknowledgement of aboriginal people. Practice could start here
- River living being. Not a function. It has a spirit.
- Park as developed as it needs to be. No more hardscape. Maintain as much wildness as possible. Balance between “human need” and the nature. Have a meeting with the land. Find out what it wants. See what comes through. Have public meetings there.

Sharon – there are places where tribes and government have maintained places together. – Grand Portage. Effigee Burial Mounds in Alabama (?) Mounds there. Interpretive center slide show with white ranger talking about the hundreds of mounds there. Disrupted a mound in the construction of the visitor's center. Rangers are always white people. Think forward. Monument at Big Sandy where 400 Ojibwe people died in 1854? Lack of provisions as promised in treaty. Provisions there were rotten.

The best way to tell the story is to tell the story. Have Dakota, Ojibwe people telling the story a few times of the year. Missing narrative. We see the story of Fort Snelling. Where do we see the story of the Ojibwe.

Peg - Met Council, DNR, Minnesota Regional Parks and Trails – have public history program. Offer scholarships. State parks programs – students work in those places as part of their fellowship. Legacy

money...How is that serving the indigenous communities? Pay them to be part of the system to share the stories with the community.

Sharon had asked Paul Wellstone for a way around park rangers being the only people "qualified" to tell stories in the national parks

Community engagement – outside of that training for professionals tasked with community engagement

Lloyd - Western ways v. indigenous ways – starting from the language.

Indigenous ways are verb centric. Everything is a process and learning as we go.

Understand

Not system of static, fixed objects.

Sandy – listen deep.

Paul - Lighting. Take it all out!!! Be really conscious about it. Night sky at least.

Improved surfaces for biking? XC skiing? NO! one place that is left to be as is. There is already a lot of access. Surfacing of trails ok to improve what is there, but no additional pavement

Parks being all things to all people doesn't develop a specific relationship to that land. It just doesn't.

Effigy mounds, Iowa and bear shaped mounds - most of the rangers are white men, they interpret the history but it is not their history.

Some local kids buried a time capsule in a mound. Maybe by the time the capsule is removed, they will realize what they have done.

Madeline Island used to be a place to receive provisions promised in the treaties. One winter no provisions came, or they came to late. By the time provisions were received , over 400 had died from hunger.

Should be telling stories from own experiences, and provide space for real discussion and openness. State legacy funding should be used to benefit indigenous people - and it so often does not do this.

Resources are things to be exploited. As long as you come from the resource perspective, it is difficult to get past that all things to all people point of view.

Emily - Emily recommends setting up a group within the Met Council, comprised of parks people, to continue this discussion– make it easier to bring stories to everyone in the region. Amanda Lovelee – could she help to streamline the process. Continuity.

Lloyd – Hiawatha – Ramona Stately started out the meeting with story. Sharing.

Must understand process and realize there's no fixed outcome.

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -  
2018 09 08 Pulling Together

8-Sep-18

WCCO Pulling Together at Hidden Falls

Anne had a table, handed out survey cards

<https://minnesota.cbslocal.com/pullingtogether/event/>

Comments:

Mosquito control needed

Most people who came for the event have never been to park before

Where are the falls?

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -

2018 09 10 West 7th Federation

Liz presented short summary to board meeting

West 7th/Fort Road Federation offices

7:00 PM

Are you working with the National Park Service?

Two people in attendance want to give input on Advisory Committee (Liz added to contact list)

Adjacent development pressures including Ford and Davern Road

Mobility map is fascinating (from parks system plan 2012)

Proximity to parks on a map looks easy but it also must take into consideration steep slopes. The bluffs prevent Sibley Manor from having good park access.

Transit access is very challenging in this area

Difficult for residents without cars to access these parks

Journal newspaper Jane was in attendance, will reach out to us and share survey link

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -

2018 09 11\_HF with Asha

Spoke with residents from Cleveland Hi Rise St Paul Public Housing Authority

Asha coordinated the meeting (Parks Ambassador)

Met Betsy Christenson from St Paul PHA

3:00 PM

Attendees:

Girard

John

Isaac

Shelly (with dog Rusty)

Kelley

Tony

Betsy

Beth

?? From PHA

We met at the picnic tables near the river's edge, by the boat launch area

Love visiting Hidden Falls, friend goes here and she is amazed how it feels like you are far from the city. "Why can't I hear cars? The city is right there!"

Most common activity for this group is fishing, sitting, and enjoying being outside

Boat ramp too steep for wheelchairs, wish that it could be more like a separate, easier slope for kayak launch that is also wheelchair accessible

Can put down snow fencing for added traction for wheelchair (temporary measure)

No access from lawn park area with picnic tables to water's edge if you are in a wheelchair – slope is too steep

Paved paths with more seating along them for people to rest – encourages activity for those with limited mobility

Want a shelter near boat launch, or a bathroom would be even better, with a water fountain with the bottle filling option

Pulling Together event was really great, one attendee had gone

Metro Transit should extend bus lines all the way to the river

If Metro Transit extends transit to Ford for new residents there, they should continue the line out to Hidden Falls as well

Would be nice to have tandem bikes or golf carts, some way to get less-abled people to experience more of the park

One attendee was related to Zack and Corey who work in Parks Maintenance

Upgrade the wooden bench shelter/gazebo structures with better seating (there are at least two in HF, one we saw with Emily and Maggie)

Appreciate that Lime Bikes and Kayak Paddle Share are down at HF

Please make sure some picnic tables are accessible, both with a path and with the extended table surface

Poor sight lines at top of bluff – can green paint be added to the intersection to grab vehicle's attention?

Not enough room for easy navigation/steering at top of bluff

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -  
2018 09 11\_HF with Asha

Not enough trash or recycling cans. Thought that last year there were more, and the trash and recycling were more often right next to each other  
More resting points with seating along trails, this applies to Crosby too.

If building new entry road, have more switchbacks with wide endpoints so that it's accessible and people can rest if walking or biking

Add a dog park here! Or, have a regular farmers market at the park, or get a restaurant like at Minnehaha Falls. Draw more people in.

Make the two entrances from Mississippi River Blvd more distinct, with better signage. They look nearly the same at top of bluff.

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -

2018 09 26 Rec Center Highland

Meeting at Highland Rec Center with Parks & Rec Employees

12:30 PM

Highland Rec Center

Attendees:

Crystal Graham, Highland Rec Center manager

Jess Harkom, Edgcumbe Rec Center manager

Patti Schwartz, Community Recreation director, Edgecumbe, Groveland and Highland

Sharina Rodgers, Community Relations

Andy Rodriguez

Patti wants to do a camp for 20 to 50 kids, to do that she would need a weather shelter, access to

water, would love an outdoor classroom like at Como

Without weather shelter, students are brought to Rec Center, bus to park, then bus needs to stand by at park in case of bad weather

Andy - could explore hosting a canoe camp, or expanding explore-a-tots (existing program)

Jess - summer blast at Edgecumbe uses the parks

Depend on partners to lead programs

Would be great to have a signed walking tour, then wouldn't need others to come in and run a hiking program (for example)

Want a playground area, especially a nature-based play

Mosquitoes are a problem

Wider paths outside of the prairie area at Crosby

In winter want a safe fire pit and shelter

Want on-site storage

Andy - could the trails be groomed in winter?

Patti - Highland park building next to Circus Juventas has garage doors, "Booya Shelter", and is great for hosting groups

Fire pit, kitchenette in booya shelter too

Jess - Teens want hammock grove, area for slack lining, hanging out with trees closer together

Booya shelter could host things like paint nite

Add geocache to these parks, this typically happens organically from the community

Patti - nature and singing camp at Groveland could move to these parks if a shelter is added

Hidden Falls and Crosby Farm are both unofficial off-leash parks

Fishing happens through Police Activity League, PAL

Jess worked with Minnesota Adventure Company for day camps, contact name John Raty

Rec Center programs tend to fall into three categories

Fee-based programs

Camps

Special events/Drop-ins

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -

2018 09 27\_HF with Asha

Hidden Falls park visit with Skyline

Asha coordinated the meeting (Parks Ambassador)

11:00 AM

Attendees:

Ayob

Mangala

Buie

Carrie

Veronica

Feedback:

Add playground with a fence to keep the kids in

More toilets or port-a-potties

Add a drinking/water fountain; don't turn them off too early or on too late

Make sure there's a clearly marked bike path to crosby

More bike racks

Fire ring is not shown in correct location on parks & rec map

Grade change makes it easier to walk to Hidden Falls than Minnehaha, there should be a better path

The group walked to the falls and then sat for a few minutes in quiet, Asha has picture of Mangala sitting in meditation

Calming to hear the waterfall

Trees and water help to make me feel better (Veronica)

Met council should add bus stops

Buie has lived in Skyline for 19 or 20 years, and this is his first time at Hidden Falls. Last year was his first time at Como.

Need better transportation options to get people like Buie out to our parks

Remote parks like this need a heated space, and a permanent storage area for programs

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -  
2018 10 02\_Cleveland Hi Rise

Cleveland Hi Rise Resident Council meeting  
Liz presented

3:30 PM

18 attendees

John  
Girard  
Angela from PHA

Make sure the goats come back!

Stairs at Hidden Falls are not even, and need handrails. Please fix them.

Two paths are possible along the falls, one could be paved one could be dirt.

Must consider accessibility and smooth paths for limited mobility

Hidden Falls Crosby Farm Regional Park Master Plan Engagement Log -  
2018 10 04\_Montreal Hi Rise

Montreal Hi Rise, St. Paul Public Housing Authority  
Liz presented to Resident Council  
2:00 PM

Attendees:  
16 residents  
2 from Cleveland were also in attendance

Plowing the trails  
Adding XC ski trails, grooming them

Betsy mentioned before the meeting - re-alignment of Lexington Avenue to Elway



# United States Department of the Interior

## National Park Service

### Midwest Region

Rivers, Trails and Conservation Assistance Program

111 East Kellogg Boulevard  
St. Paul, Minnesota 55101-1288

### **Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting – Government Agencies and Non-Profit Organizations**

#### **Minutes**

November 8, 2018

1:30 – 3:30 PM

National Park Service Office, 111 Kellogg Blvd, Saint Paul

Goal: Engage with personnel in the government agencies and non-profit organizations that use HFCF in support of their programs and services. Gain input from participants about the value of the proposed priorities from the Great River Passage Plan and determine if additional priorities should be considered.

#### People Present:

Holly Larson, NPS  
Brett Steenrod, NPS  
Liz Hixson, City of Saint Paul  
Anne Gardner, City of Saint Paul  
Nancy Duncan, NPS  
Jim Ford, NPS  
Mary Mallinger, Wilderness Inquiry  
Todd Rexine, Great River Greening  
Whitney Claire, Friends of the Mississippi River  
Auste Eigirdas, Mississippi Park Connection

- Welcome & Introductions
- Project timeline and presentation of abridged slideshow from 11/27 community meeting
  - Engagement Overview
  - Community Input Summary
    - Online Survey Results and Pop-Up Meeting
    - Permitting and Park Use Data
  - Natural Resources Inventory – summary
  - Updated Map
- Handout matrix to be filled in of yearly activities and questions to be answered; ten minutes of reflection and written response. Seeking input to refine our priorities for the master plan.
- Discussion from question prompts; answers written down on large presentation paper.
- Additional priorities added to the Great River Passage list of priorities.
- Dot exercise; each focus group member received 6 dot stickers to place next to the priorities that they deem most important.
- Priorities with two dots or more compiled into a short list of highest priorities.
- Ranking exercise; each focus group member ranked the short list of highest priorities from 1 (high priority) to 10 (low priority).
- Priorities ranks calculated and relisted from low to high.

Highest priorities ranked from high to low:

- 1 Environmental Education Center at Watergate location.
- 2 Reduce lawn area north of picnic area at Hidden Falls- be sure to preserve open space for the area commonly used by the Barebones Puppet Show.
- 3 (tied) Reduce pavement- remove some of the looped roadway at Hidden Falls at both entrances.
- 3 (tied) Restore Hidden Falls Creek to incorporate water quality treatment and habitat enhancement.
- 4 Develop rustic group tent camping area (must be developed near Env. Ed Center).
- 5 (tied) Add more land to the park at top of bluff from Ford Site.
- 5 (tied) Move Hidden Falls parking lot at top of bluff to other side of road and realign parkway to create more bluff top park space near the “ear lobe” shape part of the bluff top.
- 6 Add wayfinding signage- especially to the falls.
- 7 Restore wetland areas around lake and near storm outfalls.
- 8 Improve and extend Park trails from Watergate to Lower Crosby Farm and connecting to new parking areas.

Next steps: Focus group participants to be invited to open house and may be called back to review and provide feedback on the draft masterplan.

Open House in February 2019. Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.



United States Department of the Interior  
National Park Service  
Midwest Region

Rivers, Trails and Conservation Assistance Program  
111 East Kellogg Boulevard  
St. Paul, Minnesota 55101-1288

**Hidden Falls / Crosby Farm Regional Park Master Plan  
Focus Group Meeting – Park and Trail Users**

**Minutes**

November 1, 2018

4:30 – 6:30 PM

Highland Community Center, Saint Paul

Goal: Engage with members of the community who use HFCF for proximity and access to the Mississippi River. Gain input from participants about the value of the proposed priorities from the Great River Passage Plan and determine if additional priorities should be considered.

People Present:

Holly Larson, NPS  
Brett Steenrod, NPS  
Liz Hixson, City of Saint Paul  
Anne Gardner, City of Saint Paul  
Geoff Saign, Resident  
Lisa L., Resident and Twin Cities Hiking Meetup Member  
Ryan Lieske, Minnesota Off Road Cyclists (MORC)  
Shirley Erstad, Friends of the Parks and Trails of Saint Paul and Ramsey County  
Janet Cass, Resident  
Matt Andrews, Minnesota Off Road Cyclists (MORC)  
Shawn Sheely, Resident  
Steve Moe, Friends School of Minnesota  
Garth Morrisette, Resident  
Sue Blum, Resident

- Welcome & Introductions
- Project timeline and presentation of abridged slideshow from 11/27 community meeting
  - Engagement Overview
  - Community Input Summary
    - Online Survey Results and Pop-Up Meeting
    - Permitting and Park Use Data
  - Natural Resources Inventory – summary
  - Updated Map
- Handout of questions to be answered; ten minutes of reflection and written response. Seeking input to refine our priorities for the master plan.
- Discussion from question prompts; answers written down on large presentation paper.
- Additional priorities added to the Great River Passage list of priorities.
- Dot exercise; each focus group member received 6 dot stickers to place next to the priorities that they deem most important.
- Priorities with two dots or more compiled into a short list of highest priorities.
- Ranking exercise; each focus group member ranked the short list of highest priorities from 1 (high priority) to 10 (low priority).
- Priorities ranks calculated and relisted from low to high.

Highest priorities ranked from high to low:

- 1 Restore native floodplain meadows to include water quality treatment in appropriate areas.
- 2 Add rustic trails with access to shoreline.
- 3 Develop managed mountain bike trail loops utilizing IMBC best practices.
- 4 (tied) Restore wetland areas around lake and near storm outfalls.
- 4 (tied) Selectively manage understory of invasive vegetation species in passive activity areas.
- 5 Restore meadows to improve passive recreation and picnic areas for large and small group events.
- 6 Improve and extend park trails.
- 7 Restore Hidden Falls Creek to incorporate water quality treatment and habitat enhancement.
- 8 Add looped rustic nature trails that provide a variety of opportunities for nature hikers including the mid-bluff trail.
- 9 Control the dog off-leash problem.
- 10 Implement signage and wayfinding systems in Crosby Farm (and Hidden Falls).

Next steps: Focus group participants to be invited to open house and may be called back to review and provide feedback on the draft masterplan.

Open House in February 2019. Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.



# United States Department of the Interior

National Park Service  
Midwest Regional Office  
Rivers, Trails & Conservation Assistance Program  
Minnesota Field Office  
111 East Kellogg Boulevard  
Saint Paul, MN 55101-1288

## Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting – Water Access

### Minutes

October 17, 2018

4:00 – 6:00 PM

Highland Community Center, Saint Paul

Goal: Engage with members of the community who use HFCF for proximity and access to the Mississippi River. Gain input from participants about the value of the proposed priorities from the Great River Passage Plan and determine if additional priorities should be considered.

- Welcome & Introductions
  - Collete King, Urban Boat Builders
  - Adam Brunner, Concerned Resident
  - Jacque Hamilton, Minnesota Boat Club
  - Mary Hoffman, Minnesota Canoe Association
  - Michael Anderson, For the Rivers
  - Rebecca Hoye, Inland Sea Kayakers
  - Barett Steenrod, NPS
  - Holly Larson, NPS
  - Liz Hixson, City of Saint Paul
  - Anne Gardner, City of Saint Paul
- Project timeline and presentation of abridged slideshow from 11/27 community meeting
  - Engagement Overview
  - Community Input Summary
    - Online Survey Results and Pop-Up Meeting
    - Permitting and Park Use Data
  - Natural Resources Inventory – summary
  - Updated Map
- Handout of questions to be answered; ten minutes of reflection and written response. Seeking input to refine our priorities for the master plan.
- Discussion from question prompts; answers written down on large presentation paper.
- Additional priorities added to the Great River Passage list of priorities.
- Dot exercise; each focus group member received 6 dot stickers to place next to the priorities that they deem most important.
- Priorities with two dots or more compiled into a short list of highest priorities.
- Ranking exercise; each focus group member ranked the short list of highest priorities from 1 (high priority) to 12 (low priority).
- Priorities ranks calculated and relisted from low to high.

Highest priorities ranked from high to low:

- 1 Programming on paddling and water safety
- 2 Environmental Education Center
- 3 Add canoe/kayak launch at C.F.
- 4 Boat Ramp Improvements (tied)
- 4 Ford site acquisition (tied)
- 5 Add boat storage
- 6 Cultural events (tied)
- 6 Environmental education programs (tied)
- 7 Add boat trailer parking signs
- 8 Add interpretive signage (tied)
- 8 Add two canoe/kayak landings to H.F. (tied)
- 9 Manage invasive species

Next steps: Focus group participants to be invited to open house and may be called back to review and provide feedback on the draft masterplan.

Open House in February 2019. Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.

**CITY OF SAINT PAUL**

Mayor Melvin Carter

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## **Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting – Camps and Youth Programs**

### **Minutes**

December 11, 2018

10:00 – 11:00 AM

403 City Hall Annex

*Goal: Review meetings to date and existing conditions plan. Discuss priorities culled from previous meetings, review for any new/missing items or edits. Talk about park use for day camps and events with youth.*

We are particularly interested in the supporting the efforts to bring youth campers/school children and folks with lower mobility into the park who might not otherwise have a chance of visiting the park and the river. We want to encourage these meaningful opportunities for exploring in a natural setting with the recommendations in the master plan report that we are working on. We will also use the meeting time to review and discuss the ranked list of priorities that we have developed in working with our community advisory committee and from community engagement over the last several months.

- Welcome & Introductions
  - Hank Carlson, YMCA Mobile Camp and Outreach Coordinator
  - Niall Murton, YMCA Camp and Outreach Director
  - Patti Schwartz, City of St. Paul – Programs for Edgecumbe, Highland, and Groveland
  - Asha Shoffner, City of St. Paul – Outdoor Recreation
  - Mary Mallinger, Wilderness Inquiry
  - Liz Hixson
  - Anne Gardner
- Project timeline and presentation review from 11/27 community meeting
  - Engagement Overview
  - Community Input Summary
    - Online Survey Results and Pop-Up Meeting
    - Permitting and Park Use Data
  - Natural Resources Inventory – summary
  - Updated Map
- Discussion of camp / youth program park needs
 

Seeking input to refine our priorities for the master plan, both in terms of timing, and funding/phasing

Patti – walked through the park, need signage to help visitors find the falls. Hidden Falls badly needs maintenance attention. Foot went through wooden bridge. Concerns about safety for kids using the park, with rusty nails. Updates for safety should be a priority (safety for not getting



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hurt, not necessarily security). The park is used by the preschool group on Thursdays, not sure if the park facilities are maintained enough to serve kids well.

Hank – safety is a concern, with rusty fishing hooks on the beach. Hidden Falls needs ongoing maintenance. Also would like to have more parks staff presence at the park, for continuous oversight. Water from HF pavilion is safe to drink but some kids and families do not think it looks safe. YMCA knows it is clean city water but it does not look clean, rusty pipe, etc.

Would be great to have a shelter with walls, perhaps 3 sides, for bad weather. Not familiar with the Booya Shed at Highland.

Mary – pavement at boat launch especially is in bad shape. Jersey barriers block the roads. Should re-do turn around and parking lots to reduce un-necessary pavement. Lack of safe circulation; the bike trail is designed for circulation not safety. Would be great to have a sidewalk and paved path (designed for kids) to walk from boat launch to pavilion. Beach at boat launch has open sight lines which is nice, but not accessibility. Steep for launching boats, and impossible to navigate for ADA.

Niall – boat launch channels everyone to one spot, would be better if the activity was spread out. Separate motorized boats from smaller craft, and from fishing.

Hank – we should design the boat launch to minimize disturbance of river shore/edge. YMCA has to request a port-a-potty for camps and events. Requests go to D'Marie or Karin.

Niall – it would be great if we had a permanent bathroom, pit toilet or composting, and didn't have to request a port-a-potty every year. Can the city put in a permanent bathroom, not sewer connected.

May save money, considering how many events likely request bathrooms per year.

Anne – do you use Crosby or the other Hidden Falls entrance (south gate)?

Some Y camps use Crosby, generally this is in partnership with NPS.

Mary – WI only uses south gate of HF for parking. Sometimes might beach canoes at river shore near Crosby for a break, then continue to Harriet Island. This doesn't happen often though. Boats are always taken out and loaded onto trucks at boat launches.

Hank – we like the power supply set up as is, and also like the shade bench structures (for XC skiing). Would be great to have more shade, like those small roofs provide, in summer.

Mary – if River Learning Center happens, many of these modifications/projects in the park are not necessary.

Hank – YMCA does need storage for summer camp. In 2018, trucked most of supplies up from Burnsville on a daily basis, which is not ideal.

Niall – all the YMCA really needs are basic camp games, space for gaga pit. Would be awesome to get a ropes course. Phalen has storage similar to what is needed here at HF. YMCA operates 4 or 5 day camps in the area, for example at Spring Lake Regional Park. HF gives the opportunity to be really in the city where the Y can serve more people right here.

Possibility to expand to year round programing and camps (day camps or after school)

Hank – many of our camp attendees came from the Cleveland or Midway YMCA.

Asha- The steep roads and sidewalks into the parks area barrier. Also, lack of bus stop near the park entrances. The intersection from Hidden Falls is not easy for stopping people or having a drop off location if you don't want them parking down below, keep bathrooms unlocked for runners and park visitors, have improved signs and/or marketing material (maps that show 2, 4, 6, etc loops for running or hiking- Or how many miles of trails are in HF/CF park), make sure priorities are reflecting the preferences of diverse population, encouragement to go to Sibley Manor for input and to find a way to make safer crossing for people to get to the park.

Next steps: Representatives to send data and population information of user groups

Next meeting will be an Open House in January 2018, to review the draft report. Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.



# United States Department of the Interior

## National Park Service

### Midwest Region

Rivers, Trails and Conservation Assistance Program  
111 East Kellogg Boulevard  
St. Paul, Minnesota 55101-1288

#### **Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting #2 – Government and Non-Profits**

##### **Minutes**

March 22, 2019

1:00 – 3:00 PM

Mississippi National River and Recreation Area Office, Saint Paul

Goal: Engage with members of the community who use HFCF parks for land-based recreation. Gather feedback from the participants about the plan, and ensure content is clear and accurate.

##### **People Attending:**

Colleen O'Conner Toberman, Friends of the Mississippi River  
Whitney Clark, Friends of the Mississippi River  
Mary Hammes, Mississippi Park Connection  
Barett Steenrod, NPS  
Holly Larson, NPS  
Liz Hixson, City of Saint Paul  
Anne Gardner, City of Saint Paul

##### **Welcome & Introductions**

Meeting minutes of the Focus Group from 11/08/2018.

Overview of the draft master plan.

Discussion on all topics within the draft plan.

Participants were provided with printed copy of the draft master plan to review.

Website address for online comments (<https://www.surveymonkey.com/r/HFCFMP19>) was provided on the agenda given to participants.

##### **Meeting Notes**

##### **Trails & Connectivity Recommendations**

Friends of the Mississippi River (FMR) advocated against placing mountain bike trails on the bluff, and instead recommended putting mountain bike trails on the river bottom in the floodplain. Reasons for this:

- Bluffs are fragile
- The floodplain naturally accommodates disturbance
- The floodplain ecological value is fairly low and would not be adversely impacted by trails.

Additionally, FMR believes that mountain bikers should be separated from other trail users and that the bluff trails are better served for people on foot.

*Response: A number of mountain bikers have been involved in the engagement for this project, and they are very enthusiastic. Building up the trails to support them as well as handle erosion and traffic without adverse effects is one of their requests. Mountain biking is an expanding recreational activity that Parks*

*will support. The plan lists mountain biking as something to explore and add-in over time. In the park's current state, the use is not quite high enough to require separated trails.*

Can trails be managed for both users at different times of the day?

*Response: This is done in Colorado, but it is a difficult to manage. It's not ideal, but can be done.*

Could there be two trails on the bluff area?

*Response: There is not a lot of space on that steep bluff area, but it is worth exploring. In the future, there will have to be managed trail systems in this park.*

### **Hidden Falls North**

Discussion on Ford Site plan and potential land acquisition and expansion:

- FMR encourages parks department to pursue bluff-top land acquisition wherever and whenever possible.
- FMR desires Parks department to show south lobe of Ford Parcel as potential park expansion.
- FMR would like to see the Ford Site zoning plan depicted in the document that represents green space adjacent to Hidden Falls.

*Response: St. Paul Parks and Recreation staff is aware of and involved with the Ford site planning process and acknowledges that the site plan is being developed and negotiated between the city and the developer. Park expansion is desirable and will reference the Ford site plan again to see if there are items that have been missed.*

A suggestion was made to consider adding a port-a-john at the Hidden Falls boat landing rather than a full bathroom structure. A follow-up question about lifecycle costs of restroom vs a port-a-john was asked.

*Response: St Paul parks staff will explore the best option whether it is a bathroom structure or a port a john screen. The location needs to consider the flood fringe, provide an amenity, and be low maintenance. Parks' process is to review the best option given O&M requirements and budget.*

### **Hidden Falls South**

Participant requested there to be limited structures in the park to make it feel less structured. Could port-a-johns rather than a building be considered for both aesthetic and cost reasons?

*Response: That is a valid question and can be further explored. This is reflected in the cost range listed.*

### **Crosby Farm West**

FMR requests describing the River Learning Center (RLC) more prominently in the report, so that the active planning underway is reflected, as well as avoid having to make a master plan amendment for the park.

There are exciting connections with some of the work Mississippi Park Connection is doing. Having a facility would really make everyone's work more powerful and doable. You could make the RLC more prominent as it has its precedent in the Great River Passage Plan.

*Response: The report acknowledges the RLC to the extent parks leadership allows. Talking points are in the conflicts and opportunities section. St. Paul Parks and Recreation Dept is extremely excited about this project and what it represents. The minimal detail is also due to the timeline of the master plan development as compared to the RLC studies which are in early phases.*

*St. Paul Parks and Recreation staff have been directing questions about the RLC to the Great River Passage Initiative group. The report will be updated to include more detail.*

FMR reiterated the importance of making the RLC a high priority. Two years ago it was the number one bonding priority at the city of Saint Paul.

A participant asked whether shoreline erosion at the pine plantation is included as a priority.

*Response: Restoration would require working with Mississippi River Corridor Critical Area (MRCCA), and DNR to get permission to do this. The natural resources inventory, does talk about disturbances and restoration. Priority II can be modified to change ‘bluff erosion mitigation’ to just ‘erosion mitigation’ and include a sentence or two about the shoreline or bluff.*

### **Crosby Farm East**

FMR asked about the suitability of placing mountain biking to the east of the 35E Bridge.

*Response: The master plan proposes trail connections through East Crosby. A pump track could be considered here, but it may be hard to access by cars there is no planned parking and limited options for emergency access.*

FMR inquired whether part of the marina function will remain as part of the RLC.

*Response: The upstream bay is shown as canoe/kayak launch on map 5. The plan includes adding a non-motorized boat launch in the smaller harbor. The Great River Passage Initiative will explore the future program of the site.*

FMR noted that the Marina label should be changed knowing the proposed RLC.

*Response: The report will be edited to reflect this.*

### **General Comments**

Has there been more talk on eliminating the HF South access?

*Response: Not a lot of public feedback was received on the concept. It is feasible to eliminate Hidden Falls South as an access point except for emergency vehicles. Right now the plan proposes reorganizing the parking lot, minimizing pavement, and extending the tree canopy with more plantings and restoration.*



# United States Department of the Interior

## National Park Service Midwest Region

Rivers, Trails and Conservation Assistance Program  
111 East Kellogg Boulevard  
St. Paul, Minnesota 55101-1288

### **Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting #2 – Park and Trail Users**

#### **Minutes**

March 21, 2019

4:30 – 6:15 PM

Highland Community Center, Saint Paul

Goal: Engage with members of the community who use HFCF for land-based recreation. Gather feedback from the participants about the plan, and clear up content unclear or inaccurate.

#### People Attending:

Garth Morrisette, Saint Paul Parks Conservancy

Barett Steenrod, NPS

Holly Larson, NPS

Liz Hixson, City of Saint Paul

#### Welcome & Introductions

Review the meeting minutes of the Focus Group from 11/01/2018.

Overview of the draft master plan.

Discussion on all topics within the draft plan.

Participants were provided with printed copy of the draft master plan to review.

Website for online comments (<https://www.surveymonkey.com/r/HFCFMP19>) was provided on the agenda given to participants.

#### Meeting Notes

#### **Project Priorities Lists**

I like how the maps are tied back to the narrative with the lettering. I like the readability and being able to start with the list and to go to the map and the text section.

Consider listing all the costs of the high priority projects in the conclusion section.

There are a lot of high priority projects; possibly too many high priority projects to be realistic? It may be necessary to convert some of these medium-high ranked projects to a lower priority, or to change the timeline.

*Response: The report should be clear on what is feasible in the next five years. Some of the funding sources come up every two years, so there are two-and-a-half funding cycles to prepare to get high priority projects ready for construction. Some of the medium-high projects could be changed to 7-8 years.*

*Before the final report is issued, this will be addressed by reading through the projects one more time and adjusting the rankings.*

### **General Comments**

This is a big list of project proposals. The presence of the maps and pictures in this plan helps for legibility and is starting to give form to what is possible in this park.

An executive summary would be helpful as a road map. Some things to consider: “How is this going to get done? How are you actually going to implement it? What are the budget constraints? What are the funding constraints?”

Where are the conflicts between uses?

*Response: There is a section in the Implementation chapter that touches on conflicts- which may also be viewed as opportunities.*

Parks staff has completed community engagement so far, and then at some point the construction plan is developed; would more engagement happen then?

*Response: Yes. This plan identifies broader goals, and projects which then sets up for future shovel-ready projects. For any subsequent construction project, there would be community meetings and an advisory committee. Maintenance activities would not necessarily require engagement. Identifying which projects need additional community engagement is something that could be added to the priority list or in the paragraphs that describe the project if the budget allows staff to work on this.*

What is the vision for this plan? Are all of these projects going to happen?

*Response: Implementation of this master plan is flexible and will depend on available funding. There is a lot of review and oversight from the Metropolitan Council; they will be reviewing in early May. Instead of assessing phasing, the plan has priority recommendations that are organized on assumed timing and the importance of the project. The conclusion will identify the first seed projects for construction.*

Parks staff should be trying to get efficiencies... if public works is doing something then maybe a park project gets shifted to align with their project. Better coordination with other departments should be important.

*Response: This is addressed in the text on page 33. “The ranking levels are representative of the order for project implementation that was preferred in discussions, however, factors such as funding, sequencing, and logical combination with other City projects may shift the timeline.*

The statement on page 30 would be good to put in an executive summary.

*Response: This can be addressed by putting more detail into the conclusion and next steps.*

Where is there a description on prairie plantings?

*Response: There are sections that talk about invasive species and water quality; on page 40, item 1G details an expanding canopy and replacing turf with native species. The trees are one of the few plant types that can tolerate flooding disturbance, so it would be hard to establish other species. Prairie or other appropriate native species will be included as part of restoration and natural resource management efforts.*

How were the ‘Guiding Principles’ established?

*Response: They were written to express the project goals and address comments from the first community engagement meetings.*

In the guiding principles, the text should recognize both new and existing partnerships, not just acquiring new partnerships.

*Response: This will be edited in the final version.*

Before you convert picnic area to native habitat, you want to make sure there is not a conflict with the demand within the park.

*Response: The report includes formal demand data from the reservations that are collected from shelter permits. There is a lot of informal demand data that is difficult to capture.*

The demand forecast seems to be only accounting for the Ford Site Redevelopment.

*Response: The report text identifies the Ford Site and how that will change the flow around the site, and also the Met Council Park Use Estimate, so our data is broader than just the Ford Site. The report also includes mention of other adjacent developments including the Lexington Parkway realignment.*

In the demand forecast section, there is content about demand and also about accessibility. These are separate issues; please ensure equity is reflected in the guiding principles as well.

*Response: This report must comply with the Parks Policy Plan. That document lists topics that regional park master plans need to cover. The Parks Policy Plan has requirements about engaging with diverse communities, as well as building the park to allow for access. Equity and accessibility are important to St. Paul Parks and Recreation, and this report will more clearly address this in the final version.*



# United States Department of the Interior

## National Park Service

### Midwest Region

Rivers, Trails and Conservation Assistance Program  
111 East Kellogg Boulevard  
St. Paul, Minnesota 55101-1288

#### **Hidden Falls / Crosby Farm Regional Park Master Plan Focus Group Meeting #2 – Water Access**

##### **Minutes**

March 20, 2019

5:30 – 7:30 PM

Highland Community Center, Saint Paul

Goal: Engage with members of the community who use HFCF parks for proximity and access to the Mississippi River. Gather feedback from the participants about the draft plan, and clear up content that is unclear or inaccurate.

##### People Attending:

Adam Brunner, Concerned Resident  
Mary Hoffman, Minnesota Canoe Association  
Nick Hammer, Concerned Resident  
Ryan Lieske, Minnesota Off-Road Cyclists  
Barett Steenrod, NPS  
Holly Larson, NPS  
Anne Gardner, City of Saint Paul

##### Welcome & Introductions

Review meeting minutes of the Focus Group from 10/17/2018.

Overview of draft master plan.

Discussion of the Implementation Chapter of the draft master plan.

Review of other sections of the draft master plan that participants were interested in.

Participants were provided with printed copy of the draft master plan to review.

##### Meeting Notes

##### **Project Priorities Lists**

Boat Ramp and Trailer Parking- New Restroom Near Boat Launch only describes the parking areas and does not address the restroom. This priority has a Medium-High priority level. Where restrooms are listed within the construction section, they have differing priority levels.

*Response: These will be adjusted in the report.*

Park Security (1D) is listed as Medium and Medium-High on pg. 35 but only as Medium High on pg. 40.

*Response: Park Security concerns are listed twice in management; one aspect of security is technological such as cameras and the other aspect of security is staffing. Each aspect has varying costs and priorities, which is why they're separated. Security priorities will be clarified in the final draft*

##### **Park-wide Recommendations**

1G- There is no cost associated with tree planting.

1F- I like that the text says that there are different methods for controlling different invasive species.

1E- When our boat club talks about water safety, we are usually talking about liability. The city should stress that the river is a powerful body of water in signage.

Have you been working with the tribes as part of your community engagement?

*Response: We have reached out to Minnesota Indian Affairs Council (MIAC) and are keeping them informed on the emails we send out. Our most significant input in this area was meeting with Sharon Day, of the Nibi Water Walk Ceremony; we continue to reach out to them and discuss the plan with them. We have another project in our department that is working on a cultural resources study at Indian Mounds. We are learning a lot about how we work through these projects and development proposals and are getting better at engaging with tribal groups.*

### **Trails & Connectivity Recommendations**

2G- I am very opposed to taking parts of the park and making them exclusive to one kind of use. There are a lot of parks where I can go and get a specific outdoor experience, but this park is different.

*Response: Certain users can coexist better than others. Setting expectations by posting park ordinances and guidelines for users can be a reasonable solution.*

### **Hidden Falls North**

3C and 3I- Clarify wording of these items and their actual on-the-ground placement to address congestion and safety for motorized and non-motorized users.

3O- The boat launch restroom should be made a high priority because right now it is not ranked. A couple of port-a-johns would be a huge improvement; they are cheaper in price and would better protect the park and river resource and increase convenience for boaters.

*Response: This will be adjusted in the final report, some items are not ranked due to being added later and not being discussed by the focus groups or advisory committee.*

3B- How many acres of land would be added by this priority?

*Response: This priority came out of another focus group and we do not have these numbers. This project would add parking at the top of the bluff in order to remove parking in with the parkland at the bottom of the bluff, enabling a reconfiguration of the parking lot while improving access. This project would be very expensive and require multiyear coordination with other city departments, the Historic Preservation Council, and the Ford redevelopers.*

3A- Will this section remain open? It is great shore for anglers. If you could have one piece of property for shore fishing, you would want to have that spot.

*Response: It is not open and is private property. The item 2L in the Trails & Connectivity Section addresses the access question on this property.*

3D- The whole park is a nature-based play area, why do we need a dedicated area for this priority?

*Response: A goal of the regional parks is to create an equitable approach to recreation so that the park is attracting users from all different areas of life. Play areas are familiar to people whereas a forest park is not as comfortable for some people. By providing some elements that people can relate to and understand, it will make the park more welcoming to a culturally diverse user group, so having a 'nature-inspired play' area addresses this.*

### **Hidden Falls South**

4D- I love the pavement reduction proposal.

4A- I wonder how a boat launch this close to Hidden Falls North would work. The Minnesota Boat Club has a launch at the marina. People will probably keep going to Hidden Falls North because it is familiar; not sure if people will come to this launch without strong visible signage directing them here.

*Response: The City wants to hear where the best location would be for an additional launch.*

Are there any plans to alleviate the steep grade of the roads into the park? If you want to get the road cyclists down there, you need to make it more inviting.

*Response: There is language in the plan about an accessibility assessment. Grading and accessibility will be studied when the road is re-done.*

### **Crosby Farm West**

The North Bay from Watergate is regularly fished by anglers. In high water, the fishing is better, but the trees make it hard to cast.

5C- The canoe/kayak launch is indicated in the upstream bay from Watergate. This is a great spot as that is without current. The boat club and canoe/kayak launch should both be located here.

5F- I frequently run on the boardwalk near Crosby Lake and never see anyone using the pier. It is underwater half of the year. The DNR's surveys of Crosby Lake and Little Crosby have not found much aquatic life. Spending money on that fishing pier to me is not important, unless it is for children to learn to catch bluegill. It is a long hike to get to and there are lots of bugs and weeds and is not as convenient as other piers in the city where you can park your car right at a pier. The boardwalk gets used a lot. It should be changed to what they have at Minnehaha Creek, where the boardwalk is a composite wood product.

*Response: From a project perspective, doing boardwalk construction would be one project the report can be modified to add some language that the fishing/viewing pier is a lower priority.*

### **Crosby Farm East**

6B- I think this is a great idea to connect Victoria Park to East Crosby Park. I suggest a trail loop within the park. Any trail improvements that may be needed for the tunnel should probably have a budget included here.

*Response: Victoria Park is newly acquired parkland that is still being built out. There is a tunnel connection under Shepard Road that would connect East Crosby to Victoria Park.*

6A- If the conditions are good, this is a low priced way to get users into the winter park in a whole different way. It is a cool opportunity notwithstanding the liability issues.

*Response- The survey had a lot of responses from the ice climbing group. In the past, ice climbing was fully permitted. The landslides in Lilydale Park changed the policy to be 'Not Allowed' because of the liability to the city. This study recommends considering allowing it again*

### **General Comments**

Are signage, garbage and bathrooms, in the right places? Drinking water is good to have close to the boat launch.

Good to have universal signage, especially next to the river since you cannot always have staff on-hand. There are many people fishing with their families along the river, looking for catfish or carp. They also will make campfires. I run on the bluff trails behind Crosby Lake all the time and really like them.

Watergate Marina is a great place to launch a boat and I hope the ability to launch at this location is maintained with the development of the River Learning Center. Watergate Marina is very protected and is the easiest place to launch on the river, period. For \$10, you can launch a boat out on the river as late as you want. It is the only place like this and is the best option to get on the river for inexperienced motorboat operators.

Are there going to be campfire rings in this park?

*Response: There is one fire ring in the north area of Hidden Falls near the boat launch, and another at the building structure at the Crosby Farm parking lot. The large fire ring created by the WPA can be found close to Hidden Falls, but is not used. New fire rings are not specifically called out in the plans, but one is recommended as part of the indigenous gathering area.*

The park needs more garbage cans and dog waste receptacles. People do a good job with collecting dog waste in open areas, but in other areas it is a problem. Some folks let their dogs off leash. The park should be following the same policies as the rest of the city of Saint Paul for leashing dogs.

*Response: Trash pickup tends to happen along buildings and structures. There is not recycling in the park and the plan recommends that this begin. Many of your concerns are operations and maintenance issues, which the plan spends time addressing at the end of chapter 4.*

How many cross country ski users does the city get in a non-snow making situation? There are significant costs associated with trying to place cross-country ski trails into every park. Is this a park where perhaps we don't have them?

*Response: We do not have those numbers on-hand,. The idea here is not to build new trails but to use the existing trails for classic cross-country skiing.*

Are you designing to mind the flooding cycles?

*Response: Anything we plan to build in this park requires an extensive review process. In addition, the Mississippi Critical Corridor Area is the law that applies to the park and governs structure placement and protection of slopes.*

Regarding dam removal language on page 19, it is important to not give a subjective view of the impact of any Army Corps of Engineering work. There is a list of potential positives, but no discussion of any negatives that could arise from this, which gives the impression you support dam removal.

*Response: That is a good point. the language in this section will be revised.*

Cost for nature based play seems high.

*Response: This estimated cost is for a play area in a regional park, must be durable and safe. Play areas require accessible surfacing and meet safety requirements, which is what some of the cost estimate is accounting for.*

A lot of inexperienced boaters cannot get their boat back onto the trailer at the boat launch due to the very difficult current. A wing dam would definitely improve safety.

*Response: This has not come up with yet. This would involve the Army Corps of Engineers and DNR. In the report, this could be mentioned as something to explore.*

**CITY OF SAINT PAUL**

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## **Hidden Falls - Crosby Farm Regional Park Master Plan Pop-Up Meeting at National Public Lands Day**

### **Summary of Survey Results**

September 22, 2018

12:00 – 2:00 PM

Hidden Falls Park

National Public Lands Day is a day to celebrate and appreciate parks. Saint Paul Parks and Recreation, the Minnesota Department of Natural Resources (DNR), and many other organizations team up for a national celebration of our public lands. Families are welcome to the Mississippi River to try fishing, climbing, archery, biking, and more. The event has free outdoor activities and all equipment is provided.

133 responders, 200 popsicles handed out



- Asked similar questions to online survey but slightly different results (133 responses)
- More mentioned fishing and picnic as their typical activity
- Most common word is “nature” – keep it natural and undeveloped
- Signage, upkeep, and security were common themes as well
- Want more events with free activities where there’s a crowd and it feels safe; more winter programs
- Comments about National Public Lands Day, some were about the Ford Site, wanting a playground

Visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master> for more information.



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# POP UP MEETING

Hidden Falls / Crosby Farm Regional Park is located along the Mississippi River in St. Paul, Minnesota. St. Paul Parks and Recreation is asking for public input on priorities for a master plan of this regional park. For information on the master plan project including timeline, please visit <https://www.stpaul.gov/hidden-falls-crosby-farm-master>

1) What activities do you typically do at Hidden Falls / Crosby Farm Regional Park? (please circle)

- |                       |                        |   |
|-----------------------|------------------------|---|
| walking or running    | fishing                | study plants or trees                       |
| biking, rollerblading | volunteering           | picnic, barbecue, group gathering with food |
| canoeing/kayaking     | study animals or birds | Other (write in): _____                     |

2) Rank these potential improvements from most likely to improve your use of the park (1 or lowest number) to least likely (9 or highest number)

- |   |  |
|---|--|
| <input type="checkbox"/> More shelters or picnic areas                    | <input type="checkbox"/> Improve trail surfaces                                |
| <input type="checkbox"/> Improve river access (places to touch the water) | <input type="checkbox"/> Invasive species management                           |
| <input type="checkbox"/> Outdoor signs that describe the park             | <input type="checkbox"/> Outdoor signs that describe the park (interpretation) |
| <input type="checkbox"/> New directional signage / wayfinding             | <input type="checkbox"/> Build an Environmental Learning Center                |
| <input type="checkbox"/> Other (write in): _____                          |  |

3) What is your longer term vision for Hidden Falls / Crosby Farm Regional Park? What would you like to see here in the future?

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4) Have you been to a city meeting before? Please circle one.

Yes      No

5) Was Pop Up Meeting an easy and engaging way to be a part of city planning?

Yes      No

If you would like to stay involved with the Hidden Falls / Crosby Farm Master Plan process, or receive future updates, please share your email address: \_\_\_\_\_

## **POP-UP MEETING**

**NATIONAL PUBLIC LAND DAY – September 30, 2017**

**HIDDEN FALLS - CROSBY FARM REGIONAL PARKS**

## **P.A.R.K. BUCKET LIST**

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### **PRESERVE**

The unpaved trails to continue walking in nature

Safe to have kids toss rocks in the river

Lots of nature in the city

I like the nature here. I like the roads of the river and how I feel like I am miles far town.

Everything was beautiful

Keep waterfall access

Picnic shelter

I love everything ( 10 yrs. old boy)

I love the river (10 yrs. old girl)

Love the trails across to river boating

Love the trees

Everything

Trails

Green space

Shaded areas

Bathrooms

Places to sit by the river

Fishing

It's great to have a bathroom here

I like being able to walk/jog/bike from Hidden Falls to Crosby and back

The blacktop is quite bumpy in place, could use repaving

I wish the non-paved sand or dirt trails near river could be improved.

More signs

WE enjoy the trails

We enjoy the trails

Archery

Bike ride

### **ADD**

More hikes like nighttime would hike we did over the winter

Nature Playground

More classes for Parents with kids

Activities for kids- adults – all ages

Music

Make it more accessible  
Accessible fishing  
A new shelter closer to the water  
Pollinator habitat waypoints  
Safe bike routs  
A park for younger children when  
More grills  
Need better grill iron for bbq  
Archery  
Nature Education  
Signage about plants, animals, bugs  
Maps of parks near locations  
Nature scape playground  
A small playground for smaller children  
Little free libraries  
Climbing, archery , obstacle course (9 and 6 yrs. old)  
Kaya station  
More hiking trails  
Better bike paths fo the river so we can hike to the park  
More events like the National Public Land Day  
Better lighting in the evening  
I would like to see a bike elevator for the hill  
A bridge connecting Fort Snelling and here so you can switch between the two  
Picnic shelter close to the water  
Nature playground  
It needs a playground  
Places to sit  
Update map for Hidden Fall to show where the fire pit is  
Playground  
Nature Playground  
Canoes and deck for fishing  
Nature Playground or regular playground  
Drinking Fountain  
Zip lines(4 years old kid)  
Go-carts  
Need better making o hot o share trails by bike and pedestrians  
Add playground to the hidden falls for gatherings  
Add fire rings  
Improve bathrooms

## **REMOVE**

The fire pit at Crosby shelter is useless/  
It's hard to hold conversation o large groups talk

## **KEEP IN MIND**

More large rocks closer to the shore/hidden falls  
More signage trail marking to the falls and at the river  
Accessibility for people with limited mobility  
The voices of historically marginalized people  
Renewable energy, carbon zero models/ Ecology  
Better wayfinding signage  
Talk to youth  
Consider other languages to include on signage etc.  
We love the beach and waterfall but often there is garbage in the water

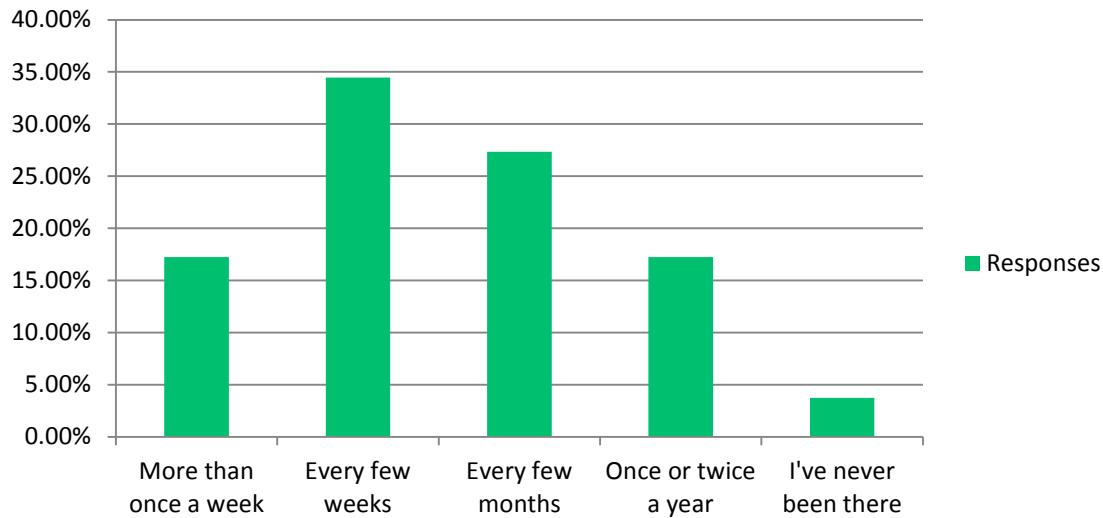
## Survey Monkey Responses

### Hidden Falls - Crosby Farm Regional Park Master Plan

#### How often do you visit Hidden Falls-Crosby Farm Regional Park?

Answer Choices	Responses
More than once a week	17.23% 162
Every few weeks	34.47% 324
Every few months	27.34% 257
Once or twice a year	17.23% 162
I've never been there	3.72% 35
<b>Answered</b>	<b>940</b>
<b>Skipped</b>	<b>0</b>

#### How often do you visit Hidden Falls - Crosby Farm Regional Park?

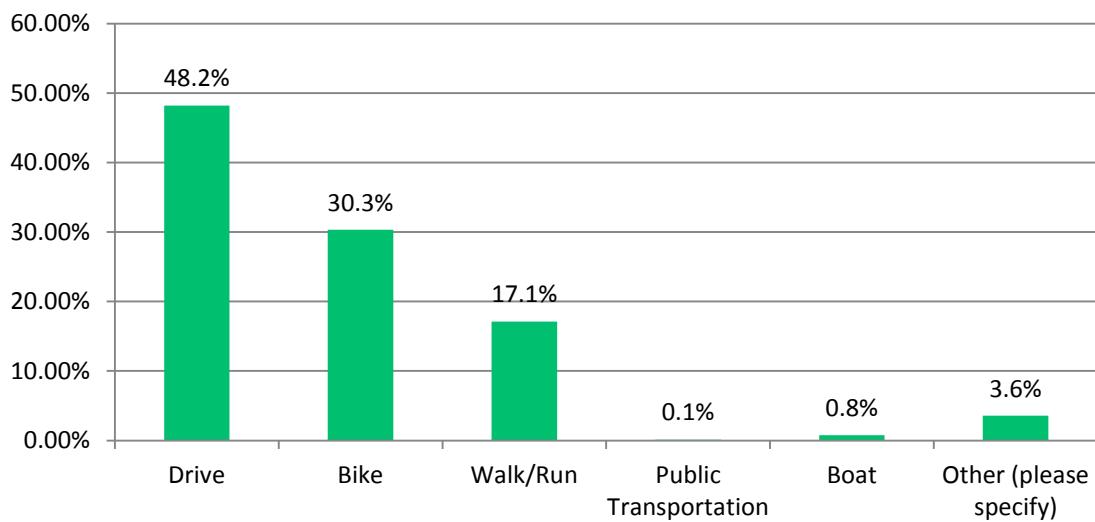


## Hidden Falls - Crosby Farm Regional Park Master Plan

### How do you typically get to Hidden Falls-Crosby Farm Regional Park?

Answer Choices	Responses
Drive	48.17% 448
Bike	30.32% 282
Walk/Run	17.10% 159
Public Transportation	0.11% 1
Boat	0.75% 7
Other (please specify)	3.55% 33
<b>Answered</b>	<b>930</b>
<b>Skipped</b>	<b>10</b>

### How do you typically get to Hidden Falls - Crosby Farm Regional Park?



Respondents	Response Date	Other (please specify)
1	Oct 30 2018	0:drive, bike, run
2	Oct 26 2018	0:Never been
3	Oct 18 2018	1:school bus
4	Oct 18 2018	1:School Bus
5	Oct 18 2018	1:School bus
6	Oct 18 2018	1:bus
7	Oct 18 2018	1:School bus or car
8	Oct 18 2018	1:School bus
9	Oct 18 2018	1:School bus
10	Oct 18 2018	1:School Bus
11	Oct 18 2018	1:school bus
12	Oct 18 2018	1:school bus
13	Oct 18 2018	1:School Bus
14	Oct 18 2018	1:School Bus

- 15 Oct 18 2018 1:school bus  
16 Oct 18 2018 1:school bus  
17 Oct 17 2018 0:I drive with family, bike on my own.  
18 Oct 10 2018 0:Drive or bike  
19 Oct 05 2018 1:Drive bike or run  
20 Oct 02 2018 0:drive, walk, run, bike  
21 Oct 02 2018 1:Scooter  
22 Oct 02 2018 1:I drive, walk, boat and bike to the park.  
23 Oct 01 2018 0:school bus  
drive, walk should offer option for multiple  
24 Sep 29 2018 0:answers  
25 Sep 28 2018 0:Typically bike to Crosby, drive to Hidden Falls

- I have biked nearby and possibly walked my dog at  
26 Sep 27 2018 0:Hidden Falls once but access is very difficult  
Crosby: I either walk, take the bus, or get a ride  
(car). ALSO please note that #1 options don't cover  
me- the first is "More than once a week" and the  
second is "Every few weeks". I'm usually there 3  
27 Sep 27 2018 0:times a month, sometimes 4.  
28 Sep 27 2018 0:bike and drive  
29 Sep 18 2018 0:I've never been there  
Never been but I would have to drive from Faribault  
and I would for mountain bike trails. I'd also be  
30 Sep 18 2018 0:eating in the area when I come.  
31 Sep 18 2018 1:Don't go  
32 Sep 18 2018 1:Never been  
33 Sep 11 2018 0:motorcycle

## Hidden Falls-Crosby Farm Regional Park Master Plan

### What do you like best about Hidden Falls-Crosby Farm Regional Park?

Answered 902

Skipped 38

Respondents	Response Date	Responses
		<p>It's a slice of nature right on my doorstep. I just moved here from 1 Nov 01 2018 0 Nebraska and love how close it is to my home in West 7th.</p>
		<p>2 Oct 31 2018 0: Nature, feels far from the city</p>
		<p>3 Oct 31 2018 0 River Access</p>
		<p>4 Oct 31 2018 1 Ice climbing</p>
		<p>We love the quiet unspoiled woodlands. It's the most 'natural' of 5 Oct 31 2018 1 parks and it's near where we live.</p>
		<p>6 Oct 31 2018 0: River access, availability of unimproved trails, proximity the river and the forest, particularly the trees with the skeleton like 7 Oct 30 2018 0 roots along the river shore</p>
		<p>I'm a disabled Iraq War Vet and go to Crosby Park every day as a quiet sanctuary to get away from the busy city. I'd like to say that I might be the most frequented visitor to the park (along with my two dogs)! I firmly believe that this park is the best hidden gem in the entire twin cities. On the busiest, perfect summer Sunday, one could go to Crosby Park to walk the secret trails... and not see a single person! Which is so important for our Vets,</p>
		<p>8 Oct 30 2018 0 teenagers, and anyone else seeking solitude.</p>
		<p>9 Oct 30 2018 1 The quiet by the river.</p>
		<p>10 Oct 30 2018 0 The plants in the marsh area</p>
		<p>11 Oct 30 2018 0 Good St. Paul option for trails</p>
		<p>12 Oct 29 2018 0: Access to river and waterfalls.</p>
		<p>13 Oct 29 2018 0 Trees</p>
		<p>14 Oct 29 2018 0: Quiet views of the river, secret hideaways</p>
		<p>15 Oct 29 2018 0: HOMERS ODYSSEY</p>
		<p>16 Oct 29 2018 0: lovely natural space, doesn't feel like you are in the city anymore The sacred space it occupies for Ojibwe people and our weekly</p>
		<p>17 Oct 29 2018 0 water ceremony.</p>
		<p>18 Oct 29 2018 1: its proximity to the Mississippi River</p>
		<p>19 Oct 29 2018 1: It's quiet and separated from the developed parts of the city</p>
		<p>20 Oct 29 2018 0: It's remote feeling. The river bank</p>
		<p>21 Oct 28 2018 0: It's peacefulness and proximity</p>
		<p>22 Oct 28 2018 0: Quiet trails</p>
		<p>23 Oct 28 2018 0: Wilderness in the City</p>

- 24 Oct 28 2018 0: Ice climbing, walking, and the river access  
25 Oct 28 2018 0: River shore access  
26 Oct 28 2018 1: Close to home  
27 Oct 28 2018 1: Trails to run through the floodplain forest  
28 Oct 28 2018 1: Waterfall ice climbing, hiking, trail running.  
29 Oct 28 2018 1: The views of the bluff  
30 Oct 28 2018 1: Seclusion
- 31 Oct 28 2018 1: A great place to access the river in the heart of the twin cities!  
32 Oct 28 2018 1: Ice climbing in the twin cities!  
33 Oct 28 2018 1: Lots of trails for biking/running  
34 Oct 28 2018 1: Secluded Trails. Information kiosk with cool aerial photo  
35 Oct 28 2018 0: Ice climbing  
36 Oct 28 2018 0: Ice Climbing  
37 Oct 28 2018 0: accessibility  
Great biking destination in the summer but would love to have ice  
38 Oct 28 2018 0: climbing in the winter.  
39 Oct 28 2018 0: Ice climbing in winter  
40 Oct 28 2018 0: Ice climbing  
41 Oct 28 2018 0: The river  
42 Oct 27 2018 1: River access.  
43 Oct 27 2018 0: Close by, free  
44 Oct 27 2018 0: You hardly know it's there yet it's in the heart of the city  
45 Oct 27 2018 0: Accesable and cloae  
46 Oct 27 2018 0: Winter Ice climbing  
47 Oct 27 2018 0: Location  
48 Oct 27 2018 0: never been there  
49 Oct 27 2018 0: The trails, it feels like the wilderness but it's right nearby  
50 Oct 27 2018 0: Nature  
51 Oct 27 2018 0: Winter ice flows  
52 Oct 27 2018 0: accessible  
53 Oct 27 2018 0: Marina  
54 Oct 27 2018 0: Marina  
Isolated, undeveloped. A small bit of "wilderness" in an urban  
55 Oct 27 2018 1: setting.  
Trails for running and the boat launch for access to the  
56 Oct 27 2018 1: Mississippi by kayak  
57 Oct 27 2018 1: Ice climbing  
58 Oct 27 2018 1: Running around the trails  
59 Oct 27 2018 1: Ice climbing  
60 Oct 27 2018 0: Density of trees, Birds, Critters  
61 Oct 27 2018 0: Paths along the river  
62 Oct 27 2018 0: The feeling that I'm in nature, not in the city  
63 Oct 27 2018 0: Great to run in. Mature trees  
64 Oct 27 2018 0: Back lakes trail

- 65 Oct 27 2018 0 The flora  
66 Oct 27 2018 0 The woods and the bike trail  
    Location, mix of trails, the ponds/lakes and river so close to the  
67 Oct 27 2018 0 trails makes for great lookouts and views.  
68 Oct 27 2018 1 The trails and nature along the river in the middle of the city.  
69 Oct 27 2018 1 Quiet, peaceful, secluded, not too busy  
70 Oct 27 2018 1 Access to the river, hidden falls, bike trails  
71 Oct 27 2018 1 Its gorgeous  
72 Oct 26 2018 1 Feeling in the woods, away from people  
73 Oct 26 2018 1 The picnic area, walking paths.  
74 Oct 26 2018 1 Wildish space in the city  
    The unpaved side paths, it feels like real isolation from the city,  
75 Oct 26 2018 1 especially in Crosby Farm  
76 Oct 26 2018 0 Ice climbing.  
77 Oct 26 2018 0 nature in the city, cycling in the park  
78 Oct 26 2018 0 Ice climbing!  
  
79 Oct 26 2018 0 how wild and natural an area it is despite being right in the city  
80 Oct 26 2018 0 Super natural and by the river  
81 Oct 26 2018 0 Green space in the city  
82 Oct 26 2018 0 Trails!  
    Being close to the river, and how you feel like you're far away  
83 Oct 26 2018 0 from the city even though you're not  
84 Oct 26 2018 0 Fun and different acces to nature in the city  
85 Oct 26 2018 0 The walking and canoeing at the lake  
86 Oct 26 2018 0 Dirt trails in woods  
87 Oct 26 2018 0 Ice climbing  
88 Oct 26 2018 0 Beach/Riverfront, biking trails  
89 Oct 26 2018 0 Ice climbing Homer's Falls  
90 Oct 26 2018 0 Hiking  
91 Oct 26 2018 0 Ice Climbing by Homer Street  
92 Oct 26 2018 0 Open space-hiking trails  
93 Oct 26 2018 0 Ice climbing  
94 Oct 26 2018 0 The tranquility.  
95 Oct 26 2018 0 The enormous trees  
96 Oct 26 2018 0 Ice climbing in winter, walks in the fall.  
97 Oct 26 2018 0 Biking  
98 Oct 26 2018 0 ice climbing  
99 Oct 26 2018 0 The variety of trails!  
100 Oct 26 2018 0 Scenic, hidden, sunken, quiet  
101 Oct 26 2018 0 River and privacy  
102 Oct 26 2018 0 Nature in the city  
103 Oct 26 2018 0 The great running trails and scenery.  
104 Oct 26 2018 0 Quiet peaceful environment in the heart of the city  
105 Oct 26 2018 0 Proximity to the Mississippi River

- 106 Oct 26 2018 0: Old trees and space for kids to run  
It's a quiet, natural world in the middle of a big city. I like the connection with the river and how the river changes from week to
- 107 Oct 26 2018 0: week.
- 108 Oct 26 2018 0: bike trail
- 109 Oct 26 2018 0: foot paths through the woods
- 110 Oct 26 2018 0: The natural setting
- 111 Oct 26 2018 0: It's accessible by bike trails!
- 112 Oct 26 2018 0: Being on the river
- 113 Oct 26 2018 0: The paths
- 114 Oct 26 2018 0: The wooded trails and scenic views  
Natural beauty accessible by bike or on foot, fairly well
- 115 Oct 26 2018 0: maintained paths
- 116 Oct 26 2018 0: Location
- 117 Oct 26 2018 0: The trails and how it feels like you are out of the city
- 118 Oct 26 2018 0: How 'untouched' it is.
- 119 Oct 26 2018 0: Wilderness setting
- 120 Oct 26 2018 0: Lots of woods/habitat, nice picnicking, watching the river
- 121 Oct 26 2018 0: The trails
- 122 Oct 26 2018 0: Never been
- 123 Oct 26 2018 0: Beauty, variety of trails (paved and unpaved)  
There are great trails, but I would like some single track for
- 124 Oct 26 2018 0: running.
- 125 Oct 26 2018 0: Close access to a non-car traffic running setting
- 126 Oct 26 2018 0: It's usually relatively quiet
- 127 Oct 26 2018 0: peaceful urban oasis
- 128 Oct 26 2018 0: It's quiet
- 129 Oct 26 2018 0: It's in St. Paul, so it's close to me.  
It has multiple bio-zones in a small area including wetlands, prairie, woods and river and many parts are wheelchair
- 130 Oct 26 2018 0: accessible
- 131 Oct 25 2018 0: Proximity to the Mississippi River.
- 132 Oct 25 2018 0: closeness to the river
- 133 Oct 24 2018 0: Hiking trails and not so crowded, peaceful
- 134 Oct 24 2018 1: Views
- 135 Oct 23 2018 0: the winding, woodsy paths & stretches along water.
- 136 Oct 23 2018 0: the natural beauty and the lack of crowds
- 137 Oct 23 2018 0: Mississippi River and bike trails  
secluded, lack of people. even when it is busy, any small dirt
- 138 Oct 22 2018 0: paths make sure you don't see them.
- 139 Oct 21 2018 0: The owls and the other wildlife
- 140 Oct 21 2018 0: Scenery
- 141 Oct 21 2018 0: the solitude and natural surroundings
- 142 Oct 21 2018 1: Quiet, natural
- 143 Oct 21 2018 1: Dog friendly

All the trees, natural growth and wildlife which offer a beautiful &  
144 Oct 21 2018 0 quiet escape from the cities.  
access to the river, and easy to find quiet spaces away from other  
145 Oct 21 2018 0 people.  
146 Oct 20 2018 0! It's an oasis in the city  
147 Oct 20 2018 0 Nature reserve-like environment (Crosby)  
148 Oct 19 2018 0! Secluded trails for hiking near the river we  
149 Oct 19 2018 1: walking my dog  
150 Oct 19 2018 1: Fishing  
151 Oct 19 2018 1! Fishing  
Being in a natural place and seeing the river rise and fall over the  
152 Oct 19 2018 1! year.  
153 Oct 19 2018 0! Limited development, quiet, river access

I love walking in the woods and along the river breathing the fresh  
154 Oct 18 2018 0 air. I also like the great variety of landscapes at Crosby.  
155 Oct 18 2018 0: The trees draping over the water. It's fun to climb around in.  
156 Oct 18 2018 0: Boat launch at Hidden Falls  
157 Oct 18 2018 1: i like how it is a fall  
I really like the Minnesota environment. Its also really cool to be in  
the same place that the Native Americans lived for thousands of  
158 Oct 18 2018 1: years.  
159 Oct 18 2018 1: I like the boardwalk  
160 Oct 18 2018 1: going to the lake/bordwalk  
  
161 Oct 18 2018 1: I like the differences between the lakes, forest, bluff, and river  
162 Oct 18 2018 1: Standing by the lake in the pier of the lake.  
163 Oct 18 2018 1: I really like seeing how nature changes throughout the year.  
164 Oct 18 2018 1: I really like being by the river, lake, and bluff. I like all of it.  
165 Oct 18 2018 1: I like the forest and the lake  
166 Oct 18 2018 1: chillin  
167 Oct 18 2018 1: The Leaves  
168 Oct 18 2018 1: I like walking down by the lake.  
169 Oct 18 2018 1: I like the bluff  
170 Oct 18 2018 1: The beach on the river  
171 Oct 18 2018 1: never bine there  
Ungroomed nature. It's the most readily accessible natural area in  
172 Oct 18 2018 0! the city.  
173 Oct 18 2018 0! It's location  
174 Oct 18 2018 0 That there are not a lot of people  
175 Oct 17 2018 0! The location along the river  
176 Oct 17 2018 0! nature and beauty  
177 Oct 17 2018 0! Near the river  
Feels tucked away from roads-a city... love being right on the  
178 Oct 17 2018 0! river & heading the river

- 179 Oct 17 2018 0: The natural habitat, seclusion and beauty
- 180 Oct 17 2018 0: How close it is to main roads, but it feels very secluded
- 181 Oct 17 2018 0: That it is near the river
- 182 Oct 17 2018 0: Nature
- 183 Oct 17 2018 1: The beautiful trail and the firepit and picnic area. Also the dock.
- 184 Oct 17 2018 1: relatively undeveloped forest and river banks
- 185 Oct 17 2018 1: The woods, trails, paths beauty away from the City but in the City
- 186 Oct 17 2018 1: Access to the river, nice views and wildlife sightings, nice trails
- 187 Oct 17 2018 0: Quiet, Woods with paths, undeveloped beaches
- 188 Oct 17 2018 0: River access
- 189 Oct 17 2018 0: Natural areas that haven't been developed to death
- 190 Oct 17 2018 0: Location. Beautiful. Quiet. Full of nature.  
I like the sections that have been restored to native Prairie and native forest--its a rare place to see a plethora of native plant species. I also love the combination of small winding paths that feel hidden and the nice paved bike trails. This is also a favorite
- 191 Oct 17 2018 0: spot to walk the dog.
- 192 Oct 17 2018 0: Location and well developed trail system.
- 193 Oct 17 2018 0: The Sandy Beach and climbing trees.  
it's quiet and has nice facilities right in the middle of such a rustic
- 194 Oct 17 2018 0: park
- 195 Oct 17 2018 0: Easy access to the park from our home in Lilydale  
The big cottonwoods and their roots, the massive water flow, the dog park on the west bank, picnicing and the ebb and flow of
- 196 Oct 17 2018 0: water level.
- 197 Oct 17 2018 0: Natural resources based park in the urban core  
Turtles, native prairie, forest area, biking and walking paths, lake,
- 198 Oct 17 2018 0: river
- 199 Oct 17 2018 0: The woods/Forrest
- 200 Oct 16 2018 1: Biking hiking trails with beach for kids to play on
- 201 Oct 16 2018 0: The bird and animal life in the natural areas.  
View of only trees and water - no buildings or other things to
- 202 Oct 16 2018 0: distract me
- 203 Oct 16 2018 0: Isolation and feeling of being in the forest.  
A refuge in the city, a natural park with hidden wonders and great paths and trails. My favorite is the elevated path below Shepard
- 204 Oct 16 2018 0: Road, which hardly anyone knows about.
- 205 Oct 16 2018 0: relative lack of development
- 206 Oct 16 2018 0: Several trails  
The fact that Crosby Farm Regional Park is not very 'managed,'
- 207 Oct 16 2018 0: it's in a fairly wild state and thus is full of wildlife.
- 208 Oct 16 2018 0: Quiet, secluded, nature

- 209 Oct 16 2018 0 The primitive parts.  
210 Oct 16 2018 0 Amenities that Watergate Marina offers for boaters  
211 Oct 16 2018 0 Natural space by the river for walking  
212 Oct 16 2018 0 Mississippi River  
213 Oct 16 2018 0 Trails through the forest to the River  
214 Oct 16 2018 0 Location and trails  
215 Oct 16 2018 0 The woods and the walking trails  
216 Oct 16 2018 0 Hiking trails and quiet beachfront  
217 Oct 16 2018 0 the natural feel  
218 Oct 16 2018 0 Beautiful trails, natural setting, lake and river.  
    Being able to access the peace and beauty of the woods just a few minutes away from my home in the city.  
219 Oct 16 2018 0: few minutes away from my home in the city.  
220 Oct 16 2018 0: Natural beauty  
221 Oct 16 2018 0: Conencting bike trails, river access  
222 Oct 16 2018 0: solitude, nature  
223 Oct 16 2018 0: Natural feel of trees and river bank.  
224 Oct 16 2018 0 The river  
    The beautiful trails along the river and through the woods. The waterfall.  
  
Trails along river, boardwalk at Crosby, skipping rocks at Hidden Falls, walking up the creek to Hidden Falls, overlooks, fishing  
226 Oct 16 2018 1: Falls, walking up the creek to Hidden Falls, overlooks, fishing  
227 Oct 16 2018 1: Readily accessible nature & the river  
    We usually walk to the falls and then river to hang out. Once in a while we bike through the park.  
228 Oct 16 2018 1: while we bike through the park.  
229 Oct 16 2018 1 Mix of woods and river  
    My boat is docked at Watergate Marina and it's a very natural setting within an urban location.  
230 Oct 16 2018 1 setting within an urban location.  
231 Oct 16 2018 1 The river!  
    Trail along river and the big staircase down into the part, just off of the trail along River Road  
232 Oct 16 2018 1 of the trail along River Road  
233 Oct 16 2018 1 Throwing rocks in the water  
    That it is minimally built, keeping the shore & surrounding woods mostly wild.  
234 Oct 16 2018 1 mostly wild.  
235 Oct 16 2018 1 It's beauty and accessibility  
    The quietness of the trails. It can feel like you are far outside of the city, even though you are in the middle of one.  
236 Oct 16 2018 1 the city, even though you are in the middle of one.  
237 Oct 16 2018 1 The nature and wildlife that are no longer present  
238 Oct 16 2018 1 Quiet solitude  
239 Oct 16 2018 1 huge trees  
240 Oct 16 2018 1 River ,woods and Hidden Falls . Trails  
241 Oct 16 2018 1 paths and access to the river  
  
River access. Safe place away from traffic for my sons to ride their bikes and to throw rocks into the river. Nice to see wildlife.

- 243 Oct 15 2018 1 Birds, deer, wildlife.  
244 Oct 14 2018 0 Water  
245 Oct 14 2018 0 natural beauty  
246 Oct 13 2018 1 I love its proximity to the river.  
247 Oct 13 2018 0 That i can walk along the river  
248 Oct 13 2018 0 wildlife/natural setting/a woodsy experience in the city  
249 Oct 13 2018 0 Close to the river  
250 Oct 13 2018 0 Walking along the river. Proximity to my home. Trails.  
251 Oct 13 2018 0 It's a gem of a park  
252 Oct 12 2018 0 Access to river, water fall, trails

Bare Bones, bringing my mom who is 89 & with Alzheimer's...she loves to sit in the car in the boat launch and watch the water...at hidden falls, Crosby is not accessible and that irks me, and it irks

- 253 Oct 12 2018 0 me to sit in the boat launch ramp but it's also fun  
254 Oct 12 2018 0 Natural and quiet  
255 Oct 12 2018 0 Big Trees, awesome trails, QUIET!  
256 Oct 12 2018 0 Limited access  
257 Oct 12 2018 1 Proximity to River; wild life; walking/biking trails  
258 Oct 12 2018 0 Unspoiled. Not paved and landscaped to death.  
259 Oct 12 2018 0 Dirt trails for winter fat-biking.  
260 Oct 12 2018 0 Never crowded  
261 Oct 11 2018 1 Beautiful places for kids to play and stay busy in nature.  
262 Oct 11 2018 0 Low traffic bike paths

It is a beautiful escape from the city without the drive. Highlighting

- 263 Oct 11 2018 0: the natural features of the Twin Cities and the Mississippi river  
264 Oct 11 2018 0 The trails  
265 Oct 11 2018 0 Boat ramp to access the river.  
266 Oct 10 2018 0 The quiet wilderness along the river and lake.  
267 Oct 10 2018 0 walking trails are good except in winter.  
268 Oct 10 2018 0 Scenery  
269 Oct 10 2018 0 It feels like you are not in the city  
270 Oct 10 2018 0 There are lots of trail options And it's not too crowded  
271 Oct 10 2018 0: Natural beauty  
272 Oct 10 2018 0: The quietness away from the city feeling I get on the trails  
273 Oct 10 2018 0 Woods in the city  
274 Oct 10 2018 0 Variety of terrain, easy to get to, down by the river

- 275 Oct 10 2018 0 Open space and travel through City away from the busy streets.

I love that I can get into a forest/wild setting just steps from my urban neighborhood. Access to this park and the river were a major reason I bought a home in the Highland Neighborhood. I run here several times a week and get great joy and stress relief

- 276 Oct 10 2018 0 from being in a forested area.

The trails and how remote it feels even though you are in Saint

277 Oct 10 2018 1| Paul  
278 Oct 10 2018 1| Trails  
279 Oct 10 2018 0| Getting out of sight of the city, it's peaceful  
280 Oct 10 2018 0| Being near The Mississippi River  
281 Oct 09 2018 0| Walking paths, open space  
282 Oct 09 2018 0| The paths, the picnic areas, the goat visits

The ability to be so close to the river along with seeing people  
283 Oct 09 2018 0| using the surrounding area for their enjoyment of nature.

284 Oct 09 2018 0| It's history and natural geography.  
285 Oct 09 2018 0| trees, solitude, access to the river  
286 Oct 09 2018 0| How "wild" it is and yet accessible.  
287 Oct 09 2018 0| It's remoteness, that it's off the beaten path  
288 Oct 09 2018 0| Access to the river!  
289 Oct 09 2018 0| Getting away from the city  
290 Oct 09 2018 1| Its protected area, natural setting. no cars  
291 Oct 09 2018 1| Boat launch  
292 Oct 09 2018 0| the beautiful trails, the trees  
293 Oct 09 2018 0| Undeveloped, wild  
294 Oct 09 2018 0| The natural setting for walking and biking

It is a relatively natural habitat right in the city. unfortunately

295 Oct 08 2018 0| noisy from the airport but still natural.  
296 Oct 08 2018 0| The falls  
297 Oct 08 2018 0| bike trails  
298 Oct 08 2018 0| Water access and beach area  
299 Oct 08 2018 0| Off the roadtrails through the forest, views of the river  
300 Oct 08 2018 0| Unpaved river bottom trails  
301 Oct 08 2018 0| That it feels un managed  
302 Oct 08 2018 0| location  
303 Oct 08 2018 0| River, quiet  
304 Oct 08 2018 1| scenic river views  
305 Oct 07 2018 0| unique, relaxing, interesting, variety  
306 Oct 07 2018 0| Quiet, lots of trails, close to home  
307 Oct 07 2018 0| The history, the paths and access to the river

The feeling of being in the country yet being in the middle of the

308 Oct 07 2018 0| city.  
309 Oct 07 2018 0| Large numbers of trees being left to grow in nature  
310 Oct 06 2018 0| Quiet forest within the city  
Nature so close to the city. Easy access to river and tree views.  
311 Oct 06 2018 0| Running and walking the trails.  
312 Oct 06 2018 1| Access to good running trails  
313 Oct 06 2018 1| Trails  
314 Oct 06 2018 1| Falls  
315 Oct 06 2018 0| Beautiful walking and running trails

- Trails, proximity to the river, feeling of being in the wilderness despite being in the city, the variety of wildlife including birds,
- 316 Oct 06 2018 0: year round accessibility, pet friendly
- 317 Oct 06 2018 0: Natural beauty, throwback to history, relatively un-developed
- 318 Oct 06 2018 0: Parking
- 319 Oct 06 2018 0: It feels remote but is so close to the city.
- 320 Oct 06 2018 0: trails through the woods
- 321 Oct 06 2018 0: The trail being close to the river
- 322 Oct 06 2018 0: Trails
- 323 Oct 05 2018 1: Hidden gem; good paths
- 324 Oct 05 2018 1: Location, not many visitors on the trail
- 325 Oct 05 2018 1: Beautiful scenery
- 326 Oct 05 2018 1: Scenery  
The peacefulness, the sense of being deep in the woods, the lake
- 327 Oct 05 2018 1: with the dock and lily pads.  
The peacefulness, the sense of being deep in the woods, the lake
- 328 Oct 05 2018 1: with the dock and lily pads.  
The peacefulness, the sense of being deep in the woods, the lake
- 329 Oct 05 2018 1: with the dock and lily pads.
- 330 Oct 05 2018 0: Nature and the trails are cool
- 331 Oct 05 2018 0: Nature and good running trails
- 332 Oct 05 2018 0: Green space
- 333 Oct 05 2018 0: The cool, shaded trails in Crosby
- 334 Oct 05 2018 0: It's the most wild place in the city.  
Feels off the beaten path, like I'm in the country when the city is
- 335 Oct 05 2018 0: so close by. It's serene and beautiful.  
I like how secluded it feels from the city. It is quiet and used, but you still feel as if you're getting away. The trails provide a view of multiple ecosystems while maintaining the integrity for the
- 336 Oct 05 2018 0: animals who live there.  
I like how secluded it feels from the city. It is quiet and used, but you still feel as if you're getting away. The trails provide a view of multiple ecosystems while maintaining the integrity for the
- 337 Oct 05 2018 0: animals who live there.  
It is quiet, multi purpose, available parking, dog friendly and great
- 338 Oct 05 2018 0: fishing  
It is nature in the city. I can walk, bike, ski, in beautiful
- 339 Oct 05 2018 1: surroundings.  
It's ungroomed, natural state near the river, in the city, 10 min
- 340 Oct 04 2018 0: from my house
- 341 Oct 04 2018 0: woods and wildlife, bike trails, the big river
- 342 Oct 04 2018 0: Undeveloped natural areas.
- 343 Oct 04 2018 0: Riverfront  
Feels like your Up North but in the city. Love the trails and nature
- 344 Oct 04 2018 0: for walks.

- 345 Oct 04 2018 1 Natural beauty, ability to walk along the river.
- 346 Oct 04 2018 1 It's on the river
- Able to go on long, rambling explorations with my children and/or dog. The various different ecosystems all close together at
- 347 Oct 04 2018 1 Crosby Farms -- river, ponds, low lying woodlands.
- 348 Oct 04 2018 1 Being in the forest, in the quiet, touching the river
- 349 Oct 04 2018 0! wildlife, not commercial old growth (close to it) wilderness in city
- 350 Oct 04 2018 0! It's undeveloped
- 351 Oct 04 2018 0 The birds
- The fact that it is natural. I feel like I am in the north wood, but
- 352 Oct 04 2018 0! still in Downtown St Paul.
- 353 Oct 04 2018 0! walking amongst the trees along the riverway.
- 354 Oct 04 2018 0! Oasis of quiet in the middle of the city
- That I can get a feeling of being completely in nature so close to
- 355 Oct 03 2018 0! my home in the city of St Paul
- 356 Oct 03 2018 0! Natural forest setting, with both paved and more rugged trails.
- it's close to our home. it's rather quiet and not so crowded. it's
- 357 Oct 03 2018 0! like an oasis from the city within the city.
- 358 Oct 03 2018 0! Fishing and river watching
- 359 Oct 03 2018 0! Wildlife, especially birds
- near by park where I can have an escape from the city without
- 360 Oct 03 2018 0: leaving the city or traveling all day
- 361 Oct 03 2018 0: Wildness in the city
- 362 Oct 03 2018 0: the mississippi
- I use it in different ways: Hidden Falls I use as a kayak launching and landing spot. I have also been at group functions in the group area. In the Crosby Farms entrance off Shepherd Road, I hike,
- 363 Oct 03 2018 0: have used group picnic and pavillion.
- 364 Oct 03 2018 0 The natural surrounding and access to the river
- 365 Oct 03 2018 0 Access to the river with nice beaches
- 366 Oct 03 2018 0 The bathrooms and a place to get away and walk in nature.
- 367 Oct 03 2018 1: Wildness, trees, shelters, water access
- 368 Oct 03 2018 1: Wildness, trees, shelters, water access
- 369 Oct 03 2018 1: a bit of nature in the urban environment
- 370 Oct 03 2018 1: Open space, trails, water access
- 371 Oct 03 2018 1: natural setting in urban area
- 372 Oct 03 2018 1: Natural setting
- 373 Oct 03 2018 1! Walking along the river
- Simplicity of them. Experiencing nature without modern window
- 374 Oct 03 2018 1! dressing obstructing or distorting the experience.

I love being so close to the park! It's an oasis in our city where I can easily access nature! You'll find me running on the trails and paths and on a weekly basis. Love the fact that there is variable terrain, groomed paths as well as more wild. I also enjoy running with my dog on paths without worrying about traffic and cars, once I get into the park. And my dog loves running with me on the dirt trails! Where else can you see bald eagles and other wildlife

- 375 Oct 03 2018 1: along the river!
- 376 Oct 03 2018 1: I love the peaceful setting.
- 377 Oct 03 2018 1: Quiet peaceful serene setting
- 378 Oct 03 2018 1: Proximity to the river and ease of access  
it's natural beauty, proximity and access to the river, wildlife
- 379 Oct 03 2018 0: habitat and a wonderful part of our public trail system
- 380 Oct 03 2018 0: Trails, ease of access to shore fishing spots, boat launch
- 381 Oct 03 2018 0: Hidden Falls
- 382 Oct 03 2018 0: location and access to nature  
How it's easily accessible- it's a super unique park being by the
- 383 Oct 03 2018 0: river, and the woods despite being an urban park  
It is not overly developed and provides excellent (relatively
- 384 Oct 03 2018 1: speaking) wildlife habitat.  
How connected to nature and away from the city it feels as well
- 385 Oct 03 2018 1: as the variety of water and woods.  
They're quiet and mostly undisturbed places. I'd hate to see a ton of development at either site without protecting what's currently
- 386 Oct 02 2018 1: there.
- 387 Oct 02 2018 1: quiet
- 388 Oct 02 2018 1: The green space  
The trails & river access (at Hidden Falls) - it's a hidden escape
- 389 Oct 02 2018 0: within the city  
It's quiet and makes you feel like you're out of the city. Love the
- 390 Oct 02 2018 0: river and nature as well.
- 391 Oct 02 2018 0: Trails for running
- 392 Oct 02 2018 0: That's it's on the water
- 393 Oct 02 2018 0: I like how serene it is.
- 394 Oct 02 2018 0: Undeveloped areas. Narrow dirt trails.
- 395 Oct 02 2018 0: Walking paths through the woods
- 396 Oct 02 2018 0: access to nature and the river very close to home
- 397 Oct 02 2018 0: Walking paths along river, being in Nature
- 398 Oct 02 2018 0: Quiet and natural wild space
- 399 Oct 02 2018 0: Expansive land and many trails and riverfront
- 400 Oct 02 2018 0: Secluded feel
- 401 Oct 02 2018 0: It's near my house
- 402 Oct 02 2018 0: The environment the trails wind through
- 403 Oct 02 2018 0: Natural setting, woods in the city, untouched green space

- nicely paved and maintained trails. Great for walking my dogs  
404 Oct 02 2018 0 and feeling like I am completely out of the city and in nature.  
Crosby Farm's beautiful trees and access to the river. I haven't  
405 Oct 02 2018 0 been to Hidden Falls for a while.  
406 Oct 02 2018 0 Access to nature in the city  
The hiking trails, plus ability to get a taste of nature within the city  
407 Oct 02 2018 0 boundaries  
408 Oct 02 2018 0 the river  
409 Oct 02 2018 0 Trails, people, the river.  
410 Oct 02 2018 0 natural beauty  
411 Oct 02 2018 0 extensive green space in the city that is not all developed  
412 Oct 02 2018 0 Proximity of "woods" to the city  
413 Oct 02 2018 0 walking the trails , or by the water with my dog  
414 Oct 02 2018 0 Convenience  
415 Oct 02 2018 0 Trails  
  
416 Oct 02 2018 0 The proximity to the neighborhoods, feels private in a city setting.  
417 Oct 02 2018 0 The feel if being away from the city  
418 Oct 02 2018 0 it is on the mississippi where i like to fish, boat launch  
Natuural trails for bikign and walking, Views of the river, and the  
419 Oct 02 2018 0 floating walkway.  
420 Oct 02 2018 0 Nature, paths, wildlife  
421 Oct 02 2018 0 Walking paths, large green space  
422 Oct 02 2018 0 The trees along the trails.  
423 Oct 02 2018 0 Nature, trails, river access  
424 Oct 02 2018 0 Nature in the city! Lovely paths by the river  
Being connected to the river, the trails on the river. The  
425 Oct 02 2018 0 barebones show at hidden falls every year.  
426 Oct 02 2018 0 It's an oasis of nature available right in the city  
  
427 Oct 02 2018 0 River views and access, relatively quiet and natural city park  
428 Oct 02 2018 0 Quiet  
  
That it feels remote and there are paths all over the place. I like  
being able to reach and touch the river. It's great that it feels far  
429 Oct 02 2018 0 away from the city which I can just bike down the hill to it.  
430 Oct 02 2018 0 Natural, peaceful, nature and untouched  
431 Oct 02 2018 0 River, Falls, trails  
432 Oct 02 2018 0 The quietness and nature while still being in the city!  
The nature and quiet aspect. Walking trails through "real woods"  
as my daughter says. Quiet and less crowded access to the river  
433 Oct 02 2018 0 to dip our toes or just sit.  
434 Oct 02 2018 0 Quietness

- 435 Oct 02 2018 1: River views and access, relatively quiet and natural city park
- 436 Oct 02 2018 1: not too crowded, kept somewhat wild.  
Close to home, accessible from a bike trail, feels secluded when
- 437 Oct 02 2018 1: there!
- 438 Oct 02 2018 1: It feels like it's a million miles away from the city.  
It really does feel like a hidden gem, esp with the fire pits- great
- 439 Oct 02 2018 1: gathering space
- 440 Oct 02 2018 1: Paved paths, not very crowded
- 441 Oct 02 2018 1: River
- 442 Oct 02 2018 1: Nature, shade. Nice for walks.
- 443 Oct 02 2018 1: Quiet remote nature
- 444 Oct 02 2018 1: The convenience and ease to get outside so close to home  
Easy access to nature, feels natural even though it is surrounded
- 445 Oct 02 2018 1: by urban areas. Nice trails for walking.
- 446 Oct 02 2018 1: Nature. Trees. Seclusion from city  
Raw undeveloped natural park minutes from my home. Please
- 447 Oct 02 2018 1: don't change it from the park it is  
Hidden Falls is UNIQUE in that it offers ideal setting for those of us who practice rituals of Native American & Indigenous South American cultures. Being in Nature is 1st Requirement; being away from crowds of gawkers/passers by/street noise/etc. is 2nd Requirement. The water is a sacred element, as are the trees and wildlife. PLEASE RETAIN THESE ASPECTS OF HIDDEN
- 448 Oct 02 2018 1: FALLS AREA!!!  
The paved trails. Also the beauty of the trees, plants, river, and
- 449 Oct 02 2018 1: wildlife.
- 450 Oct 02 2018 1: Proximity to river, natural areas, trails, rest rooms.
- 451 Oct 02 2018 1: We use the public water access.
- 452 Oct 02 2018 1: Fishing
- 453 Oct 02 2018 1: Scenic trails, easy to access and free to use  
It is relatively easy to feel like you are by yourself. Not overrun
- 454 Oct 02 2018 1: with people and kids, peaceful.
- 455 Oct 02 2018 1: quite relaxing place to walk  
The acceptability of natural space in an urban area. I constantly remark about how fortunate we are to have and use this resource. I slip 2 boats at Watergate Marina and enjoy the park daily in the boating season and at least 2x per week in the winter
- 456 Oct 02 2018 1: with my friends
- 457 Oct 02 2018 1: Proximity to the Mississippi and MSP
- 458 Oct 02 2018 1: It is a quiet spot in he middle of the city.
- 459 Oct 02 2018 1: The river
- 460 Oct 02 2018 1: The trees and water coming together.
- 461 Oct 02 2018 1: The lack of over-development in Crosby
- 462 Oct 02 2018 1: everything

463 Oct 02 2018 1 The nature and water.  
464 Oct 02 2018 1 The River and the quiet  
I love the towering Cottonwoods, the wildlife and the proximity to  
465 Oct 02 2018 1 the river.  
How remote and wild it feels. It really feels like a refuge from the  
466 Oct 02 2018 1 bustle of the city.  
467 Oct 02 2018 1 Network of both paved and un-paved trails  
468 Oct 02 2018 0 The boat landing and nature in the middle of the city.  
469 Oct 02 2018 0 It's at the favorite part of the river  
Boat launch on P2 that is free and has a a decent chance I don't  
470 Oct 02 2018 0 get murder or robbed.  
471 Oct 02 2018 0 Biking  
That it is secluded and not overly developed. It is a section of  
wilderness within the city, and that is the reason that it is such a  
472 Oct 02 2018 0 great park.  
473 Oct 02 2018 0 walking the trails, the woods, the river, the quiet  
474 Oct 01 2018 0 Ice Climbing  
475 Oct 01 2018 0 River

We live so close. It's the best "back yard" we could ask for. So  
476 Oct 01 2018 0 many trails and paths. It feels like a getaway even in the city.

477 Oct 01 2018 0 Boat Launch  
478 Oct 01 2018 0 Wide bike paths (but wider is always better). Not crowded.  
479 Oct 01 2018 0 The river and natural surroundings  
480 Oct 01 2018 0 The river and natural surroundings  
481 Oct 01 2018 0 I like the walk next to the lake and then the river.  
482 Oct 01 2018 0 Proximity to my house and the trail system.  
483 Oct 01 2018 1 The nice big boat ramp  
484 Oct 01 2018 1 Trails

The best parts of the park are the NON-PAVED running trails in  
485 Oct 01 2018 1 Crosby, and the boat launch at Hidden Falls

486 Oct 01 2018 0 Beautiful and quiet setting  
Natural state of the park. I can feel like I am out of the city, not in

487 Oct 01 2018 0 a manicured park  
I like the wildness of the river and the very large trees with roots

488 Oct 01 2018 1 exposed. There is a nice sandy beach  
Ancient Cottonwood Trees and nearness of River. Feels like I am

489 Sep 30 2018 0 in natural area  
490 Sep 30 2018 0 The remote-feeling location in the city.

491 Sep 30 2018 0 Natural area within the city  
492 Sep 30 2018 1 feels remote and wild

493 Sep 30 2018 1 beautiful park  
494 Sep 30 2018 1 The bike trails and connections to scenic areas

495 Sep 30 2018 0 It feels secluded but it's in the city!  
496 Sep 30 2018 0 Nature and river close to the city.

- 497 Sep 29 2018 0 The feeling that you are away from the city.
- 498 Sep 29 2018 0 Hiking
- 499 Sep 29 2018 0 The walking and biking trails
- 500 Sep 29 2018 1 I like to see the wildlife along the river.
- 501 Sep 29 2018 0 peace and quiet of nature
- 502 Sep 29 2018 0 river walk  
I like that it is close to the Mississippi River, the open wooded
- 503 Sep 28 2018 1 areas and sandy beaches
- 504 Sep 28 2018 0 Walking along the trails and in the woods  
It is an expansive, open, beautiful area where people of all sorts can engage with local nature in multitudes of ways. I love the network of trails, both paved and dirt trails, which let one explore
- 505 Sep 28 2018 0 the quiet, peaceful park.
- 506 Sep 28 2018 0 River to walk by, seeing wildlife frequently, quiet close to the city  
all-season access; paved and unpaved trails through woods and
- 507 Sep 28 2018 0 along river; steep/rocky primitive trails along bluff; lots of trees
- 508 Sep 28 2018 0 Feels off the map a bit. Natural oasis in an urban context.
- 509 Sep 28 2018 0 close to my house and by the Mississippi River  
significant extent of natural area so close to rest of the city;
- 510 Sep 28 2018 0 minimal development on river bank.
- 511 Sep 28 2018 0 The trails  
it's wild nature. I appreciate that is one of the few spots in Twins Cities Parks that is not overdeveloped. It is a very natural place where you can hike along teh river and enjoy nature. Please do not make a Nature Center her. It would ruin the "natural" aspect
- 512 Sep 28 2018 0 of the park!
- 513 Sep 28 2018 0 Location, nature
- 514 Sep 28 2018 0 quiet & lovely place to walk and enjoy nature
- 515 Sep 28 2018 0 The walking trails, the birds, the wildflowers. How close it is  
It's quiet, pretty, expansive, and best of all, it's near the river. I like the events hosted there as well. Nice place for a picnic or
- 516 Sep 28 2018 0 family gathering.
- 517 Sep 28 2018 0 Remoteness
- 518 Sep 28 2018 1 I like how wooded it is, the trails and the access to the river
- 519 Sep 28 2018 1 Wilderness like bike, walking, and skiing paths.
- 520 Sep 28 2018 1 it's nearby, access to nature
- 521 Sep 28 2018 1 It's a bit like our neighborhood's best secret
- 522 Sep 28 2018 1 It feels like you're far away from the city in a nature preserve.
- 523 Sep 28 2018 1 A nature getaway from city life.
- 524 Sep 28 2018 1 in nature setting
- 525 Sep 28 2018 1 iTs beautiful

Crosby Farm is my favorite park in the metro area. I love how quiet and peaceful it is; how simple. It is relatively uncrowded,

526 Sep 28 2018 1 and I love that it is both pedestrian and bike-friendly.

527 Sep 28 2018 1 peaceful, scenery, and not crowded

528 Sep 28 2018 1 Nature

529 Sep 28 2018 1 Open space in city

530 Sep 28 2018 1 That it is relatively undeveloped.

531 Sep 28 2018 0 Walking trails

532 Sep 28 2018 0 seclusion, quiet, expansiveness

533 Sep 28 2018 0 It is a beautiful place for family gatherings.

The setting, the many biking and walking trails, the connections to other parks and trails, cross in the city, the variety of different

534 Sep 28 2018 0 landscapes, and different things for different kinds of people to do

535 Sep 27 2018 1 Wild large space. Diversity of habitat-prairie, river, lake, marsh.

536 Sep 27 2018 0 Riverfront

537 Sep 27 2018 0 Bike path

538 Sep 27 2018 0 quiet walks

539 Sep 27 2018 0 Close to nature - peaceful

540 Sep 27 2018 0 close to home, on the River

wildlife visible from trails, quiet & less developed space to connect with nature. I value it for being less heavily trafficked

541 Sep 27 2018 0 than other parks & trails

542 Sep 27 2018 0 being by the river

543 Sep 27 2018 0 relatively undeveloped, pretty quiet

Crosby - I love that it's wild. I love that it's at the juncture of the two rivers. It's a sacred place for many reasons and to many peoples. I've seen there: eagles (sometimes nesting on the lake!), deer, river otters, hummingbirds, beaver, muskrat, herons, cranes, ducks, geese, all manner of insects and butterflies. I love the boardwalk on the pond. Crosby is the most special place of all in the Twin Cities for me. I'd like to help you on the master plan as a community person. Contact me, Gabriela, at . I forgot to say: I love being at Crosby when the ice is breaking up in the spring- seeing it come downriver, sometimes settling into eddies and patterns. And seeing everyone come for the sauger who rise at

544 Sep 27 2018 0 that time!

545 Sep 27 2018 0 It's close to our home and we like exploring the falls.

It's one of the few places where you can get right down to the river in a natural setting (as opposed to along a highway, like Shepard Road). The pond, native plantings and woods are also

546 Sep 27 2018 0 beautiful

- quiet, variety of non-paved paths, birds and not usually crowded, prairie
- 547 Sep 27 2018 0
- 548 Sep 27 2018 1 Area to roam by the river, trees with exposed roots
- 549 Sep 27 2018 1 Peaceful nature environment within the city
- 550 Sep 27 2018 1 The natural landscape and open spaces
- 551 Sep 27 2018 1 its peaceful pretty and relaxing
- 552 Sep 27 2018 0 The paved trails and escape to nature.
- 553 Sep 27 2018 0 feel like you are out of the city....
- 554 Sep 27 2018 0 All the birds! The quiet beauty and the paths
- 555 Sep 27 2018 0 Peaceful, beautiful  
laid back natural environment, not highly groomed and controlled,
- 556 Sep 27 2018 0 feels safe, friendly, easy to access, free  
Great place to let my dog run; beautiful for being in the middle of
- 557 Sep 27 2018 0 the city  
the paths (for both walking/ biking) as well as the mix of long
- 558 Sep 27 2018 0 grass/ trees
- 559 Sep 27 2018 0 Near river, wooded area
- 560 Sep 26 2018 1 How big it is and not too developed
- 561 Sep 26 2018 1 Feels remote and wild. Not very crowded.
- 562 Sep 26 2018 1 It feels like we've left the city. Dense forest, quiet paths.
- 563 Sep 26 2018 1 The wide variety of areas to visit, falls, river, floodplain, pavilion
- 564 Sep 26 2018 1 Walking trails along river, beautiful , quiet
- 565 Sep 26 2018 1 Getting close to the Mississippi River in a beautiful setting
- 566 Sep 26 2018 1 Easy trail for my kids and lots of area for kids to explore nature  
The "other worldliness" .... you're in the city but you would have
- 567 Sep 26 2018 1 no clue, and so many of the unique experiences.  
Old Oak (& other) enormous trees. Deep shade. Connection to
- 568 Sep 26 2018 1 river. Connection to hidden falls.
- 569 Sep 26 2018 1 The quiet space so near the river.  
The variety of spaces and terrain for exploring and playing. We
- 570 Sep 26 2018 0 also adore the unique trees along the shore
- 571 Sep 26 2018 0 The wilderness in the heart of the city
- 572 Sep 26 2018 0 The beach and trails
- 573 Sep 26 2018 0 The river. The beach. It's quiet and great for all seasons.
- 574 Sep 26 2018 0 River/beach access with a stroller  
The ability to be on unpaved paths with solitude observing nature
- 575 Sep 26 2018 0 with kids
- 576 Sep 26 2018 0 Nature, quiet, secluded
- 577 Sep 26 2018 0 Nature, sense of remoteness, access to river
- 578 Sep 26 2018 0 on the bike path and near the river  
Waterfront, the falls. Sandy paths that are gentle to hike. Boat
- 579 Sep 26 2018 0 access. Group areas. Large fire rings. Picnic areas.

- quick way to get away from it all and the river is a great place to  
580 Sep 26 2018 0 walk and explore.  
The trails through the woods and the river front. It feels like you  
are way out of the city. I like all the bike trails and XC skiing in the  
winter. We take our dog there daily and everyone we meet in the  
581 Sep 26 2018 0 park is great  
It has the feeling of being out in the woods/nature, but also is very  
accessible. The trails are laid out nicely and the biggest concern I  
would have is over-developing areas of these parks and taking  
582 Sep 26 2018 0 away its natural beauty  
The river, the trails, they are quiet at the right times. It's really a  
583 Sep 26 2018 0 great spot in the city.  
584 Sep 26 2018 0 The peacefulness  
585 Sep 26 2018 0 The Falls and Trails  
Lush greenery, magnificent trees, the marsh boardwalk and the  
586 Sep 26 2018 0 river  
587 Sep 26 2018 0 The woods and the river  
588 Sep 26 2018 0 A nice place for bird watching near the Mississippi flyway.  
feeling like you're not in the city. The birds and bird habitat are  
589 Sep 26 2018 0 good  
590 Sep 26 2018 0 Being out in nature, while close to the city.  
591 Sep 26 2018 0 Trails, access to trails along the river, birding  
592 Sep 26 2018 0 views of river, lots of trails to walk on, ease of access  
593 Sep 26 2018 0 wildness  
594 Sep 26 2018 0 clean, lots of trails and not super crowded  
The natural settings and bike/walk/hike opportunities in the  
595 Sep 26 2018 0 middle of the city.  
596 Sep 26 2018 0 The river  
597 Sep 26 2018 0 birds, woods, hiking trails  
  
It's hidden from the city with no traffic and minimal human  
598 Sep 26 2018 0 intervention. Feels more natural and wild than other city parks.  
599 Sep 26 2018 1 It is wild and unspoiled  
600 Sep 26 2018 1 Being able to walk next to the river  
601 Sep 26 2018 0 it's close to my neighborhood.  
602 Sep 26 2018 0 green leafy trees  
Its location right on the river, diversity of plants, paved walking  
603 Sep 26 2018 0 paths.  
604 Sep 26 2018 0 It's beautiful  
605 Sep 26 2018 0 feels like wild space just inside the city  
606 Sep 25 2018 1 Simple and natural  
607 Sep 25 2018 1 Quiet, remote, natural  
608 Sep 25 2018 1 Quiet and less developed, peaceful  
The tall trees, river, bog walk. The diversity of land types in one  
609 Sep 25 2018 0 small park.

- 610 Sep 25 2018 0 The forested and beach areas.  
I like the peaceful bike paths which are close to Crosby pond/lake
- 611 Sep 25 2018 0 and the river.
- 612 Sep 25 2018 0 River views, greenery, secluded feeling
- 613 Sep 25 2018 0 Nature, peaceful  
The natural areas, quiet space with animals away from all of the
- 614 Sep 25 2018 0 people.
- 615 Sep 25 2018 0 I love the fact that it's wooded and relatively undeveloped.
- 616 Sep 25 2018 0 convenient, pretty
- 617 Sep 25 2018 0 The trails and wild life plus being right along the river
- 618 Sep 25 2018 0 Bike trails into the woods and near the river
- 619 Sep 25 2018 0 dog walking kayak rental
- 620 Sep 24 2018 0 The nature and it's untouched beauty.
- 621 Sep 24 2018 0 I don't know yet. I would like to find out soon.
- 622 Sep 22 2018 0 Nature
- 623 Sep 22 2018 1 The trails
- 624 Sep 22 2018 1 The scenery and nearness to the river.
- 625 Sep 22 2018 0 Location along the river
- 626 Sep 21 2018 1 Quiet
- 627 Sep 21 2018 1 Trails along the river
- 628 Sep 21 2018 1 close to river
- 629 Sep 21 2018 1 Old trees and wooded feel
- 630 Sep 21 2018 1 PEACE
- 631 Sep 21 2018 1 Natural open space, the riverfront
- 632 Sep 21 2018 0 the seclusion, it feels far from motors
- 633 Sep 21 2018 0 Undeveloped paths  
The river. The trails. The picnic area the boating access fishing
- 634 Sep 21 2018 0 from shore.
- 635 Sep 21 2018 0 It's next to the river  
The vast woodlands to hike and numerous dirt trails. The country
- 636 Sep 21 2018 0 feel but in the city. Close to home.  
The vast woodlands to hike and numerous dirt trails. The country
- 637 Sep 21 2018 0 feel but in the city. Close to home.  
Great hiking with our kids—easy and accessible spot to go in all
- 638 Sep 21 2018 1 seasons as a family.
- 639 Sep 21 2018 1 Access to the river. Walking trails
- 640 Sep 21 2018 1 The views of the river, forest, and bluffs
- 641 Sep 20 2018 1 Bike trails dirt and paved
- 642 Sep 20 2018 1 Trail system, views of the river
- 643 Sep 20 2018 1 Nicely paved Paths through the trees and along the river
- 644 Sep 20 2018 1 Quiet  
That I feel far away from the city though I am right in the heart of
- 645 Sep 20 2018 1 it.
- 646 Sep 20 2018 1 I love the shade and watching boats on the river.
- 647 Sep 20 2018 0 Fishing

- 648 Sep 20 2018 0 Walking paths by River  
649 Sep 20 2018 0 It feels like secluded wilderness in the middle of the city!  
650 Sep 20 2018 0 It's trails, the view of the Mighty Mississippi River up close  
651 Sep 20 2018 0 The river views.  
652 Sep 20 2018 0 Great bike trails  
653 Sep 20 2018 0 The dirt trails in the woods.  
654 Sep 20 2018 0 It is scenic and feels like it's not part of a city.  
655 Sep 20 2018 0 River views  
656 Sep 20 2018 0 Walking trails along river  
657 Sep 20 2018 0 Bike trails  
658 Sep 20 2018 0 Trails  
659 Sep 20 2018 0 Floodplain forest, wetlands, bluffs and MN River access  
660 Sep 20 2018 0 Bike Trails by the River  
661 Sep 20 2018 0 Open  
662 Sep 20 2018 0 Openness  
I like being able to escape the city without leaving the city. I like  
663 Sep 20 2018 0 introducing my kids to nature a bike ride from home.  
664 Sep 20 2018 0 The wooded flood plain and lake boardwalk in Crosby.  
That it is wild and has many diverse natural habitats. I like that  
665 Sep 20 2018 0 there is minimal paving and other human intrusion  
666 Sep 20 2018 0 River  
667 Sep 20 2018 0 Great walking trails  
668 Sep 20 2018 0 Chance to be in nature, quiet  
669 Sep 20 2018 0 River trails  
670 Sep 20 2018 0 Walking paths  
671 Sep 20 2018 0 The wooded trails for walking, snowshoeing, and XC skiing.  
672 Sep 20 2018 0 River trails  
673 Sep 20 2018 0 Vke and walking  
674 Sep 20 2018 0 Paths that are not paved  
All the undeveloped unpaved trails along the river and through  
675 Sep 20 2018 0 the flood plains  
Sandy beaches, sparse population, paths through the trees,  
676 Sep 20 2018 0 mountainbike opportunities  
  
I like that it's well maintained, there are marked paths but it's not  
677 Sep 20 2018 0 overly developed. I like that there are such large parks in the city.  
678 Sep 20 2018 0 Natural setting  
679 Sep 20 2018 0 Trails  
680 Sep 20 2018 0 The river, the waterfall  
681 Sep 20 2018 0 the prairies and ponds in Crosby Farm, good bike paths  
682 Sep 20 2018 0 The river and the woods  
683 Sep 20 2018 0 Nature  
684 Sep 20 2018 0 Natural beauty, convenience  
685 Sep 20 2018 0 Biking trails

- I love the natural setting along the river. It's so cool to be there
- 686 Sep 20 2018 1 hidden away from the big city.
- 687 Sep 20 2018 1 Walking paths
- 688 Sep 20 2018 1 Lack of paved trails on NW side of Crosby Lake
- 689 Sep 20 2018 1 not crowded, wonderful paths
- 690 Sep 20 2018 1 Proximity to my house
- 691 Sep 20 2018 1 Quiet and secluded
- 692 Sep 20 2018 1 How quiet/nice it is to connect with nature.
- 693 Sep 20 2018 1 The shoreline along the Mississippi and the trails.
- 694 Sep 20 2018 1 Watergate marina  
The open space and winding trails that seem to maximize the
- 695 Sep 20 2018 1 perceived size of the park
- 696 Sep 20 2018 1 Trails with facilities
- 697 Sep 20 2018 1 Quiet and peaceful
- 698 Sep 20 2018 1 Quiet
- 699 Sep 20 2018 1 The falls
- 700 Sep 20 2018 1 Pure wilderness within the city
- 701 Sep 20 2018 1 Nature, river
- 702 Sep 20 2018 1 The varied habitats for birding
- 703 Sep 20 2018 1 dirt trails
- 704 Sep 20 2018 1 Easy to get to
- 705 Sep 20 2018 1 Walking trails
- 706 Sep 20 2018 1 The hiking/biking trails and access to the river.
- 707 Sep 20 2018 1 Trails and river  
The bluffs, nature in the city, BareBones Halloween Show, fall
- 708 Sep 20 2018 1 colors, the river, the trails.
- 709 Sep 20 2018 1 Trees  
The Trails are easy to access and easy for my dog to walk
- 710 Sep 20 2018 1 around on
- 711 Sep 20 2018 1 Nature so close to the city
- 712 Sep 20 2018 1 The Mississippi River and the access to it.
- 713 Sep 20 2018 1 It's right in the city!
- 714 Sep 20 2018 1 Good hiking and nature sightings close to home
- 715 Sep 20 2018 1 Unpaved trails, room to explore without running into other people
- 716 Sep 20 2018 1 The trails by the river and throughout the trees!  
Largely undeveloped natural spaces with trails and a few picnic
- 717 Sep 20 2018 1 facilities
- 718 Sep 19 2018 0 It's peacefull.
- 719 Sep 19 2018 1 Scenery
- 720 Sep 19 2018 0 green space close to urban area, nice and close.
- 721 Sep 19 2018 0 proximity to river
- 722 Sep 19 2018 0 How secluded it is.
- 723 Sep 19 2018 0 bike trails
- 724 Sep 19 2018 0 Location and



- 768 Sep 18 2018 0 Natural area in middle of city  
769 Sep 18 2018 0 Natural area in middle of the city  
770 Sep 18 2018 0 Close to home, easy to bike to, and beautiful!  
771 Sep 18 2018 0 River  
772 Sep 18 2018 0 The quiet beauty  
773 Sep 18 2018 0 Nature in the middle of the big cities  
774 Sep 18 2018 0 Shady and cool. Love the lake  
775 Sep 18 2018 0 It's convenient.  
776 Sep 18 2018 0 Trails  
777 Sep 18 2018 0 Close to city  
778 Sep 18 2018 0 Would like to go if there's a mtb singletrack park  
779 Sep 18 2018 0 Trails  
780 Sep 18 2018 0 The great big fat people  
781 Sep 18 2018 0 Nature  
782 Sep 18 2018 0 lots of green space  
783 Sep 18 2018 0 Location  
784 Sep 18 2018 0 Rustic and accessible  
785 Sep 18 2018 0 It's lack of people.  
786 Sep 18 2018 0 Scenery  
787 Sep 18 2018 0 The trails and the board walk in Crosby Farm.  
788 Sep 18 2018 0 Easy access to nature  
789 Sep 18 2018 0 Bandit style  
Access to natural beauty & Mississippi riverfront in an urban  
790 Sep 18 2018 0 environment  
791 Sep 18 2018 0 Nature in the city! You feel like you're far outside of the city  
792 Sep 18 2018 0 I've never been there  
  
793 Sep 18 2018 0 The river! And the wilderness in the middle of an urban areas.  
794 Sep 18 2018 0 Peaceful  
795 Sep 18 2018 0 Riding bikes along the shore of the river.  
796 Sep 18 2018 0 River bank  
its wild and simple- simple trails and ability to cross country ski or  
797 Sep 18 2018 0 bike on snow in relative isolation  
798 Sep 18 2018 0 wilderness area within city limits  
799 Sep 18 2018 0 Nature and trails  
800 Sep 18 2018 0 The forest  
801 Sep 18 2018 0 It's near my home and very scenic  
802 Sep 18 2018 0 Great trails  
803 Sep 18 2018 0 River bluff scenery and hiking the river shore.  
804 Sep 18 2018 0 Woods, quiet  
805 Sep 18 2018 0 Trees and River.  
806 Sep 18 2018 0 Proximity to river, nature so close to me  
807 Sep 18 2018 0 Scenic  
The dirt trails covered with forest canopy and the riverside  
808 Sep 18 2018 0 beaches and views

- 809 Sep 18 2018 0 Close by and wooded  
810 Sep 18 2018 0 Close to home  
811 Sep 18 2018 0 The natures  
812 Sep 18 2018 0 It's on the river and not many people visit it.  
813 Sep 18 2018 0 Beautiful trails and forest. Great fishing  
814 Sep 18 2018 0 Proximity
- 815 Sep 18 2018 0 The isolation from the urban environment. Wildlife and nature.  
816 Sep 18 2018 0 Being in "nature".  
817 Sep 18 2018 0 Trails.  
818 Sep 18 2018 0 Love nature.  
819 Sep 18 2018 0 Close to home  
820 Sep 18 2018 0 Quiet, close to work  
821 Sep 18 2018 0 The size of the park and it's network of trails  
822 Sep 18 2018 0 The path along the river and the picnic areas  
823 Sep 18 2018 0 Quiet, remote feel, nature  
824 Sep 18 2018 0 Scenery  
825 Sep 18 2018 0 It's on the river.  
826 Sep 18 2018 0 Location  
827 Sep 18 2018 0 I like parks and green space  
The bike trails and "unofficial" mountain bike trails, especially in  
828 Sep 18 2018 0 the winter for fat biking  
829 Sep 18 2018 0 variety  
830 Sep 18 2018 0 The feeling of being in nature, still in an urban core.  
831 Sep 18 2018 0 being in nature  
832 Sep 18 2018 0 The hiking and openness  
833 Sep 18 2018 0 wooded areas, river  
834 Sep 18 2018 0 Location and scenery  
835 Sep 18 2018 0 Riverside  
836 Sep 18 2018 0 The scenery  
837 Sep 18 2018 0 secluded river access, trails  
I haven't been there, I would go if there were single track mtn  
838 Sep 18 2018 0 bike trails  
I've only been there once, and it wasn't totally thawed out yet.  
839 Sep 18 2018 0 Looked like it would be a fun place to explore  
840 Sep 18 2018 0 The river and the bike path  
841 Sep 18 2018 0 Feel like I'm not in the city when I am, beautiful nature!  
I use to live close to the park it was a great place to "escape" the  
842 Sep 18 2018 0 city without leaving it.  
843 Sep 18 2018 0 Gorgeous area  
844 Sep 18 2018 0 Birds and riverside trails  
845 Sep 18 2018 0 It's usually not very busy and very beautiful neature  
846 Sep 18 2018 0 Location and how quiet it is down near the river  
847 Sep 18 2018 0 Everything  
848 Sep 18 2018 0 Disconnect from city, connect with river & nature

- 849 Sep 18 2018 0 Light traffic and nature in the city  
850 Sep 18 2018 1 Location  
851 Sep 18 2018 1 Love the views along the river  
852 Sep 18 2018 1 Scenery  
853 Sep 18 2018 1 Primitive nature so close to the city  
854 Sep 18 2018 1 The setup of forested areas next to the river.  
855 Sep 18 2018 1 Having outdoor space in the city  
856 Sep 18 2018 1 Being under the canopy of the big trees and along the river  
857 Sep 18 2018 1 Feels like a secluded spot right in the city  
858 Sep 18 2018 1 Being by the river  
859 Sep 18 2018 1 I like how its a remote space within the city, tucked away  
860 Sep 18 2018 1 Opportunity for mountain bike development, scenic value.  
861 Sep 18 2018 1 Location  
862 Sep 18 2018 1 Mature trees/Nature  
863 Sep 18 2018 1 It's proximity to my life  
864 Sep 18 2018 1 Beautiful winding trails through the woods close to home  
865 Sep 18 2018 1 Nature in the city  
Location close to home, nice paved trail system makes for a great  
866 Sep 18 2018 1 commute  
867 Sep 18 2018 1 N/A  
868 Sep 18 2018 1 Location  
869 Sep 18 2018 1 access to natural spaces (non-paved)  
870 Sep 18 2018 1 Green space close to urban centers for recreation  
871 Sep 18 2018 1 terrain/view of the river  
872 Sep 18 2018 1 Don't go  
  
873 Sep 18 2018 1 Accessibility. It has an untouched feel so close to an urban area  
874 Sep 18 2018 1 Dirt trails  
875 Sep 18 2018 1 Interesting forest with amazing vegetation  
That it is kept close to its natural state - it overly engineered.  
876 Sep 18 2018 1 Biodiversity.  
877 Sep 18 2018 1 Scenery  
878 Sep 18 2018 1 The scenery  
879 Sep 18 2018 1 Wilderness in the city  
880 Sep 18 2018 1 Natural setting  
881 Sep 18 2018 1 Remoteness from the city  
Never been but would go there several times a week if there was  
882 Sep 18 2018 1 a mountain bike trail  
883 Sep 18 2018 1 I like parks and outdoors.  
884 Sep 18 2018 1 On the river, hidden  
885 Sep 18 2018 1 Biking  
886 Sep 18 2018 1 The dirt trails. Wish their was mountain bike trails.  
887 Sep 18 2018 1 It's pretty with a lot of trails and hiking  
888 Sep 18 2018 1 The scenery  
889 Sep 18 2018 1 It's close

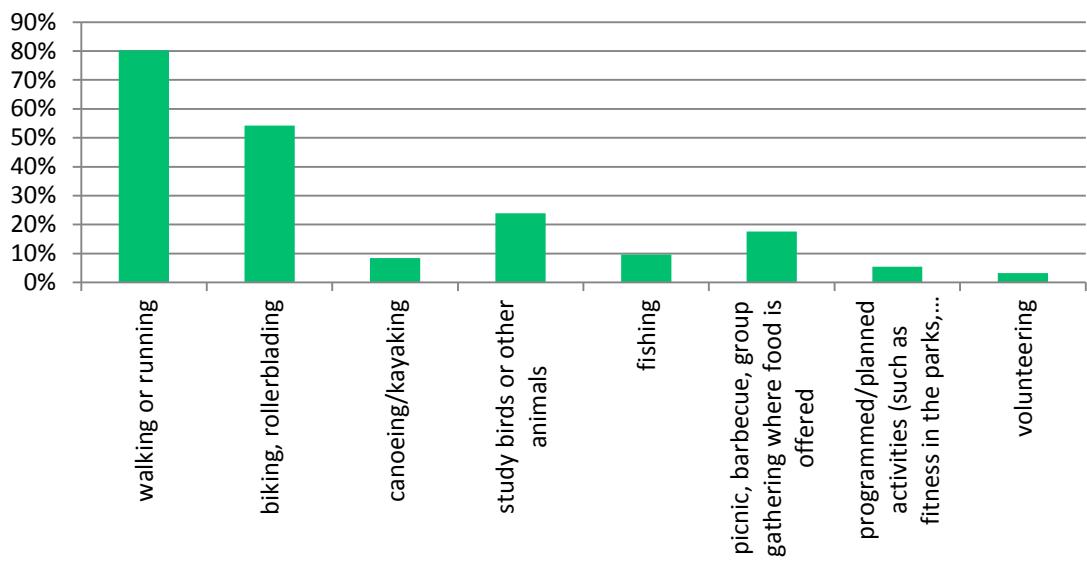
- 890 Sep 18 2018 1 The nature feel  
891 Sep 18 2018 1 Woods, east access  
892 Sep 18 2018 1 The different scenery and terrain.  
893 Sep 18 2018 0 natural beauty  
Walking in the woods and seeing parts of nature. Playing in the  
894 Sep 17 2018 0 water without actually swimming.  
895 Sep 16 2018 1 Access to the Mississippi. Forest. Bird and some wildlife.
- Crosby is wonderful for having a wild feel, rather than a developed one. The lack of amenities - no playground equipment, etc. - is a good thing, not bad. I hate to see plans to "improve it" if
- 896 Sep 15 2018 0 that means reducing its lack of development.  
897 Sep 15 2018 0 beauty, natural park, secluded  
898 Sep 14 2018 0 Nature  
899 Sep 14 2018 0 Feels like a little country in the City  
900 Sep 14 2018 0 Easy access to the river, shade  
Not a lot of people there. Feels like I am out in the woods in the  
901 Sep 14 2018 0 middle of the city.  
902 Sep 11 2018 0 The goats

## Hidden Falls-Crosby Farm Regional Park Master Plan

### What activities do you typically do at this regional park?

Answer Choices	Responses
walking or running	80.18% 704
biking, rollerblading	54.21% 476
canoeing/kayaking	8.43% 74
study birds or other animals	23.92% 210
fishing	9.68% 85
picnic, barbecue, group gathering where food is offered	17.65% 155
programmed/planned activities (such as fitness in the parks, bike with a ranger, etc.)	5.47% 48
volunteering	3.19% 28
Other (please specify)	186
<b>Answered</b>	<b>878</b>
<b>Skipped</b>	<b>62</b>

### What activities do you typically do at this regional park?



Respondents	Response Date	Other (please specify)
1	Nov 01 2018	0 Ice fishing this year, hopefully.
2	Oct 31 2018	1 Ice climbing Ceremony with Sharon Day, Bare bones Halloween show, meandering along the river and
3	Oct 30 2018	0 in the forest
4	Oct 30 2018	0 Sitting and meditating
5	Oct 30 2018	0 CLIMBING
6	Oct 29 2018	0 Ice Climbing
7	Oct 29 2018	0 Weekly Cultural Water Ceremony

we engage in a water ceremony every sunday

- 8 Oct 29 2018 1:morning
- 9 Oct 29 2018 1:Exploring
- 10 Oct 28 2018 0:ice climbing
- 11 Oct 28 2018 0:ice climbing
- 12 Oct 28 2018 0:Ice climbing
- 13 Oct 28 2018 1:Ice climbing
- 14 Oct 28 2018 1:Ice Climbing
- 15 Oct 28 2018 1:Boating (jet skiing), ice climbing
- 16 Oct 28 2018 1:Ice climbing
- 17 Oct 28 2018 1:Ice climbing
- 18 Oct 28 2018 0:Ice climbing
  - Ice climbing, introducing new climbers to ice
- 19 Oct 28 2018 0:climbing
- 20 Oct 27 2018 1:Ice climbing
- 21 Oct 27 2018 0:Ice climbing
- 22 Oct 27 2018 0:Ice climbing
- 23 Oct 27 2018 0:Boating
- 24 Oct 27 2018 0:Boating
- 25 Oct 27 2018 1:Ice climbing
- 26 Oct 27 2018 1:Ice climbing
- 27 Oct 27 2018 1:Ice climbing
- 28 Oct 27 2018 0:Photography
- 29 Oct 27 2018 1:I'd like to ice climb there

Walking my dogs unfortunately nobody enforces  
the leash laws so I dont bring my dogs there

- 30 Oct 27 2018 1:anymore. Too many loose dogs running around
- 31 Oct 26 2018 0:Ice climbing.
- 32 Oct 26 2018 0:Ice climbing

- 33 Oct 26 2018 0:My children love playing at the small beach area
- 34 Oct 26 2018 0:dipping toes in the river :-)
- 35 Oct 26 2018 0:XC ski
- 36 Oct 26 2018 0:Climb
- 37 Oct 26 2018 0:Playing with my kids
- 38 Oct 26 2018 0:Ice climbing
- 39 Oct 26 2018 0:Ice climbing
- 40 Oct 26 2018 0:ice climbing
- 41 Oct 26 2018 0:Ice climbing
- 42 Oct 26 2018 0:Ice climbing
- 43 Oct 26 2018 0:Photography
- 44 Oct 26 2018 0:Never been

My mother can walk up to a mile but, for longer walks, needs to be partly pushed in a wheelchair. So we like this park for its paved paths and board

45 Oct 26 2018 0 walks

46 Oct 23 2018 0 reading

Sometimes will bike it, but live nearby and typically will walk my dog. Occasionally will drive

47 Oct 19 2018 1 there in winter, but 8 out of 10 times I will walk.

X-C ski; bring friends and family to share the

48 Oct 19 2018 1 experience; picnic with large family gathering

49 Oct 18 2018 1 do things with my school

50 Oct 18 2018 1 Do things with my school and the park service

51 Oct 18 2018 1 River and animals

52 Oct 18 2018 1 school trips

53 Oct 18 2018 1 School trips

River data and notes, observations and drawing,

54 Oct 18 2018 1 and sometimes taking pictures.

55 Oct 18 2018 1 On a school trip.

We learn about the area and the Mississippi

56 Oct 18 2018 1 River

57 Oct 18 2018 1 Field trip

58 Oct 18 2018 0 Sit and read

59 Oct 17 2018 0 Playing along river

60 Oct 17 2018 0 Forrest school

61 Oct 16 2018 1 Kids play along beaches

62 Oct 16 2018 0 Shoe shoe, XC ski

63 Oct 16 2018 0 Bird watching, walk the dog, visit the beach

64 Oct 16 2018 0 School field trips

65 Oct 16 2018 0 photography

66 Oct 16 2018 1 Cross country skiing

67 Oct 16 2018 1 Boating out of Watergate Marina

68 Oct 14 2018 0 pray

I go there with friends as a birthday ritual to connect with the river, as cold as it might be on Dec. 31 morning! I go there to find peace, to

69 Oct 13 2018 1 connect with the sacred.

70 Oct 12 2018 0 Water ceremony

71 Oct 12 2018 0 See above, enjoy the river

72 Oct 12 2018 0 Indigenous Nibi ceremony

73 Oct 12 2018 0 Praying for the water!

74 Oct 12 2018 0 Fat biking

75 Oct 11 2018 1 Playing!

- 76 Oct 11 2018 0: Using the boat ramp and parking lot for my trailer  
77 Oct 10 2018 0: Biking  
78 Oct 10 2018 0 Snowshoeing in winter  
79 Oct 09 2018 1: photography  
walking and viewing leaves and animals; please  
80 Oct 09 2018 0 keep it natural  
81 Oct 08 2018 0: walk dog  
Organized meetup hikes and bare bones outdoor  
82 Oct 08 2018 0: puppet show  
Throwing rocks in the river, hanging out in the  
83 Oct 08 2018 0: quiet and uncrowded places  
84 Oct 08 2018 0: snowshoeing  
85 Oct 06 2018 1 Relaxing  
86 Oct 05 2018 1 Throw rocks in river  
87 Oct 05 2018 0: Snowshoeing  
88 Oct 05 2018 1 Skiiing  
89 Oct 04 2018 1 Rowing  
90 Oct 04 2018 0: watching wildlife, sitting  
91 Oct 03 2018 0: hiking  
92 Oct 03 2018 0 Boat launch
- 93 Oct 03 2018 0: prayer group, and outdoor theatre performances  
94 Oct 03 2018 1: run my dog off leash  
95 Oct 03 2018 1 Thinking solitude  
96 Oct 03 2018 1 reading  
97 Oct 02 2018 0 Bonfire  
98 Oct 02 2018 0 kids throwing rocks and sticks in the river
- more parking for those without trailers so they quit using boat trailer parking, also make sure all snow is removed from the ramp in the winter and
- 99 Oct 02 2018 0: parking areas so people can use the park
- Throw rocks into the river. Geocache. Read the signs about the river. Off road bike on the dirt
- 100 Oct 02 2018 0 paths. Look at wildlife (I don't "study" them).
- 101 Oct 02 2018 0 take pictures, sit by river, collect rocks, leaves  
102 Oct 02 2018 0 dog walking  
My children love to explore the trees on the  
103 Oct 02 2018 0 beach  
104 Oct 02 2018 1: na  
105 Oct 02 2018 1: Gathering with friends  
106 Oct 02 2018 1: be by the river

- 107 Oct 02 2018 1 Dog walking  
Biking year round through the woods. Not on the paved trail
- 108 Oct 02 2018 1 paved trail  
Ceremony/Ritual of Indigenous Peoples. P.S. I know other spiritual groups who gather there
- 109 Oct 02 2018 1 regularly for similar purposes.
- 110 Oct 02 2018 1 Sitting and meditating
- 111 Oct 02 2018 1 Boat launch
- 112 Oct 02 2018 1 Reading, drawing
- 113 Oct 02 2018 1 I keep 2 boats at Watergate Marina
- 114 Oct 02 2018 1 Just watching the river
- 115 Oct 02 2018 1 Taking the dog for a walk
- 116 Oct 02 2018 1 everything
- 117 Oct 02 2018 0 Hiking.
- 118 Oct 01 2018 0 Ice Climbing
- 119 Oct 01 2018 0 hiking
- 120 Oct 01 2018 0 dog walking  
taking photos of the trees and the river in different seasons
- 121 Oct 01 2018 1 different seasons
- 122 Sep 30 2018 0 Resting near the Cottinwoods
- 123 Sep 29 2018 1 Skiing
- 124 Sep 29 2018 0 wild life, firepit, volunteering, walking  
Nature photography and field recording; forest bathing
- 125 Sep 28 2018 0 bathing
- 126 Sep 28 2018 0 cross country skiing
- 127 Sep 28 2018 0 Cross country skiing in the winter.
- 128 Sep 28 2018 1 launch boat
- 129 Sep 27 2018 0 Observing plants  
snowshoeing! Singing! Sitting on the dock at the pond and reading or studying. Pulling garlic
- 130 Sep 27 2018 0 mustard (I went through the training to do that)
- 131 Sep 27 2018 1 chill with friends
- 132 Sep 27 2018 0 photography, meditation, hug trees
- 133 Sep 26 2018 1 Free Forest School weekly meetup
- 134 Sep 26 2018 1 Cross country ski
- 135 Sep 26 2018 1 Skip rocks with my kids.
- 136 Sep 26 2018 1 Climbing fallen trees and digging in the mud
- 137 Sep 26 2018 0 Free forest school
- 138 Sep 26 2018 0 Hiking with homeschool co-op
- 139 Sep 26 2018 0 Free nature play with children
- 140 Sep 26 2018 0 play with dog
- 141 Sep 26 2018 0 Boating
- 142 Sep 25 2018 0 Walk the dog
- 143 Sep 25 2018 0 study plants

- I typically enjoy mountain biking, hiking and
- 144 Sep 24 2018 0 watching birds at parks  
145 Sep 21 2018 1 Take the grandkids  
146 Sep 21 2018 0 Off pavement biking  
147 Sep 20 2018 0 Walking the dog.  
148 Sep 20 2018 0 Mountain biking  
149 Sep 20 2018 0 Watching the river flow.  
150 Sep 20 2018 0 Exploring, enjoying the quiet  
151 Sep 20 2018 0 Boating  
152 Sep 20 2018 0 Snowshoeing, XC skiing  
153 Sep 20 2018 1 reading by the water  
154 Sep 20 2018 1 Boating from Watergate Marina  
155 Sep 20 2018 1 dog walking  
156 Sep 20 2018 1 BareBones, snowshoeing.  
157 Sep 20 2018 1 cross country skiing  
158 Sep 19 2018 0 disc golf  

I used to ride there single track in the late 90s I  
thought it was a ton of fun !!!! But then other

159 Sep 18 2018 1 places started popping up  
160 Sep 18 2018 0 ice climbing  
161 Sep 18 2018 0 Fat tire mountain biking  
162 Sep 18 2018 0 Still never been there  
163 Sep 18 2018 0 Riding on the unofficial off road trails  
164 Sep 18 2018 0 Cross country skiing  
165 Sep 18 2018 0 Cross country skiing  
166 Sep 18 2018 0 Walk dog  
167 Sep 18 2018 0 Mountain Biking  
168 Sep 18 2018 0 Biking  
169 Sep 18 2018 0 I've never been there  
170 Sep 18 2018 0 Winter Fat biking  
171 Sep 18 2018 0 cross country skiing  
  
172 Sep 18 2018 0 hammocking and reading-mushroom foraging  
173 Sep 18 2018 0 mountain bike trails please  
174 Sep 18 2018 0 Mountain biking on bootleg trails  
175 Sep 18 2018 0 Geocaching  
176 Sep 18 2018 0 geocaching  
177 Sep 18 2018 0 bike!  
178 Sep 18 2018 0 bring my dog  
179 Sep 18 2018 0 Throwing rocks in the river with my little boy  
180 Sep 18 2018 0 Dog Walking  
181 Sep 18 2018 1 Biking the dirt trails and along the river  
  
182 Sep 18 2018 1 Looking for new places for biking with my kids.  
183 Sep 18 2018 1 Don't go

Never been. I would mountain bike if there was a

184 Sep 18 2018 1 trail built

185 Sep 15 2018 0 cross country skiing

Reading, knitting, watching the water, hanging

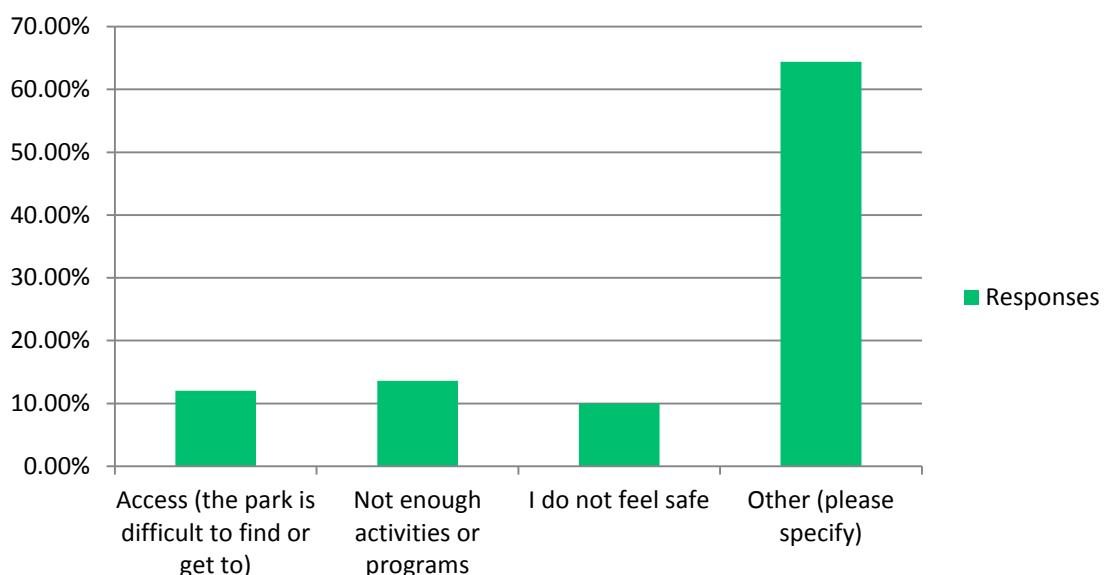
186 Sep 14 2018 0 out with my dog.

## Hidden Falls-Crosby Farm Regional Park Master Plan

### What limits your use of the park?

Answer Choices	Responses
Access (the park is difficult to find or get to)	12.03% 93
Not enough activities or programs	13.58% 105
I do not feel safe	9.96% 77
Other (please specify)	64.42% 498
<b>Answered</b>	<b>773</b>
<b>Skipped</b>	<b>167</b>

### What limits your use of the park?



Respondents	Response Date	Other (please specify)
1	Oct 31 2018 0:	Restrictions on ice climbing.
		It's fine the way it is. See #8 as to what would make it even more attractive and accessible.
2	Oct 31 2018 1:	None
		So many choices of beautiful places to go in the cities
3	Oct 31 2018 0:	I do not experience any limits - it's great!
		more signs and maps please!
4	Oct 30 2018 0:	I no longer live nearby
		I prefer the unpaved trails along other side of river
5	Oct 30 2018 0:	Parking
6	Oct 30 2018 0:	Nothing
7	Oct 30 2018 0:	Nothing
8	Oct 30 2018 0:	none

13 Oct 29 2018 1(Flooding  
14 Oct 29 2018 0:Nothing  
15 Oct 28 2018 0:I don't know the trails all that well  
16 Oct 28 2018 0-distance from my home  
17 Oct 28 2018 0:Have to give other parks some love too.  
18 Oct 28 2018 1-No limits  
19 Oct 28 2018 1-Protect the parks use cases.

20 Oct 28 2018 1(Weather  
21 Oct 28 2018 1(Limited access when the river is high

22 Oct 28 2018 1(Time restraints  
23 Oct 28 2018 1(Parking on east side is limited  
24 Oct 28 2018 0:Nothing

25 Oct 28 2018 0>No ice climbing  
26 Oct 28 2018 0:None currently

27 Oct 27 2018 1(Crosby lake needs to be dredged.

28 Oct 27 2018 0:Parking

29 Oct 27 2018 0-time

30 Oct 27 2018 0:nothing

31 Oct 27 2018 0-Time

No real limitations on use, it is just one of many nice parks, some of which are closer to

32 Oct 27 2018 1:home.

33 Oct 27 2018 1:Nothing

34 Oct 27 2018 1-Nothing

Currently living in Mpls, and do not always

35 Oct 27 2018 1-get over to the area

Too many man-made structures. The point is to get away from the city life for a couple

36 Oct 27 2018 0-hours.

37 Oct 27 2018 0:Nothing

38 Oct 27 2018 0:Really that is my wife

39 Oct 27 2018 0-Nothing

40 Oct 27 2018 0-Nothing

41 Oct 27 2018 0(My own schedule (time limitations)

This is a positive thing, but I suppose the abundance of other great places to run around the Twin Cities limits my use in that

42 Oct 27 2018 0!there are always so many great options.

43 Oct 27 2018 1- Nothing I can think of

Leash laws are not enforced. Too many dogs

44 Oct 27 2018 1:running around

Flooding. Sometimes I avoid it because I

45 Oct 26 2018 1-can't make a loop from Shepard if it's wet.

46 Oct 26 2018 0: St. Paul's hostility towards ice climbing.  
47 Oct 26 2018 0: nothing  
48 Oct 26 2018 0: Legal ability to climb.  
49 Oct 26 2018 0: no problem  
50 Oct 26 2018 0: NO PLAY EQUIPMENT!!!!  
51 Oct 26 2018 0: Not permitting ice climbing  
52 Oct 26 2018 0: Weirdos and freaks at Crosby  
53 Oct 26 2018 0: there could be more adventure elements  
54 Oct 26 2018 0: None of the above  
55 Oct 26 2018 0: Floods  
56 Oct 26 2018 0: Walkers and bikers on the same path  
57 Oct 26 2018 0: time off from work  
58 Oct 26 2018 0: paved trails are really rough

Crossing Shepard can be dangerous. Drivers  
59 Oct 26 2018 0: run the lights. Only a few crossings.  
I live in Mpls so don't get there as often as I'd  
60 Oct 26 2018 0: like  
Flooding after rains or snow melt. Sometimes  
61 Oct 26 2018 0: hesitant to go alone.  
62 Oct 26 2018 0: nothing  
Possibly safety issues sometime but have  
63 Oct 26 2018 0: never had a bad experience yet.  
I live far away (Maple Grove), but it's a really  
64 Oct 26 2018 0: nice park.  
FLOODING (or worry about flooding and not  
65 Oct 26 2018 0: finding up-to-date info)  
It floods out a lot around the pond and lake,  
limiting access. Would love to see a  
permanent raised board walk around parts of  
the pond and repair to trail on the Pond's  
66 Oct 26 2018 0: northwest hillside  
67 Oct 25 2018 0: Nothing!  
68 Oct 25 2018 0: my schedule  
69 Oct 24 2018 0: Nothing limits my use  
70 Oct 23 2018 0: Occasionally high water on trails.  
71 Oct 22 2018 0: my work schedule!  
72 Oct 21 2018 1: Weather

When the trail between the parks is flooded, I  
generally won't go down to Hidden Falls as  
73 Oct 21 2018 0: biking back up the HF entrance is tough.

Walking access to hidden falls - both North  
74 Oct 21 2018 0: and South entrances - needs to be improved

- 75 Oct 20 2018 0:time  
76 Oct 20 2018 0: Personal time  
77 Oct 19 2018 0:Nothing  
For a while, it was the Coyotes (aka "Hi-  
78 Oct 19 2018 1:yote") because I bring my dog there  
Took me a long time to understand where the  
entries are and what the reach down to.  
79 Oct 19 2018 1:Competing uses for time.  
80 Oct 19 2018 0:occasional flooding; mosquitoes  
Hidden Falls is kind of yucky. Here are far too  
many picnic tables with all the cars and boats  
81 Oct 18 2018 0:going by.  
82 Oct 18 2018 1:I usually only go on school trips  
83 Oct 18 2018 1:i dont like parks  
84 Oct 18 2018 1:I dont live close by  
I don't really like it because I've only ever  
85 Oct 18 2018 1:been because of school.  
86 Oct 18 2018 1:I don't live close by  
87 Oct 18 2018 1:I only go for school.  
88 Oct 18 2018 1:weather  
89 Oct 18 2018 1:i dont like going  
90 Oct 18 2018 1:never bine there  
Acess, but more specifically: the bus doesn't  
91 Oct 18 2018 1:go there.  
92 Oct 18 2018 0: My just not going there that often.  
93 Oct 18 2018 0: Parking  
94 Oct 17 2018 0:Time- my schedule is busy  
95 Oct 17 2018 0:Time - busy working mom!  
96 Oct 17 2018 0:Flooding  
97 Oct 17 2018 0:I have no limits  
  
All the picnic tables are in one area and only  
98 Oct 17 2018 1:one firepit. Also the bike trail is rough.  
99 Oct 17 2018 1:No limits perceived  
Nothing really -wish the trails would be  
100 Oct 17 2018 1: repaired  
101 Oct 17 2018 0:Nothing!  
102 Oct 17 2018 0:I moved out of the neighborhood.  
I feel like while I have to drive/bike/paddle a  
little ways from Minneapolis, it's actually quite  
close. I might visit it more often if there was  
better bike lane infrastructure along the  
Mississippi River Blvd. I also would come  
very often if there was a public kayak launch  
103 Oct 17 2018 0:site from Crosby.

I live in Woodbury. I use other parks that are closer to home more often.

104 Oct 17 2018 0: I don't get down as often as I would like, and the only times I have not been able to get there were when there was a hunting party or

105 Oct 17 2018 0: when it's flooded

106 Oct 17 2018 0: Time

107 Oct 17 2018 0: Time and other committments

108 Oct 17 2018 0: Lack of free time

109 Oct 17 2018 0: Time

110 Oct 16 2018 1: Time

111 Oct 16 2018 1: I do not feel limited.

112 Oct 16 2018 0: None

113 Oct 16 2018 0: Time

I and my birding friends appreciate that there are few activities or programs, there are plenty of other parks with play areas and massive picnic shelters, this is one of the few

114 Oct 16 2018 0: where we can let our imaginations run free.

115 Oct 16 2018 0: High water

Continuous erosion of the Riverbanks and loss of trees due to Mn River in high water

116 Oct 16 2018 0: sending excessive water across Pike Island.

117 Oct 16 2018 0: Mosquitos .:-)

The trails can be muddy. However, this is not

118 Oct 16 2018 0: much of a problem.

Limited parking near I-35 (this may be a good

119 Oct 16 2018 0: thing)

Bathroom open in winter for students would be helpful to staying there for a longer period

120 Oct 16 2018 0: of time

121 Oct 16 2018 0: N/A

I actually walk to Crosby Farm about once

122 Oct 16 2018 0: each week. I don't feel limited.

Sometimes the parking lot on the north (my

123 Oct 16 2018 0: preferred) end of the park is full

West end of bike trail is patchy--some terrible

124 Oct 16 2018 0: stretches

Lack of bathroom facilities throughout the

125 Oct 16 2018 0: year, especially winter.

I don't feel safe at night, I only come during

126 Oct 16 2018 0: the day

127 Oct 16 2018 1: Shoreline of Crosby lake overgrown

128 Oct 16 2018 1: Nothing, except high water.

129 Oct 16 2018 1 Lack of free time

I'm not sure if car break-ins are still a

130 Oct 16 2018 1 problem, but that does bother me.

I don't feel limited at all. One thing that would limit my use would be if more buildings & paved paths were put in. Too much

131 Oct 16 2018 1 development would wreck the experience.

132 Oct 16 2018 1 Own physical limitations

I don't prioritize it. And the parking at the small lot at Crosby is closest to my house but is usually full. It would be great if there were

133 Oct 16 2018 1 additional parking spots down there.

134 Oct 16 2018 1 None

135 Oct 16 2018 1 I do not feel that my use is limited

136 Oct 15 2018 1 No limits

137 Oct 14 2018 0 I visit from great distance.

I live in St. Paul, but not particularly close to

138 Oct 13 2018 1 the park.

My use of park is occasionally limited by

139 Oct 13 2018 0 closures of the river road

140 Oct 13 2018 0 dogs being run off leash

141 Oct 13 2018 0 No place for dog to run off-leash

142 Oct 13 2018 0 Nothing...it's perfect

143 Oct 12 2018 0 Flooding.

Access in terms of older people with walker or wheelchair, like how can my mom enjoy the river? For me, i walk and bike and i like how dowdy it is, and i do feel safe, people who don't feel safe want lights and

144 Oct 12 2018 0 domesticated dominant culture junk

When the park is closed for other activities

145 Oct 12 2018 0 and we have to sneak in.

146 Oct 12 2018 1 I tend to use it only in summer for biking

147 Oct 12 2018 0 Aggressive dogs running loose!

Dirt trails erode into the river, becoming

148 Oct 12 2018 0 unsafe.

149 Oct 12 2018 1 none

At times there is not enough parking for boat

150 Oct 11 2018 0 trailers.

There is nothing that limits my use of this

151 Oct 10 2018 0 area.

152 Oct 10 2018 0 no limits for me.

153 Oct 10 2018 0 None

154 Oct 10 2018 0:Weather

Wish there were mountain bike single track

155 Oct 10 2018 0:trails

Specific mountain bike single track would be

156 Oct 10 2018 0:awesome

Maintenance of the trails is limited. A natural surface would be smoother and easier to

157 Oct 10 2018 0:maintain in most areas.

I have no limitations to access. It is easy to find parking when I do drive and I can run/walk to the park easily. Once in the park there is an excellent trail system both paved

158 Oct 10 2018 0:and dirt and a great picnic shelter/bathrooms.

Just making it over there from my regular

159 Oct 10 2018 1(routine.

160 Oct 10 2018 1(Parking, trails sometimes flooded

Nothing really. Just choose other places to

161 Oct 10 2018 0:exercise from time to time.

Safety is a concern, I do not go as early as I

162 Oct 09 2018 0:would like.

I do not feel safe in the evening, particularly in the fall and winter when the sun sets

163 Oct 09 2018 0:earlier.

164 Oct 09 2018 0:I see no limits to my enjoyment of the park.

165 Oct 09 2018 0:not limited

166 Oct 09 2018 0:I don't feel limited to use the park

167 Oct 09 2018 0:Nothing

168 Oct 09 2018 0:car break-ins

169 Oct 08 2018 0:I work for a living.

170 Oct 08 2018 0:Location.I live in Burnsville.

171 Oct 08 2018 0:mosquitoes/flooding

172 Oct 08 2018 0:Too many paved trails

173 Oct 08 2018 0:flooding :> (

174 Oct 08 2018 0:nothing does

175 Oct 07 2018 0:Nothing

176 Oct 06 2018 0:Weather is the only thing that limits my use.

177 Oct 06 2018 1:Flooding

178 Oct 06 2018 0:Seasonal flooding

Too many other great parks in the region so I

179 Oct 06 2018 0:need to check out all of them.

180 Oct 06 2018 0:location is far from my home

I usually frequent parks nearer my home, like

181 Oct 05 2018 1:Lebanon Hills Regional Park.

- 182 Oct 05 2018 1(Outdated/run down facilities like bathroom  
183 Oct 05 2018 1(Asphalt needs improved  
Other parks closer to home and more  
184 Oct 05 2018 0!peaceful  
185 Oct 05 2018 0!Nothing  
Nothing. I like to run a variety of places, that's  
186 Oct 05 2018 0!all!  
187 Oct 05 2018 0!Life is busy  
Flooding or snow/ice making boat ramp  
188 Oct 05 2018 0!unusable  
Sometimes trails are underwater or have  
189 Oct 05 2018 1(fallen into the river.  
nothing -except if there's an event going on  
190 Oct 04 2018 0!and there's too many people  
191 Oct 04 2018 0!distance from my house by bicycle  
192 Oct 04 2018 0!Nothing  
Nothing except the periodic bow hunting  
weekend but I expect that helps keep deer  
193 Oct 04 2018 1(population in check.  
194 Oct 04 2018 0!nothing love it!  
It's become a dog park with many dogs  
195 Oct 04 2018 0!running free every time.  
196 Oct 04 2018 0!Time  
197 Oct 04 2018 0!Nothing  
198 Oct 04 2018 0!Nothing limits my access  
199 Oct 04 2018 0!no limits  
When it's flooded and when the mosquitos  
200 Oct 03 2018 0!are terrible.  
Nothing but a lack of time on my part.  
Although the lot nearest me (off 35 is often  
full, but that's a minor concern with multiple  
201 Oct 03 2018 0!access points.  
202 Oct 03 2018 0!None. Love the park.  
203 Oct 03 2018 0!Nothing  
  
Lots of garbage. I spend much of my time in  
the spring picking up the hillside from all the  
trash that's dumped in the woods. Also I am  
suspicious that there are drug deals going on  
in the parking lots, which I also find evidence  
204 Oct 03 2018 0!of when I pick up trash :)  
205 Oct 03 2018 0!No limits  
events outside the park on the river road that  
206 Oct 03 2018 0!block entrance

Snow and entrance closing to hidden falls in colder times of year, even though the river is  
207 Oct 03 2018 0: open and I am interested in boating.

I don't have anything that limits my use of the  
208 Oct 03 2018 0: park. I drive by every day.

lack of quality built features, good trails,  
benches, picnic tables, play grounds, large

209 Oct 03 2018 0: shelters

210 Oct 03 2018 0: Safety and flooding

211 Oct 03 2018 1: Closure times and overnight parking

212 Oct 03 2018 1: Nothing

limited enhancement (parking, trail to river,  
213 Oct 03 2018 1: dock for launching non-motorized boats, etc.)

214 Oct 03 2018 1: Flooding

215 Oct 03 2018 1: I don't have any limits, I feel safe

216 Oct 03 2018 1: Nothing

Daytime inappropriate sexual activities in  
217 Oct 03 2018 1: parking areas.

Park hours(HF closes at 10pm) and poor trail  
218 Oct 03 2018 0: maintenance

219 Oct 03 2018 0: Nothing

220 Oct 03 2018 0: Weather- flooding or snow

Nothing limits use. It's limited access points  
preserve its secluded charm and helps limit  
disturbance of wildlife. Do not turn this into  
more soccer fields. These are ecologically  
vital areas for a host of species. They are  
running out of space. Please save this small  
221 Oct 03 2018 0: sliver of habitat from development.

222 Oct 03 2018 1: nothing limits my use

when some of the trails are closed for  
flooding. Plus more bathroom access and  
223 Oct 02 2018 0: signage about trail paths would be helpful.

South entrance is not great for walking since  
224 Oct 02 2018 0: there is no sidewalk or shoulder.

225 Oct 02 2018 0: Nothing

The paths are very rough for biking, the  
signage is a little lacking or confusing to me  
226 Oct 02 2018 0: for way finding

227 Oct 02 2018 0: Limited free time, I would go more if I could

228 Oct 02 2018 0: Nothing

- 229 Oct 02 2018 0: I work too much  
230 Oct 02 2018 0: The lights aren't on!  
231 Oct 02 2018 0: Trails under water!  
232 Oct 02 2018 0: Simply not enough time  
233 Oct 02 2018 0: nothing

I don't feel safe alone in Crosby Farm Park,  
due to its heavily wooded character. This is

- 234 Oct 02 2018 0: part of its beauty however.  
235 Oct 02 2018 0: Flood water or mosquitoes  
236 Oct 02 2018 0: Parking and seasonal closures  
237 Oct 02 2018 0: none  
238 Oct 02 2018 0: dark  
239 Oct 02 2018 0: na

I would not feel safe there at dusk or dawn (I  
240 Oct 02 2018 0: am a woman).

- 241 Oct 02 2018 0: Available free time  
the roads suck going to the park, bumpy, and  
too many people taking up limited parking

- 242 Oct 02 2018 0: near the boat ramp  
243 Oct 02 2018 0: Nothing- it is perfect

When the river floods it's hard to use the  
paths. I wish there were more garbage cans  
around but I guess that might increase trash

- 244 Oct 02 2018 0: blown around  
Parking at the entrance near Shepard and  
245 Oct 02 2018 0: 35E is very limited  
Nothing limits my use of the park. I love it  
tremendously the way it is. I especially love  
being able to access hidden falls via canoe or  
246 Oct 02 2018 0: car.

My husband doesn't like me to go there alone  
(I'm female) so I bike there with the kids. I  
don't let them go in there alone. So safety is

- 247 Oct 02 2018 0: a concern, but more for them, than for me.  
248 Oct 02 2018 0: nothing

Periodic flooding. Trees have not been  
249 Oct 02 2018 0: cleared from paths.

Needs new paths, many times The paths are

- 250 Oct 02 2018 0: underwater.

- 251 Oct 02 2018 0: None

Seasonal flooding of trails/steepness of

- 252 Oct 02 2018 0: access roads for my kids while biking

- 253 Oct 02 2018 1: nothing limits my use of the park

- 254 Oct 02 2018 1: Nothing - use frequently even with the big hill water. I can't use the trails when they are
- 255 Oct 02 2018 1: underwater.
- 256 Oct 02 2018 1: nothing
- 257 Oct 02 2018 1: Nothing limits my use.
- 258 Oct 02 2018 1: Personal business/winter  
I like to walk or bike with my kids there, but there are sections of the trail that are much too steep to be used safely with a stroller or small child on a bike. I'd like to see these
- 259 Oct 02 2018 1: regraded for safety of use
- 260 Oct 02 2018 1: Bathroom access (toddler parent)  
I feel safe with others but I probably wouldn't
- 261 Oct 02 2018 1: go alone as a woman
- 262 Oct 02 2018 1: Leave it as is!!
- 263 Oct 02 2018 1: Lack of parking
- 264 Oct 02 2018 1: My schedule.
- 265 Oct 02 2018 1: Lack of trails and rest rooms at south end
- 266 Oct 02 2018 1: Nothing
- 267 Oct 02 2018 1: I wish I had more time
- 268 Oct 02 2018 1: Nothing
- 269 Oct 02 2018 1: Lack of off-road trails (singletrack)
- 270 Oct 02 2018 1: None
- 271 Oct 02 2018 1: the long hill  
The trails can be rough on the North side at
- 272 Oct 02 2018 1: Crosby Farm.
- 273 Oct 02 2018 1: Nothing limits it. It's fine as it is.
- 274 Oct 02 2018 0: I fish in the evening until past dark.
- Not set up for nor enough parking spots to park boat trailers. The park has spots but people don't feel comfortable using the singles due to the cars that are parked with
- 275 Oct 02 2018 0: patrons doing questionable things
- 276 Oct 02 2018 0: Many other parks to visit  
Nothing. People like Crosby because it is a hidden gem, and it should stay that way.  
Please do not turn it into just another city
- 277 Oct 02 2018 0: park.
- 278 Oct 01 2018 0: Limited parking
- 279 Oct 01 2018 0: Nothing  
Sometimes there are too many people and bikers around. It feels overcrowded. Bikers
- 280 Oct 01 2018 0: are not respectful.

281 Oct 01 2018 0:flooding  
282 Oct 01 2018 0:Nothing  
283 Oct 01 2018 0:No limits

Hours of operation. Parks should be open 24/7 to promote use by a diverse group of people. People who work 2nd shift, etc. Boat ramp closing at 10pm takes some of the best fishing windows out of possibility.  
None  
nothing

Do not feel particularly safe using bathrooms.  
N/A  
don't want to go after dark  
Poor condition of area around the falls  
Not enough trails.  
No limitations  
Time.  
nothing. we live nearby  
safety, program info not easily accessible  
None. I only feel limited by my personal time  
constraints.  
My own schedule

The place I feel the least safe is on the trail under the bridge and near the parking lot at Hidden Falls south gate. People loitering and sitting in cars, people on or near trail with no obvious purpose (e.g. they are not walking a dog or fishing). I do not use either park early in the morning or after sunset.  
Not much limits my use but I do have some safety concerns.  
I do not feel safe by myself  
other options...  
Nothing  
time  
Not enough time in my schedule  
Parking during large events  
Nothing limits me, but the trash along the path, the riverbank and the graffiti across the river on the concrete embankment are disgusting

disgusting

- Periodic flooding of two low lying areas of the Hidden Falls bike path and the outer loop of
- 307 Sep 28 2018 0 the Crosby bike path.  
I wish there were less steep and more
- 308 Sep 28 2018 0 options for entry and exit on foot and bike  
A little bit of all of the above. Also, lack of
- 309 Sep 28 2018 1 modern, clean amenities.  
I feel safe. But i can see how women might
- 310 Sep 28 2018 1 not.  
uneven pavement for walking on paved trail;
- 311 Sep 28 2018 1 better trails to the river; a fishing pier  
nothing limits me from using or visiting the
- 312 Sep 28 2018 1 park
- 313 Sep 28 2018 1 steep hills to walk or bike back up  
Nothing. IMO - Question should be worded
- 314 Sep 28 2018 1 with none option!!  
There are no limits to me, day or night,
- 315 Sep 28 2018 1 summer or winter.
- 316 Sep 28 2018 0 Coyotes in the area
- 317 Sep 28 2018 0 nothing in particular  
One of the choices should be nothing limits
- 318 Sep 28 2018 0 my access to the parks...
- 319 Sep 27 2018 1 Nothing
- 320 Sep 27 2018 0 It is a distance from my apartment
- 321 Sep 27 2018 0 nothing
- 322 Sep 27 2018 0 I do not find anything that limits my use
- 323 Sep 27 2018 0 I visit other parks that are closer to me
- 324 Sep 27 2018 0 Time to attend.  
Only my work schedule. I would be there every week if I could. I would like to be part of the team who helps keep the trails cleaned. I could also be a Spanish-speaking docent if
- 325 Sep 27 2018 0 you need that.
- Getting across Shepard Road at either park entrance ...or in between. There are gaps of over a mile or more between signalized intersections on Shepard, and no other crossings with crosswalks, signage or even openings in the guard rails that would permit a person to safely cross this over-built
- 326 Sep 27 2018 0 highway.
- 327 Sep 27 2018 0 none
- 328 Sep 27 2018 1 we live live in oregon
- 329 Sep 27 2018 1 Just don't live close enough
- 330 Sep 27 2018 1 Washed out paths
- 331 Sep 27 2018 1 NA

- 332 Sep 27 2018 1 when they close at night  
Hill down to the park in the winter isn't plowed
- 333 Sep 27 2018 0 and is very icy
- 334 Sep 27 2018 0 Flooding
- 335 Sep 27 2018 0 locked gate, high water, big loud events
- 336 Sep 27 2018 0 not enough benches/ picnic tables
- 337 Sep 27 2018 0 Trail conditions
- I would love a more accessible public fire pit  
that wasn't surrounded by glass. We have
- 338 Sep 26 2018 1 been trying to clean up what we find.
- 339 Sep 26 2018 1 Nothing
- 340 Sep 26 2018 1 Nothing
- Nothing. You should have had an option to
- 341 Sep 26 2018 0 say that.
- 342 Sep 26 2018 0 It's a 20 min. Drive. Como park is closer
- 343 Sep 26 2018 0 Nothing, it's part of my neighborhood.
- 344 Sep 26 2018 0 Time
- 345 Sep 26 2018 0 Nothing
- 346 Sep 26 2018 0 I don't have any issues except work
- 347 Sep 26 2018 0 Flooding
- 348 Sep 26 2018 0 Time
- Not enough freetime. The excuses above are
- 349 Sep 26 2018 0 sad.
- the itchy plants that overgrown the trails on
- 350 Sep 26 2018 0 the eastern end
- 351 Sep 26 2018 0 Not enough time to be at a park
- 352 Sep 26 2018 0 no limits constrain me
- i live close, so nothing really limits me but it  
would be nice if there was a dedicated dog
- 353 Sep 26 2018 0 park area in hidden falls park!!
- 354 Sep 26 2018 0 Cost
- 355 Sep 26 2018 0 Flooding this year, hunting the deer
- 356 Sep 26 2018 0 Nothing limits my use of the park.
- I am not limited although I do not like to go
- 357 Sep 26 2018 1 alone.
- 358 Sep 26 2018 0 na
- Nothing, I feel very comfortable, I meditate
- 359 Sep 25 2018 1 there
- Often flooded. Stopped having picnics on the  
river bank at Crosby because too many
- 360 Sep 25 2018 0 people let their dogs run off leash.
- 361 Sep 25 2018 0 I do not feel limited in my access to this park.
- 362 Sep 25 2018 0 visit other sites with more amenities

There is no reason someone who wants to access the park cannot. It has easy access. The only thing I would say is that crossing Shepard road is putting your life at risk some

363 Sep 25 2018 0 days.

364 Sep 25 2018 0 flooding

365 Sep 25 2018 0 vehicle traffic when I'm on a bike

Nothing. I like that access isn't obvious, nor quick, so it doesn't become a gathering place

366 Sep 25 2018 0 for loud ne'er do wells

367 Sep 25 2018 0 nothing

368 Sep 24 2018 0 Absolutely NOTHING!

369 Sep 22 2018 0 Not enough singletrack for mountain biking

370 Sep 22 2018 0 It's just a simple park. Nothing special to do

371 Sep 21 2018 0 N/A

372 Sep 21 2018 1 Distance from Minneapolis

373 Sep 21 2018 0 no limits

374 Sep 21 2018 0 No limitations

375 Sep 21 2018 0 NA

376 Sep 21 2018 0 Nothing

Seems like flooding or construction have closed it a few times over the years, but

377 Sep 21 2018 1 nothing consistent. It feels a little untended.

378 Sep 21 2018 1 Free time

379 Sep 21 2018 1 Nothing

380 Sep 20 2018 1 Busy

381 Sep 20 2018 1 Nothing

382 Sep 20 2018 1 Bathrooms are so far from the water.

383 Sep 20 2018 0 Been closed a lot lately/flooding, construction

384 Sep 20 2018 0 Not enough parking

385 Sep 20 2018 0 Nothing

386 Sep 20 2018 0 Nothing really (maybe flooding)

387 Sep 20 2018 0 Going to work

388 Sep 20 2018 0 Poor trail maintenance

389 Sep 20 2018 0 flooding, and too much silt on trails

390 Sep 20 2018 0 Nothing limits my use.

Just flooding, but that's part of what it's supposed to do so I don't mind when I can't

391 Sep 20 2018 0 go because of water

392 Sep 20 2018 0 Water levels. Flooding

393 Sep 20 2018 0 Time

394 Sep 20 2018 0 None  
395 Sep 20 2018 0 Not enough personal free time  
396 Sep 20 2018 0 Not enough mtb trails

I don't feel limited except in the winter if the roads down are particularly icy, but that's true  
397 Sep 20 2018 0 of any steep grade in icing conditions  
Occasionally bothered by off leash dogs and  
398 Sep 20 2018 0 their owners  
Trails aren't paved - difficult to bike/use  
399 Sep 20 2018 0 stroller. Lots of car break-ins  
400 Sep 20 2018 0 Time  
401 Sep 20 2018 0 Nothing  
402 Sep 20 2018 0 I don't feel limited  
403 Sep 20 2018 1 Nothing  
404 Sep 20 2018 1 No limits

It seems rediculous that most of the area by the water seems devoted to parking lots. It seems like a really weird use of the land. I'd  
405 Sep 20 2018 1 like to read/sit with my dog by the water.

406 Sep 20 2018 1 No walking path access to lower hidden falls.  
407 Sep 20 2018 1 Nothing limits me other than flooding  
Nothing, though car break ins are always a  
408 Sep 20 2018 1 concern.

Not serviced by public transportation as if I walk there I wouldn't need to walk once I

409 Sep 20 2018 1 arrive

410 Sep 20 2018 1 None of the above

People let their dogs run loose and my dog

411 Sep 20 2018 1 was attacked

412 Sep 20 2018 1 time

413 Sep 20 2018 1 Time and weather

Wish there was a trail from Summit University

414 Sep 20 2018 1 connecting to the river.

415 Sep 20 2018 1 n/a

416 Sep 20 2018 1 NOthing

417 Sep 20 2018 1 Nothing comes to mind

418 Sep 20 2018 1 Too many MOSQUITOES!!

419 Sep 19 2018 0 Free time

420 Sep 19 2018 0 flooding

Paved trails get boring. Would like off-road

421 Sep 19 2018 0 trails

422 Sep 19 2018 0 Nothing.

- 423 Sep 19 2018 0 nothing
- 424 Sep 19 2018 0 No designated MTN bike trails  
I would like more mountain bike/ natural
- 425 Sep 18 2018 1 surface trails
- 426 Sep 18 2018 1 Flooding, excessive moisture
- 427 Sep 18 2018 0 Nothing.  
Activities aren't limited really, but would love more bike trails. Specifically single track mountain bike trails. Not enough of that in
- 428 Sep 18 2018 0 Saint Paul
- 429 Sep 18 2018 0 my own willpower and motivation.
- 430 Sep 18 2018 0 Wet in spring, overgrown trails
- 431 Sep 18 2018 0 None of the above
- 432 Sep 18 2018 0 nothing really
- 433 Sep 18 2018 0 I haven't felt limited
- 434 Sep 18 2018 0 Nothing
- 435 Sep 18 2018 0 No idea
- 436 Sep 18 2018 0 No proper off road bike trails  
Parking is limited, not well lit or mapped out, no kid friendly equipment or activities (age is
- 437 Sep 18 2018 0 3-4)  
Erosion of the beach, and loss of trees along
- 438 Sep 18 2018 0 the beach
- Later in the day a bad crowd shows up. Off
- 439 Sep 18 2018 0 road bikes on the trails that are a danger
- 440 Sep 18 2018 0 Downed trees on trails.
- 441 Sep 18 2018 0 It is often to muddy or icy to safely enjoy
- 442 Sep 18 2018 0 I live in hopkins, so it's a drive over there
- 443 Sep 18 2018 0 Distance from my house
- 444 Sep 18 2018 0 There could be official mountain bike trails
- 445 Sep 18 2018 0 Lack of mountain bike singletrack  
I would LOVE to see mountain bike trails put in there! It would drastically increase how
- 446 Sep 18 2018 0 often I used the park!
- 447 Sep 18 2018 0 Lack of MTB trails
- 448 Sep 18 2018 0 Not enough parking
- 449 Sep 18 2018 0 High water and events that close the park
- 450 Sep 18 2018 0 Not enough free time
- 451 Sep 18 2018 0 not enough time  
Not enough well funded, maintained and
- 452 Sep 18 2018 0 sustainable MTB trails.
- 453 Sep 18 2018 0 Far from home
- 454 Sep 18 2018 0 Limited trails



490 Sep 18 2018 1 No mountain bike trails

Wish there were mountain bike trails for off-

491 Sep 18 2018 1 road biking

I usually go mountain biking. On the weekend

492 Sep 18 2018 1 and that takes me away from the park.

493 Sep 18 2018 1 There isn't any mountain biking.

Personal disabilities. Moving the Crosby  
parking lot so far from Upper Lake reduced

494 Sep 16 2018 1 my ability always to get there.

There can be a conflict between bikes and  
walkers using the same path. I am always  
worried about fast paced bikes coming up

495 Sep 15 2018 0 behind me.

window was broken on my car window in the

496 Sep 15 2018 0 parking lot at Montreal and Shepard

497 Sep 14 2018 0 My time

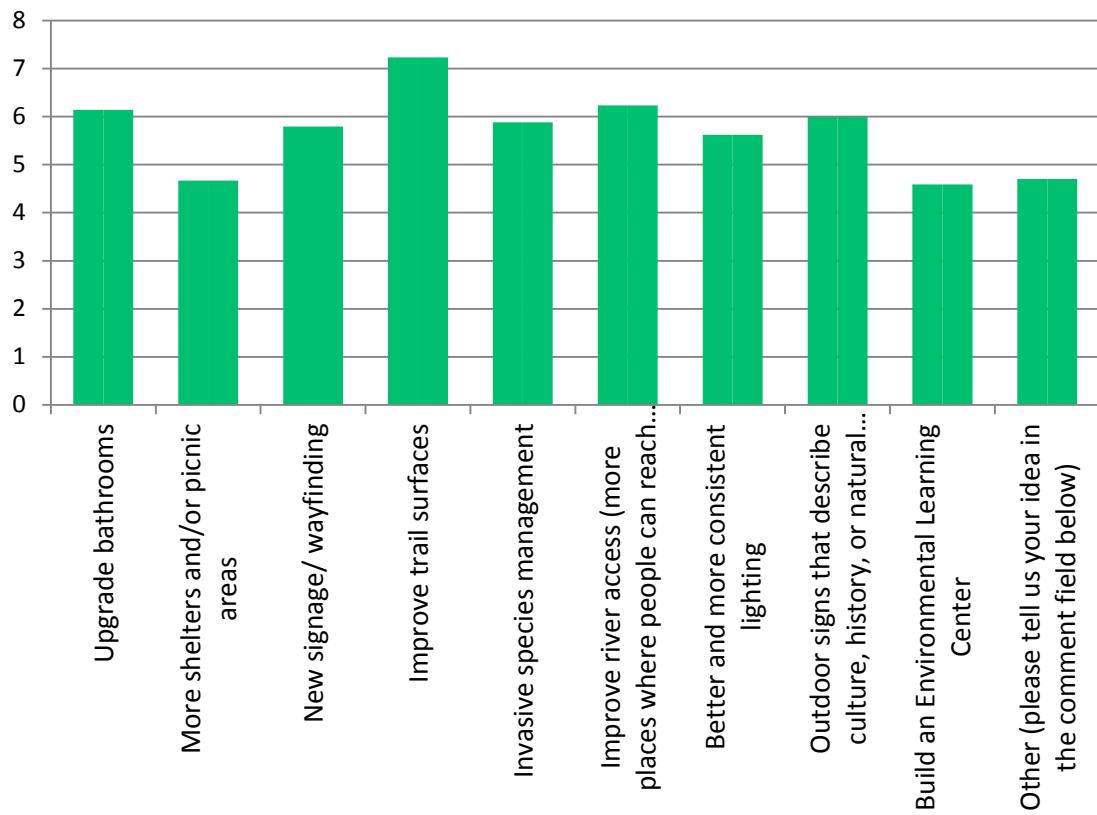
498 Sep 14 2018 0 No real limits

## Hidden Falls-Crosby Farm Regional Park Master Plan

Please rank these potential improvements from most likely to improve your use of the park (top/lowest number) to least likely (bottom/highest number):

	1	2	
Upgrade bathrooms	7.09%	47	11.76% 78
More shelters and/or picnic areas	2.69%	17	5.38% 34
New signage/ wayfinding	6.65%	43	8.96% 58
Improve trail surfaces	28.25%	191	17.60% 119
Invasive species management	9.89%	65	13.09% 86
Improve river access (more places where people can reach the river)	11.62%	76	14.68% 96
Better and more consistent lighting	7.45%	47	10.46% 66
Outdoor signs that describe culture, history, or natural features within	6.46%	42	11.69% 76
Build an Environmental Learning Center	4.87%	31	7.55% 48
Other (please tell us your idea in the comment field below)	29.98%	161	5.21% 28

Please rank these potential improvements from most likely to improve your use of the park (top/lowest number) to least likely (bottom/highest number):





	Total	Score
23	663	6.14
40	632	4.67
25	647	5.79
28	676	7.23
30	657	5.88
26	654	6.23
25	631	5.62
15	650	5.99
70	636	4.59
268	537	4.7
<b>Answered</b>	<b>751</b>	
<b>Skipped</b>	<b>189</b>	

## Hidden Falls-Crosby Farm Regional Park Master Plan

### Do you have any other comments, questions, concerns, or ideas?

Answered 561

Skipped 379

Respondents	Response Date	Responses
		For the most part I prefer to leave it natural, but if something is to
1	Oct 31 2018 0	be built I would suggest a nature play area.
		Availability of larger group spaces for year round programming.
2	Oct 31 2018 0	The park should be kept low key and natural. We don't want more landscaping, tables, etc. It's a serene retreat and want to
		keep it that way.
3	Oct 31 2018 1	no
		Indigenous people history, culture, and stories of area are given
4	Oct 31 2018 0	prominent place.
		I reviewed the meeting minutes on 10/16, and agree with Group 2's assertion to "Keep it Wild", and as a "nature preserve", which coincides with Group 3's input - "quiet spaces in the flats should also be a priority". An ideal compromise could be to repair or improve only the areas that have already been developed or embraced human intervention, while "keeping it wild and quiet" in all other areas. This could be a win-win for everyone. For example, improve the pavilion and pavilion bathrooms, and only repaving paths that have previously been paved. All while continuing to allow the river trails and North side of Crosby Lake to have minimal human intervention. Thank you for considering improvements to this important park, and for considering my
6	Oct 30 2018 0	input.
7	Oct 30 2018 0	no
8	Oct 29 2018 0	No
		i wish more people knew about crosby park and could get to it -
9	Oct 29 2018 0	it's such a great nature space
		If you upgrade signage please add Ojibwe and Dakota language to the signs. We do not need more motorized access.
		Sometimes it is just nice to have quiet places to go and be with nature. This place is sacred to Native people from the entire state. We drive over 2 hours once a month to attend Water
10	Oct 29 2018 0	Ceremony on Sunday morning.
11	Oct 29 2018 1	not really
		If you change the lighting, please make sure it's low Kelvin/Yellow
12	Oct 29 2018 0	lights: <a href="http://www.startribune.com/light-pollution/494609791/">http://www.startribune.com/light-pollution/494609791/</a>

- Allow more crossings into the park so that apartments nearby can safely travel to the park
- 13 Oct 28 2018 0 More ice climbing friendly
- 14 Oct 28 2018 0 no
- More play activities for kids, maybe a nature obstacle course made out of stumps and fallen trees
- 
- 16 Oct 28 2018 1: This is one of few spots where ice climbing is possible in the twin cities
- 17 Oct 28 2018 1 Please allow ice climbing at the park!
- Outdoor recreation is important in Minnesota winters. It is a unique and special experience to be able to climb close to the city. Please consider how to maintain recreational climbing for the next generation. I hope my kids (ages 8 and 12) will have the continuing opportunity to climb here in the future. Thank you for the consideration!
- 19 Oct 28 2018 0 Keep this area open for ice climbing
- 21 Oct 28 2018 0 Keep parks clean
- 22 Oct 27 2018 1 Improve ice climbing
- 23 Oct 27 2018 0 No
- 24 Oct 27 2018 0 Allow Ice climbing within park w/o additional permits/fees
- 25 Oct 27 2018 0 Ice climbing
- 26 Oct 27 2018 0 less theft
- Food & drink service! Look at Lake Nikomis & Minnehaha Sea Salt
- 27 Oct 27 2018 0 Salt
- 28 Oct 27 2018 1 No
- 29 Oct 27 2018 1 No
- Please preserve the ice climbing as you redesign the park.
- 30 Oct 27 2018 1 Thanks!
- Winter programming (nordic ski trails) w/chalet style rental building, canoe/kayak launch, connectivity between Hidden Falls and Crosby parks, unleash Hidden Creek back into Ford site and build bridge over creek along MRB.
- 31 Oct 27 2018 0 Thanks for a great riverfront park!
- 32 Oct 27 2018 0 Build playfields
- It is very hard to cross Shepard road to get to the park and trails.
- 34 Oct 27 2018 0 It would be great to have some safer crossing points. Thanks!
- 35 Oct 27 2018 0 No
- 36 Oct 27 2018 1 I would love to see ice climbing developed more in the park.
- 37 Oct 27 2018 1 Park should be safe for everyone
- I like it's wild feel I wouldn't want to see if over developed or over programmed.
- 38 Oct 26 2018 1 Yay, parks!

- Not that interested in making the parks more 'recreational' in the sense of picnic shelters, etc. What makes these parks unique is their proximity to the river and their forests. If I wanted more
- 40 Oct 26 2018 1 I picnic shelters I'd go to Minnehaha, Como, etc.
- The Homer's Odyssey ice climbing area has been an important part of twin cities ice climbing for many years. World class competitive ice climbers from MN have spent many hours there in the past. I would like to see the St. Paul park system welcome Ice climbers. Specific park improvements are not necessarily required. Just allow free and open access to the naturally occurring ice flows in the park. Look to the city of Sandstone for an example of how climbers are a positive force in the
- 41 Oct 26 2018 0 I community.
- riverside campsite, primitive camping. More dirt paths that are
- 42 Oct 26 2018 0 I cycling friendly
- 43 Oct 26 2018 0 I Farm ice and promote this wonderful ice climbing location!
- More ways to access the park and improving connectivity would
- 44 Oct 26 2018 0 I be great
- For Crosby, connections between the neighborhoods and the
- 45 Oct 26 2018 0 I park across Shepherd need to be improved.
- 46 Oct 26 2018 0 I Access to the ice climbing would be greatly appreciated.
- More information about the Dakota people who used to live in the area. It's right by Bdote - the birthplace of the world according to
- 47 Oct 26 2018 0 I the Dakota!
- I enjoy the multi use winter trails. Could develop the bluff trails for
- 48 Oct 26 2018 0 I mountain bikes.
- This place needs play equipment. It's unbelievable there is nothing here. I would suggest something fun and rustic, not like the playground equipment but more some fun things made from wood, ropes. Kind of like fun, challenging equipment for
- 49 Oct 26 2018 0 I kids/adults to explore and play.
- 50 Oct 26 2018 0 I I like ice climbing in the park
- 51 Oct 26 2018 0 I Keep Crosby wild, and allow us to ice climb
- 52 Oct 26 2018 0 I I enjoy ice climbing in this park.
- 53 Oct 26 2018 0 I Beach cleanup
- Improving access to the ice climbing gorge, and clearing trees and debris above and below the gorge. Improved erosion control
- 54 Oct 26 2018 0 I at the culvert outlet is a must.
- 55 Oct 26 2018 0 I Making it easier to bike to Crosby Farm state park!
- 56 Oct 26 2018 0 I No
- 57 Oct 26 2018 0 I Please, please DO NOT OVER-BUILD this lovely park.
- 58 Oct 26 2018 0 I More biker friendly!

I have almost been hit multiple times crossing the entrance while on the Mississippi River Trail bike path by cars coming up the steep hill. The park, because of the steep hill and lack of trails down to it, is not easy to get to by bike because how will I be able to get my 3 kids back up that hill? Maybe add some switchbacks like at frogtown farm & park. It is also not easy to get to from the neighborhoods. My kids attend school at homecroft -now Jie Ming- & we have tried to bike along the river and then to our school playground a few times and again- it is very dangerous because of cars leaving hwy 5 and getting angry we are taking up space on the road because there's no trail to transition into the quiet neighborhood there. Please improve pedestrian and bike access

59 Oct 26 2018 0: in the area as it is super dangerous right now.

60 Oct 26 2018 0: Thank you for providing a wonderful park in the city.

The park needs better bike and pedestrian access. It's really hard to cross Shepard Road to get to Crosby Farm. Also, I'd like to see a bike connection to the river road trail on the north end that

61 Oct 26 2018 0: doesn't rely on the car access road.

62 Oct 26 2018 0: more dirt trails for hiking-running.

63 Oct 26 2018 0: no

Leave it as simple as possible. It is a gem in the city. Walking biking or access to the river is just what we need. Nothing fancy,

64 Oct 26 2018 0: planned or over scheduled.

I think more access to the park is needed. I can also see how

65 Oct 26 2018 0: some feel unsafe there due to lighting and remote.

The huge hill in Hidden Falls is difficult to navigate up by foot or bike. Installing a bicycle lift and also a sidewalk with railing would

66 Oct 26 2018 0: be very helpful.

We love having fires on the river and the peacefulness that the

67 Oct 26 2018 0: park brings.

I recently moved to a new apartment on Shepard Road specifically so I can be close to the trail that takes me right to Hidden Falls/Crosby Farm. It's a wonderful area that I only just

68 Oct 26 2018 0: discovered last year.

Keep it natural and wildlife friendly. Invite people to appreciate this incredibly special flood plain as it is--walk, canoe, birdwatch, fish, etc. Don't inflict human activities on it--ballparks, soccer fields, etc. There are plenty of other places for those activities. Also, is this planning being done in conjunction with Ford plant

69 Oct 26 2018 0: development.

As a woman I dont feel safe on the trails unless I know its a busy time eg after work during the Spring and Summer and on the weekends. It would be great if it were more frequently patrolled

70 Oct 26 2018 0: on bike/horse and cars frequenting the parking lots.

71 Oct 26 2018 0: Single track trails for running  
72 Oct 26 2018 0: More non paved trails  
73 Oct 26 2018 0: Keep up the great work!  
74 Oct 26 2018 0: Allow us updates about closures due to flooding

The biggest limiting factor is flooding which has become more frequent. Streams feed the pond across the pathway as you come down the hill. Often this year, this area was under water. The floating paths at the north end of the pond are often not floating but also submerged. The once paved pathway on the northwest side of the pond has decayed to a place where it is no longer wheelchair accessible. I would like to see permanent raised boardwalk at the south and north ends of the pond and repair to the once paved trail around the northwest side of the pond. Opening and maintaining the bathrooms in the existing shelter would be nice also, rather than forcing folks to use a port-

75 Oct 26 2018 0: a-john.

76 Oct 26 2018 0: More running trails. Non paved. Cross Country Skiing?

We really need lighting at these parks. As a young, white, male I feel safe but I have many friends who do not feel safe. It is very dark down there! Especially at Crosby. But the lower parking lot at

77 Oct 25 2018 0: Hidden Falls is pretty scary at dusk, folks!

I love how close I live to wild nature within the bdate/confluence of the Mississippi and Minnesota Rivers. Though I understand some upgrades are necessary, I would be concerned with solutions that sterilizing and tame the area in such a way that we lose the wild

78 Oct 25 2018 0: character.

79 Oct 24 2018 0: Keep Crosby rustic and natural

Build a sand volleyball court, basketball court, or even small

80 Oct 24 2018 1: soccer field. Area needs more active space for youth.

81 Oct 23 2018 0: No.

82 Oct 23 2018 0: no

83 Oct 23 2018 0: Set the river free

Keep it secluded, keep it natural. Crosby and lilydale are two gems because they are nature both nature sanctuaries in the middle of the city. I go there to get away. Don't turn it into Harriet

84 Oct 22 2018 0: island. Let the people explore and get lost in the woods

85 Oct 21 2018 0: Worried about car getting broken into at north entrance.

86 Oct 21 2018 0: Mountain biking trails would be a great addition to this park!

I would like park staff or more people around. I typically walk at Minnehaha Falls Park in Mpls. as it's a safer walk, less crime.

Would love to be able to explore Hidden Falls on my own, I

87 Oct 21 2018 0 always go with a group when I go there so don't go as often.

Although I live within a block of the park (Crosby parcel), it is

88 Oct 21 2018 1; more than one mile to any safe access point.

89 Oct 21 2018 1(Dog park

I really enjoy riding/walking the trails but have often been disappointed to find various trails closed for weeks, sometimes months due to flooding. So I would suggest putting in bridges in

90 Oct 21 2018 0 parts of the trails where they generally get flooded.

The WPA projects should be a high priority for maintenance and  
91 Oct 21 2018 0 protection.

92 Oct 20 2018 0! no

Maintain as much as possible the natural river ecosystem with minimal unnatural development such as large picnic areas, athletic fields, parking lots - avoid development that could endanger the the river ecosystem. Limit the removal of trees, and

93 Oct 20 2018 0 other vegetation unless invasive.

I really like the park the way it is and would not want too much to change. I think it's important to have wild spaces in cities where  
94 Oct 19 2018 0! nature can take its course.

Don't build an environmental learning center UNLESS you plan to program and staff it. Too often, these buildings are empty and

95 Oct 19 2018 1; unused (despite good intentions).

96 Oct 19 2018 1(The interface for this question is maddening.

Restore more natural areas, like the wild flower fields at Crosby,  
97 Oct 18 2018 0 at Hidden Falls. The boat launch rules the whole flat area.

A boat landing should not be installed at Crosby Farm. Instead, money should be used to improve the parking, parking and ramp of Hidden falls. I do not see a reason to have two ramps so close

98 Oct 18 2018 0; together on such a sparsley used section of the river.

99 Oct 18 2018 1; no

100 Oct 18 2018 1; nope

101 Oct 18 2018 1; year round bathrooms would be very much appreciated

102 Oct 18 2018 1; nope

103 Oct 18 2018 1; No.

104 Oct 18 2018 1; none

105 Oct 18 2018 1; No

Work with Metro Transit to bring frequent buses to the park  
106 Oct 18 2018 1(entrances. The park should be available to everyone.

107 Oct 18 2018 0 None

If you don't want to drive to the park, it is a huge hill down and up to walk/ride. Anything creative to get people up/down would be awesome so that I wouldn't have to drive. Of course this is far

108 Oct 17 2018 0! fetched, but a gondola would be awesome!!

109 Oct 17 2018 0: upgrade the trails and boardwalk. Leave it natural!

110 Oct 17 2018 0: None

Under no circumstances should the Crosby bathroom building be demolished or replaced. It is an architectural gem. Its low height unimposing stone and woodwork are a perfect fit to this natural

111 Oct 17 2018 0: area.

Nature is vastly superior to park or city oversight. Please leave

112 Oct 17 2018 1: this park alone!

Please leave much of this park natural--the quiet trails and the woods offer much for families to adventure near the cities. Don't pave it all all put up tons of amenities! It will damage the unique

113 Oct 17 2018 0: feel of the park in the city.

114 Oct 17 2018 0: More nature, less human development

115 Oct 17 2018 0: This is a hidden gem.of St Paul. Love it. It's like home to me.

I think the park is lovely the way it is. Maintaining the trails and

116 Oct 17 2018 0: surfaces is very important.

Crosby Farm is such a beautiful gift to the city. I am so pleased

117 Oct 17 2018 0: that there is a plan in place to improve the grounds.

For #2, having the park staffed - would make me feel a bit safer.

As a woman, I don't feel comfortable being down there by myself,

118 Oct 17 2018 0: however.

I've never seen the falls and don't even know where it is and could really use a map kiosk like they have around the lakes in Minneapolis that gives distances and locates the park. Do not add

119 Oct 17 2018 0: lighting; keep it as natural as possible.

Keep supporting a clean watershed, and educating the public and nearby neighbors especially about preventing pollution and runoff

120 Oct 17 2018 0: from yards and roads, and picking up dog poop, etc

121 Oct 17 2018 0: Pollution of the water near park.

I've heard about safety issues at Crosby. □

Sometimes it's flooded at Crosby, a natural thing, but it's prevented us from walking there. □

My favorite thing at Hidden Falls is the shore with cottonwood roots. Second favorite thing is the WPA stonework and fire circles

122 Oct 16 2018 0: and steps. Wish the waterfall was cleaned up.

Improve connecting trails between Hidden Falls and Crosby Farm

123 Oct 16 2018 0: Park.

Please repave the trails. Consider a boat landing. Clean up the lakes, they're over nitrated. Fix up the current pavilion. Work on access to the upper trail on the bluff -- there's not a sign or even an easy way to get there, though I learned how on my own. Then maybe a learning center -- but the park needs a lot of work before

124 Oct 16 2018 0: considering that.

My idea is to leave Crosby pretty much as it is, we need more places where people can get away from urbanization, and Crosby

125 Oct 16 2018 0 provides this, at least in its present form.

126 Oct 16 2018 0 Please retain primitive nature of undeveloped areas

I really like that this area is NOT developed. Doing things like adding lighting or providing hard surfaces on the trails would

127 Oct 16 2018 0 probably decrease the attractiveness of this park.

128 Oct 16 2018 0 Enforce dogs on leashes. More trash cans would be nice too.

I think an environmental Ed center would be a fantastic resource

129 Oct 16 2018 0 at Crosby! Something similar to what is at Ft Snelling State Park.

130 Oct 16 2018 0 N/A

131 Oct 16 2018 0 no

I do not feel comfortable walking alone. The paths do not give adequate site lines to see what is up ahead and too few people

132 Oct 16 2018 0 on the paths.

133 Oct 16 2018 0 More nature tours, kayak rental for local paddling.

We are truly blessed in St. Paul to have a wealth of beautiful parks and natural areas. I've lived here for 23 years and haven't explored them all yet. I keep being surprised by all the natural beauty of the city. St. Paul does a great job of maintaining and

134 Oct 16 2018 0 improving its parks. Thank you.

Needs a playground/play area for kids

Canoe/kayak entry area into big Crosby Lake on eastern side of

135 Oct 16 2018 1 lake

Why is Watergate Marina excluded from the planning process area? It appears to be the red headed step child of St. Paul Parks

136 Oct 16 2018 1 & Recreation for some reason.

Groomed cross country ski trails would be amazing!

Also, a mountain-bike trail that runs along the bluff would be really

137 Oct 16 2018 1 cool.

It's a big park area, so maybe an eatery like Sea Salt across the river. It would be a place where people could sit and talk. The

138 Oct 16 2018 1 park now seems oriented toward movement.

Building more buildings, paths, sign and lights would make me much less likely to use these parks. Walking along the river at

139 Oct 16 2018 1 night by moonlight, hearing owls, etc. is too precious to lose.

140 Oct 16 2018 1 Beees

141 Oct 16 2018 1 I love the park from both entrances.

Would be great to see this park be more accessible -- both in terms of transportation to get there, but also once folks get there, to make sure it's accessible for them to participate and enjoy the park. I'd like to see a larger parking lot at Crosby (the side by 35E). And for the restrooms to remain open later into the season (and open earlier in the spring). Would be great to have a bike pump/tools down at Hidden Fall for cyclists. Also would be nice to have several water fountains at the park -- preferably ones that were on all year round, or when the temps weren't regularly below freezing. Could we also get a restroom down at the boat launch at Hidden Falls? It's inconvenient (and sometimes not possible) to make it to the other end of the park from the boat launch to use the restroom. Making the beach area more accessible for folks would be great too. And some picnic tables that were longer/could be pushed closer together for bigger families. It would also be great if there was some kind of indoor space/warming house type thing for folks to go in the winter. The map on the city's website is not accurate in terms of where the fire ring is located at Hidden Falls. It would be nice to make the falls more accessible too -- there's a number of folks I know that will never be able to see the falls, because they aren't able to traverse on uneven trails. If you can work with Met Council on getting a bus stop closer to the park, that would be great too. We take folks there in a van for work, but they can't get back there on their own without having to cover a long distance. Also, figuring out a way that someone can get up and out of the park without climbing that huge hill. It's not accessible for someone to get

142 Oct 16 2018 1 down (or back up) for someone who uses a wheelchair.

Enforce off leash dog abuse, increase patrols- in 42 years I have only seen park patrol twice. Charge for parking or have on site staff. Off leash dogs ruin non trail areas, chase kill wildlife, and now that i am physically challenged and have been bit twice there and chased by sexual predators it is not a safe place to go. That Should be number 1 and only concern. Signage is rediculous, lets manage appropriately enhance what is there, restore wildlife, and add a few trash cans on trails so i dont have to haul others litter

143 Oct 16 2018 1 every time I go

Thank you for protecting such a wonderful park!□

144 Oct 16 2018 1

Safety is always a concern when at the park. I do not like my wife running there alone. □

145 Oct 16 2018 0

146 Oct 14 2018 0 I love it like it is.

Improvements in the road access and trails would make it nicer.

147 Oct 14 2018 0 Also clean up the mess by the hwy 5 bridge.

- 148 Oct 13 2018 1: Thank you for doing this survey!
- 149 Oct 13 2018 0: Bike lane park road and bike parking in park.  
better signs explaining it is NOT an off leash park; repair of
- 150 Oct 13 2018 0: shelters/bridges that have deteriorated  
If it's not possible to have a dog park at the ford site, hidden falls
- 151 Oct 13 2018 0: would be my second choice for Highland.
- 152 Oct 13 2018 0: The park is perfect...what more do you really need to do?
- More than an environmental learning center, I'd like to see a cultural center, focused on using culture to build our relationship with the river. This would be led by indigenous leadership and story about the Bdote area. It would also invite all of the people in our community to explore their ancestors relationship to rivers
- 153 Oct 12 2018 0: and celebrate their relationship to the river.  
How can there be better access to river from Crosby? I don't want the hidden falls area to have an environmental ed center, i
- 154 Oct 12 2018 0: basically like it the way it is.  
I have already indicated my biggest desire for improvement -
- 155 Oct 12 2018 1: bike/walking trail surface improvement.
- Please do not build a lot of structures and "access" in this park! It is good because it is close to nature. There are other places for
- 156 Oct 12 2018 0: picnics in St. Paul that do not require destroying a natural area.
- 157 Oct 12 2018 0: Maintain dirt trails for mountain and fat-biking.  
A better trail connection between hidden falls and Crosby farm would be great.□
- 158 Oct 12 2018 0: Off leash space would be great  
I love how wild the park is. As much as possible it would be great
- 159 Oct 12 2018 1: to retain the natural aspects while improving accessibility.
- Would love to have mountain bike trails added to this area of the city. With a perfect mix of bluffs, woods and river views, it is a perfect place to add trails. Mountain biking in the Twin cities is very popular and will bring many visitors to the park as well as a
- 160 Oct 11 2018 0: community to support and maintain the area.  
My top ranked improvement would be to add more parking for cars and boat trailers. Often cars are parked in the boat trailer
- 161 Oct 11 2018 0: spots limited use of the river for boats.  
I don't want the park to become so "Improved" that it loses the
- 162 Oct 10 2018 0: wilderness feeling.
- 163 Oct 10 2018 0: All is good.
- 164 Oct 10 2018 0: Bike trails. Cuclocross skills park
- 165 Oct 10 2018 0: I'd love to see some formal mountain biking trails available
- 166 Oct 10 2018 0: More single-track bike trails

167 Oct 10 2018 0: No

168 Oct 10 2018 0: Build single track mountain bike trails

Mountain bike singletrack would be a great addition to the park since it's already so easy to bike to. So many more people would

169 Oct 10 2018 0: use the area.

I think a major need in Crosby Farm Park is improving the trail surfaces. The trail surrounding the small pond with the fishing pier is often flooded in several areas making access very difficult. The boardwalk through the marsh is often very slippery and uneven. The paved trail on the north side of that pond is in bad need of repair. Water management on the west side of the pond is needed where the trail is almost always flooded or extremely icy in winter. □

I would very much like to see the unpaved dirt trails remain unpaved. This includes the trails on the bluff above lake Crosby and trails along the Mississippi River. I think there is a need for more wild feeling places in the city and these dirt trails are a wonderful resource for the many park visitors that use the park for

170 Oct 10 2018 0 walking, running, and walking their dogs.

I am curious how the development of the Ford plant site will effect

171 Oct 10 2018 1 the Hidden Falls area.

172 Oct 10 2018 1 No

Possibly make the tiny area directly next to the ford plant land a

173 Oct 10 2018 0 dedicated dog park?

Being a resident right along the Hidden Falls park my concern is increase traffic within and along this neighborhood area. With only one entrance for the north and one entrance for the south any increase of traffics will only add to an already heavenly used road and bike/walking paths. There needs to be a open discussion on this as well as park improvements will be dealt with. I'm all for improving our parks but it can't be at the expense of the

174 Oct 09 2018 0 people that live along this area.

175 Oct 09 2018 0 Very difficult to walk across Shephard Rd. to get to the park.

Please make sure design concepts make it safe for pedestrians, bikers and non motorized transit. Many neighbors walk to and from the park and cars are currently prioritized over people. The road gets plowed and salted but not the sidewalk. Please stop using chemicals and salt for the roads. They go straight to the river. The road can simply be closed when there is significant snow. Please make sure that there is adequate funding to upkeep any structures that you add. If increasing river access, make sure to minimize erosion and use sustainable and natural trail building techniques. Finally, please prioritize native plants and maintaining

176 Oct 09 2018 0 trees and other carbon offsets.

I wish that there was better access from Shepard Road. For example, a staircase or two between Gannon Rd and Elway St.

177 Oct 09 2018 0 Perhaps the staircase(s) could also include a bike ramp.

178 Oct 09 2018 0 N/A

The Highland District Council has requested bike racks at both Hidden Falls and Crosby regional parks. Resolution is here: <http://highlanddistrictcouncil.org/wp-content/uploads/2014/06/HDC-Bike-Rack-Resolution-11022017.pdf> All regional parks should be able to be accessed on foot and by bike, but there also needs to be bike parking. Just because you bike there doesn't mean you want to be on your bike the entire time there. Please install bike racks that meet the

179 Oct 09 2018 0 specifications outlined in the district council's resolution.

I believe it would be a mistake to use a lot of cement, lights, signs, shelters, and comforts for the sake of human beings.

180 Oct 09 2018 0 Leave this area as natural as possible.

Designated boat trailer parking and enforcement of the parking

181 Oct 09 2018 1 area

I am very concerned that the park will become run down, not

182 Oct 09 2018 0 properly maintained

Improve boardwalk around lake at Crosby so that it's not under

183 Oct 09 2018 0 water when flooding

I love the park BECAUSE it has natural walking paths in the woods. Please don't change this. The one negative is so many

184 Oct 09 2018 0 car break-ins.

less infrastructure, more nature.□

it is a flood plain subject to regular and damaging flooding. don't

185 Oct 08 2018 0 build fancy things in the flood plain.

Keep it safe because the trails can be fairly isolated. My fear is

186 Oct 08 2018 0 being attacked. This has not been a problem.

Riverbottom wet/mesic natural habitat restoration incl. removing

187 Oct 08 2018 0 paved trails that are in floodplain

- 188 Oct 08 2018 0: Please leave this space wild. It is unique among St. Paul parks.
- 189 Oct 08 2018 0: no
- 190 Oct 08 2018 1: reduce flood impacts if feasible  
safety is a concern. Need good lighting, "eyes on the streets",
- 191 Oct 07 2018 0: visibility,  
It's a great park with lots of history. Please keep it for the future
- 192 Oct 07 2018 0: generations
- 193 Oct 07 2018 0: No
- 194 Oct 06 2018 0: No  
Clean up graffiti and trash. Bring more amenities to bring more activities, therefore making it safer. Now I only run or walk there
- 195 Oct 06 2018 0: during organized events.
- 196 Oct 06 2018 1: No  
I really treasure Crosby as a place that feels removed from the city and wouldn't want development that takes away from the
- 197 Oct 06 2018 0: feeling of being in nature.  
We live very close to the North entrance to Hidden Falls and there is frequent late night activity in the park making safety questionable. Is it supposed to be a 24-hour park for underage
- 198 Oct 06 2018 0: drinking, etc, or is it patrolled after-hours?
- 199 Oct 06 2018 0: These are great parks...don't change too much.
- 200 Oct 06 2018 0: more parking for events
- Safety is a concern for me as well. I had my vehicle broken into when parked at the parking lot at shepherd and 35e entrance a couple years ago. I've been extra careful ever since. That same
- 201 Oct 06 2018 0: parking lot has seen vandalism on the porta potty there.  
Invasive species are bad at Hidden Falls--sometimes both sides of the trail are nothing but invasives. Makes for an ugly, stressful
- 202 Oct 05 2018 1: hike.  
A portopotty or bathroom would be nice on the south end of
- 203 Oct 05 2018 1: Hidden Falls
- Mosquitoes were so bad down in Hidden Falls this summer. I don't know if there is a way to manage it without insecticides, but I would go to Hidden Falls more often if the bugs were less. □  
□
- 204 Oct 05 2018 1: Also: young people smoke weed in their cars in the parking lot.  
There was a park ranger who interrupted my run on 2 occasions to tell me I maybe shouldn't be running there because of mountain lions or events that were going on. It was weird and I didn't go back for a while. I still don't know why he singled me out among all the people in the park. You should screen you
- 205 Oct 05 2018 0: applicants

206 Oct 05 2018 0: Have the police regularly sweep the area for homeless people

I'm not sure how to rank the choices in question #6 because I

207 Oct 05 2018 0: love the park just the way it is

I really like the park as it is, so I'm a bit concerned. I don't want to

208 Oct 05 2018 0: spend a lot of money to 'fix something that isn't broken'

More police presence would be nice. We see a lot of drug use,

209 Oct 05 2018 0: used condoms, trash, it would be nice to see more patrols.

Improving unpaved trails so they stay above water, and are

210 Oct 05 2018 1: usable. Tracking for skiing in the winter.

Maintain the wooded paths minimally -clear trees that block the

211 Oct 04 2018 0: path, but keep it natural

212 Oct 04 2018 0: It's such a wonderful natural place. Don't "improve" it too much.

Better access to park from Shepard Davern Neighborhood. There are lots of condos and apartments on Graham Ave and Norfolk etc. Perhaps a bridge from Shepard/ Davern to Crosby park. I have lived at Highland Pointe condos for 13 years. I love this area and there is so much potential.□

□

I think <http://www.villagemh.com> (The Villages of Mendota Heights) would be a great concept for the former US Bank Site/ Johnson Brothers Property. Housing, retail and restaurants.

Imagine having lunch/dinner or ice cream and being able to walk to the parks and having easy access. I think the park's vision needs to include the development of the neighborhood

213 Oct 04 2018 0: surrounding. It's time!!!!

I want this park to stay wild. Over the last 5-10 years it's become a dog park, with dogs almost always off leash, running wild, etc. They scare wildlife, they don't belong ,and people let them run free. It's very upsetting. There should be big signs at both entrances that dogs off leash is a \$250 fine, and be enforced. One year of enforcement would get the word out. This is the single most damaging thing occurring at this park that is taking wildlife out of it. I don't want more buildings, infrastructure, etc. Outside of improving the north paved trail on the pond, which is dangerous, and the boardwalk, a little, please do not add trails, or begin more development. We have enough manicured parks in the city. Leave this one wild! Just get the dogs out or under strict

214 Oct 04 2018 0: control.

Enforce leash laws, please! Very few dog owners keep their dogs on leash and there are many of them running free. The signage is ludicrously small and inconspicuous and the meaning is lost due

215 Oct 04 2018 0: to lack of enforcement.

Provide additional access point to Crosby Farm Park between

216 Oct 04 2018 0: Davern and Montreal

217 Oct 04 2018 0: no

My #1 suggestion: make more gravel trails (soft) for running/walking AND, also #1, in winter, have consistent and high

218 Oct 04 2018 0: quality grooming for classic XC skiing.

The paved trails really need to be resurfaced. Also, creating ways

219 Oct 03 2018 0: to get around or over areas that commonly flood would be helpful.

220 Oct 03 2018 0: It's a wonderful natural area- don't groom it to death.

221 Oct 03 2018 0: No

There is a feeling of wilderness here that exists nowhere else in Saint Paul, including habitats for both migrating and nesting birds.

I am very concerned that 'improvements' will damage the very

222 Oct 03 2018 0: things that make Crosby Farm special.

An anti-graffiti coating of paint for the highway 5 bridge would be helpful! I would consider personal funding (within reason) for this.

Or if an artist were to paint the cement then put the anti graffiti

223 Oct 03 2018 0: coating on may help it blend in more to nature?

224 Oct 03 2018 0: No

To include a center for all paddle sports. Including educational training on boat use,safety, along with invasive species

225 Oct 03 2018 0: management and water quality.

Build the environmental learning center with a national park

226 Oct 03 2018 0: service office

The National Park Service needs a headquarters facility and a physical presence in this area. They need to be part of this discussion as they help glue multiple communities together as part of the Mississippi National River and Recreation Area. They are a natural fit. The Marina should also be included in the discussion as a high potential location for a new National Park Headquarters and a great location for urban school outdoor programs. It is time for the Marina site to go full public and be transformed into a space that can nurture new outdoor

227 Oct 03 2018 0: enthusiasts.

228 Oct 03 2018 0: Emergency call box would make me feel a lot safer

Better parking management for vehicles with trailers Vs passenger vehicles. Spaces are used up by cars without trailers

229 Oct 03 2018 1: leaving a limited space for those with trailers.

230 Oct 03 2018 1: There ought to be an OFFICIAL off leash dog area

- area for storing non-motorized boats as well as possibly renting
- 231 Oct 03 2018 1: some out.
- 232 Oct 03 2018 1: I'd be interested in an enclosed dog play area  
Keep the hand of humans to a minimum. Allow the magnificence
- 233 Oct 03 2018 1: of nature to be the focus.
- 234 Oct 03 2018 1: More security  
connections to the adjoining 'Victoria Park' trail system would help give us a unique Mississippi waterfront (not highway front)
- 235 Oct 03 2018 1: experience that could extend to downtown
- Navigational signs would be great. I remember getting lost the
- 236 Oct 03 2018 1: first couple times I was at Crosby Farm Park and Hidden Falls  
When trees fall on the trail it often takes weeks or even months for the city/whoever to take care of it. Also, there are missing planks and potholes on/near the first foot bridge at hidden falls north trail that have been there for a few months to more than a
- 237 Oct 03 2018 0: year.  
Don't change the names. Hidden falls is the name of that park that I remember from childhood. Upgrade the parks but don't change their names. It has history in the city Many people are
- 238 Oct 03 2018 0: attached to nostalgically
- Please do not put more concrete or turf grass in these parks.  
The limited running/walking/biking trails are fine. Do not undertake major hardscape infrastructure (e.g., building/parking
- 239 Oct 03 2018 0: lots). This is a vital ecological corridor. Don't screw it up.
- 240 Oct 03 2018 1: would like to see roads and parking lots repaved.
- 241 Oct 02 2018 0: Sidewalk at the south entrance
- 242 Oct 02 2018 0: No  
I'm repeatedly frustrated by picnickers leaving trash behind and fishermen and women cleaning fish and not throwing away
- 243 Oct 02 2018 0: remains. More enforcement would be great.  
A dog beach area like the one right across the river would be great. And along with better facilities more water fountains would
- 244 Oct 02 2018 0: be great  
I like the park the way it is. Finding peace and nature so close to my home is important. I don't want picnic grounds and shelters at
- 245 Oct 02 2018 0: Crosby. Just safer, better walking paths.  
Keep it wild and don't over develop. We have a habit of building things in St. Paul and hey don't get maintained. Put the money into Homecroft Park - rebuild the ice rink that used to be there,
- 246 Oct 02 2018 0: keep the park clean and in good repair.
- 247 Oct 02 2018 0: No
- 248 Oct 02 2018 0: Bathrooms could use freshening.
- 249 Oct 02 2018 0: n/a

I live near the entrance to Crosby Park. I used to bike to Hidden Falls and I recall that the trails were/are in need of improvement. I don't bike anymore, and walking into Crosby is a bit scary alone!

250 Oct 02 2018 0 It is beautiful however! A couple open areas might be helpful.

251 Oct 02 2018 0 Encourage more citizen science!

Repave the existing paved trails so it is more accessible to rollerbladers, and people with physical disabilities. Also, keep it as natural as possible for migratory birds and other wildlife who pass

252 Oct 02 2018 0 through the metro area to continue to use undisturbed.

253 Oct 02 2018 0 Improved boat launch and parking.  
no

254 Oct 02 2018 0

Police should do more staking out or bait cars or something where windows are smashed and cars are broken into in the

255 Oct 02 2018 0 parking lot.

256 Oct 02 2018 0 na

more parking and spots for trailer parking since people going for a walk tend to park in the trailer spots, or give them tickets for

257 Oct 02 2018 0 parking there

Please don't dramatically change this wonderful park. It is a gem

258 Oct 02 2018 0 as-is and used by so many.

I worry that building on the land will disrupt habitats. Why not do minor improvements to pathways, etc to allow service workers to

259 Oct 02 2018 0 keep it clean, but nothing major?

I hope that the trails through the trees and the open spaces are maintained. I like feeling like I am not in the city when I am at the

260 Oct 02 2018 0 park.

After flooding/storms, please cut fallen trees as soon as possible. As I get older, I can't bike on dirt as well. Is garbage an issue? I like the idea of an environmental learning center, but don't we have Ft. Snelling just across the river? I think informational signs

261 Oct 02 2018 0 are just fine.

I love this park, the Hidden Falls and the natural appearance of the 1930s design. I wouldn't like to see a renovation or modernizing of this park. Perhaps making trails in Crosby more

262 Oct 02 2018 0 usable when flooding occurs...that's about it.

Trees which have fallen over the paths are not cleared in a timely manner which prevents hiking. I used to be a on a Park Board and our crews were always out the day after a storm to clear the

263 Oct 02 2018 0 paths.

264 Oct 02 2018 0 No

This is one our family's favorite city parks as it is less groomed and quieter. We love being able to explore in the forest and along

265 Oct 02 2018 0 the riverbank with fewer people.

Please protect this park, keep it as wild as possible. So much wildlife comes here, they need to be protected. There is too much buckthorn and garlic mustard. More native species need to be planted and protected. There is quite a bit of drinking by young people and littering, erosion, etc. from them. Would be nice to have school groups (high school students in the area) involved with taking care of the area and learning about it, so that

266 Oct 02 2018 1:they can have more empathy for nature and their surroundings.

Not really - the park is really wonderful and we are there all of the

267 Oct 02 2018 1:time

Figure out a way to deal with trails constantly underwater.

268 Oct 02 2018 1:Boardwalk? Bridges?

269 Oct 02 2018 1:no

270 Oct 02 2018 1:Upgrade bathrooms, but please don't change too much

Year round bathroom use please! Also, as commented above some trail areas are too steep and dangerous to walk with a stroller or bike with younger children (going toward hidden falls from watergate marina). I'd very much like to see those fixed for safety issues so our family could use those routes. Also flooding especially around Crosby lake (trail split by parking lot and boardwalk area specifically) has greatly hindered our use. Better drainage under the trails or some sort of bridge system would be

271 Oct 02 2018 1:nice and make the trails more accessible in a variety of seasons.

It's a beautiful area. I'm all for improvements where needed, but

272 Oct 02 2018 1:don't change the overall feel of the park.

Please be working thinking about erosion management and flooding issues at both parks - be planning for global warming and

273 Oct 02 2018 1:water issues

LEAVE "HIDDEN FALLS" as a quiet, fairly private, MEDITATIVE, CONTEMPLATIVE AREA. It is widely used for ceremony/ritual activities— important Sanctuary Space in the hubbub of the

274 Oct 02 2018 1:Cities.

275 Oct 02 2018 1:Na

276 Oct 02 2018 1:No

277 Oct 02 2018 1:Very hard to get our little boat down to the access.

Just that sometimes it feels a little unsafe if you are alone in these

278 Oct 02 2018 1:paarks

279 Oct 02 2018 1:Improve management and facilities at Watergate Marina

280 Oct 02 2018 1:Develop purpose-built singletrack trails

281 Oct 02 2018 1:No

Make more walking access points to the park. Make the really long car path have stairs-walking next to it as i'm always

282 Oct 02 2018 1:concerned i'll get hit.

- It would be nice to have activity areas for kids swimming,
- 283 Oct 02 2018 1 playground. Think hyland park reserve in Bloomington  
The river is coolest part, and increasing usage and ease of use
- 284 Oct 02 2018 0 should be priority #1 imo.  
I would like to see a safe and easy to access boat launch. There are tons of parks in Minneapolis, but this one is specifically located on pool 2 of the greatest American river. It would be wasteful to use this opportunity to make more trails when it should
- 285 Oct 02 2018 0 be a river focused park
- 286 Oct 02 2018 0 No  
The park is so beloved because it is wilder (in terms of nature) and less maintained than other parks. People go there so they can feel like they are outside the city even though they are right
- 287 Oct 02 2018 0 within city limits. Keep the park as is.
- I hope whatever changes are made, they don't disturb the birds and wildlife living there too much. The area along the river should be preserved for them.□
- I'm concerned about the mentioned storm drainage "feature" that could flow into Hidden Falls. That sounds like garbage/pollutants could flow from the Ford Plant area into Hidden Falls and then the
- 288 Oct 02 2018 0 river. How would this be prevented?
- 289 Oct 01 2018 0 No. Please maintain ice climbing  
Walkable entrances down to the park/river/especially Hidden Falls area by the Mendota Bridge would be nice. The driveway down
- 290 Oct 01 2018 0 there is dangerous for walkers/bikers.  
#1 Other = no changes. Don't do anything that doesn't promote the natural environment. Don't chase away animals by building
- 291 Oct 01 2018 0 where they could be living.  
What will happen to the parks if they remove the dams--will they flood/change? Wider, resurfaced, more extensive bike paths.
- 292 Oct 01 2018 0 Enclosed dog park.
- 293 Oct 01 2018 0 No
- 294 Oct 01 2018 0 Could there be an off leash dog park ?  
There needs to be dedicated boat trailer parking where access by auto's is not allowed. Many times, the spaces are filled with cars and there is no room for trailers. There should be warning and
- 295 Oct 01 2018 1 fines for those parking improperly.
- On the "improvement" of trail surfaces. How is "improve" defined? By you mean "pave" then this would be the WORST thing you could do for the park. There are countless miles of paved paths in the twin cities. Access to well-maintained dirt and gravel paths -- like this found on Pike Island in Ft Snelling State Park or at Theo Wirth Park in Mpls should be a priority. This would set
- 296 Oct 01 2018 1 Crosby/Hidden apart.

There are plenty of parks with amenities. Keep Crosby as simple and natural as possible. Victoria Park is closeby and can have

297 Oct 01 2018 0! more amenities

When I have been at Hidden Falls around dusk, I have noticed that suddenly there are many cars coming and parking. It is apparently a gay pickup spot. Even though I am a woman, I do not feel safe. Even in broad daylight, I feel I have to keep alert . I think they need park personnel as in most parks on site from time to time or maybe all the time.□

298 Oct 01 2018 1:

299 Sep 30 2018 0 Preserve Cottonwood Trees as much as possible

300 Sep 30 2018 0 No.

Restore the Crosby farm trail on the North side that goes along the hill. Fix boardwalk so that it doesn't become unusable during

301 Sep 30 2018 0 high water

302 Sep 30 2018 1 no

303 Sep 30 2018 0 No

Hidden Falls-Crosby would greatly benefit from having a long, designated off-road (dirt) mountain biking trail that includes/links

304 Sep 30 2018 0 both parks.

305 Sep 29 2018 0 I would love to see groomed classic ski trails.

I would like to see a portion of the parks dedicated to a dog park along the river. St Paul is behind Minneapolis in having a nice dog park. I now drive to Minneapolis 3 times a week to use the dog

306 Sep 29 2018 1 park.

The idea of building an environmental learning center on a flood plain--especially as flooding is predicted to be more frequent (climate change)--is a waste of a good idea. Yes to an environmental center but in an accessible, visible area that will

307 Sep 29 2018 0 not be underwater with growing frequency.

change to Crosby Park, is to keep in mind that any change should not step on or disturb the unique, wonderful, quiet, tranquil piece of urban nature that it already is. As a lifelong resident, this is my favorite place in the Twin Cities. There is nowhere else like it, nor have I seen any big city parks anywhere that are so wild, so immersive and peaceful as Crosby Park. Any changes and attempts at improving the park must first and foremost not take away from what makes it so special to begin with. Treating this like any other park will not work.□

- 1) Add bike racks where people can lock up their bikes at both parking lots.□
- 2) Water fountain at the north parking lot.□
- 3) Possibly develop an app shows all of the trails (paved and unpaved). It could map out the trails by seeing where people walk, if they allow location tracking. This could apply to other local parks as well.□
- 4) Signs that remind both pedestrians and bicyclists to share the (paved) trails with each other.□
- 5) Don't add too many signs in the middle of the park. In my opinion, this takes away from the immersion in nature. Keeping any added signs near the entrances would work well, I think.□
- 6) Consider establishing trails (probably unpaved, at least to begin with) at Crosby North of 35E. This whole side of Crosby is pretty wild and lacks any trails. I think adding a few small, dirt trails (maybe hiring a crew/volunteers to maintain them) through this side of the park could be a great opportunity to get people immersed in some wild urban nature. I would be sad to see it completely "tamed" out there, however, as it is an interesting and

308 Sep 28 2018 0 extremely wild little area - a fairly unique place to find in the heart

309 Sep 28 2018 0 Crosby is a lovely place to walk and be in an urban wilderness.

I'm a male. Not sure how safe women feel? Get some strange

310 Sep 28 2018 0 people at times. I've walked there for years.

A major concern is the lack of sidewalk/safe pedestrian access up the big hill at Hidden Falls south gate (you have to walk on the road with the cars). There is a sidewalk up the hill at Hidden Falls north gate, but it is not in great shape, and there is a sidewalk up the hill at Crosby near the marina, but it is not great either as it is narrow and hugs an awkward guard rail. Creating safe pedestrian sidewalks at all of the park entrances would be a major improvement. ALSO, it's a small thing, but please make sure all trails connect smoothly. For example, if I bike down the hill at Hidden Falls south gate, I have to stop, lift my bike over the curb, and then bike across the grass to join the trail in either direction. Please create smooth trail transitions for all types of users,

- 311 Sep 28 2018 0 including those using wheelchairs or other mobility aids.
- 312 Sep 28 2018 0 Not at this time
  - Concerned about less desirable activity by patrons in Hidden Falls
- 313 Sep 28 2018 0 south parking lots.
- 314 Sep 28 2018 0 disability access is high priority.

I honestly would hate to see Crosby Farm developed further. It is a natural hidden gem in the Twin Cities. Great place to hike and enjoy nature. Adding a natural center/additional picnic shelters would make the park less attractive for me. There are plenty of

- 315 Sep 28 2018 0 developed parks nearby that fill this niche.
  - I love this park! We have had many celebrations there over the years. Most often we use the trails to go for walks with our dogs
- 316 Sep 28 2018 0 or bike rides or cross country skiing at Crosby.

in fall and spring a friend and I regularly meet to walk at Crosby and both enjoy the park. Thank you. Hidden Falls seems trickier

- 317 Sep 28 2018 0 to get to so don't go there. Perhaps better signage??
- 318 Sep 28 2018 0 Would love an archery range
- 319 Sep 28 2018 0 No
  - Important to have the park be attractive to families with kids of various ages. Would be great to improve the paved and
- 320 Sep 28 2018 0 nonpaved trails.

As mentioned above, the number 1 thing I would like to see improved is the amount of garbage. There are old fishing lines and plastic debris along the riverbank. Garbage along the path, empty drink containers, beer bottles; the firepits often have garbage in them. I have volunteered at park cleanup events, and have seen the amount of garbage that collects there over the year. Some years the park cleanup event gets cancelled and the garbage goes uncollected. I used to bring a plastic bag with me and pick up garbage along the way, but I simply don't make it there as often due to having little kids now. It would be nice if at least more trashcans were located along the paths. Another thing is the really gross looking embankment on Mpls side, I wish they

321 Sep 28 2018 0 would just jackhammer the whole thing down.

322 Sep 28 2018 0 No.

I'm not sure how connected the parks are to biking trails, but it seems to me that making the parks appear more welcoming and accommodating is crucial. The perception of both parks is that one might get propositioned for an illegal activity and/or have their

323 Sep 28 2018 1 car broken into.

My perception of the areas is partying by young people. This may or may not be as real as my experiences in the past but I rarely go there now because I perceive it as a place where younger

324 Sep 28 2018 1 people (including young adults) party disruptively

Please don't make it feel modern -- except for the bathrooms. Like there's a wooden dock overlooking a pond. It's charming the way it is. Please don't take the naturalness out of this area with more modern stuff. Also it would be cool to have canoe share

325 Sep 28 2018 1 here.

More handicap parking at lower level; make two trails--one for

326 Sep 28 2018 1 biking and one for walking.

Crosby Farm is an amazing asset to our urban area because it is relatively well-conserved and provides access for city residents to natural green space and the river. I really love it for exactly what it is and don't think it requires improvement. To the extent improvement is required, I would focus efforts on conservation efforts: managing and minimizing human impacts (ensuring sufficient trash receptacles and staff for cleaning up; signs asking park users to minimize impact; bags for people to pick up dog poop; expanding the no-wake zone on the river etc.) and wildlife

327 Sep 28 2018 1 preservation and conservation.

328 Sep 28 2018 1 no

329 Sep 28 2018 1 Less steep path to get out of park, or stairs

At this point, I think "less is more." If you overdevelop these two parks you will be killing the goose that laid the golden egg. I am not opposed to environmental education, but I'd hate to see more land in the parks devoted to centers, buildings, you name it. The parks are valuable because they have not been ruined by development. Please keep it as natural as possible. If you want an environmental center, put it up on top of the bluff. I'm sure the 8,000 residents the city wants to shoe-horn into the 120-acre Ford

330 Sep 28 2018 1 site would love to have it there.

331 Sep 28 2018 0 No

332 Sep 28 2018 0 patrols by park staff to assist with security

333 Sep 28 2018 0 No.

With regard to signage and wayfinding, I would like that to include natural and cultural topics along with wayfinding within the park and connections to other parks and trails throughout the city, Ramsey County, and nearby Dakota County trails. And of course, things like QR codes on these signs so we can access digital versions of these maps (and links to live options like Google maps) so that we can enjoy these as we bike around the whole

334 Sep 28 2018 0 system.

335 Sep 27 2018 1 Bird blind, better dock

336 Sep 27 2018 0 Drinking water

337 Sep 27 2018 0 Better signage and control of off-leash dogs

Would like to see support for development that intentionally minimizes our 'footprint' which may be key to conserving & protecting our marginally wild park. For example, maintaining trails of rock/stone or other suitable material rather than frequently repaved asphalt where flooding is inherent. Limiting lighted areas though those designated should be well thought out & maintained. Education in the park encouraging & supporting conservation. Hoping that you will invite & seriously consider input from professionals trained in environmental conservation. Love walking along trails listening to the sounds, seeing the birds,

338 Sep 27 2018 0 enjoying nature within city limits.

Conserve, protect and restore natural resources, develop a faunal element goal for the park, e.g. return of Yellow Cheeked Warbler. Maintain the park in a natural state--it is along the Mississippi River flyway and provided important resting and habitat for Birds and other Animals. Add land to the park.

339 Sep 27 2018 0 Minimize asphalt and the built environment.

I usually walk down from the Prior Avenue entrance. Erosion and fallen rocks make this entrance a little scary. Also, it would really nice if there was a separated pedestrian path. Cars coming up/down on the slope are especially scary if I am walking or

340 Sep 27 2018 0 running.

Please limit invasive improvements to Crosby as much as you can. I forgot to say that I've also seen snowy and barred owls there, as well as field mice and shrews. So much habitat, so

341 Sep 27 2018 0 many species! I am concerned that they would be driven away.

You need to add more signalized and safety-enhanced crossings of Shepard Road. Right now the only signalized crossing is at Davern and it is not very safe for pedestrians. It's only on one side of the intersection, has a slip-turn for vehicles (who only look left for on-coming traffic as they turn right). There is not another signalized, or signed/safe pedestrian crossing of any kind for over a mile (maybe two miles). There are tons of apartment buildings and housing northeast of Davern and Shepard but there isn't even a SIDEWALK to get to this intersection along the north side of Shepard Road. The only sidewalk is on Youngman Ave and ends in a circle at the end of this street, at least a half-mile from Davern. A signalized, pedestrian crossing of Shepard Road, with high-visibility crosswalks and warning signage and pavement markings (for drivers) should be added at Alton and Rankin to allow all the nearby residents access to Crosby and the Mississippi River Trail. Right now, the park is hard to get to and

342 Sep 27 2018 0 thus less known.

Because the park is so close to the city is it is nice to have it a bit more natural. The serenity of the park may be harmed by some of the improvements mention. Because of increase flooding, erosion and loss of tree cover I think it is better to keep most of

343 Sep 27 2018 0 the trail unpaved.

Improving police/ranger presence so people feel comfortable walking alone. Engineer trails better at Crosby so paths aren't constantly flooded and impassable. A dog park including river access would be nice. More trash cans along paths for waste

344 Sep 27 2018 1 disposal.

I would love to see some kind of outdoor play/activity area (jungle

345 Sep 27 2018 1 gym, obstacle course, etc.) for my kids to play on.

I would love to see a park built for children to play on. An

346 Sep 27 2018 0 environmental learning center would also be amazing!

347 Sep 27 2018 0 The sites feel remote and for a women walking alone, uninviting.

Love Crosby & Hidden Falls!! Would love to have some of the flooding resolved so the park doesn't close during some of the best weeks of spring/ summer due to flooded paths. It is a special

348 Sep 27 2018 0 place for our family.

Concerned about integrity of Ford landfill upstream from parks, how to safely remove and clean without ruining park and poisoning land and water, hoping the parks will remain truly FREE and no paid parking, would rather their historical character be preserved as to not make it look like a sterile place, the wildness and easy accessibility is important, and I go there many times a

349 Sep 27 2018 0 week and have for decades.

Enforce leash laws in Crosby park. Most dogs are off leash and

350 Sep 27 2018 0 it's not a dog park.

351 Sep 26 2018 1 No

352 Sep 26 2018 1 Would love a public fire pit that isn't full of glass.

There are a few unpaved trails. I like those. Maybe even make

353 Sep 26 2018 1 those a formal part of the park.

Crosby farm is my favorite regional park. Looking through the woods between the tall canopy and expanse of underbrush, it's not unlike flying between cloud layers. So beautiful. Thanks for

354 Sep 26 2018 0 loving on our parks with this survey & future improvements.

355 Sep 26 2018 0 Please continue to have unpaved paths

Keep it natural, people enjoy nature in the city. It's therapy for me, to just take a walk to the river and through the woods for a sense of peace at the end of the week or a start of a weekend. I do like the environmental education concept. Education is always a

356 Sep 26 2018 0 pathway to a good stuart of our Earth.

357 Sep 26 2018 0 More goats!

358 Sep 26 2018 0 more planned activities like canoeing, nature hike, kids games

Make the falls at hidden falls more accessible and safer. Need to repair the stairs. Get rid of weeds that block the path to the small catch basin put signage explaining the falls and allow access from the hilly side. Make a Path and viewing site accessible from the river road by foot that would also let you see the Mississippi river.

359 Sep 26 2018 0 Think Minnehsha falls viewing area bridges

I use the parks daily. There is a lot of litter and graffiti in some areas and a lot of people loitering. As a female I would not feel safe at night and think it would be nice to have more lighting and

360 Sep 26 2018 0 more presence of patrolling to feel safe since it is so secluded.

- Quite a bit of trash left over from people either fishing or hanging  
361 Sep 26 2018 0 out after dark in the park and lighting fires that i notice by the river  
I think things are pretty great! Would like to see the invasive  
362 Sep 26 2018 0 species handled.  
363 Sep 26 2018 0 More signs reminding people to leash their dogs  
Building an Environmental Learning Center in one of the parks is  
such a bad idea that I placed it below Other. Keep what we have  
as wild as possible without more buildings. Please. Please.  
364 Sep 26 2018 0 Please.  
  
Be sure that there is adequate and safe access by people walking  
365 Sep 26 2018 0 and biking. Also, improved bike parking would be very valuable.  
don't make this another damned urbanized park. It is somewhat  
366 Sep 26 2018 0 wild and keep it that way. I walk it daily.  
Add a small dog park area in the Hidden Falls park on St Paul  
367 Sep 26 2018 0 side  
368 Sep 26 2018 0 Keep the locks  
369 Sep 26 2018 0 Fear it will lose its wild ambiance  
370 Sep 26 2018 0 I am happy with the park the way it is. Keep it natural.  
Please do not gentrify one of the last wild spaces within the  
371 Sep 26 2018 1 city!!!!  
Definitely needs more signage. I was visiting the park for three  
years before I found out how to get back to the falls. Water in the  
spring is definitely an issue. Don't know if it would be possible to  
build bridges or boardwalks so that the paths would be accessible  
372 Sep 26 2018 1 during the spring?  
373 Sep 26 2018 0 No  
374 Sep 26 2018 0 Please build an archery range.  
375 Sep 26 2018 0 I'd love to see an archery range built on the property.  
376 Sep 25 2018 1 Improve safety (somehow) at crosby  
  
Having a natural place that is not "slick" is unusual in the city and  
377 Sep 25 2018 1 important. Do not try to upgrade nature, leave it alone!  
People letting their pets run free is really a barrier for me. There's  
one area near the lake at Crosby that often floods. It would be  
good to have a boardwalk there, too. □  
378 Sep 25 2018 0 Crosby is a hidden gem.  
I enjoy the closeness of the woods, and remote access to the  
riverbank. Walking in the woods with my dog. I think the biggest  
379 Sep 25 2018 0 priority is to protect the flora and fauna.  
I live on the 900 block of Bayard and appreciate the new bike trail  
on Otto. However, it is still hard to cross Shepard Road.. can I  
somehow someday get to Crosby from the new city park that is  
380 Sep 25 2018 0 being built near Nova Academy????

These parks create little sense of safety, especially at night, given  
381 Sep 25 2018 0 constant police activity.

Most of these ideas just seem like making it more like any city park anywhere. I am against them. Especially more lighting. If that's what people want they can go to Harriet Island or Como Park. You should be working to enhance the character of the park not change it. The city of St. Paul just fiddles things into

382 Sep 25 2018 0 mediocrity.

I appreciate that the parks need some improving but I'm

383 Sep 25 2018 0 concerned that the wild feel of the park will be lost.

I have contacted the parks dept numerous times about the entrances/exits to Hidden Falls, regarding cars exiting. Drivers do not pay any attention to bikers, pedestrians, etc. when leaving. I have almost been hit several times when I ride along the River Rd. I have emailed and called a number of times about this and haven't gotten any response at all. If and when I get hit by a car leaving the park, I will hold the driver as well as the city

384 Sep 25 2018 0 responsible for not addressing this issue.

My husband and I were regular hikers in Crosby until last summer when we started noticing vandalism in the parking lot and in the rest shelters. We've seen cars with broken windows and people

385 Sep 25 2018 0 who appeared to be vagrants.

As a St. Paul resident on fixed income, I'm being overtaxed, with now annual property tax increases, a garbage tax, increased garbage fees, and more school referenda. If improving the park is going to cost me another nickel, I don't want it. It's been fine for

386 Sep 25 2018 0 the decades I've used it.

387 Sep 25 2018 0 Fix and maintain bike paths

388 Sep 24 2018 0 Leave the park alone!

389 Sep 22 2018 0 Single track!

New Mountain Biking trails would be an excellent new activity option. This would help the park compete with other trails that

390 Sep 22 2018 1 currently or have plans to add mountain biking trails.

391 Sep 22 2018 0 MTB (of road) biking trails

392 Sep 21 2018 1 No

Bike trail down to highway bikeway rather than stairs by hidden

393 Sep 21 2018 1 falls

It's a great park! Please don't wreck it with clutter, more

394 Sep 21 2018 1 infrastructure.

Efforts to upkeep existing improvements should far out weigh additional improvements. No additional improvements would be

395 Sep 21 2018 0 perfect, dont ruin the natural setting

396 Sep 21 2018 0 Love this park

397 Sep 21 2018 0 Add mountain bike trails!!

- Tell the Met Council to worry about roads and bridges and leave nature alone. These are floodplains and flood often. There's a reason they aren't highly invested in and we have plenty of areas
- 398 Sep 21 2018 0 funds would be better used and suited.  
Love it when parks connect to bike trails—this one is an easy route. Have met scout groups here a few times and had confusion identifying which entrance to meet at. Clarifying
- 399 Sep 21 2018 1 signage would be great.
- 400 Sep 21 2018 1 No  
I live very close by so i'll go no matter what you do to change
- 401 Sep 21 2018 1 them lol
- 402 Sep 20 2018 1 Would love an off leash dog area (fenced is fine!)
- 403 Sep 20 2018 1 How about some play equipment for kids at Hidden Falls.  
Shepard Road is a huge barrier from the neighborhoods to the park. Better pedestrian access from West 7th is sorely needed. My neighbors and I are hoping there is a trail access from Victoria Park underneath Shepard to the undeveloped Triangle below Victoria Park. Also better pedestrian access at the Elway
- 404 Sep 20 2018 0 entrance.  
Invest more money into poorer neighborhoods. Highland park
- 405 Sep 20 2018 0 already receives extensive funding.  
The #1 thing that would increase my use of the park (question #6), would be increased dirt surface trails for riding mountain
- 406 Sep 20 2018 0 bikes.  
Improve hidden falls part by the Ford Site and extend to the Park
- 407 Sep 20 2018 0 into the site
- 408 Sep 20 2018 0 Build a bike pump track
- 409 Sep 20 2018 0 I'd love more benches.  
There is a huge demand for bike parks and mountain bike trail access across the metro. It would be awesome to have more
- 410 Sep 20 2018 0 single track in the states capital.  
Leave the parks mostly undeveloped and natural; limit paving of trails and fancy picnic facilities. The area floods every so many
- 411 Sep 20 2018 0 years so why develop in a flood zone.  
I want it to stay wild, more "improvements" will bring more people
- 412 Sep 20 2018 0 and more damage.
- 413 Sep 20 2018 0 Too many wild turkeys...
- 414 Sep 20 2018 0 Nope  
I think it's pretty awesome the way it is. It's my favorite outdoor
- 415 Sep 20 2018 0 get-a-way in St Paul.
- 416 Sep 20 2018 0 Park is great just as it is  
Make the creek/falls at hidden falls more natural. Keep the
- 417 Sep 20 2018 0 unpaved trails in both parks the way they are.

- Revamping the high-line trail on the north side of upper and crosby lake would be fantastic for mountainbiking. Don't make water access easier to drive up to. Sure, making it more accessible is fair, but the amount of flooding that area sees does not suggest loads of pavement are needed. Sparse, well-maintained paved trails are certainly welcomed and beneficial, but
- 418 Sep 20 2018 0 natural surfaces should dominate the landscape.  
I'm at the parks pretty often. I like that there are some paved paths but also prefer how many unimproved paths there are.
- 419 Sep 20 2018 0 Some very basic trail markers are more than sufficient.
- 420 Sep 20 2018 0 Add off road biking!  
So many mosquitos - is there a natural way to reduce these
- 421 Sep 20 2018 0 around trails that will not harm wildlife?
- 422 Sep 20 2018 0 More park security
- 423 Sep 20 2018 1 Keep up with the graffiti on the bridge  
Leave as undeveloped as possible - there are few areas in St Paul where it's possible to find as much unimproved area to
- 424 Sep 20 2018 1 recreate on.
- 425 Sep 20 2018 1 n0  
Restoring shoreline, limiting mowed areas, native plantings,
- 426 Sep 20 2018 1 removing parking lots near the water
- 427 Sep 20 2018 1 N/A  
The city should promote the Marina. It's a hidden gem right in our neighborhood which took me 43 years to discover. I love it and
- 428 Sep 20 2018 1 think others would too if it was better advertised.
- 429 Sep 20 2018 1 Public transportation  
Please keep changes to a minimum. It's already such a beautiful
- 430 Sep 20 2018 1 space
- 431 Sep 20 2018 1 Enforce the leash law
- 432 Sep 20 2018 1 off leash areas
- This park is so convenient, but very underused, likely because it has a poor reputation for safety and security - it's dark, few people on the trails, car break ins and other shady business. I've talked to people who say they'd never go there alone. If I knew there would be more people (families, park staff, activities, etc.) there, I'd be inclined to visit more often. Maybe this could be an opportunity to partner with Public Arts St. Paul to create an arts
- 433 Sep 20 2018 1 destination (sculpture garden, poetry trail, etc.)?

Two things: I think adding more dirt trails for hiking/running would be amazing. Note, I think these should be in addition to paved trails, not in place of. Additionally I think security is a concern in the park and increased patrolling is necessary. Folks go down here to smoke pot and speed in and out of the parking lot all the

434 Sep 20 2018 1 time making it dangerous for walkers and bikers.

Better signage along Mississippi River Blvd, at the MRB/Hwy 5 intersection, and MRB/Ford Parkway intersection would be very helpful. I only know of this park because I live in the immediate neighborhood. No one else I talk to has heard of Hidden Falls or knows there is a park down there, even if they regularly bike/walk along Mississippi Blvd. For the few events I've attended in the park, people always struggle to find it. Connecting the South entrance and the North entrance would be helpful too since

435 Sep 20 2018 1 turning into the wrong entrance is a very common mistake.

We need food vendors! Places to sit down and enjoy a meal or

436 Sep 20 2018 1 coffee

437 Sep 20 2018 1 n/a

I would like to see this largely unspoiled area stay that way. On the weekends that we can't make it out of the city, it's a little piece of wilderness in our backyard. Every time we visit Crosby/Hidden Falls we see so much wildlife and there's nothing like hiking in the

438 Sep 20 2018 1 woods off the beaten path.

The current design/control of the waterfall and creek through the park is very dilapidated and uninviting.□

The low areas of the park are also so very overgrown with great swaths of nettles, that walking unimproved paths can mean having to be very careful not to accidentally brush up against

439 Sep 20 2018 1 nettles crowding toward the paths.

440 Sep 20 2018 1 No

There are often shenanigans happening in the parking lots (drugs, people sitting in their cars for hours, etc.) and we live by Crosby and can often times hear loud music and parties going on late at night. More patrols, video surveillance, and additional

441 Sep 20 2018 1 lighting would help deter this. There are often car break-ins too.

442 Sep 19 2018 0 no

443 Sep 19 2018 1 Single track mountain bike course

444 Sep 19 2018 0 Add mountain bike trails.

445 Sep 19 2018 0 Keep it bike friendly

Please build singletrack MTN bike trails here. I have been riding

446 Sep 19 2018 0 here since the 90's and have always wanted something like this.

447 Sep 18 2018 1 Mountain bike trails would be great!

- 448 Sep 18 2018 1 Single Track for Mountain Biking  
I would like to see more natural surface single track mountain
- 449 Sep 18 2018 1 bike trails
- 450 Sep 18 2018 1 Clean up and improve MountainBike trails along the bluff side  
I would be very interested in single track mountain bike trails, provided that there would be a way to manage spring and summer flooding. □
- 451 Sep 18 2018 1  
  
Combination of paved/unpaved trails is great; kayak/canoe access at Crosby would be great! Have not tried crosscountry
- 452 Sep 18 2018 1 skiing here but the environment would be great for it.  
Would love single track mountain biking trails. Something similar
- 453 Sep 18 2018 0 to what carver lakes park in Woodbury has
- 454 Sep 18 2018 0 don't sanitize the wildness of the area.
- 455 Sep 18 2018 0 Mountain bike trails  
Would love MORC maintained mountain bike trails. It would take advantage of the long linear park and not conflict with other
- 456 Sep 18 2018 0 activities at either end of park.
- 457 Sep 18 2018 0 Dirt trails for multiple uses like mountain biking or trail running
- 458 Sep 18 2018 0 Mountain bike trails
- 459 Sep 18 2018 0 No
- 460 Sep 18 2018 0 Thank you for your hard work improving these great parks!
- 461 Sep 18 2018 0 More mountain bike trails
- 462 Sep 18 2018 0 Build mtb trails and I will come
- 463 Sep 18 2018 0 Add more bike trails
- 464 Sep 18 2018 0 No  
Outside of geocaching I don't know of any other family activities,
- 465 Sep 18 2018 0 nor the total area of Crosby Park. It's a mystery!
- I love Crosby Farm Park. It provides a wonderful break from city
- 466 Sep 18 2018 0 pavement, which is important for physical and mental health.  
I am concerned about increased off road cycling. They disturb
- 467 Sep 18 2018 0 the wildlife and create unsafe trail conditions.
- 468 Sep 18 2018 0 Crosby Farm/Hidden Falls has endless recreation potential.  
If there were singletrack mountain bike trails, I would go way more
- 469 Sep 18 2018 0 often.
- 470 Sep 18 2018 0 Mountain bike trails would be awesome down there
- Singletrack mountain bike trails, even if only a few miles. Just
- 471 Sep 18 2018 0 don't make them like Carver Lake. Make them like Lebanon.
- 472 Sep 18 2018 0 Mountain bike trails would be great!

- Please add mountain bike singletrack. A bonus if you do that, mountain bikers are great stewards and will promote, maintain
- 473 Sep 18 2018 0 and monitor the park in a responsible and inclusive way.
- Please add mountain bike trails! This would be the most positive addition that would increase park usage and healthy outdoor
- 474 Sep 18 2018 0 activities!!!
- 475 Sep 18 2018 0 Add MTB single track to area
- 476 Sep 18 2018 0 More parkjng
- 477 Sep 18 2018 0 No.  
Would like to see actual off road mountain bike trail system
- 478 Sep 18 2018 0 developed.
- 479 Sep 18 2018 0 No  
Mountain biking trails would be the best! I would also love if the old Ford site was turned into the "Theodore Wirth of St.Paul". Connect it to Crosby□
- 480 Sep 18 2018 0 Farm via trails=)=)=)
- Biking is one of the most used and popular ways to experience the parks. There should be river paths above the flood plains for both road/walking, as well as Mountain Biking. Mountain bikers have been asking for sustainable and city funded trails for years along the Mississippi - i.e. higher up where it doesn't flood. They would be used a LOT. Just look at Theo Worth, Lebanon Hills etc. Connecting the river trails with the Battle Creek trails would
- 481 Sep 18 2018 0 be a bonus as well.
- There is already a lot of dirt trail use, designate some to mountain
- 482 Sep 18 2018 0 biking. It's a good spot for beginners and those with limitations.
- 483 Sep 18 2018 0 No
- 484 Sep 18 2018 0 No  
Allowing MORC to groom legitimate mountain bike trails would be
- 485 Sep 18 2018 0 a great addition
- 486 Sep 18 2018 0 Dirt trails for hiking and mountain biking would be amazing!  
With the kids riding mountain bikes in a high school league now I think some Mountain Biking trails is a good idea. Also Fat biking
- 487 Sep 18 2018 0 in the winter could utilize the same trails
- Overall Crosby is a great place because it is a simple place- the
- 488 Sep 18 2018 0 woods, wildlife and river are enough. Please keep it that way.
- 489 Sep 18 2018 0 Mountain bike trails
- 490 Sep 18 2018 0 I recommend constructing sanctioned mountain bike trails  
Singletrack in this area is a fabulous idea! The accessibility of the park would mean many city kids would get to try out mountain
- 491 Sep 18 2018 0 biking who otherwise wouldn't.
- 492 Sep 18 2018 0 More hiking or off road biking trails through wooded areas.

- 493 Sep 18 2018 0 No
- 494 Sep 18 2018 0 The area needs legitimate mountain bike trails
- 495 Sep 18 2018 0 Would love to have natural surface trails for bicycling.
- 496 Sep 18 2018 0 Mountain bike/single track trails
- Some legit mountain bike trails would be amazing. It's already a
- 497 Sep 18 2018 0 fantastic place to ride plus- or fat-tire bikes year round.
- 498 Sep 18 2018 0 No
- Mountain bike trails would be sweet□
- 499 Sep 18 2018 0
- Purpose built off road cycling trails would be a huge
- 500 Sep 18 2018 0 improvement!!
- 501 Sep 18 2018 0 Mountain biking opportunities please.
- Mountain bike trails would be a very good use of the land. Please
- 502 Sep 18 2018 0 add this to the master plan.
- Please let MORC add mountain bike trails. I will come to ride often and I will be spending money while in the area. MORC volunteers will build and maintain the trails so it wouldn't be an expense for taxpayers but would bring income to the area.
- 503 Sep 18 2018 0 Everyone wins.
- 504 Sep 18 2018 0 Mountain Bike trails would be a very good addition
- The existing trails are fine, but there is a lot of potential to develop unpaved, multi-use trails for mountain biking and hiking. If there were legal mountain bike trails I could easily see riding a couple
- 505 Sep 18 2018 0 of times a week after work.
- 506 Sep 18 2018 0 Add off-road mountain bike single track and a skills area
- 507 Sep 18 2018 0 Singletrack please!
- Mountain bike trails. □
- 508 Sep 18 2018 0 Cross county ski trail grooming.
- 509 Sep 18 2018 0 Ideal place for off road cycling track.
- 510 Sep 18 2018 0 Singletrack mountain bike trails
- 511 Sep 18 2018 0 How about some winter fat bike groomed trails!
- 512 Sep 18 2018 0 Make off road cycling an official activity in the park
- I would use the park more with single track trails for both hiking
- 513 Sep 18 2018 0 and mountain biking
- 514 Sep 18 2018 0 Single track trails!
- offroad cycling, snowshoeing, more dog friendly stuff would be
- 515 Sep 18 2018 0 great.
- 516 Sep 18 2018 0 More mountain biking trails would be nice
- 517 Sep 18 2018 0 Singletrack for mountain bikes
- 518 Sep 18 2018 0 Off road bike trails!
- 519 Sep 18 2018 0 Would love to see more mountain bike/multi use trail
- Mountain biking is a great way to explore our parks! There are so many parks that go unused while the limited mountain bike trails
- 520 Sep 18 2018 0 are frequently used

521 Sep 18 2018 0 I would like to see mountain bike trails at hidden falls park.

I would love to see technical mountain bike trails built here. We do not need more green trails in the cities. We lack more advanced trails to keep those who are into riding, into it by

522 Sep 18 2018 0 offering more challenging features.

The best improvement right now would be to have a biologist and land management officer evaluate the health of the forest. The constant flooding and foot traffic are degrading the land at a visually obvious rate every year. I have seen many trees fall naturally and watching others die. Simple forest management practices could greatly improve the land for future recreational

523 Sep 18 2018 0 activities.

Some single track mountain bike trails would be awesome! And to allow access to the Ford dam area which is off limits to extend the size of the park would be a bonus as well. Maybe this site could be made safe and some history of the dam and the lower portion

524 Sep 18 2018 0 of the Ford site could be provided?

Allowing bicycles on dirt trails would be a wonderful addition to

525 Sep 18 2018 0 the park.

526 Sep 18 2018 0 Single Track Mountain bike trails

527 Sep 18 2018 0 Mountain biking trails would be the #1.

528 Sep 18 2018 1 Mountain Bike Trailhead

529 Sep 18 2018 1 Mountain biking trails!

530 Sep 18 2018 1 More off road trails for biking and hiking

531 Sep 18 2018 1 It would be great if there was a mountain bike trail.

532 Sep 18 2018 1 Mountain bike trails

You guys should build a singletrack trail for mountain bikes!

533 Sep 18 2018 1 Awesome place to do it.

534 Sep 18 2018 1 Mountain biking, or natural multi use trails would be great!

If this park had purpose-built soundtrack for mountain biking

535 Sep 18 2018 1 (even if designated as multi use) that would be a major draw.

This would be an incredible place for a mountain bike trail

536 Sep 18 2018 1 network.

537 Sep 18 2018 1 Mountain bike trails!

538 Sep 18 2018 1 I support a single track

As a mountain biker, I would love to have singletrack trails available within biking distance of my house. Even if it were simple, non-technical trail (ex MN River bottoms), I would make

539 Sep 18 2018 1 use of it on at least a weekly basis

540 Sep 18 2018 1 Mountain biking trails is a huge draw for me and my teens.

I'd love to see more off-road (non-paved), natural surface trails developed. Dirt underfoot (or under bike tire) helps users connect

541 Sep 18 2018 1 with nature.

542 Sep 18 2018 1 Off road biking/running trails

- 543 Sep 18 2018 1 Mountain bike trails would be a great addition  
Dedicated off road cycling trails would be most helpful to my
- 544 Sep 18 2018 1 enjoyment of the park.
- 545 Sep 18 2018 1 Wish there were mountain bike trails for off-road biking  
Install cameras or 'panic' boxes at distant parts of the trail. I don't
- 546 Sep 18 2018 1 feel safe here if I'm alone during the day.
- 547 Sep 18 2018 1 Mountain bike trails would be great.  
I would love to see some single track mountain bike trails. This  
would draw me and my friends to the park with much more  
frequency. It would also occasionally draw me there the winter,
- 548 Sep 18 2018 1 which is something i don't do currently.
- 549 Sep 18 2018 1 Need to invest in mountain biking.
- 550 Sep 18 2018 1 Mountain bike trails  
I would definitely visit more often if there were mountain biking
- 551 Sep 18 2018 1 trails here.
- 552 Sep 18 2018 1 I would rank building a mountain bike trail at the top
- 553 Sep 18 2018 1 Bring some mountain bike single track!
- 554 Sep 18 2018 1 No
- 555 Sep 18 2018 1 Singletrack!
- 556 Sep 18 2018 1 Some mountain bike trails would make my trip more enjoyable.  
Signage leading people to the park before they arrive is VERY  
important. Also helpful would be signage about trails/features  
within the park. I've seen a more than a few people go down the  
wrong trail both heading into the park and trying to get out (and  
helped them get to the right place). The falls at Hidden Falls are
- 557 Sep 17 2018 0 TOOOO hidden.  
Benches along the trails and along the river I rank 3rd in question
- 558 Sep 16 2018 1 #6.  
I am very concerned that the attempts to "improve" Crosby might  
actually cause it to be ruined. There are many parks with lots of  
amenities, but very few with wildness left in them. Please keep
- 559 Sep 15 2018 0 the area wild.
- 560 Sep 14 2018 0 My favorite park(s)! Keep it natural  
Do something about the men cruising. It makes bringing family
- 561 Sep 14 2018 0 there awkward.

## Hidden Falls-Crosby Farm Regional Park Master Plan

**What would improve your experience, or encourage you to visit the park more often?**

**Answered** 773  
**Skipped** 167

Respondents	Response Date	Responses
		I would go ice climbing there if it was legal. If permits are required they should be available through self registration on-site, like the state park climbing permits.
1	Oct 31 2018 0	More of a presence from law enforcement or Conservation Officers
2	Oct 31 2018 0	Keep access to ice climbing areas open as part of the redesigned Hidden Falls-Crosby Farm Regional Park!
3	Oct 31 2018 1	We would love to see improvements of the trail around the smaller 'pond'. I would like to see the trail become a special loop with a raised boardwalk to get above the wet, muddy parts. This improved trail could be a special leisure walk for people with walkers (I am 90), baby strollers, kids and for those who just want to stroll and look at nature. (No bicycles, runners or dogs permitted). Perhaps it could have some small signs labeling special trees, plants and birds. It would be a special walk for those who wish to meditate and look at the natural world. The basic path for this is there already, but needs a lot of work.
4	Oct 31 2018 1	Thanks
5	Oct 31 2018 0	No more development
		I love the park and will continue to visit as long as the river and the trees are there
6	Oct 30 2018 0	Keeping it Wild and Quiet :) □
		□
7	Oct 30 2018 0	Minimal human intervention.
8	Oct 30 2018 0	online maps
		No good ideas here, sorry. Maybe an escalator so I don't have to bike my butt all the way up that big hill after I'm done!
9	Oct 30 2018 1	bike my butt all the way up that big hill after I'm done!
10	Oct 30 2018 0	It's so tucked away that I easily forget it's there.
11	Oct 30 2018 0	More dirt trails for running/hiking
12	Oct 29 2018 0	Less congestion at prime times.
13	Oct 29 2018 0	This is a poor survey asked and answered in prior questions
14	Oct 29 2018 0	If bathrooms were open year round. more signage, more public events, better access - if people use public transit how do they get there?

We don't always need bright shiny new things - sometimes quiet spaces to be with nature are what is needed to decompress and

16 Oct 29 2018 0 engage with the outdoors.

17 Oct 29 2018 1 As a white male I can't think of one  
Better trail surfaces □

18 Oct 29 2018 0!

A more comprehensive city wide trail system that connected me

19 Oct 28 2018 0! to the river trail

20 Oct 28 2018 0! More/better marked and mapped natural surface trails

21 Oct 28 2018 0 Keep open to ice climbing

22 Oct 28 2018 0 less kids there throwing bottles

23 Oct 28 2018 0; Na

Play structure for kids/obstacle course that fits into nature (no

24 Oct 28 2018 1; plastic structures)

The new parking lot is great, an improved bathroom facility that is open year round with access to drinking water (example: one of the filtered water bottle stations) would be helpful for those that

25 Oct 28 2018 1 visit in the colder weather.

26 Oct 28 2018 1 Protect the parks use cases.

27 Oct 28 2018 1; Keep it wild

28 Oct 28 2018 1; Na

29 Oct 28 2018 1; N/a

More of a loop option for the trails that doesn't involve walking

30 Oct 28 2018 1; along Shepard ave.

31 Oct 28 2018 0! More adventure opportunities

32 Oct 28 2018 0! I would love to see more (official) dirt trails, not just paved trails!

33 Oct 28 2018 0! Ice climbing

34 Oct 28 2018 0; More ice climbing area ;)

35 Oct 28 2018 0 More access

36 Oct 28 2018 0; Cleaner and easier access to hidden falls

37 Oct 27 2018 1; An ice climbing farm.

38 Oct 27 2018 0! Programmed kid events? More parking

39 Oct 27 2018 0! Better road surfaces

40 Oct 27 2018 0; Allowing ice climbing

41 Oct 27 2018 0! .

42 Oct 27 2018 0; Ice climbing

Fewer creeps down along the river. They're not always there, but

43 Oct 27 2018 0; some of them are pretty sketchy

44 Oct 27 2018 0; patrols

45 Oct 27 2018 0 See #7

Better trail surfaces and clearer connections to other trail

46 Oct 27 2018 1; systems.

47 Oct 27 2018 1; Mostly, leave it alone

48 Oct 27 2018 1; Install artificial boulders like the one at St Paul academy

- 49 Oct 27 2018 1 Being able to ice climb on the waterfalls  
Maybe having more surveillance by park police so women can
- 50 Oct 27 2018 1 safely access park  
Replace current paved trails with more appropriate crushed limestone trails. □  
The current paved trails cannot take the abuse of changing
- 51 Oct 27 2018 0 weather and make the flooding worse.  
Winter programming (nordic ski trails) w/chalet style rental building, canoe/kayak launch, connectivity between Hidden Falls and Crosby parks, unleash Hidden Creek back into Ford site and
- 52 Oct 27 2018 0 build bridge over creek along MRB.
- 53 Oct 27 2018 0 Restore the waterfall
- 54 Oct 27 2018 0 Have trail routes marked
- 55 Oct 27 2018 0 Fix trail between crosby and falls area
- 56 Oct 27 2018 0 More playfields
- I would like more signs because I get turned around on the trails.
- 57 Oct 27 2018 0 Safer crossing of Shepard road would be helpful as well.  
Better trail markings - - easy to get lost. Ideally a number system,
- 58 Oct 27 2018 0 such as the one used at Lebanon Hills.  
I like the parks the way they are, would just like to see ice climbing areas protected and developed better. There aren't many good places to climb are the Twin Cities. The MN Climbers Association has done great work up at Sandstone, it would be really nice to have a similar development of ice climbing closer to
- 59 Oct 27 2018 1 home.  
More trails or trails that connect better to other trails,
- 60 Oct 27 2018 1 opportunities for kayak rental (paddleshare is so great!)
- 61 Oct 27 2018 1 Enforce leash laws
- 62 Oct 26 2018 1 Nothing. I love this park.
- 63 Oct 26 2018 1 More programs for youth.
- 64 Oct 26 2018 1 Better bike route
- 65 Oct 26 2018 1 Bus access to Crosby Farm -- the 84 is very infrequent.
- 66 Oct 26 2018 0 See #7.
- 67 Oct 26 2018 0 riverside primitive campsites
- 68 Oct 26 2018 0 See above comment  
Improved beach area. Playground area for kids. Less steep road
- 69 Oct 26 2018 0 (hard to walk with kids!).
- 70 Oct 26 2018 0 Better access/connections to other bike trails and streets
- 71 Oct 26 2018 0 Single track trails that are maintained and challenging  
For Hidden Falls, a less steep road (or bike path) would allow me
- 72 Oct 26 2018 0 to visit the park by bike more often.
- 73 Oct 26 2018 0 Clearer guidelines for use.
- 74 Oct 26 2018 0 See previous answer. White people weren't the first people here.

75 Oct 26 2018 0: Better mountain bike trails  
The park sometimes has creepy people hanging out, also it needs play equipment! The picnic tables is also seemingly poorly done, it's weird and spread out. Please invest in making this park

76 Oct 26 2018 0: family friendly.

77 Oct 26 2018 0: Time

78 Oct 26 2018 0: Ice climbing

79 Oct 26 2018 0: Getting rid of the freak trolling

80 Oct 26 2018 0: Better access to ice climbing

81 Oct 26 2018 0: Repaving the super rough trails.

82 Oct 26 2018 0: I use the park seasonally.

Smooth bike trails. They were very tough last time I was there so

83 Oct 26 2018 0: I haven't returned

84 Oct 26 2018 0: It's pretty dang good as is.

85 Oct 26 2018 0: Less drug dealings happening in lot

86 Oct 26 2018 0: Family moving closer

87 Oct 26 2018 0: Bike lanes

88 Oct 26 2018 0: Better lighting and signs at trail intersections.

Better bike and pedestrian safety. Right now I feel like people are

89 Oct 26 2018 0: just trying to run us down for being there.

90 Oct 26 2018 0: Nothing.

91 Oct 26 2018 0: Better connection with other bike trails

92 Oct 26 2018 0: More hiking trials

93 Oct 26 2018 0: better trails

Better bus service to w 7th, better parking at the back end and  
94 Oct 26 2018 0: good trash receptacles to dispose of litter found along the route.

95 Oct 26 2018 0: More trails would be nice.

96 Oct 26 2018 0: Bicycle lift and better bicycle trails

The only factor is the 15 minute drive it takes for us to get there.

97 Oct 26 2018 0: The parking lots are sometimes rowdy as well.

98 Oct 26 2018 0: I think it's a great park.

Signage when trail is flooded, improve rough pave trail spots,  
99 Oct 26 2018 0: more lighting, water at Crosby Trailhead access point

100 Oct 26 2018 0: Safety- Security that my won't get broken into or anything worse  
More enhancement of wildlife opportunities. Environmental

101 Oct 26 2018 0: protection and education.

102 Oct 26 2018 0: I am happy with the parks current condition.

A safe area to lock/store my bike so I could explore the area

103 Oct 26 2018 0: more on foot.

Improve access across Shepherd Road. Crossings should be located at most 1/4 mile apart. Also would benefit from additional

104 Oct 26 2018 0: ways to get down the bluff.

Increased park patrol during daylight hours/dusk. More group  
105 Oct 26 2018 0: exercise classes. Its pretty great as is. Thanks!

106 Oct 26 2018 0: Single track trails for running

107 Oct 26 2018 0: Good signage and natural surface trails

108 Oct 26 2018 0: More unpaved trails

109 Oct 26 2018 0: Maybe a trail race or organized run in the park?

110 Oct 26 2018 0: Unpaved trails

111 Oct 26 2018 0: Snow making for cross country skiing.

Increase access places for pedestrians and cyclists across Shepard Road which is basically a 4-lane freeway that has many miles between its only safe, signalized crossings at Elway and Davern Streets. There are no sidewalks on the west side of the road to connect either of these intersections to all the Apartment buildings and neighborhood that extends for miles between the intersections. Many of these folks would enjoy the park but Rankin, Alton and all the other streets, lack crossings of this dangerous highway. It prevents thousands of people from reaching the park and the MRTrail, many of them low-income folks and east-african immigrants. Also, do what we suggested in question #7. Otherwise, it's a beautiful park-- one of the best in

112 Oct 26 2018 0: Saint Paul. Don't over build it!

113 Oct 25 2018 0: Better lighting and better signage.

114 Oct 25 2018 0: X-country ski rental in the winter

115 Oct 24 2018 0: Improved hiking trails

Improve trails:

Add culvert under trail and debris trap at base of bluff at Hidden Falls. Rain makes trail dangerous due to flowing water and debris on trail.

Add curb cut at base of S Prior Avenue hill to allow bike and other wheeled access to multi-use trail.

Improve drainage at SW side of Upper Lake trails to reduce risk

116 Oct 24 2018 1: of slipping and falling.

117 Oct 23 2018 0: nothing

118 Oct 23 2018 0: better bike paths

119 Oct 23 2018 0: If I lived closer I would

Don't change anything! Only negative is some of the bike trail is

120 Oct 22 2018 0: starting to deteriorate, but is still more than usable.

121 Oct 21 2018 0: Improved surveillance of the parking lots.

122 Oct 21 2018 0: Mountain biking trails

123 Oct 21 2018 0: A police presence, or a feeling of being safe down there

Increased accessibility - safe pedestrian access across Shepard

124 Oct 21 2018 1: Road.

125 Oct 21 2018 1: Safety

Bike parking!! I usually only ride through the parks because there are NO bike racks in either park which is super frustrating! If bike racks in both parks were available I would definitely spend much more time walking and exploring both parks.

Implement a separate walking path at Hidden Falls South gate to connect to River Road, or close the gate to car traffic.

If I had more time!

Keeping it as a nature reserve.

Nothing

trails could use a resurfacing. I would love to see the additional more additional wood chip trails that cut through the hillside-middle part of the park (currently no trails go in the middle of the

"loop")

More parking

More events to draw people down to the riverside.

Management of invasive species would be nice, but probably

wouldn't alter my use of the park

I want a natural experience, though I do see how smoother pathways would make the paths more accessible to all. I want woods and prairie and water and sand and wildlife and other quiet

contemplative walkers and bikers.

Plowed lot and ramp in winter time.

Nicer bathrooms and maybe an environmental learning center

Maybe have some sort of park-wide scavenger hunt?

the bathroom

Im not sure

An ELC

Year round bathrooms

Warm spaces in the winter, better bathrooms

Probably an environmental learning center that would have field guides for plants and animals, as well as binoculars, and hand

lenses.

I like how it is right now.

fire pits it gets cold!!

If there were more shelters/fire pits and year round bathrooms

A heated building with possible rentals of skis or snowshoes

N/A

Bus service to the park.□

More frequent litter cleanup, especially along the river.

overall improvements

- 152 Oct 18 2018 0: If the trails weren't flooded  
See above about the big hill to enter/exit. On a week day, it feels a little isolated in terms of safety. More people would make it feel
- 153 Oct 17 2018 0: safer.
- 154 Oct 17 2018 0: More birds.
- 155 Oct 17 2018 0: Just the list I ranked  
Remove fallen trees from the beach and clear the river beach
- 156 Oct 17 2018 0: area.
- 157 Oct 17 2018 0: I am just not available that often, so it is on me  
I don't feel safe there because it is so secluded. And sometimes
- 158 Oct 17 2018 0: there are people there just sitting in their cars.
- 159 Oct 17 2018 1: more picnic areas
- 160 Oct 17 2018 1: Nothing
- 161 Oct 17 2018 1: Nothing -I visit it a couple times a week.  
my biggest barrier is that I don't drive, its easily accessible by bike but harder to get to if you're walking all the way down to the
- 162 Oct 17 2018 1: park  
Better park cleanup--people leave trash all over the beaches all the time, and my kids are always tripping on beer bottles and cigarette butts. If there were some infrastructure for keeping the park clean, that would be a huge benefit and contribution to park
- 163 Oct 17 2018 0: visitation.
- 164 Oct 17 2018 0: Less development, more control of invasives, more river access,
- 165 Oct 17 2018 0: Less road construction but that'll go away soon.  
Safe bike lanes along Mississippi Blvd, no public boat/kayak
- 166 Oct 17 2018 0: launch in Crosby
- 167 Oct 17 2018 0: Make sure parking lots and paved trails are maintained.  
A playground like structure would be nice near the main entry
- 168 Oct 17 2018 0: points at either park, more naturalized plantings  
It's about perfect for me right now. I love how wild it is. I don't think that we need more shiny centers, necessarily, unless they
- 169 Oct 17 2018 0: are truly integrated into the landscape.
- 170 Oct 17 2018 0: See #7
- 171 Oct 17 2018 0: As above  
  
I'm not sure why the city closes the park during flooding. Seems
- 172 Oct 17 2018 0: like a good time to go close and see the mighty River.  
I appreciate the variety of opportunities in our park system and
- 173 Oct 17 2018 0: value a natural resource park.  
More turtles, frogs, dragonflies, fireflies, mix of waterfowl, etc.
- 174 Oct 17 2018 0: The richer the biodiversity, the better.
- 175 Oct 17 2018 0: Less mosquitoes in the summer
- 176 Oct 16 2018 1: Just need more hours in the day
- 177 Oct 16 2018 1: Please do not sacrifice any more of the natural areas.

Wish the waterfall was cleaned up of trash and weird cement and

178 Oct 16 2018 0: graffiti.

179 Oct 16 2018 0: Better trails and flood protection.

180 Oct 16 2018 0: More programming would help.

181 Oct 16 2018 0: Better Parks leadership - fire Mike Hahm

182 Oct 16 2018 0: Na

183 Oct 16 2018 0: Better maintenance of the boardwalk and deck structure.

184 Oct 16 2018 0: Nothing

185 Oct 16 2018 0: Trails that help negotiate high water

186 Oct 16 2018 0: Improve access for canoes, kayaks, paddleboards.

187 Oct 16 2018 0: Groomed winter ski trails

188 Oct 16 2018 0: see above

189 Oct 16 2018 0: Nothing. I really like this park as it is.

190 Oct 16 2018 0: Dogs on leashes.

191 Oct 16 2018 0: Good trails

Environmental Ed center with Naturalists on staff, educational

192 Oct 16 2018 0: signage and shelter/ bathrooms do for the winter

193 Oct 16 2018 0: N/A

I visit Crosby Farm frequently, but haven't gone to Hidden Falls

194 Oct 16 2018 0: yet this year so can't speak about it.

It would be great if there were updates, particularly in the spring season, about current conditions in the park- oftentimes it's flooded and the trails are impassable (or bugs are extreme) and it would be awesome to have an updated source of information to check conditions before heading out to the park, instead of

195 Oct 16 2018 0: making an educated guess.

196 Oct 16 2018 0: See above

197 Oct 16 2018 0: just improvement of bike trails.

198 Oct 16 2018 0: More seating, bathrooms along the trail. I'm getting older.

I could stay longer and enjoy the parks more if there were always open bathroom facilities, especially in the winter when bathroom buildings are usually closed for the season. Please at least provide portable toilets at all parks, in several locations at bigger

199 Oct 16 2018 0 parks.

More bike and park connections coming from Shepard Road. I

200 Oct 16 2018 0 bike from downtown St Paul.

Develop more opportunities for fishing Crosby Lake. Need weed

201 Oct 16 2018 1: control and shoreline improvements for access

202 Oct 16 2018 1: More welcoming entrance, improved paths

I really enjoy visiting Minnehaha Falls, think it would be nice to have a similar feel, like the restaurant and used to go there for beer too. Not sure if it is feasible because of location being off

203 Oct 16 2018 1: the beaten path, which is nice too

The entire area under St. Paul Parks & Rec suffers from neglect. Hopefully a more comprehensive strategy orchestrated with the various partners (DNR, Corps, National Parks, counties, and cities) The Mississippi River is the thread that connects all these spaces and its water is what gives these spaces context.

204 Oct 16 2018 1 Food (beer) vendor   
□  
Nature-based playground area for little kids - log structures, stick teepees, etc.

205 Oct 16 2018 1 my retirement

206 Oct 16 2018 1 Fewer man-made structures.

208 Oct 16 2018 1 Fewer bees

209 Oct 16 2018 1 Leave it as it is.  
I think everything I just listed in #7. Also, thanks for everything that you're doing to listen to residents about preferred improvements for the park.

210 Oct 16 2018 1 See above

212 Oct 16 2018 1 See above

213 Oct 16 2018 1 more and better-marked trails

214 Oct 16 2018 1 areas with those who have mobility disadvantages can access.

215 Oct 16 2018 1 Repair Hidden Falls

Safety.   
I feel very safe at Minnehaha park in Minneapolis.   
□  
We need to attract more people to the park to improve safety.   
□  
Access across shepard road is challenging with two small kids.   
□  
There is very limited parking in the circular lot.   
□  
Signs explaining historical locations within the park would be great.

216 Oct 16 2018 0 Clear out the urban campers north of I35E.  
Keep as natural as possible.

218 Oct 14 2018 0 Things that improve the feeling of safety - and if I had more free time!

219 Oct 14 2018 0 Maybe another shelter somewhere for gathering? I appreciate the park a lot the way it is..

220 Oct 13 2018 0 The outdoor Halloween program

- further enhancement of the natural areas, i.e., additional
- 222 Oct 13 2018 0: plantings of native species
- 223 Oct 13 2018 0: More activities-community events. Concerts, art fairs.
- 224 Oct 13 2018 0: More events held in the park (concerts, etc.).
- 225 Oct 13 2018 0: Not a thing...I love this park
- 226 Oct 12 2018 0: More places to enjoy being right by the river.  
More nature, more access to river for all people regardless of
- 227 Oct 12 2018 0: physical challenges  
Cleaner and improved bathrooms. Feel safer when there in
- 228 Oct 12 2018 0: evening with dogs or family.
- 229 Oct 12 2018 0: more time off from work?
- 230 Oct 12 2018 1: Perhaps a newsletter about activities in the park  
Keeping people from running their dogs uncontrolled through this
- 231 Oct 12 2018 0: park.
- 232 Oct 12 2018 0: See above
- 233 Oct 12 2018 0: Trail improvement paved. Addition of mountain bike trails.
- 234 Oct 12 2018 1: Year round bathroom access!  
Better biking paths/safer separation for cars both accessing the
- 235 Oct 11 2018 0: path and crossing the road exiting the park
- 236 Oct 11 2018 0: Mountain Bike trails!
- 237 Oct 11 2018 0: Maps
- 238 Oct 11 2018 0: More parking spaces.
- 239 Oct 11 2018 0: NA
- 240 Oct 10 2018 0: additional dirt paths through the woods for Nordic classic skiers.
- 241 Oct 10 2018 0: no improvements needed.
- 242 Oct 10 2018 0: Taco truck  
Mountain biking trails. Some sort of parking lot camera or
- 243 Oct 10 2018 0: surveillance
- 244 Oct 10 2018 0: Open 24 hours
- 245 Oct 10 2018 0: Adding in more trails or mountain bike trails
- 246 Oct 10 2018 0: Single track mountain bike trails
- 247 Oct 10 2018 0: Mountain bike single track.  
Many residents don't know it exists. Signage might help, but history shows that this would only reach people that are already
- 248 Oct 10 2018 0: aware of the space.  
I already visit this park multiple times a week through all the seasons. This park is one of my favorite reasons for living in the Highland Park neighborhood. I don't want to see it change too much. I think it is important to improve and maintain the trails
- 249 Oct 10 2018 0: that already exist.  
Better maps of the park trails? I would look at **Lebanon Hills Park**
- 250 Oct 10 2018 1: as an example. They have great signage.
- 251 Oct 10 2018 1: Better trails, parking and restrooms

- lighting improvements, better access to the falls and river and  
252 Oct 10 2018 0: definitely invasive species management  
More fun activities
- 253 Oct 10 2018 0:  
254 Oct 09 2018 0: Lighting. More access to river  
255 Oct 09 2018 0: Improve the path from flooding, more lighting  
256 Oct 09 2018 0: More user amenities, grills, bathrooms , summer festivals.  
257 Oct 09 2018 0: Better walking access from across Shephard Road.
- Please consider improving access for pedestrians and bikes to get to and from the park, especially at the south gate. Walking on the road is dangerous. I suggest we improve existing infrastructure before adding new, use native plants and maintain the wooded area and path near the falls in the northern part of hidden falls. It is a piece of solitude and quiet in the city. Be careful when adding access to the river as it can be dangerous and is ever changing. Increased signs in multiple languages would help in the park. Trash along the river banks sometimes prevents me from using that area. I would appreciate any efforts to combat this. Education and enforcement would also be
- 258 Oct 09 2018 0: appreciated.  
Easier access from Sheppard Rd. Now almost always drive to
- 259 Oct 09 2018 0: the entrance at Gannon St.
- 260 Oct 09 2018 0: Better trails and directions  
The biggest barrier to visiting Hidden Falls is the hill into/out of it! Not sure what can be done about that but it's the barrier for me.
- 261 Oct 09 2018 0: Bike escalator? ;)  
I go there all the time; if this area becomes over populated, I will
- 262 Oct 09 2018 0: no longer go there. Leave the river alone.
- 263 Oct 09 2018 1: Safer feel
- 264 Oct 09 2018 0: see above
- 265 Oct 09 2018 0: Improvetrail down to Crosby. It's an ankle breaker
- 266 Oct 09 2018 0 Less car break-ins primarily. Better bathrooms secondarily.  
I used to go there to cross county ski and walk at night. that can
- 267 Oct 08 2018 0: be a bit spooky now. how to make it more safe????
- 268 Oct 08 2018 0: Events held at the park
- 269 Oct 08 2018 0: better access to water and beach  
Riverbottom wet/mesic natural habitat restoration incl. removing
- 270 Oct 08 2018 0: paved trails that are in floodplain
- 271 Oct 08 2018 0: better flood protection
- 272 Oct 08 2018 0: Repaving the current trails  
more programs
- 273 Oct 08 2018 0:
- 274 Oct 08 2018 1: smoother trail for biking

- 275 Oct 07 2018 0 if I felt safe without having to bring someone  
276 Oct 07 2018 0 I Dunno  
277 Oct 07 2018 0 Kids programs  
278 Oct 07 2018 0 Better and safer parking areas. Better restroom facilities.  
279 Oct 06 2018 0 Unknown  
280 Oct 06 2018 0 More people. More safety.  
281 Oct 06 2018 1 Trails that are not blocked by flooding  
282 Oct 06 2018 1 Upkeep of area  
283 Oct 06 2018 0 More lighting so I felt safe to walk there alone  
284 Oct 06 2018 0 Trail resurfacing in the paved path areas  
Clean it up a bit... lot's of litter... also, patrol at night to keep the  
285 Oct 06 2018 0 after-hours activity under control  
It would be cool if there was a way to get from Ft. Snelling or  
Minnehaha Falls over to the park at river level (like a pedestrian  
bridge below the Hwy 5 bridge) instead of going out of the park  
286 Oct 06 2018 0 and across on one of the current bridges.  
287 Oct 06 2018 0 Not sure  
288 Oct 06 2018 0 more parking for events  
289 Oct 06 2018 0 Plow the trail in the winter  
  
Love the idea of a Nature Center but you have to have more  
native nature. So if you build it be sure you are both removing the  
invasives (get volunteer help) AND planting new native  
replacements for the invasive Japanese Hedge Parsley,  
290 Oct 05 2018 1 buckthorn, etc. The seedbed may be mainly invasives.  
291 Oct 05 2018 1 See #7  
292 Oct 05 2018 1 Fewer bugs  
293 Oct 05 2018 1 Just improving the trails  
294 Oct 05 2018 0 More parking areas towards Crosby Farms  
295 Oct 05 2018 0 Nice professional park rangers  
296 Oct 05 2018 0 More children's activities  
I occasionally feel unsafe when other walkers/runners aren't on  
297 Oct 05 2018 0 the Crosby trails because it's so isolated  
298 Oct 05 2018 0 I can't think of anything.  
299 Oct 05 2018 0 Nothing- I'm satisfied!  
300 Oct 05 2018 0 More time in my life!  
301 Oct 05 2018 0 Additional year round maintenance  
302 Oct 05 2018 1 As above.  
Keeping it as a natural get away in the city that is not a heavily  
303 Oct 04 2018 0 groomed, asphalt/concrete everywhere park.  
304 Oct 04 2018 0 Paved trails, better signs, better access to the river.  
305 Oct 04 2018 0 The absence of winter.  
Making sure there are no coyotes or other dangerous animals in  
306 Oct 04 2018 0 the park.

Safety. Lots of men still meeting up for sex in these parks. I would never walk the lower area of these parks alone. Never ever at

307 Oct 04 2018 0: night.

308 Oct 04 2018 1: Easier to access the river via boat, more water sports.

309 Oct 04 2018 1: A bit more parking at the bottom of Lexington Ave.

Keep the dogs out! This is a wildlife park, not a frisbee course, not a dog park, not a theme park It's rare and wild and should be

310 Oct 04 2018 0: left minimally disturbed for wildlife, etc.

Maintaining access to the ponds at Crosby with functioning boardwalks would be great. The boardwalks are bogged down,

311 Oct 04 2018 0: no longer float and are often flooded.

See 7 above; drinking water of some kind; better pathing around

312 Oct 04 2018 0: big lake and little lake.

More hiking trails, or a surface that I can roller blade on. The one

313 Oct 04 2018 0: area is always flooded, reduce the flooding.

Crosby, specifically:

Winter - consistently well groomed XC ski trails

Summer - develop more gravel paths 1. on the current man-made narrow dirt trail along the lake at the bottom of Shepard Road embankment - the path that runs from near the boardwalk to the small parking lot on Shepard; 2. gravel path on the man made dirt path(s) in the woods from small parking lot going to the river and eventually joining the paved path.

Hidden and Crosby:

Resurface all bike paths and maintain them for biking, roller

314 Oct 04 2018 0: skiing, rollerblading, walking.

315 Oct 04 2018 0: Open up the south entrance

Better management of the mosquitos, easier access when

316 Oct 03 2018 0: flooded.

If parking were close and easy. Or if there was a safe way to

317 Oct 03 2018 0: access the bike trail from the west side not involving hwy 13.

318 Oct 03 2018 0: South end access to hidden falls can be tricky

319 Oct 03 2018 0: Better upkeep of existing trails and facilities

I am right up the street from it. This will likely be the park I visit most often until I decide to move. But I agree there can be more

320 Oct 03 2018 0: improvements.

321 Oct 03 2018 0: More attractive entrances from Mississippi River Boulevard.

322 Oct 03 2018 0: if hours were extended

323 Oct 03 2018 0: Not sure.

324 Oct 03 2018 0: If I had a place to store my rowing shell I'd be there every day.

more built features, better planned/interesting trails, a National

325 Oct 03 2018 0: Park Service presence

A National Park Headquarters. I think you sense a theme here. This issue has been ignored too long. I think St. Paul has benefited greatly from the partnership already and would gain even more from an NPS interpretive and education center located

326 Oct 03 2018 0 within the park rather than in a downtown facility.

Flood management, more visible safety patrols, an emergency call box. I don't feel safe going there alone but I love it there.

I love going to both Crosby and Hidden Falls and love the access

328 Oct 03 2018 1: in between

329 Oct 03 2018 1: If there were an official off leash dog area

330 Oct 03 2018 1: none

□

Patrol it□

331 Oct 03 2018 1:

332 Oct 03 2018 1: More pathways and benches

333 Oct 03 2018 1: I love it as at is, more wild than not!

334 Oct 03 2018 1: To become younger.

335 Oct 03 2018 1: Nothing

336 Oct 03 2018 1: Leave it simple and a quiet place for people.

337 Oct 03 2018 1: snow/ice clearing of paved trails in winter

338 Oct 03 2018 1: Additional water stations would be lovely

339 Oct 03 2018 0: Better trail maintenance

340 Oct 03 2018 0: All of the items I rated

341 Oct 03 2018 0: quality of trails for walking, biking, rollerblading and safety!

342 Oct 03 2018 0: better trails like the improved part of crosby

343 Oct 03 2018 0: Programs, access to river and better lighting

I visit both parks frequently. They are great. Best thing you could do to improve them would be to restore native plant species and habitats. Second best thing you could do is basic low cost clean up of trash, etc. I'd be happy to volunteer! I already pick up garbage when I visit (and am not on bike). Third best thing you

344 Oct 03 2018 0 could do is leave them alone.

345 Oct 03 2018 1: this a confusing question- I think I've already answered that.

I don't think people know what's back in the Crosby Farm area.

346 Oct 02 2018 1: Some better public awareness would probably help.

347 Oct 02 2018 1: Better trails

348 Oct 02 2018 1: Parking lot cameras for safety.

349 Oct 02 2018 0: better signage on the trails and upgraded restrooms

350 Oct 02 2018 0: Like it the way it is

351 Oct 02 2018 0: Safety improvements

Once the Ford Site is redeveloped, it'll be easier for me to walk

352 Oct 02 2018 0: there from the bus stop.

- Large and small fenced in dog park. Better paved trails for biking
- 353 Oct 02 2018 0: with signage. Bike/walk trails  
Paved trails need subgrade correction, but I do not support raising long segments of the trails to reduce frequency of
- 354 Oct 02 2018 0: flooding.
- 355 Oct 02 2018 0: Same as above.
- 356 Oct 02 2018 0: Better facilities and a more comfortable trail to ride a bike on
- 357 Oct 02 2018 0: Better, safer walking paths
- 358 Oct 02 2018 0: Keep it as is
- 359 Oct 02 2018 0: None
- 360 Oct 02 2018 0: Lights automatically turn on at night.
- 361 Oct 02 2018 0: Better drainage for the trails around Crosby Lake.  
Repairing the pavement of the trails would make biking and
- 362 Oct 02 2018 0: rollerblading for my kids easier and more enjoyable.
- 363 Oct 02 2018 0: better lighting at dusk/dawn  
Improved trail surfaces. Patrol of parking lots. Better lighting and
- 364 Oct 02 2018 0: signage.
- 365 Oct 02 2018 0: More events for the family. More picnic facilities
- 366 Oct 02 2018 0: Unlocked bathrooms
- 367 Oct 02 2018 0: Improved boat access.  
Safer access for pedestrians and bikes from the streets that lead into the parks.□
- 368 Oct 02 2018 0:  
More police patrolling parking area where cars are routinely
- 369 Oct 02 2018 0: broken into.
- 370 Oct 02 2018 0: better paths and better lighting
- 371 Oct 02 2018 0: Na
- 372 Oct 02 2018 0: na
- 373 Oct 02 2018 0: Better access
- 374 Oct 02 2018 0: Better trail management  
If the park had better facilities (restrooms, pavilion, etc) I would
- 375 Oct 02 2018 0: be more likely to visit.
- 376 Oct 02 2018 0: I like it as is.
- 377 Oct 02 2018 0: more patrols by park police and parking
- 378 Oct 02 2018 0: Nothing
- 379 Oct 02 2018 0: Nothing. Maybe less graffiti on the benches.
- 380 Oct 02 2018 0: Better parking near 35E and Shepard; better bathrooms.  
I don't think these parks need any improvement. I like them a lot
- 381 Oct 02 2018 0: already!

My whole family really enjoys the outdoor experience we have at hidden falls and Crosby. With access to the river shoreline and trails both are wonderful places to bring the whole family for the opportunity to enjoy a walk in the outdoors surrounded by nature. I never visit alone because I feel it's not safe. I have avoided Hidden Falls this season because of the coyote and wasn't sure of it was safe to bring my dog there. We are looking forward to improvements but hope the feel of the spaces remains the same

382 Oct 02 2018 0 (not overly groomed).

Probably the knowledge that there is a police presence showing up periodically, like on a horse or bike. I love the wild feeling of the park (especially during the week, but I'm at work now so I never go there during the week). XC trails would be nice too. Any

383 Oct 02 2018 0 of those?

More trash bins by the river for the fishing. People leave lure and bait all over the beach. I have stepped on a hook and my dog has eaten bait. As it is more discovered, people leave more glass and trash. Several people go around picking up as much trash as they

384 Oct 02 2018 0 are able to.

See above. I don't know what you can do about flooding but there are times when the entrances for auto traffic are blocked due to flooding but the flooding is minimal and pedestrians are

385 Oct 02 2018 0 still using the park. Also, a dog park area would be nice.

It would be cool if the Falls area could be picked/cleaned up more

386 Oct 02 2018 0 often, I feel like there's often a lot of trash in the area.

Nothing! We drove across town to go there all the time! Please

387 Oct 02 2018 0 don't change it too much!

Management of seasonal flooding so trails wouldn't be blocked

388 Oct 02 2018 0 for so long that connect Hidden Falls with Crosby Farm.

I already visit it multiple times per day, but I think that dog owners should keep their dogs on a leash, as they are required to do. My dog has been attacked by off leash dogs there on multiple occasions. Further, there should be some policing on littering.

The people who come there to fish constantly just dump their fishing stuff, including their garbage but also fish hooks, etc. I

389 Oct 02 2018 1; pick it up all the time.

390 Oct 02 2018 1; Better bathrooms are always a plus

391 Oct 02 2018 1; Being able to use the trails despite rain/flooding.

392 Oct 02 2018 1; more time

393 Oct 02 2018 1; It's fine the way it is

394 Oct 02 2018 1; Better bathrooms

- I have young children, so something like a voluntary scavenger hunt sheet at the pavilion or other child-centered learning opportunities would be nice. Also, I don't want pesticides but if there are natural ways to reduce mosquito populations around the
- 395 Oct 02 2018 1 trails that would be helpful-build bat houses maybe?
- 396 Oct 02 2018 1 My husband getting off the couch.  
better management of the water/flooding/erosion of the
- 397 Oct 02 2018 1 waterbanks
- 398 Oct 02 2018 1 Hidden Falls is lovely as is.
- 399 Oct 02 2018 1 Love the parks!
- 400 Oct 02 2018 1 Better paving on trails.  
Improvement of the St Paul East River Road Trail, making it
- 401 Oct 02 2018 1 wider, a better surface, and separated walking and biking.
- 402 Oct 02 2018 1 Bathrooms!  
More public events like National Public Lands Day and kid-friendly activities. A dog park.
- 403 Oct 02 2018 1 Weather is my biggest factor when choosing to come or not so
- 404 Oct 02 2018 1 nothing  
Improve the walking surface down to the park at the south entrance to Hidden Falls
- 406 Oct 02 2018 1 Possibly put cameras discretely along the trails to improve safety.
- 407 Oct 02 2018 1 better bathrooms
- 408 Oct 02 2018 1 If there were a singletrack trail system
- 409 Oct 02 2018 1 Better trail maintenance, easier access to the river for swimming  
Easier walking access points. There are 2 on the side closest two cleveland, but they are far apart and aren't walking friendly (Why
- 410 Oct 02 2018 1 have peds walking with cars?)  
Maintain the rustic nature of Crosby Farm. It is a rarity and a gem in the middle of the city and does not need to be developed to resemble Como or Phalen. We already have parks that serve that purpose and if Crosby were to be developed in such a manner it
- 411 Oct 02 2018 1 would lose its uniqueness.
- 412 Oct 02 2018 1 Improve the trails.
- 413 Oct 02 2018 1 See comment
- 414 Oct 02 2018 1 get rid of the long hill.
- 415 Oct 02 2018 1 I want to hear more about the Native history of this land.  
It's mostly fine as it is. Staying on top of trail maintenance would
- 416 Oct 02 2018 1 be the most helpful. Grooming the ski trails in winter.  
Having 24 hour safe access, and not worrying about my vehicle
- 417 Oct 02 2018 0 being broken into or trailer stolen.
- 418 Oct 02 2018 0 Night lighting of the boat ramp (with motion detectors)

- Safety of patrons and a better safer boat launch that doesn't have
- 419 Oct 02 2018 0: a 3mph current
- 420 Oct 02 2018 0: More adventure elements  
Please keep the park in its current state. The park should not build new shelters or paved trails for the sake of implementing a plan or modernizing the park. Such modernization could ruin the
- 421 Oct 02 2018 0: essence of the park.
- More quiet areas. When I go to these parks, I go to get away
- 422 Oct 02 2018 0: from the lights and sounds of the cities, as much as possible.
- 423 Oct 01 2018 0: Better boat launch facility with dockage and current breaks
- 424 Oct 01 2018 0: More Ice climbing  
Safety features to make the area more usable for single
- 425 Oct 01 2018 0: women/children such as emergency stations, etc.
- 426 Oct 01 2018 0: Remove bike trails.  
Play fields for frisbee, soccer, intermurals, lacrosse, dog
- 427 Oct 01 2018 0: activities.
- 428 Oct 01 2018 0: Longer bike trails
- 429 Oct 01 2018 0: Activities  
Easier access across Shepard Road at multiple points. Maybe a
- 430 Oct 01 2018 0: tunnel or bridge?  
I like the park overall but more rule enforcement around the boat
- 431 Oct 01 2018 1: launch would be helpful.  
More hours of operation, especially at the boat ramp.   
  
More non-paved paths.   
  
The boat ramp area needs signage that clearly communicates ramp etiquette. There are very often anglers fishing from the ramp when a boat is trying to launch or load. Other times there are people throwing rocks, Or sticks to their dogs. Or groups of 20 people on kayak trips that lay their gear all over the boat landing for 40 minutes, rendering the ramp useless to those for whom it was designed -- people launching and loading boats on
- 432 Oct 01 2018 1: trailers.
- 433 Oct 01 2018 0: Better access to public transportation
- 434 Oct 01 2018 0: Maintaining the existing trail surfaces

Feeling as a single elder woman that I am safe while visiting the park. I have never seen any park personnel at either site. I would not go to Crosby alone. On the other hand, I do not want to see the natural features and wilderness destroyed by more ball fields and parking lots. At either or both parks, it would be nice for those who do not have canoes or boats to have pontoon or canoe rides available and maybe some facilities to teach those of us who do not know much about fishing.□

Interpretive signs about the trees and directional signs □

435 Oct 01 2018 1 would be helpful.

436 Sep 30 2018 0 I visit it as frequently as I can now.

I like the parks as they are. The Hidden Falls steps/falls area

437 Sep 30 2018 0 should be cleaned up and better maintained.

438 Sep 30 2018 0 Dog park

439 Sep 30 2018 1 updated restrooms, repaved parking lots

The falls should connect to the Ford Site under Mississippi River Boulevard. It would be a great way to connect the neighborhood

440 Sep 30 2018 1 to Hidden Falls, which is really just too hidden.

We often enter the park via the South Entrance. It would be nice to have a pedestrian walkway down to the park. With kids/dogs/etc. it seems unsafe if there is a vehicle on the road

441 Sep 30 2018 0 while pedestrians are going down to the trails.

See #7, above. Also parking lots surfaces need repaving, better

442 Sep 30 2018 0 signage, better lighting, etc.

Nothing. Love the accessibility, love the trails, asphalt and off

443 Sep 29 2018 0 trail.

444 Sep 29 2018 0 More benches and areas for bird watching.

I would go more often if there was a dog park because a dog park brings people out throughout the day, and I find it makes the

445 Sep 29 2018 1 area feel safer.

446 Sep 29 2018 0 n/a

A regular facebook, newspaper, community bulletin board listings

447 Sep 29 2018 0 of activities and available resources.

448 Sep 28 2018 1 Bathrooms open for a longer period of the year.

As mentioned above, adding spots to lock up bikes would certainly help. I, like many other I imagine, like to ride my bike to the park. Sometimes I would like to lock my bike up and enjoy the park on foot, only using my bike to commute. Currently, there isn't anywhere to really do this (other than locking my bike on trees, of

449 Sep 28 2018 0 course, which isn't the worst thing in the world).

450 Sep 28 2018 0 Maybe a bench or two along the paths.

Encourage all visitors to get out of their cars. Some don't get out  
451 Sep 28 2018 0 and try to talk to you. They leave patrol cars come along...

I like these parks and they are close to home, but I have general safety concerns about using the parks alone. I wouldn't mind more park ranger presence or maybe some call boxes. It would also be nice if there were a few clear bypass options for the trail that goes under the Hwy 5 bridge at Hidden south gate -- for example, multiple trails that connect the road and parking area to the riverside trail, so that users have options for choosing routes according to the people/scenario they encounter on any given

452 Sep 28 2018 0 day.

More people seeking healthy outdoor time. Theodore Wirth and

453 Sep 28 2018 0 the Loppet foundation is a model with striving for

Super concerned about whether another bridge will be built under Hwy 5. I really don't want to see this happen because of the negative impact to the wildlife, the river, and this beautiful area of

454 Sep 28 2018 0 our city.

I like the fact that it is less visited than Minnehaha Park for example and thus hesitate to build "things" when it is the

455 Sep 28 2018 0 experience that is most valued.

Bike trails need to be resurfaced. The board walk around the marsh is beautiful, but needs some repair as well. Better pedestrian/bike crossings across Shepherd road would help as well. A small canoe/kayak rental place on the river woudl I think be nice, but making a large nature center would be detrimental to

456 Sep 28 2018 0 the park.

457 Sep 28 2018 0 Already mentioned and ranked above

458 Sep 28 2018 0 clearer signage of trails (indicating where they lead to)

459 Sep 28 2018 0 More safe feeling after dark, archery range

460 Sep 28 2018 0 Nothing

461 Sep 28 2018 0 Smoother trails, connectivity to the neighborhood

462 Sep 28 2018 0 See above.

The Hidden Falls bike path/walking path floods in two specific places at least yearly and in most years multiple times per year. A 20 yard stretch just north of the Hwy 5 bridge floods when the Miss. River reaches the 10 foot mark as measured by the downtown St. Paul river gauge. A five yard stretch 30 yards south floods at the same time. This could be easily fixed by raising the path in those areas and installing a small drainage culvert under the path. A one time fix would be less costly than the maintenance done multiple times per year by Parks and Rec staff. Check the maintenance records against the river gauge

463 Sep 28 2018 0 reading to verify this.

- Improved trails (better surfaces, more clearly marked) and more  
464 Sep 28 2018 0 access options  
Figuring out how/where to make a dog park so that dog lovers  
can use the space without encroaching on the comfort and  
465 Sep 28 2018 1 experience of those who are not dog lovers.  
More visible security (if they're not already routinely present),  
modernize the physical space where people gather (again, it's  
been awhile but it always seems rather run down and  
466 Sep 28 2018 1 overlooked).  
I think there are some creepy guys that park there probably  
trolling for sex. Find a way to get rid of those people. It's a family  
oriented place and you shouldn't have to worry about your kids  
467 Sep 28 2018 1 going there on their bikes.  
468 Sep 28 2018 1 better walking access to the river  
  
More trash/debris cleaned up. There is a fair amount of flotsam  
469 Sep 28 2018 1 that washes up, as well as litter that park users leave behind.  
470 Sep 28 2018 1 see survey  
Lower Hidden Falls would be a perfect place for an archery  
range. We have to travel 7-9 miles to the nearest range. The  
471 Sep 28 2018 1 Archery in Schools program would benefit.  
472 Sep 28 2018 1 More bathrooms  
473 Sep 28 2018 1 Nothing  
474 Sep 28 2018 1 See response above.  
  
Removal of coyotes in the area. I had a VERY close encounter  
475 Sep 28 2018 0 with one while walking my dog. I'd rather not do that again.  
476 Sep 28 2018 0 patrols by park staff to assist with security  
477 Sep 28 2018 0 Accessibility  
See comments above about better wayfinding and natural and  
cultural information. And especially information and maps about  
the larger parks and trails system in the region available digitally  
478 Sep 28 2018 0 with links to live maps.  
479 Sep 27 2018 1 Good trail connections to adjacent parks and trails.  
Better access that connects the parks to surrounding  
neighborhoods, including pedestrian bridges over Shepherd  
480 Sep 27 2018 0 Road.  
There is too much human trash everywhere. Some days I don't  
want to leave the house because of it. The river takes much of  
481 Sep 27 2018 0 this as it all goes down the stream.  
482 Sep 27 2018 0 Better signage about and control of off-leash dogs

- having a restored native plants garden or region with signage & sitting areas would be wonderful! Would appreciate bike racks nearby, & also bike racks at anticipated scenic stops along the river. Possibly widening trails a bit when they are being redone at
- 483 Sep 27 2018 0 intervals. Designated trails for walking only might be really nice.
- 484 Sep 27 2018 0 Restoration of habitat to support animal species
- 485 Sep 27 2018 0 Less work.  
The area has a negative reputation. Maybe if the public areas--- entrance area, picnic areas, etc. were spruced up this would go
- 486 Sep 27 2018 0 away.
- I would love to be part of a team that would make materials about Crosby (or hidden falls) available in Spanish, Somali, Hmong, Vietnamese, and the other major languages spoken in our community. I would love everyone to feel encouraged to visit the park and to respect and treasure it as I do. That would improve
- 487 Sep 27 2018 0 everyone's experience.  
Signalized crosswalks of Shepard Road at Alton and Rankin/Homer Streets to enable folks in the nearby residential community to access Crosby Farm and the Mississippi River
- 488 Sep 27 2018 0 Trail.
- 489 Sep 27 2018 0 not to many improvements
- 490 Sep 27 2018 1 travel money
- 491 Sep 27 2018 1 More directional signs
- 492 Sep 27 2018 1 Improved trails and security.  
I would love to see some kind of outdoor play/activity area (jungle gym, obstacle course, etc.) for my kids to play on. Some
- 493 Sep 27 2018 1 educational children's programs would be nice as well.
- 494 Sep 27 2018 1 more open times  
Keeping the trails paved well for stroller/bike access, and
- 495 Sep 27 2018 0 anything kid/family friendly.
- 496 Sep 27 2018 0 More inviting....
- 497 Sep 27 2018 0 Improved trails, control river flooding  
Biking with a road bike can be uncomfortable, as the paved trails are quite bumpy. Running/walking on trails is great. I don't go to
- 498 Sep 27 2018 0 the park at night alone due to safety concerns.  
Don't mess with what already works, keep it free and wild. Not
- 499 Sep 27 2018 0 like Minnehaha which is now sterile and requires money to enjoy.
- 500 Sep 27 2018 0 Maybe allow food trucks to come at set times.
- 501 Sep 27 2018 0 Improved trails and bathrooms with drinking water.
- 502 Sep 26 2018 1 If there was less trash around.
- 503 Sep 26 2018 1 Path maintenance
- 504 Sep 26 2018 1 We love this park !!

- 505 Sep 26 2018 1 Nothing, I go daily year round
- 506 Sep 26 2018 1 Events  
Would love a snow plow through there in the winter so people could more easily run/walk on the paved trails. Not sure anything could be done about the flooding in the spring - I like it in some ways but makes it hard to access some of the best parts of the
- 507 Sep 26 2018 1 park.  
I'm honestly here as often as possible and choose it for a meeting place whenever possible. An indoor learning space for winter is probably the only improvement that would increase my time spent
- 508 Sep 26 2018 1 at the park
- 509 Sep 26 2018 0 Fire pits, small non-bookable pavilions. More grills.  
The paved trails could use some help. It's a really bumpy ride for
- 510 Sep 26 2018 0 my stroller riding kiddo.
- 511 Sep 26 2018 0 Year round bathroom facilities
- 512 Sep 26 2018 0 I visit it a lot. Keeping it clean!
- 513 Sep 26 2018 0 Better walking/biking surfaces
- 514 Sep 26 2018 0 more planned activities, night hike, games, etc
- Better path around Crosby lake from the Shepard road/I35S
- 515 Sep 26 2018 0 access side. . It floods often and is too close to the lake in spots.
- 516 Sep 26 2018 0 Add a beach area, maybe, but we really like it the way it is.
- 517 Sep 26 2018 0 See above  
Nothing, I love the area and feel it's being utilized well. Maybe have some more events for neighbors to meet each other, becoming closer as a community through this park. I feel a lot of people already know each other by seeing them at the park on a
- 518 Sep 26 2018 0 weekly basis
- 519 Sep 26 2018 0 Less work!  
I love Crosby because of the peace and serenity. It should be accessible for those who are disabled and more interpretative signs would be great. Otherwise, it's perfect as is. Do not open it
- 520 Sep 26 2018 0 up to more private events, runs, etc.  
I live near Otto street, only a mile from the entrance to the park. Shepherd Road is so noisy! I would go more often, particularly on my bike, if there were a quieter way. I am hoping one day Victoria Park will link with Crosby along the river and through the
- 521 Sep 26 2018 0 lovely trees.
- 522 Sep 26 2018 0 More lighting better signage more people there  
Keeping the City's wild areas wild is more important to me than making "improvements" which take away from the wild nature of the parks. Ridding the park of exotic plant life to allow native
- 523 Sep 26 2018 0 species a better chance would be good.  
My car window got busted once. Also kids and others smoke pot
- 524 Sep 26 2018 0 down there a lot. More SPPD patrols

I visit about as often as I would mean to, I would just need more time in life :) But again, better bike access and parking is always

525 Sep 26 2018 0 good.

526 Sep 26 2018 0 I like the park as it is; it would help to improve the paved trails perhaps some portable toilets in a couple of places some

527 Sep 26 2018 0 benches

528 Sep 26 2018 0 bathrooms available year-round

529 Sep 26 2018 0 Feeling more safe at the parks.

530 Sep 26 2018 0 dog park area in hidden falls park

531 Sep 26 2018 0 If I didn't have a job. I try to be there whenever I'm not working

532 Sep 26 2018 0 nothing

Trails are often closed due to flooding. If there is a noninvasive

533 Sep 26 2018 0 way to control that I would support that.

534 Sep 26 2018 1 Leave it wild so it feels like history there.

Not such a steep hill out of Hidden Falls haha. I avoid riding my bike there because I assume I wouldn't make it back up that hill. (not a serious suggestion, I realize there's probably no way to fix

535 Sep 26 2018 1 that)

536 Sep 26 2018 0 better directions to the parks (signage)

Improved trails with signage, regular visits by park staff to

537 Sep 26 2018 0 improve safety, more lighting.

538 Sep 26 2018 0 An archery range

539 Sep 26 2018 0 build an archery range

540 Sep 25 2018 1 Safety

541 Sep 25 2018 1 Keeping it in its natural stste. Must we "improve" everything?

Dogs have to be on leash. A little worried about car break-ins at

542 Sep 25 2018 0 Crosby parking lot.

I visit the parks every other week. Access to the river, access to

543 Sep 25 2018 0 the natural forests should be protected.

Smoother trails... bumpy trails prevent my husband from wanting

544 Sep 25 2018 0 to ride there with me.

545 Sep 25 2018 0 Definitely need improved trail surfaces (especially Crosby farm)

546 Sep 25 2018 0 Local events, for Saint Paul residsents

Work to remove the garlic mustard, buckthorn, trash. Replant the river banks with native species. Try to enhance the plant and wildlife diversity. Have crossings that don't require traffic lights on

547 Sep 25 2018 0 Shepard road.

548 Sep 25 2018 0 mosquito control

Place warning signs near the exits telling drivers to slow down and look for bikers and pedestrians before they even look for

549 Sep 25 2018 0 oncoming traffic. I just want someone to contact me!

We now go to FT Snelling park. It seems safer perhaps because visitors need a permit to enter and there are park rangers around during daytime hours. Perhaps some type of park personnel presence would make Crosby/Hidden Falls more welcoming and

550 Sep 25 2018 0 safer.

551 Sep 25 2018 0 A knee replacement

552 Sep 25 2018 0 Keeping the creepy guys who sit in their cars away.

If there weren't a bunch of new lights, pavement, sidewalks down to the river and giant building that gets used occasionally to teach

553 Sep 24 2018 0 a bird watching class but costs the tax payers millions.

554 Sep 22 2018 0 Singletrack for mountain biking

555 Sep 22 2018 1 Mountain Biking Trails

556 Sep 22 2018 0 Single track mtb trails.

557 Sep 21 2018 0 Improved trail system and invasive species management.

558 Sep 21 2018 1 Less dog poop

559 Sep 21 2018 1 more parking

560 Sep 21 2018 1 ?

Minneapolis has so cluttered up and monetized the regional parks that I've been looking for good parks for grandkids, now ages 6, 8, 10, 12: Como, Crosby, Ft Snelling, MN River Valley, out of

561 Sep 21 2018 1 metro. Because of driving farther, we just don't go as often.  
better signage. posted maps of the paved and lesser developed

562 Sep 21 2018 0 paths

563 Sep 21 2018 0 2 ply toilet paper

Watergate has too many vandalism reports so I don't go there

564 Sep 21 2018 0 anymore. Make this park safer somehow.

The addition of mountain bike trails, managed by MORC for all

565 Sep 21 2018 0 skills levels!

566 Sep 21 2018 0 These parks are fine as is.

Hiking trails are our main use, so anything that improves that

567 Sep 21 2018 1 experience, from signage to options, to maintenance is great.

568 Sep 21 2018 1 Unsure

569 Sep 21 2018 1 a seasonal food/beer place, like the sea salt eatery at minnehaha

570 Sep 20 2018 1 More single track trail

571 Sep 20 2018 1 Signs guiding within the park/trail map

572 Sep 20 2018 1 Off leash dog area, otherwise I like the area for walks regardless.

- 573 Sep 20 2018 1 Have the bathroom closer to the water. Or a couple portapotties .  
574 Sep 20 2018 0 Nicer paths, playground  
575 Sep 20 2018 0 Efforts to make women feel safe in park  
    Better pedestrian access from the surrounding neighborhoods -  
576 Sep 20 2018 0 Again Shepard Road is a huge barrier  
577 Sep 20 2018 0 More parking  
578 Sep 20 2018 0 Safer trails.  
579 Sep 20 2018 0 More mountain bike opportunities.  
580 Sep 20 2018 0 More bathrooms and river access  
581 Sep 20 2018 0 Better trail surface  
582 Sep 20 2018 0 Park for kids  
583 Sep 20 2018 0 More trails.  
584 Sep 20 2018 0 Improved bike access from surrounding neighborhoods  
    Better bike trail entrance to Hidden Falls, or at least a protected  
585 Sep 20 2018 0 area to make riding down the hill safer  
    I would be here regularly if there were mountain bike related  
    activities, single track and skills park. If you build it, they will  
586 Sep 20 2018 0 come.  
587 Sep 20 2018 0 I like the parks as they are.  
588 Sep 20 2018 0 Nothing, I like it the way it is and have since I was a kid.  
589 Sep 20 2018 0 Get rid of the turkeys  
    Unflooded trails  
      
590 Sep 20 2018 0  
591 Sep 20 2018 0 Better accesss between the two parks.  
592 Sep 20 2018 0 Feeling safer  
  
    Only really having more time to visit, which is not something you  
    can control! I've heard that others have had cars broken into in  
    the parking lot. While I've never had that problem, perhaps more  
593 Sep 20 2018 0 patrolling of the area would be helpful.  
    I would love to walk down there more, but alone as a female, it  
    feels rather isolated. If there are large parties at the picnic tables,  
594 Sep 20 2018 0 its a little intimidating as well.  
595 Sep 20 2018 0 Nothing  
596 Sep 20 2018 0 More activities  
597 Sep 20 2018 0 See above  
    The parks are great as they are. Don't over improve them. Basic  
    trail marking and maintenance is plenty. It's great to be so close  
    to a natural environment with  
598 Sep 20 2018 0 Minimal improvements."  
599 Sep 20 2018 0 Add off road biking

Paved trails hands down. The fact that I can't easily bring my  
600 Sep 20 2018 0 stroller with my kids is the only reason I'm not there weekly.

Raised paths or boardwalks for frequently wet and flooded areas,  
especially at west end of ponds in Crosby Farm and low-lying  
areas between shelter and river in Hidden Falls. Slightly better  
shoring up/leveling of the path on the bluff side of the ponds - a

601 Sep 20 2018 0 few areas there could also use boardwalks in wet seasons.

602 Sep 20 2018 0 More security

603 Sep 20 2018 0 improved access to river

604 Sep 20 2018 1 Manage the flooding if possible

605 Sep 20 2018 1 Leaving woods/water as intact as possible

606 Sep 20 2018 1 Safety concerns

Restoring shoreline, limiting mowed areas, native plantings,

607 Sep 20 2018 1 removing parking lots near the water

A path for walking/running by the entrance to lower hidden falls  
as currently it's just a road. It is an accident waiting to happen as

608 Sep 20 2018 1 drivers don't expect to see people on the road.

The park is extremely nice - I am glad we are trying to improve

609 Sep 20 2018 1 our parks. It is a nice space - so all changes welcome.

Again, parking lot security. Also mildly concerned about the  
coyotes. Even though they don't tend to attack humans, I'm

610 Sep 20 2018 1 reluctant to take my small kids there right now.

611 Sep 20 2018 1 Public transportation

Management of flooding areas. Trails often flood out for months

612 Sep 20 2018 1 at a time

Have the leash law enforced, I used to walk there every day but

613 Sep 20 2018 1 don't want to endanger my dog so hardly ever go there anymore

614 Sep 20 2018 1 off leash areas

More attractions to bring visitors (nature center with coffee shop,  
naturalist-led activities, rental facility, marketing it as a

615 Sep 20 2018 1 destination). Better lighting. More staff or security presence.

616 Sep 20 2018 1 Nothing I can think of

617 Sep 20 2018 1 see above

More lighting to make it more welcoming, more inviting entrances  
(better pavement, less of a gigantic hill, less of a super sharp

618 Sep 20 2018 1 angle to try to maneuver your car around)

619 Sep 20 2018 1 Traffic free trails from the Summit-University neighborhood

620 Sep 20 2018 1 Know that my car would not be broken into

621 Sep 20 2018 1 Food vendors, restaurants

622 Sep 20 2018 1 Better lighting and access to the waterways

623 Sep 20 2018 1 Easy access to river

- I Know there are improvements that could be made, but I really
- 624 Sep 20 2018 1 enjoy the park just the way it is
- 625 Sep 20 2018 1 More trails  
Improved bathroom facilities, cleaned up paths in the Hidden Falls areas, a playground for children, fixed up benches/shelters
- 626 Sep 20 2018 1 that currently exist.
- 627 Sep 20 2018 1 See previous response.
- 628 Sep 19 2018 0 I need more free time.
- 629 Sep 19 2018 0 nothing
- 630 Sep 19 2018 1 More bike trails
- 631 Sep 19 2018 0 Mountain bike trails
- 632 Sep 19 2018 0 Off-road bicycle trails (single-track)
- 633 Sep 19 2018 0 Nothing
- 634 Sep 19 2018 0 add mtb trails
- 635 Sep 19 2018 0 MTN bike trails
- 636 Sep 18 2018 1 Mountain bike trails
- 637 Sep 18 2018 1 Single track for mountain biking
- 638 Sep 18 2018 1 More off road trails and single track for mountain bikes
- 639 Sep 18 2018 1 MountainBike trails  
Better management of spring and summer flooding. □
- 640 Sep 18 2018 1  
Security. We have had a couple car break ins while using the
- 641 Sep 18 2018 1 park  
Elway @ Shepard is a bit of a mess for crossing: signal retiming
- 642 Sep 18 2018 1 or ped priority would be desirable.
- 643 Sep 18 2018 0 Repaving of trails.
- 644 Sep 18 2018 0 Making some bike features, skils park or mtb course
- 645 Sep 18 2018 0 Mountain biking
- 646 Sep 18 2018 0 Mountain biking would bring me to the park.
- 647 Sep 18 2018 0 Mountain bike trails
- 648 Sep 18 2018 0 off-road cycling trails
- 649 Sep 18 2018 0 Mountain bike trails  
Mountain bike trails, and modestly trimming current dirt paths for
- 650 Sep 18 2018 0 both biking and walking.
- 651 Sep 18 2018 0 Mountain bike trails
- 652 Sep 18 2018 0 Mountain bike trails.
- 653 Sep 18 2018 0 ?
- 654 Sep 18 2018 0 More trails
- 655 Sep 18 2018 0 Bus service to the north entrance
- 656 Sep 18 2018 0 More mountain bike trails
- 657 Sep 18 2018 0 Mtb trails
- 658 Sep 18 2018 0 Mountain bike trails
- 659 Sep 18 2018 0 Canoe or kayak rentals for the river would be lovely!
- 660 Sep 18 2018 0 Mountain bike trails

- Better maps, Facebook events for family seasonal activities, a
- 661 Sep 18 2018 0 nature center w/bathrooms.
- 662 Sep 18 2018 0 Let it be wild.
- 663 Sep 18 2018 0 Discouraging bicycles  
Designated shared single track for MTB and trail running., winter fat biking, and kayak access from Crosby Farm would be a dream
- 664 Sep 18 2018 0 come true for a local park user.
- 665 Sep 18 2018 0 None at this time
- 666 Sep 18 2018 0 Any improvements would help. Thank you!
- 667 Sep 18 2018 0 Single track mountain bike trails
- 668 Sep 18 2018 0 Mountain bike trails
- 669 Sep 18 2018 0 Mtb trails
- 670 Sep 18 2018 0 Build mountain bike trails
- 671 Sep 18 2018 0 Mountain bike singletrack.
- 672 Sep 18 2018 0 Mountain bike trails!
- 673 Sep 18 2018 0 Better mountain biking trails
- 674 Sep 18 2018 0 Add MTB singletrack to area
- 675 Sep 18 2018 0 Better parking.
- 676 Sep 18 2018 0 Dog park?
- 677 Sep 18 2018 0 Free time
- 678 Sep 18 2018 0 Easier parking access  
Hiking trails and mountain biking trails. And Cross country ski
- 679 Sep 18 2018 0 trails!! yoga in the park type events.  
Expanding MTB trails, connecting with and improving Battle
- 680 Sep 18 2018 0 Creek MTB trails.
- 681 Sep 18 2018 0 More trails
- 682 Sep 18 2018 0 Bike trails and off leash dog areas.
- 683 Sep 18 2018 0 Activities - dog friendly areas .  
More off road trails. I love the surface down there, and go to it, now that the River Bottoms are being overrun with mouth
- 684 Sep 18 2018 0 breathers.
- 685 Sep 18 2018 0 Access to offroad and trail cycling
- 686 Sep 18 2018 0 More non-paved trails. Maybe some kind of camping.
- 687 Sep 18 2018 0 Allowing MORC to use for mountain bike trails
- 688 Sep 18 2018 0 Better bike connections from Minneapolis and St Paul.
- 689 Sep 18 2018 0 Less itch weed in the Summer would help
- 690 Sep 18 2018 0 Single Track trails
- 691 Sep 18 2018 0 keeping it simple
- 692 Sep 18 2018 0 Mountain bike trails
- 693 Sep 18 2018 0 Sanctioned off-road mtb trails
- 694 Sep 18 2018 0 Singletrack! And plowing the access roads/paths in the winter.
- 695 Sep 18 2018 0 More hiking or off road biking trails through wooded areas.
- 696 Sep 18 2018 0 Mountain bike trails!

- 697 Sep 18 2018 0 Mountain bike trails.
- 698 Sep 18 2018 0 Natural surfaced trails
- 699 Sep 18 2018 0 Mountain bike/single track trails
- 700 Sep 18 2018 0 More bicycle friendly trails, especially dirt trails.
- 701 Sep 18 2018 0 Off-road bike trails
- 702 Sep 18 2018 0 Mountain bike trails would be awesome
- 703 Sep 18 2018 0 See above....
- 704 Sep 18 2018 0 Mountain bike trails please.
- 705 Sep 18 2018 0 Mountain bike trails.
- 706 Sep 18 2018 0 Mountain bike trails.
- 707 Sep 18 2018 0 MTB trails  
Mountain biking paths would be great! The woods around the falls are gorgeous and it would be cool if People could bike through
- 708 Sep 18 2018 0 them
- 709 Sep 18 2018 0 Mountain bike trails and improved restrooms
- 710 Sep 18 2018 0 Mountain bike trails
- 711 Sep 18 2018 0 See 7  
Mountain bike trails. □
- 712 Sep 18 2018 0 Cross country ski trails and grooming.
- 713 Sep 18 2018 0 Ideal place for off road cycling track.
- 714 Sep 18 2018 0 Mountain biking would get me out there!
- 715 Sep 18 2018 0 love it.
- 716 Sep 18 2018 0 Dedicated MTB trails!  
I would use the park more with single track trails for both hiking
- 717 Sep 18 2018 0 and mountain biking
- 718 Sep 18 2018 0 Bike trails
- 719 Sep 18 2018 0 more non-paved trails  
Nicer facilities i.e. bathrooms, changing rooms, shelters, bike
- 720 Sep 18 2018 0 racks
- 721 Sep 18 2018 0 Singletrack for mountain bikes
- 722 Sep 18 2018 0 Repeating myself since this field is required. MTB trails!
- 723 Sep 18 2018 0 More trails to ride. More than our and back rides
- 724 Sep 18 2018 0 Mountain bike trails!
- 725 Sep 18 2018 0 Dirt, single track mountain bike trails.
- 726 Sep 18 2018 0 MTB trails.  
Some single track mountain bike trails would be awesome! And to allow access to the Ford dam area which is off limits to extend the size of the park would be a bonus as well. Maybe this site could be made safe and some history of the dam and the lower portion
- 727 Sep 18 2018 0 of the Ford site could be provided?
- 728 Sep 18 2018 0 Off road cycling  
Forest Management. It is getting to be a sight for sore eyes
- 729 Sep 18 2018 0 watching all of the healthy trees die due to no maintenance.
- 730 Sep 18 2018 0 MTB friendly trails

- 731 Sep 18 2018 0 Dedicated bike trail network
- 732 Sep 18 2018 0 Having MORC manage mountain biking trails.
- 733 Sep 18 2018 1 Mountain bike trails
- 734 Sep 18 2018 1 I like it now!
- 735 Sep 18 2018 1 Mountain biking trails
- 736 Sep 18 2018 1 More off road trails for biking and hiking
- 737 Sep 18 2018 1 If there was single track mountain bike trails to ride in.
- 738 Sep 18 2018 1 mtb trails
- 739 Sep 18 2018 1 Parking  
Build more natural surface/non-paved trails for hiking, running
- 740 Sep 18 2018 1 and biking
- 741 Sep 18 2018 1 more natural, dirt trails
- 742 Sep 18 2018 1 Purpose built singletrack trails for mountain biking
- 743 Sep 18 2018 1 Dirt trails.
- 744 Sep 18 2018 1 Mountain biking options
- 745 Sep 18 2018 1 A single track
- 746 Sep 18 2018 1 Better paved trail surfaces, restrooms at the North parking lot
- 747 Sep 18 2018 1 Mountain biking trails.
- 748 Sep 18 2018 1 Singletrack, natural surface trails  
Well built/maintained mountain biking or trail running trails
- 749 Sep 18 2018 1 between the two sections of the park.
- 750 Sep 18 2018 1 Mountain bike/singletrack trails  
More information about the area, signage, etc. public events held
- 751 Sep 18 2018 1 in the park.
- 752 Sep 18 2018 1 Dedicated off road cycling paths.
- 753 Sep 18 2018 1 Wish there were mountain bike trails for off-road biking
- 754 Sep 18 2018 1 More safety features.
- 755 Sep 18 2018 1 Add mountain bike trails
- 756 Sep 18 2018 1 Mountain bike and or hiking trails.
- 757 Sep 18 2018 1 I would visit biweekly if there was some decent mountain biking.
- 758 Sep 18 2018 1 Mountain bike trails
- 759 Sep 18 2018 1 Mountain biking trails
- 760 Sep 18 2018 1 Build a mountain bike trail
- 761 Sep 18 2018 1 Off road trails
- 762 Sep 18 2018 1 Mountain bike support
- 763 Sep 18 2018 1 Single track mountain bike trails !
- 764 Sep 18 2018 1 Singletrack!
- 765 Sep 18 2018 1 More trails, mtb, hiking  
Oh, Singletrack trails. Guess I could have answered that here
- 766 Sep 18 2018 1 instead.
- 767 Sep 17 2018 0 Knowing how to find the interesting places.
- 768 Sep 16 2018 1 Nothing

Flooding is a major issue. The boardwalk around the lake needs to be raised, as it is dangerous when wet (much of the time, this summer.) The asphalt path is breaking up in some areas due to flooding, and can make walking unnecessarily treacherous.

Having the bathrooms open in the winter would encourage me to

769 Sep 15 2018 0 come there more in the winter.

770 Sep 15 2018 0 Please leave it as natural as possible, that's what makes it unique

771 Sep 14 2018 0 nothing additional

772 Sep 14 2018 0 More trails

We go pretty regularly. My biggest concern is related to safety, during the day it's fine (well, lunchtime can be interesting). I try to

773 Sep 14 2018 0 be out of there before the sun starts setting.

## **Hidden Falls-Crosby Farm Regional Park Master Plan**

**If you want to sign up for more information about the park, please provide  
your email:**

**Answered                    310**

**Skipped                    630**



# HIDDEN FALLS REGIONAL PARK NATURAL RESOURCE MANAGEMENT PLAN



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# **HIDDEN FALLS REGIONAL PARK**

## **NATURAL RESOURCE MANAGEMENT PLAN**

Prepared for:  
Prepared by:

**City of Saint Paul**  
**Great River Greening**

Suggested Citation: Great River Greening (2019). Hidden Falls Regional Park: Natural Resource Management Plan.

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Great River Greening  
251 Starkey Street, Suite 2200  
St. Paul, MN 55107



**Great River Greening** (GRG) is a Minnesota nonprofit organization that leads community-based restoration of prairies, forests, and waters. Restoration efforts help preserve natural areas, protect clean air and water, and increase residents' access to healthy natural areas and sustainable open space. Working with partner organizations and governmental units, GRG has helped restore over 17,500 acres of natural habitat area in Minnesota.

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# Executive Summary

## Executive Summary

Hidden Falls Regional Park is a 130 acre natural area park located in Saint Paul, Minnesota. It is comprised of floodplain forest and bluff land, and is within the Mississippi River Corridor Critical Area and the Mississippi National River and Recreation Area (MNRRA). Hidden Falls Regional Park is a refuge for many native wildlife species, and attracts thousands of visitors per year.

The Hidden Falls Regional Park Natural Resource Management Plan (NRMP) was developed to identify opportunities for managing native plant communities within the regional park, and provide the City of St. Paul staff recommendations for restoration and enhancement projects.

The goals and recommendations outlined in the NRMP are based on a review of aerial photography, soil data, topography, surficial geology data, and Minnesota Land Cover Classification System (MLCCS) data. In addition, plant community species composition, invasive species distribution and abundance, and potential restoration opportunities were evaluated through site visits. The NRMP describes current site conditions, key ecological features, management goals, and a framework to manage the natural resources within Hidden Falls Regional Park.

The most intact plant community within Hidden Falls Regional Park is the floodplain forest along the Mississippi River. Much of the remaining parkland within the floodplain is considered altered, and consists of minimal to no intact native habitat. The bluff area of the park is primarily comprised of oak forest or altered deciduous forest. The habitat in these areas tends to be overgrown and has a considerable amount of invasive species present. All native habitat types within the park rely on a disturbance regime, flooding, fire, and/or grazing. These disturbances have either been suppressed or are being altered by outside conditions such as changing weather patterns.

Management and enhancement of Hidden Falls Regional Park will be guided by an analysis of the conditions and constraints imposed due to its particular location of along the bluffs and floodplain of the Mississippi River in a dense urban area. The disturbance factors inherent with Hidden Falls' location have caused varying levels of degradation and invasion by nonnative species over time. Plant communities typical of the area at the time of European settlement have been altered due to development, suppression of natural disturbance regimes (fire and grazing), alteration of the hydrologic regime (damming?), and the introduction of invasive species. Using these historic presettlement conditions as models for moving forward with the restoration and enhancement of future plant communities may not be desirable given the likelihood of ongoing disturbance and limitations to implementing appropriate disturbance regimes as needed in the future to maintain a given plant community. The restoration effort should instead target as outcomes, plant communities that are diverse (when that is a reasonable outcome), resilient, and sustainable.

Before committing to a restoration or enhancement project, the City should assess its capacity to not only implement a project, but also to manage the plant community over time. The actions taken in each management unit should be considered the beginning of a long-term commitment to manage the resource. Some of the disturbances impacting a given site may be ongoing and intractable, and persistent timely effort will be required to transition a habitat from a plant community dominated by invasive species to a more diverse and ecologically functional plant community. Initial efforts to remove invasive species from a site will have been in vain if resources for ongoing management are not committed for the long term.

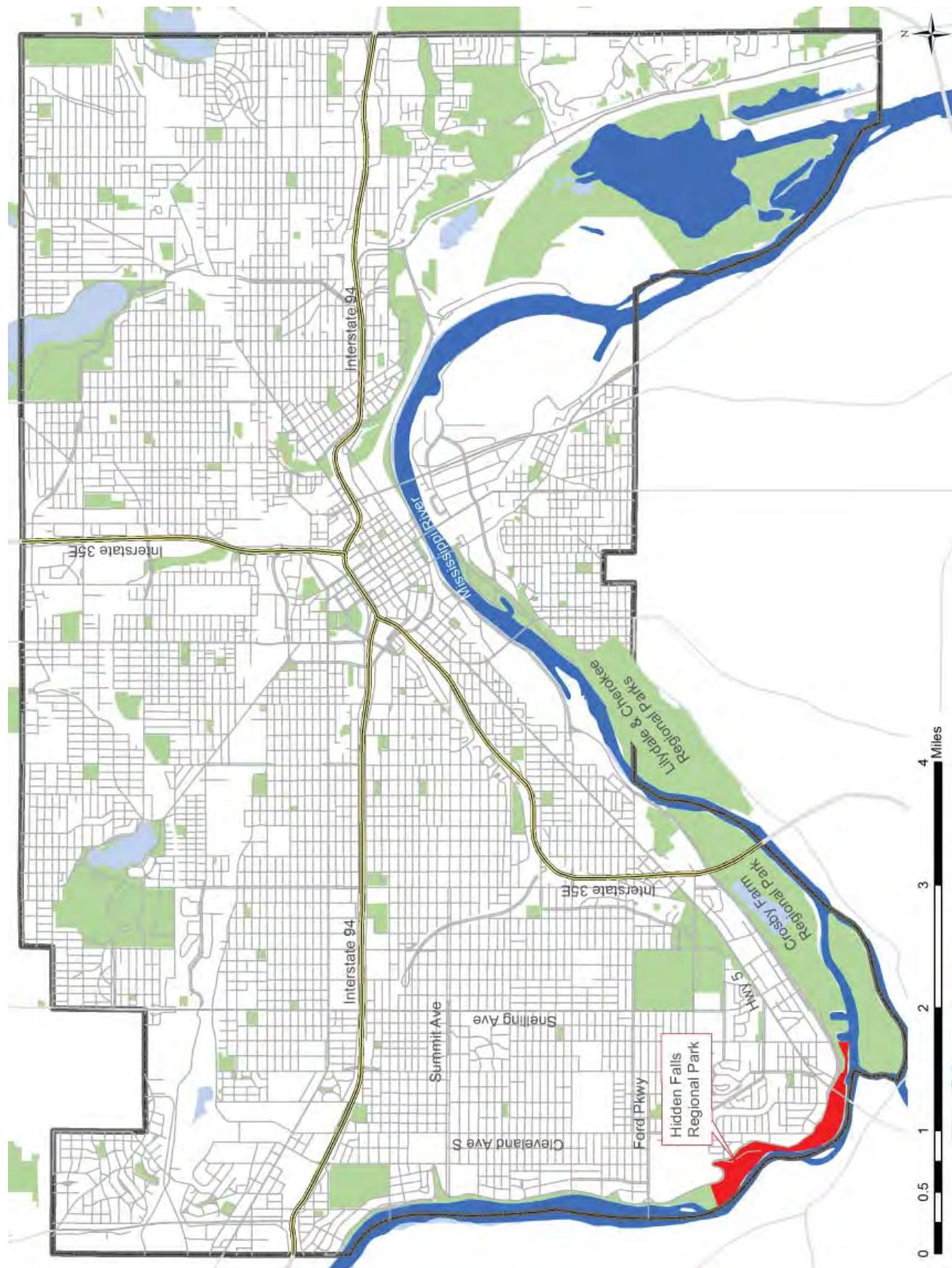


Figure 1.1: Hidden Falls Regional Park within the City of Saint Paul



## 1. Background and History of Site

### General Location

Hidden Falls Regional Park is located along the Mississippi River adjacent to Saint Paul's Highland neighborhood. It is part of a connected regional park system, running along the bluff and floodplain of the Mississippi River. This regional park corridor ends downstream near the Smith Avenue bridge on the adjacent bank of the river with Cherokee and Lilydale Regional Parks crossing back over the river to Victoria Park and Crosby Farm Regional Park. This system of 5 adjacent regional parks encapsulates about 1,460 acres of habitat corridor for wildlife and passive recreation for residents within the larger National Park Service's Mississippi National River and Recreation Area (MNRRRA). The MNRRRA Corridor protects a 72 mile and 54,000 acre area from Dayton and Ramsey, Minnesota to just downstream of Hastings, Minnesota. This includes the stretch that flows through Minneapolis and Saint Paul.

Today, Hidden Falls Regional Park encompasses 130 acres and 1.6 miles of shoreline and is an important natural area within the Mississippi River Corridor Critical Area and the Mississippi National River and Recreation Area. It is an oasis of floodplain forest along the Mississippi River visited by local residents and visitors using the park's trails throughout the year. Visitors utilize the park for hiking, fishing, running, bicycling, dog walking, bird watching, wildflower watching, picnics, and boating. The park is a significant stopover place for migrating songbirds and waterfowl traversing the Mississippi Flyway. The park also serves as an outflow for storm water from adjacent neighborhoods north and west of the park via storm sewers that end in the bluffs along the park's eastern edge.

### Climate

Because of its location in North America, Minnesota experiences temperature extremes characteristic of a continental climate, with cold winters and mild to hot summers. The current regional climate is categorized as "Humid Continental" (Kottek et al. 2006). The Twin Cities region experiences some of the widest temperature ranges in the United States. With no natural barriers to block cold air from pouring south from Canada, the Twin Cities are subjected to arctic air masses throughout the winter months (NOAA). Likewise, because of the distance from moderating oceans, heat is able to build up over a large land expanse, which makes summer temperatures relatively hot. The regional eastern longitude allows Gulf currents to bring moist air into contact with hot summer days and heavy winter storms; hence the "Humid Continental" context. Minnesota is far from major sources of moisture and is in the transition zone between the moist East and the arid Great Plains, with seasonally distinct upper atmospheric patterns and temperatures and widely variable precipitation. Minnesota's highest and lowest temperature is the 11th largest variation of any U.S. state, and 3rd largest of any non-mountainous state (behind North Dakota and South

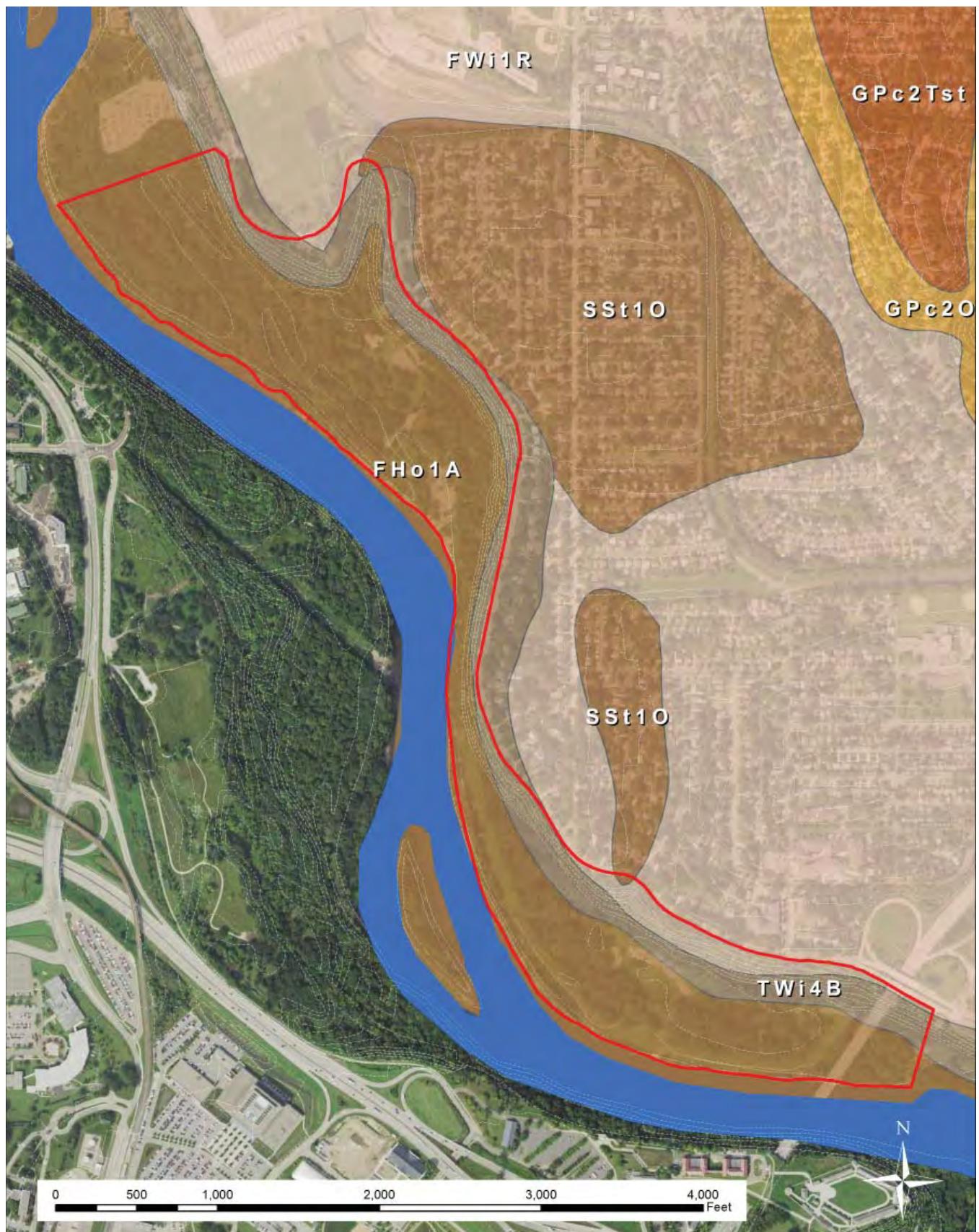


Figure 1.2: Surficial Geology

Dakota). Annual average precipitation (from rainfall) in the Twin Cities is 32 inches, across the state the range is from around 35 inches in the southeast to 20 inches in the northwest (Table 1). Snow is the main form of precipitation from November through March, while rain is the most common the rest of the year. For the Saint Paul area:

Annual high temperature:	56.6°F
Annual low temperature:	37.5°F
Average temperature:	47.05°F
Average annual precipitation - rainfall:	32.4 inches
Days per year with precipitation - rainfall:	110 days
Annual hours of sunshine:	2710 hours
Av. annual snowfall:	51 inches

Table 1. Climate data for Minneapolis, MN - 55468 - 1981-2010. [http://www.dnr.state.mn.us/climate/twin\\_cities/normals.html](http://www.dnr.state.mn.us/climate/twin_cities/normals.html)

## Geology

Hidden Falls Regional Park's boundary straddles two ecological subsections. The northern half is within the Anoka Sand Plain while the southern half of the park lies in the Saint Paul-Baldwin Plains and Moraines, of which both subsections are part of the Eastern Broadleaf Forest Ecological Section (MNDNR, Ecological Classification System). The geomorphic classification of the land in the park crosses these two subsection.

The Anoka Sand Plain subsection is an area of droughty, sandy upland soils associated with oak barrens and openings (oak savanna) (<http://www.dnr.state.mn.us/ecs/222Mc/index.html>, August 2018).

The Saint Paul-Baldwin Plains and Moraines consists of a Superior Lobe end moraine complex (St. Croix Moraine). To the west, terraces associated with the Mississippi River separate the subsection from the Anoka Sand Plain subsection. The southern boundary coincides with the southern edge of the Rosemount Outwash Plain. This subsection is small and continues into Wisconsin. Although it is topographically low in comparison to other areas in the state, the subsection is dominated by a large moraine and areas of outwash plain. (<http://www.dnr.state.mn.us/ecs/222Md/index.html>, September 2018).

While Hidden Falls straddles both the Anoka Sand Plain and Saint Paul-Baldwin Plains and Moraines the specifics of the geology and vegetation of the site are different than the larger subsections. The characteristics are generalizations of the overall dominant traits of the subsections and these areas are typically a mosaic of vegetation types corresponding to variations in soils. With the majority of the park lying below the bluff line in the Mississippi River floodplain those variations in the make up of the out wash soils and floodplain forest habitat complex become evident. The upland area above the bluff line does follow the overall characteristics of the two subsections with vegetation being Oak Savanna, Oak woodland and prairie.

### Geomorphic classification (figure 1.2)

**FH01A** - (F) Fluvial, (Ho) Holocene Interglacial phase, (1) Level, Includes areas of little relief relative to adjacent topography such as lakes and outwash plains and flat terrain such as bogs and marshes, (A) Alluvium. FH01A classification area overlays the Mississippi floodplain area at Hidden Falls which is an active fluvial process, an area that is associated with rivers and the deposits and landforms created by them. As a part of being a floodplain the soils are comprised of alluvium deposition. This refers to the clay, silt, sand and gravel left behind after flood waters rise and fall.

**TWi4B** - (T) Dissected Bedrock Terranes, (Wi) Wisconsinian Glacial phase, (4) Steep, includes abrupt peaks, sharply dropping hills or ridges which seriously hamper management efforts, (R) Terrace. TWi4B corresponds to the bluff area of Hidden Falls where there is exposed limestone bedrock.

**FWi1R** - (F) Fluvial, (Wi) Wisconsinian Glacial phase, (1) Level, Includes areas of little relief relative to adjacent topography such as lakes and outwash plains and flat terrain such as bogs and marshes, (R) Terrace.

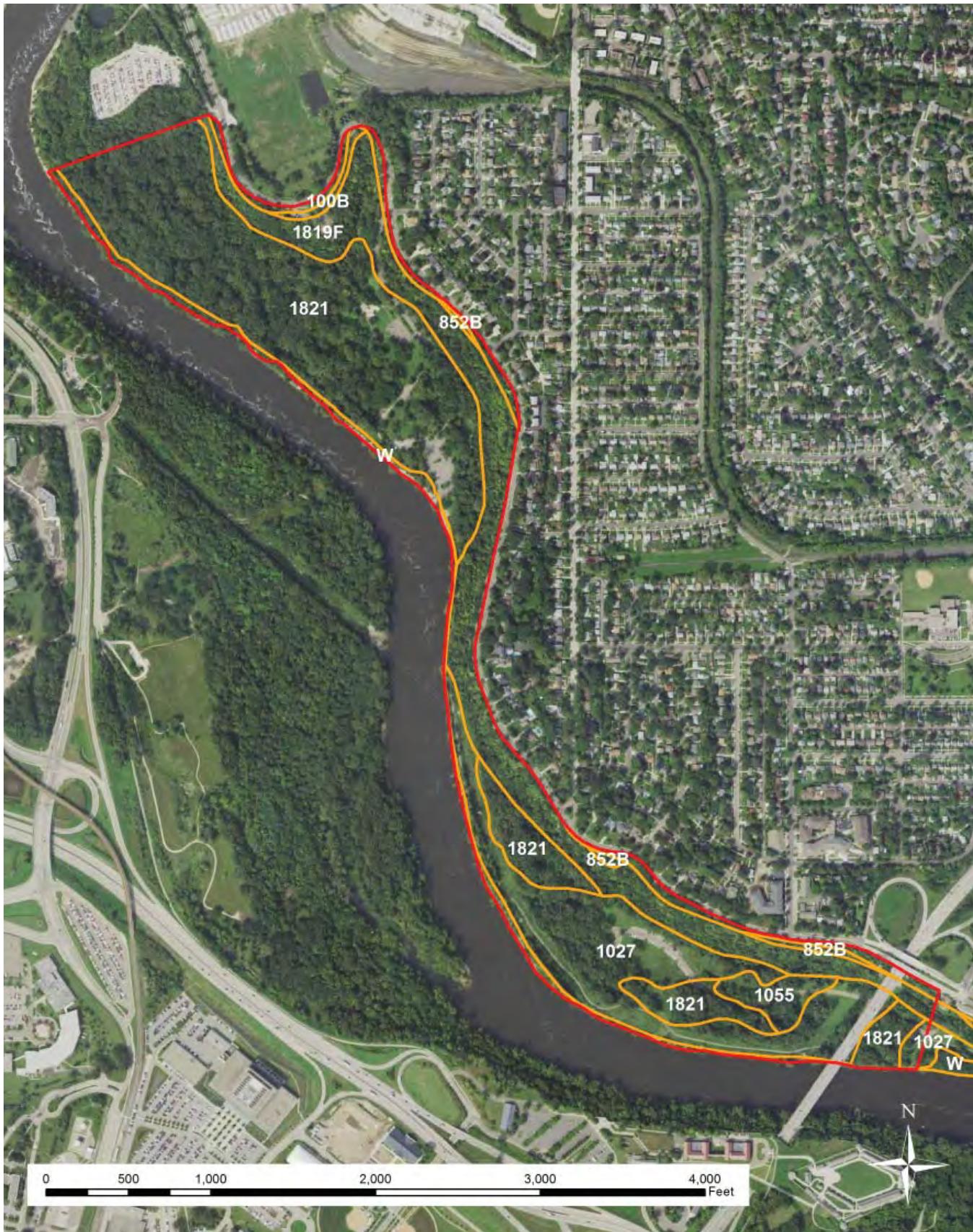


Figure 1.3: Site Soils

#### **Adjacent Geomorphic Classifications**

**SSt1O** - (S) Superior Lobe, (St) St. Croix Glacial phase, (1) Level, Includes areas of little relief relative to adjacent topography such as lakes and outwash plains and flat terrain such as bogs and marshes, (O) Outwash.

**GPc2O** - (G) Grantsburg Lobe, (Pc) Pine City Glacial phase, (2) Rolling to undulating, includes areas exhibiting variable relief over broad reaches including till plains and gently rolling terrain such as hills or ridges which will not seriously hamper management efforts, (O) Outwash.

**GPc2Tst** - (G) Grantsburg Lobe, (Pc) Pine City Glacial phase, (2) Rolling to undulating, includes areas exhibiting variable relief over broad reaches including till plains and gently rolling terrain such as hills or ridges which will not seriously hamper management efforts, (T) Till plain, (st) Stream washed.

## **Soils**

According to the Ramsey County Soil Survey (NRCS, 2018), seven soil classifications occur within Hidden Falls Regional Park (figure 1.3). Overall soils on the bluffs tend to be shallow with limestone outcrops in the flood plain soils tend to be deposits of sandy alluvium. A brief description of the soil types compiled from the soil survey are below. The full custom soil report is include in appendix A for further information.

Copaston Loam (100B) - This soil tends to be well drained and formed a layer of glacial drift over hard sandstone or limestone bedrock. Native vegetation is tall grass prairie.

Urban Land –Copaston Complex (852B) - This soil tends to be disturbed, well drained and formed a layer of glacial drift over hard sandstone or limestone bedrock. Native vegetation is tall grass prairie.

Udorthents, wet substratum (1027) - This soil tends to be moderately well drained and in areas where the parent soil has been cutaway or covered with gravelly fill material. The soil is typically located in glacial fluvial deposits or moraines. Wet substratum soils tend be bordering existing wetland areas. ([neosoil.com](http://neosoil.com), 2018)

Urban Land (1039) - This is soil that has been altered by or obscured by urban work or structures

#### Aquolls and Histosols, ponded (1055)

Aquolls - Very poorly drained depressions with till parent material.

Histosols - Very poorly drained depressions with organic parent material.

Dorerton–Rock outcrop complex (1819F) - This complex is comprised of very steep, well drained soils and rock outcrops along river and stream valleys. Typically outcrops are comprised of Limestone bedrock. Dorerton soil tends to be a loamy sediment (sandy to gravelly clays). The vegetation tends to be in native hardwood stands as the soils are poor for agriculture or building/site development (*Soils Survey Washington and Ramsey Counties*, 1980).

Alganese Loamy Sand (1821) – These soils tend to be poorly drained and developed in sandy alluvium on floodplains. The dominant texture is sand but fine sand, silt and loam also occur (*Soils Survey Washington and Ramsey Counties*, 1980).

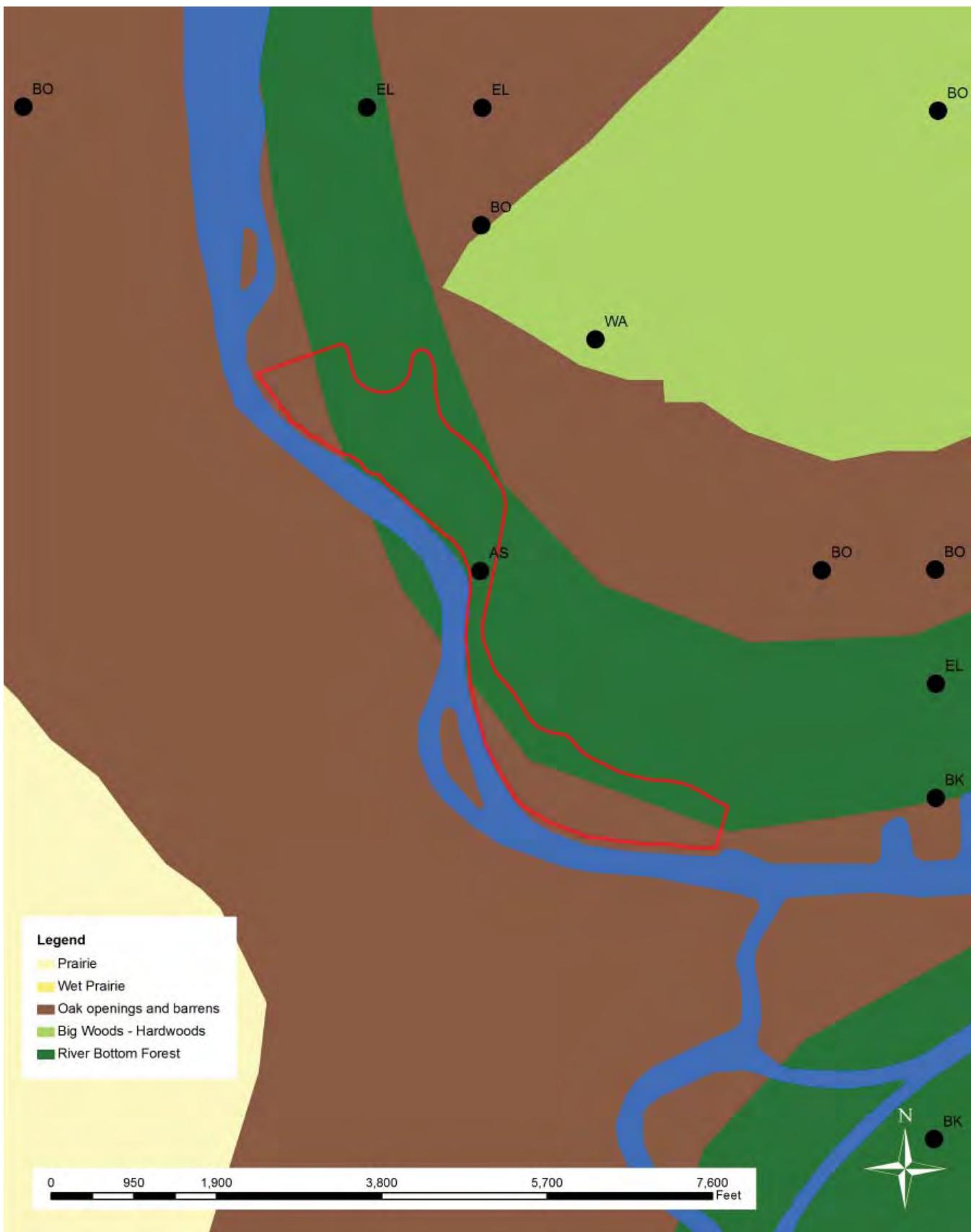


Figure 1.4: Presettlement Vegetation and Bearing Trees

## Pre-settlement Vegetation

Between 1929 -1930 Francis J. Marschner mapper the pre-settlement vegetation of Minnesota. His interpretation was based on notes from the Public Land Survey conducted from 1847-1907. Marschner's Map gives ecologists, natural resource managers and others a snap shot of what the land looked like prior to European settlement (<http://www.dnr.state.mn.us/volunteer/janfeb03/mystery.html>, 20130828).

From looking at the pre-settlement vegetation map of Hidden Falls (figure 1.4), coupled with the bearing tree information from the Public Land Survey, it becomes evident that the larger landscape complexes were a mosaic of River Bottom Forest within the floodplain of the Mississippi River and Oak Openings and Barrens on the terrace edges of the park. An area of "Big Woods," Marschner's generic term for hardwood forest, was mapped farther east on rolling Des Moines lobe deposits outside the glacial river valley (Marschner 1974).

River bottom forest consisted predominantly of floodplain forest dominated by elm, ash, cottonwood, box elder, silver maple, willow, aspen and hackberry. American elms were common bearing trees in this community.

Oak openings and barrens consisted predominantly of scattered trees and groves of oaks in scrubby form with patches of open prairie and areas of brush and thickets. Present day communities in this category include oak savannas and woodlands.

Marschner's boundary between river bottom forest and oak openings and barrens along the east side of the park does not coincide exactly with the terrace edge that forms the bluffs along the east edge of the park. This is an error of scale: Marshner's map was created on a very large scale and the boundary lines between vegetation units are not accurate within several hundred feet. The vegetation currently present at Hidden Falls clearly demonstrates that the original vegetation of the bluffs and the terrace above the bluffs was part of the oak openings and barrens region. Prairie plants remaining from past savannas are still hanging on along the tops of the bluffs. The lower half of the bluffs may have been more of a mesic forest rather than savanna, as these areas are presently dominated by red oaks and contain a dry-mesic to mesic shade tolerant flora. The pre-settlement river bottom forest was clearly confined to the low floodplain below the bluffs.

## Post-settlement Land Use History

Hidden Falls Regional Park dates back to 1887, when the area was selected by Horace Cleveland as one of the City of Saint Paul's four original park areas. No major improvements were made to the site, aside from a tree nursery, until 1936-37 when the Works Progress Administration (WPA) carried out a site improvement program. In the 1960's Hidden Falls took on much of its present form ([www.stpaul.gov](http://www.stpaul.gov), 2018).

An aerial photo from 1937 (figure 1.5) shows the beginnings of a network of trails and roads constructed with in the parks borders. The adjacent land is still sparsely populated with some tree groves closer to the park border. There is a large area along the southwestern riverbank that is showing quite a bit of disturbance at this time with a lack of vegetative cover. By 1951 (figure 1.6) this same area appears to have reforested some and there is more passive recreational use in the area. In 1961 the Fort Snelling Tunnel, on the opposite bank, was completed allowing Highway 5 to pass under the fort site (Figures 1.7 & 1.8). This shifted the bridge configuration, which used to be just south of the Hidden Falls boundary, to passing over the southern portion of the park. At some point between 1960 and 1970 the marina that abutted the southern boundary of the park was abandoned and began to fill in and revegetate. By 1970 the southern entrance, as its location exists today, was established. Overall, the aerials over the years (figures 1.5 -1.11), indicate that canopy vegetation is fairly consistent with slight changes as various areas of the park were developed for lawns, trails, and roads.



Figure 1.5: 1937 Aerial Photograph

(MN Historical Photographs Online, John R Borchert Map Library)

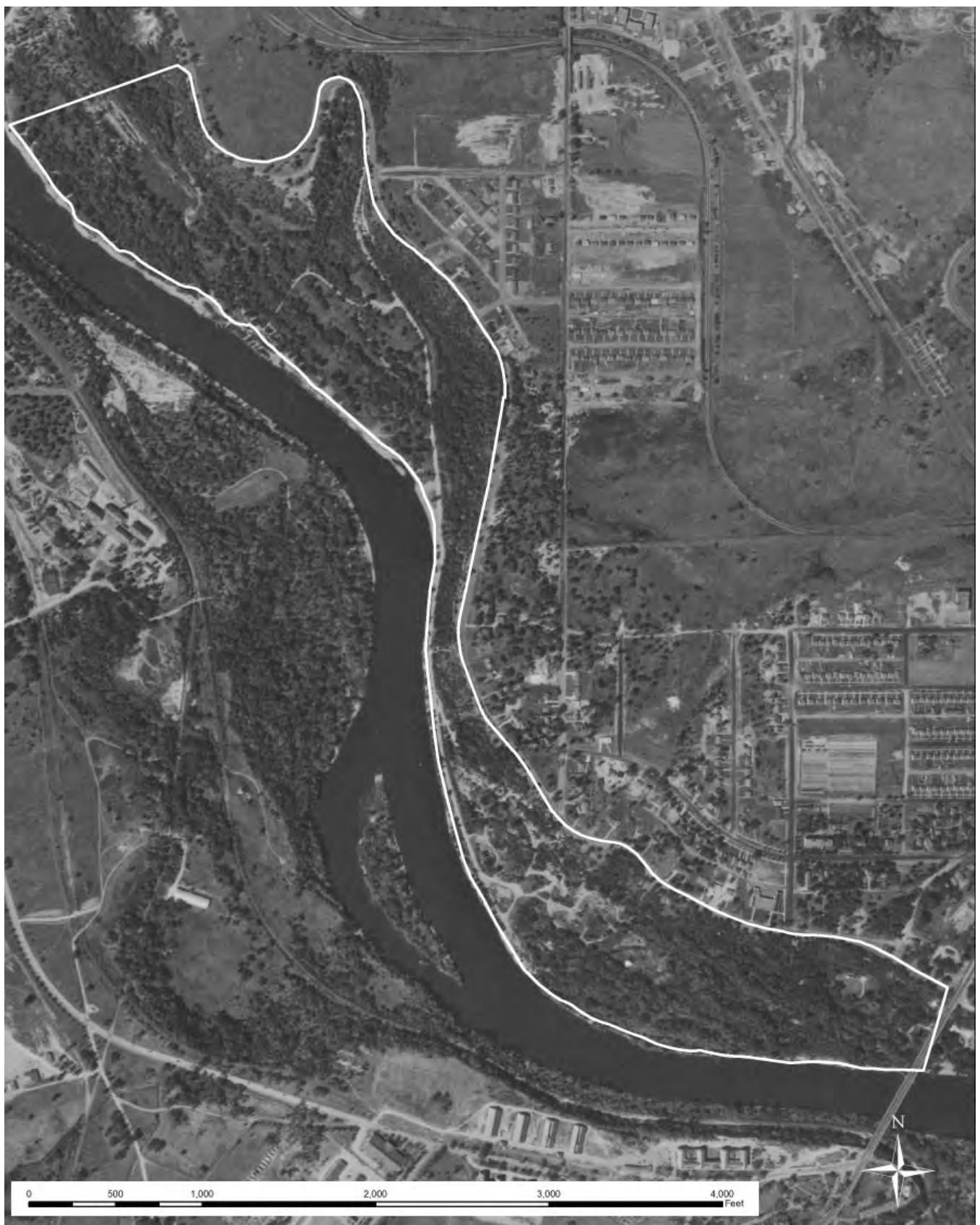


Figure 1.6: 1951 Aerial Photograph

(MN Historical Photographs Online, John R Borchert Map Library)



Figure 1.7: 1960 Aerial Photograph

(MN Historical Photographs Online, John R Borchert Map Library)



Figure 1.8: 1970 Aerial Photograph

(MN Historical Photographs Online, John R Borchert Map Library)



Figure 1.9: 1991 Aerial Photograph

(MnGeo WMS service)



Figure 1.10: 2006 Aerial Photograph

(MnGeo WMS service)

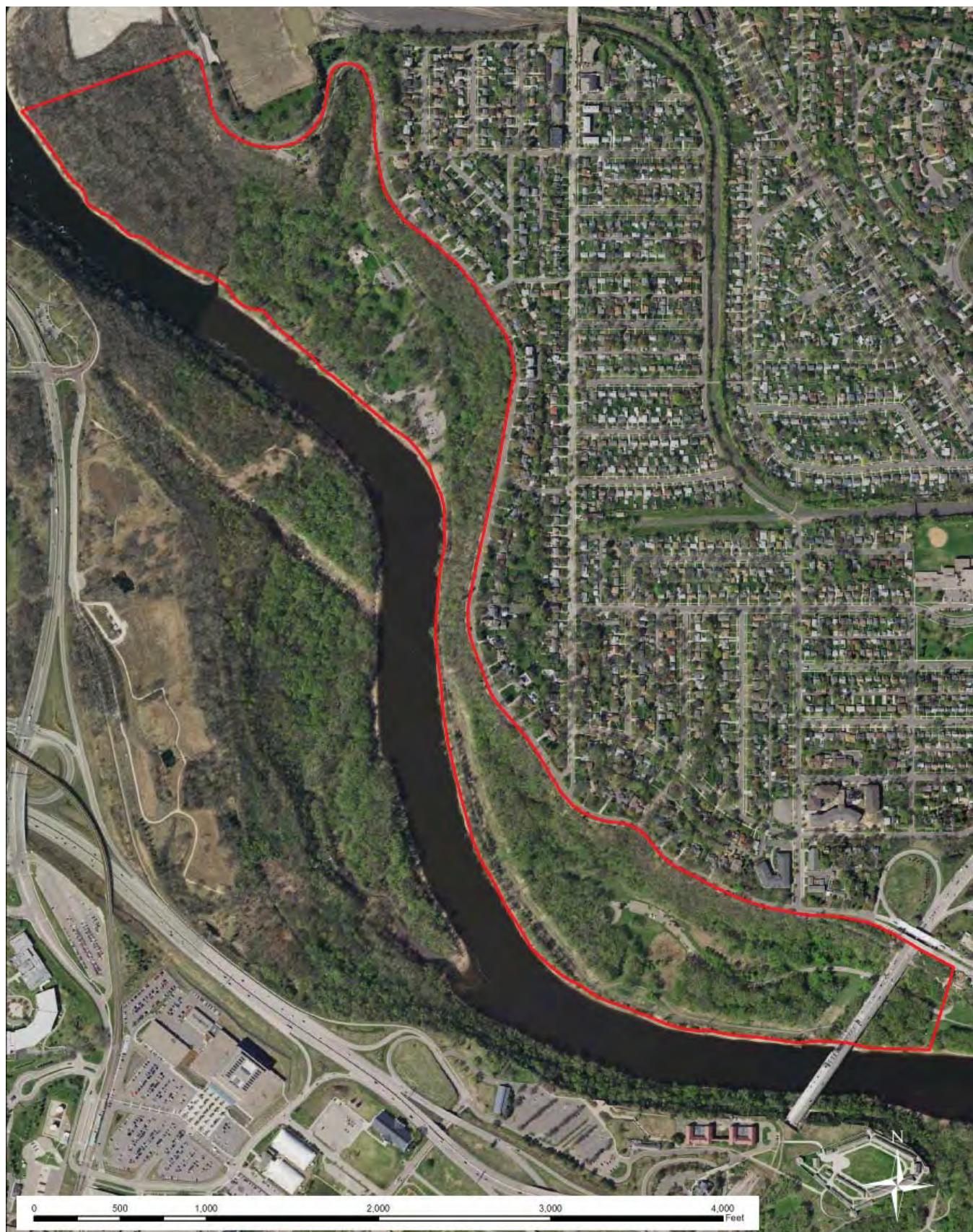
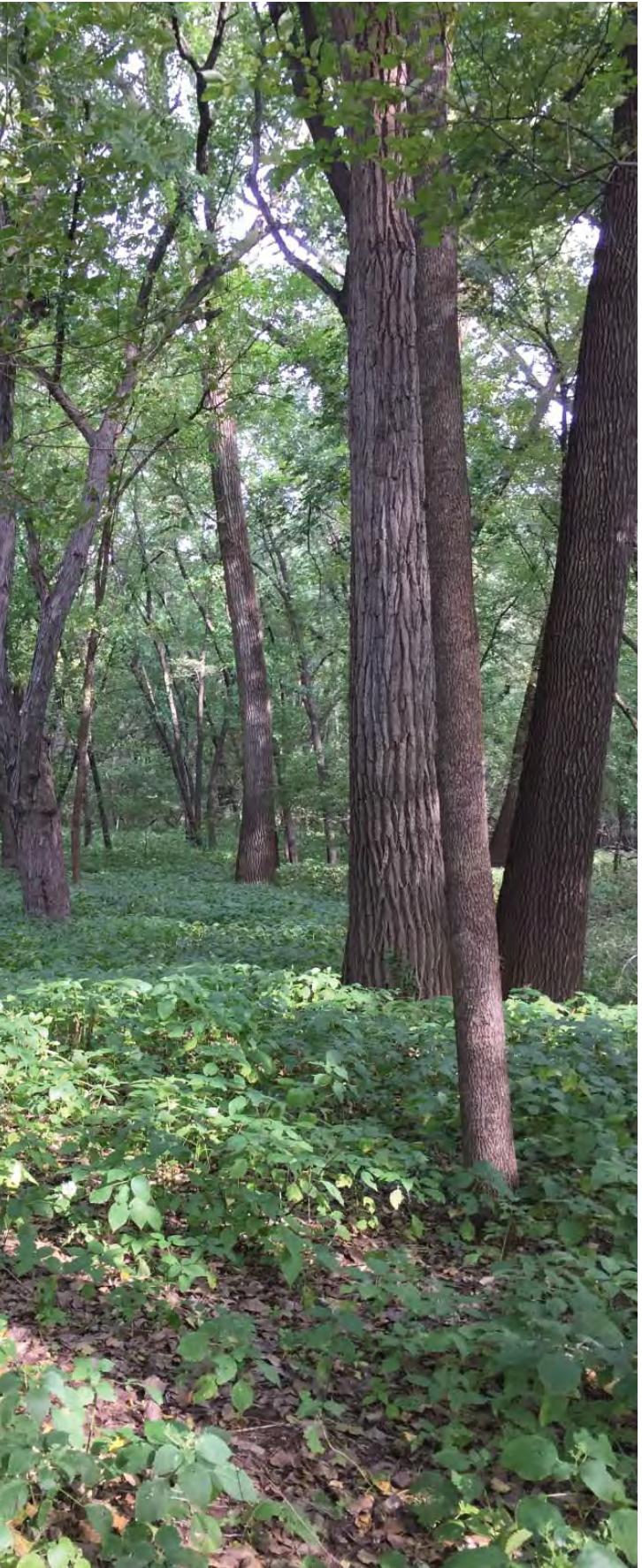


Figure 1.11: 2016 Aerial Photograph

(MnGeo WMS service)



## 2. Native Plant Community Assessment

Habitat units within Hidden Falls Regional Park (figures 2.1 and 2.4) that have not experienced a lot of manipulation or direct impact from humans are in a better state. This tends to be the floodplain forest areas that are able to withstand the seasonal flooding that occurs from the Mississippi River. Invasive species presence tends to be in areas that have seen more alterations or are not being maintained in their natural disturbance regime (ie flooding, grazing, fire, etc.). Management of invasive species will prove challenging due to the topography of the site and the seasonal flooding that brings seeds (garlic mustard, reed canary, etc..) on to the property. The City is working on closing openings in the canopy with shelterwood pocket plantings as laid out in the Crosby Farm Park Report. This will be a continuing technique throughout the park as the green ash population is showing signs of stress and die back due to emerald ash borer.

Due to the similarity in habitat type, land use and connectivity, the plant community quality ranking that was used for the Crosby Farm Park Report was also employed at Hidden Falls. The condition of land cover types in the 2004 inventory has been summarized in a scale ranging from A to D (Figure 2.1). This scale is loosely based on the methodology used to rank native plant community occurrences by the Minnesota DNR, but does not use the same criteria. The criteria used in this inventory are as follows:

- A: Excellent: Areas of native plant communities undisturbed by modern human activity.
- B: Good: Areas of native plant communities with moderate disturbance but nearly intact species diversity. This includes floodplain forest stands that have recovered continuous tree canopy cover.
- C: Fair: Areas of native plant communities with high past disturbance or invasion of exotic species that has significantly reduced native species diversity and altered community structure.
- D: Poor: Not an example of a native plant community. Dominated by invasive or exotic species with a very low diversity of native species. Includes formerly cultivated, cleared, or constructed sites.

Hidden Falls Regional Park has had moderate to severe disturbance to the natural habitat from past and current human activity (trails, parking lots, managed lawn, transmission line right of way, highway 5 bridge, stormwater outflow, etc.). A few places in reasonably good condition (B rank) include the floodplain forested areas with a continuous canopy of mature silver maples. About half of the bluff slopes are in fair condition (C rank) due to buckthorn invasion and slope erosion. D ranked areas include most of the floodplain that has been planted with turf grass or paved and bluff areas showing severe invasive infestation.



Figure 2.1: Upland Habitat Ranking

## Species and Habitats of Concern

There are several State-listed animal and plant species that have been documented in the Mississippi area adjacent to Hidden Falls. A species is considered a **species of special concern** if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. <http://www.dnr.state.mn.us/ets/index.html>

Common name	Scientific name	Last observed	Status	Category
Paddlefish	<i>Polyodon spathula</i>	2004	Threatened	Vertebrate animal
Mucket	<i>Actinonaias ligamentina</i>	2008	Threatened	Invertebrate animal
Black Sandshell	<i>Ligumia recta</i>	2008	Special Concern	Invertebrate animal
Bell's Vireo	<i>Vireo bellii</i>	1980	Partners in Flight Continental Watchlist	Vertebrate animal
Purple Wartyback	<i>Cyclonaias tuberculata</i>	2001	Threatened	Invertebrate animal
Spike	<i>Elliptio dilatata</i>	1988	Special Concern	Invertebrate animal
Blue Sucker	<i>Cyclopterus elongatus</i>	2003	Special Concern	Invertebrate animal

## Federal Species Protections

Although no longer a listed federal endangered or threatened species, bald eagles are still protected by the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act.

### Bald and Golden Eagle Protection Act

*This law, passed in 1940, provides for the protection of the bald eagle and the golden eagle by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. "Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.*

### Migratory Bird Treaty Act

*The Migratory Bird Treaty Act is a Federal law that carries out the United States' commitment to four international conventions with Canada, Japan, Mexico, and Russia. Those conventions protect birds that migrate across international borders. The take of all migratory birds, including bald eagles, is governed by the Migratory Birds Treaty Act's regulations. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit. See figure 2.2 Mississippi migratory flyway.*

### Lacey Act

*Protections provided by the Lacey Act will continue even though the bald eagle has been delisted under the Endangered Species Act. This law, passed in 1900, protects bald eagles by making it a Federal offense to take, possess, transport, sell, import, or export their nests, eggs and parts that are taken in violation of any state, tribal or U.S. law." ([www.fws.gov/midwest/eagle/](http://www.fws.gov/midwest/eagle/), January 2017).*

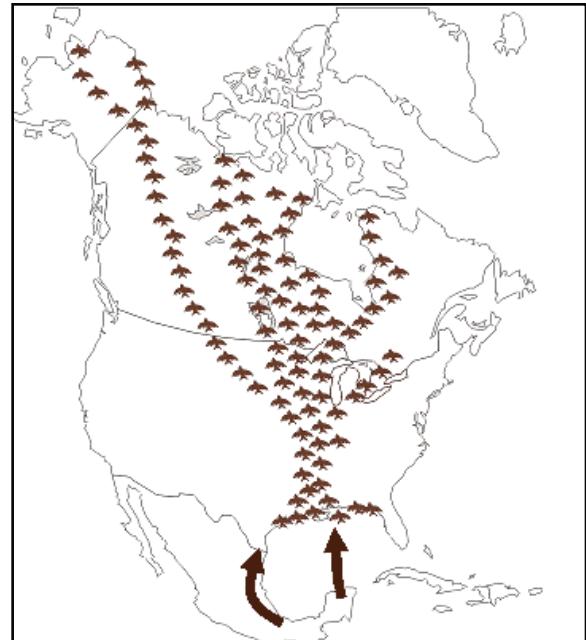


Figure 2.2: Mississippi Flyway (<https://twpd.texas.gov>)

For more information on the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the Lacey Act refer to the U.S. Fish and Wildlife Service's website regarding federal laws that protect bald eagles. [www.fws.gov/midwest/eagle/protect/index.html#3](http://www.fws.gov/midwest/eagle/protect/index.html#3)

## **Resource Threats**

Hidden Falls Regional Park is subject to a variety of threats to its natural and cultural resources. Some are global in scope and others are specific to the plant communities of urban areas. While many of these threats are beyond the City's ability to fully address, they can be mitigated through appropriate management, maintenance, and enhancement. None of the threats are mutually exclusive. All, in one way or another, relate to and influence other threats.

### ***Changing Weather Patterns***

Studies show increasing ecological change and stress in Earth's biosphere due to warming temperatures. As a result, systems and patterns are changing, and some species are adapting by migrating into areas they did not previously occupy. Animal and plant species are experiencing increasing competition for resources. Short term and long term management strategies need to be flexible enough so they can be adapted accordingly.

### ***Flooding***

Flooding is a natural occurrence with the Mississippi River floodplain. Historically the river floods in the spring after snow melt and spring rains. In more recent times flooding is occurring during the summer and fall due to changing weather systems and more frequent large rain events. This off season flooding is disruptive to native plants and animal's lifecycles that have adapted to the seasonal flooding.

### ***Eastern Cottonwood Regeneration***

While it can be viewed as a "messy" tree for planting in urban areas, the eastern cottonwood (*Populus deltoides*) is an important tree in the river valley system. There has been research conducted by Mississippi Park Connection, National Park Service and partner organizations on regeneration of the eastern cottonwood in the floodplain of the Mississippi River in Minnesota. Findings are showing that in the floodplain there are many large mature cottonwood trees reaching the end of their lifespan, with few seedlings or younger cottonwoods to take their place. Speculation points to changing weather and flood timing as possible reasons for this decline in younger plants. For wildlife, it is the preferred nesting tree for bald eagles, it also provides nesting habitat to other birds including woodpeckers, owls, and songbirds, and provides antimicrobial resin that protects bees. The value of cottonwoods and what is necessary to ensure regeneration should be considered on any planting/reforestation with in the floodplain.

### ***Invasive Species***

Undesirable, invasive species are plants, animals, insects that are introduced from other areas and are able to thrive and out compete native species, due to the lack of biological controls. They tend to establish in disturbed areas and can then quickly spread into less disturbed areas. The low diversity that comes as a by-product of the invasion and establishment leads to a steady decline in the overall biodiversity of natural areas.

Several invasive species, mostly exotic, have become established in the Hidden Falls area, and have the potential to negatively affect the diversity and quality of the habitats and wildlife in the valley. A few of the common invasive species at Hidden Falls include: common buckthorn, glossy buckthorn, exotic honeysuckle, garlic mustard, reed canary grass. Box elder is one aggressive native specie that has become invasive in the valley and has the potential to cause problems.

Other invasive threats, such as insects, are also having an impact on the natural resources. With the documented occurrence of Emerald Ash Borer in the City and larger metropolitan area there is concern for the regions large Green Ash population and how to react. Other potential non vegetative invasive species such as Gypsy Moths are of concern and trends will need to be monitored.

### ***Non-management***

Non-management, or inaction, will lead to further degradation of the site. The potential for increased pressure from invasive species and possibly exotic species to continue encroaching on the various habitat types due to the lack of disturbance, and an engrained maintenance program, is great.

## **Erosion**

Erosion is a natural process and should be expected to some extent in a floodplain system located along a major river system. With urbanization this process can be sped up without preemptive measures in place. Most of the erosion within Hidden Falls Regional Park is due to either off site land use practices, in regards to storm water management that culminates within the park, or related to foot traffic that tramples vegetation and destabilizes soil.

In regards to storm water there are several outfall areas from storm water pipes that discharge along the bluff line. At all of these locations there is some form of erosion along the bluff line as well as in the adjacent floodplain as water flows to the Mississippi River after rain fall events. The most prevalent erosion related to storm water outfall is where the main falls, that is the parks namesake, are located and the stream course that is associated with it. There is evidence of undercutting of the concrete chute in the upper portions of the outfall, where a lot of the WPA walls and steps are located. Between the concrete chute and first trail crossing on the east side, the channel shows signs of severe cut banks and failing bank stabilization practices (figure 2.3). At the western trail crossing and the Mississippi River there is moderate erosion but here the creek enters the floodplain and appears that the discharge is able to spread out and disperse across the landscape.

Throughout the site there are signs of erosion related to foot traffic. Within the park there are several variations of how foot traffic erosion occurs:

1. Some of this is due to visitors going off trail exploring the less visited part of the park.
2. Visitors walking around fallen trees that are blocking the existing trail.
3. Lack of connection to trail entrances from parking areas.

Human facilitated erosion can be managed to minimize further accelerated erosion of the bluff and floodplain. Controls/management techniques may include:

1. Constructing stable conveyance systems down the slope for storm sewer systems. Pipes, high velocity chutes, and in some instances, vegetated swales may be needed. Reducing the number of storm sewer discharge points by collecting runoff above the bluff to single points of flow down the bluff may be needed.
2. Planting denuded areas (trails and bare slopes) with plant materials that will promote infiltration and stable soil structure.
3. Applying stable materials for footpaths that will diffuse water flow, resist compaction and disintegration from human foot traffic.
4. Redirecting flows away from trails to avoid concentrated flow.
5. Assessing the trail network and providing clear access and signage to trailheads, as well as removing fallen trees from trails as soon as possible.



*Figure 2.3: Bank erosion from Hidden Falls storm outflow*

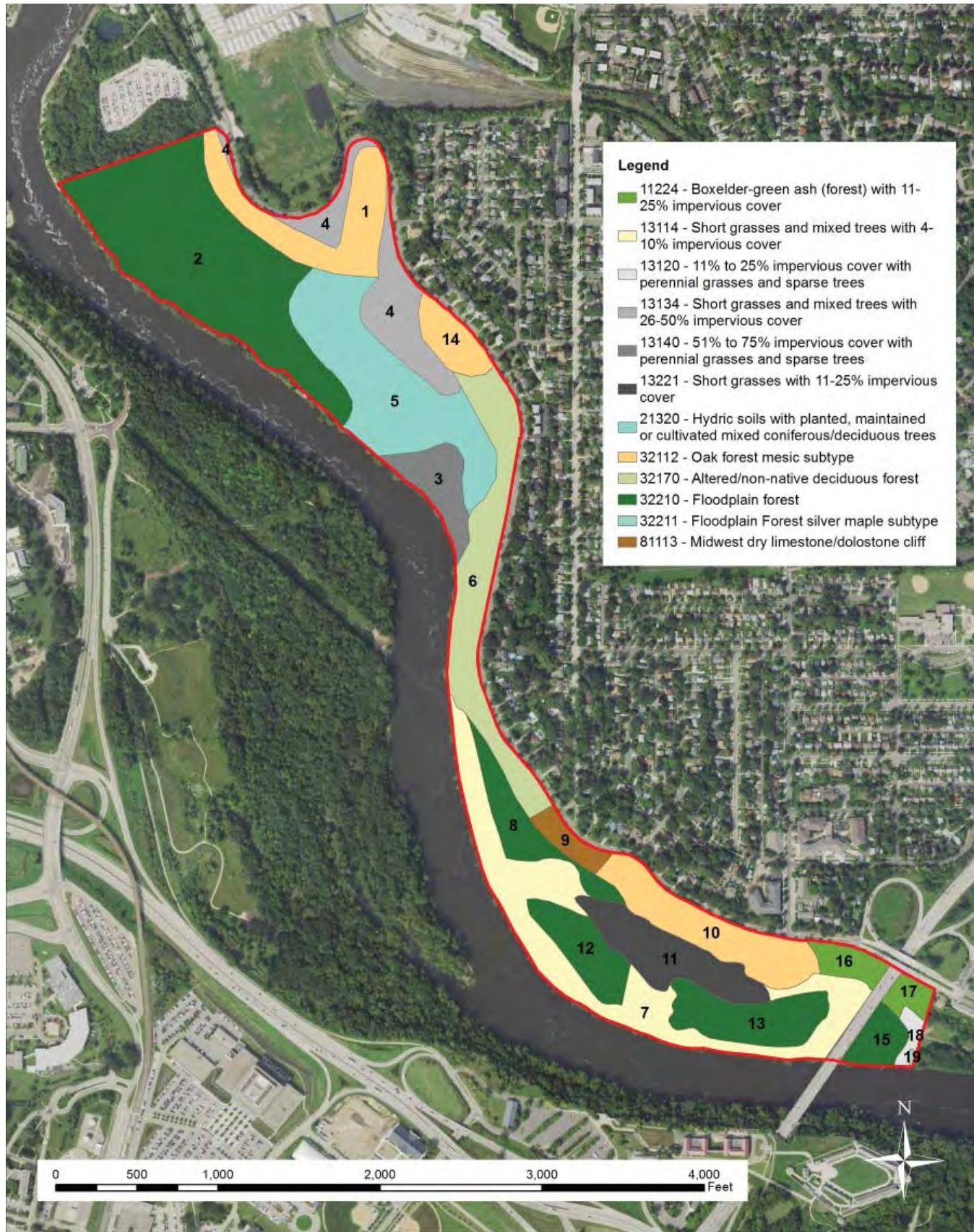


Figure 2.4: Upland Habitat Management Complexes

# Habitat Complexes

Habitat complex areas are categorized by their Minnesota Land Cover Classification System (MLCCS) code and associated polygon id number, referenced in figure 2.4. Management comments are made for the habitat complex as a whole after individual polygon descriptions. Habitat species lists from Native Plant Communities of Minnesota are included in Appendix C for reference.

## 11224 Boxelder-green ash (forest) with 11-25% impervious cover

Predevelopment vegetation with a matrix of 11% to 25% impervious cover, see classification number **32170** for vegetation definition (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg.80*).

**Polygon:16**

**MLCCS Code: 11224**

**Habitat Grade: D**

**(FDs37, MHs37)**

**Description:** This is a disturbed habitat community with the highway 5 bridge bisecting the unit and containing the southern entrance road into the park. The canopy contains green ash that are in decline. The shrub layer is heavily dominated by common buckthorn.

**Canopy layer vegetation:**

Green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*), cottonwood (*Populus deltoides*)

**Sub-canopy & shrub layer vegetation:**

Common buckthorn (*Rhamnus cathartica*), staghorn sumac (*Rhus typhina*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), snakeroot (*Ageratina altissima*), jewelweed (*Impatiens capensis*), Virginia creeper (*Parthenocissus quinquefolia*), wild grape (*Vitis riparia*), garlic mustard (*Alliaria petiolata*), creeping Charlie (*Glechoma hederacea*)



Figure 2.5: Understory with buckthorn (polygon 16)

**Polygon:17**

**MLCCS Code: 11224**

**Habitat Grade: C**

**(FDs37, MHs37)**

**Description:** Situated upland from the floodplain and surrounded by the entrance to the park. Overall there appears to be a low density of invasive species. Common buckthorn is present with few large specimens but scattered seedlings. Just as in polygon 16 there are declining green ash in this unit as well

**Canopy layer vegetation:**

Boxelder (*Acer negundo*), basswood (*Tilia americana*), green ash (*Fraxinus pennsylvanica*)

**Sub-canopy & shrub layer vegetation:**

Common buckthorn (*Rhamnus cathartica*), staghorn sumac (*Rhus typhina*)

**Ground layer vegetation:**

Jewelweed (*Impatiens capensis*), common buckthorn seedlings (*Rhamnus cathartica*), blue violets (*Viola sororia*), common wood sedge (*Carex blanda*), Virginia creeper (*Parthenocissus quinquefolia*), Canadian wood nettle (*Laportea canadensis*), creeping Charlie (*Glechoma hederacea*), garlic mustard (*Alliaria petiolata*)

### Management Comments Polygon 16 & 17:

1. Monitoring and removal of woody invasive species such as buckthorn. Heavy infestations of buckthorn on slopes and bluffs can lead to bare soils prone to erosion and management should only be undertaken if resources are in place for a sustained effort. On steeper bluff slopes, material should be cut into 3 foot lengths, in order to make ground contact, and left on the slope to decay. This debris will aid in minimizing erosion of bare soils from rainfall as well as potential erosion caused from dragging material off site. Seeding of native graminoids with a cover crop (oats or winter wheat) should be facilitated after a cutting

- operation to promote fine root structure in the soil. Native forb and shrub species can be planted at a later time when the woody invasive infestation is deemed under control.
2. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
  3. In openings created by clearing or thinning native shade canopy trees should be promoted to deter invasives and enhance habitat. Planting a more diverse species composition will help with resiliency in the canopy utilizing the species list for FDs37: Southern Dry-Mesic Oak (Maple) Woodland and MHs37: Southern Dry-Mesic Oak Forest in the *Native Plant Communities of Minnesota*.
  4. In areas of bare soil, plant native ground layer species (graminoids and forbs) to stabilize soils and enhance diversity. Utilize plants that are able to compete with invasive species or that will make management easier.

## **13114 - 4% to 10% Impervious Cover with Perennial Grasses and Sparse Trees**

Areas of short grasses with a matrix of 4% to 10% impervious cover. Planted grass species typical of “turf” (bluegrass, fescue, etc). Species composition is typical of regular and frequent mowing, with mixed planted/pre-development trees and/or shrubs (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg.88*).

**Polygon:7      MLCCS Code: 13114      Habitat Grade: C      (FFs59, FFs68)**

**Description:** Common buckthorn accounts for 50% of the shrub layer cover. A lot of the species are in large clumps along the river. There is a lot of erosion from flooding along the bank of the river. It appears that willow staking was done along the shore. The topography becomes steep further upstream. A larger portion of this unit is kept mowed due to overhead transmission lines. This produces a challenge in reestablishing a canopy or maintaining volunteer tree species in the sub-canopy/shrub layer along the river.



Figure 2.6 Cottonwoods in mowed area (polygon 7)

### **Canopy layer vegetation:**

Green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), white mulberry (*Morus alba*)

### **Sub-canopy & shrub layer vegetation:**

Common buckthorn (*Rhamnus cathartica*), bur oak (*Quercus macrocarpa*), staghorn sumac (*Rhus typhina*), amur maple (*Acer ginnala*), Siberian elm (shrub layer), honeysuckle (*Tartarian sp.*)

### **Ground layer vegetation:**

Mowed turf grass, giant ragweed (*Ambrosia trifida*), Canada goldenrod (*Solidago canadensis*), wild grape (*Vitis riparia*), Virginia creeper (*Parthenocissus quinquefolia*), wild cucumber (*Echinocystis lobata*)

### **Management Comments Polygon 7:**

1. Removal of woody invasive species such as buckthorn, amur maple, Siberian elm, and honeysuckle. Infestations are located along the edges or riverbank of the unit.
2. Reconnect the tree canopy between floodplain polygons 8, 12, and 13. This will help reduce fragmentation and edge with in the floodplain. Whether it was promoted or not there seems to have been considerable canopy closure already between units 8 and 12 since 1991. Planting a more diverse species composition will help with resiliency in the canopy similar to the species planted in polygon 5, utilizing the species list for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest in the *Native Plant Communities of Minnesota*.
3. Utilize way finding signage and trail marking to direct visitors from parking area to larger trail system. This will concentrate visitors impact towards existing trails and minimize impact to adjacent higher habitat value areas.

- Evaluate the need for mowed turf throughout unit. If it is deemed to be unnecessary for visitor use conversion to a mesic/wet prairie would be appropriate. WPs54: Southern Wet Prairie species list from *Native Plant Communities of Minnesota* would be appropriate.

## **13120 - 11% to 25% Impervious cover with perennial grasses with sparse trees.**

Areas where the sum of buildings, pavement and other impermeable surfaces averages 11% to 25% of the total cover and the vegetation cover is dominated by grasses with few trees (*Minnesota Land Cover Classification System – User Manual*, MnDNR, pg.89).

**Polygon:18      MLCCS Code: 13120      Habitat Grade: D      (FFs59, FFs68)**

**Description:** This polygon contains the road that leads to the south entrance parking lot, paved trails, and mowed areas leading to the river.

**Canopy layer vegetation:**

Cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), boxelder (*Acer negundo*)

**Ground layer vegetation:**

Turf grass

**Management Comments Polygon 18:**

- Due to the presence of invasive species in adjacent units. The unit should be monitored and treated as they are documented.
- Reconnect canopy and/or ground layer between floodplain units 15, 16, and 18. This will reduce fragmentation and edge with in the floodplain. Planting a more diverse species composition will help with resiliency in the canopy similar to the species planted in polygon 5, utilizing the species list for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest in the *Native Plant Communities of Minnesota*.

## **13134 - Short grasses and mixed trees with 26-50% impervious cover**

Areas of short grasses with a matrix of 26% to 50% impervious cover. Planted grass species typical of ‘turf’ (bluegrass, fescue, etc). Species composition is typical of regular and frequent mowing, with mixed planted/pre-development trees and/or shrubs (*Minnesota Land Cover Classification System – User Manual*, MnDNR, pg.90).

**Polygon:4      MLCCS Code: 13134      Habitat Grade: D      (FDs37, MHs37)**

**Description:** This area is comprised in large part by the paved road and trail entrance into the park.

**Canopy layer vegetation:**

Bur oak (*Quercus macrocarpa*), silver maple (*Acer saccharinum*)

**Sub-canopy & shrub layer vegetation:**

Common buckthorn (*Rhamnus cathartica*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), basswood (*Tilia americana*)

**Ground layer vegetation:**

Turf grass

**Management Comments Polygon 4:**

- Monitoring and removal of woody invasive species such as buckthorn. Heavy infestations of buckthorn



Figure 2.7: Storm drain culvert (polygon 4)

on slopes and bluffs can lead to bare soils prone to erosion and should only be undertaken if resources are in place for a sustained effort. On steeper bluff slopes material should be cut into 3 foot lengths, in order to make ground contact, and left on the slope to decay. This debris will aid in minimizing erosion of bare soils from rainfall as well as potential erosion caused from dragging material off site. Seeding of native graminoids with a cover crop (oats or winter wheat) should be facilitated after a cutting operation to promote fine root structure in the soil. Native forb species can be planted at a later time when buckthorn infestation is deemed under control.

2. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
3. Below the bluff line promote native shade canopy trees to deter invasives and enhance habitat. Promote recruitment of more desirable tree species by removing box elder, and other less desirable trees or invasive/exotic species that may be shading and suppressing seedlings. Planting a more diverse species composition will help with resiliency in the canopy utilizing the species list for FDs37: Southern Dry-Mesic Oak (Maple) Woodland and MHs37: Southern Dry-Mesic Oak Forest in the *Native Plant Communities of Minnesota*.
4. On top of the bluff, promote native species to deter invasives and enhance habitat. Promote recruitment of more desirable species by removing less desirable species or invasive/exotic species that may be shading and suppressing native species. Planting a more diverse native species composition will help with resiliency utilizing the species list for UPs13: Southern Dry Prairie Woodland and UPs14: Southern Dry Savanna in the *Native Plant Communities of Minnesota*.



Figure 2.8: Typical bluff vegetation (polygon 4)

## **13140 - 51% to 75% impervious cover with perennial grasses**

### **and sparse trees**

Areas where the sum of buildings, pavement and other impermeable surfaces averages 51% to 75% of the total cover and the vegetation cover is dominated by grasses with few trees (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg.90*).

**Polygon:3      MLCCS Code: 13140      Habitat Gradee: D      (FFs59, FFs68)**

**Description:** This is the boat launch, parking lot and surrounding mowed lawn.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and boxelder (*Acer negundo*)

**Ground layer vegetation:**

Turf grass

**Management Comments Polygon 3:**

1. Promote native shade canopy trees to enhance habitat diversity. Plant and promote recruitment of more desirable tree species by removing less desirable trees species that may be shading and suppressing seedlings. Refer to specie list in *Native Plant Communities of Minnesota* for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest.

## **13221 - Short grasses with 11-25% impervious cover**

Areas where the sum of buildings, pavement and other impermeable surfaces averages 11% to 25% of the total cover, and the vegetation cover is dominated by planted grass species typical of 'turf' (bluegrass, fescue, etc). Species composition is typical of regular and frequent mowing. These grasses are regularly maintained to heights below one foot (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg.91*).

**Polygon: 11****MLCCS Code: 13221****Habitat Grade: D****(FFs59, FFs68)**

**Description:** This unit is primarily mowed turf grass and creeping Charlie with picnic tables adjacent to a parking lot. Large shade producing trees such as cottonwood and silver maple dominate the canopy. This unit creates fragmentation of the floodplain from polygons 8, 12, and 13 with little reason for some of the mowing to the north.

**Canopy layer vegetation:**

Cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*)

**Ground layer vegetation:**

Turf grass, creeping Charlie (*Glechoma hederacea*)



Figure 2.9: Polygon 11 looking towards floodplain forest

**Management Comments Polygon 11:**

1. Look at possibility of reduction of turf area at this entrance as it seems to be less utilized than the northern entrance.
2. Reconnect the tree canopy between floodplain polygons 8, 12, and 13. This will help reduce fragmentation and edge with in the floodplain. Whether it was promoted or not there seems to have been considerable canopy closure already between units 8 and 12 since 1991. Planting more diversity of species composition will help with resiliency in the canopy similar to the species planted in polygon 5, utilizing the species list for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest in the *Native Plant Communities of Minnesota*.
3. Utilize way finding signage and trail marking to direct visitors from parking area to larger trail system. This will concentrate visitors impact towards existing trails and minimize impact to adjacent higher habitat value areas.
4. Evaluate the need for mowed turf throughout unit. If it is deemed to be unnecessary for visitor use conversion to a mesic/wet prairie would be appropriate. WPs54: Southern Wet Prairie species list from *Native Plant Communities of Minnesota* would be appropriate.

## 21320- Hydric soils with planted, maintained or cultivated mixed coniferous/deciduous trees

Areas where surface water is present for brief or extended periods during the growing season. The water table may or may not be near the surface and may have been artificially lowered. Common of this classification are drained or partially drained wetlands, where vegetation has been converted to upland varieties. Hydrophytic vegetation may still be present (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg.99*).

**Polygon: 5****MLCCS Code: 21320****Habitat Grade: D****(FFs59, FFs68)**

**Description:** This unit is the northern parking area and north pavilion. It is surrounded by mowed turf grass.

The ash trees in this area have been removed, and replaced with saplings of 8 tree species: Basswood, black walnut, cottonwood, hackberry, Kentucky coffeetree, river birch, and swamp white oak. As well as 4 shrub species: Nannyberry, elderberry, Missouri gooseberry and pagoda dogwood. The other trees in this area are large, shade producing trees.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), boxelder (*Acer negundo*)

**Sub-canopy & shrub layer vegetation:**

Basswood (*Tilia americana*), black walnut (*Juglans nigra*), cottonwood (*Populus deltoides*), hackberry (*Celtis occidentalis*), Kentucky coffeetree (*Gymnocladus dioicus*), river birch (*Betula nigra*), swamp white oak (*Quercus bicolor*), nannyberry (*Viburnum lentago*), elderberry (*Sambucus canadensis*), Missouri gooseberry (*Ribes missouriense*), pagoda dogwood (*Cornus alternifolia*)

**Ground layer vegetation:**

Turf grass, reed canary grass

**Management Comments Polygon 5:**

1. Continue to promote native shade canopy trees to enhance habitat diversity. Plant and promote recruitment of more desirable tree species by removing less desirable tree species that may be shading and suppressing seedlings. Refer to specie list in *Native Plant Communities of Minnesota* for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest.
2. Utilize way finding signage and trail marking to direct visitors from the parking areas to larger trail system. This will concentrate visitors towards existing trails and minimize impact to adjacent higher habitat value areas.



Figure 2.10: Northern Parking Area (polygon 5)

## 32112 - Oak forest mesic subtype

Northern red oaks (*Quercus rubra*), white oaks (*Quercus alba*), or bur oaks (*Quercus macrocarpa*) dominate the more mesic stands of Oak Forest. These stands occur on sites that had fewer severe fires before European settlement than the sites on which dry Mixed Oak Forest occurs. These mesic stands most likely were always forest, rather than woodland or savanna. They have tall (> 20 meters), straight, single-stemmed trees that lack spreading lower branches. Commonly, mesic fire sensitive tree species are present with the oaks in these stands, especially in the understory. These species include basswood (*Tilia americana*), green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), big-toothed aspen (*Populus grandidentata*), and butternut (*Juglans cinerea*). The shrub layer in mesic stands is sparser than in dry stands and, correspondingly, the forb layer is denser and more diverse and there are more graminoid species. Like the drier stands, however, there is little oak regeneration, and most mesic Oak Forests appear to be succeeding to Maple-Basswood forest. Heavy selective logging of the oaks in mesic stands may accelerate this trend, producing young stands of Maple-Basswood Forest. The mesic stands often grade into drier stands of Maple-Basswood Forest, but differ from them by having a somewhat denser shrub layer and the herbs woodrush (*Luzula acuminata*) and pointed-leaved tick-trefoil (*Desmodium glutinosum*) in their understory. Natural stands of mesic Mixed Oak Forest are rare. Drier stands are more common, in part because relative to the mesic forests they occur on sites with soils less suitable for cultivation (*Minnesota Land Cover Classification System – User Manual*, MnDNR, pg 110).

**Polygon: 1      MLCCS Code: 32112      Habitat Grade: D      (FDs37, MHs37)**

**Description:** Unit 1 encompasses an area that is on a slope/bluff area at the northeast corner of the park. The main falls for which the park is named after resides within this unit.

There are paved trails at the top of the bluff and gravel trails also bisect it. There is the presence of declining green ash in the canopy layer. Common buckthorn dominates most of the understory, with other invasive plants such as amur maple, common burdock, and garlic mustard present.

**Canopy layer vegetation:**

Green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*), cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), bur oak (*Quercus macrocarpa*)

**Sub-canopy & shrub layer vegetation:**

Staghorn sumac (*Rhus typhina*), American Elm (*Ulmus Americana*), common buckthorn (*Rhamnus cathartica*), amur maple (*Acer ginnala*)

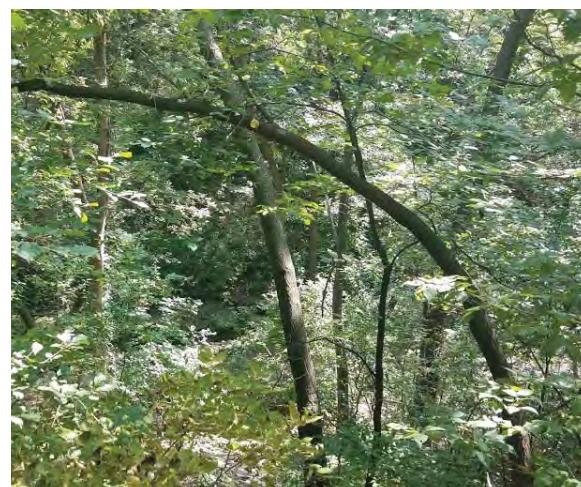


Figure 2.11: Shrub layer density (polygon 1)

**Ground layer vegetation:**

Snakeroot (*Ageratina altissima*), three-seeded mercury (*Acalypha rhomboidea*), common burdock (*Arctium minus*), garlic mustard (*Alliaria petiolata*), Pennsylvania sedge (*Carex pensylvanica*), white heath aster (*Symphyotrichum ericoides*), pink smartweed (*Polygonum pensylvanicum*), gooseberry (*Ribes sp.*), Virginia creeper (*Parthenocissus quinquefolia*), Solomon's seal (*Polygonatum biflorum*)

Scattered occurrences of Norway spruce (*Picea abies*) and honeysuckle (*Lonicera sp.*).

**Polygon: 10****MLCCS Code: 32112****Habitat Grade: C****(FDs37, MHs37)**

**Descriptions:** This unit is on a sloped area and has moderate erosion. Ground cover is 50%, with a significant duff layer.

Contains large old growth bur oaks (*Quercus macrocarpa*) scattered in the canopy. There is a deep ravine that is showing a high amount of erosion.

**Canopy layer vegetation:**

Bur oak (*Quercus macrocarpa*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), black locust (*Robinia pseudoacacia*)

**Sub-canopy & shrub layer vegetation:**

Black locust (*Robinia pseudoacacia*), common buckthorn saplings (*Rhamnus cathartica*)

**Ground layer vegetation:**

Gooseberry (*Ribes sp.*), Virginia creeper (*Parthenocissus quinquefolia*), Solomon's seal (*Polygonatum biflorum*), Canadian wood nettle (*Laportea canadensis*), moonseed (*Menispermum canadense*), yellow avens, (*Geum aleppicum*), goldenrod (*Solidago sp.*)

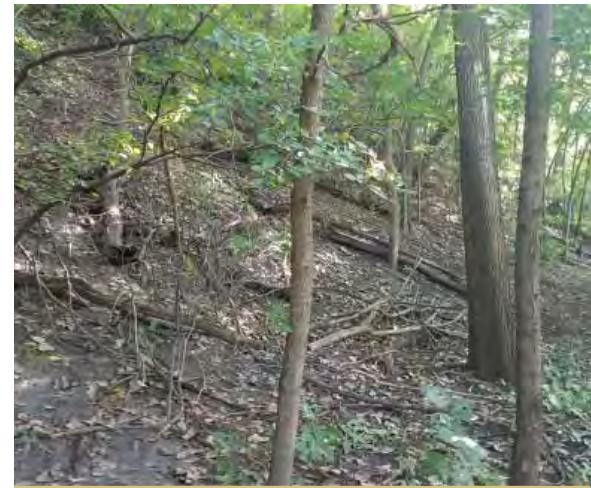


Figure 2.12: Slope vegetation (polygon 10)

**Polygon: 14****MLCCS Code: 32112****Habitat Grade: D****(FDs37, MHs37)**

**Description:** Located between the paved trail and the road leading into the park, this unit has large open grown bur oak (*Quercus macrocarpa*), primarily located on the top of the bluff. There is a significant amount of common buckthorn (*Rhamnus cathartica*) in the understory.

**Canopy layer vegetation:**

Bur oak (*Quercus macrocarpa*)

**Sub-canopy & shrub layer vegetation:**

Green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), and basswood (*Tilia americana*), black locust (*Robinia pseudoacacia*), buckthorn (*Rhamnus cathartica*), gooseberry (*Ribes sp.*)



Figure 2.13: Polygon 14 vegetation cover (typical)

**Ground layer vegetation:**

Solomon's seal (*Polygonatum pubescens*), Virginia creeper (*Parthenocissus quinquefolia*), moonseed (*Menispermum canadense*), wild grape (*Vitis riparia*), yellow avens (*Geum aleppicum*), goldenrod (*Solidago sp.*)

**Management Comments Polygon 1, 10 & 14:**

1. Monitoring and removal of woody invasive species such as buckthorn. Heavy infestations of buckthorn on slopes and bluffs can lead to bare soils prone to erosion and should only be undertaken if resources are in place for a sustained effort. On steeper bluff slopes material should be cut into 3 foot lengths, in

- order to make ground contact, and left on the slope to decay. This debris will aid in minimizing erosion of bare soils from rainfall as well as potential erosion caused from dragging material off site. Seeding of native graminoids with a cover crop (oats or winter wheat) should be facilitated after a cutting operation to promote fine root structure in the soil. Native forb species can be planted at a later time when buckthorn infestation is deemed under control.
2. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
  3. Promote native shade canopy trees to deter invasives and enhance habitat below bluff line. Promote recruitment of more desirable tree species by removing box elder, and other less desirable trees or invasive/exotic species that may be shading and suppressing seedlings. Planting a more diverse species composition will help with resiliency in the canopy utilizing the species list for FDs37: Southern Dry-Mesic Oak (Maple) Woodland and MHs37: Southern Dry-Mesic Oak Forest in the *Native Plant Communities of Minnesota*.
  4. On top of the bluff, promote native species to deter invasives and enhance habitat. Promote recruitment of more desirable species by removing less desirable species or invasive/exotic species that may be shading and suppressing native species. Planting a more diverse composition of native species will help with resiliency. When replanting use the species list for UPs13: Southern Dry Prairie Woodland and UPs14: Southern Dry Savanna in the *Native Plant Communities of Minnesota*.
  5. In areas of bare soil, plant native ground layer species (graminoids and forbs) to stabilize soils and enhance diversity. Utilize plants that are able to compete with invasive species or will make management easier.
  6. Assess storm water out flow and creek discharge from Hidden Falls (polygon 1) to direct repair and stabilization of downstream banks that are eroding from excess storm flow. This will require an analysis of storm discharges and will require an engineered solution for bank stability and slowing the water down. Planting vegetation may be part of the solution but will need to be part of multi-stage project to stabilize the banks.
  7. Remove black locust before it spreads and begins to compromise canopy diversity.

## **32170 - Altered/non-native deciduous forest**

This upland deciduous forest is not dominated by oaks, aspens, balsam poplars, paper birches, yellow birches, sugar maples, or basswoods. Boxelder maple (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), and cottonwood (*Populus deltoides*) are typical canopy dominants, sometimes together and sometimes singly. Elms are common associates. Hackberry, aspen, oak, and basswood may also be present. The shrub layer is often dominated by common buckthorn (*Rhamnus cathartica*) and Tartarian honeysuckle (*Lonicera tatarica*), but gooseberries and elderberries can also be common. The ground layer is also dominated by species tolerant of disturbances, including white snakeroot (*Ageratina altissima*), motherwort (*Leonurus cardiaca*), and garlic mustard (*Alliaria petiolata*). Occasionally, when higher quality forests are nearby, the understory can be more diverse (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg124-5*).

**Polygon: 6      MLCCS Code: 32170      Habitat Grade: C      (FDs37, MHs37)**

**Description:** This unit occurs along a very steep bluff with an understory cover of 30%. Erosion is mild and occurs to be from heavy rainfall. Understory is dominated by invasive species that prevent view to the river. There is a seep and/or ravine on the southern end of the polygon with significant erosion.

**Canopy layer vegetation:**

Boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus Americana*), bur oak (*Quercus macrocarpa*) - open grown, cottonwood (*Populus deltoides*)

**Sub-canopy & shrub vegetation:**

Basswood (*Tilia americana*) - sub canopy dominate, staghorn sumac (*Rhus typhina*), common buckthorn (*Rhamnus cathartica*) - 75% cover

**Ground layer vegetation:**

Goldenrod (*Solidago* sp.), white snakeroot (*Ageratina altissima*), smartweed (*Persicaria pensylvanica*), moonseed (*Menispermum canadense*), common blue violets (*Viola sororia*), Virginia creeper (*Parthenocissus quinquefolia*), creeping Charlie, sedges (*Carex* sp.), wild cucumber (*Echinocystis lobata*)

Scatterings of conifers including white spruce (*Picea glauca*), red cedar (*Juniperus virginiana*), red pine (*Pinus resinosa*) are present.

**Management Comments Polygon 6:**

1. Monitoring and removal of woody invasive species such as buckthorn. Heavy infestations of buckthorn on slopes and bluffs can lead to bare soils prone to erosion and should only be undertaken if resources are in place for a sustained effort. On steeper bluff slopes material should be cut into 3 foot lengths, in order to make ground contact, and left on the slope to decay. This debris will aid in minimizing erosion of bare soils from rainfall as well as potential erosion caused from dragging material off site. Seeding of native graminoids with a cover crop (oats or winter wheat) should be facilitated after a cutting operation to promote fine root structure in the soil. Native forb species can be planted at a later time when buckthorn infestation is deemed under control.
2. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
3. Below the bluff line promote native shade canopy trees to deter invasives and enhance habitat. Promote recruitment of more desirable tree species by removing box elder, and other less desirable trees or invasive/exotic species that may be shading and suppressing seedlings. Planting a more diverse species composition will help with resiliency in the canopy utilizing the species list for FDs37: Southern Dry-Mesic Oak (Maple) Woodland and MHs37: Southern Dry-Mesic Oak Forest in the *Native Plant Communities of Minnesota*.
4. On top of the bluff, promote native species to deter invasives and enhance habitat. Promote recruitment of more desirable species by removing less desirable species or invasive/exotic species that may be shading and suppressing native species. Planting a more diverse composition of native species will help with resiliency. When replanting use the species list for UPs13: Southern Dry Prairie Woodland and UPs14: Southern Dry Savanna in the *Native Plant Communities of Minnesota*.
5. In areas of bare soil, plant native ground layer species (graminoids and forbs) to stabilize soils and enhance diversity. Utilize plants that are able to compete with invasive species or will make management easier.
6. Remove black locust before it spreads and begins to compromise canopy diversity.



Figure 2.14: Polygon 6 bluff vegetation

## 32210 - Floodplain forest

Vegetation with >30% tree cover that is subject to occasional floodplain inundations and is dominated by some combination of silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), black willow (*Salix nigra*), American elm (*Ulmus Americana*), slippery elm, boxelder maple (*Acer negundo*), bur oak (*Quercus macrocarpa*), and swamp white oak (*Quercus bicolor*) (*Minnesota Land Cover Classification System – User Manual, MnDNR, pg 125*).

**Polygon: 2      MLCCS Code: 32210      Habitat Grade: B      (FFs68)**

**Description:** This unit goes from the river to the toe of the bluff.

It appears areas were flooded for most of the growing season and do not have much for understory vegetation. The area is low and prone to flooding. There are shelterwood pockets that have been started with in the unit. Pockets had removal and replanting in 2016 and 2017.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), American elm (*Ulmus Americana*), cottonwood (*Populus deltoides*)

**Sub-canopy & shrub layer vegetation:**

Green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*) –future dominate, amur maple (*Acer ginnala*), black locust (*Robinia pseudoacacia*)

**Ground layer vegetation:**

Snakeroot (*Ageratina altissima*), Canada goldenrod (*Solidago canadense*), wild grape (*Vitis riparia*), white heath aster (*Sympyotrichum ericoides*), giant ragweed (*Ambrosia trifida*), common blue violet (*Viola sororia*), bottlebrush grass (*Elymus hystrix*), white mulberry (*Morus alba*), strawberry (*Fragaria virginiana*), green foxtail (*Setaria viridis*), wild cucumber (*Echinocystis lobata*), pink smartweed (*Polygonum pensylvanicum*), pale jewelweed (*Impatiens pallida*), switchgrass (*Panicum virgatum*)



Figure 2.15: "Intact" floodplain forest (polygon 2)

**Polygon: 8      MLCCS Code: 32210      Habitat Grade: D      (FFs68)**

**Description:** The understory has 75% cover, mostly comprised of nettle. There is the presence of common buckthorn saplings. It is cut off from the rest of the floodplain by paved trail, ROW powerline, and bluff.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*)

**Sub-canopy & shrub layer vegetation:**

Boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), common blue violet (*Viola sororia*), wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), pale jewelweed (*Impatiens pallida*), Virginia creeper (*Parthenocissus quinquefolia*), woodland sunflower (*Helianthus strumosus*), common buckthorn (*Rhamnus cathartica*)



Figure 2.16: Overgrown floodplain forest (polygon 8)

**Polygon: 12      MLCCS Code: 32210      Habitat Grade: B      (FFs68)**

**Description:** The understory has 75% cover, mostly comprised of nettle. It does, however, contain a greater diversity of vegetation than other floodplain forest units in the park. There are areas of shelterwood pockets planted where dead and diseased green ash (*Fraxinus pennsylvanica*) were removed.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*)

**Sub-canopy & shrub layer vegetation:**

Boxelder maple (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), common blue violet (*Viola sororia*), wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), pale jewelweed (*Impatiens pallida*), Virginia creeper (*Parthenocissus quinquefolia*), woodland sunflower (*Helianthus strumosus*)

**Polygon: 13      MLCCS Code: 32210      Habitat Grade: B      (FFs68)**

**Description:** Like other floodplain forest units, this one is bisected by paved trails, entry road, and ROW. It has very low density of invasive species, but this is probably due to the river's seasonal flooding. Vegetation in the understory was present but was minimal.

**Canopy vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*)

**Sub-canopy/shrub layer vegetation:**

Green ash (*Fraxinus pennsylvanica*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), jewelweed (*Impatiens capiensis*), creeping Charlie (*Glechoma hederacea*), garlic mustard (*Alliaria petiolata*)

**Polygon: 15      MLCCS Code: 32210      Habitat Grade: B      (FFs59, FFs68)**

**Description:** Unit is bordered by impervious cover (entrance road, paved trails) and disturbed land (bridge ROW). The water had just receded in late July after late season flooding.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*)

**Sub-canopy/shrub layer vegetation:**

American elm (*Ulmus americana*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), Virginia creeper (*Parthenocissus quinquefolia*), *Impatiens* sp.

**Management Comments Polygons 2, 8, 12, 13, & 15:**

1. Remove woody invasive species such as buckthorn while it is still small and hasn't taken over the shrub layer.
2. Monitoring and removal of woody invasive species such as Amur maple and black locust (polygon2).
3. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
4. Thin boxelder sub-canopy and dense stands of diseased/declining trees. Replant areas using shelterwood plantings to promote stand succession. Plant and promote recruitment of more diverse and desirable tree and shrub species that will help with stand resiliency. Refer to species list in *Native Plant Communities of Minnesota* for FFs59: Southern Terrace Forest and FFs68: Southern Floodplain Forest.
5. Clear downed trees from trails. Thin out excess dead and downed wood from units.
6. Actively discourage off-trail use by visitors and pets to minimize impact to vegetation and soil compaction.

7. Monitoring for woody invasive species due to adjacent units with infestations.
8. Continue to monitor for green ash for signs of emerald ash borer and utilize shelterwood plantings where trees are declining.

## **32211 - Floodplain Forest Silver Maple subtype**

The Silver Maple subtype occurs mainly in the deciduous forest-woodland zone along the Minnesota, lower Mississippi, and St. Croix rivers and their tributaries, although there are some stands to the north in the conifer-hardwood forest zone, such as along the Prairie River in Carlton and southern St. Louis counties. The Silver Maple Subtype seems to be best developed in broad, deep glacial meltwater-cut river valleys that have been filling with coarse alluvium ever since the glacial meltwaters subsided. (The Mississippi and St. Croix River valleys are exemplary of these.) As the name implies, silver maples dominate the tree canopy in this subtype, and are present in the subcanopy and shrub layer as well. Green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), and American elm (*Ulmus americana*) are often present in the canopy, but are most common as seedlings and saplings. Trees such as hackberry (*Celtis occidentalis*) bur oak (*Quercus macrocarpa*), and Boxelder (*Acer negundo*) are sometimes present in the community, but most often occur only on natural levees along active river channels. The understory of the Silver Maple Subtype is open, with less than 25% cover by tree seedlings and saplings. Herbs in the nettle family, including wood nettle (*Laportea canadensis*) and clearweed (*Pilea pumila*), dominate the groundlayer. Woody and herbaceous climbers are common, especially wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), burcucumber (*Sicyos angulatus*), groundnut (*Apios americana*), and hog-peanut (*Amphicarpa bracteata*). (Minnesota Land Cover Classification System – User Manual, MnDNR)

**Polygon: 19      MLCCS Code: 32211      Habitat Grade: C      (FFs68)**

**Description:** Located next to the river with a sand beach.

There is a paved trail along the northern edge. It has a very low density of non-native species. This area was previously classified as MLCCS 52210 (native dominated temporarily flooded shrubland). Upon assessment of the vegetation composition the team found the unit to have changed composition. The site had a high degree of young silver maple stands and a lack of shrub layer. This may have been a disturbed area at the time of the previous classification and the site is experiencing natural succession back to a floodplain forest system.

**Canopy layer vegetation:**

Silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*)

**Sub-canopy & shrub layer vegetation:**

Green ash (*Fraxinus pennsylvanica*)

**Ground layer vegetation:**

Canadian wood nettle (*Laportea canadensis*), hog peanut (*Amphicarpaea bracteata*), wild grape (*Vitis riparia*), burcucumber (*Sicyos angulatus*)



Figure 2.17: Silver maple floodplain forest (polygon 19)

### **Management Comments Polygon 19:**

1. Manage as part of larger habitat unit comprised with in Crosby Farm Regional Park following Crosby Park Natural Resources plan.

## **81113 – Midwest dry limestone/dolostone cliff**

A cliff with <25% vegetative cover, primarily composed of limestone or dolostone, and without continuous groundwater seepage.

This limestone/dolostone cliff community type is found throughout the midwestern United States and adjacent Canada, from Ohio and Ontario, west to Minnesota, south to Kansas, and possibly Arkansas, and east to Indiana.

Stands occur as steep to vertical rock exposures of limestone bedrock. Aspect is variable, but stands are best developed on south- and west-facing slopes. Vegetation is restricted to shelves, cracks and crevices in the rock, generally averaging less than 20 percent, and typically consisting of vines and ferns. In the Ozarks and Interior Plateau region, ferns include *Cheilanthes feei*, *Argyrochosma dealbata* (= *Notholaena dealbata*), *Pellaea atropurpurea*, and *Pellaea glabella*. Herbaceous forbs and graminoids include *Aquilegia canadensis*, *Houstonia nigricans*, *Mentzelia oligosperma*, *Muhlenbergia cuspidata*, *Sedum pulchellum*, and *Solidago drummondii*. Lichens include *Dermatocarpon lachneum*, *Lecanora muralis* and *Psora russellii*. In Ohio, stands contain the ferns *Pellaea atropurpurea*, and *Pellaea glabella*, and the forbs *Aquilegia canadensis*, *Arabis laevigata*, *Heuchera americana*, *Hydrangea arborescens*, and *Sedum ternatum*. Scattered woody plants across the range include *Celastrus scandens*, *Juniperus virginiana*, *Parthenocissus quinquefolia*, *Physocarpus opulifolius*, *Quercus prinus* (southward), and *Toxicodendron radicans* (= *Rhus radicans*), and farther north, *Taxus canadensis*, *Thuja occidentalis*, and *Tsuga canadensis*.

Natural disturbances include drought stress, wind and storm damage, and disturbances from cliff dwelling animals, particularly in the crevices, ledges and rock shelters (Nelson 1985). (*Minnesota Land Cover Classification System – User Manual*, MnDNR, pg 189)

**Polygon: 9      MLCCS Code: 81113      Habitat Grade: B      (UPs13, UPs14)**

**Description:** Sparse vegetation, but has scatterings of trees. There are declining green ash present in the canopy. Lots of woody debris present. With the presence of large, open grown bur oaks this area, historically, would have been more open and vegetative height would have been controlled by periodic fire and grazing animals.

**Canopy layer vegetation:**

Bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus Americana*)

**Sub-canopy & shrub vegetation:**

Common buckthorn (*Rhamnus cathartica*)

**Ground layer vegetation:**

Snakeroot (*Ageratina altissima*), wild grape (*Vitis riparia*), large, Virginia creeper (*Parthenocissus quinquefolia*), smooth wild rose (*Rosa blanda*)

**Management Comments Polygon 9:**

1. Monitoring and removal of woody invasive species such as buckthorn. Heavy infestations of buckthorn on slopes and bluffs can lead to bare soils prone to erosion and should only be undertaken if resources are in place for a sustained effort. On steeper bluff slopes, material should be cut into 3 foot lengths, in order to make ground contact, and left on the slope to decay. This debris will aid in minimizing erosion of bare soils from rainfall as well as potential erosion caused from dragging material off site. Seeding of native graminoids with a cover crop (oats or winter wheat) should be facilitated after a cutting operation to promote fine root structure in the soil. Native forb species can be planted at a later time when buckthorn infestation is deemed under control.
2. Removal of black locust before it spreads and begins to compromise the canopy diversity.
3. Monitor green ash for signs of emerald ash borer. Where feasible and where snags could be a potential public safety hazard declining ash populations should be removed following State of Minnesota quarantine regulations.
4. Promote native species to deter invasives and enhance habitat. Promote recruitment of more desirable species by removing box elder, and other less desirable species or invasive/exotic species that may be shading and suppressing native species. Planting a more diverse species composition will help with resiliency utilizing the species list for UPs13: Southern Dry Prairie Woodland and UPs14: Southern Dry Savanna in the *Native Plant Communities of Minnesota*.
5. In areas of bare soil, plant native ground layer species (graminoids and forbs) to stabilize soils and enhance diversity. Plants characteristic of dry prairies are often common in this habitat complex.

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### 3. Natural Resources Management & Mission Sustainability Goals, Objectives and Strategies

The goals for Hidden Falls Regional Park are designed to meet the habitat and user needs for the park. The strategies are high level overarching to meet the objectives and goals. Site specific activities would need to be designed in accordance with the goals, objectives and strategies as individual areas are targeted for restoration or enhancement.

- Goal 1: Manage a diverse bluff habitat
- Goal 2: Manage a diverse system of riparian habitats
- Goal 3: Invasive species control and management
- Goal 4: Balance between wildlife, habitat management and visitor use of the Minnesota River Valley

#### ***Goal 1: Manage a diverse bluff habitat***

##### ***Objective 1.1 Enhance Oak Savanna (UPs14)***

Rationale: Oak savanna once covered large portions of Minnesota and has now been reduced to small unconnected patches. It has been identified by The Nature Conservancy as a globally endangered habitat type. Most oak savanna was converted to agricultural lands. Those areas that were not converted had disturbances, such as grazing and fire suppressed, resulting in other species moving in and outcompeting the habitat components that create the unique diversity in the savanna ecosystem.

Strategies:

- 1.1.1 Maintain and enhance current oak savanna remnants.
- 1.1.2 Reestablish a tree canopy of 25 -50% cover.
- 1.1.3 Mechanical removal of non-savanna tree species to attain tree canopy goal. This may include thinning of oak species as well.
- 1.1.4 If oaks do need to be removed a representative age class should be maintained to allow for regeneration.
- 1.1.5 In open areas reintroduce oak seedlings to vary the canopy age class and preserve the oak savanna matrix. Not exceeding 11 mature trees per acre.
- 1.1.6 Enhance diversity of ground cover with deep rooted native oak savanna grasses and wildflower species. Where possible use local ecotype seed following the Minnesota Board of Water & Soil Resources “Native Vegetation Establishment and Enhancement Guidelines.” Multiple seedings may be necessary. See Appendix C: UPs13 and UPs14 species list.

- 1.1.7 Conduct periodic mowing and/or cutting and removal of non-savanna species that may encroach where fire is not a possibility.

Table 3.1: Oak Savanna Enhancement/Restoration Time Table

Activity	Comments
Invasive species treatment	Cut and herbicide treatment. Attention to steepness of terrain will be a determining factor as to extent of removal.
Seed/plant Graminoids in bare areas after invasive species removal	Could be hand accomplished volunteers. Attention to steepness of terrain will be a determining factor.
Canopy improvement	As green ash declines plant/promote bur and white oak regeneration or planting.
Invasive species treatment	Prescribed burn or herbicide treatment.
Continue monitoring and invasive species treatment	
Green Ash monitoring	Continued monitoring of affects from Emerald Ash borer.

### ***Objective 1.2 Restore/Enhance Mesic Oak Woodlands (FDs37, MHs37)***

Strategies:

- 1.2.1 Maintain and enhance current Mesic Oak remnants.
- 1.2.2 Reestablish a tree canopy of 50-85% cover.
- 1.2.3 Mechanical removal of all non-oak woodland tree species to attain tree canopy goal. This may include thinning of oak species as well in particular red and pin oak.
- 1.2.4 If white oak species do need to be removed a representative age class should be maintained to allow for regeneration.
- 1.2.5 In open areas reintroduce oak seedlings to vary the canopy age class and preserve the oak savanna matrix.
- 1.2.6 Enhance diversity of ground cover with deep rooted native woodland grasses and wildflower species. Where possible use local ecotype seed following the Minnesota Board of Water & Soil Resources "Native Vegetation Establishment and Enhancement Guidelines." See Appendix C: FDs37 and MHs37 species list.
- 1.2.7 Conduct periodic cutting and removal of non-woodland species that may encroach where fire is not a possibility.

Table 3.2: Oak Woodland Enhancement/Restoration Time Table

Activity	Comments
Invasive species treatment	Monitor and treat those species and area that is able to be maintained.
Supplemental Seeding/planting of graminoids and forbs	Could be hand seeded by volunteers.
Timber stand improvement	As trees decline plant/promote higher quality mesic oak woodland species such as red oak, hackberry, basswood.
Ongoing invasive species management	Volunteers (stewards) could participate in monitoring and control efforts.
Green Ash monitoring	Continued monitoring of affects from Emerald Ash borer.

### ***Goal 2: Manage a diverse system of riparian habitats***

### ***Objective 2.1 Enhance Floodplain and terrace forests (FFs59, FFs68)***

Rationale: There is varying quality to the forest in the floodplain portion of the park. The dense forest canopy structure provides high quality habitat for forest songbirds that could potentially nest in the park. This would be an effort to enhance those areas that are in good condition and bring other areas, classified as Boxelder-Green Ash and Altered/Non-native woodland, up to a higher habitat value.

Strategies:

- 2.1.1 Enhance ground plain and shrub species as canopy thinning and invasive species are removed.
- 2.1.2 Reduce quantity of less desirable canopy species such as boxelder and replant with more desirable forest species. This can be done by conducting shelter wood clearings where there are pockets with high densities of less desirable or diseased trees. See Appendix C: FFs59 and FFs68 species list.
- 2.1.3 Canopy cover of 85% -100%.
- 2.1.4 Reduction in dead down wood. Exact reduction percentage would need to be assessed for each area.
- 2.1.5 Monitor areas for emerald ash borer impacts.

Table 3.3: Floodplain Forest Enhancement/Restoration Tasks

Activity	Comments
Invasive species treatment	Cutting or mowing and/or herbicide treatment.
Timber stand improvement	Completed as funding is available. Will affect timing of additional seeding and planting.
Shelter wood pockets	Continual monitoring of large areas of Emerald Ash Borer (or other disease/pest) die back. Thin larger areas of dying trees and replant with appropriate desirable species.
Seed/plant Forbes and Graminoids	Focused on key areas, such as trail heads. These could be used as nursery plots.
Ongoing invasive species management	Volunteers (stewards) or Conservation Corp of Minnesota -Iowa (CCMI) crews could participate in monitoring and control efforts.
Continued Timber stand improvement and planting of desirable tree species	Volunteers or CCMI crews could plant containerized or seedling tree stock.
Plant 10x10 fenced off nursery plots.	Could be planted by volunteers. Approximately 1 per every 1-2 acres. Volunteers (stewards) could divide and plant in other parts as plants mature.

### ***Objective 2.2 Manage canopy in day use areas***

Rationale: The majority of the park facilities being located in the floodplain portion of the park makes it important to keep in mind the canopy in those areas. Too much fragmentation between forest patches can make the park less attractive to forest songbird species and other animal species.

Strategies:

- 2.2.1 Monitor health of canopy trees in mowed grass areas.
- 2.2.2 Plant trees planning for succession as canopy trees begin to age out. See Appendix C: FFs59 and FFs68 species list.

Table 3.4: Manage canopy in day use areas

Activity	Comments
Preplanning for tree succession	Work with City forester to have a plan for tree planting in advance of tree succession.
Close gaps in canopy	Where there are gaps between forest stands caused by active use areas plant canopy trees to fill in the gap and make connections.

### ***Goal 3: Invasive Species Control and Monitoring***

Inventory and manage invasive species as restoration and enhancement takes place. Monitor and treat new infestations as they appear. See appendix B for invasive species management protocols for species.

Rationale: Invasive species are introduced from other areas and have no competition or biological controls. They tend to invade disturbed areas and have the ability to spread quickly. If not controlled they have the potential to completely take over an area and out compete the native vegetation.

Strategies:

- 3.1.1 Document location, density and area of invasive populations with GIS.
- 3.1.2 When feasible use biological control.
- 3.1.3 Where biological control is not available, use chemical and mechanical means to control.
- 3.1.4 Mowing can be an effective control technique, where feasible.
- 3.1.5 Monitor infested areas for effectiveness of control.
- 3.1.6 Reach out to adjacent landowners to educate them on invasive species prevention and management.



Figure 3.1: Lower trail to Hidden Falls

### ***Goal 4: Balance between wildlife, habitat management and visitor use of Hidden Falls***

Rationale: If visitors are able to have an enjoyable experience recreating at Hidden Falls they can become advocates for the importance of the resource.

Strategies:

- 4.1.1 Post restoration and management activities at entry points that explain what is going on and the importance of the activity to the health of the park habitat.
- 4.1.2 When feasible remove or stack away from the trail any felled trees or dead fall. If material is unable to be removed it should be stacked out of direct site lines in a way that it can be pile burned at a later date.
- 4.1.3 Provide areas of respite within the trail system.
- 4.1.4 Provide access that is sensitive to the surrounding landscape and minimizes impact on the natural resources.
- 4.1.5 Provide clear site lines to trails and use signage to help visitors with navigation of trail system (figure 3.1-3.2).



Figure 3.2: Upper trail to Hidden Falls



## Appendices

*Appendix A: Soil Survey Report*

*Appendix B: Invasive and Noxious Terrestrial Plant Management*

*Appendix C: Native Plant Communities of Minnesota: Habitat Complex Sheets and Species Lists*

*Appendix D: Shelterwood Planting*

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# Appendix A: Soil Survey Report



United States  
Department of  
Agriculture

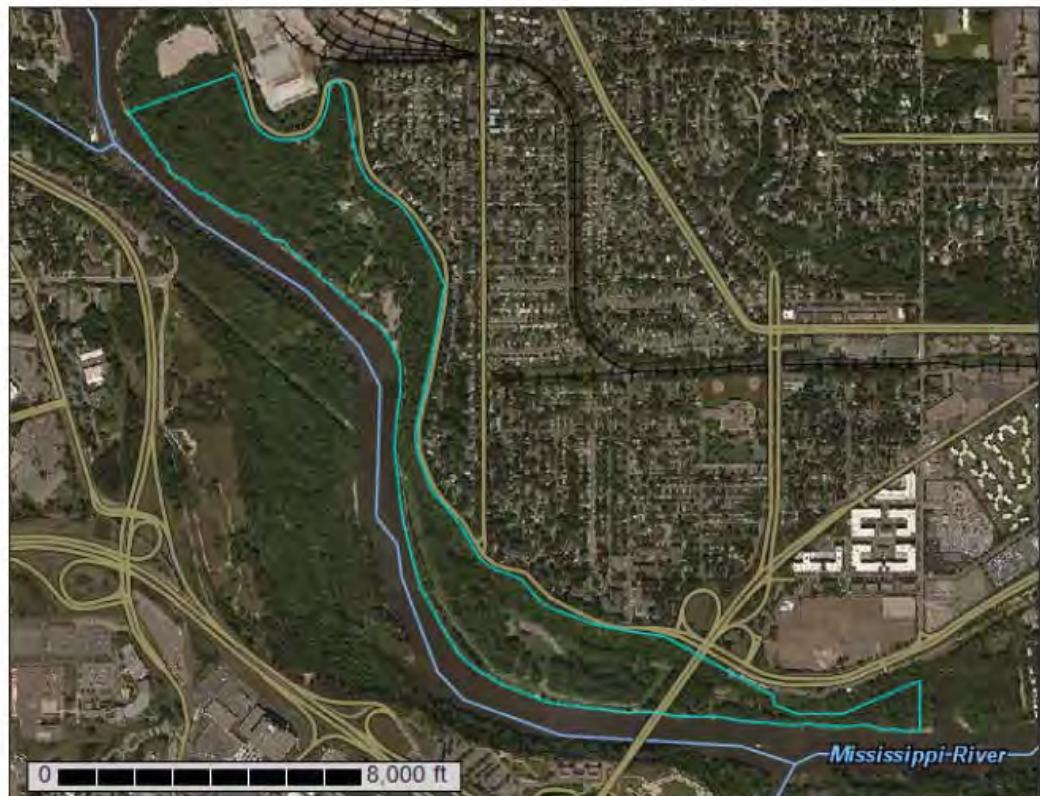
**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

## Custom Soil Resource Report for Ramsey County, Minnesota

**HiddenFalls\_Boundary**



September 17, 2018

Custom Soil Resource Report  
Soil Map



## MAP LEGEND



## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Ramsey County, Minnesota  
Survey Area Data: Version 11, Oct 4, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 26, 2014—Sep 7, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
100B	Copaston loam, 0 to 6 percent slopes	0.8	0.6%
852B	Urban land-Copaston complex, 0 to 8 percent slopes	1.0	0.7%
1027	Udorthents, wet substratum	28.5	20.7%
1039	Urban land	0.3	0.2%
1055	Aquolis and histosols, ponded	3.1	2.3%
1819F	Doretton-Rock outcrop complex, 25 to 65 percent slopes	33.6	24.4%
1821	Alganssee loamy sand	64.1	46.6%
W	Water	6.3	4.5%
<b>Totals for Area of Interest</b>		<b>137.7</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

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mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Ramsey County, Minnesota

### 100B—Copaston loam, 0 to 6 percent slopes

#### Map Unit Setting

*National map unit symbol:* 1t97v  
*Elevation:* 700 to 1,200 feet  
*Mean annual precipitation:* 27 to 33 inches  
*Mean annual air temperature:* 39 to 46 degrees F  
*Frost-free period:* 135 to 180 days  
*Farmland classification:* Farmland of statewide importance

#### Map Unit Composition

*Copaston and similar soils:* 100 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Copaston

##### Setting

*Landform:* Terraces, hills  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Loamy sediment over bedrock

##### Typical profile

*A - 0 to 8 inches:* loam  
*Bw1 - 8 to 14 inches:* sandy loam  
*Bw2 - 14 to 18 inches:* gravelly sandy loam  
*2R - 18 to 22 inches:* unweathered bedrock

##### Properties and qualities

*Slope:* 0 to 6 percent  
*Depth to restrictive feature:* 12 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 16 percent  
*Available water storage in profile:* Low (about 3.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* D  
*Forage suitability group:* Sloping Upland, Low AWC Acid (G09DXN008MN)  
*Hydric soil rating:* No

## 852B—Urban land-Copaston complex, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 1t9bp  
*Elevation:* 700 to 1,200 feet  
*Mean annual precipitation:* 27 to 33 inches  
*Mean annual air temperature:* 39 to 46 degrees F  
*Frost-free period:* 135 to 180 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Urban land:* 65 percent  
*Copaston and similar soils:* 35 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit*

### Description of Urban Land

#### Setting

*Landform:* Terraces  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear

### Description of Copaston

#### Setting

*Landform:* Terraces  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Loamy sediment over bedrock

#### Typical profile

*A - 0 to 8 inches:* loam  
*Bw1 - 8 to 14 inches:* sandy loam  
*Bw2 - 14 to 18 inches:* sandy loam  
*2R - 18 to 22 inches:* unweathered bedrock

#### Properties and qualities

*Slope:* 0 to 8 percent  
*Depth to restrictive feature:* 12 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high  
(0.14 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Available water storage in profile:* Low (about 3.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

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*Land capability classification (nonirrigated): 3e  
Hydrologic Soil Group: D  
Forage suitability group: Sloping Upland, Low AWC, Acid (G090XN008MN)  
Hydric soil rating: No*

### 1027—Udorthents, wet substratum

#### Map Unit Setting

*National map unit symbol: 1t9c6  
Mean annual precipitation: 27 to 33 inches  
Mean annual air temperature: 39 to 46 degrees F  
Frost-free period: 135 to 180 days  
Farmland classification: Not prime farmland*

#### Map Unit Composition

*Udorthents, wet substratum, and similar soils: 90 percent  
Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Udorthents, Wet Substratum

##### Setting

*Landform: Moraines  
Down-slope shape: Linear  
Across-slope shape: Linear*

##### Properties and qualities

*Slope: 0 to 6 percent.  
Depth to restrictive feature: More than 80 inches  
Depth to water table: More than 80 inches  
Frequency of flooding: None  
Frequency of ponding: None*

### 1039—Urban land

#### Map Unit Setting

*National map unit symbol: 1t9c9  
Mean annual precipitation: 27 to 33 inches  
Mean annual air temperature: 39 to 46 degrees F  
Frost-free period: 135 to 180 days  
Farmland classification: Not prime farmland*

#### Map Unit Composition

*Urban land: 100 percent  
Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Urban Land

#### Setting

*Landform:* Moraines  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear

## 1055—Aquolls and histosols, ponded

#### Map Unit Setting

*National map unit symbol:* 119cc  
*Elevation:* 700 to 1,600 feet  
*Mean annual precipitation:* 27 to 33 inches  
*Mean annual air temperature:* 39 to 46 degrees F  
*Frost-free period:* 135 to 180 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Aquolls, ponded, and similar soils:* 50 percent  
*Histosols, ponded, and similar soils:* 50 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Histosols, Ponded

#### Setting

*Landform:* Depressions on moraines  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Organic materials

#### Typical profile

*Oa1 - 0 to 8 inches:* muck  
*Oa2 - 8 to 60 inches:* muck

#### Properties and qualities

*Slope:* 0 to 1 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Very poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 5.95 in/hr)  
*Depth to water table:* About 0 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* Frequent  
*Available water storage in profile:* Very high (about 23.9 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 8w  
*Hydrologic Soil Group:* A/D  
*Forage suitability group:* Not Suited (G090XN024MN)  
*Hydric soil rating:* Yes

**Description of Aquolls, Ponded**

**Setting**

*Landform:* Depressions on moraines  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Till

**Typical profile**

*A - 0 to 42 inches:* silty clay loam  
*Bg - 42 to 50 inches:* clay loam  
*Cg - 50 to 60 inches:* loam

**Properties and qualities**

*Slope:* 0 to 1 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Very poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 2.00 in/hr)  
*Depth to water table:* About 0 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* Frequent  
*Calcium carbonate, maximum in profile:* 20 percent  
*Gypsum, maximum in profile:* 1 percent  
*Available water storage in profile:* High (about 11.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 8w  
*Hydrologic Soil Group:* B/D  
*Forage suitability group:* Not Suited (G090XN024MN)  
*Hydro soil rating:* Yes

**1819F—Dorerton-Rock outcrop complex, 25 to 65 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 1t9ct  
*Elevation:* 800 to 1,400 feet  
*Mean annual precipitation:* 27 to 33 inches  
*Mean annual air temperature:* 39 to 46 degrees F  
*Frost-free period:* 135 to 180 days  
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Dorerton and similar soils:* 80 percent  
*Rock outcrop:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Dorerton

#### Setting

*Landform:* Escarpments on terraces, hills

*Landform position (two-dimensional):* Shoulder

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Loamy sediment over limestone bedrock

#### Typical profile

*A-E - 0 to 10 inches:* sandy loam

*2Bt - 10 to 30 inches:* flaggy clay loam

*2C - 30 to 45 inches:* very flaggy loamy sand

*3R - 45 to 60 inches:* bedrock

#### Properties and qualities

*Slope:* 25 to 65 percent

*Depth to restrictive feature:* 45 to 70 inches to lithic bedrock

*Natural drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.67 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 5 percent

*Available water storage in profile:* Low (about 5.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* B

*Forage suitability group:* Not Suited (G090XN024MN)

*Hydric soil rating:* No

### Description of Rock Outcrop

#### Setting

*Landform:* Escarpments on terraces, hills

*Landform position (two-dimensional):* Shoulder

*Down-slope shape:* Linear

*Across-slope shape:* Linear

### 1821—Alganchee loamy sand

#### Map Unit Setting

*National map unit symbol:* 119ch

*Elevation:* 600 to 900 feet

*Mean annual precipitation:* 27 to 33 inches

*Mean annual air temperature:* 39 to 46 degrees F

*Frost-free period:* 135 to 180 days

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Farm/land classification: Not prime farmland

### Map Unit Composition

Algansee and similar soils: 95 percent

Minor components: 5 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Algansee

#### Setting

Landform: Flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium

#### Typical profile

A - 0 to 6 inches: loamy sand

C - 6 to 60 inches: sand

#### Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water ( $K_{sat}$ ): High to very high (5.95 to 19.98 in/hr)

Depth to water table: About 18 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Available water storage in profile: Low (about 5.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Forage suitability group: Level Swale, Low AWYC, Neutral (G090XN003MN)

Hydric soil rating: No

### Minor Components

#### Chaska

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

## W—Water

### Map Unit Composition

Water: 100 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

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# Appendix B: Invasive and Noxious Terrestrial Plant Management

## *Invasive Species control and management*

The goal for complete eradication of invasive species from a site once there is an infestation may not be attainable. A more realistic goal is management and reduction of the invasives over time. The goal is that any one species should not dominate the site nor compromise the integrity of the ecosystem. Management of undesirable vegetation requires both a short-term plan, and long-term commitment.

### *Short-term plans*

Plans are necessary to diminish existing and seedling populations of undesirable species. When undesirable vegetation dominates a patch, ecosystem attributes such as nutrient flow, hydrology, and microclimates are determined by the dominate vegetation. The vegetation ensures dominance through regulating the ecosystem attributes in ways that reinforce their dominance. Tactical procedures should target the species in attempts to reduce their influence over ecosystem attributes; however, solutions don't target the altered ecosystem attributes, such as eutrophic soils, and the site will remain highly invasible until those attributes are changed in ways that facilitate a more desirable vegetation.

### *Long-term Commitment*

Over the long term the site needs to be continually monitored for invasive species while managing for native species habitat. This would include some form or combination of biomass harvest procedures may include grazing, haying (cutting and removing biomass), prescribed fire, and mowing. The primary benefits of biomass harvest to plant community configuration is control over nutrient flow and secondarily over light competition. Without some form of biomass harvest, many desirable plant species drop out of the community configuration. All restoration projects require long-term commitment in order to ensure long-term success

## *Overview of Strategies and Tactics:*

### **Chemical:**

The close proximity to water restricts the use of foliar herbicides such as oil-based Triclopyr (Garlon 4®) and Glyphosate (Round-up®) or non-water safe herbicides containing Clopyralid. Non-oil based Triclopyr (Garlon 3A®, Pathfinder) and aquatic approved Glyphosate (Rodeo®, AquaNeat®) herbicides offer a better foliar alternative. Oil based Triclopyr herbicides can be used to precision treat cut stumps in below freezing conditions. Triclopyr based herbicides are broad-leaf specific and tend not to injure graminoids, while Glyphosate based herbicides are broad-spectrum and can eliminate desirable vegetation (collateral damage) due to over-spray.

### **Mowing:**

Mowing might offer the greatest returns on investment for keeping undesirable vegetation under control. Properly timed mowing can achieve vegetation management objectives. Mowing a species just before boot stage or early into the bloom stage is detrimental to that species. This vulnerability is due to the plants resource allocation from the roots to the reproductive structures. If the plant is mowed off during this stage, precious resources are not allowed to return to the roots. This impoverishes the plant and makes it more susceptible to freezing, herbicides, and disease.

Mowing will also allow more light to lower growth form plants such as graminoids. A strong population of graminoids can create stiff competition for weedy opportunistic species. The drawback to mowing to some areas may be access or wet conditions. With bridge systems and creeks mobilizing equipment for mowing could be a drawback in some areas. The use of weed whips with grass blade attachments is a good alternate at this site.

### **Prescribed Fire:**

The benefits of fire include oxidizing detrital biomass, including senesced herbaceous material and leaf-litter. If the leaf-litter and senesced vegetation remains unburned, it will soon smoother out the ground layer vegetation which in

turn makes the site less attractive to game. Fire will also control encroaching shrubs and trees, and clean up dead down wood, both of which will also eliminate ground layer vegetation. Fire is also selective for native species and detrimental to many non-native species. Finally, fire denitrifies organic nitrogen into atmospheric dinitrogen, the principle component of the air we breathe. Despite the benefits of fire, employing it in our current built landscape is increasingly difficult. Smoke management, air quality issues, climate change, and the potential for wildfire can make using prescribed fire unfeasible in some instances.

Another possible way to employ fire is through "Spot Fire". A propane torch attached to a wand can be used to treat individual plants or small groups of plants. This technique works well on seedlings and saplings, but will only top-kill mature plants.

Propane torching undesirable vegetation is less labor-intensive than hand-pulling and less expensive than herbicide treatments. The process requires the flame over the targeted plant for one second, which is enough time to "boil" the plant.

#### **Conservation Grazing:**

**Feasibility:** Currently there is not a large market in Minnesota for conservation grazing so grazing resources are minimal but the need and interest is growing. As more land managers seek to use grazers to manage their open spaces the market place will adapt and parties should emerge to provide grazing services. Grazers are now absent from our landscape but were an integral part of the ecosystem prior to European settlement. They kept savannas and prairies open from woody encroachment through browsing and trampling of vegetation.

#### **Suitable Grazers:**

Both goats and sheep provide adequate control over undesirable vegetation. Goats are useful for initial brush clearing and sheep are useful for long term maintenance. Both sheep and goats can be contained with temporary fencing and shepherding. Specific information on both goats and sheep follows.

- Domestic Goats (*Capra aegagrus hircus*): Goats are primarily browsers (folivores), which is the primitive herbivore condition, and they prefer leaves and shoots of woody species. Goats are useful in the restoration process for clearing shrubs such as buckthorn. Goats are a tactical management tool used to achieve a more desirable community configuration composed of grasses and forbs.
- Domestic Sheep (*Ovis aries*): Sheep are grazers and prefer grass and forb species. Sheep are used to prevent the over growth of herbaceous vegetation which in turn facilitates encroachment by woody species like buckthorn. Sheep were employed in Minneapolis and surrounding communities to maintain park "lawns" until the advent of motorized lawn mowers. Sheep are used to maintain urban landscapes in many European countries.

#### Noxious weed control by goat and sheep grazing

- Sheep and goats: Bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), wild parsnip (*Pastinaca sativa*), garlic mustard (*Alliaria petiolata*), spotted knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), white and yellow sweet clover (*Melilotus alba*, *M. officinalis*), tansy (*Tanacetum vulgare*), and reed canary grass (*Phalaris arundinacea*).
- Goats: Japanese knotweed (*Fallopia japonica*), black locust (*Robinia pseudoacacia*), common buckthorn, honeysuckle (all species), Siberian elm (*Ulmus pumila*), Russian olive (*Elaeagnus angustifolia*), oriental bittersweet (*Celastrus orbiculatus*), and crown vetch (*Securigera varia*)

## **Implementation:**

The following text provides tactical management techniques, procedures, and tools to target undesirable species. Plans are presented through a species by species list of undesirable species. The species are identified and procedures to diminish their dominance through chemical and physical means follow. The plans are designed to diminish the invasive species.

### **Common Buckthorn (*Rhamnus cathartica*)**

### **Glossy Buckthorn (*Frangula alnus*)**

#### **Buckthorn treatment time frames**

(Derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

#### **Glossy Buckthorn**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
Flowering Period										

(<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>)

#### **Common Buckthorn**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
Flowering Period										

(<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>)

## **Description**

Although common and glossy buckthorn are taxonomically different, they occupy a similar functional group based on shared traits such as: shade tolerant, labile, extended growing season, non-edible, shrub. Control management for any species is based on a species functional traits, such as cool season, legume, and so forth. For this reason we treat both buckthorn species from their functional grouping identification as "buckthorn".

Buckthorn was introduced to North America as an ornamental shrub, for fence rows, and wildlife habitat. Introduction of buckthorn was based on its ability to thrive in a variety of climates, soils, and light conditions. Buckthorn fruit is primarily non-edible, but some birds, such as robins and cedar waxwings, will consume the fruits, especially when nothing else is available. The ingested fruits produce a severe laxative effect, helping distribute seeds from the parent plant (Wieseler). Buckthorn seeds can stay viable in the soil for 5-7 years. Buckthorn prefers lightly shaded conditions, and is invasive to savannas and groves. Buckthorn is also invasive in abandon fields, where unmanaged vegetation overtops itself creating excessive shade. Graminoid and herbaceous vegetation that isn't burned, grazed, hayed, or mowed grows taller each season in order to overtop the previous season's senesced vegetation. Existing populations of desirable vegetation diminish in vigor and are prone to invasion. Buckthorn seedlings are tolerant to the shade and the less vigorous desirable vegetation's inability to assimilate nutrients allows a perfect nursery space for buckthorn. After two to three growing seasons, the buckthorn saplings create pools of shade that eliminate the declining desirable vegetation. Eventually dense buckthorn thickets form and completely shade out native shrubs and

herbs and prevent native plant regeneration. Lack of herbaceous vegetation under buckthorn prohibits fires. The site stabilizes in a “buckthorn domain” and will remain so unless a significant intervention occurs.

Buckthorn on adjacent properties will continue to be a threat. A buckthorn control plan would seek to: 1) diminish the existing buckthorn population, and 2) make it more resilient to buckthorn re-infestation.

## **Mechanical**

Mowing repeatedly for several years, often multiple times a year, will eventually kill buckthorn. The goal is to deplete the roots of stored resources while at the same time enhancing a competitive herbaceous layer. Manually pulling smaller buckthorn with weed-wrenches is a useful method in smaller populations or when volunteers are involved. Small saplings can often be hand-pulled if the soil conditions are right.

## **Prescribed Fire**

Where appropriate prescribed fire can help kill existing buckthorn and create a less invasible landscape. The problem with employing fire in existing buckthorn stands is the lack of fuel to carry fire. Therefore, fire is typically a tool to prevent re-infestation.

## **Chemical**

Applying herbicide to the cut stump of buckthorn is highly effective. Cut stump treatments are best done in late summer, fall and winter when the herbicide is better translocated to the roots. Herbicide can also be used as a foliar spray. Foliar treatment is very effective in late summer or late fall when buckthorn is one of the few plants in leaf-out. Another means of control is to mow buckthorn in June and return later with a broadleaf foliar spray in the fall when buckthorn has resprouted.

## ***Garlic Mustard (Alliaria petiolata)***

### **Garlic Mustard treatment time frames**

(Derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
Flowering Period										

[\(http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf\)](http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf)

## **Description**

Garlic mustard is a cool season evergreen biennial herb. The first growing season produces basal rosettes. During the second season the basal rosettes produce mature erect stalks- 1 to -3 feet tall with small white 4-petaled flowers cluster at the top of the stems that produce slender seed capsules (1-2.5 inches long) with a single row of black seeds. Seeds remain viable for up to 5 years.

Garlic mustard is a Restricted Noxious Weed in Minnesota and is native to Europe. It rapidly colonizes afforested savannas and groves where excessive shade has eliminated the former ground layer vegetation. Excess soil nitrogen is also expected to increase garlic mustard invasibility. Garlic mustard exhibits the functional traits associated with nitrophiles, such as, short life span, labile structures, and non-edible. Like most nitrophiles, garlic mustard provides poor habitat for wildlife.

## **Mechanical**

If a population of garlic mustard is small enough, the best option for control is to manually pull the plant before it is seeded and bag it for removal. If the infestation is too large or dense for hand removal, mowing is a viable option. It is essential to mow before the plant is flowered because even if cut, garlic mustard will continue to develop seeds. It is recommended to cut the plant into smaller sections to prevent the seed production and mow the plant all the way to the ground. If the plant is into the flowering stage or beyond, the plant should not be mowed as this will only help spread the seed and potentially increase the infestation footprint. Careful attention to native and beneficial plants around the mowed areas will need to be taken to ensure they are not cut.

Mowed garlic mustard will either die or potentially form new flowers; however the plant will be much shorter and typically produce less seeds. A second mowing is sometimes needed to treat these plants and is effective because later developing plants can be mowed.

## **Prescribed Fire**

Prescribed fire is an effective management tool against first year garlic mustard if a sufficient fire can be carried through the area. Second year garlic mustard will potentially sprout following a burn, so follow up treatment is required. It is recommended to use prescribed fire in an integrated approach in garlic mustard control by following up with mechanical or chemical control methods.

Spot treating with a propane torch can be effective on garlic mustard seedlings. See "Spot Treating with Fire" for more information.

## **Chemical**

Garlic mustard can be chemically treated early spring before flowering or in the late fall when native plants are dormant.. Careful and accurate application should occur to minimize killing beneficial species. Spraying in the fall will help prevent killing native species if they are dormant. Follow-up treatment may be necessary.

## **Honeysuckle (*Lonicera tartarica*, *L. morrowii*, *L. x bella*)**

### **Honeysuckle treatment time frames**

(Derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Flowering Period									

(<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>)

## **Description**

Honeysuckles replace native shrubs and herbaceous plants in forests, savannas, and riparian areas. They reproduce primarily through seeds which are spread mostly by birds. Birds feed on the berries in the winter once native food sources are depleted. Focus should be on minimizing the production and spread of these seeds for honeysuckle control.

Honeysuckle is one of the first plants to leaf out in the spring and one of the last species to retain its leaves in the fall. Considering this allows for more efficient and accurate control of the plant.

## **Mechanical**

Brush mowing or cutting honeysuckle without herbicide treatment is considered ineffective unless done continuously for several years. Typical regrowth can be low to the ground and horizontal, making it challenging for mowers to effectively cut the plant. Combining cutting or mowing with a fall herbicide application is very effective.

## **Prescribed Fire**

Continual prescribed fire will kill young honeysuckles and potentially girdle and top kill larger plants. The biggest challenge is carrying a fire through areas of high infestation because of a lack of ground cover. Combining prescribed fire with other control methods is preferable.

## **Chemical**

Applying herbicide can be very effective, especially if done while honeysuckle is the only plant bearing leaves. Foliar spraying a glyphosate solution while native species are dormant is effective. When there is concern over nearby plants, one can apply a cut-stump treatment with glyphosate solution applied quickly to the stump; delay in applying the herbicide could reduce the effectiveness. Another option is to cut-stump with a triclopyr solution.

## **Siberian Elm (*Ulmus pumila*)**

### **Siberian Elm treatment time frames**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Flowering Period									

## **Description**

Siberian Elm moves in to prairies and savannas after disturbance. Seed germination is high and seedlings establish fast in disturbed areas.

## **Mechanical**

Mowing saplings repeatedly for several years, often multiple times a year, will eventually kill Siberian Elm. The goal is to deplete the roots of stored resources while at the same time enhancing a competitive herbaceous layer. Manually pulling smaller Siberian Elm with weed-wrenches is a useful method in smaller populations or when volunteers are involved. Small saplings can often be hand-pulled if the soil conditions are right.

Larger Siberian Elm can be girdled but can take up to 2 years to die. It is essential that when girdling the cut is continuous around the trunk of the tree.

## **Prescribed Fire**

Prescribed fire will help kill Siberian elm seedlings. Established saplings or larger will usually survive and resprout from the roots.

## **Chemical**

Applying herbicide to the cut stump of Siberian Elm is highly effective. Cut stump treatments are best done in late summer, fall and winter when the herbicide is better translocated to the roots. Herbicide can also be used as a foliar spray. Foliar treatment is very effective in late summer or late fall when buckthorn is one of the few plants in leaf-out. Another means of control is to mow Siberian Elm in June and return later with a broadleaf foliar spray in the fall when Siberian Elm has resprouted.

## **Birdsfoot Trefoil (*Lotus corniculatus*)**

**Birdsfoot Trefoil treatment time frames**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

### **Description**

Birdsfoot Trefoil is a low-growing, perennial that is part of the legume family. The plants spread by seed, rhizomes and stolons. It is adapted to a variety of soil types including dry, moist or droughty soils.

### **Mechanical**

Continuously mowing birdsfoot trefoil at a 2" height throughout the year for several years will eventually kill the plant. However, doing this will also harm native plants in the mowed area. Birdsfoot trefoil responds quickly to being mowed and will respond within a couple of weeks so continuous monitoring and mowing are required to prevent it from seeding.

Birdsfoot can also be hand-pulled. Taking time to spike the taproot will knock it back if not kill it completely.

### **Prescribed Fire**

Prescribed fire is not recommended as the sole management strategy as it increases seed germination; however, it can be part of an integrated approach to increase effectiveness of other methods. A spring burn will remove thatch (expose plants) and stimulate the seed bank (more plants treated at once) which would increase effectiveness of herbicide applications and accelerate the depletion of the seed bank.

### **Chemical**

A solution of triclopyr applied to fast growing plants before flowering or a glyphosate solution applied in spring before flowering will knock back and kill birdsfoot trefoil. Follow-up applications will be required.

## **Burdock (*Arctium minus*)**

**Burdock treatment time frames**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

## **Description**

Burdock is a biennial plant. In the first year it grows a rosette similar in appearance to rhubarb. In the second year it develops a hollow stem between 3 to 7 feet tall with multiple branches. Leaves tend to be large and heart shaped and wooly underside.

Since burdock spreads by seed, the main management goal is to prevent the plant from going to seed. It can also shade out desirable species.

## **Mechanical**

Small plants can be disked or dug up. For larger plants, the entire plant needs to be removed which can be challenging because of the long taproot. "Spiking" the plant with a shovel or parsnip predator can successfully knock the plant back if not kill it completely.

Mowing or lopping the burdock stalk when it is budding or recently flowered will prevent the plant from seeding or at least significantly reduce the amount of seed the plant produces. If the stalk regrows it will be shorter, decreasing the potential for the seed to spread. Mowing the plant when it first stalks will allow time for a second mow later in the year if there are plants that did not die completely.

If burdock has already gone to seed, it can be clipped and the seed heads bagged.

## **Prescribed Fire**

Due it is structure fire is not an effective tool to combat burdock directly. It is an effective tool in reducing leaf litter which contributes to the higher nutrient loads in the soil that burdock prefers.

Prescribed fire can kill young burdock and top kill older plants if there is sufficient thatch to carry a burn.

## **Chemical**

Apply glyphosate or triclopyr to the rosette before the plant has produced buds. These herbicides might only top-kill the plant, in which case a follow-up treatment would be required. Another method is to cut and stump treat burdock before the bud stage.

## **Leafy Spurge (*Euphorbia esula*)**

### **Leafy Spurge treatment time frames**

(Derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

## Description

Leafy spurge is a perennial plant 2 – 3 ½' feet tall. All parts of the plant have white milky sap when broken. The plant spreads by rhizomes and seeds. Seed dispersal is explosive with the ability throw seeds 15 -20 feet. Seeds also stay viable in the soil for 7 – 10 years.

## Mechanical

Leafy spurge can be mowed in spring when the plant is beginning to flower. If the plant is too far along, leafy spurge should not be mowed as it will potentially spread the seed of the plant.

Spring fires can successfully reduce the number of new seedlings. Combining prescribed burning with grazing, chemical treatment or biological controls are ideal.

## Prescribed Fire

Fire alone will not eliminate Leafy Spurge. It should be part of multi-tactic approach. If fire is used on season the next treatment time should be followed up with a foliar application.

### Chemical

Leafy spurge treated with a combination of 2,4-D and glyphosate based herbicides for several years while the plant is flowering in spring and during its growing season in the fall (still emits milky substance in stem) will help control the plant. This is best combined with other management methods such as prescribed fire, mowing, or grazing. Other chemicals are effective on leafy spurge but must be water safe. Leafy spurge can also be sprayed with just 2, 4-D in certain areas as it is broadleaf specific. The herbicide won't be as effective but will prevent creating kill patches amongst grasses.

## Biocontrol

Aside from grazing there is a biocontrol available for Leafy Spurge, if the population is not able to be managed by other methods. Leafy Spurge beetles are an option and can decrease a stands viability. To obtain beetles contact the County Agriculture Inspector (CAI) or the Minnesota Department of Agriculture (MDA) and explain the interest in using a biocontrol for Leafy Spurge.

## Crown Vetch (*Coronilla varia*)

### Crown Vetch treatment time frames

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn/Foliar									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

## Description

Crown Vetch is a legume that reproduces by seed and rhizomes. In bloom it has pink flowers

Crown Vetch has the ability to invade already established areas. Due to its ability to grow over plants and can quickly overtake an area and shade out desirable vegetation and decrease biodiversity. Continued maintenance to remove populations while they are small is necessary.

## **Mechanical**

Crown vetch can be mowed in June when the plant is flowering. This will help slow down the growth of the plant and remove thatch from the area which makes it more efficient when applying chemical. It is best to repeat mowing to negatively impact the plant long-term.

In small infestations, plants can be pulled.

## **Prescribed Fire**

Prescribed fire is helpful in removing thatch which allows for more thorough coverage when applying herbicide, can kill some small plants, and can slow down the growth of larger plants. Overall it is not enough to control crown vetch and should be integrated with other control methods.

## **Chemical**

Chemical applications are currently the most effective management strategy. Applying a foliar treatment of triclopyr is effective. This prevents killing species the crown vetch has grown over if they are grasses. A surfactant should be used as complete coverage is needed to kill the plant. Glyphosate will top kill crown vetch but is non-selective and therefore, will kill all vegetation that crown vetch has grown over. Follow-up treatments are required.

## **Sweet Clover (*Melilotus officinalis*, *M. alba*)**

### **Sweet Clover treatment time frames**

(derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
Flowering Period										

[\(http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf\)](http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf)

## **Description**

White and Yellow Sweet Clover have adapted to a variety of conditions, however it cannot tolerate dense shade. It is a biennial legume putting resources into a healthy root system the first year and during the second season flowers, sets seed and dies. Seeds can stay viable for upwards of 30 years.

## **Mechanical**

Sweet clover can be mowed or cut below the lower stems in the early flower stage before seed production has occurred. If cut low enough, the plant will typically not regrow. Sweet clover can also be pulled when the soils are moist so the taproot can be removed. Cutting first year growth in the fall can disturb the plant while it is sending most of its nutrients into its taproot, making the plant weaker the following year.

## **Prescribed Fire**

Well-timed prescribed burns are the recommended control method for sweet clover. As it is a biennial, pairing burns together in consecutive years is optimal. An early spring season burn (April) will increase germination rates of sweet clover. A hot, complete late spring burn (May) the following year should kill the germinated sweet clover before it flowers and seeds. Doing this every two years can successfully control sweet clover. If the burn is not complete and thorough, spot treatment with another control method will be necessary.

## **Chemical**

Glyphosate (Rodeo© or Aquaneat©) or triclopyr (Garlon 3A©) can be used to spot treat sweet clover; however, return treatments might be necessary. A surfactant is also recommended. A good time to spray is before the early flower stage or in the fall when other native plants are dormant. Sweet clover can grow quite tall, so spray drift should be noted and avoided.

## **Motherwort (*Leonurus cardiaca*)**

### **Motherwort treatment time frames**

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

## **Description**

Motherwort is a perennial plant from the mint family. Though not considered invasive it is becoming more common and problematic in partial shade with moist, rich soils. It has fuzzy, small, lavender flowers on 2-4 foot tall plant. The stem square with oppositely arranged leaves.

## **Mechanical**

Digging or hand-pulling motherwort can effectively control the plant if all the root is removed. Continuous mowing or whipping can reduce the vigor of the plant over time and reduce the population and seed production.

## **Chemical**

Applying a triclopyr solution to the plant before it has started producing seed can effectively control motherwort. Return applications are required for plants that germinate from the seed bank.

## **Canada Thistle (*Cirsium arvense*)**

### **Canada Thistle treatment time frames**

(derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
	Mow									
	Don't mow									
	Flowering Period									

<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

## Description

Canada Thistle grows in prairies, fields and disturbed landscapes. Mature plants are 3 – 5 feet high with an extensive root system, up to 15 feet horizontal and 6 -15 feet vertical. Tends to grow in colonies unlike other thistles.

## Mechanical

Mowing and cutting Canada thistle can be effective if done on a regular basis until the plant roots are depleted. The optimal time to mow Canada thistle is when the buds are formed or early flowering stage. If the flowers or seeds are formed, mowing should be avoided as it will spread the seed.

Clipping and bagging seed heads can be done in smaller populations.

Hand pulling small populations is effective if the root is entirely removed. Using a shovel or parsnip predator can help remove the root. Thick gloves are required to prevent being poked by the thistle.

## Prescribed Fire

Prescribed fire can have mixed results on Canada thistle. When a prescribed burn can be used to strengthen native plant species around the thistle populations, it's more effective towards the management goal. Integrated management techniques are required for best results.

## Chemical

Foliar treat Canada thistle with glyphosate (Rodeo© or Aquaneat©) or triclopyr (Garlon 3A©). Herbicide should be applied during the rosette stage for best results but can be applied up until flower buds are formed. Repeat treatments are required.

Herbicide can also be applied to the stem once it is cut. Applying herbicide until flower buds are formed is preferred.

## Biological

Stem weevil, bud weevil and stem gall fly are commercially available to control Canada thistle although results have been mixed.

Grazing appears ineffective, although sheep and goats will graze on thistle during the rosette stage.

## Amur Maple (*Acer ginnala*)

### Amur Maple treatment time frames

(derived from MN DOT Noxious Weed document) <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>

		April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
	Burn									
Herbicide	Foliar									
	Cut Stem									
Flowering Period										

(<http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>)

## Description

Small tree that grows to 20 feet tall. Displaces native shrubs and understory vegetation in forests, woodlands and open habitats. Produces dense shade and leafs out earlier than native vegetation.

### **Mechanical**

Similarly, cutting without chemically treating Amur Maple stumps will not remove them.

Removing small trees with weed wrenches or grubbing is effective.

### **Prescribed Fire**

Prescribed fire will setback Amur Maple but will not kill it.

### **Chemical**

Applying glyphosate (Aquaneat) or triclopyr (Garlon 3A) to the cut stump of an Amur Maple will control the plant. One can also foliar spray saplings, but must be aware of spray drift especially if using glyphosate. If at a safe distance from water, triclopyr ester (Garlon 4 Ultra) can be used as a basal bark treatment.

### **Combined Maintenance Tables**

by plant species for observed invasive species

Burn	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil									
Buckthorn (Common)									
Buckthorn (Glossy)									
Burdock									
Canada Thistle									
Crown Vetch									
Garlic Mustard									
Honeysuckle									
Leafy Spurge									
Motherwort									
Siberian Elm									
Sweet Clover									

Foliar Spray (Herbicide)	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil									
Buckthorn (Common)									
Buckthorn (Glossy)									
Burdock									
Canada Thistle									
Crown Vetch									
Garlic Mustard									
Honeysuckle									
Leafy Spurge									
Motherwort									
Siberian Elm									
Sweet Clover									

Cut Stem (Herbicide)	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil									
Buckthorn (Common)									
Buckthorn (Glossy)									
Burdock									
Canada Thistle									
Crown Vetch									
Garlic Mustard									
Honeysuckle									
Leafy Spurge									
Motherwort									
Siberian Elm									
Sweet Clover									

Mow	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil		■	■						
Buckthorn (Common)				■	■				
Buckthorn (Glossy)				■	■				
Burdock			■	■					
Canada Thistle		■	■						
Crown Vetch			■		■				
Garlic Mustard	■	■							
Honeysuckle									
Leafy Spurge	■	■							
Motherwort		■	■	■					
Siberian Elm			■	■	■				
Sweet Clover	■	■			■	■			

Don't Mow	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil									
Buckthorn (Common)									
Buckthorn (Glossy)									
Burdock									
Canada Thistle				■	■	■	■	■	
Crown Vetch									
Garlic Mustard			■	■	■	■	■	■	
Honeysuckle									
Leafy Spurge			■	■	■	■	■	■	
Motherwort									
Siberian Elm									
Sweet Clover			■	■	■				

<b>Flowering</b>	April	May	June	July	Aug	Sept	Oct	Nov	Dec-Mar
Amur Maple									
Birdsfoot Trefoil		■	■	■					
Buckthorn (Common)		■	■	■					
Buckthorn (Glossy)		■	■						
Burdock				■	■	■			
Canada Thistle			■	■	■	■	■		
Crown Vetch			■	■					
Garlic Mustard	■	■	■						
Honeysuckle									
Leafy Spurge		■	■	■	■				
Motherwort			■	■	■				
Siberian Elm									
Sweet Clover			■	■					

# Appendix C: Native Plant Communities of Minnesota Species Lists

## FDs37: Southern Dry-Mesic Oak (Maple) Woodland



FDs37 Southern Dry-Mesic Oak (Maple) Woodland – Species Frequency and Cover					
		freq %	cover		
<b>Forbs, Ferns &amp; Fern Allies</b>					
Clayton's sweet cicely ( <i>Osmorhiza claytonii</i> )	78	● ● ●			
Pointed-leaved tick trefoil ( <i>Dosmorrhodium glutinosum</i> )	78	● ● ●			
Hog peanut ( <i>Ampelocissus cordata</i> )	76	● ● ●			
Canada mayflower ( <i>Habenaria borealis</i> )	73	● ● ●			
Wild geranium ( <i>Geranium maculatum</i> )	69	● ● ●			
Common enchanter's nightshade ( <i>Circaea lutetiana</i> )	60	● ● ●			
Wild sarsaparilla ( <i>Aralia nudicaulis</i> )	60	● ● ●			
Lopseed ( <i>Prunella leptostachya</i> )	60	● ● ●			
Common false Solomon's seal ( <i>Smilacina racemosa</i> )	60	● ● ●			
Pale bellwort ( <i>Uvularia sessilifolia</i> )	60	● ● ●			
Lady fern ( <i>Athyrium filix-femina</i> )	51	● ● ●			
Bracken ( <i>Pteridium aquilinum</i> )	51	● ● ●			
Sweet-scented bedstraw ( <i>Gaultheria triflora</i> )	51	● ● ●			
Large-leaved aster ( <i>Aster macrophyllus</i> )	49	● ● ●			
Collomia ( <i>Collomia canescens</i> )	40	● ● ●			
Northern bedstraw ( <i>Gaultheria borealis</i> )	40	● ● ●			
Wood anemone ( <i>Anemone quinquefolia</i> )	40	● ● ●			
Spreading dogbane ( <i>Apocynum androsaemifolium</i> )	38	● ● ●			
Maryland black snakeroot ( <i>Sanguinaria Canadensis</i> )	36	● ● ●			
Early meadow-rue ( <i>Thlaspi dubium</i> )	31	● ● ●			
Giant Solomon's seal ( <i>Polygonatum biflorum</i> )	27	● ● ●			
Starry false Solomon's seal ( <i>Smilacina stellata</i> )	22	● ● ●			
Starflower ( <i>Tribulus terrestris</i> )	20	● ● ●			
Interrupted fern ( <i>Osmauris claytoniana</i> )	20	● ● ●			
Large-flowered bellwort ( <i>Uvularia grandiflora</i> )	20	● ● ●			
Elliptic sunleaf ( <i>Pyrola elliptica</i> )	20	● ● ●			
Tail-leaved aster ( <i>Aster sagittifolius</i> )	18	● ● ●			
<b>Grasses &amp; Sedges</b>					
Pennsylvania sedge ( <i>Carex pensylvanica</i> )	84	● ● ●			
Mountain rice grass ( <i>Oryzopsis asperifolia</i> )	40	● ● ●			
Nodding tasselgrass ( <i>Festuca subverticillata</i> )	11	● ● ●			
Bottlebrush grass ( <i>Elymus hystrix</i> )	11	● ● ●			
<b>Woody Vines</b>					
Virginia creeper ( <i>Parthenocissus spp.</i> )	91	● ● ●			
<b>Trees</b>					
		freq %	canopy cover	subcanopy freq %	shrub layer freq %
<b>Low Shrubs</b>					
Wild grape ( <i>Vitis riparia</i> )					62
Red raspberry ( <i>Rubus idaeus</i> )					64
Tall blackberries ( <i>Rubus allegheniensis</i> and similar <i>Rubus</i> spp.)					47
<b>Tall Shrubs</b>					
Chokeberry ( <i>Prunus virginiana</i> )					82
American hazelnut ( <i>Corylus americana</i> )					80
Gray dogwood ( <i>Cornus racemosa</i> )					67
Prickly ash ( <i>Zanthoxylum americanum</i> )					67
Poison ivy ( <i>Toxicodendron radicans</i> )					64
Prickly gooseberry ( <i>Ribes cymosbatum</i> )					49
Downy arrowwood ( <i>Viburnum dentatum</i> )					49
Juneberries ( <i>Amborella spp.</i> )					47
Nannyberry ( <i>Viburnum lentago</i> )					42
Bush honeysuckle ( <i>Dेervilla lonicera</i> )					33
Missouri gooseberry ( <i>Ribes missouriense</i> )					24
Blacked hazelnut ( <i>Corylus cornuta</i> )					22
Showberry or Molberry ( <i>Symplocarpus albus</i> or <i>S. occidentalis</i> )					20
Red-berried elder ( <i>Sambucus racemosa</i> )					20
Round-leaved dogwood ( <i>Cornus rugosa</i> )					16

## FFs59: Southern Terrace Forest

**FFs59**  
-continued -

FLOODPLAIN FOREST/SYSTEM  
Southern Floristic Region

### FFs59 Southern Terrace Forest – Species Frequency & Cover

	freq% cover					
<b>Forbs, Ferns &amp; Fern Allies</b>						
Wood nettle ( <i>Laportea canadensis</i> )	98	•••				
Touch-me-not ( <i>Impatiens spp.</i> )	77	•				
Virginia waterleaf ( <i>Hydrophyllum virginianum</i> )	70	•••				
Tall coneflower ( <i>Rudbeckia laciniata</i> )	67	••	•••			
Stinging nettle ( <i>Urtica dioica</i> )	58	•	••			
Cleavers ( <i>Gallium aparine</i> )	51	••				
Honeysuckle ( <i>Cyrtandra canadensis</i> )	49	••				
White avens ( <i>Geum canadense</i> )	40	•				
Anise-root ( <i>Osmorhiza longistylis</i> )	37	••				
Blue phlox ( <i>Phlox divaricata</i> )	37	•				
Virginia knotweed ( <i>Polygonum virginianum</i> )	35	••				
Silene blue violet*	35	•				
Erect, Smooth, or Illinois carpet-flower**	35	•				
Jack-in-the-pulpit ( <i>Arisaema triphyllum</i> )	33	••				
Rugulose or Yellow violet ( <i>Viola canadensis</i> or <i>V. pubescens</i> )	30	••				
False rue anemone ( <i>Erythronium americanum</i> )	30	••				
Clearweed ( <i>Pilea spp.</i> )	28	••				
Hispid buttercup ( <i>Ranunculus hispida</i> )	28	•				
Common enchanter's nightshade ( <i>Circaea lutetiana</i> )	26	•				
Ontario aster ( <i>Aster ontario</i> )	26	•				
Gregorian black snakeroot ( <i>Sanicula gregaria</i> )	23	•				
Maryland black snakeroot ( <i>Sanicula marilandica</i> )	23	•				
Cow parsnip ( <i>Heracleum lanatum</i> )	23	•				
Sweet-scented bedstraw ( <i>Gaultheria triflora</i> )	21	••				
Clayton's sweet cicely ( <i>Osmorhiza claytonii</i> )	19	••				
Hog peanut ( <i>Ampelocarpea bracteata</i> )	19	•				
Wood mint ( <i>Blephilia hirsuta</i> )	16	•				
Early meadow-rue ( <i>Thalictrum dioicum</i> )	16	•				
Starry false Solomon's seal ( <i>Smilacina stellata</i> )	16	•				
Virginia bluebells ( <i>Mertensia virginica</i> )	16	••				
Ostrich fern ( <i>Matteuccia struthiopteris</i> )	16	••				
Wild geranium ( <i>Geranium maculatum</i> )	16	•				
<b>Grasses &amp; Sedges</b>						
Virginia wild rye ( <i>Elymus virginicus</i> )	44	•				

\*Stemless blue violets (*Viola sororia* and similar *Viola spp.*) \*\*Erect, smooth, or Illinois carpet-flower (*Smilacina stellata*, *S. herbacea*, or *S. illinoensis*)

## FFs68: Southern Floodplain Forest

**FFs68**  
-continued-

FLOODPLAIN FOREST/SYSTEM  
Southern Floristic Region

### FFs68 Southern Floodplain Forest - Species Frequency & Cover

	freq %	cover	freq %	cover	freq %	cover	freq %	cover	freq %	cover
<b>Forbs, Ferns &amp; Fern Allies</b>										
Wood nettle ( <i>Laportea canadensis</i> )	93	●●●	Southern blue flag ( <i>Iris virginica</i> )	11	●					
Ontario aster ( <i>Aster ontarioensis</i> )	56	●●●	Virginia wild rye ( <i>Elymus virginicus</i> )	52	●●					
Mad dog skullcap ( <i>Scutellaria lateriflora</i> )	56	●●	White grass ( <i>Leersia virginica</i> )	44	●●●					
Clearweed ( <i>Filaea spp.</i> )	52	●●●	Rice cut grass ( <i>Leersia oryzoides</i> )	30	●●●					
Bur mangold and Beggarsticks ( <i>Bodens spp.</i> )	44	●●●	Hop umbrella sedge ( <i>Carex lupulina</i> )	22	●●●					
Touch-me-not ( <i>Impatiens spp.</i> )	41	●●●	Cattail sedge ( <i>Carex typhina</i> )	15	●●●					
Tall coneflower ( <i>Rudbeckia laciniata</i> )	41	●●●	Ambiguous sedge ( <i>Carex amphibola</i> )	15	●●●					
Slinging nettle ( <i>Urtica dioica</i> )	37	●●●	Bladder sedge ( <i>Carex intumescens</i> )	11	●					
Kidney-leaved buttercup ( <i>Panunculus abortivus</i> )	33	●●●	Shout woodseed ( <i>Cinn arundinacea</i> )	11	●●●					
Narrow-leaved hedge nettle ( <i>Stachys tenuifolia</i> )	33	●●●	Gray's sedge ( <i>Carex grayi</i> )	11	●●●					
Honewort ( <i>Cryptotaenia canadensis</i> )	26	●●●	<b>Climbing Plants</b>							
False nettle ( <i>Boehmeria cylindrica</i> )	26	●●●	Wild grape ( <i>Vitis riparia</i> )	81	●●●					
Wild cucumber ( <i>Echinocystis lobata</i> )	19	●●●	Canadian moonseed ( <i>Menispermum canadense</i> )	56	●●●					
Nodding or Virginia stickseed ( <i>Flacelia deflexa</i> or <i>H. virginiana</i> )	19	●●●	Greenbrier ( <i>Smilax tamnoides</i> )	33	●●●					
Northern bugleweed ( <i>Lycopus uniflorus</i> )	19	●●●	Virginia creeper ( <i>Parthenocissus spp.</i> )	26	●●●					
Side-flowering aster ( <i>Aster lateriflorus</i> )	15	●●●	Climbing poison ivy ( <i>Toxicodendron rydbergii</i> )	**	**					
Dodder ( <i>Cuscuta spp.</i> )	15	●●●	<b>Shrubs</b>							
Tall bellflower ( <i>Campanula americana</i> )	15	●●●	Climbing poison ivy ( <i>Toxicodendron rydbergii</i> )	33	●●●					
Virginia knotweed ( <i>Polygonum virginianum</i> )	15	●●●	Black willow ( <i>Salix nigra</i> )	11	●●●					
Germanander ( <i>Teucrium canadense</i> )	15	●●●	<b>Trees</b>							
Bur cucumber ( <i>Sicyos angulatus</i> )	15	●●●	<b>Canopy</b>							
Woundwort ( <i>Stachys palustris</i> )	11	●●●	freq %	cover	freq %	cover	freq %	cover	freq %	cover
Cut-leaved bugleweed ( <i>Lycopus americanus</i> )	11	●●●	Silver maple	96	●●●●	56	●●●	63	●●●	
Eastern panicled aster ( <i>Aster lanceolatus</i> )	11	●●●	Green ash	67	●●●●	48	●●●	74	●●●	
Green dragon ( <i>Aniseia difaonium</i> )	11	●●●	American elm	41	●●●●	56	●●●	56	●●●	
White snakeroot ( <i>Eryngium rugosum</i> )	11	●●●	Cottonwood	30	●●●●	-	-	-	-	
Stemless blue violets ( <i>Viola sororia</i> and similar <i>Viola spp.</i> )	11	●●●	Hackberry	22	●	19	●●●	33	●●●	
Erect, Smooth, or Illinois cranesbill-flower*	11	●●●	Box elder	11	●●●●	22	●●●	22	●●●	
Common mint ( <i>Mentha arvensis</i> )	11	●●●	Swamp white oak	11	●●●●	-	-	-	-	
Three-seeded mercury ( <i>Acalypha rhomboidea</i> )	11	●●●	Pied elm	-	-	-	-	26	●●●	

\*Erect, smooth, or Illinois cranesbill-flower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*). \*\*Climbing poison ivy is important in both the shrub and climbing plant layers, but all records from plot samples were universally assigned to the shrub layer.

## MHs37: Southern Dry-Mesic Oak Forest

**MHs37**  
-continued-

MESIC HARDWOOD FOREST SYSTEM  
Southern Floristic Region

### MHs37 Southern Dry-Mesic Oak Forest – Species Frequency & Cover

	freq % cover						
<b>Forbs, Ferns &amp; Fern Allies</b>							
Lady fern ( <i>Athyrium filix-femina</i> )	91	91	91	91	91	91	91
Pointed-leaved tick-trefoil ( <i>Desmodium glutinosum</i> )	88	88	88	88	88	88	88
Clayton's sweet cicely ( <i>Osmorhiza claytonii</i> )	86	86	86	86	86	86	86
Common enchanter's nightshade ( <i>Circaea lutetiana</i> )	81	81	81	81	81	81	81
Wild geranium ( <i>Geranium maculatum</i> )	79	79	79	79	79	79	79
Honeysuckle ( <i>Cyrtomenia canadensis</i> )	72	72	72	72	72	72	72
White avens ( <i>Geum canadense</i> )	72	72	72	72	72	72	72
Lopseed ( <i>Phytomyza leptocephala</i> )	70	70	70	70	70	70	70
Hog peanut ( <i>Amphicarpaea bracteata</i> )	65	65	65	65	65	65	65
White shakeroot ( <i>Eupatorium rugosum</i> )	65	65	65	65	65	65	65
Common false Solomon's seal ( <i>Smilacina racemosa</i> )	63	63	63	63	63	63	63
Large-flowered bellwort ( <i>Uvularia grandiflora</i> )	58	58	58	58	58	58	58
Gregarious black snakeroot ( <i>Sarcococca gregaria</i> )	56	56	56	56	56	56	56
Maidenhair fern ( <i>Adiantum pedatum</i> )	56	56	56	56	56	56	56
Wild sarsaparilla ( <i>Aralia nudicaulis</i> )	53	53	53	53	53	53	53
Jack-in-the-pulpit ( <i>Arisaema triphyllum</i> )	51	51	51	51	51	51	51
Sweet-scented bedstraw ( <i>Gaultheria trifolia</i> )	47	47	47	47	47	47	47
Rattlesnake fern ( <i>Botrychium virginianum</i> )	44	44	44	44	44	44	44
Spreading Jacob's ladder ( <i>Polemonium reptans</i> )	42	42	42	42	42	42	42
Blue cohosh ( <i>Caulophyllum thalictroides</i> )	40	40	40	40	40	40	40
Erect, Smooth, or Illinois crinum-flower*	40	40	40	40	40	40	40
Wood anemone ( <i>Anemone quinquefolia</i> )	35	35	35	35	35	35	35
Red baneberry ( <i>Actaea rubra</i> )	35	35	35	35	35	35	35
Bracken ( <i>Pteridium aquilinum</i> )	33	33	33	33	33	33	33
Cleavers ( <i>Gallium aparine</i> )	28	28	28	28	28	28	28
Bloodroot ( <i>Sanguinaria canadensis</i> )	28	28	28	28	28	28	28
Early meadow-rue ( <i>Thalictrum dioicum</i> )	23	23	23	23	23	23	23
Maryland black snakeroot ( <i>Sarcococca manillana</i> )	21	21	21	21	21	21	21
Zizad goldenseed ( <i>Solidago flexicaulis</i> )	19	19	19	19	19	19	19
Cleaved sedge ( <i>Pilea sp.</i> )	14	14	14	14	14	14	14
<b>Grasses &amp; Seages</b>							
Slurry sedge ( <i>Carex rosea</i> )	37	37	37	37	37	37	37
Pennsylvania sedge ( <i>Carex pensylvanica</i> )	35	35	35	35	35	35	35
Bland sedge ( <i>Carex blanda</i> )	23	23	23	23	23	23	23

\*Erect, Smooth, or Illinois crinum-flower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*)

## UPs13: Southern Dry Prairie



### UPs13 Southern Dry Prairie – Species Frequency & Cover

	freq%	cover	freq%	cover
<b>Folios, Ferns &amp; Fern Allies</b>				
Purple prairie clover ( <i>Dalea purpurea</i> )	72	● ● ● ● ● ● ● ●	Flowering spurge ( <i>Euphorbia corollata</i> )	22
Gray goldenrod ( <i>Solidago nemoralis</i> )	61	● ● ● ● ● ● ● ●	White sage ( <i>Artemisia ludoviciana</i> )	22
Silky aster ( <i>Aster sericeus</i> )	61	● ● ● ● ● ● ● ●	Whorled milkweed ( <i>Asclepias verticillata</i> )	21
Heath aster ( <i>Aster ericoides</i> )	60	● ● ● ● ● ● ● ●	Field blue-eyed grass ( <i>Sisyrinchium campestre</i> )	21
Stiff goldenrod ( <i>Solidago rigida</i> )	53	● ● ● ● ● ● ● ●	Tall wormwood or Tarragon*	20
Long-headed thimbleweed ( <i>Anemone cylindrica</i> )	53	● ● ● ● ● ● ● ●	Hairy golden aster ( <i>Chrysopsis villosa</i> )	20
Bearded birdfoot violet ( <i>Viola pedatifida</i> )	47	● ● ● ● ● ● ● ●	Prairie or Balsam ragwort ( <i>Senecio plattensis</i> or <i>S. pauperatus</i> )	20
Rough blazing star ( <i>Liatris aspera</i> )	45	● ● ● ● ● ● ● ●	False boneset ( <i>Kuhnia eupatorioides</i> )	19
Daisy fleabane ( <i>Erigeron strigosus</i> )	43	● ● ● ● ● ● ● ●	False gromwell ( <i>Crocosmia mollis</i> )	19
Pasque-flower ( <i>Anemone patens</i> )	42	● ● ● ● ● ● ● ●	Green milkweed ( <i>Asclepias viridiflora</i> )	19
Stiff sunflower ( <i>Helianthus pauciflorus</i> )	41	● ● ● ● ● ● ● ●	Narrow-leaved puccoon ( <i>Lithospermum incisum</i> )	17
Narrow-leaved purple coneflower ( <i>Echinacea angustifolia</i> )	40	● ● ● ● ● ● ● ●	Hairy puccoon ( <i>Lithospermum caroliniense</i> )	16
Tall cinquefoil ( <i>Potentilla arguta</i> )	40	● ● ● ● ● ● ● ●	Hairy prairie clover ( <i>Dalea villosa</i> )	13
Bastard toad-flax ( <i>Comandra umbellata</i> )	37	● ● ● ● ● ● ● ●	● ● ● ● ● ● ● ●	6
Prairie turnip ( <i>Pedicularis esculentum</i> )	37	● ● ● ● ● ● ● ●	<b>Grasses &amp; Sedges</b>	
Prairie wild onion ( <i>Allium stellatum</i> )	36	● ● ● ● ● ● ● ●	Little bluestem ( <i>Schizachyrium scoparium</i> )	88
Dotted blazing star ( <i>Liatris punctata</i> )	34	● ● ● ● ● ● ● ●	Side-oats grama ( <i>Bouteloua curtipendula</i> )	79
Hoary puccoon ( <i>Lithospermum canescens</i> )	32	● ● ● ● ● ● ● ●	Big bluestem ( <i>Andropogon gerardii</i> )	73
Aromatic aster ( <i>Aster oblongifolius</i> )	30	● ● ● ● ● ● ● ●	Prairie dropseed ( <i>Sporobolus heterolepis</i> )	58
Virginia ground cherry ( <i>Physalis virginiana</i> )	30	● ● ● ● ● ● ● ●	Porcupine grass ( <i>Stipa spartea</i> )	57
Flootman's thistle ( <i>Cirsium floodmani</i> )	29	● ● ● ● ● ● ● ●	Plains muhly ( <i>Muhlenbergia cuspidata</i> )	56
Bird's foot coreopsis ( <i>Coreopsis palmata</i> )	28	● ● ● ● ● ● ● ●	Indian grass ( <i>Sorghastrum nutans</i> )	45
Grooved yellow foxglove ( <i>Linum strictum</i> )	28	● ● ● ● ● ● ● ●	Junegrass ( <i>Koeleria pyramidalis</i> )	43
Western ragweed ( <i>Ambrosia psilostachya</i> )	26	● ● ● ● ● ● ● ●	Hairy grama ( <i>Bouteloua hirsuta</i> )	30
Canada goldenrod ( <i>Solidago canadensis</i> )	25	● ● ● ● ● ● ● ●	Scribnier's panic grass ( <i>Panicum oligosanthes</i> )	26
Heart-leaved alexanders ( <i>Zizia aptera</i> )	25	● ● ● ● ● ● ● ●	Willow-panic grass ( <i>Panicum willowicum</i> )	22
Wild bergamot ( <i>Monarda fistulosa</i> )	25	● ● ● ● ● ● ● ●	Blue grama ( <i>Bouteloua gracilis</i> )	16
Hartnett's bellflower ( <i>Campanula rotundifolia</i> )	25	● ● ● ● ● ● ● ●	Sand reed-grass ( <i>Calamovilia longifolia</i> )	16
Toothed evening primrose ( <i>Oenothera serrulata</i> )	25	● ● ● ● ● ● ● ●	Needle-and-thread grass ( <i>Stipa comata</i> )	13
Missouri goldenrod ( <i>Solidago missouriensis</i> )	24	● ● ● ● ● ● ● ●	<b>Semi-Shrubs</b>	
Skyblue aster ( <i>Aster obovatusangustifolius</i> )	24	● ● ● ● ● ● ● ●	Leadplant ( <i>Amorpha canescens</i> )	71
Mock pennyroyal ( <i>Hedeoma hispida</i> )	23	● ● ● ● ● ● ● ●	Prairie rose ( <i>Rosa arkansana</i> )	40
Prairie sedgeweed ( <i>Artemisia frigida</i> )	23	● ● ● ● ● ● ● ●	Smooth sumac ( <i>Rhus glabra</i> )	29
Hoary vernalis ( <i>Veronica stricta</i> )	23	● ● ● ● ● ● ● ●	Wolberry ( <i>Symporicarpos occidentalis</i> )	15

\*Tall wormwood or Tarragon (*Artemisia frigida* or *A. campestris*)

## UPs14: Southern Dry Oak Savanna

**UPs14**  
-continued-

UPLAND PRAIRIE SYSTEM  
Southern Floristic Region

### UPs14 Southern Dry Savanna – Species Frequency & Cover

	freq% / cover						
<b>Ferns, Fern Allies</b>							
Western ragweed ( <i>Anibrobia psilostachya</i> )	80	•	80	•	80	•	80
Virginia ground cherry ( <i>Physalis virginiana</i> )	73	•	73	•	73	•	73
Hairy puccoon ( <i>Lithospermum canescens</i> )	70	•	70	•	70	•	70
Gray goldenrod ( <i>Solidago nemorosa</i> )	67	•	67	•	67	•	67
Hoary frostweed ( <i>Helianthemum bicknellii</i> )	67	•	67	•	67	•	67
Horseweed ( <i>Conyza canadensis</i> )	60	•	60	•	53	•	53
White sage ( <i>Artemisia ludoviciana</i> )	53	•	53	•	40	•	40
Bearded birdfoot violet ( <i>Viola pedata</i> )	53	•	53	•	37	•	37
Starry false Solomon's seal ( <i>Smilacina stellata</i> )	47	•	47	•	37	•	37
Purple prairie clover ( <i>Dalea purpurea</i> )	47	•	47	•	37	•	37
Common milkweed ( <i>Asclepias syriaca</i> )	40	•	40	•	37	•	37
Long-headed thimbleweed ( <i>Anemone cylindrica</i> )	40	•	40	•	37	•	37
Hoary puccoon ( <i>Lithospermum canescens</i> )	40	•	40	•	37	•	37
Prarie pinweed ( <i>Echeta stricta</i> )	33	•	33	•	30	•	30
Round-headed bush clover ( <i>Lespedeza capitata</i> )	33	•	33	•	30	•	30
Skyblue aster ( <i>Aster ovalifolius</i> )	33	•	33	•	23	•	23
Rough blazing star ( <i>Liatris spicata</i> )	33	•	33	•	23	•	23
Rock spikemoss ( <i>Selaginella rupestris</i> )	30	•	30	•	47	•	47
Mission goldenrod ( <i>Solidago missouriensis</i> )	30	•	30	•	53	•	53
Bird's foot coreopsis ( <i>Coreopsis palmata</i> )	30	•	30	•	43	•	43
Harebell ( <i>Campanula rotundifolia</i> )	30	•	30	•	50	•	50
Hairy golden aster ( <i>Chrysopsis villosa</i> )	27	•	27	•	43	•	43
Bastard toad-flax ( <i>Comandra umbellata</i> )	27	•	27	•	40	•	40
Health aster ( <i>Aster ericoides</i> )	23	•	23	•	37	•	37
Showy goldenrod ( <i>Solidago speciosa</i> )	23	•	23	•	37	•	37
Flowering spurge ( <i>Euphorbia corollata</i> )	23	•	23	•	23	•	23
Mock pennyroyal ( <i>Hedeoma hispida</i> )	23	•	23	•	17	•	17
Large-flowered beardtongue ( <i>Penstemon grandiflorus</i> )	23	•	23	•	67	•	67
Erect, smooth, or Illinois carion-flower*	23	•	23	•	37	•	37
Tall cinquefoil ( <i>Potentilla arguta</i> )	20	•	20	•	23	•	23
Stiff sunflower ( <i>Helianthus pauciflorus</i> )	20	•	20	•	23	•	23
Horsemint ( <i>Monarda punctata</i> )	20	•	20	•	17	•	17
Tall wormwood or Tarragon**	17	•	17	•	17	•	17
Silky prairie clover ( <i>Dalea villosa</i> )	17	•	17	•	17	•	17

\*Erect, smooth, or Illinois carion-flower (*Smilax eciriflora*, *S. herbacea*, or *S. illinoensis*) \*\*Tall wormwood or Tarragon (*Artemisia dracunculus* or *A. campestris*)

## WP54: Southern Wet Prairie

**WP54**  
continued

WETLAND PRAIRIE SYSTEM  
Southern Floristic Region

### WP54 Southern Wet Prairie – Species Frequency & Cover

	freq %	cover	freq %	cover
<b>Forbs, Ferns &amp; Fern Allies</b>				
Canada goldenrod ( <i>Solidago canadensis</i> )	78	•••	Grass-leaved goldenrod ( <i>Euthamia graminifolia</i> )	22
Tall meadow-rue ( <i>Thalictrum dasycarpum</i> )	69	••	New England aster ( <i>Aster novae-angliae</i> )	22
Health aster ( <i>Aster ericoides</i> )	67	••	Canada tick trefoil ( <i>Desmodium canadense</i> )	22
Eastern panicled aster ( <i>Aster paniculatus</i> )	61	•••	Skyblue aster ( <i>Aster obovata</i> )	22
Clasping dogbane ( <i>Apocynum sibiricum</i> )	61	••	Swamp thistle ( <i>Cirsium muticum</i> )	22
Virginia mountain mint ( <i>Pycnanthemum virginianum</i> )	57	••	Bottle gentian ( <i>Gentiana andrewsii</i> )	20
Common strawberry ( <i>Fragaria virginiana</i> )	55	••	Rough bugleweed ( <i>Lycopodium asper</i> )	18
Great starflower ( <i>Liatris pycnostachya</i> )	53	••	Veiny pea ( <i>Lathyrus venosus</i> )	18
Giant, Sawtooth, or Nuttall's sunflower*	51	•••	Swamp loosestrife ( <i>Pedicularis lanceolata</i> )	16
Golden alexanders ( <i>Zizia aurea</i> )	49	••	Culver's root ( <i>Veronicastrum virginicum</i> )	14
Great goldenrod ( <i>Solidago gigantea</i> )	45	••	Flat-topped aster ( <i>Aster umbellatus</i> )	14
Golden or False golden ragwort ( <i>Senecio aureus</i> or <i>S. pseudaureus</i> )	43	••	Great lobelia ( <i>Lobelia siphilitica</i> )	12
Fiddel's goldenrod ( <i>Solidago fidelis</i> )	41	••	Yellow stargrass ( <i>Hypoxis hirsuta</i> )	12
Northern bog violet ( <i>Viola nephrophylla</i> )	41	••	Cup plant ( <i>Silphium perfoliatum</i> )	12
Northern plains blazing star ( <i>Liatris ligulistylis</i> )	39	••	Wood lily ( <i>Lilium philadelphicum</i> )	12
Heart-leaved alexander's ( <i>Zizia aptera</i> )	37	••		
Autumn sneezeweed ( <i>Helenium autumnale</i> )	35	•••		
Spotted water hemlock ( <i>Cicuta maculata</i> )	35	•••		
Stiff goldenrod ( <i>Solidago rigida</i> )	35	•••		
Prairie horsebit-flea ( <i>Lysimachia quadriflora</i> )	33	•••		
Prairie phlox ( <i>Phlox pilosa</i> )	33	•••		
Swamp milkweed ( <i>Asclepias incarnata</i> )	33	•••		
White camas ( <i>Zigadenus elegans</i> )	33	•••		
Northern bedstraw ( <i>Gaura borealis</i> )	29	•••		
Purple prairie clover ( <i>Dalea purpurea</i> )	29	•••		
Yarrow ( <i>Achillea millefolium</i> )	29	•••		
Pale-spiked lobelia ( <i>Lobelia spicata</i> )	29	•••		
Canada anemone ( <i>Anemone canadensis</i> )	27	•••		
Gray-headed coneflower ( <i>Echinacea purpurea</i> )	27	•••		
Marsh vetchling ( <i>Lathyrus palustris</i> )	27	•••		
Smooth scouring rush ( <i>Equisetum laevigatum</i> )	25	•••		
Cut-leaved blueteedeed ( <i>Lycopodium americanum</i> )	25	•••		
Maximilian's sunflower ( <i>Helianthus maximiliani</i> )	24	•••		
Field horsetail ( <i>Equisetum arvense</i> )	24	•••		
*Giant, Sawtooth, or Nuttall's sunflower ( <i>Helianthus giganteus</i> , <i>H. grosseserratus</i> , or <i>H. nuttallii</i> )				
<b>Grasses &amp; Sedges</b>				
Prairie cordgrass ( <i>Spartina pectinata</i> )	86	•••		
Big bluestem ( <i>Andropogon gerardii</i> )	80	•••		
Indian grass ( <i>Sorghastrum nutans</i> )	51	•••		
Switchgrass ( <i>Panicum virgatum</i> )	47	•••		
Woolly sedge ( <i>Carex pellita</i> )	41	•••		
Rigid sedge ( <i>Carex tetanica</i> )	39	•••		
Flattened spikeletish ( <i>Eleocharis compressa</i> )	39	•••		
Mat-mulchy grass ( <i>Muhlenbergia richardsonii</i> )	33	•••		
Bluetop ( <i>Calamagrostis canadensis</i> )	25	•••		
Baltic rush ( <i>Juncus arcticus</i> )	25	•••		
Tussock sedge ( <i>Carex stricta</i> )	24	•••		
Prairie dropseed ( <i>Sporobolus heterolepis</i> )	24	•••		
Narrow reedgrass ( <i>Calamagrostis stricta</i> )	24	•••		
Fowl manna grass ( <i>Glyceria strata</i> )	20	•••		
<b>Shrubs</b>				
Prairie rose ( <i>Rosa arkansana</i> )	29	•••		
Red-osier dogwood ( <i>Cornus sericea</i> )	18	•••		
Pussy willow ( <i>Salix discolor</i> )	16	•••		

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## Appendix D: Shelterwood Planting

Excerpt from Crosby Park Regional Park Ecological Inventory and Restoration Management Plan, pg 70-71

Eventually the planted trees will create enough shade to shade out the light-dependent box elders. This approach of partially clearing a forest for planting is called a shelterwood pattern (figure 14). The standing trees that are left will help to protect the newly planted tree seedlings. The purpose is to establish nodes of desirable tree species throughout the disturbed woods. These nodes will greatly increase the seed sources for desirable species and greatly accelerate the conversion of the woods into a native floodplain forest. Once the areas of planted trees are a few feet high, the process can be completed for the previously uncut belts of box elder trees – thus the process could be described as a two-stage shelterwood method. For a more complete discussion of the shelterwood method, see Baughman and Jacobs, 1992.

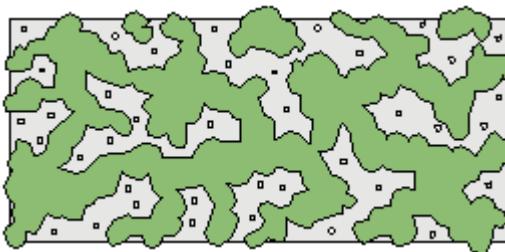


Figure: Shelterwood harvesting method of opening canopy for tree planting. Small squares represent stumps from tree clearing. (modified from Baughman & Jacobs, 1992).

Apply Garlon3a or TordonRTU onto cut stumps after cutting, as box elder vigorously stump sprouts. Use a heavy, oil-based formulation (Garlon 4) when cutting and applying in the winter. Cut tree crowns so that pieces are in contact with the ground. Leave cut wood in place to decay – preferably as large pieces that will not lend themselves readily as firewood for men camping out in the woods. Box elder wood is generally undesirable as firewood and most firewood dealers will not accept it. Much of the slash can be piled up and burned.

Tree planting would be an excellent activity for a large group of volunteers. Large numbers of local people cherish Crosby Park and may volunteer for an event. Each volunteer can plant about 25-30 tree seedlings in a single 4 hour volunteer event. For each tree, volunteers will have to dig a small hole, plant tree, water tree, and add fabric to reduce weeds.

It is recommended that this project be done as a multi-year process in waves starting with the west end of the first priority area of polygon 82. Each successive area of planting would then add on to previously planted areas. Given that there are scattered keeper trees of silver maple and green ash present in the woods, and that the planting would be in a shelterwood pattern, then it would take approximately a 60 to 100 acre area of woods for 30 acres of planting space.

A challenge for planting in portions of the floodplain is flooded river channels in the spring. The channels can be quite deep and uncrossable. For areas blocked by flooded channels, plant on rises between channels in late spring or early summer when the flood waters have abated. Plant as soon as possible after the waters recede in order to maximize growing season time for the newly planted trees and to avoid working within a dense thicket of nettles. Planting at this time will require planting either tree seedlings or containerized/burlapped stock, as bare root stock requires early spring planting.

Avoid planting into deep drifts of river sand.

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# Crosby Farm Regional Park

## Ecological Inventory and Restoration Management Plan

### 2019 Amendment

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City of Saint Paul, Department of Parks and Recreation, Natural Resources

With assistance from

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Saint Paul Natural Resources

January 2019

This document provides post-2019 management recommendations for native plant communities at Crosby Farm Regional Park. The document is an amendment to the Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan prepared by Great River Greening (Fred Harris), dated January 2005.

Management recommendation strategies addressed in the 2005 management plan are amended in the 2019 update as follows:

- *Original recommendations are summarized in italicized text. The year the recommendations were made precede the recommendation in parentheses.*
- Progress made to address these recommendations from 2005 through January 2019 follows in unformatted text.
- **Current site conditions and future recommendations are in bold text and are preceded by the symbol: □**

## OVERALL SITE STRATEGIES

The management strategies outlined below were included in the 2005 management plan as park-wide management strategies for Crosby Farm Regional Park (Crosby Farm). These management strategies are included on pages 34 – 56 in the 2005 Crosby Farm Regional Park Restoration Management Plan (2005 NRMP). Strategies unique to specific plant communities are outlined after this section, following the same format.

*(2005) An engineering study is needed to identify and assess the causes and solutions to severe slope erosion from stormwater runoff on the bluffs. Once a study is completed, these severe erosion problems should be corrected.*

The “Crosby Farm Park: Bluff Stabilization / Restoration Feasibility Study - St. Paul, MN” prepared by Emmons & Olivier Resources (EOR), Inc. in 2007 combined site

observations and watershed modeling to provide further, and more specific, management recommendations to correct erosion issues within the oak woodland areas of the Crosby Farm. An inventory conducted by the Ramsey Conservation District in 2004 identified 39 actively eroding points of interest. These are the same 39 points identified in the 2005 NRMP. The objectives of the EOR Bluff Stabilization Study were to determine the best methods for controlling or eliminating bluff degradation in Crosby Farm. The Study identified three primary causes of erosion:

- I. Stormwater piping discharge points
- II. Surface water runoff discharge points
- III. Pedestrian and recreational activities along the bluff

To mitigate these causes of erosion, the City of Saint Paul has taken the following steps:

- I. Stormwater piping discharge points – EOR’s 2007 Bluff Stabilization Study provides recommendations to address these points of concern. Solutions to address erosion at these discharge points are large-scale and must be concurrently addressed by the City Departments of Parks and Recreation and – as the owner of the stormsewer system – Public Works. No updates to the piped, stormwater discharge points have been made in the park, at the bluff edge, since 2005.
- II. Surface water runoff discharge points – Reconstruction of the Sam Morgan trail by Saint Paul Parks and Recreation in 2010 included five filtration ditches, designed by TKDA (Toltz, King, Duvall, Anderson, and Associates, Inc. – an engineering firm), between Shepard Road and the top of the bluff at Crosby Farm. These filtration basins were designed to capture and control overland flow and have reduced surface water runoff. Vegetation management practices outlined in the 2005 Management Plan, implemented as a part of the Saint Paul Oak Woodland Enhancement project (Minnesota Department of Natural Resources, Conservation Partners Legacy grant, fiscal year 2010) from 2010 – 2013, have further stabilized areas of concern. These practices have included invasive species removal and replanting efforts, as outlined later in this document.
- III. Pedestrian and recreational activities along the bluff – Many of the recreational activities causing erosion issues are occurring mid-bluff, where oak forest and lowland hardwood forest plant communities overlap. Required improvements within the lowland forest riparian area were identified by Wenck Associates, Inc. in 2013, as identified in the Crosby Farm Regional Park Stabilization project (Project 2756-04). Multiple bioengineering practices identified in this plan were implemented by Prairie Restorations, Inc. in the spring of 2013. Funding for this work was secured by Great River Greening as a part of the Metro Big Rivers Habitat – Phase II program, as recommended by the Lessard Sams Outdoor Heritage Council (FY2012). With only a few minor exceptions, the majority of the hardscaping

modifications recommended by Wenck Associates (staircase construction and handrail installation) have yet to be completed.

- ❖ Current site conditions indicate that the best management practices implemented as a part of the Sam Morgan Trail reconstruction project and the 2013 riparian area stabilization project have reduced the effects of overland flow that were contributing to areas of erosion. These areas were classified as low to moderate points of erosion in the 2005 Management Plan and EOR's 2007 Bluff Stabilization Study. Parks should continue to monitor these low to moderate points of erosion to ensure that vegetation establishment continues to progress. Areas classified as high erosion locations need to be addressed within the watershed or through large-scale engineering studies and were outside of the scope of 2013 implementation projects.
- ❖ Parks and Recreation staff should remove trees from the filtration ditches every three years and annually control herbaceous invasive species. A thorough sweep for invasive woody species was completed in summer 2015.

(2005) Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.

Great River Greening identified suggested trail improvements to curb erosion issues at Crosby Farm in the “2004 Crosby Park: Bluff Trail Project” plan. Wenck Associates Inc. referred to this document and identified specific required trail improvements, within the oak woodland/lowland forest plant community interface, in the Crosby Farm Regional Park Stabilization project document (Project 2756-04, 2013).

In 2015, Conservation Corps of Minnesota and Iowa completed select trail improvements outlined in the “Crosby Park: Bluff Trail Project” plan. Funding was secured from a 2013 Recreational Equipment Inc. (REI) grant. A failing retaining wall was repaired and a new set of stairs were installed. The crew also regraded the trail above the staircase to decrease the likelihood of future erosion events.

- ❖ Additional funding is required to complete all aspects of the trail improvements identified by Wenck Associates Inc (Project 2756-04, 2013) and as outlined in the 2004 Crosby Park: Bluff Trail Project.

(2005) Continue monitoring and removal of invasive buckthorn and Tartarian honeysuckle; buckthorn creates bare soils prone to erosion; removal work needs to continue annually.

Receipt of a 2010 Minnesota Department of Natural Resources, Conservation Partners Legacy grant for the Saint Paul Oak Woodland Enhancement project, has allowed Saint Paul Parks and Recreation to make significant strides in controlling invasive woody species within the oak woodland plant communities at Crosby Farm Regional Park. Land cover units identified in the following statements refer to land cover units identified

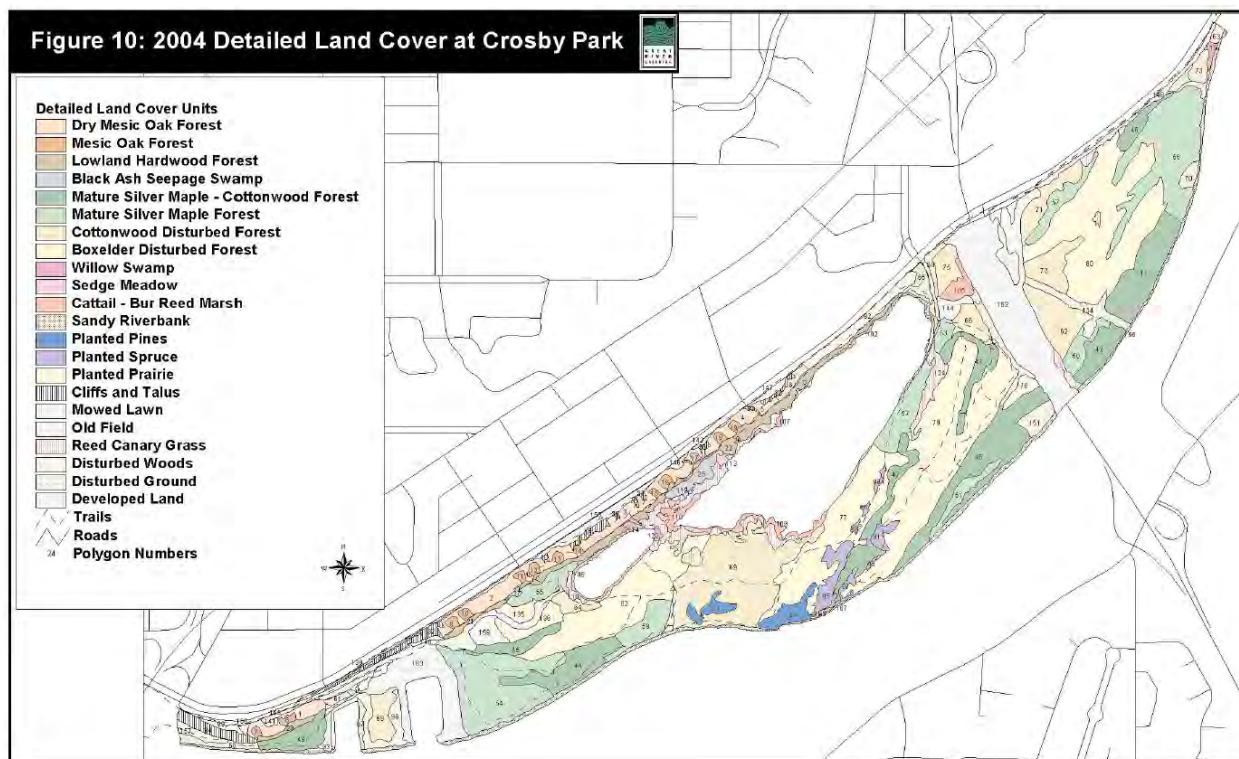
in the 2005 Crosby Farm NRMP, page 33, Figure 10 – the land cover units are identified in the figure on page 5 for reference.

- I. In 2010, Parks contracted with Natural Resources Restoration, Inc. (NRR) to control common buckthorn and Tartarian honeysuckle larger than ½ inch in diameter using the cut-stump method of control, by applying a 50% solution of Garlon 3A. Work was performed in land cover units 1 – 3 & 7 – 16. NRR staff were instructed to remove smaller (< 8" dbh) ash, elm, boxelder as appropriate to allow sunlight to reach subcanopy and groundlayer while controlling buckthorn and honeysuckle. This was completed in an effort to control or limit early successional invaders. 95% of the brush was hauled off of the slopes by NRR and removed from the site by City staff.
- II. In 2010, City forestry crews removed buckthorn, Tartarian honeysuckle, diseased elm, failing green ash, Siberian elm, and boxelder from the top of the bluff to promote the growth of desirable native species.
- III. Conservation Corps Minnesota (CCM) crews performed sweeps through NRR's removal areas from 2011 – 2013 to remove any of the aforementioned species as they reached sapling size. CCM used a combination of cut-stump and flame-weeding (propane torch) treatments. Flame-weeding was used primarily in land cover unit 1 to supplement herbaceous weed management efforts at that location.
- IV. In 2013, CCM crews completed woody species control efforts as previously described for land cover units 4 – 6 & 17 – 19.

In 2017 & 2018, receipt of a 2017 Conservation Partners Legacy grant provided additional invasive species control by grazing in land cover units 4 – 6, 17 – 19, 22 & 92. These units were grazed by goats in summer 2017, fall 2017 & spring 2018. Vegetative enhancement of these units will occur in 2019.

- ❖ **Parks staff should monitor land cover units 1 – 19, 22 & 92 every five years, and control invasive woody species as required to encourage regeneration of desirable native species; identified in the 2005 Management Plan. Continue to limit early successional invaders such as boxelder. With the presence of Emerald Ash Borer (EAB) in Saint Paul, removal of green ash is encouraged whenever practicable. Continue use of the cut-stump method using Garlon 3A and the use of flame-weeding when appropriate. Herbaceous weeds should be monitored and controlled as needed to promote natural regeneration of trees and shrubs.**

**Figure 10: 2004 Detailed Land Cover at Crosby Park**



## OAK WOODLAND

Oak woodland plant communities described in the 2005 Crosby Ecological Inventory and Restoration Management Plan include: Dry Mesic Oak Forest, Mesic Oak Forest

(2005) *Monitor the woods for oak wilt. Obvious signs of this disease were not detected in 2004.*

- ❖ **As of November 2018, oak wilt has not been detected in Crosby Farm Regional Park. Parks and Recreation should continue to monitor annually.**

(2005) *In areas of bare soils not subject to excessive stormwater runoff, plant herbs (forbs and graminoids) to stabilize soils, enhance floristic diversity, and improve habitat for native wildlife species. Control invasive herbaceous species, including garlic mustard.*

Following invasive species removal within mesic oak forest plant communities (listed as land cover units 7 – 19 in the figure on page 5), these areas were planted with a native seed mix to quickly stabilize the soils, improve diversity, and out-compete invasive herbaceous species.

- I. Invasive woody species were removed as described under management recommendation #3. All brush and slash was removed from the planting areas.
  - II. Herbaceous weedy species including: garlic mustard, narrowleaf bittercress, burdock, smooth brome, and sweet clover were spot sprayed with a 3% solution of Roundup Pro, being careful to avoid injuring desirable species.
  - III. In the spring of 2013, a native seed mix was hand broadcast on site by Conservation Corps Minnesota crews, just prior to a rainfall, to promote movement of the seed into the loose soils of the mesic oak forest land units. The seed mix included: Elymus canadensis, Schizachyrium scoparium, Rudbeckia hirta, Andropogon gerardii, Dalea purpurea, and Carex brevior.
- ❖ **Parks and Recreation should annually monitor the seeded areas and spot spray invasive species to encourage native plant establishment. In areas where green ash are adjacent to the planting areas, these trees should be proactively removed to allow more sunlight to penetrate to the groundlayer.**

*(2005) Garlic Mustard Control via weed whipping when plants are in flower. This may have to be done at least twice during the growing season. Top priority would be polygons 7, 8, 13 & 16 (land cover units on map, page 4). Monitor and evaluate this to determine if it is effective in reducing the garlic mustard population.*

Garlic mustard spot sprayed in land cover units 7-19 in 2013 (page 5). Area monitored annually by Parks and Recreation.

Friends of the Mississippi River's "Pledge to Pull" utilizes volunteers to control garlic mustard in polygons 7 & 8 (page 5). Volunteers commit to 8 hours of garlic mustard hand pulling at this location after a brief introduction to the park and garlic mustard removal processes.

- ❖ **Parks and Recreation staff will continue to control garlic mustard with available resources. Individual and group volunteers will continue to be utilized for garlic mustard removal in Crosby Farm.**

*(2005) Promote canopy closure to enhance native habitat; plant oak trees in open areas; promote oak recruitment.*

Between 2011 and 2012, community volunteers and Conservation Corps Minnesota crews helped Parks and Recreation plant 5,750 tree and shrub seedlings, and over 50,000 local-ecotype white, bur and pin oak acorns. Planting efforts occurred in land cover units 2 – 6 & 9 – 19 (page 5). Anecdotally, large numbers of oak seedlings were found in 2013 in areas where acorns were planted. Many saplings were present in 2018.

- ❖ **Parks and Recreation will continue to monitor oak planting locations for native tree establishment and control invasive species as possible to encourage**

**natural regeneration and establishment of newly planted trees and shrubs. Continue to follow vegetation management recommendations on pages 60 – 69 of the 2005 Crosby Farm NRMP.**

*(2005) Introduce biological control organisms to control garlic mustard when and if they are eventually identified and certified for release.*

- ❖ **As of January 2019, new biological controls have not been identified. Parks and Recreation will continue to monitor status.**

## FLOODPLAIN FORESTS

Floodplain forest plant community descriptions described in the 2005 Crosby Farm NRMP include: Mature Cottonwood-Silver Maple Forest, Mature Silver Maple Forest, Cottonwood Disturbed Forest, Boxelder Disturbed Forest, Lowland Hardwood Forest

*(2005) Promote canopy closure to enhance bird habitat and create more shade to deter buckthorn. Cut box elders that may be shading and suppressing seedlings and saplings of more desirable tree species (especially basswood and green ash).*

*(2005) Promote replacement of box elders to allow better canopy development by cutting and stump treating large boxelders that are shading and suppressing trees seedlings of the following species: silver maple, green ash and basswood.*

*(2005) Boxelder stands are excellent candidates for planting other tree species to accelerate conversion of the stands to higher quality floodplain forest. A shelterwood approach is recommended, which involves cutting and stump-treating boxelder and planting seedlings or saplings of silver maple, green ash, basswood and hackberry.*

Shelterwood harvest projects in Crosby Farm Regional Park began in 2005. The pilot project, based on recommendations in the 2005 Crosby Farm NRMP, was a joint effort between Parks and Recreation and Great River Greening. In October 2005, female boxelder trees were targeted for removal to create openings in the tree canopy. In all, approximately 10 acres of floodplain shelterwood openings were created. All lumber was removed from the site – hauled to trails by volunteers, to be utilized as biomass at Saint Paul's District Energy power plant. In the spring of 2006, 5,360 native trees and shrubs (bareroot whips and #2 & #5 potted plants) were installed by volunteers in these shelterwood pockets. In the winter of 2007, additional boxelder trees were removed around the periphery of the shelterwood harvest areas created in 2005. In the spring of 2007, an additional 730 trees and shrubs were planted in the area.

The first Emerald Ash Borer (EAB) infestation in Minnesota was discovered in Saint Paul in May 2009. Today, the green ash population at Crosby Farm is heavily infested with EAB. Removal of green ash will occur, as feasible, within the framework of natural resources management projects in the park. Green ash will be the initial target for

removal for any future shelterwood harvest project in the park. When replanting in floodplain forest ecosystems, Saint Paul staff have selected local ecotype plant material from Southern Floodplain Forest (FFs68), and associated plant lists, developed by the Minnesota Department of Natural Resources. Ash trees included on these lists will not be replanted as a part of management activities in the park.

In 2012, Saint Paul Parks and Recreation received a Conservation Partners Legacy (CPL) grant to enhance and manage 30 acres of disturbed floodplain forest in Crosby farm Regional Park. Saint Paul Parks staff began by delineating different canopy types within the project area utilizing remote sensing (Lidar) data and aerial photographs. This data was then ground-truthed to determine the species composition of the canopy, and additional data was gathered regarding understory and ground layer composition, canopy cover percentage and regeneration. Using these data, staff were able to estimate the amount of ash and boxelder within the project area and identify shelterwood harvesting zones. While ground-truthing the species composition, staff also determined the basal area, which informed seeding and planting rates.

In spring of 2012, Conservation Corps youth crews and Saint Paul Parks staff collected and sowed approximately 1 gallon by volume of silver maple (*Acer saccharinum*) seed (wings attached) and 8 gallons by volume of cottonwood (*Populus deltoides*) seed within the project area. A contractor was hired in the fall of 2012 to remove all ash and boxelder under 5 inches in diameter. Volunteers hauled the brush and created burn piles, and sowed 60,000 hackberry, basswood and oak seeds. Brush piles were burned in the winters of 2012-2013 and 2014-2015.

In the spring of 2013, Saint Paul Parks planted a total of 3,750 tree and shrub seedlings with volunteers and Conservation Corps youth crews. Tree tubes were installed on 800 of the trees and shrubs, focusing on maples and chokecherry, which tend to experience the highest rate of deer herbivory. Staff also purchased and installed 100 seedling mats designed to reduce competition at the base of newly planted seedlings.

In winter 2013, Conservation Corps crews girdled larger green ash and boxelder within the shelterwood zones, and also removed undesirable trees along paved trails, thereby allowing more sunlight penetration to the forest floor.

In the spring of 2014, Conservation Corps crews weeded and selectively applied herbicide to garlic mustard and burdock in the project area to reduce competition for the tree seedlings.

In 2016, Great River Greening initiated restoration of the disturbed floodplain forest areas within Crosby Farm Regional Park. This work occurred in the eastern most floodplain forest (the section east of interstate 35E) – land cover units 41, 43, 48, 50, 56, 57, 62, 70 – 72, and 80 (page 5). Invasive woody species were controlled across a total of 104 acres. Species controlled included: buckthorn, honeysuckle, black locust, mulberry, Siberian elm, green ash less than 6" DBH, and diseased American elm trees. Within the 104 acre project area, targeted ash removal for all class sizes of ash

occurred on 18 acres of land. An additional 14.5 acres were cleared of all ash trees plus boxelder trees with a DBH of 12" or less, mimicking a shelterwood harvest model to forest restoration. These 14.5 acres were replanted utilizing volunteer labor. Great River Greening (GRG) held two volunteer planting events in spring 2018, with 180 total volunteers. Additional GRG crew and Conservation Corps Minnesota work days completed this work. In total, 5,300 seedlings were installed – 700 of which were protected with Plantra Grow Tubes and weed matting. The following table lists the tree and shrubs species installed:

**Trees and shrubs installed by Great River Greening  
in Crosby Farm floodplain forest in 2016**

<i>Acer saccharinum</i>	Silver maple	2400
<i>Populus deltoids</i>	Cottonwood	900
<i>Prunus virginiana</i>	Chokecherry	500
<i>Viburnum dentatum</i>	Arrowwood viburnum	500
<i>Quercus bicolor</i>	Swamp white oak	500
<i>Sambucus canadensis</i>	Common elderberry	500

Saint Paul Parks and Recreation received a 2017 Conservation Partners Legacy (CPL) grant to restore 210 acres of disturbed floodplain forest at Crosby Farm Regional Park, adjacent to land covered by the 2012 CPL grant. The work completed under this grant will provide non-fragmented, contiguous management areas. The grant period is early 2017 through June 2020. Conservation Corps Minnesota crews, Saint Paul Parks and Recreation staff, and contractors will perform a woody invasive species sweep throughout the entire 210 acre area. This work was initiated in spring 2018 and will continue throughout the grant period. As there have been confirmed Emerald Ash Borer (EAB) infestations within this 210 acre project area, green ash will be selectively removed to create shelterwood openings. Local ecotype plant material will be installed in these openings. Tree tubes will be installed on select trees to protect from deer herbivory.

- ❖ Continue to sweep areas for invasive species. Maintain shelterwood openings to ensure adequate sapling survival.

## SWAMPS

Swamp plant communities from 2005 Crosby Ecological Inventory and Restoration Management Plan include: Black Ash Sweepage Swamp, Cattail-Bur Reed Marsh, Sedge Meadow, and Willow Swamp.

*(2005) Control reed canary grass patches to keep it out of the black ash sweepage swamps and sedge meadows. Cut reed canary grass down to ground level in June just after it has sent up flowering stems – a brush saw fitted with a grass blade works well – leave cuttings in place. Follow-up spraying: spot spray or apply with wick application*

*Roundup (or Rodeo if near open water) on to the previously cut reed canary after first frost in fall (late Sept. or Oct.). Be careful to avoid spraying other plants.*

- ❖ **As of January 2019, Parks and Recreation has not completed any work within the Black Ash Sweepage Swamp/Sedge Meadow complex.**

*(2005) Enhance sedge meadow conditions that promote the invasion, expansion and takeover by reed canary in these meadows. This should include monitoring for silt deposition via erosion from upslope.*

*(2005) Consider selective removal of clumps of narrow leaf cattail in sedge meadows. This could be accomplished by winter cutting in areas that flood in the spring (cut as low as possible – water above cut tips in the spring will kill the plants); or by selective application of Roundup (or Rodeo near water) onto plants using wick or glove application.*

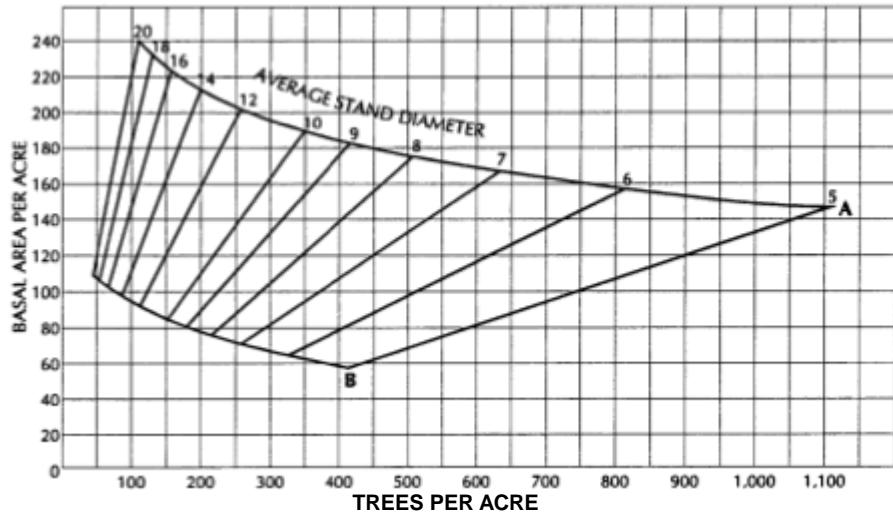
- ❖ **As of January 2019, Parks and Recreation has not completed any work within the Sedge Meadow.**

## **PLANTED PINES/SPRUCE**

*(2005) Thin out dense pine stands to promote healthier trees. 10x10 foot spacing between trees will promote healthier, stronger trees.*

*(2005) Remove dead spruce trees and thin the stands to allow the remaining trees more space and light.*

This future recommendation is from Dan Anderson, Urban Forester for the City of Saint Paul: "The recommendations in the attached document<sup>i</sup> are still pertinent and are what I recommend. The only differences being that I was looking at Basal Area (BA) as the way to calculate stocking instead of just trees per acre and I am not sure that 6" diameter is accurate anymore. Of note is on page 2 the #3 recommendation, "Conduct first thinning when the stand attains 150 square feet per acre basal area. If the stand is significantly above recommended maximum density, exercise caution and consider thinning to a higher residual basal area (e.g. 120 square feet/acre) to reduce risk." To get the recommended BA of 150 to 120 the number of trees per acre to remain on the site after a thin depends on the average tree diameter, see figure below. So, if you want the recommended 450 trees per acre in your plan then the average tree diameter at breast height would need to be around 7 inches to meet the recommended stocking level. If the average diameter is larger, you need to reduce the number of trees per acre to adjust. I think that using recommendations that are geared toward production silviculture are apt since their goal is the fastest effective growth, which means healthy full crown trees."



- ❖ As of January 2019, Parks and Recreation has not thinned pine stands.

## DISTURBED WOODS

(2005) Eliminate brush thickets. For sumac, this involves cutting twice a year at flowering time and treating stumps with Roundup.

- ❖ As of January 2019, Parks and Recreation has elected to not control Minnesota-native small tree and large shrub species within Disturbed Woods.

(2005) Plant trees into existing large gaps, or gaps created by cutting and stump treating box elder. Protect the planted trees with tree mats. Plant mostly bur oak and white oak which are less susceptible to oak wilt than red oak.

In the Spring of 2013, Great River Greening, as a part of the Metro Big Rivers Habitat – Phase II program as recommended by the Lessard Sams Outdoor Heritage Council (FY2012), hired Prairie Restorations, Inc. to initiate forest gap creation in land cover units 5, 6 & 92 (page 5).

Saint Paul Parks and Recreation's 2017 Conservation Partners Legacy grant provided additional invasive species control by grazing in land cover units 5, 6 & 92 (page 5). These units were grazed by goats in summer 2017, fall 2017 & spring 2018. Vegetative enhancement of these units will occur in 2019.

- ❖ As of January 2019, Parks and Recreation selects replacement tree and shrub species consistent with recommendations within the State of Minnesota Department of Natural Resources' Field Guide to the Native Plant Communities of Minnesota, The Eastern Broadleaf Forest Province, 2005.

- ❖ Continue to sweep areas for invasive species. Maintain shelterwood openings to ensure adequate sapling survival.

## PLANTED PRAIRIE

(2005) Continue to hand pull or spot spray Canada thistle. Canada thistle populations greatly expand in cool wet years and contract in dry years.

(2005) Treat heavy populations of exotic grasses and plant a diverse assemblage of prairie forbs and grasses.

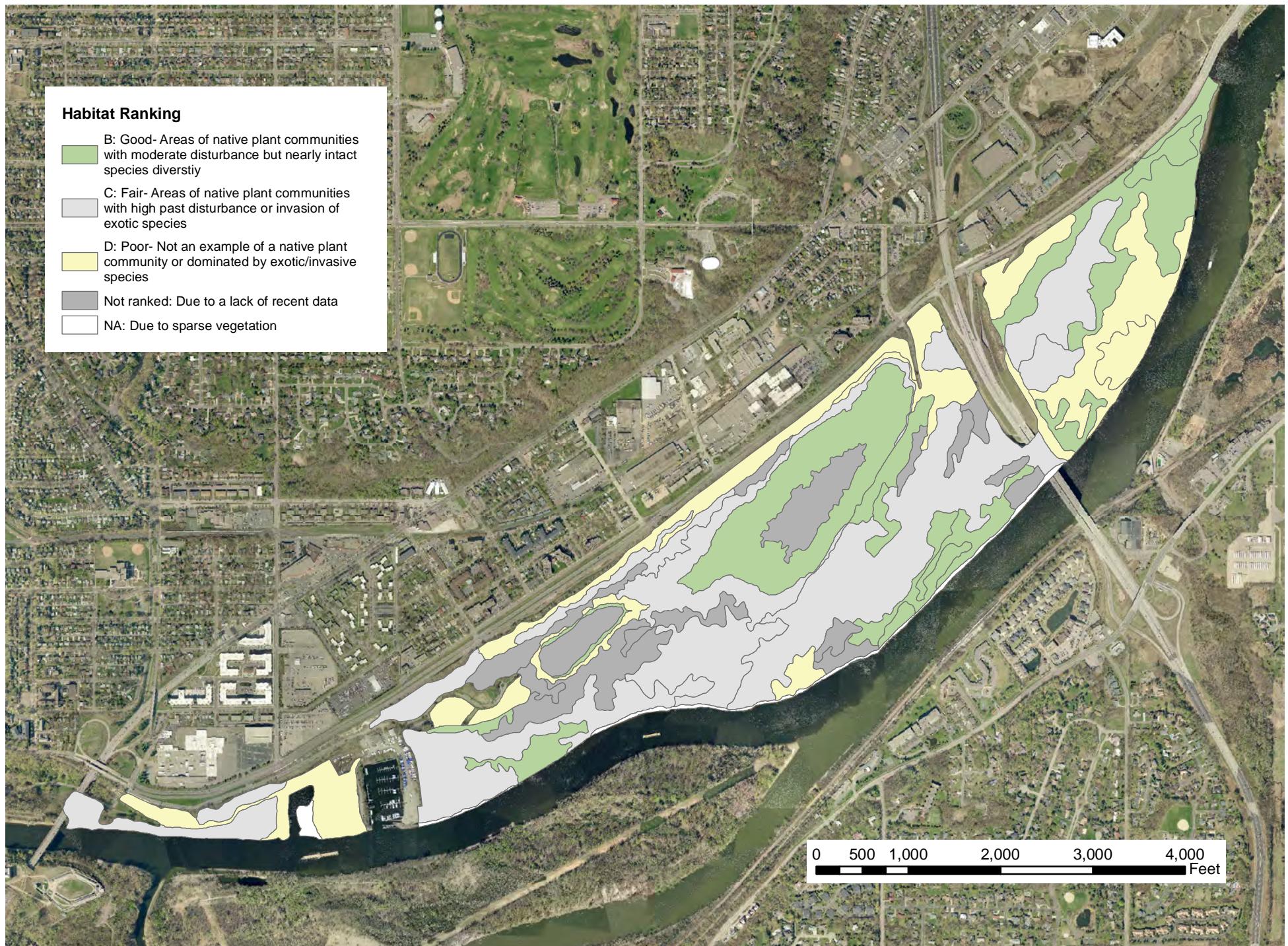
In 2013, the parking lot and main entrance to Crosby Farm were redesigned. As a part of this project, raingarden and filtration systems were added and all prairie areas immediately to the east of the main parking lot were expanded and seeded with a mesic to wet prairie seed mix. In the spring of 2015, a prescribed burn of the entire prairie complex was completed by Saint Paul Parks and Recreation staff, resulting in 95% consumption of vegetation.

Saint Paul staff has continued to mow the planted prairies on an annual basis to control weedy or invasive species such as Canada thistle, burdock and wild parsnip. Staff have spot sprayed wild parsnip in a further effort to control this species as it is on the Minnesota State Listed Noxious Weeds list, considered a Prohibited: Control species, wherein, a plant listed as "Prohibited: Control" must be controlled preventing the maturation and spread of propagating parts.

- ❖ Continue to mow, hand-pull and spot treat invasive or weedy species when necessary.
- ❖ Use prescribed fire as a management tool when conditions are appropriate.

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<sup>i</sup> Attachment 1: Considerations in the Management of Young Red Pine Stands: Implications to Growth, Yield and Economics



# Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan



Prepared for the City of St. Paul  
Division of Parks and Recreation  
by Great River Greening  
January 2005

With assistance from the Ramsey  
Conservation District



## **Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan**

**Compiled by  
Fred Harris  
Great River Greening**

**With assistance from  
Tom Petersen, Dave Bauer, Matt Swanson  
Ramsey Conservation District**

**January 2005**

**Great River Greening (GRG)** is a nonprofit organization that restores valuable and endangered natural areas in the greater Twin Cities by engaging individuals and communities in stewardship of the Mississippi, Minnesota and St. Croix river valleys and their watersheds. Greening involves local citizens in hands-on volunteer and training programs on a larger scale than any other Twin Cities organization— 14,000 since inception in 1995. (See Appendix D for more information).

**Ramsey Conservation District (RCD)** is a special purpose local government agency responsible for promoting the conservation of Ramsey County's natural resources. The district, through its publicly elected board of supervisors and staff, assists private citizens, businesses, and other governmental agencies implement natural resource conservation practices.

**Fred Harris, Ph.D.** is the Lead Ecologist for Great River Greening. He conducts ecological inventories and writes restoration plans. Previously, he worked for many years with the Minnesota Department of Natural Resources as a plant ecologist with the Minnesota County Biological Survey and as an ecologist for the Minnesota Chapter of The Nature Conservancy.

**Tom Petersen**, Ramsey Conservation District Manager, is responsible for the administration and management of all district programs. He has 25 years of experience in urban land use conservation programs and has specialized in soil erosion control and landscape restoration technologies and wetland ecology.

**Dave Bauer**, District Conservation Technology Specialist and Mn Licensed Professional Soil Scientist, is responsible for District GIS technologies and services, applied soil science programs, and soil erosion and sediment control programs. He has nine years of experience in this area.

**Matt Swanson**, District Groundwater Specialist and Mn Licensed Professional Geologist, is responsible for developing and implementing the District's groundwater quality protection programs and geologic and hydro-geologic science programs. He has 15 years of experience, including consulting and government work.

## Executive Summary

Crosby Farm Regional Park is the largest natural park within the City of St. Paul. It is also a significant natural area within the State of Minnesota Mississippi River Critical Area Corridor and the Mississippi National River and Recreation Area (MNRRRA). The park consists of a large area of floodplain and valley side slopes, the “bluffs,” along the Mississippi River near its confluence with the Minnesota River. The park’s forests, wetlands and lakes are important refuges for a broad diversity of native wildlife species. As a natural oasis of oak woods, marshes, lakes, floodplain forests and Mississippi River shoreline in a major metropolitan area, the park attracts tens of thousands of local residents throughout the year.

A detailed vegetation inventory, analysis of management problems, and assessment of bluff trails was conducted in 2004. The bluff trails analysis completed in June focuses on recommendations for ameliorating erosion problems and improving trail design. It was published separately in a companion report entitled *Crosby Park Bluff Trail Project: Design Strategies for an Ecologically Sustainable Bluff Trail* (Shaw et al. 2004) also compiled by Great River Greening.

This report on Crosby Farm Regional Park focuses on the following main objectives: A.) preliminary documentation and assessment of bluff erosion problems; B.) detailed inventory and mapping of terrestrial and wetland native plant communities in the park; C.) identification and analysis of problem areas needing management and restoration work; and D.) identification of strategies for managing and reconstructing native plant communities in the park.

Appendices to this inventory and management plan provide technical information to supplement the recommendations, including a checklist of plants seen in the park in 2004, detailed plant species lists of target native plant communities, and information about controlling exotic species.

Preliminary examinations of the bluffs along the north side of Crosby Park reveal numerous examples of erosion from excess storm water runoff and off-trail traffic, ranging from low levels of sandstone weathering to deep canyons incised into the bluff. This erosion is compromising the integrity of the native vegetation of the bluffs, washing out portions of the park’s trail system, and depositing silt and sand into the park’s lakes.

Crosby Park has a broad range of terrestrial and wetland native plant communities containing over 300 plant species. Vegetation survey highlights include areas of intact sedge meadow, black ash seepage swamps, areas of diverse spring ephemeral wildflowers, a colony of Kentucky coffee trees, and large tracts of intact floodplain forest.

This project was not intended to inventory the wildlife species, aquatic environments or recreation/environmental education values of the park – subjects that should be addressed in future inventory and management plans.

## Acknowledgements

This project was made possible with major funding from the Capitol Region Watershed District, the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative Commission on Minnesota Resources, and the U.S. National Park Service via the Mississippi National River and Recreation Area. Additional financial or in-kind contributions to the project were provided by the Ramsey Conservation District, the City of St. Paul Division of Parks and Recreation, the Carolyn Foundation, and Great River Greening.

This project would not have existed without the leadership of Patricia Freeman, Environmental Resource Specialist for St. Paul Parks and Recreation, who initiated the project, brought a diverse group of resource professionals together for input, and organized funding to make it a reality. Dan Tix assisted air photo interpretations, vegetation surveys, and plant identification. Alan Olson and Richard Peterson, Minnesota DNR Foresters, provided extensive advice on strategies for forest restoration. Michael Varien, Melissa Peterson, Katie Anderson, and Adam DeKeyrel mapped the park's buckthorn concentrations. Dan Shaw, Wiley Buck, Cade Hammerschmidt, Patricia Freeman, Mark Doneaux, Cy Kosel, Nancy Duncan, John Grzybek, and Kelly Osborn reviewed and commented on drafts of the report.

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Figure 1: Crosby Farm Regional Park location within the City of St. Paul.  
 (from the St. Paul Parks and Recreation website). Some regional parks on this map are owned and managed by the City of St. Paul and some are owned and managed by Ramsey County.

## Description of Project Area

### General Location:

Near the end of the last glaciation in Minnesota, the Crosby Park region was buried in glacial till of the Grantsburg Sublobe. This was an extension of the Des Moines Lobe glacier that covered much of western and southern Minnesota. As the glacial period ended, a huge meltwater stream, Glacial River Warren, carved through the glacial till deposits and underlying sedimentary bedrock layers where the park occurs today. A high, level terrace north of Crosby Park, now occupied by Shepard Road and West 7<sup>th</sup> St., is evidence of this huge glacial stream. Further downcutting by the modern Mississippi River within the glacial river valley cut further into the underlying limestone and sandstone bedrock and formed the smaller valley now occupied by the Mississippi River. The north edge of this valley forms the bluffs along the north edge of Crosby Park.

### Geology:

The geology in the Crosby Farm Park area is relatively straightforward. The bluffs are capped by the Platteville Formation, which is relatively resistant to erosion. The slope of the bluffs is underlain by the St. Peter Sandstone. At the base of the bluffs, Holocene (recent) floodplain alluvium laps over the St. Peter. The bedrock units are essentially horizontal, with just a slight regional dip, so structure does not affect outcrop patterns.

As noted, the top of the bluffs is capped by limestone and dolomite of the Platteville Formation. This unit is a light-gray, thin- to medium-bedded dolomitic limestone and dolomite with some discontinuous, very thin shale beds. Where weathered, the Platteville Formation is typically buff to tan in color, with fresher surfaces showing the gray coloring. In the metro area, the Platteville formation may be 30 feet thick or greater (Meyer and Swanson, 1992; Mossler and Tipping, 2000).

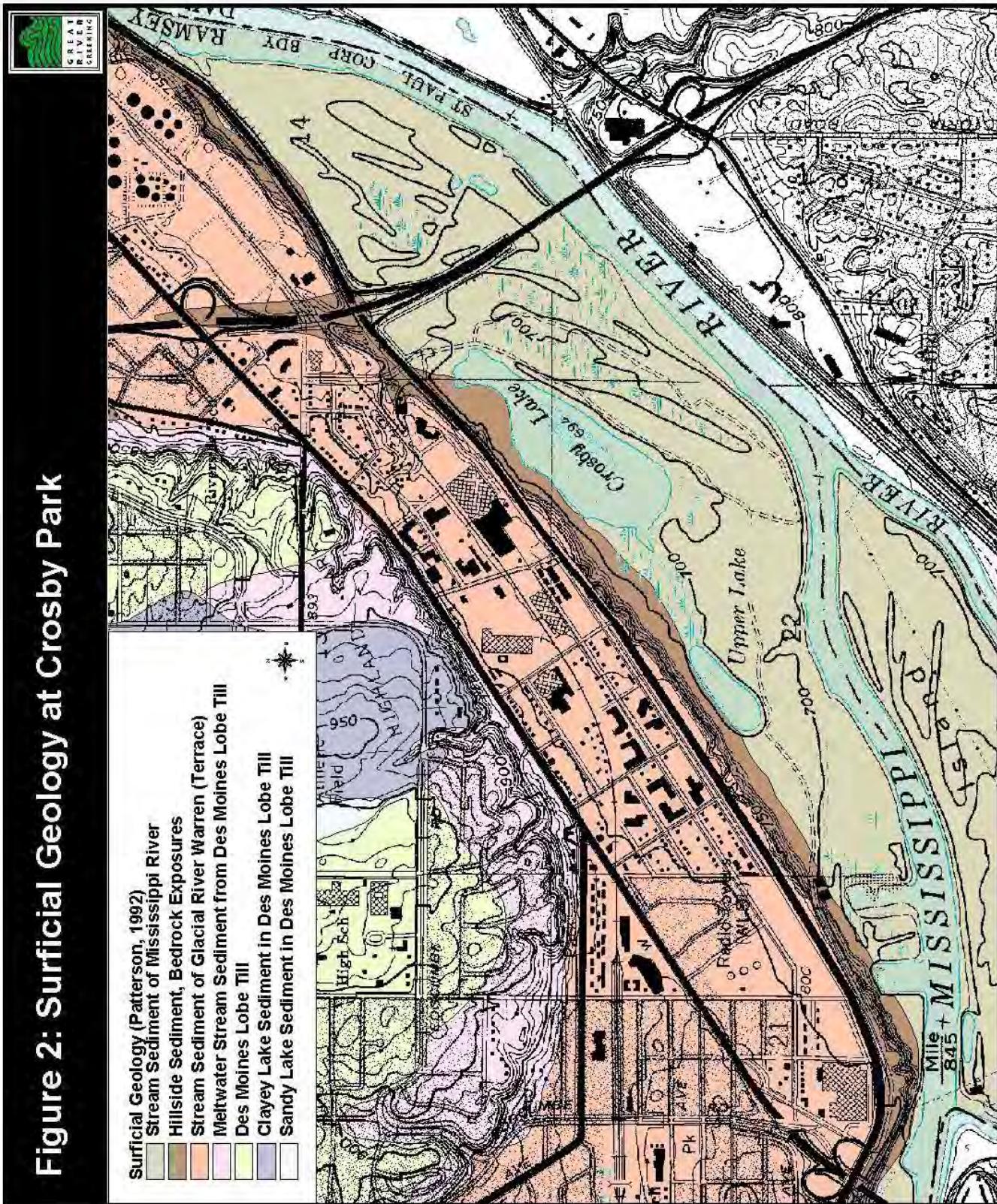
In some locations, the Platteville is underlain by a thin (typically 3 to 5 feet or less), green shale unit known as the Glenwood Formation. The presence of this unit along the bluffs is not always clear, largely because it is much more susceptible to erosion and is likely to have eroded back and be covered with other material. At some locations (e.g., gullies) where there are larger outcrops, the unit appears to be present, but the outcrop could not be reached to confirm this.

The slope of the bluffs is formed on or within the St. Peter Sandstone. In the metro area, the St. Peter is 128 to 166 feet thick, with the upper 100 feet being a light gray to light yellow to white, fine- to medium-grained, poorly cemented sandstone with thick to massive bedding (Mossler and Tipping, 2000). Only this upper portion of the St. Peter Sandstone is present along the Crosby Park bluffs. The unit is generally light gray to light tan or buff when exposed in outcrops at the park. In the past, the St. Peter has been mined for glass sand, and many man-made caves have been dug into the bluffs all along the Mississippi River in St. Paul. One such cave is present across the access road from

the Watergate Marina. Some caves in the St. Peter are also present due to natural erosion by moving water; as a result of being poorly cemented, the St. Peter Sandstone can be vulnerable to erosion. Relative to the Platteville caprock above, the St. Peter is clearly more susceptible to erosion.

Along the base of the bluffs in the Crosby Park area are unconsolidated alluvial deposits. Meyer (1985) mapped this particular area as “floodplain alluvium (clayey)”, described as principally clay and silt, commonly mixed with variable amounts of sand. It may be overlain with fill in developed areas. At the western end of the park, the alluvium is mapped as being dominated by sand. So, most of the material observed at the bottom of the bluffs is floodplain deposits. This is further evidenced by noting that where there is silt- or clay-dominated material at the base of the bluffs, it is much darker than the soils on the bluffs and slopes, owing to the greater organic content typical of alluvial floodplain deposits.

**Figure 2: Surficial Geology at Crosby Park**



## **Hydrogeology:**

In the geologic units of concern at Crosby Park, the groundwater flow direction is generally toward the Mississippi River, which is the discharge point for the unconsolidated and shallow bedrock aquifers in this area. So, flow is roughly perpendicular to the bluff face. In the bluffs area, the regional water table is very close to the same elevation as the river, or about 690 feet (Meyer and Swanson, 1992). As a result, the water table is roughly 100 feet below the ground surface at the top of the bluffs, and roughly 5 to 10 feet below the surface at the foot of the bluffs, and possibly less depending on the local topography and the river stage.

Some seeps are present along the bluffs. These seeps are present within the St. Peter Sandstone, which is unusual. Typically, springs emerge along the Mississippi River bluffs where a very low-permeability geologic unit underlies a more permeable unit. Water is held up above the low-permeability unit (or “perched”), then where this interface is exposed on the bluffs, the water flows out, with the flow rate determined by several factors. The seeps in Crosby Park are likely to represent instances where cracks provide a localized preferential pathway for migration of small amounts of water that have infiltrated into the St. Peter Sandstone.

As indicated by the name, seeps have relatively little water moving out from the rock to the surface. It is unlikely that flowing water will be observed, unless the climate has been generally wet. In addition, urbanization of the terrace above the bluffs has limited the infiltration of precipitation, reducing the amount of water that can reach these seeps.

## **Bluff Soils at Crosby Park:**

### **Mapped Soil:**

The soil mapped is the Dorerton-Rock outcrop complex, 25 to 65 percent slopes, 1819F (Figure 3). As mapped, the topsoil consists of a very dark gray sandy loam about 4 inches thick over a dark brown fine sandy loam about 6 inches thick. The subsoil is a dark brown gravelly clay loam, often with larger stones. The mapped soil has a medium level of natural fertility, is moderately permeable, has moderate available water capacity, and has rapid surface water runoff (Vinar, 1977).

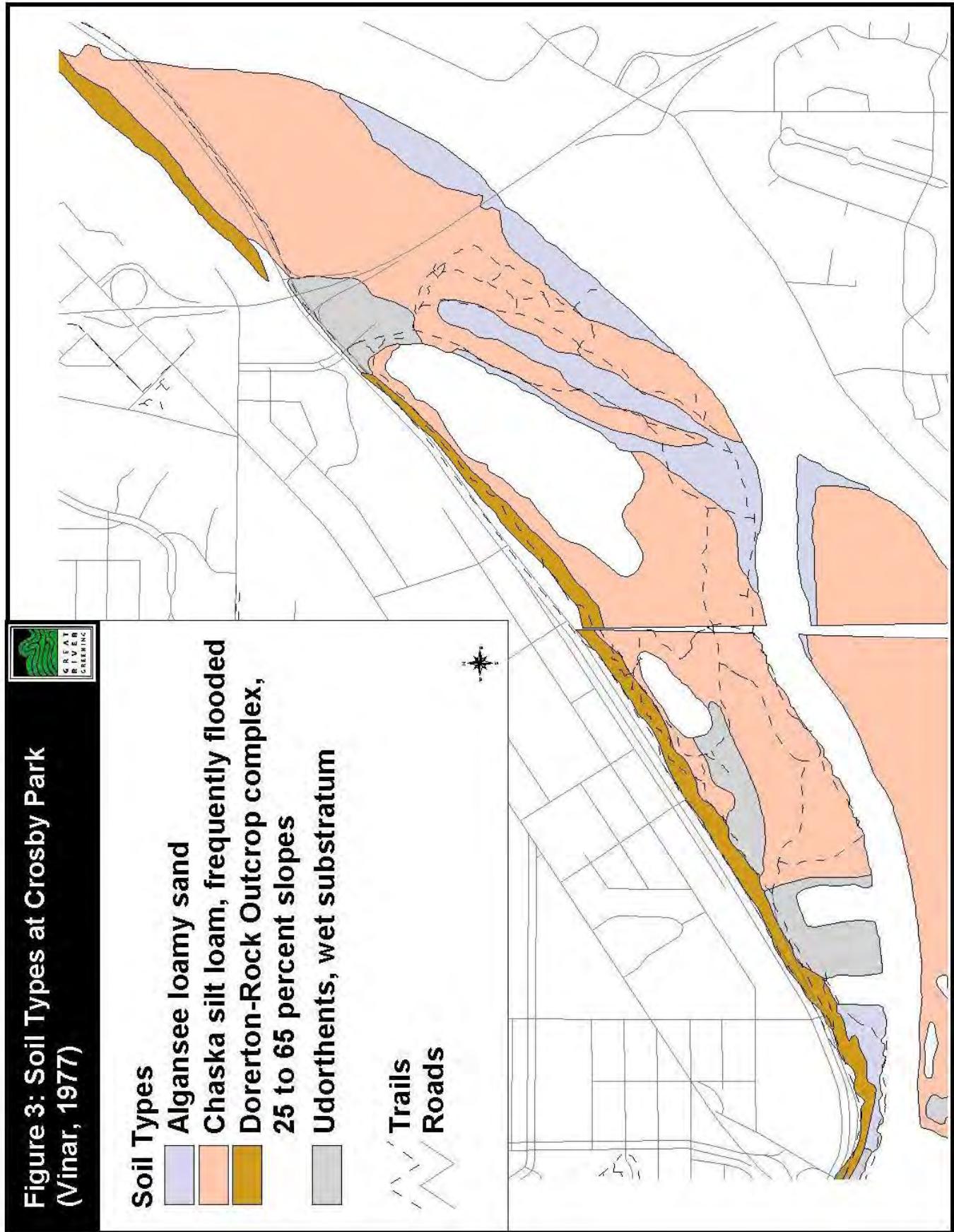
### **Field Observations:**

Technicians observed soil properties along seven transects from summit to foot slope. The soils identified in the field seemed to fit into the mapped soil with the following variations.

The subsoil seems to be absent in most cases.

As a general rule, soil seemed to be shallower as the steepness increased. Soil also seemed to be shallower near the summit and deeper near the foot slope. Finally, soils tended to be higher in sand content near the foot slope, which lowers the moisture holding ability of the soil.

The soils further varied with four topography classes noted in the field.



## Topography Classes

### **Sandstone Spurs:**

A sandstone spur occurs where the limestone is not exposed at the surface or where the outcrop is set apart from the lower bluff by a gentler slope. The slopes range from 40-80%. These soils are extremely well drained and consists of loam (~20% clay, 40% silt, 40% sand) near the summit and sandy loam (~10% clay, 25% silt, 65% sand) near the foot. Near the summit, there are usually many limestone pieces, with up to 80% surface coverage and rocks make up 50% of the soil. These soils tend to have less moisture nearer the foot slope. The soil depth ranges from less than 12 inches near the summit to greater then 36 inches near the foot.

### **Float Slopes:**

A float slope occurs when a steep slope occurs beneath a limestone outcrop. It is very steep, mostly 70-80% and covered by limestone and sandstone pieces, 40-80%. The soil is less than 12 inches and dominated by 20-50% rock fragments. The soils tend to be loam (~20% clay, 40% silt, 40% sand). Near the foot slope, where the slope is less then 50%, the soil tends to be a sandy loam (~10% clay, 25% silt, 65% sand) and can be more then 20 inches deep with a decrease in rock fragments. This soil tends to have less moisture near the foot slope when compared to soils near the summit.

### **Gullies:**

Gullies are highly eroded and consist mostly of float and debris/fill in the channels and exposed bedrock or very shallow soils on the walls. Most soil that accumulates or forms tends to be washed down slope.

### **Fill:**

Construction of Shepherd Road appears to have been the reason for some areas of fill along the bluff. These soils are variable, but often consist of a sandy clay loam (~25% clay, 15% silt, 60% sand). Depth of fill varies between 12 inches and 24 inches. A buried soil sometimes has been preserved below this layer as another sandy clay loam. Moisture on these features tends to be higher than on other features, but is still low overall. There are many pieces of bricks, asphalt, and other building materials, which is the easiest way to identify this topography in the field.

## Pre-settlement Vegetation

In 1930, Frances J. Marschner mapped the pre-settlement vegetation of Minnesota using bearing tree and line notes recorded by surveyors of the Public Land Survey in the mid-1800s as they marked the grid of section lines across the state. Marschner's map (Figure 4) indicates that the pre-settlement vegetation of the Crosby Park area consisted of River Bottom Forest within the floodplain of the Mississippi River and Oak Openings and Barrens on most of the high, glacial river terrace on the north edge of the park above the Platteville Limestone cliffs. An area of "Big Woods," Marschner's generic term for hardwood forest, was mapped farther north on rolling Des Moines lobe deposits outside the glacial river valley (Marschner 1974).

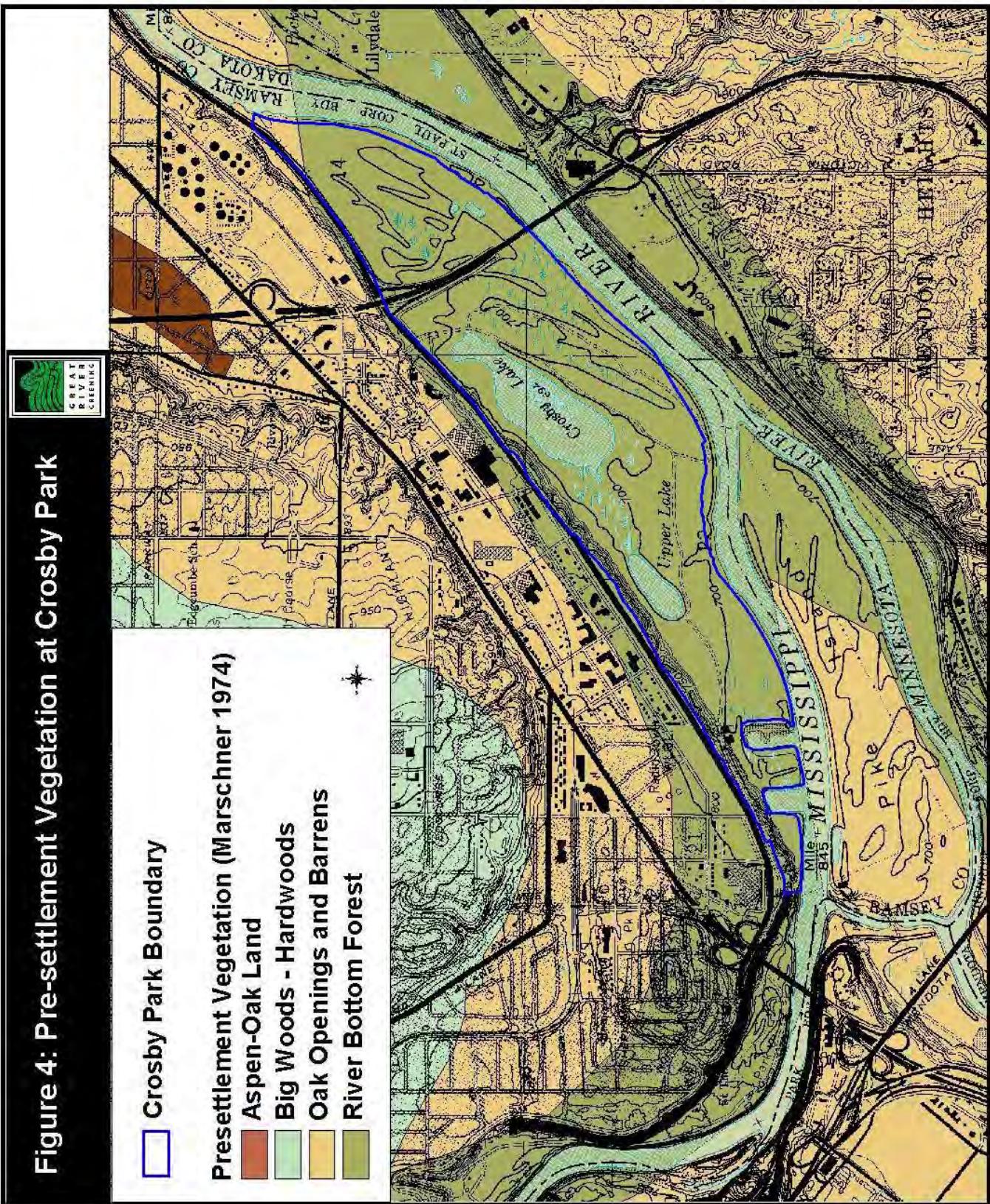
River bottom forest consisted predominantly of floodplain forest dominated by elm, ash, cottonwood, box elder, silver maple, willow, aspen and hackberry. American elms were common bearing trees in this community.

Oak openings and barrens consisted predominantly of scattered trees and groves of oaks in scrubby form with patches of open prairie and areas of brush and thickets. Present day communities in this category include oak savannas and woodlands. Marschner's boundary between river bottom forest and oak openings and barrens along the north side of the park does not coincide exactly with the terrace edge that forms the bluffs along the north edge of the park. This is an error of scale: Marshner's map was created on a very large scale and the boundary lines between vegetation units are not accurate within several hundred feet. The vegetation currently present at Crosby clearly demonstrates that the original vegetation of the bluffs and the terrace above the bluffs was part of the oak openings and barrens region. Prairie plants remaining from past savannas are still hanging on along the tops of the bluffs, particularly above the limestone cliffs by the entrance road at the west end of the park. The lower half of the bluffs may have been more of a mesic forest rather than savanna, as these areas are presently dominated by red oaks and contain a dry-mesic to mesic shade tolerant flora. The pre-settlement river bottom forest was clearly confined to the low floodplain below the bluffs.

## Post-settlement Land Use History

Thomas Crosby first established a 160 acre farm at the southwest end of the park in 1858. The area was then continuously farmed until it was purchased for a park in 1962. Crosby raised cattle, dairy cows, horses, pigs and chickens, and grew potatoes and apples (MNRRA 2004).

An aerial photo from 1940 shows the high intensity of farming in the area (figure5). Crosby Lake was considerably smaller than it is today. A farm access road followed the southern edge of the lake. Much of the floodplain southeast and southwest of Crosby and Upper Lakes was cultivated. The lower, more frequently flooded portions of the floodplain north and west of the lakes, as well as much of the east end, were grazed and also largely devoid of trees. Floodplain forest trees were confined to narrow zones within grazed areas near the Mississippi River. Most of the floodplain forest remnants were



thinned by past logging and many of the trees appear to be very young. The bluff slopes along the north edge of the park had very thin tree cover limited to discrete patches: many of the spur ridges had few or no trees and most trees were confined to ravines. These bluffs were thinned by logging and probably grazed. The far westernmost end of what is today's park was much less disturbed than the rest of the area, as the bluffs and floodplain are heavily wooded there in the 1940 photo. The straight line separating this end from the rest of the present park area suggests that that this western tip was in a different ownership from the Crosby farm.

Since 1962, the former Crosby farm has been managed as a public park. By 1970, many of the formerly cultivated and pastured fields on the floodplain were in the "first stages of reverting to forest" (Blacklock 1970). Blacklock also described areas of floodplain forest that had not been cleared as mature "climax" forest containing dense wood nettle cover – which is much the way these stands appear today. Blacklock observed huge American elms estimated at 14 or more feet in circumference – trees that have since been lost to disease – and occasional huge cottonwoods, many of which still stand in the park. By the 1970s, the farm road south of Crosby Lake cut through young woods not open fields.

Today, 500 acre Crosby Farm Regional Park is the largest natural park within the City of St Paul, and an important natural area within the Mississippi River Critical Area Corridor and the Mississippi National River and Recreation Area. It is an oasis of woods and wetlands along the Mississippi River visited by tens of thousands of people using the park's 6.7 miles of trails throughout the year. Visitors utilize the park for hiking, fishing, running, bicycling, dog walking, bird watching, wildflower watching, picnics, and cross-country skiing. The park is a significant stopover place for migrating songbirds and waterfowl and each of the metro area Audubon chapters hold annual field trips to Crosby Park. The park also serves to capture storm water from adjacent neighborhoods north of the park via storm sewers that end in the bluffs along the park's north edge.



Figure 5: 1940 Aerial Photo of Crosby Farm

**Crosby Regional Park Bluff Erosion  
A Preliminary Assessment - September 2004  
by  
Tom P. Petersen  
with assistance from  
David W. Bauer**

**Summary of Findings**

The overall bluff is undergoing the natural process of geologic erosion. Geologic erosion is necessary for the formulation of mineral soils. The sandstone/limestone matrix of the site's geologic material is inherently susceptible to weathering/destruction by the forces of water (raindrop detachment, sheet and concentrated flow), frost, gravity, vegetation root systems, and acidic precipitation. Theoretically, the increased acidity of precipitation, due to the effects of combusted fossil fuels, may or may not accelerate the geologic erosion of the bluffs. Most likely, however, with or without the presence of humans, the process of geologic erosion will continue until the site is level (zero gradient) millions of years from now.

Evidence of accelerated erosion of the bluff, i.e., human induced, abounds throughout the site. Most can be attributed to either channelized flows of water or foot traffic (trails) destabilizing the soil structure and/or denuding the slope of stabilizing vegetative root networks. Channelized flow is generally the result of storm water systems being outlet at the top of the bluff whether by pipe or channel. The foot traffic erosion (trails) is the result of concentrated human travel corridors destroying vegetation and in some cases creating collection points for sheet flow off the bluffs to become concentrated flow. Trails seem to follow contours of stable gradient, connect points of human interest, e.g., easiest way up or down the bluff to park amenities, or are predetermined by parks personnel as desirable points of human interaction with the bluff.

The accelerated erosion caused by human influences can be managed to minimize further accelerated erosion of the bluff. Controls/management techniques may include: 1. Constructing stable conveyance systems down the slope for storm sewer systems. Pipes, high velocity chutes, and in some instances, vegetated swales may be needed. Reducing the number of storm sewer discharge points by collecting runoff above the bluff to single points of flow down the bluff may be needed. 2. Planting denuded areas (trials and bare slopes) with plant materials that will promote infiltration and stable soil structure. 3. Applying stable materials for foot- paths that will diffuse water flow, resist compaction and disintegration from human foot traffic. 4. Redirecting flows away from trails to avoid concentrated flow.

Several bare soil areas were encountered on the bluff usually associated with bedrock protrusions and/or mast bearing trees, e.g., Oak trees. It is assumed that in the case of the mast bearing trees, squirrels, rodents, wild turkey and/or deer are disturbing the plant

cover in search for nuts and are leaving the slope surface in a near constant state of denuded soils. This is an observation and not necessarily a source of significant erosion.

### **Survey Methods and Definitions**

Staff from the Ramsey Conservation District have identified 39 sites with noticeable soil erosion within the “bluff zone” at Crosby Park in St. Paul. The field assessment was completed in early September 2004 and is intended to provide a “low-tech” cursory assessment and inventory of overall soil erosion conditions on the bluff.

The purpose of this information is intended to assist resource managers in developing a plan for the restoration and management of this resource. To aid in the management process, we have categorized soil erosion as either Severe, Moderate, or Low. Each category may be further modified according to whether erosion is ongoing, the result of a past event, likely source of the erosion, and/or is likely to present future problems with the management of the resource. Also noted are areas where significant sediment has accumulated and may present management problems.

It should be noted that the information contained in this assessment would require a more detailed site-specific assessment to select the appropriate best management practice for the long-term management of the resource. RCD staff are qualified and experienced to assist with this level site management should the City Parks Department desire our assistance. The following are some definitions of terms used in the preliminary erosion assessment:

#### **Severe Erosion:**

A condition resulting in accelerated denudification of the slope, the development of severe “rills” and/or “gully” with sidewall cave-in/instability, and the inability of the slope to arrest further deterioration. If not corrected, this condition will have significant impact on the long-term utility of the bluff. For the Crosby Park bluff area, this condition is usually the result of concentrated storm water discharge onto the bluff at its crest. The ongoing effects of this point discharge prevent the establishment of erosion arresting plants and ongoing removal of soil materials. Without corrective actions, usually structural and engineered, the size of the denuded landscape will continue to grow, and in many instances undermine the root system of trees causing further deforestation.

In areas of severe erosion, the Saint Peter Sandstone is exposed or the landscape is dominated by bedrock flagging. Both conditions preclude the ability for plant materials to be re-established.

#### **Moderate Erosion:**

A condition where erosion of the landscape is evident but is not at a rate or size that will have long-term effects on the utility of the slope. This condition is most associated with foot- paths and other human activities that collect and direct runoff, from adjacent slopes

to points of concentrated flow. The concentrated flow will cause “rills” and minor sediment deltas that prevent vegetation from establishing and stabilizing the slope.

Diverting and/or collecting runoff from paths prior to discharge onto a slope, and constructing paths on the contour to act as a terrace can usually stabilize these areas. Paths should also be constructed of stable material to maintain their grade.

#### Low Erosion:

A condition of minor soil exposure usually caused by rodents and birds foraging and digging for mast crop. Can also be a condition where canopy and/or under story vegetation shades the growth of grasses and forbs that can hold soil in place on steep gradients.

Simple techniques of vegetation management are sufficient to stabilize these areas.

It should be noted that many low erosion areas exist on the bluff probable the result of invasive plant species with poor root systems.

#### Field Notes

The following brief field notes correspond to the numbered red points in Figures 6 and 7. Green triangles in these figures correspond to photo points taken at the top of the bluff. Selected photos taken in the corresponding points are given here. Photos of all the points and a more complete report from this preliminary survey are available from the Ramsey Conservation District.

##### **Point 1 (Fig. 6).**

Saint Peter Sandstone outcrop. Human caused erosion due to access up and down slope. Erosion has formed channelized flow in the sandstone and an alluvial fan of sand has been created on the adjacent footpath. No soil remaining, all has eroded away.

Low erosion problem.

Erosion could be eliminated if foot traffic access were eliminated. The alluvial fan can be stabilized with vegetation. If access is required here, use stable train substrate.

No evidence of gully-head from channelized flow over the bluff. Obvious digging/mining of the SPS by park visitors.



Restoration should include long-term elimination or minimization of human access at this site with a minimum of 9 inches of topsoil placed over the exposed SPS and mixed into the SPS alluvial fan. Plant vegetation on topsoil to stabilize.

Special note: Many exposed “noses” of SPS by geologic forces and rodent foraging for mast-crop. Random vegetation best stabilization solution.

#### **Point 2 (Fig. 6).**

Two channels start at a common point at the top of the bluff. Limited evidence of foot traffic up and/or down the channel. Estimated flow velocities of 1 to 3 CFS. Gullies form a broad horseshoe valley with very active erosion. Cause is flow from top of bluff. Little contribution of water from the valley sidewalls, however. Severe erosion problem that must be controlled soon. The two channels converge before foot of the bluff and are 2 to 3 feet wide and about 1 foot deep.

Diversion of flow(s) from the top of bluff to stable conveyance system down the bluff is necessary to control erosion. Channels need not be restored just add topsoil, mulch, and plant with vegetation to reclaim the landscape.

Much urban rubble debris found in the vicinity of this site. This suggests dumping from top of bluff. Clean up of debris may be desired to aesthetically restore the site restoration.

#### **Point 3 (Fig. 6).**

Exposed “nose” of SPS. Minimal erosion very low erosion problem. Typical of many sites along the entire bluff where the bluff undulates due to geologic erosion. Solve with vegetative planting. Low priority erosion.

#### **Point 4 (Fig. 6).**

Severe gully 10 to 12 feet wide with an average depth of 3 feet. Concentrated flow from top of bluff. Very active erosion, many side-slope cave-ins present. High priority for control and restorative work. Two gully branches meeting to form a large channel filled with limestone float. No evidence of seep from bedrock causing or adding to gully erosion problem.



Must control erosion with proper storm water pipe techniques. I recommend an engineer be consulted to solve this severe erosion problem site. Further collapse of the landscape will continue if this is not corrected ASAP.

#### **Point 5 (Fig. 6).**

No evidence of human foot travel, i.e., path up and down the bluff. Random bluff profile erosion of low erosion problem. Random planting on exposed soils recommended.

**Point 6 (Fig. 6).**

Lower end of St. Peter Sandstone “spur”. Minimal exposed topsoil. Low erosion problem. Recommend plantings within exposed soil areas. Exposed soils probably the result of rodent activity seeking mast-crop.

**Point 7 (Fig. 6).**

Lower end of St. Peter Sandstone spur. Low erosion problem. Recommend random plantings on exposed soils.

**Point 8 (Fig. 6).**

Very severe gully. Large sediment delta at base.

Gully 12 to 15 feet wide. Lower end of gully 5 feet deep. No seep evidence at head of bluff/gully.

Very high erosion problem. Must be controlled to avoid loss of trees and significant loss of bluff landscape. Unknown source of water causing gully. Recommend further survey of gully source(s).

Once source is known, recommendations of stable conveyance will be possible.

**Point 9 (Fig. 6).**

Exposed soil at base of oak tree. Evidence of rodent digging for mast-crop. Low erosion problem. Random plantings may be appropriate.

**Point 10 (Fig. 6).**

1 foot deep by 3-foot wide small gully. Minimal erosion with gully extending to top of slope. Source of flow is bluff sidewall. No evidence of storm sewer/culvert outlet storm water flow from top of bluff.

Moderate erosion problem. I recommend further assessment of this site to better determine the source of the runoff. Once this is determined, corrective measures can be recommended.

**Point 11 (Fig. 6).**

Severe gully with many tree root exposed. Flow from top of bluff, no evidence of seep. Gully 2 feet deep and 6 foot wide.

Suggest diversion at top of bluff to common point for transport down-slope to stable outlet.

High erosion problem site. Recommend stabilizing work ASAP to prevent further loss of bluff landscape.

**Point 12 (Fig. 6).**

Exposed St. Peter Sandstone knoll with obvious human digging/mining activities. Foot-path up to top of bluff.

Low erosion problem. Recommend diverting human traffic and random planting into exposed soils that have been augmented with an additional 6 to 9 inches of topsoil.

**Point 13 (Fig. 6).**

Two very active gully channels. The left channel is from an 18 or 24-inch pipe protruding from the top of bluff. The right channel originates at the top of bluff as spill-off from top of bluff.

Long-term management should include filling in of gullies with plantings and engineered diversion of and management of flow down bluff as necessary. High erosion problem area. Restore ASAP to avoid further loss of bluff landscape.

Urban rubble present in gullies, as evidence of past gully filling. I recommend further analysis of site to determine best-engineered solution to the gully. Evidence of foot traffic is also present in the east gully. This however, is not exacerbating the gully problem.

**Point 14 (Fig. 6).**

Backside of point 1. Human path causing channelized flow to begin. Moderate erosion problem. Fill in path/gully and plant to restore.

**Point 15 (Fig. 6).**

Moderate erosion problem along the upper path. Highly weathered St. Peter Sandstone crumbling along path's up-slope side. Sheet flow off the adjacent bluff channelizing and flowing down the path and depositing sandstone delta.

Recommended restoration, 1. Carry water with drain tile and 2. Place stable path surface with stair system to manage the natural grade.

**Point 16 (Fig. 6).**

Runoff from foot-path washing over the side of path and creating a collapse of the path. This should be a very high priority problem to address to sustain the current path grade and location.

This is a medium erosion problem but in need of restoration ASAP for the sake of the path.

**Point 17 (Fig. 6).**

The trail gradient causing erosion. Need stable path surface to stop erosion. Low erosion problem.

**Point 18 (Fig. 6).**

Human path down slope causing erosion. Low erosion problem. Seems to be a path connecting the lower trail with the upper trail.

**Point 19 (Fig. 6).**

Shallow gully from the top path to lower path. Not a severe problem , i.e., low erosion problem, because of the terracing effect of the trail. Recommend keeping humans off site and random planting.

**Point 20 (Fig. 6).**

Shallow gully from top path to lower path. Establish holes in wall with tile to carry water to stable outlet.

**Point 21 (Fig. 6).**

Severe gully from slope top. 3 feet deep by 20 to 30 feet wide. Side-slopes are collapsing. Retaining wall is being destroyed. High erosion problem.

To restore, continue pipe that is outlet at top of bluff down to base of bluff.

Restoration of gully is necessary once drainage issue is controlled to avoid further loss of landscape. Fill in gully and plant.

**Point 22 (Fig. 6).**

Sheet flow off slope top to the path than directed to the west over the wall. Diversion to capture water flow than down slope via pipe . Severe erosion high priority to fix and restore.

**Point 23 (Fig. 6).**

Eroding footpath off retaining wall. Low erosion problem. Plantings needed.

**Point 24 (Fig. 6).**

Pair of eroding St. Peter Sandstone knolls. Sheet flow directed to path than down path to retaining wall. Plant knolls.

**Point 25 (Fig. 6).**

Footpaths to bluff with water flowing down the path. High erosion Problem. Restore landscape with fill; redirect runoff down to stable slope with pipe, and plant to stabilize.

**Point 26 (Fig. 6).**

Severe gully with seep. Sediment being deposited on lower path. Severe gully between upper and lower paths. Side slopes are collapsing. Loss of trees expected. Very high erosion problem. Erosion restoration of landscape needed ASAP. Source of erosion t08, i.e., storm water pipe outlet at top of bluff. Pipe water down slope and restore landscape by fill and plantings.

**Point 27 (Fig. 7).**

Sluff of knoll. Natural geologic erosion. Very low erosion problem.

**Point 28 (Fig. 7).**

Side-slope slump. Knoll is destabilized by path. Use retaining wall with vegetation to stabilize. High erosion problem. Stabilize and restore ASAP.

**Point 29 (Fig. 7).**

Bare soil under oak tree on knoll. Minor evidence of overland flow eroding exposed soil. Rodent digging for mast crop exposing soils. Small gully starting at top possibly as a result of water being diverted from upper path. Low erosion problem. Plantings will stabilize.

**Point 30 (Fig. 7).**

Sheet erosion over trail. Low erosion problem. Plant bare soils. Trial erosion needs stable trail surface.

**Point 31 (Fig. 7).**

Cave digging. Deposits of sandstone dominate the management issues. Eliminate human access to this specific site to avoid further accumulation of sandstone.

**Point 32 (Fig. 7).**

Large gully carving into St. Peter Sandstone . Very deep 10 to 20 feet wide. Side-hill seeps present. Evidence of very heavy flow. Side walls look stable. No vegetation of sandstone sidewalls. Large canyon looking feature. Source of water is storm water pipe at top of bluff (picture t09). Engineered solution needed to prevent further erosion. May not want to fill gully but leave as an amenity once storm water issue id managed.

**Point 33 (Fig. 7).**

Trail interchange. Foot/path erosion. The oak tree in the photo is critical to the overall slope stability. Low erosion problem. Plantings needed.



**Point 34 (Fig. 7).**

Knoll erosion due to vegetation loss possibly because of shading and human foot traffic. A moderate erosion problem exists if foot traffic is allowed onto the slope. Plantings needed to stabilize.

**Point 35 (Fig. 7).**

Side-slope collapse. Probably caused by a single storm event. May be a random catastrophic collapse of slope. Must vegetate ASAP. High erosion problem.

**Point 36 (Fig. 7).**

Very pronounced side-slope cave-in. Storm sewer pipe at top of bluff is source of the problem. To manage the problem, must pipe water down slope. High erosion problem. Source of water map site T13

**Point 37 (Fig. 7).**

Off street flow over bluff minor side hill slump.

Suggest redirect flow at top of bluff to point where stable flow over bluff, i.e., pipe is possible. High erosion problem.

**Point 38 (Fig. 7).**

Simple knoll erosion down to St. Peter Sandstone. Moderate erosion problem.

**Point 39 (Fig. 7).**

SUPER Gully!!!

Very active erosion at the “head”. Matches to point T11. Very large alluvial fan. Seep at head of gully also present. Massive erosion problem. All movable soil has been eroded. Only erosion of the St. Peter Sandstone is taking place now. May want to consider leaving the gully as is and selecting another site to convey storm water down slope.





**Crosby Gully Sites West**

1 inch equals 150 feet

2003 Aerial photo



Crosby Gully Sites East

1 inch equals 150 feet

2003 Aerial photo

## 2004 Detailed Inventory of Upland and Wetland Native Plant Communities in Crosby Park

In 2004, a detailed inventory of native plant communities in Crosby Park was conducted and is summarized below. This inventory was intended to add additional detail to the land cover mapping by the Minnesota Land Cover Classification System (MLCCS) of the Minnesota Department of Natural Resources (MNDNR 2004). This greater level of detail is essential for identifying specific areas for management or restoration attention.

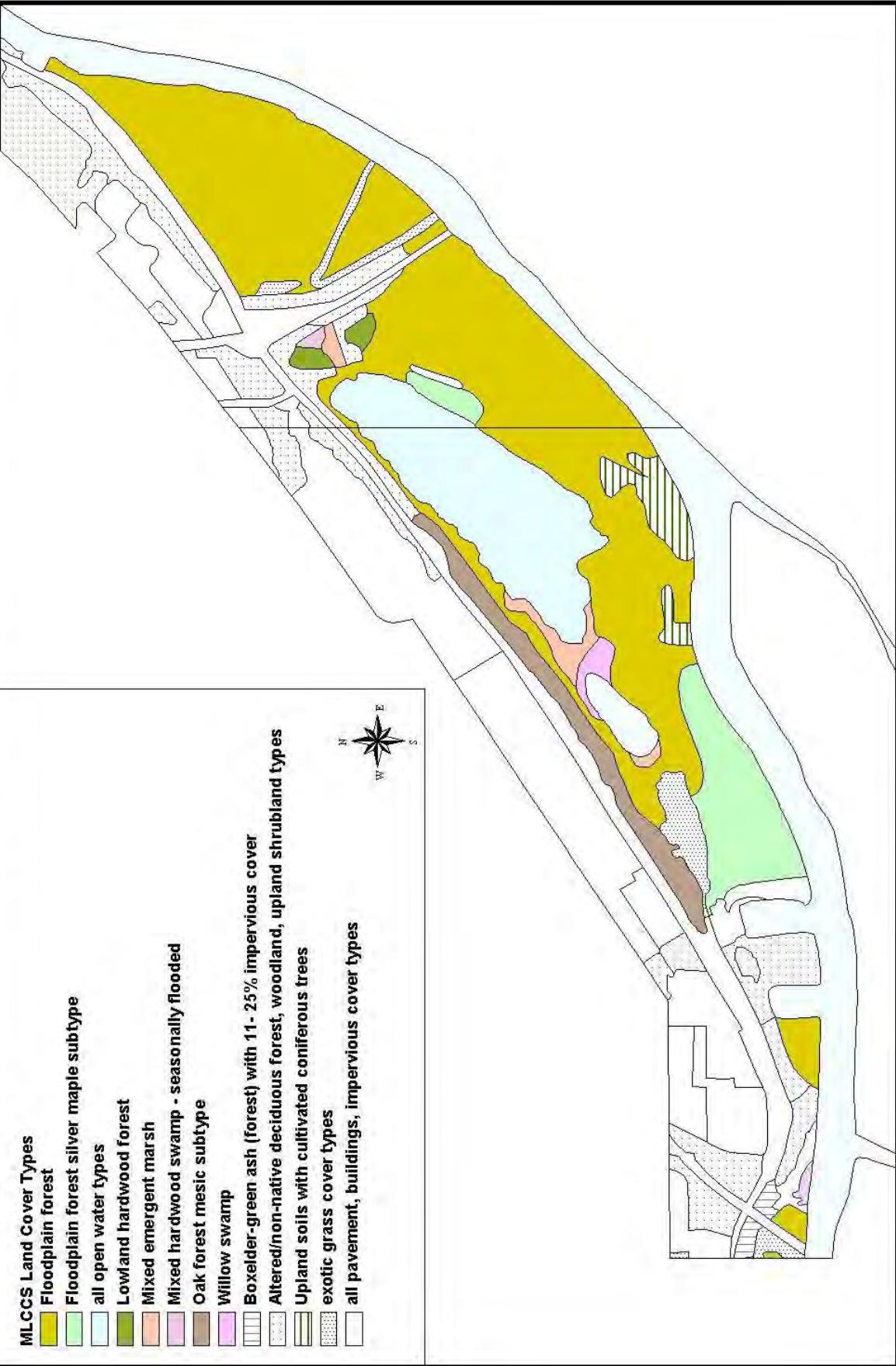
### **Comparison of 2004 inventory with previous mapping of the area:**

The DNR's Minnesota County Biological Survey (MCBS) mapped small portions of the park in its map of remaining, high quality native plant communities and rare species of Anoka and Ramsey Counties (MCBS 1994). This map depicts areas of floodplain forest on the floodplain along the Mississippi River east and west of highway 35E. These areas were identified primarily from air photo interpretation. The scale of the map and the intensity of ground survey work were not sufficient to break out the more disturbed areas of floodplain forest from the higher quality forest. This map also depicts a zone of willow swamp in a low flood channel on both sides of highway 35E – these flood channels still exist but there is no willow swamp left in them.

The Minnesota Land Cover Classification System (MNDNR 2004) mapped all the area's land cover (native plant communities and disturbed areas) in the mid to late 1990s based on aerial photo interpretation and ground survey (figure 8). This mapping effort did not have the benefit of the high resolution, low altitude photography of the park taken in 2003 and used in the 2004 detailed inventory in this report. The MLCCS cover identifies some areas of silver maple-dominated floodplain forest found in the present inventory. Other parts of the floodplain are identified more generically as "floodplain forest" which may denote forest stands dominated by "any combination of silver maple, cottonwood, black willow, American elm, slippery elm, box elder, bur oak and swamp white oak" (MNDNR 2004). In Crosby Park, this unit includes areas ranging greatly from highly disturbed areas with invasive species (box elder, cottonwood) to mature stands with intact canopies dominated by silver maples. Swamp white oak does not naturally occur in the Twin Cities and is not present in Crosby Park. Slippery elm and bur oak are essentially absent from the floodplain forests in the park – they are present on the bluffs. The large willow trees abundant in the park are *Salix x rubra*, a hybrid of black willow (*Salix nigra*) and the exotic weeping willow (*Salix alba*). According to Welby Smith, the Minnesota DNR's Natural Heritage Program Botanist, nearly all of the large willow trees in the Twin Cities are this hybrid.

The MLCCS map correctly identifies the oak forest on the bluffs. The MLCCS cover does not distinguish mesic from dry-mesic oak forest, areas of black ash seepage swamp, and areas of highly eroded cliffs within the forested bluffs. The area of oak forest on the bluffs at the far west end of the park, west of the marina, was also not shown on the MLCCS map.

**Figure 8: MLCCS Land Cover at Crosby Park (MNDNR, 2004)**



**2004 Inventory procedure:**

The detailed inventory of the park in 2004 started with a close inspection of color infrared (CIR) photography of the area, using 1:15,840 fall photography from MNDNR Forestry taken in 1994 (figure 9). CIR photography shows different colors corresponding to different plant species, as follows:

- rusty red crowns on slopes = oaks
- blue gray crowns on floodplain = cottonwood
- deep red crowns on floodplain = silver maple
- light yellow/whitish crowns on slopes = basswood and sugar maple
- hot pink wetlands = reed canary grass
- black/dark blue = water
- bright red grass = Kentucky bluegrass
- dark red clusters of small crowns = planted pines

This photography enabled identification of different tree species and allows for a preliminary mapping of native plant community types. Distinct areas of mature and disturbed forest types were identified and digitized in ArcView 3.3 (ESRI). This preliminary land cover was then overlain and adjusted to match the low altitude, color air photography taken in 2003 for the City of St. Paul.

Field visits to the park were started in April 2004 and continued through October 2004 to ground truth aerial photograph interpretations and survey the plant species and the condition of the vegetation units in the park. Field notes and locations of special features and boundaries of native plant community types were determined in the field using a hand-held, Garmin 76 Global Positioning System (GPS) unit. The digital ArcView maps were subsequently revised and descriptions of remaining vegetation in the units were written and are given below. Additional field visits were conducted to map locations of special features and exotic species.

The results of the 2004 inventory are mapped in figure 10. Descriptions of the individual map units are given below. Each polygon in the inventory was assigned a unique identification number. Comments on selected polygons are given in the land cover unit descriptions below and are denoted by inventory polygon numbers that are shown in figure 10. A complete list of the plants that were recorded in the 2004 inventory is given in Appendix A.



**Figure 9: 1994 Color Infra Red Photo**

(Source: MN DNR Division of Forestry)

**Figure 10: 2004 Detailed Land Cover at Crosby Park**



**Detailed Land Cover Units**

Dry Mesic Oak Forest

Mesic Oak Forest

Lowland Hardwood Forest

Black Ash Seepage Swamp

Mature Silver Maple - Cottonwood Forest

Mature Silver Maple Forest

Cottonwood Disturbed Forest

Boxelder Disturbed Forest

Willow Swamp

Sedge Meadow

Cattail - Bur Reed Marsh

Sandy Riverbank

Planted Pines

Planted Spruce

Planted Prairie

Cliffs and Talus

Mowed Lawn

Old Field

Reed Canary Grass

Disturbed Woods

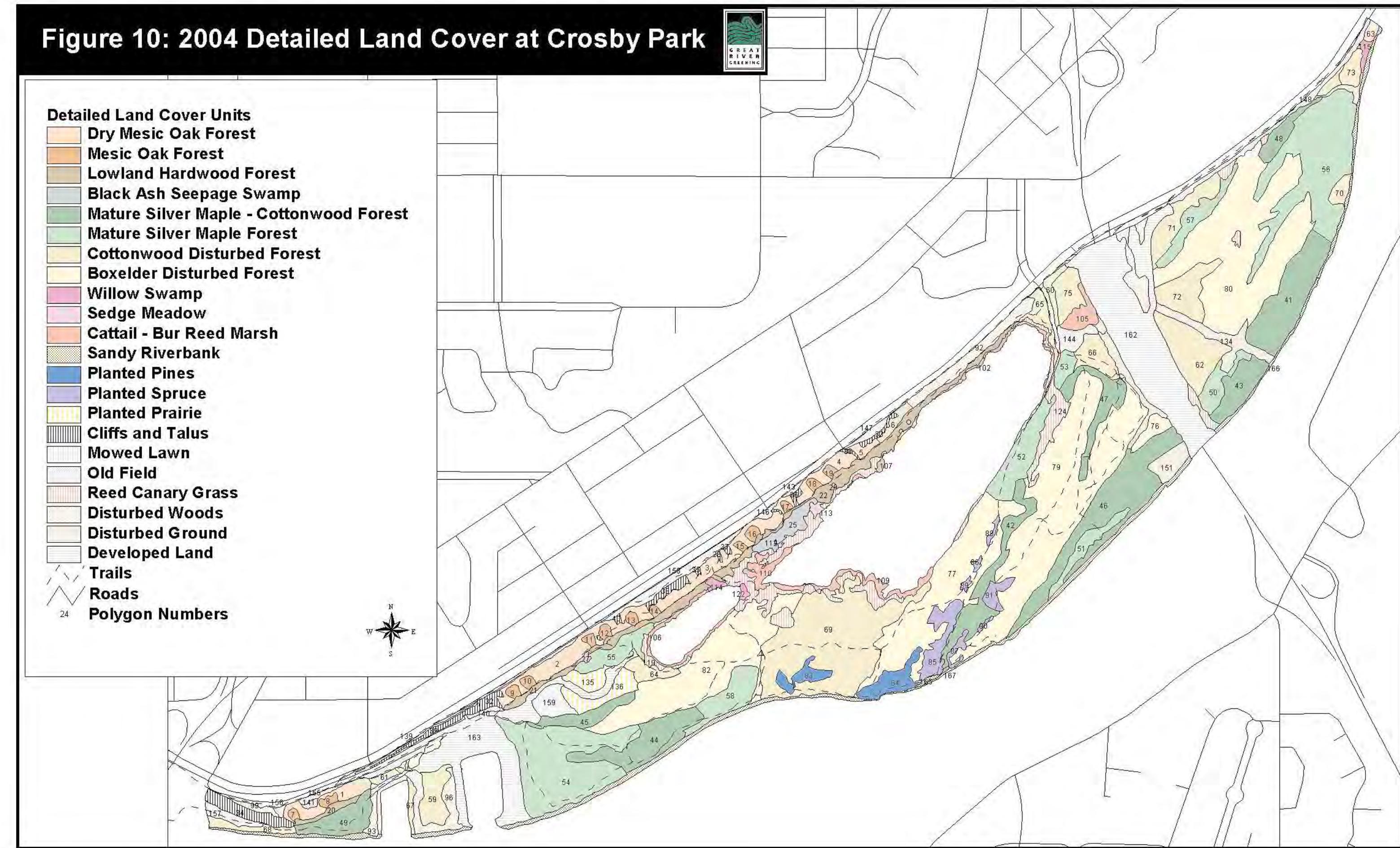
Disturbed Ground

Developed Land

Trails

Roads

Polygon Numbers



## Dry Mesic Oak Forest

Dry mesic oak forest in fair condition with a very patchy canopy occurs on spur ridges and upper slopes above and between mesic ravines on the bluffs along the north side of the park. This vegetation originated on slopes that were fairly degraded when the area was farmed. This unit includes some very small mesic ravines that were too small to map separately as mesic oak forest. Open grown bur oaks (with horizontal branches and large crowns) dominate on the uppermost slopes and shallow soils above limestone cliffs on the edge of the valley. Open grown red oak and red oak – pin oak hybrids dominate elsewhere on mid- to upper slopes. True northern pin oaks are also present but not common. Other canopy-size tree species also present include early successional invaders: cottonwood, hackberry and box elder are the most common; green ash and basswood are very infrequent; black cherry is rarely present. Subcanopy size trees include American elm, ironwood, box elder, basswood, and hackberry. Red oak seedlings occur in a few areas but are not common.



The shrub cover in these stands is very high and composed mostly of chokecherry. Gray dogwood is common on upper slopes and ridge tops. Other shrub species include American hazelnut (uncommon), bladdernut (on moist, clayey soils), prickly gooseberry and black raspberry (openings). Common buckthorn has heavily infested these slopes in the past, most of which has been removed by recent management work. Areas of former buckthorn thickets have very few herbs on the ground. Tartarian honeysuckle is also present but not nearly as abundant as buckthorn and tends to be fairly scattered.

The herbaceous layer on these slopes is sparse and has very low diversity. The most common herbs in the dry-mesic slopes include Virginia creeper, white snakeroot, heart-leaved aster, elm-leaved goldenrod, and racemose muhly grass. Virginia waterleaf, bloodroot, carriionflower, stellate false Solomon's seal, and columbine occur in a few places. Pennsylvania sedge is present in a few places but surprisingly not abundant on the bluffs. Pale touch-me-not is abundant in areas of moist, clayey soils at the bases of limestone cliffs and on the tops of some spur ridges. Sprengel's sedge forms dense large patches in a several areas on steep lower slopes on ridges in soft sandy unstable soils.

Several dry-mesic forest herbs are essentially absent from these bluffs, such as hog peanut, (see Appendix B for complete plant species list). Past over-grazing is probably the primary cause for the low diversity of herbs in the woods. Additional, more recent causes include shifting, unstable soils on very steep slopes, sheet erosion from storm water runoff, and recent heavy buckthorn thickets, and possibly acorn foraging by local wildlife. Garlic mustard is highly abundant on most of these slopes. It is much more abundant here than on the floodplain.

**Management Comments:**

1. An engineering study is needed to identify and assess the causes and solutions to severe slope erosion from storm water runoff on the bluffs. Once a study is completed, these severe erosion problems should be corrected.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs. Off-trail traffic is another significant cause of bluff erosion and promotes exotic species invasions.
3. Continue monitoring and removal of invasive buckthorn and tartarian honeysuckle (see figure 12). Buckthorn populations on the slopes have been greatly reduced by intensive removal efforts in recent years. Buckthorn creates bare soils prone to erosion. Numerous buckthorn seedlings still remain on the slopes, however, and removal work needs to continue every year. Presently, the west end slopes (polygon 1) have the greatest need for immediate buckthorn control.
4. Monitor the woods for oak wilt. Obvious signs of this disease were not detected in 2004.
5. In areas of bare soils not subject to excessive stormwater runoff, plant herbs (forbs and graminoids) to stabilize soils, enhance floristic diversity, and improve habitat for native wildlife species. Forest herbs for planting are listed in the dry-mesic oak forest list in Appendix B. A suggested methodology for this is given in project #4 in the section on recommended restoration projects.
6. Promote shade to deter buckthorn and enhance native habitat. Restoration of native oak forest canopies on the bluffs will improve the park's habitat for forest songbirds. Plant trees into open areas: particularly white oak, bur oak and northern pin oak. Promote oak recruitment: cut and stump treat box elders, aspen, and exotic trees or saplings that may be shading and suppressing oak seedlings. Leave cut trees to rot in place on the ground.
7. Introduce biological control organisms to control garlic mustard when and if they are eventually identified and certified for release.

### **Mesic Oak Forest**

Mesic oak forest occurs in small ravines and portions of toe slopes on the steep bluff slope along the north side of the park. The largest and best examples of this forest were mapped separately from the dry-mesic oak forest (Figure 10). Numerous other very narrow ravines also contain mesic conditions but were not mapped separately from the dry-mesic forest of the slopes. Mesic forest conditions are also localized on areas of clayey soils on spur ridges and below limestone cliffs.



Areas mapped as mesic oak forest in the park are somewhat variable in composition but common dominant trees are red oak, sugar maple, green ash, hackberry, basswood, box elder, and slippery elm. Canopy cover is variable but generally fairly high. Tree seedlings are predominantly green ash, sugar maple, and basswood. Ironwood is also very infrequently present in the subcanopy. Red oak seedlings are not common. Without active management over time, sugar maple, basswood and green ash will be more dominant in the canopy.

The shrub cover is variable in these areas and depends on aspect and amount of shade, with the shadiest areas having little shrub cover. Chokecherry is highly abundant in most of these ravines. Bladdernut, a shrub of moist, well shaded slopes, occurs in several ravines most often on the most sheltered, east-facing slopes. Other shrubs found in the ravines include Missouri gooseberry, prickly gooseberry and red-berried elder. The diversity and abundance of herbs in these ravines is generally quite low.

Mesic forest herbs found in the most sheltered parts of the ravines, most commonly on east-facing slopes of ravines, include Virginia waterleaf, large-flowered bellflower, carrion flower, pale touch-me-not, woodland sedge, columbine, lopseed, Solomon's seal, racemose false Solomon's seal, wild geranium, Canada violet, Sprengel's sedge, zig-zag goldenrod, bloodroot, cleavers, and heart-leaved aster. Virginia creeper is one of the most common plants on the ground in these ravines on stable soils as well as on limestone talus (float slopes) where few other herbs occur.

Garlic mustard is dense in these ravines. It is colonizing large areas of bare soils in the ravines. Buckthorn is also present, but fairly thin in areas of high shade.

Most of these ravines currently have moderate to very severe erosion in channels from storm water runoff (see more detailed notes on erosion in the previous section on bluff slope erosion). Several ravines also have large amounts of limestone talus and or discarded concrete pieces in the middle of the ravines.

- Polygons 7 & 8, at the west end of the park. These ravines, together with the adjacent lowland hardwood forest, have the highest diversity and abundance of spring ephemeral wildflowers in the park. As indicated by the 1940 aerial photo (figure 5), this is the least-disturbed portion of the bluffs in the park. Spring ephemerals include dense, extensive carpets of white trout lily, false rue anemone, Dutchman's breeches, and white toothwort – these species do not occur elsewhere within the park. Other mesic forest herbs in this ravine include Virginia waterleaf, Canada violet, wild ginger, wild geranium, large-flowered bellflower, Sprengel's sedge, common blue violet, wild leek, zig-zag goldenrod, blue cohosh, and enchanter's nightshade. This high diversity of wildflowers indicates that this portion of the park was not grazed in the past. Of the two ravines, polygon 7 is in the best condition and is the best example of mesic hardwood forest in the park. This ravine is threatened, however, by an eroding channel from storm water runoff on the upper west side of the ravine. Polygon 8 also has abundant spring

ephemerals, but has poor canopy cover with young trees. The ravine has some large buckthorn plants that should be removed soon. Heavy garlic mustard cover also exists in both of these ravines.

- Polygon 9. Two small ravines separated by a spur ridge. No gully erosion problems. Small areas of mesic forest herbs.
- Polygons 10, 11 and 12. Mesic forest herbs present at the bases of the ravines. These ravines have heavy gully erosion from storm water runoff. Erosion is taking out soil from tree roots and some trees have toppled over. Lots of bare soils. Frequent buckthorn present. Dense garlic mustard.
- Polygon 13 has marginal tree canopy structure but has one of the better populations of mesic forest wildflowers, dominated by Virginia waterleaf and wild ginger in a large basin at the bottom of the ravine. Low levels of erosion are present on steep side slopes in the ravine. Garlic mustard is very dense in much of the ravine. After the west end ravines, this ravine would be the next highest priority for local garlic mustard control.
- Polygon 14. A small ravine with good quality forest located below a heavy limestone talus pile. The lower half of slope has black ash, American elm and hackberry. Mesic forest herbs are present on the lower part of ravine. Buckthorn seedlings are abundant.
- Polygon 15. This is one of the more intact ravines: narrow and well-forested. Mature slippery elm, basswood and green ash in the tree canopy. Steep sides of the ravines have some bare sandy soils due to the steepness and looseness of the soils.
- Polygon 16. A broad, shallow bowl mostly dominated by hackberry and box elder but also containing slippery elm, basswood, sugar maple and green ash. Much Sprengel's sedge on steep sandy slopes on the east side of the ravine. Low amounts of gully erosion present. Good forest herb cover on lower slopes.
- Polygon 17. Patchy tree canopy and high shrub cover. Sugar maple present. Large patches of Sprengel's sedge on east side of ravine. Good forest herb cover on lower part of ravine.
- Polygon 18. This is a broad ravine with patchy canopy cover of mostly young trees, including much slippery elm, sugar maple, green ash. The upper half of ravine is covered with young, invasive, weedy trees: white poplar, aspen and box elder. Some good forest herb cover at the low end of the ravine.
- Polygon 19. Much green ash and basswood present. Side slopes and bottom of ravine have some mesic forest herbs. Heavy garlic mustard infestation.

**Management Comments:**

1. An analysis by hydrogeologists and engineers is needed to determine the causes and solutions to numerous instances of excessive bluff erosion from storm water runoff. The highest quality ravines threatened with gully erosion from storm water runoff are Polygons 7 and 13. Excessive bluff erosion is severely compromising the quality of the native habitats on the bluff slopes, the integrity of the trail systems on the bluffs, and the quality of the aquatic habitats in Crosby and Upper Lakes.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Continue monitoring and control of buckthorn and honeysuckle. Expansion of these exotics into thickets will directly threaten forest herb populations and promote bare soils prone to erosion.
4. In areas not prone to excessive stormwater runoff, revegetate bare soils to help stabilize soils and recolonize areas formerly covered by dense buckthorn thickets. A species list of herbs recommended for planting is given in Appendix B; a methodology is given in restoration recommendation #4. Also, try transplanting small amounts of white trout lilies into some of these ravines from its stronghold at the westernmost end of the park. To do this, dig a piece of ground containing trout lilies about 1 foot in diameter and at least 1.5 feet deep, as the bulbs of trout lilies are deep below the ground surface. A shovel full of ground can be dug in the fall and transferred to an equivalent sized hole in the target area. Trout lilies spread vegetatively by stolons. Try this with just a couple of shovels worth of plants and monitor the results. The loss of a couple of shovels worth of plants will not put a dent in the massive population of trout lilies on the west end slopes.
5. Garlic mustard control via weed whipping when plants are in flower (see recommendation #5 in the proposed management and restoration projects section). This may have to be done at least twice during the growing season. Top priority ravines for this would be polygons 7, 8, 13 and 16. Monitor and evaluate this to determine if it is effective in reducing the garlic mustard population. Otherwise, wait for a biological control organism to be identified for garlic mustard control (this is currently being investigated by the DNR's biological control unit (Skinner 2004)).
6. Promote canopy closure and greater shade. This will enhance bird habitat and deter buckthorn, which prefers much light penetration. Accomplish this by removing weedy trees (box elder, cottonwood) that appear to be overly shading seedlings or saplings of trees of more desirable mesic oak forest trees. Plant seedlings or small trees into light gaps, particularly red oak, basswood, slippery elm, and green ash. Do not plant sugar maples, as sugar maple is already seeding itself into these ravines, and dense sugar maple reproduction creates very heavy shade which promotes bare soils prone to erosion.

## Lowland Hardwood Forest

Areas mapped as this type occur as a narrow transition zone between steep bluff slopes and wet bottomlands. Unlike floodplain forest, this area is not frequently flooded. Unlike mesic oak forest, these woods lack sugar maples and oaks. This forest is generally well-shaded with continuous to interrupted (50-100%) canopy cover but with occasional areas of thin, gappy canopy cover. Dominant trees in this zone consist of basswood, hackberry, green ash, box elder and cottonwood. Hybrid black willow is often dominant on wetter soils near the margins of lakes. Shrub species include chokecherry, common elder, and Missouri gooseberry. The herb layer includes many mesic forest herbs. These woods are fairly degraded from past grazing and have low native plant species diversity. Very heavy buckthorn concentrations in these woods in the past have also contributed to low herb cover on the ground.



- Polygon 20. This is an area of forest on toe slopes at the west end of the park. These toe slopes are dominated by a mixture of mature hackberry, sugar maple, basswood, cottonwood and box elder. The polygon contains a grove of large, mature Kentucky coffee trees with numerous small saplings formed from root suckering. This species is uncommon in Minnesota, which is at the northern end of its range in North America, and occurrences of it have been tracked by the DNR's Natural Heritage Program for possible status as a listed rare species. The stand also has a very large butternut that lacks signs of butternut canker. Subcanopy size sugar maple trees are present. A fairly high shrub cover consists primarily of bladdernut. This stand is probably the top place in the park to see wildflowers as it has a high diversity of spring ephemeral wildflowers and mesic forest herbs. The herbs include false meadow rue, white trout lily, Dutchman's breeches, toothwort, blue phlox, Canada violet, wild geranium, and wild ginger. The trout lilies are part of a very large and dense patch of tens of thousands of plants that extends along the toe slopes and most of the way up the sides of the bluff face. Buckthorn is common and dense in parts, particularly on the bluff side slopes. Garlic mustard is highly abundant.
- Polygons 21 & 22. This is a long narrow zone of forest extending along the bottom of the bluffs along Upper and Crosby Lakes. The canopy cover is variable and very thin or full of gaps in places. Areas of thin canopy cover or light gaps have dense shrub cover including buckthorn. A grove of young walnut trees occurs along Crosby Lake. This area contains some thickets of dense, large buckthorn along the level ground along the east half of Crosby Lake. Portions of this thicket were cut and treated over the winter in 2004.

### Management Comments:

1. Continue to cut and stump treat remaining thickets of buckthorn. A top priority place for this is in the western most part of the park (polygon 20). Also, the heaviest remaining

buckthorn infestation is in the woods bordering the north side of the east half of Crosby Lake (see Figure 12).

2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Promote canopy closure to enhance bird habitat and create more shade to deter buckthorn. Cut box elders that may be shading and suppressing seedlings and saplings of more desirable tree species (especially basswood and green ash).

### **Black Ash Seepage Swamp**

Black ash seepage swamps occur in small areas of groundwater seepage on toe slopes at the base of the bluffs along the north side of the park. These swamps occur within the zone of lowland forest along the base of the bluff. The wettest seeps are dominated by small to mid-size black ash with interrupted (50-75%) canopy cover. Soils in these areas are soft, saturated muck. Other trees occasionally present within seeps include American elm and box elder. Shrubs are common in these seeps and include common elder, swamp currant, and common buckthorn. Black ash seedlings are common. The herb layer in wettest areas is dominated by a dense carpet of spotted touch-me-not. Skunk cabbage is a characteristic plant in these seeps that does not occur elsewhere in the park. Other common herbs include marsh marigold, fringed loosestrife, obedient plant, sensitive fern, stellate false Solomon's seal, and lake sedge.



Several species are missing that are present in less disturbed swamps, especially graminoids – see the species list in Appendix A and the list for wet ash swamp in Appendix B. Localized patches of reed canary grass are also present.

- Polygon 25 denotes a cluster of individual black ash swamps. This polygon also includes areas of lowland hardwood forest around the seeps. Recent management activity has cut and treated much large buckthorn within this polygon. The clusters of skunk cabbage in this zone mark the greatest areas of groundwater seepage.

#### Management Comments:

1. Continue monitoring and removing buckthorn.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Monitor and correct areas of soil erosion that cause soil deposition within these swamps, if they exist. Soil deposition promotes reed canary grass expansion within these swamps.

4. Control reed canary grass patches to keep it out of the swamps:

- cut reed canary grass down to ground level in June just after it has sent up flowering stems – a brush saw fitted with a grass blade works well – leave cuttings in place
- follow-up spraying: spot spray or apply with wick application Roundup (or Rodeo if near open water) on to the previously cut reed canary after first frost in the fall (late Sept. or Oct.). Be very careful to avoid spraying other plants.

## Cliffs and Talus

This unit consists of large, exposed cliffs of St. Peter Sandstone or Platteville Limestone or large areas of limestone talus accumulation (float slopes) at the foot of cliffs. There are also numerous small areas of exposed St Peter Sandstone on mid- to lower slopes of the bluffs that were too small to map as polygons but are noted in the erosion maps (Figures 6 and 7). Many of these areas are subject to lots of human traffic; small caves are being dug into some of the sandstone exposures.



- Polygon 39, steep cliffs along main entrance road. This area of exposed St. Peter Sandstone and Platteville Limestone along the main entrance road to the park was created by road construction. A cave excavated into the sandstone has doors and is actively used. A steeply sloping float slope of limestone talus occurs along the base of this cliff. This talus has been invaded by trees: mostly cottonwoods, but also with some red oak saplings. Other trees present include the exotics Siberian elm and Russian olive. The ground on the slope is dominated mostly by smooth brome. Some prairie-associated herbs present include Canada goldenrod, tall goldenrod, and false boneset may have colonized from former savanna areas at the top of the cliff. The exotic tree Russian olive is abundant at the base of the talus. Several oak seedlings have successfully invaded and remained rooted in the talus, which suggests that additional oaks may colonize the talus slope or could be planted as acorns.
- Polygon 32, just east of the St Peter Sandstone cliff along the main entrance road. This is an area of super steep, limestone talus. This area has little tree cover consisting of scattered cottonwoods. Beneath the cottonwoods is a very dense thicket of large buckthorn. Highly eroded, bare soils occur underneath the dense buckthorns.
- Polygons 33, 36, 37, 28, 38, 40, on upper slopes of the bluffs north of Crosby and Upper Lakes. These are areas of heavy limestone talus accumulation as a result of undercutting of the limestone cliffs along the tops of the bluff. These areas occur primarily at the tops of ravines. Headward erosion may have contributed to

accelerated cliff undercutting and erosion within the ravines. Vegetation on these talus slopes is highly disturbed and contains little tree cover. Virginia creeper is common on the talus and may be more able to handle shifting talus piles than other plant species.

- Polygon 34, bluffs at far west end of the park. These bluffs are dominated by steep, eroding cliffs of St Peter Sandstone. The vegetation on the slopes is highly disturbed due to the instability of continually eroding bedrock faces. The slopes have little tree cover, and much buckthorn and other exotic plants on the slopes.

#### Management Comments:

1. Where possible, ameliorate areas of headward ravine erosion via stormwater runoff that promote undercutting and collapsing of limestone cliffs.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs. Several off-trail areas that attract human traffic are small sandstone exposures on the bluffs that are becoming badly eroded and growing in size. Comments about specific eroded exposures are given in preliminary report on bluff slope erosion given earlier in this report.

#### **Mature Cottonwood – Silver Maple Forest**

This community consists of areas of mature, even-aged continuous-canopied floodplain forest dominated by large, tall cottonwoods that form a supercanopy over other trees. A few of the cottonwoods are enormous, open-grown trees with huge trunk diameters and broad, widely spreading crowns. These few trees are progenitors of most of the cottonwoods in the park. They are surprisingly young, however: one that fell down in late summer 2004 was approximately 4 feet in diameter but had only 80 - 90 growth rings. Most of the other large cottonwoods are younger and straight-trunked, indicating that they grew up together in a stand.



Sites mapped with this type are predominantly on floodplain terraces between flood channels. Silver maples form a dense canopy below the cottonwood supercanopy and this type is very similar in composition to the mature silver maple forest type in this inventory. Other tree species in the canopy include green ash, hackberry, and box elder. Subcanopy size trees include silver maple, American elm, box elder and green ash. These woods are generally shaded well enough so that box elder expansion is not a problem. Shrub cover is usually very low in well-shaded areas or moderate in partially shaded areas. Shrubs are generally very scattered and consist mostly of Missouri gooseberry and common elder. Tree seedlings mostly consist of hackberry, green ash, silver maple, and American elm. The groundlayer is dominated by dense cover of wood nettles, particularly in areas of silty soil under canopy thin spots and gaps. Other common groundlayer herbs include white grass, Ontario aster, ambiguous sedge, and

goldenglow. Climbers are abundant, including river grape, Virginia creeper, woodbine, and moonseed.

The dense, multi-layered forest canopy in these stands constitute high quality habitat for forest canopy birds, including many forest songbirds that could potentially be nesting in the park. Restoration of high quality forest canopies in adjacent disturbed areas, mapped in this inventory as box elder disturbed or cottonwood disturbed forest, would greatly enhance the park's potential for sustaining breeding populations of forest interior bird species.

Exotic species include garlic mustard in areas of thin wood nettle cover, such as in densely shaded parts of the forest. Because garlic mustard does not appear to invade heavy wood nettle cover, the garlic mustard infestation is less intense on the floodplain than on the bluff slopes. Several sweeps to remove buckthorn in recent years have reduced buckthorn occurrences, but some areas of buckthorn remain, particularly in areas of little to no shade (see figure 12). Creeping Charlie is an abundant exotic plant on the ground nearly throughout the wood nettle thickets.

#### Management Comments:

1. Continue monitoring and removal of buckthorn and tartarian honeysuckle.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.

### **Mature Silver Maple Forest**

These are even-aged stands with dense canopies of silver maples and are very similar to the Mature Cottonwood – Silver Maple Forest type. These stands occur primarily within channels frequently flooded by the Mississippi. Cottonwoods are sometimes present but are generally not very abundant, as they have a lower tolerance for prolonged flooding than silver maples. These forests have a sparse subcanopy cover of primarily silver maples. Often there is no shrub cover. Areas on upland terraces have dense herb cover dominated by wood nettles. Low, moist ground in flood channels has bare soil. Silver maples typically occur as narrow bands on the margins of the most frequently flooded channels with bare, unvegetated soil in the centers of the channels. In light gaps in wide places in flood channels there are some wet spots dominated by sedges, particularly lake sedge.



Buckthorn tends to be absent from these stands, as it may not withstand prolonged flooding and shaded conditions. Reed canary grass is present in some unshaded areas of moist silty soils. Creeping Charlie is highly abundant outside of frequently flooded channels.

These stands have intact, continuous floodplain forest canopies and are high quality habitats for forest canopy birds. Restoration of high quality forest canopies in adjacent disturbed areas, mapped in this inventory as box elder disturbed or cottonwood disturbed forest, would greatly enhance the park's potential for sustaining breeding populations of forest interior bird species.

- Polygon 52, along the southeast side of Crosby Lake. This is a younger stand than other silver maple stands in the park. It is even-aged and has continuous canopy cover formed by silver maples.

Management Comments:

1. Continue monitoring and removal of buckthorn and tartarian honeysuckle.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.

### **Cottonwood Disturbed Forest**

These are stands of disturbed floodplain forest dominated by even-aged, young, straight-trunked cottonwoods on terraces between flood channels that were once cultivated or cleared and grazed. These stands are co-dominated by box elders and are very similar to areas mapped as Box elder Disturbed Forest. In contrast to the box elder disturbed forest, these stands have higher canopy coverage and a higher abundance of late successional tree species in the canopy, particularly silver maple and green ash. Hybrid black willow is co-dominant along the margins of lakes. American elm is abundant in the subcanopy. The herb layer has heavy cover of wood nettles in most of the stands. Areas of much garlic mustard cover are also present, particularly where wood nettle cover is thin. Creeping Charlie is abundant throughout. Other abundant native herbs include Ontario aster, white grass, and goldenglow.

Management Comments:

1. Monitor and control buckthorn and honeysuckle.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Promote replacement of box elders to allow better canopy development by cutting and stump treating large box elders that are shading and suppressing tree seedlings of the following species: silver maple, green ash and basswood (see restoration project #7).

## Box elder Disturbed Forest

This type occurs primarily on formerly cultivated areas or cleared and grazed areas on floodplain terraces between frequently flooded channels. The canopy, composed nearly entirely of box elders, is low and very patchy (25-50% cover) with frequent small to large canopy gaps. American elms are frequent as small, subcanopy-size trees in some areas but are absent as large trees. Other tree species in the canopy are very rare in much of the box elder disturbed units - these include silver maple, green ash, hackberry, hybrid black willow, cottonwood and basswood. The herb layer is composed mostly of a dense cover of wood nettles. Native herbs scattered within the heavy nettle cover include goldenglow, Ontario aster, and white grass. Exotic species are common, including creeping charlie, bittercress, and reed canary grass (unshaded depressions). Tree seedlings are often very sparse and consist primarily of hackberry and green ash. Succession to a more natural floodplain forest is proceeding very slowly in much of these areas.



These stands are very poor habitat for forest bird species, particularly canopy-nesting birds. Judging from the very low abundance of tree seedlings in these stands, these areas will take a long time to succeed to better quality forest. These areas would be excellent sites for forest replanting to accelerate conversion to closed canopy forest composed of late successional tree species, particularly green ash, basswood, hackberry, and silver maple. The return to a continuous canopy cover of these areas would greatly enhance the park's habitat for forest birds.

- Polygon 82. Scattered large and much small box elder with lots of light gaps. Occasional large multi-stemmed silver maples. Green ash is present but rare. Deep drifts of river sand in places.
- Polygon 77. Scattered large and much small box elder. Portion north of trail and south of Crosby Lake includes some tall cottonwood and silver maples; green ash and hackberry seedlings present. Dense garlic mustard in shadier areas of diffuse wood nettle cover. South of the trail includes scattered, planted red pines within the box elder matrix. This part is in worse condition with fewer trees and seedlings of species other than box elder or pines.
- Polygon 79. This is the second most disturbed of the box elder stands. Large area of low, scruffy, even-aged box elders with lots of canopy openings filled with dense wood nettle and common nettle cover. Occasional green ash, cottonwood and silver maple. Contains a cluster of a few large and small white pines.
- Polygon 80. This is the most disturbed of the box elder stands. Large gaps are visible in the 2003 photography. Large areas here have no trees in the canopy other than box elder. One small area has a cluster of green ash saplings near a mature green ash tree. Very dense wood nettle cover essentially throughout.

### Management Comments:

1. Monitor and control buckthorn and honeysuckle.
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Promote replacement of box elders to allow better canopy development by cutting and stump treating large box elders that are shading and suppressing tree seedlings of the following species: silver maple, green ash and basswood. In particular, target female box elder trees for cutting and stump treating, as these are the trees that are setting seed.
4. These stands are excellent candidates for planting other tree species to accelerate conversion of the stands to higher quality floodplain forest (see suggested project #7 in the potential management and restoration projects section). A shelterwood approach is recommended, which involves cutting and stump-treating areas of box elder and planting seedlings or saplings of silver maple, green ash, basswood, and hackberry.

### **Planted Pines**

These are areas of well-drained, sandy terraces within the floodplain where red pines were planted many years ago. These islands of river sand are higher in elevation than most of the surrounding floodplain. Pines do not tolerate flooding well and are restricted in the park to high, terraces of river sand that are above extended flood events. These stands have closely spaced young to mid-sized red pine trees. In the densest areas of pines, few other trees and herbs occur and the ground is covered by needle duff. In thinner areas, other trees mixed in with the pines are predominantly box elder, and also include paper birch, hybrid black willow, American elm, cottonwood and green ash. There are some dense thickets of common buckthorn and honeysuckle in areas of thinner pine cover. In silty soils with less river sand these stands also have a lot of garlic mustard and wood nettles. Moonseed is a particularly abundant climber in these stands.



Scattered red pines also occur in other parts of the park, particularly in southwest half of the box elder disturbed forest of polygon 77. These are well spaced trees and occur within a matrix of poor quality woods dominated by box elders.

The dense pine stands are in poor condition due to close spacing (3 to 5 foot spacing): their root systems are too crowded and the trees are shading each other. Many pines are also being shaded by neighboring deciduous trees. The pines in these conditions have very few branches with needles. Thinning the pine stands would allow the remaining trees to have more space to grow, develop stronger root systems and become larger, healthier trees.

A portion of the pine stands are close to cut banks of the Mississippi River, where trees are falling over into the river. Though pine stand thinning will produce stronger healthier trees with larger, more fibrous root systems, it is unlikely that pine stand thinning will

have much influence in deterring riverbank erosion along the Mississippi River's edge, however, as pines are shallow-rooted with roots confined to the top 36 inches of soil (Olson, pers. comm.)

There are a few large white pines also on sandy floodplain terraces but they are widely spaced and were not mapped separately from the surrounding box elder disturbed forest (polygon 79).

#### Management Comments:

1. Identify and control thickets of common buckthorn and honeysuckle.
2. Thin out dense pine stands to promote healthier trees. 10 x 10 foot spacing between trees will promote healthier stronger trees (see discussion above). Martin and Lorimer (1996) recommend that red pines with a diameter of 6 inches be thinned to 450 trees per acre, which is greater than 10' x 10' spacing between trees. In thinning pines, the smallest and least healthy trees should be cut out. Thinning to 10 x 10 foot spacing will involve removing more than half of the existing trees in the dense pine stands. A small sign explaining to the public that this is for the good of the remaining trees may be a good idea.

### **Planted Spruce**

These are planted stands of white spruce on high, river sand deposits on floodplain terraces. Areas of dense, closely-spaced spruce trees have heavy shade, dense needle litter and few other plant species within them. Many trees are very small and are being over topped and shaded by deciduous trees (American elm, box elder, silver maple, hybrid black willow). Numerous small, shaded spruce in the stands are dead. Other mid-size spruces completely lack needles except for a few small branches at the tops of the trees where they reach small light gaps.



Though the dense spruce stands in the park are larger than the red pine stands, it appears that the spruces are more prone to overtopping and are dying off at a faster rate than the pines. Several dense stands along the paved trails are persisting because they are in permanent light gaps created by the trail corridor.

#### Management Comments:

1. Monitor and control buckthorn and honeysuckle.
2. Remove dead spruce trees and thin the stands to allow the remaining trees more space and light.

## Disturbed Woods

These are highly degraded areas on sites exposed to much human disturbance. In general they consist of a mixture of early successional tree species particularly cottonwood and box elders, large patches of old field exotic grasses, other exotic weeds such as burdock and buckthorn, and patches of brush particularly black raspberry and staghorn sumac.



- Polygon 92. This is an area of young trees and brushy old field on steep slopes constructed for Shepard Road along the east end of Crosby Lake. Young cottonwoods are the most common trees. Other abundant trees are small American elm, green ash, and box elder. Siberian elms are scattered throughout open areas on this slope. Black locust lines the uppermost edges of the slopes and is invading down slope. Garlic mustard is very dense in large parts of the slope. Other exotics present in bromy open areas include: amur maple, burdock, dandelions, and exotic grasses especially smooth brome and Canada bluegrass. Tartarian honeysuckle and buckthorn are scattered throughout. There are large patches of dense shrub thickets, including staghorn sumac clones.
- Polygon 96: west of Watergate Marina. The perimeters of this patch of floodplain consist of earth that was dug out of the river bottom to create the two inlets that border the polygon. These spoils are dominated by the invasive exotic tree black locust, and have abundant other invasive species including siberian elm, box elder, buckthorn and staghorn sumac. The interior of this rectangular polygon contains a remnant of disturbed floodplain forest dominated by cottonwoods, including a small patch of tall, straight trees. Much of the area has dense sub-canopy to canopy sized box elders and a high concentration of buckthorn. This area should be a priority area for buckthorn and other exotic species control (see Figures 12 and 13, and project # 2 in the recommended restoration projects). Planting native floodplain forest trees would greatly improve the condition of the habitat. A management plan for Watergate Marina will be completed in early 2005 that addresses the condition and restoration of this portion of the floodplain forest in much greater detail.

### Management Comments for polygon 92:

1. Monitor and control invasive exotics: buckthorn, honeysuckle, Siberian elm, black locust (see Appendix C).
2. Actively discourage off-trail use by visitors and their pets, such as by blocking access to closed travel routes and posting signs.
3. Eliminate brush thickets. For sumac, this involves cutting twice a year at flowering time and treating cut stumps with Roundup (see Appendix C).

4. Plant trees into existing large gaps or gaps created by cutting and stump treating box elder (see potential projects section). Protect the planted trees with tree mats. Plant mostly bur oak and white oak which are less susceptible to oak wilt than red oak.

Management Comments for polygon 96:

Follow the same recommendations as above, but because this stand is on the floodplain the appropriate tree species for planting would be basswood, silver maple, green ash and hackberry. Bur oak could also be planted in unshaded areas on the berms, as it naturally occurs in better-drained portions of floodplain forest stands. Do not plant swamp white oak, a species that does not occur in this portion of the Mississippi River Valley.

### Cattail – Bur Reed Marsh

Emergent marshes surround both lakes in the park. Many parts of the marshes were not marshes in 1940, as the photo shows that Crosby Lake was much smaller than it is today (Figure 5). These marshes are dominated primarily by narrow leaf cattail, an invasive species from eastern North America that did not originally occur in Minnesota. Unlike the native broad-leaf cattail, this species forms very dense, mono-specific stands. Its invasion throughout our region has been linked to nutrient enrichment (particularly nitrogen) from storm water runoff. Much of the narrow-leaf cattail thickets have very little plant diversity in the park. Patches of other species are scattered throughout the cattail stands, including frequent patches dominated by giant bur reed, and less frequent areas dominated by lake sedge or broad-leaved arrowhead. Softstem bulrush commonly forms a zone along the edge of open water. Wild rice occurs in deeper water than other emergents in Upper Lake. Other frequent graminoids in the marshes include giant manna grass, bluejoint, and fowl meadow grass. Several wetland forb species are common, including great water dock, tufted loosestrife, swamp milkweed, and water smartweed.



Reed canary grass frequently intermixes with these marshes in the park, particularly on the edges of dense, mono-specific reed canary grass zones. Crosby Lake's water levels in 2004 were significantly lower than in recent previous years, as evidenced by newly exposed mud flats on the margins of the lake, which is causing a shift in cattail marsh and reed canary grass zones. Narrow leaf cattail is colonizing newly exposed lake beds formerly occupied by water lilies on the margins of the lake. Also, it appears that reed canary grass is invading areas of cattails, particularly on higher ground away from the lake where less standing water is present than in previous years.

Purple loosestrife is present in marshes all the way around both lakes. Biological control insects have been released in the past to control this species in the park. It appears that the purple loosestrife population has been set back, as infestations are not as dense as they have been in the past. In 2004, there was evidence that the insects are still actively eating the plants. The populations of control insects and purple loosestrife will follow

boom and bust cycles in the future. Purple loosestrife will never be completely eradicated from the park but the control organisms should keep it from overrunning the park and allow other marsh species to dominate (Skinner, pers. comm.).

- Polygon 107; on the middle of the north side of Crosby Lake. This is a white sand delta formed by storm water erosion into the St. Peter Sandstone on the bluff face. Reed canary grass dominates the highest parts of the delta along the forest margin. Close to the lake, the delta is dominated by *Juncus* sp. with much boneset, giant sunflower, small sand-bar willow, small amounts of narrow leaf cattail, and marsh spike rush. This sandy spit may well undergo succession to shrub swamp dominated by sand bar willow and then eventually be colonized by cottonwoods and hybrid black willows.

#### Management Comments:

1. Where possible, mitigate areas of silt deposition from storm water runoff by redirecting runoff water. Excessive bluff erosion greatly contributes to siltation in the lake basins and reed canary grass invasion.

### Sedge Meadow

A surprising find in this inventory was a few small areas dominated by native wetland sedges. The major dominant sedge species in these areas is lake sedge. Other sedges that are also present in some of these areas include beaked sedge, tussock sedge and aquatic sedge. Accompanying these sedges are other graminoids, including fowl meadow grass, bluejoint, giant manna grass, giant bur reed, and sweet flag. Typical forbs found in these areas include boneset, spotted joe pye weed, tufted loosestrife, spotted touch-me-not, giant water dock, bulbous water hemlock, marsh fern, sensitive fern, and broad-leaved arrowhead. These areas have some reed canary grass infestation and are surrounded by heavy reed canary grass. Because reed canary grass has been in the park's wetlands for a long time, these wet meadows probably represent a few small wetland areas that do not contain ideal conditions for complete reed canary grass invasion. These areas are located away from the lake's edge and are less exposed to lake water fluctuations, silt deposition from storm water runoff, or Mississippi River flooding than other wetlands in the park.



- Polygon 112. This is a small area of wet meadow surrounded on 3 sides by lowland hardwood forest. Reed canary grass occurs on the edges.
- Polygon 113, along the north side of Crosby Lake. This is the largest and highest quality sedge meadow remnant in the park. The meadow occurs on saturated soils with groundwater seepage on the edge of a black ash seepage swamp. This area is dominated mostly by lake sedge with much narrow leaf cattail, bluejoint, fowl meadow grass, sweet flag and sand bar willow. A few plants of the broad-leaved

cattail (*Typha latifolia*), the native, non-invasive cattail species, are also present here. This species was probably one of the dominant emergent marsh plants in the area but has been largely displaced by the invasive narrow-leaf cattail and reed canary grass. Further south, toward the lake, beaked sedge becomes more dominant. Further lakeward, the meadow then grades into a marsh dominated by giant bur reed, narrow leaf cattail, softstem bulrush and marsh spikerush. Reed canary grass is absent from most of the meadow but is abundant on its margins within 20 meters of the lake's edge.

**Management Comments:**

1. Ameliorate where possible conditions that promote the invasion, expansion and takeover by reed canary in these meadows – particularly in polygon 113. This should include monitoring for silt deposition via erosion from up slope.
2. Selectively remove the scattered reed canary grass in both sedge meadow areas. Good results have been obtained with the following method (Gaynor, 2004):
  - cut reed canary grass in June with a brush saw fitted with a grass blade just after it has sent up flowering stems – leave cuttings in place
  - if surrounding vegetation arches over the reed canary and shades it, then follow-up spraying might not be necessary
  - follow-up spraying: spray or wick apply Roundup (or Rodeo if near open water) to the previously cut reed canary after in Late September or early October
3. Consider selective removal of clumps of narrow leaf cattail. This could be accomplished by winter cutting in areas that flood in the spring (cut as low as possible – water above cut tips in the spring will kill the plants); or by selective application of Roundup (or Rodeo if near open water) onto plants using wick or glove application (method described in fact sheet, Appendix C).

### **Willow Swamp**

Three areas in the park are mapped as willow swamp: one at the far northeast end of the park and two between Upper and Crosby Lakes.

- Polygon 114: This is a small area of willow swamp that has undergone significant reed canary grass and narrow leaf cattail invasion. Away from Upper Lake, common shrubs include sand bar willow, false indigo and red osier dogwood. Lake sedge is present and probably dominated before reed canary and narrow leaf cattail invasion. Tussock sedge dominates along the margin of Upper Lake. Aquatic sedge is also present near the tussock sedge hummocks. Areas of greater standing water have less reed canary grass infestation. Other wetland graminoids present here include softstem bulrush, black bulrush, marsh spikerush, giant bur reed and reed grass. Other wetland plants include broad-leaved arrowhead, bulbous water hemlock, and water smartweed. Purple loosestrife is present.

- Polygon 115: This area sits on wet, sandy soils on the edge of the Mississippi river at the far east end of the park. The site is dominated by a dense thicket of hybrid black willow and sand bar willow saplings averaging approximately 2 meters tall. Lake sedge occurs throughout the thicket. Other plants present include Ontario aster, silver maple seedlings, broad-leaved arrowhead, Virginia wild rye, ironweed, and river grape. This area is being invaded by trees, particularly cottonwood and silver maple, and will succeed to floodplain forest dominated by those two species. This follows the typical process of point bar succession in which trees invade willow thickets, as discussed by Noble (1979).
- Polygon 122: This is a small cluster of sand-bar willows within a dense sward of reed canary grass.

**Management Comments:**

1. Allow continued succession to cottonwood forest in polygon 115.

### **Reed Canary Grass**

These are large wetland areas that have become completely overrun with the exotic reed canary grass. On the margins of the two lakes, reed canary grass occupies a zone of wet soils that are not flooded throughout the growing season. Thus, it occupies a position between emergent marsh (cattails, bur reed, bulrushes) and edges of the forest. In 2004, this zone appears to be expanding lakeward as the water levels in 2004 are significantly lower than they were in the 2003 aerial photography. Newly exposed mudflats adjacent to the water's edge are losing water lilies and are being invaded by narrow leaf cattail. Former cattail beds in areas that no longer have standing water are being invaded by reed canary grass. Other areas with heavy reed canary grass in the park include several wetland basins on the floodplains and numerous other scattered areas that have little shade and moist silty soils.



Conditions that promote reed canary grass infestation include: frequent large fluctuations in water levels, nutrient enrichment (especially nitrogen) from runoff, silt deposition from upslope erosion or heavy flooding, and import of reed canary grass seed which floats and is readily transported by water. These conditions are all supplied in abundance by storm water flow into the park. To some extent, heavy flooding of the Mississippi and Minnesota Rivers also promotes reed canary grass by adding areas of bare silt. Thus, changes in conditions that promote heavy reed canary grass infestations will require some large scale engineering solutions to storm water runoff that cause erosion and deposition of soil in the wetlands and large scale lake level fluctuations. Until such solutions are implemented it is not feasible to attempt any large scale removal of reed canary grass to convert it to another wetland type.

## **Planted Prairie**

This is an area of prairie plantings adjacent to parking lots at the west end of the park. The soils of this area are mesic to wet-mesic and formed in excavated fill put in place from past construction activities. These plantings have a number of native prairie species mixed with heavy infestations of exotic species (see species list). Exotics include Kentucky bluegrass, smooth brome, quack grass, red top, reed canary grass, Canada thistle, sweet clover, and dandelions. A recommended process for restoring this planting is given as project #9 in the restoration recommendations section, and a list of species recommended for planting is in the mesic prairie list in Appendix B.

### Management Comments:

1. Continue to hand pull or spot spray Canada thistle. Canada thistle populations greatly expand in cool wet years and contract in dry years. Thus the summer of 2004 was a good year for it.
2. Monitor and remove buckthorn and honeysuckle.
3. Treat heavy populations of exotic grasses and plant a diverse assemblage of prairie forbs and grasses. Steps to accomplish this are presented in project #9 in the section on proposed restoration projects.

## **Old Field**

Areas of ground dominated primarily by the exotic grasses smooth brome and Kentucky bluegrass.

- Polygon 139. This is a narrow strip of land with shallow soils over limestone bedrock. It is located along the top of the limestone/sandstone cliffs along the entrance to the parking lots at the west end of the park. This area is dominated primarily by smooth brome grass. Several invasive trees and shrubs are scattered throughout this strip: buckthorn, staghorn sumac, Siberian elm, eastern red cedar, Russian olive, and lilacs. Exotic herbs are also common: Canada bluegrass, catnip, butter and eggs, spotted knapweed, and white sweet clover. A small patch of big bluestem is present. Several native prairie plants have also persisted in the strip: false boneset, stiff goldenrod, smooth aster, heath aster, butterfly weed, prairie rose, woodland sunflower, Jerusalem artichoke, and grey coneflower. These plants are evidence of the oak savannas that occupied the high terrace above the bluffs at the time of Euro-American settlement.
- Polygon 148, engineered slope along Shepard Road east of I-35. This slope is dominated by very weedy, invasive exotics including smooth brome, crown vetch, leafy spurge, black locust, reed canary grass, quack grass, Canada thistle, smooth sumac, Siberian elm, parsnip, hoary alyssum and burdock. Big bluestem and wild bergamot are also present.

### Management Comments:

1. Monitor and remove buckthorn and tartarian honeysuckle.

2. Re-construction of oak savanna in old fields between Shepard Road and the bluff slopes would help buffer the native woods on the bluff slopes and enhance the scenery along the bike trail (see project #10 in the proposed projects section).

3. Control invasive exotics in these areas, especially spotted knapweed, leafy spurge and Canada thistle (see Figure 13 and Appendix C).

## **Disturbed Ground**

These are areas that are highly disturbed by human activity, mainly the recent redesign of the I-35 bridge and the storm sewer drainage construction located just west of I-35.

- Polygon 134; long narrow gap cut through floodplain forest east of I-35. This is an open, largely treeless line constructed for a storm sewer line that outlets on the edge of the Mississippi River. Presently the gap is dominated mostly by a dense thicket of invasive and weedy species including much reed canary grass, common nettle, Canada thistle, and burdock. Tree seedlings that have invaded the gap include American elm, green ash and box elder. Over time, this polygon will revert to forest; periodic culling and stump treating of box elder would promote greater green ash and silver maple cover.
- Polygon 151; former bridge construction site along the Mississippi River. Floodplain forest vegetation was removed and the land was compacted with heavy equipment for use as a lot for machinery used in the 2004 reconstruction of the I-35 bridge. The Minnesota Department of Transportation plans to revegetate this area as part of the bridge reconstruction project. Replanting should be to cottonwood-silver maple floodplain forest. After replanting of the site, box elder and buckthorn invasion of the site should be monitored and halted by periodically removing seedlings that invade the site.



### Management Comments:

1. Monitor and remove invasive species, particularly buckthorn and honeysuckle.

2. Bridge Construction Site Remediation: Convert this area of bare, highly compacted ground (inventory polygon 151) back to native floodplain forest. This site is already planned for remediation as part of the bridge construction contract.

Recommended Procedure:

Timing	Activity
Before planting	Run over the whole site with a 3 foot chisel plow to loosen the soil. This will be necessary to allow the roots of planted trees to expand horizontally
Late June	Plant containerized or burlapped trees at 8 foot by 10 foot spacing. Water the plants well. Put fabric tree mats around the bases of the planted trees and stake them into the soil. If tree seedlings are used instead, plant at a minimum density of 4 x 5 foot spacing.
	If a native grass cover is needed to stabilize the bare ground after tree planting, choose a native species such as Virginia wild rye.
2-3 weeks later	Re-water the planted trees at least once as needed.
Rest of the season	Mow the area a couple of times to keep weeds down. Or spray out weeds near trees with Roundup.
Year 2	Monitor trees; mow if necessary; replant if some trees fail

Comments:

Time the planting for late June to minimize the chances of a large flood event that would wash trees out of the site. Plant early in the year to give the trees the greatest chance of getting rooted in the ground before the following spring. Desirable species include: Cottonwood, silver maple, green ash, basswood and hackberry. Obtain local genotypes if at all possible. Trees can be obtained from the DNR nursery.

Site acreage = 2.4 acres or 104,544 sq. feet. At 8 x 10 foot spacing, 1307 trees are needed.

At 8 x 10 foot spacing, you should get tree canopy closure within 5 years.

A 4 inch layer of wood chip mulch over the entire site would be a good idea but a high flood event in the following spring would wash the mulch away.

### **Mowed Lawn**

Areas of Kentucky bluegrass that are maintained as lawns.

### **Developed Land**

These areas consist of parking lots, park shelters, I-35 and associated construction, access roads, and boat marina.

### Sandy Riverbank

These areas consist of sandy beaches and cut banks along the Mississippi River. Portions of the cut banks are being undercut by the river during river flooding. Trees growing along the river's edge are being undercut and toppling into the river. This is a natural process though it is somewhat accelerated in recent decades by larger more frequent floods as a result of wetland ditching and tile drainage throughout the Mississippi and Minnesota River watershed basins.



Thinning of the dense pine and spruce stands along the river's edge will enable those trees to become healthier and develop larger root systems. These trees are very shallow rooted, however, and stronger root systems are unlikely to have much benefit in resisting severe bank undercutting when the river is in flood.

### Open Water

This unit corresponds to open water in Crosby and Upper Lakes in 2003 aerial photography. A survey of the aquatic vegetation of the lakes was not in the scope of this report.



## Plant Community Quality Ranks

The condition of land cover types in the 2004 inventory was summarized in a scale ranging from A to D and mapped in figure 11. This scale is loosely based on the methodology used to rank native plant community occurrences by the Minnesota DNR, but does not use the same criteria. The criteria used in this inventory are as follows:

- A: Excellent: Areas of native plant communities undisturbed by modern human activity.
- B: Good: Areas of native plant communities with moderate disturbance but nearly intact species diversity. This includes floodplain forest stands that have recovered continuous tree canopy cover.
- C: Fair: Areas of native plant communities with high past disturbance or invasion of exotic species that has significantly reduced native species diversity and altered community structure.
- D: Poor: Not an example of a native plant community. Dominated by invasive or exotic species with a very low diversity of native species. Includes formerly cultivated, cleared, or constructed sites.

Crosby Park has had moderate to severe disturbance from past human activity. A few places in reasonably good condition (B rank) include the forested areas of high herb diversity at the west end of the park, and tracts of floodplain forest with a continuous canopy of mature silver maples. Most of the bluff slopes are in fair condition (C rank) due to past logging and grazing, buckthorn invasion and slope erosion. D ranked areas include most of the floodplains that were cultivated, the engineered slopes along Shepard road, marshes now dominated nearly exclusively by narrow leaf cattail, and areas of heavy reed canary grass infestation.

**Figure 11: Condition of Native Plant Communities at Crosby Park**



**Quality Rank**

- [Green Box] B: Good Condition
- [Yellow Box] C: Fair Condition
- [Grey Box] D: Poor Condition

Roads  
 Trails



## Potential Management and Restoration Projects

### **Summary:**

Crosby Farm Regional Park was highly degraded in the past by farming and is currently undergoing an onslaught of many different disturbances. This section lists and discusses ten potential management or restoration projects intended to prevent further degradation and maintain and improve the quality of the park as a natural area and place for recreation. The ten projects are listed below in approximate order of their immediate need.

The first two projects are absolutely critical to maintaining the park's existing natural habitats and should be undertaken as soon as possible.

1. Bluff slope erosion control
2. Continued monitoring and control of invasive species
3. Bluff trail redesign and reconstruction
4. Bluff slope revegetation and floristic enhancement
5. Mesic forest ravine garlic mustard control
6. Bluff slope oak forest canopy closure
7. Floodplain forest restoration
8. Forest restoration on the Shepard road bluff slope
9. Parking lot prairie management and enhancement
10. Terrace savanna reconstruction

## **Project Descriptions:**

### **1. Bluff Slope Erosion Control**

**Goal:** Stop excessive erosion of the bluff slopes from storm water runoff and off-trail traffic. This report documents numerous locations on the bluffs with excessive gullying and erosion (figures 7 and 8). These erosion sites are where storm sewer outlet pipes empty at the top of the bluff slope, where un-piped surface runoff water channelizes and runs into the bluff slope ravines, and where people have repeatedly gone off of the trail on to erosion-prone areas such as sandstone exposures. The bluffs have numerous instances of extreme erosion that is undercutting and toppling trees on the bluffs, washing out portions of the bluff slope trails, denuding native vegetation, promoting exotic plant invasion in the bluffs and wetlands, and depositing large amounts of soil and sand into Crosby and Upper Lakes. Excessive bluff slope erosion needs to be solved before other urgent problems can be solved, most notably the bluff trail reconstruction.

An engineering study of the causes and solutions to the bluff slope erosion from excessive stormwater runoff is urgently needed before major steps to curtail erosion can be undertaken. Potential solutions may involve expanding the stormwater catchment area that feeds into the drains that empty at the bases of the bluffs; piping or otherwise conveying water down the bluff slope from outlets that end at the top of the bluff; and installing pipes to convey to the floodplain channelized surface water not captured in storm sewers.

### **2. Continued Monitoring and Control of Exotic Species**

**Goal:** Prevent invasions of exotics; reduce/eliminate populations that already exist in the park.

One of the most degrading forces in native habitats is the continual onslaught of exotic plants. These plants crowd out native plants, degrade the quality of the habitats for wildlife, and promote bare soils susceptible to erosion. St. Paul Parks and Recreation staff have made tremendous strides in reducing the load of exotic plants in the park where possible. This work needs to be continued on an annual basis because more individuals of these exotics will continue to invade the park. Limiting off-trail use by walkers, bikers and pets, which degrades native habitats and promotes exotic species establishment, is also an important component of exotic species control in the park. Below is a summary and brief comments about particular species of concern. Fact sheets with detailed information on the control of these species are given in Appendix C.

#### **General approach to invasive management**

Management of invasive species, typically exotic, is a major concern of resource managers, and typically requires a great deal of resources. This has been the case for many years, and by all indications will continue to be a major focus and resource drain for managers in years to come. While techniques are improved and efficiency increases, new exotics are reaching the Twin Cities Metro every year. Wild parsnip and Queen Anne's Lace are two examples of exotics working their way up from the south. These are very invasive in Wisconsin and Illinois.

While management of each species is unique, and covered elsewhere in the report, a general approach to exotic management should include preventing exotic species invasions, as prevention is much easier and cost-effective than mop-up. Vigilance, plant identification, and keeping up with new exotics is key. If a new species reaches your site, attacking it fully is recommended. The wisdom of doing so is not always apparent to untrained personnel, so you may have to train and explain. Adopt a zero tolerance mandate for new invasives.

For species already present, a 3-pronged approach is best. Adopt a zero tolerance for an exotic expanding into new areas of your site. This means zero seed set in these expansion areas. The second prong is to start shrinking the range of the exotic. Perimeter populations and newly established populations are easier to control and should be a priority. The third prong is to weaken for several years the core population of an exotic. For prolific seed producing species such as garlic mustard and spotted knapweed, reducing the seed set is key. Zero tolerance at the worst infestations is not reasonable; adopt a more reasonable tolerance level – 90% reduction for example – for several years. If you are able to maintain that level of control, then increase the attack to zero tolerance of the species. These are multi-year approaches.

Great River Greening also believes that in general resource managers do not pay enough attention to seed vectoring. After working a garlic mustard invasion, for example, boots should be cleaned and even footwear should be changed. Contact GRG for more information on our demonstration projects for individual exotic species.

Biological control, while holding much promise, so far has just been one of 3 tools to help control species. Purple loosestrife control is the one that is most advanced in Minnesota – and the experts are predicting that it will follow a boom-and-bust cycle. Repeated releases of bio control may be required after the bust cycle if the bio control does not persist on its own. In short, for now consider bio control as one of your tools, not an ultimate tool.

### **Comments on specific species**

#### Common buckthorn:

Major progress over several years has been made in removing areas of very dense buckthorn infestation. This is critically important, as buckthorn causes extreme damage to native forest herb communities. Much work remains to be done, as a few dense areas still exist and other areas of young, more scattered plants are common (see figure 12). The continual seed rain of buckthorn seeds via the avian gastro-intestinal route into the park means that this work will have to be continued in the future. Greater tree canopy closure and shade in the park's forests in the future will lessen the extent of buckthorn infestations, as buckthorn is a light dependent species.

#### Tartarian honeysuckle:

Tartarian honeysuckle is also scattered throughout the park, and tends to co-occur with buckthorn. Large thickets were not seen in the park and so this species was not mapped. Control of this species is also needed. It can be more difficult to kill than buckthorn.

**Garlic mustard**

Garlic mustard occurs throughout the park and it did not make sense to map it. Levels of infestation are the densest on the bluff slopes. In floodplain forests, garlic mustard occurs primarily in areas of thin wood nettle cover. Overall control of garlic mustard in the park is currently not feasible. Research is currently being conducted to identify a biological control organism for this species – it should be released if and when a suitable organism is eventually identified and available. In the meantime, control of small patches of garlic mustard should be conducted through frequent cutting and/or pulling to prevent it from setting seed. Priority areas for control of small patches are areas of greatest diversity and abundance of spring ephemeral and other forest wildflowers in areas of mesic oak forest (see the mesic ravine project #5 below for discussion on mechanical control of garlic mustard).

**Leafy spurge**

Leafy spurge occurs primarily on the Shepard Road slopes east of I-35 (figure 13). This species should be treated and removed soon, as it is much easier to control recently established plants than long-established populations.

**Siberian elm**

This species is scattered along the top edge of the bluffs, in old fields and disturbed woods, and in small openings on the floodplain.

**Purple loosestrife**

This species is being controlled with biological control organisms. The population will boom and bust according to fluctuations in control organism populations. Priority areas for control should be sedge meadow remnants.

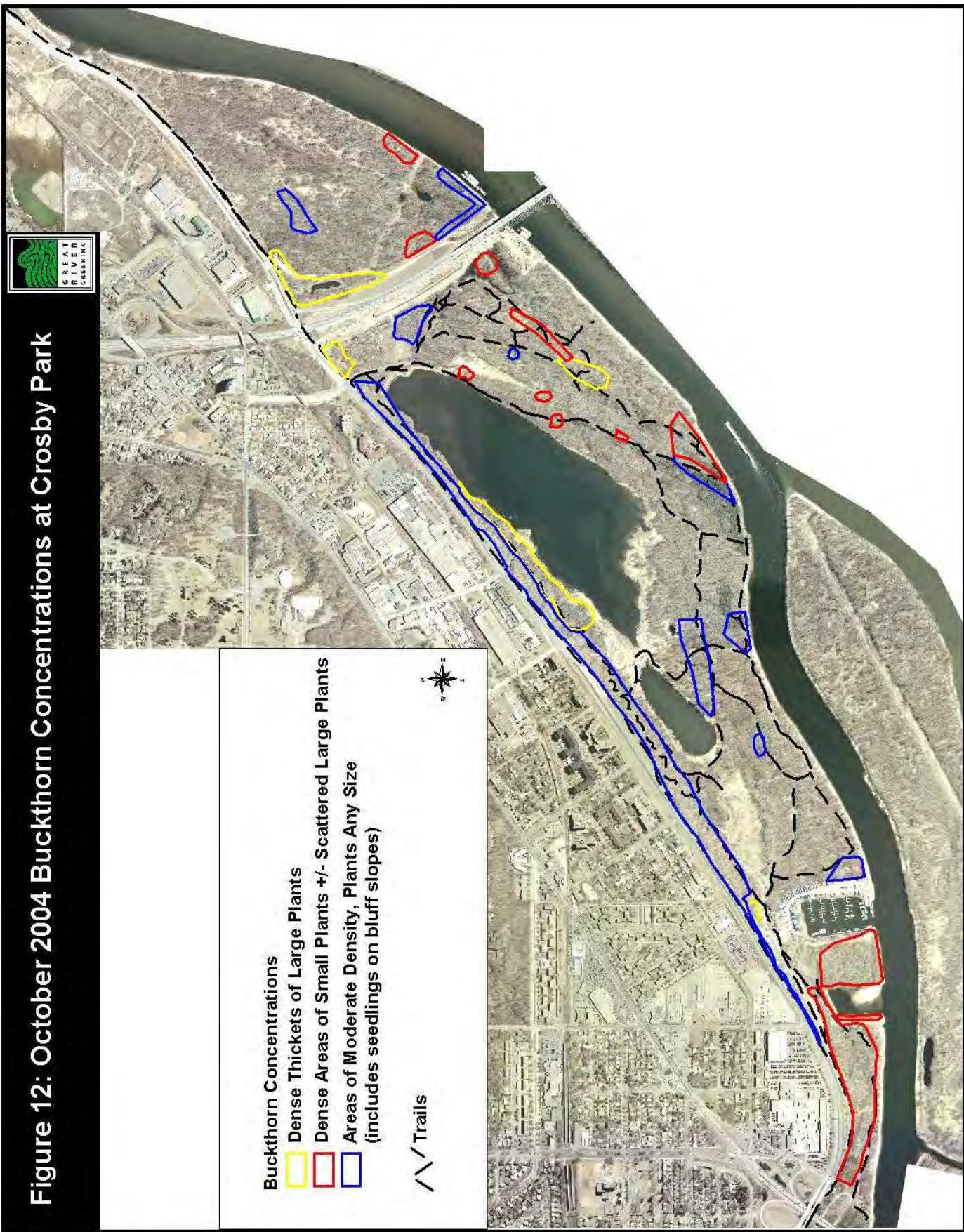
**Reed canary grass**

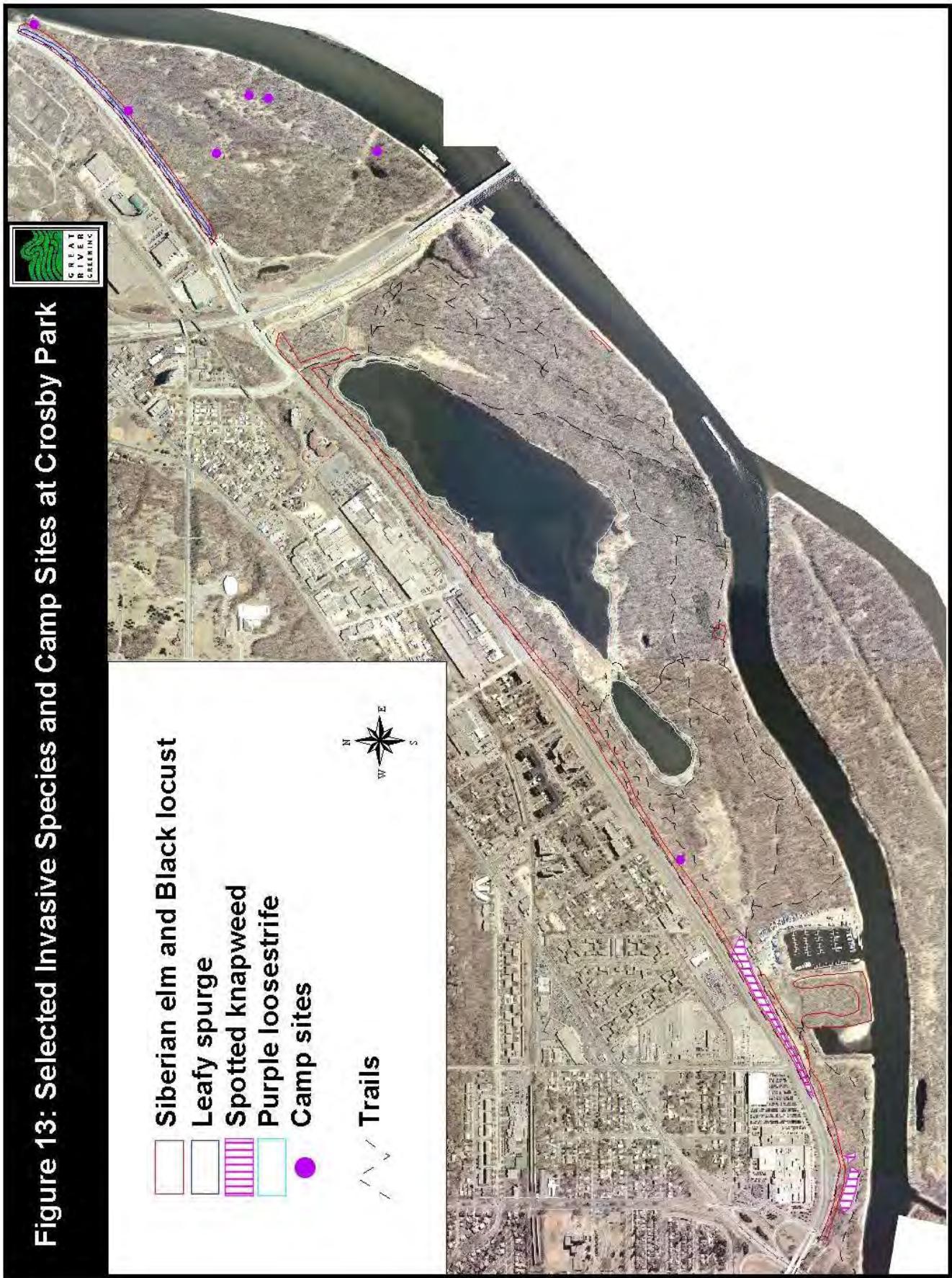
This inventory documents large areas of dense reed canary grass infestations. Much of the dense reed canary grass areas on the margins of Upper and Crosby Lakes are here to stay, as they are promoted by large scale conditions of high nutrient inputs, high water fluctuations, invasions of seed, and wetland siltation that are very difficult to resolve. It is, however, a good idea to remove reed canary grass from the small areas of sedge meadows and black ash seepage swamps. These small communities have not yet been overrun by reed canary grass and are some of the more unusual native habitats in the park.

We recommend the following approach to controlling small patches of reed canary grass:

- cut reed canary grass in June with a brush saw fitted with a grass blade just after it has sent up flowering stems – leave cuttings in place
- follow-up spraying: spray the previously cut reed canary in Late September or early October using Roundup (or Rodeo if near open water). Be very careful to make sure herbicide does not touch other species.
- Recheck the areas in following years to assess the effectiveness of this approach and repeat control measures as needed.

Figure 12: October 2004 Buckthorn Concentrations at Crosby Park





### **3. Bluff Trail Redesign and Reconstruction**

**Goal:** Rebuild bluff trails that have become severely degraded and close off areas of off-trail traffic that are eroding the bluffs and promoting exotic species invasions.

Portions of the trails on the bluffs on the north side of the park have become degraded from soil erosion and the decomposition of building materials in the trails. These problems stem from excess storm water runoff, heavy trail use and off-trail traffic over 30 years. Please see the companion report to this report entitled “Crosby Park: Bluff Trail Study” (Shaw et al. 2004) for an analysis of the trails and recommendations for their restoration. Much of the trail restoration work depends on first solving large scale problems from storm water runoff.

### **4. Bluff Slopes Forest Soil Stabilization and Floristic Enhancement**

**Goal:** Plant forest herbs into the woods on the bluff slopes in order to help stabilize the bare soils, enhance the plant diversity and visual appeal of the bluffs, and improve wildlife habitat. This work should not be done in areas where major erosion problems from storm water runoff are promoting erosion of steep slopes until those causes of erosion are resolved.

**Where:** The best parts of the bluff slopes for planting are areas of the most intact dry-mesic oak forest and mesic ravines that are not undergoing obvious erosion from storm water runoff and are not in the path of human traffic.

Best places to start:

- Inventory polygon 1 (slopes west of the marina)
- Inventory polygon 2 west of Upper Lake

#### **Recommended Procedure:**

<b>Timing</b>	<b>Activity</b>
	Identify a target area for replanting.
Fall	Cut and treat any buckthorn or honeysuckle that may be present in the target area – even small seedlings
before planting	Add topsoil to areas where surface soils have been washed away.
before planting	On very steep areas with surface erosion, consider placing biodegradable erosion fabric on the site to help stabilize the soil while plants are taking root
late April after thaw	Plant and water bare root seedlings (if available) of woodland herbs (refer to dry-mesic forest species list in Appendix B for suggested species)
2 weeks later	Re-water planted seedlings if necessary – keep plants moist for 3 weeks
May	Cut garlic mustard as it starts to flower with weed whips (see method below)
June	Plant potted seedlings of woodland herbs if bare root seedlings are not available
June	Re check garlic mustard and re-cut if necessary
Following months	Monitor success and establishment of herbs. Note which species are doing the best and which are not establishing
Next May	Return and cut garlic mustard in the plot;

**Comments:**

There are many areas of fairly bare soils on these bluffs. Many possible causes for these bare soils include: past over-grazing, unstable sandy soils on super steep slopes, sheet erosion by storm water runoff, past heavy buckthorn cover, possible digging by wildlife seeking acorns, herbivory by deer, and earthworms.

Earthworms have received a lot of attention lately as another cause of the loss of forest herbs in many woods in the state, as they consume the organic duff required by many wildflowers. In 2001, a preliminary test for earthworm infestation did not find many earthworms. Also, the highly abundant earthworm castings on the soil surface, typical of a woods with heavy earthworm infestation, was not seen on the bluffs.

Because of the many possible causes for the bare soils, we cannot predict for sure the outcome of planting herbs on these slopes. Nevertheless, it is definitely worth a start in one or two test plots to see what happens. Because this is of some research interest to the larger restoration community, an experimental approach may be a basis for getting funds for the work. Great River Greening is actively testing the methodology and outcomes of forest groundlayer revegetation and can assist with obtaining funding and conducting this work.

Early in the growing season, plant bare root or containerized seedlings of plant species that are suitable for the bluffs. Bare root stock is available from just a few suppliers, such as Prairie Moon Nursery, very early in the spring. Appropriate plants for sandy, well-drained soils on upper slopes and the tops of spur ridges are listed in Appendix B under dry-mesic oak forest. Plants appropriate for moist, clayey soils, mesic ravines and lower slopes are listed in Appendix B under mesic oak forest. Any plants that survive once planted will be useful for stabilizing the soil surface. Plants that may be particularly useful for stabilizing loose soils are species that spread vegetatively above or below the ground surface. Examples of these herb and climbers are:

<b>Species</b>	<b>Scientific name</b>	<b>Microhabitat</b>
Canada moonseed	<i>Menispermum canadense</i>	moist, well shaded ground
Common strawberry	<i>Fragaria virginiana</i>	open to semi-shade on dry to dry-mesic ground
Golden alexanders	<i>Zizia aurea</i>	dry-mesic ground in open to partial shade
Hog peanut	<i>Amphicarpaea bracteata</i>	dry to dry-mesic ground in partial shade
Long-stalked sedge	<i>Carex pedunculata</i>	moist, heavy soils in heavy shade
Pennsylvania sedge	<i>Carex pensylvanica</i>	dry to dry-mesic ground in partial shade
Spreading dogbane	<i>Apocynum androsaemifolium</i>	dry to dry-mesic ground in partial shade to open sun
Sprengel's sedge	<i>Carex sprengelii</i>	moist, shaded sandy soil
Virginia waterleaf	<i>Hydrophyllum virginianum</i>	moist, well shaded ground
Virginia creeper	<i>Parthenocissus vitacea</i>	dry-mesic to moist ground in shade
White trout lily	<i>Erythronium album</i>	moist, mesic ground in partial to full shade
Wild ginger	<i>Asarum canadense</i>	moist, heavy shade
Wild sarsaparilla	<i>Aralia nudicaulis</i>	shaded dry-mesic ground
Zig-zag goldenrod	<i>Solidago flexicaulis</i>	dry-mesic to mesic ground in heavy shade

Start this project in a small part of the bluffs and then monitor the planted seedlings to see how well they do. Note which species are the most successful and which are not. Adjust the list of species for future plantings based on the results. Look for the following: evidence of herbivory

by deer, evidence of sheet erosion that has washed out plants, earthworm castings, and other factors that may prohibit herb seedling establishment. Fencing to exclude deer from a planted area would be useful for ruling out deer herbivory.

## 5. Mesic Forest Ravine Garlic Mustard Control

**Goal:** Concentrate garlic mustard control in areas of high spring ephemeral and other forest wildflower diversity in order to reduce competition and overcrowding by garlic mustard. Garlic mustard has gained a reputation for crowding out native herbaceous plants.

**Where:** Selected mesic forest herb ravines on bluff slopes, and lowland hardwood forest west of the marina. Priority areas are: inventory polygons 7, 8, 13 and 16.

### Recommended Process:

Timing	Activity
Year 1 May	Cut garlic mustard with a weed whip when it begins to flower. Try cutting each plant into small pieces from the top down rather than just lopping it off at the base. Some practitioners have found that garlic mustard cut this way does not set seed. Pull whole plants out unless it causes too much disturbance to the soil surface. Remove whole plants from the site as they may set seed.
Year 1 3-4 weeks later	Monitor the cut plants 3-4 weeks later, as some managers have found it resprouting and reflowering at that time
Later in season	Check the plots to see how well garlic mustard was killed
Years 2-4	Return to the ravine and repeat above. You will be exhausting the native seed bank of garlic mustard, which may take a while because garlic mustard seed can be viable up to 5 years.
Years 2-4	Re-assess the results. Compare areas of garlic mustard control with areas of no garlic mustard control. Is this making any difference? Are the herbs in areas with no control disappearing?
Eventually	Release biocontrol insects for controlling garlic mustard; breathe a sigh of relief; hope for the best; now look for the next exotic invader...

This will have to be repeated several years in a row as the seed bank is exhausted. Because the area is saturated by the prolific garlic mustard, it will continue to seed itself into the control areas.

Eventually, release biocontrol organisms to control garlic mustard. Research to identify such organisms is currently underway at the MN DNR and Cornell University.

## 6. Bluff Slope Oak Forest Canopy Closure

**Goal:** Promote greater canopy cover in areas of dry-mesic and mesic oak forest.

This would enhance the native habitat for forest wildlife, especially forest-nesting songbird, help prevent invasion and expansion of buckthorn (a light-dependent species), and help stabilize bluff slopes. This work could be undertaken by identifying and working on 1-2 small target areas at a time. You could progress from one end of the bluff slopes to another. Planting more oaks would be an important step in revegetating areas of slope erosion after remediation.

### Recommended Procedure:

Identify target areas to do this. These are:

- Places where oak seedlings or saplings are being overly shaded by invasive trees.
- Places where there are existing large canopy gaps or concentrations of invasive tree species lacking any oak cover.

Cut and stump treat invasive species in target areas: particularly box elder, cottonwood, white poplar, aspen

- Small trees can be left as standing dead trees. Standing dead trees are good for wildlife.
- In the case of aspen, aspen can be girdled or cut and stump sprayed with herbicide. Girdling is less labor intensive and done with a tool called a ‘spud’ made from a leaf spring or any similar tool that will not damage the meristem of the tree yet remove a strip of bark all the way around the tree.
- Larger trees should be cut down, particularly where they might fall on trails. With cut trees, leave large cut parts on the ground to decay and remove and pile slash for later burning

Plant seedlings or seeds of trees to fill in gaps where necessary. Priority species should be oaks: bur oak, white oak, northern pin oak on better-drained soils; red oak and white oak for more mesic areas. Basswood would be another species to consider planting. Do not plant sugar maple, as it is seeding itself in anyway and dense maple reproduction promotes bare soils.

- An excellent resource for information on tree seeding is in a recent publication from the MNDNR Division of Forestry entitled *Direct Seeding of Native Hardwood Trees: An Innovative Approach to Hardwood Regeneration* (MNDNR 2003).
- Some considerations:
  - Oaks need to be planted in open areas with a lot of sunlight
  - Collect large numbers of acorns in the fall when they drop from the trees (about August 20 for bur oak; later for red and white oak); soak them in water for 24 hours; then refrigerate the acorns until planting that fall
  - you should plan for animal foraging and plant at least ten times more acorns than you want trees.

Planting maintenance will be needed:

- Keep the sprouting trees from being shaded out
- Monitor and control weeds that may be out competing the seedlings for moisture

- Protect trees from herbivory by installing wire fencing around the tree and put protection devices (bud caps) on the terminal buds to keep them from being eaten by deer during the winter

Throughout the bluffs: locate, cut and stump treat female box elder trees. These trees are setting the seed that is invading and sprouting in gaps on the slopes.

## 7. Floodplain Forest Restoration

**Goal:** Replant formerly cultivated areas of the floodplain.

Large portions of the river bottoms south of Crosby and Upper Lakes, and east of I-35, were cultivated in the mid-1900s. Following release from cultivation, these areas were colonized primarily by box elder. Present day box elder stands in these areas contain very few seedlings or trees of tree species that compose an intact floodplain forest. As such, these areas constitute very poor quality habitat for native forest wildlife species. Also, natural succession to intact floodplain forest is occurring at a very slow pace – this appears to be due mostly to a lack of green ash, silver maple, hackberry and basswood trees that would be seeding in new trees.

This project would greatly accelerate the conversion of disturbed box elder stands on rises between flood channels to native floodplain forest. Recreating the native floodplain forest will substantially improve the quality and quantity of the park's habitat for forest wildlife by expanding the areas of continuous canopied forest and by reducing the fragmented nature of the currently existing floodplain forest stands. The recommended process (Olson 2004, Peterson 2004) involves planting floodplain forest trees into gaps cleared in the matrix of box elders. As the planted trees mature, they will shade out the gaps where they are planted and seed themselves into intervening spaces between planted areas. Areas where substantial shade is created will be released from invasion by box elder and buckthorn, which are very light dependent species. Choose target areas that lack seedlings of green ash, hackberry basswood, or silver maple.

**Where:** box elder disturbed and cottonwood disturbed forest stands:

- Priority 1: polygon 82: easiest access not blocked by flooded channels; can plant bare root trees here; most visible to the public; will directly buffer large stands with intact canopies (polygons 54, 44, 48)
- Priority 2: polygon 69: cottonwood disturbed stand adjacent to box elder stand 82; accessible in spring and can plant bare root trees. There will be fewer areas of box elder dominance to clear out in this stand than in the box elder disturbed stands.
- Priority 3: polygon 77: the next stand to the east; access also will not be blocked by flooded channels; can plant bare root trees here. Plant mostly in the portion of the polygon south of the trail that lack ash and hackberry seedlings.

- Priority 4: polygon 79: this is the second most disturbed of the 4 box elder disturbed stands. Access may be blocked by flooded channels in the spring; plant tree seedlings in late June after floodwaters have abated.
- Priority 5: polygon 80, located east of I-35: this is the most disturbed of the four box elder stands; most difficult access ; least used by the public. Access may be blocked by flooded channels in the spring; plant tree seedlings in late June after floodwaters have abated.

**Recommended Procedure:**

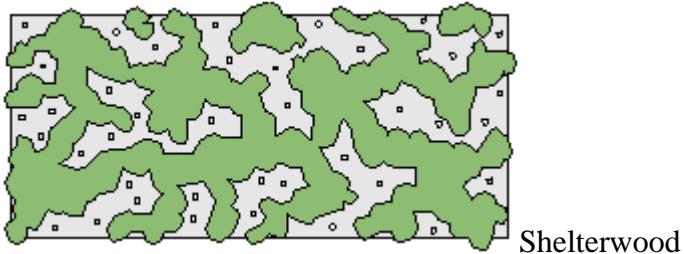
Timing	Activity
Year 1 winter	Locate and mark areas for box elder clearing. These should be places that lack trees or seedlings of desirable species (particularly silver maple, green ash, basswood).
Year 1 winter, early spring	In marked areas, cut and stump-treat box elders to open up large gaps in the disturbed woods. Box elder cover should be reduced to narrow zones between large opened spaces planted with trees.
Year 1 June	Collect silver maple seeds as they mature and drop from trees in the park. Put large tarps on the ground to catch the seeds. Collect seeds from the tarps and store them in a refrigerator in burlap or other breathable bags. Plant seeds soon after collecting.
Year 1 June	2 weeks before planting, spray out herbaceous vegetation with Roundup in the cleared areas where you will be planting seedlings and seeds.
Year 1 Late June	Plant trees into the cleared areas. Silver maple seeds can be broadcast and then raked into the ground surface. To supplement silver maple seeds, plant tree seedlings of other tree species into the cleared areas. Spread these seedlings out among the areas in which seeds have been planted. DNR foresters recommend 6 x 10 foot spacing (700seedlings/acre) of tree seedlings. Water them well. To suppress competing weeds, install fabric tree mats around the bases of the trees and stake into the ground (purchase material as a roll and cut into 1 sq meter size pieces).
Year 1, 2-3 weeks after planting	Re-water trees if necessary.
Year 1, rest of season	Monitor planted trees and identify/ correct problems. Post signs to inform the public about the goal and significance of the project.
approx 1 month after planting	Spray planted areas with Roundup to set back herbaceous plants that compete for moisture with the tree seedlings. Avoid the planted trees.
Year 2	Monitor the plantings and apply weed control measures to reduce competition for moisture
Year 3	Monitor the plantings and apply weed control measures to reduce competition for moisture

**Comments:**

Eventually the planted trees will create enough shade to shade out the light-dependent box elders. This approach of partially clearing a forest for planting is called a shelterwood pattern

(figure 14). The standing trees that are left will help to protect the newly planted tree seedlings. The purpose is to establish nodes of desirable tree species throughout the disturbed woods. These nodes will greatly increase the seed sources for desirable species and greatly accelerate the conversion of the woods into a native floodplain forest. Once the areas of planted trees are a few feet high, the process can be completed for the previously uncut belts of box elder trees – thus the process could be described as a two-stage shelterwood method. For a more complete discussion of the shelterwood method, see Baughman and Jacobs, 1992.

**Figure 14: Shelterwood harvesting method of opening canopy for tree planting. Small squares represent stumps from tree clearing. (modified from Baughman & Jacobs, 1992).**



Apply Garlon3a or TordonRTU onto cut stumps after cutting, as box elder vigorously stump sprouts. Use a heavy, oil-based formulation (Garlon 4) when cutting and applying in the winter. Cut tree crowns so that pieces are in contact with the ground. Leave cut wood in place to decay – preferably as large pieces that will not lend themselves readily as firewood for men camping out in the woods. Box elder wood is generally undesirable as firewood and most firewood dealers will not accept it. Much of the slash can be piled up and burned.

Tree planting would be an excellent activity for a large group of volunteers. Large numbers of local people cherish Crosby Park and may volunteer for an event. Each volunteer can plant about 25-30 tree seedlings in a single 4 hour volunteer event. For each tree, volunteers will have to dig a small hole, plant tree, water tree, and add fabric to reduce weeds.

It is recommended that this project be done as a multi-year process in waves starting with the west end of the first priority area of polygon 82. Each successive area of planting would then add on to previously planted areas. Given that there are scattered keeper trees of silver maple and green ash present in the woods, and that the planting would be in a shelterwood pattern, then it would take approximately a 60 to 100 acre area of woods for 30 acres of planting space.

A challenge for planting in portions of the floodplain is flooded river channels in the spring. The channels can be quite deep and uncrossable. For areas blocked by flooded channels, plant on rises between channels in late spring or early summer when the flood waters have abated. Plant as soon as possible after the waters recede in order to maximize growing season time for the newly planted trees and to avoid working within a dense thicket of nettles. Planting at this time will require planting either tree seedlings or containerized/burlapped stock, as bare root stock requires early spring planting.

Avoid planting into deep drifts of river sand.

Tree options:

- Seeds – see MNDNR brochure on direct seeding of native hardwoods (MNDNR 2003).
- Seedlings: much less expensive than containerized stock and you can purchase and plant many more trees. The problem is that you will have to return to the site to control weed competition. The best method is to cut 1 meter square swatches of tree mat fabric and stake these mats around each planted seedling. Tree seedlings may be obtained from the MN DNR nurseries.
- Another possible source of trees would be bare root stock: young trees removed from the ground at a nursery in early spring while they are still dormant. These must be planted in very early spring as soon as possible after the ground thaws. The taller trees have fewer problems with weed competition than seedlings. These trees are more expensive than seedlings and may not be practical for large areas. For a detailed, step by step outline of how to plant bare root stock, see the website for the National Arbor Day Foundation: <http://www.arborday.org/trees/NineNum8.cfm>.
- Containerized/burlapped stock (not recommended): much more expensive and you will not be able to plant enough to fill much space. The advantage of these is that they are tall enough so that overcrowding/shading by nettles will not be a problem.

Species to plant: Plant the following species in the approximate ratios:

Green ash: 25%  
Silver maple: 25%  
Hackberry: 10%  
Basswood: 20%  
Cottonwood: 10%  
Bur oak: 10%

Add bur oak to the list for higher, sandy areas of floodplain terrace such as in the vicinity of the pine and spruce plantations. It naturally occurs in some floodplains.

## 8. Forest Reconstruction on the Shepard Road Bluff Slope

**Goal:** Reconstruct native forest cover on the engineered slope along the northeast side of Crosby Lake (inventory polygon 92). This will eliminate large gaps that are prone to heavy buckthorn invasion and increase the amount of the park's cover of oaks, which are an important food source for many wildlife species. This would make an excellent event for volunteers.

### Recommended Procedure:

Timing	Activity
Year 1 summer, fall, winter	Create large, open gaps between strips of existing trees by removing invasive trees and brush: black locust, Siberian elm, box elder, staghorn sumac, black raspberries, and amur maple (see appendix C for control methods for these species). You may also have to remove an occasional cottonwood. Cut wood can be left on the ground to decay. Remove excess slash and pile for later burning.
2 weeks before planting	Spray out old field grasses with Roundup in open areas that are to be planted.
Year 2, May or June	Plant oaks into large open gaps. Plant seed or seedling following process outlined in project #6. Plant mostly bur oak near the top of the slope. At and below mid slope, plant bur oak, white oak, northern pin oak and red oak. These trees need full sunlight to grow. Water the trees well at planting time. Put tree mats around the bases of the tree seedlings to reduce competition.
Year 2, 2-3 weeks later	Water well 2-3 weeks after planting
Fall year 1, and possibly fall year 2	If the terminal buds of the planted trees can be reached by deer, then put some protection on the buds to protect them from winter browsing. Bud caps are commercially available.

### Comments:

Tree seeds and seedlings are most economical and best choices for local genetic ecotypes. Other options include planting bare root trees in early spring or containerized trees. See the discussion for floodplain forest restoration (project #7) for a discussion of these different options.

## 9. Parking Lot Prairie Management and Enhancement

**Goal:** Control and remove the exotic species that currently dominate the plantings. Add additional native prairie species to enhance the diversity and visual appeal of the planting.

**Where:** Polygons: 135 (1.7 acres) & 136 (2.9 acres)

### Recommended Procedure:

Timing	Activity
Before mowing	Identify and mark with stakes small concentrations or “nodes” of planted species you wish to keep. Leave out areas of scattered plants within heavy exotic grass cover.
Late June	Cut reed canary grass plants with a brush saw fitted with a grass blade as the plants begin to form flowering stems
Year 1 August	Mow all of the area including the marked nodes, removing the clippings. You will have to remove and replace the stakes during the mowing
Year 1 Sept.	After 1 month, spray all the mowed areas outside nodes with Roundup. The intent is to kill regrowing exotics, particularly Canada thistle, quack grass and reed canary grass. Spot spray individual weeds like Canada thistle that are in the nodes.
Year 2 May	After spring green up by early season grasses: spray the whole area with Roundup.
Year 2 Sept.	Till all of the ground outside of the nodes on the level ground. On side slopes don’t till in order to avoid erosion and soil washing off into the surrounding areas.
Year 2 Oct.	Prior to seeding the site, till the ground again on level ground.
Year 2 Oct.	Seed all of the tilled areas in mid to late October. We recommend drilling prairie grass on the level upland then following by broadcasting forb seed on the ground surface. Use a no-till drill to seed the slopes with prairie grasses.
Year 3, 4	Maintenance: monitor for weeds; mow above seedlings to set back weeds if necessary; spot spray if necessary for exotic grasses and Canada thistle
Year 5 May	Early spring controlled burn: time it to set back early season exotic grasses.

### Comments:

A major problem for this project will be to remove the extensive cover of Kentucky bluegrass, quack grass, reed canary grass and Canada thistle in this site. Quack grass, Canada thistle and reed canary grass are particularly difficult to eliminate. For these reasons, we recommend a whole year of treatments to eliminate weeds in preparation for replanting.

**Seeding Rates:** Please seed at a high density of at least 60 seeds per square foot so as to minimize unoccupied space that can be colonized by weeds.

A traditional seeding would be a 50:50 ratio of grass to forb seeds. Recent studies of prairie restorations have found that this ratio results in over-dominance by grasses after a period of several years. Grasses are invigorated by controlled burning and easily crowd out many forbs.

Instead, consider a lower proportion of grass seed, such as a ratio of 25:75 grass to forb seeds (by number, not weight).

A list of recommended plant species to plant is given in the list for mesic prairie in Appendix B. This list identifies a subset of species that are appropriate for planting in the shallow, wet depressions within this site. We recommend planting a high diversity of prairie forb species.

## 10. Terrace Savanna Reconstruction

**Goal:** recreate native savanna in brome-dominated old field areas above the bluffs in order to enhance the aesthetic appeal of the park and buffer the bluff woods with native species.

**Where:** old fields:

- Polygon 147 (0.8 acres);
- Polygon 143 (0.2 acres);
- Polygon 146 (0.4 acres);
- Polygon 141 (0.2 acres);

**Recommended Procedure for seeding:**

Timing	Activity
Year 1, Late Fall	Mow the site
Year 2, Spring when new growth is 10-12" tall	Spray out the area with roundup [alternative: cover with heavy black plastic or mulch for an entire growing season – a problem with the method is stormwater runoff]
10 days later	Cultivate or rototill the site if possible.
2-3 weeks later	Monitor for regrowth. Spot spray re-growing plants when they reach 10-12"
1 week later	Seed with mesic prairie species – refer to list of recommended species and planting density below
first 3 years	Monitor for weed growth. Mow at height of approx 1 foot if weed growth exceeds Mow before invasive species and weeds are able to set seed
Spring 3 years after planting	Controlled burn to set back early season exotic grasses and invigorate planted species
at least 3 years later	Plant bur oak trees – spaced at least 30-40 feet apart
following years	Maintenance: controlled burn every 3-5 years. An alternative would be to mow the planting in late fall after seed has shattered (mid to late October) and remove the cuttings.

### **Recommended Procedure for planting plugs or containerized seedlings:**

<b>Timing</b>	<b>Activity</b>
Year 1, Late Fall	Mow the site
Year 2, Spring when new growth is 10-12" tall	Spray out the area with roundup [alternative: cover with heavy black plastic or mulch for an entire growing season]
Before planting	Cover the site with 2- 4 inches of wood chip mulch
Year 2, June	Plant plugs of prairie plants. Plant at a high density so as to minimize space for weed invasion: 3 plants per square foot if possible. Water plants well
Year 2, 2-3 weeks later	Re-water plants
Year 2, rest of season	Monitor for weed invasion. Spot spray specific weeds if necessary.
at least 3 years later	Plant bur oak trees – spaced at least 30-40 feet apart
following years	Maintenance: controlled burn every 3-5 years. An alternative would be to mow the planting in late fall after seed has shattered (mid to late October) and remove the cuttings.

#### **Comments:**

Seed the area (or plant seedlings) with mesic prairie species. See the list for mesic prairie in Appendix B for species recommended for planting. Plant at a high density in order to minimize space for exotics to invade. Seedling density = 3 per square foot; seed density = at least 60 seeds per square foot.

Planting plugs or small pot seedlings would make an excellent volunteer event.

Maintenance: in seeded sites, monitor and control exotics by mowing with the mower set so that it is higher than the planted seedlings (generally 1 foot above the ground surface). Mow areas of thistles or other undesirable species 2-3 times per year for 3 years.

3 years later, burn the site in early spring. An early spring burn will set back exotic, cool season grasses that have persisted or reinvaded the site. It will also invigorate the native grasses. Any burn would have to be done with a strong wind out of the north to direct smoke away from Shepard Road.

Mowing is a viable alternative to burning but does not have the benefit of setting back early season grasses gained by early spring burning. Mowing should be done late in October and clippings should be removed.

Re-introduction of oaks: add scattered, widely spaced bur oaks several years later, as they will get in the way of mowing or burning in the early stages of the planting.

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**Appendix A:**  
**Upland and Wetland Plant Species of Crosby Park**  
**Great River Greening, 2004**

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**KEY:**

Lifeform: c climber, f forb, g graminoid, s shrub, t tree

Exotic: Exotic Species (includes some invasive native spp. not native to Minnesota)

EM: Emergent Marshes and Wet Meadows

FF: Floodplain Forests (terraces and channels)

BA: Black Ash Seepage Swamps

MH: Mesic Oak and Lowland Hardwood Forests

BS: Dry-Mesic Oak Forest on Bluff Slopes

PR: Prairie Planting

OF: Old Fields and Disturbed Places (includes brome- dominated areas above limestone cliffs)

Common name	Scientific Name	Lifeform	Exotic	EM	FF	BA	MH	BS	PR	OF
amur maple	<i>Acer ginnala</i>	t	x							x
boxelder	<i>Acer negundo</i>	t			x	x	x	x		
red maple	<i>Acer rubrum</i>	t					x			x
silver maple	<i>Acer saccharinum</i>	t			x	x	x			
sugar maple	<i>Acer saccharum</i>	t					x			
yarrow	<i>Achillea millefolium</i>	f							x	x
sweet flag	<i>Acorus calamus</i>	g		x						
red baneberry	<i>Actaea rubra</i>	f			x					
common agrimony	<i>Agrimonia gryposepala</i>	f			x		x	x		
quack grass	<i>Agropyron repens</i>	g	x		x				x	x
redtop	<i>Agrostis stolonifera</i>	g	x				x		x	x
water plantain	<i>Alisma subcordatum</i>	f		x						
garlic mustard	<i>Alliaria petiolata</i>	f	x		x	x	x	x		
wild leek	<i>Allium tricoccum</i>	f					x			
common ragweed	<i>Ambrosia artemesiiifolia</i>									
giant ragweed	<i>Ambrosia trifida</i>	f							x	x
false indigo	<i>Amorpha fruticosa</i>	s		x						
hog peanuts	<i>Amphicarpea bracteata</i>	f			x		x	x		
big bluestem	<i>Andropogon gerardii</i>	g							x	x
Canada anemone	<i>Anemone canadensis</i>	f		x	x					
hemp dogbane	<i>Apocynum cannabinum</i>	f						x		x
columbine	<i>Aquilegia canadensis</i>	f					x	x		
burdock	<i>Arctium minus</i>	f	x		x	x	x	x	x	x
jack in the pulpit	<i>Arisaema triphyllum</i>	f			x		x	x		
absinthe wormwood	<i>Artemisia absinthium</i>	f	x							x
biennial wormwood	<i>Artemisia biennis</i>	f			x			x		
wild ginger	<i>Asarum canadense</i>	f					x			
marsh milkweed	<i>Asclepias incarnata</i>	f		x						
common milkweed	<i>Asclepias syriaca</i>	f			x				x	x
butterfly weed	<i>Asclepias tuberosa</i>	f								x
whorled milkweed	<i>Asclepias verticillata</i>	f								x
heart-leaved aster	<i>Aster cordifolius</i>	f						x		
heath aster	<i>Aster ericoides</i>	f								x
smooth aster	<i>Aster laevis</i>	f						x		x
ontario aster	<i>Aster ontarionis</i>	f			x		x			
hoary alyssum	<i>Berteroa incana</i>	f	x		x					x
white birch	<i>Betula papyrifera</i>	t			x					
beggar ticks	<i>Bidens</i>	f			x					
false nettle	<i>Boehmeria cylindrica</i>	f			x					
smooth brome	<i>Bromus inermis</i>	g	x					x	x	x
woodland brome	<i>Bromus latiglumis</i>	g						x		

**Appendix A:**  
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Common name	Scientific Name	Lifeform	Exotic	EM	FF	BA	MH	BS	PR	OF
bluejoint	<i>Calamagrostis canadensis</i>	g		x						
marsh marigold	<i>Caltha palustris</i>	f				x				
american bell flower	<i>Campanula americana</i>	f				x	x	x		
harebell	<i>Campanula rotundifolia</i>	f						x		
hemp	<i>Cannabis sativa</i>	f	x		x					
five parted toothwort	<i>Cardamine concatenata</i>	f					x	x		
pennsylvania bitter cress	<i>Cardamine pensylvanica</i>	f			x	x	x			
musk thistle	<i>Carduus nutans</i>	f	x		x					
ambiguous sedge	<i>Carex amphibola</i>	g				x				
water sedge	<i>Carex aquatilis</i>	g			x					
woodland sedge	<i>Carex blanda</i>	g				x	x	x		
	<i>Carex brevior</i>	g								x
	<i>Carex comosa</i>	g			x					
riverbank sedge	<i>Carex emoryi</i>	g				x	x			
	<i>Carex granularis</i>	g					x			
bottlebrush sedge	<i>Carex hystricina</i>	g						x		
lake sedge	<i>Carex lacustris</i>	g			x					
pennsylvania sedge	<i>Carex pensylvanica</i>	g						x		
? Several	<i>Carex cf. tenera</i>	g		x						
sprengel's sedge	<i>Carex sprengelii</i>	g					x	x		
awl-fruited sedge	<i>Carex stipata</i>	g			x					
tussock sedge	<i>Carex stricta</i>	g			x					
beaked sedge	<i>Carex utriculata</i>	g			x					
catalpa	<i>Catalpa speciosa</i>	t	x		x					
blue cohosh	<i>Caulophyllum thalictroides</i>	f					x			
hackberry	<i>Celtis occidentalis</i>	t				x	x	x		
sand bur	<i>Cenchrus longispinus</i>	g			x					x
spotted knapweed	<i>Centaurea maculosa</i>	f	x							x
celandine	<i>Chelidonium majus</i>	f	x		x					
turtlehead	<i>Chelone glabra</i>	f			x					
lamb's quarters	<i>Chenopodium album</i>	f				x				
bulbose water hemlock	<i>Cicuta bulbifera</i>	f			x					
enchanter's nightshade	<i>Circaeaa lutiana</i>	f					x	x		
canada thistle	<i>Cirsium arvense</i>	f	x		x				x	x
thistle	<i>Cirsium discolor</i>	f	x		x					x
virgin's bower	<i>Clematis virginica</i>	c					x			
bindweed	<i>Convolvulus arvensis</i>	c					x			
horseweed	<i>Conyza canadensis</i>	f	x		x					x
alternate-leaved dogwood	<i>Cornus alternifolia</i>	s					x			
gray dogwood	<i>Cornus foemina</i>	s						x		
red osier dogwood	<i>Cornus sericea</i>	s			x			x		
crown vetch	<i>Coronilla varia</i>	f	x							x
american hazelnut	<i>Corylus americana</i>	s						x		
honewort	<i>Cryptotaenia canadensis</i>	f				x	x			
dodder	<i>Cuscuta spp.</i>	f				x				
nutsedge	<i>Cyperus sp.</i>	g								
orchard grass	<i>Dactylis glomerata</i>	g	x					x		x
dutchman's britches	<i>Dicentra cucullaria</i>	f					x			
wild yam	<i>Dioscorea villosa</i>	c						x		
barnyard grass	<i>Echinochloa muricata</i>	g		x						
wild cucumber	<i>Echinocystis lobata</i>	c		x						
russian olive	<i>Eleagnus angustifolia</i>	t	x							x
needle-like spike-rush	<i>Eleocharis acicularis</i>	g		x						
water spike rush	<i>Eleocharis palustre</i>	g		x						

**Appendix A:**  
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Common name	Scientific Name	Lifeform	Exotic	EM	FF	BA	MH	BS	PR	OF
canada wild rye	<i>Elymus canadensis</i>	g								x
minnesota wild rye	<i>Elymus diversiglumis</i>	g						x		
streambank wild rye	<i>Elymus riparius</i>	g				x				
virginia wild rye	<i>Elymus virginica</i>	g			x			x		
marsh horsetail	<i>Equisetum fluviatile</i>	f			x					
horsetail	<i>Equisetum hyemale</i>	f				x				
philadelphia fleabane	<i>Erigeron philadelphicus</i>	f				x			x	
daisy fleabane	<i>Erigeron strigosus</i>	f								x
white trout lily	<i>Erythronium album</i>	f					x	x		
wahoo	<i>Euonymus atropurpureus</i>	s						x		
spotted joe pye weed	<i>Eupatorium maculatum</i>	f			x					
boneset	<i>Eupatorium perfoliatum</i>	f			x					
purple node joe pye weed	<i>Eupatorium purpureum</i>	f						x		
white snakeroot	<i>Eupatorium rugosum</i>	f				x	x	x		
leafy spurge	<i>Euphorbia esula</i>	f	x					x		x
nodding fescue	<i>Festuca subverticillata</i>	g						x		
black ash	<i>Fraxinus nigra</i>	t				x				
green ash	<i>Fraxinus pennsylvanica</i>	t				x	x	x	x	
cleavers	<i>Galium aparine</i>	f				x		x		
sweet scented bedstraw	<i>Galium triflorum</i>	f					x	x		
wild geranium	<i>Geranium maculatum</i>	f					x			
white avens	<i>Geum canadense</i>	f				x		x		
creeping charlie	<i>Glechoma hederacea</i>	f	x		x		x	x	x	
giant manna grass	<i>Glyceria grandis</i>	g			x					
fowl manna grass	<i>Glyceria striata</i>	g					x			
kentucky coffee tree	<i>Gymnocladus dioica</i>	t						x		
common sneezeweed	<i>Helenium autumnale</i>	f			x					
woodland sunflower	<i>Helianthus strumosus</i>	f					x	x		
jerusalem artichoke	<i>Helianthus tuberosus</i>	f						x		x
ox-eye	<i>Helianthus annuus</i>	f						x	x	
day lily	<i>Hemerocallis fulva</i>	f	x					x		
cow parsnip	<i>Heracleum lanatum</i>	f				x				
dame's rocket	<i>Hesperis matronalis</i>	f	x					x		x
alum root	<i>Heuchera richardsonii</i>	f					x	x		
virginia waterleaf	<i>Hydrophyllum virginianum</i>	f						x		
spotted touch-me-not	<i>Impatiens capensis</i>	f		x	x	x				
pale touch-me-not	<i>Impatiens pallida</i>	f			x			x	x	
southern blue flag	<i>Iris virginica</i>	f			x					
false meadow rue	<i>Isopyrum biternatum</i>	f						x		
butternut	<i>Juglans cinerea</i>	t						x		
black walnut	<i>Juglans nigra</i>	t						x		
?	<i>Juncus spp</i>	g			x					
rush	<i>Juncus tenuis</i>	g			x					
eastern red cedar	<i>Juniperus virginiana</i>	t						x		x
false boneset	<i>Kuhnia eupatorioides</i>	f								x
wild lettuce	<i>Lactuca spp</i>	f			x			x		x
wood nettle	<i>Laportea canadensis</i>	f			x			x		
rice cut grass	<i>Leersia oryzoides</i>	g			x					
white grass	<i>Leersia virginica</i>	g				x		x		
motherwort	<i>Leonurus cardiaca</i>	f				x		x		
butter and eggs	<i>Linaria canadensis</i>	f	x							x
tatarian honeysuckle	<i>Lonicera tartarica</i>	s	x		x		x	x		
bird's foot trefoil	<i>Lotus corniculatus</i>	f	x							x
american water horehound	<i>Lycopus americana</i>	f		x						

**Appendix A:**  
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Common name	Scientific Name	Lifeform	Exotic	EM	FF	BA	MH	BS	PR	OF
common water horehound	<i>Lycopus asper</i>	f		x						
fringed loosestrife	<i>Lysimachia ciliata</i>	f				x				
tufted loosestrife	<i>Lysimachia thyrsiflora</i>	f			x					
purple loosestrife	<i>Lythrum salicaria</i>	f	x	x						
crabapple	<i>Malus sp.</i>	t	x		x					
chamomile	<i>Matricaria spp.</i>	f			x					x
black medic	<i>Medicago lupulina</i>	f	x							x
alfalfa	<i>Medicago sativa</i>	f	x				x	x	x	
white sweet clover	<i>Melilotus alba</i>	f	x					x	x	
moonseed	<i>Menispermum canadense</i>	c			x		x			
wild mint	<i>Mentha arvensis</i>	f			x					
monkey flower	<i>Mimulus ringens</i>	f			x					
bergamot	<i>Monarda fistulosa</i>	f					x	x	x	
white mulberry	<i>Morus alba</i>	t	x		x					
swamp satin grass	<i>Muhlenbergia frondosa</i>	g		x						
marsh muhly grass	<i>Muhlenbergia glomerata</i>	g		x						
racemose muhly	<i>Muhlenbergia racemosa</i>	g					x			
?	<i>Mustard</i> (? fh 037)	f				x				
forget-me-not	<i>Myosotis scorpioides</i>	f	x		x	x	x			
catnip	<i>Nepeta cataria</i>	f	x							x
common evening primrose	<i>Oenothera biennis</i>	f								x
sensitive fern	<i>Onoclea sensibilis</i>	f			x		x			
sweet cicely	<i>Osmorhiza claytoniana</i>	f				x	x			
long-styled sweet cicely	<i>Osmorhiza longistylis</i>	f				x				
ironwood	<i>Ostrya virginiana</i>	t				x	x			
wood sorrel	<i>Oxalis spp</i>	f			x			x		
scribner's panicum	<i>Panicum oligosanthes</i>	g								x
switchgrass	<i>Panicum virgatum</i>	g								x
virginia creeper	<i>Parthenocissus inserta</i>	c			x	x	x	x		
woodbine	<i>Parthenocissus quinquefolius</i>	c			x					
parsnip	<i>Pastinaca sativa</i>	f	x					x		x
reed canary grass	<i>Phalaris arundinacea</i>	g	x	x	x	x	x			x
timothy	<i>Phleum pratense</i>	g	x						x	x
blue phlox	<i>Phlox divaricata</i>	f				x				
reed grass	<i>Phragmites australis</i>	g			x					
lopseed	<i>Phryma leptostachya</i>	f					x	x		
obedient plant	<i>Physostegia virginiana</i>	f			x					
white spruce	<i>Picea alba</i>	t			x					
clearweed	<i>Pilea spp</i>	f			x					
red pine	<i>Pinus resinosa</i>	t			x					
white pine	<i>Pinus strobus</i>	t			x					
common plantain	<i>Plantago major</i>	f	x	x	x			x	x	x
canada bluegrass	<i>Poa compressa</i>	g					x			x
fowl meadow grass	<i>Poa palustris</i>	g			x					
kentucky bluegrass	<i>Poa pratensis</i>	g							x	x
solomon's seal	<i>Polygonatum biflorum</i>	f					x	x		
water smartweed	<i>Polygonum amphibium</i>	f			x					
black bindweed	<i>Polygonum convolvulus</i>	f			x					
dotted smartweed	<i>Polygonum punctatum</i>	f		x						
?	<i>Polygonum spp</i>	f		x						
?	<i>Polygonum spp</i> (fh 038)	f		x						
?	<i>Polygonum spp</i> fh 046	f		x						
white poplar	<i>Populus alba</i>	t	x		x			x		
cottonwood	<i>Populus deltoides</i>	t			x		x	x		

**Appendix A:**  
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Common name	Scientific Name	Lifeform	Exotic	EM	FF	BA	MH	BS	PR	OF
big tooth aspen	<i>Populus grandidentata</i>	t				x				
quaking aspen	<i>Populus tremuloides</i>	t					x			
black cherry	<i>Prunus serotina</i>	t					x			
chokecherry	<i>Prunus virginiana</i>	s			x	x	x			
white oak	<i>Quercus alba</i>	t					x			
northern pin oak	<i>Quercus ellipsoidalis</i>	t					x			
bur oak	<i>Quercus macrocarpa</i>	t					x			
red oak	<i>Quercus rubra</i>	t					x			
red - pin oak hybrid	<i>Quercus rubra x ellipsoidalis</i>	t					x			
small-flowered buttercup	<i>Ranunculus abortivus</i>	f			x	x	x			
cursed crowfoot	<i>Ranunculus sceleratus</i>	f	x	x						
common buckthorn	<i>Rhamnus cathartica</i>	s	x		x	x	x			x
smooth sumac	<i>Rhus glabra</i>	s					x			x
staghorn sumac	<i>Rhus typhina</i>	s								x
wild black current	<i>Ribes americana</i>	s				x				
prickly gooseberry	<i>Ribes cynosbati</i>	s			x	x	x			
missouri gooseberry	<i>Ribes missouriense</i>	s			x	x	x			
black locust	<i>Robinia pseudoacacia</i>	t	x				x			x
water-cress	<i>Rorippa nasturtium-aquaticum</i>	f	x	x						
common yellow-cress	<i>Rorippa palustris</i>	f		x						
prairie rose	<i>Rosa arkansana</i>	s								x
red raspberry	<i>Rubus idaeus</i>	s					x	x		
black raspberry	<i>Rubus occidentalis</i>	s					x			x
black eyed susan	<i>Rudbeckia hirta</i>	f								x
golden-glow	<i>Rudbeckia laciniata</i>	f			x	x				
curly dock	<i>Rumex crispus</i>	f	x	x						x
golden dock	<i>Rumex maritimus</i>	f	x	x						
great water dock	<i>Rumex orbiculatus</i>	f			x					
broad-leaved arrowhead	<i>Sagittaria latifolia</i>	f			x					
sand bar willow	<i>Salix exigua</i>	s		x						
slender willow	<i>Salix gracilis</i>	s		x						
hybrid black willow	<i>Salix x rubra</i>	t	x	x	x		x			
common elder	<i>Sambucus canadensis</i>	s			x	x	x			
red-berried elder	<i>Sambucus pubens</i>	s					x	x		
bloodroot	<i>Sanguinaria canadensis</i>	f					x	x		
black snakeroot	<i>Sanicula marilandica</i>	f					x	x		
little bluestem	<i>Schizachyrium scoparium</i>	g					x			x
black bulrush	<i>Scirpus atrovirens</i>	g		x						
river bulrush	<i>Scirpus fluviatile</i>	g		x						
soft stem bulrush	<i>Scirpus validus</i>	g		x						
figwort	<i>Scrophularia lanceolata</i>	f			x				x	
mad dog skullcap	<i>Scutellaria lateriflora</i>	f			x					
ragwort	<i>Senecio spp</i>	f		x						
bur-cucumber	<i>Sicyos angulatus</i>	c			x					
bladder campion	<i>Silene cserei</i>	f	x		x					
white campion	<i>Silene latifolia</i>	f	x							x
cup plant	<i>Silphium perfoliatum</i>	f					x			
racemose false solomon's seal	<i>Smilacina racemosa</i>	f					x	x		
stellate false solomon's seal	<i>Smilacina stellata</i>	f		x	x			x		
carriónflower	<i>Smilax herbacea</i>	f					x			
bristly greenbriar	<i>Smilax hispida</i>	f			x					
bittersweet	<i>Solanum dulcamara</i>	f	x	x	x		x			
canada goldenrod	<i>Solidago canadensis</i>	f						x		x
zig-zag goldenrod	<i>Solidago flexicaulis</i>	f					x			

## **Appendix A: Upland and Wetland Plant Species of Crosby Park Great River Greening, 2004**

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## Appendix B: Species Lists for Restoration of Native Plant Communities at Crosby Park

The descriptions and lists given here are from Dunevitz and Lane (2004) and were edited by the author of this report to more specifically fit the geographic location and conditions at Crosby Farm Park. The original lists and accompanying text may be viewed in the Great River Greening website ([www.greatrivergreening.org](http://www.greatrivergreening.org)) under the heading “East-Central Minnesota Species Lists.”

For the purpose of analysis, species too taxonomically similar to confidently separate were lumped into species complexes which are abbreviated according the following table (from Dunevitz and Lane 2004):

Complex name	Species included in complex
<i>Agrimonia</i> cmx	<i>A. gryposepala, striata</i>
<i>Amelanchier</i> cmx	Species with shrub forms: <i>A. laevis, interior, humilis, arborea</i>
<i>Crataegus</i> cmx	<u><i>C. punctata, macracantha, succulenta, calpodendron</i></u>
<i>Epilobium</i> cm1	<u><i>E. coloratum, glandulosa</i></u>
<i>Epilobium</i> cm2	<i>E. leptophyllum, palustre, strictum</i>
<i>Hackelia</i> cmx	<u><i>H. deflexa, virginiana</i></u>
<i>Impatiens</i> cmx	<i>I. capensis, pallida</i>
<i>Nymphaea</i> cmx	<i>N. odorata and tuberosa</i>
<i>Oxalis</i> cmx	<i>O. acetosella, stricta, dillenii</i>
<i>Parthenocissus</i> cmx	<i>P. quinquefolia, vitacea</i>
<i>Pilea</i> cmx	<u><i>P. fontana, pumila</i></u>
<i>Rosa</i> cmx	<i>R. acicularis, blanda</i>
<i>Rubus</i> cm1	Tall blackberries: <i>R. allegheniensis</i> and similar species
<i>Rubus</i> cm2	Trailing blackberries: <i>R. flagellaris</i> and similar species
<i>Senecio</i> cmx	<u><i>S. aureus, pseudauraeus</i></u>
<i>Symphoricarpos</i> cmx	<u><i>S. albus, occidentalis</i></u>
<i>Smilax</i> cmx	
<i>Viola</i> cm1	Herbaceous species: <i>S. ecirrata, herbacea, illinoensis</i> Stemless blue violets: <i>V. cucullata, missouriensis, nephrophylla, nova-angliae, pratincola, sororia</i>
<i>Viola</i> cm2	Small white violets: <i>V. incognita, macloskeyi</i>
<i>Viola</i> cm3	Small blue violets with caudate leaves: <i>V. adunca, conspersa, labradorica</i>
<i>Viola</i> cm4	Large violets with caudate leaves: <i>V. canadensis, pubescens</i>
<i>Zigadenus</i> cmx	<u><i>Z. elegans, glaucus</i></u>

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MESIC PRAIRIE</b> (modified from Dunevitz and Lane 2004)				
Genus	Species	Common Name	* = spp recommended for planting in parking lot prairie; w= plant only in wet spots; dnp = do not plant	* = spp recommended for planting in terrace oak savanna reconstruction; dnp = do not plant
<b>Understory Trees</b>				
<i>Acer</i>	<i>negundo</i>	Box elder	dnp	dnp
<i>Juniperus</i>	<i>virginiana</i>	Red cedar	dnp	dnp
<i>Populus</i>	<i>tremuloides</i>	Quaking aspen	dnp	dnp
<i>Quercus</i>	<i>macrocarpa</i>	Bur oak		*
<i>Quercus</i>	<i>ellipsoidalis</i>	Northern pin oak		
<i>Tilia</i>	<i>americana</i>	Basswood	dnp	dnp
<i>Ulmus</i>	<i>rubra</i>	Slippery elm	dnp	dnp
<b>Shrubs</b>				
<i>Cornus</i>	<i>racemosa</i>	Gray dogwood		
<i>Cornus</i>	<i>sericea</i>	Red-osier dogwood		
<i>Corylus</i>	<i>americana</i>	American hazelnut		*
<i>Prunus</i>	<i>americana</i>	Wild plum		
<i>Prunus</i>	<i>virginiana</i>	Chokecherry		
<i>Prunus</i>	<i>pumila</i>	Sand cherry		
<i>Rhus</i>	<i>glabra</i>	Smooth sumac	dnp	dnp
<i>Rhus</i>	<i>typhina</i>	Staghorn sumac	dnp	dnp
<i>Rosa</i>	<i>arkansana</i>	Prairie rose		*
<i>Rosa</i>	cmx.	Smooth wild rose		
<i>Salix</i>	<i>humilis</i>	Prairie willow		
<i>Spiraea</i>	<i>alba</i>	Meadowsweet	*w	
<i>Symphoricarpos</i>	cmx.	Snowberry		
<b>Low Shrubs</b>				
<i>Amorpha</i>	<i>canescens</i>	Lead-plant	*	*
<i>Amorpha</i>	<i>nana</i>	Fragrant false indigo	*	
<i>Artemisia</i>	<i>frigida</i>	Prairie sagewort		
<i>Rubus</i>	<i>occidentalis</i>	Black raspberry	dnp	dnp
<i>Rubus</i>	<i>idaeus</i>	Red raspberry	dnp	dnp
<i>Toxicodendron</i>	<i>rydbergii</i>	Poison ivy	dnp	dnp
<b>Vines</b>				
<i>Parthenocissus</i>	cmx.	Virginia creeper	dnp	dnp
<i>Clematis</i>	<i>virginiana</i>	Virgin's bower	dnp	dnp
<i>Vitis</i>	<i>riparia</i>	Wild grape	dnp	dnp
<b>Forbs</b>				
<i>Achillea</i>	<i>millefolium</i>	Yarrow		
<i>Allium</i>	<i>stellatum</i>	Prairie wild onion		*
<i>Allium</i>	<i>canadense</i>	Wild garlic		
<i>Ambrosia</i>	<i>artemisiifolia</i>	Common ragweed	dnp	dnp
<i>Ambrosia</i>	<i>psilostachya</i>	Western ragweed	dnp	dnp
<i>Anemone</i>	<i>cylindrica</i>	Long-headed thimbleweed		*
<i>Anemone</i>	<i>virginiana</i>	Virginia thimbleweed		
<i>Anemone</i>	<i>canadensis</i>	Canada anemone	*w	
<i>Antennaria</i>	spp.	Pussytoes		
<i>Apocynum</i>	<i>androsaemifolium</i>	Spreading dogbane		*
<i>Apocynum</i>	<i>sibiricum</i>	Clasping dogbane		
<i>Artemisia</i>	<i>ludoviciana</i>	Western mugwort		
<i>Artemisia</i>	<i>dracunculus</i>	Estragon	dnp	dnp
<i>Artemisia</i>	<i>campestris</i>	Tall wormwood	dnp	dnp
<i>Asclepias</i>	<i>tuberosa</i>	Butterfly-weed		*
<i>Asclepias</i>	<i>syriaca</i>	Common milkweed	dnp	dnp
<i>Asclepias</i>	<i>ovalifolia</i>	Oval-leaved milkweed		

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Genus	Species	Common Name	* = spp recommended for planting in parking lot prairie; w= plant only in wet spots; dnp = do not plant	* = spp recommended for planting in terrace oak savanna reconstruction; dnp = do not plant
<i>Aster</i>	<i>oolentangiensis</i>	Sky-blue aster	*	*
<i>Aster</i>	<i>ericoides</i>	Heath aster	*	*
<i>Aster</i>	<i>lanceolatus</i>	Panicled aster	*w	
<i>Aster</i>	<i>novae-angliae</i>	New England aster	*w	
<i>Aster</i>	<i>laevis</i>	Smooth aster	*	*
<i>Astragalus</i>	<i>agrestis</i>	Field milk-vetch		
<i>Astragalus</i>	<i>canadensis</i>	Canada milk-vetch	*	
<i>Campanula</i>	<i>rotundifolia</i>	Harebell		
<i>Chrysopsis</i>	<i>villosa</i>	Prairie golden aster		
<i>Cirsium</i>	<i>muticum</i>	Swamp thistle		
<i>Cirsium</i>	<i>flodmanii</i>	Prairie thistle		
<i>Comandra</i>	<i>umbellata</i>	Bastard toad-flax		
<i>Conyza</i>	<i>canadensis</i>	Horseweed	dnp	dnp
<i>Coreopsis</i>	<i>palmata</i>	Stiff tickseed		
<i>Cuscuta</i>	<i>spp.</i>	Dodder		
<i>Dalea</i>	<i>purpurea</i>	Purple prairie-clover	*	*
<i>Dalea</i>	<i>candida</i>	White prairie-clover		*
<i>Desmodium</i>	<i>canadense</i>	Canadian tick-trefoil	*	*
<i>Erigeron</i>	<i>strigosus</i>	Daisy fleabane		*
<i>Euphorbia</i>	<i>corollata</i>	Flowering spurge		
<i>Euthamia</i>	<i>graminifolia</i>	Grass-leaved goldenrod		
<i>Fragaria</i>	<i>virginiana</i>	Common strawberry	*	*
<i>Galium</i>	<i>boreale</i>	Northern bedstraw		*
<i>Galium</i>	<i>triflorum</i>	Three-flowered bedstraw		
<i>Gentiana</i>	<i>billingtonii</i>	Closed gentian		
<i>Geum</i>	<i>triflorum</i>	Prairie smoke		*
<i>Glycyrrhiza</i>	<i>lepidota</i>	Wild licorice	*	
<i>Hedeoma</i>	<i>hispida</i>	Mock pennyroyal		
<i>Helenium</i>	<i>autumnale</i>	Autumn sneezeweed	*w	
<i>Helianthus</i>	<i>maximiliani</i>	Maximilian's sunflower	*	*
<i>Helianthus</i>	<i>giganteus</i>	Giant sunflower	*w	
<i>Helianthus</i>	<i>pauciflorus</i>	Stiff sunflower		*
<i>Heliospopsis</i>	<i>helianthoides</i>	Ox-eye	*	*
<i>Heuchera</i>	<i>richardsonii</i>	Alum-root		*
<i>Hypoxis</i>	<i>hirsuta</i>	Yellow star-grass		
<i>Krigia</i>	<i>biflora</i>	Two-flowered Cynthia		
<i>Kuhnia</i>	<i>eupatorioides</i>	False boneset		*
<i>Lactuca</i>	<i>spp.</i>	Wild lettuce		
<i>Lathyrus</i>	<i>palustris</i>	Marsh vetchling		
<i>Lathyrus</i>	<i>venosus</i>	Veiny pea		
<i>Lespedeza</i>	<i>capitata</i>	Round-headed bush-clover	*	*
<i>Liatris</i>	<i>aspera</i>	Rough blazing star		*
<i>Liatris</i>	<i>ligulistylis</i>	Northern plains blazing star	*	
<i>Liatris</i>	<i>pycnostachya</i>	Gayfeather	*w	
<i>Lilium</i>	<i>philadelphicum</i>	Wood lily		
<i>Lithospermum</i>	<i>canescens</i>	Hoary puccoon		*
<i>Lithospermum</i>	<i>carolinense</i>	Hairy puccoon		
<i>Lobelia</i>	<i>spicata</i>	Rough-spiked Lobelia	*	
<i>Mirabilis</i>	<i>hirsuta</i>	Hairy four-o'clock		
<i>Monarda</i>	<i>fistulosa</i>	Wild bergamot	*	*
<i>Oenothera</i>	<i>biennis</i>	Common evening-primrose	*	*

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<i>Oxalis</i>	cmx.	Wood-sorrel		
<i>Pedicularis</i>	<i>canadensis</i>	Wood-betony		
<i>Pediomelum</i>	<i>argophyllum</i>	Silvery scurf-pea	*	
<i>Phlox</i>	<i>pilosa</i>	Prairie phlox	*	
<i>Physalis</i>	<i>heterophylla</i>	Clammy ground-cherry		
<i>Physalis</i>	<i>virginiana</i>	Ground-cherry		
<i>Polygala</i>	<i>sanguinea</i>	Purple milkwort		
<i>Polygonatum</i>	<i>biflorum</i>	Giant Solomon's-seal		
<i>Potentilla</i>	<i>simplex</i>	Old-field cinquefoil		
<i>Potentilla</i>	<i>arguta</i>	Tall cinquefoil	*	*
<i>Prenanthes</i>	<i>racemosa</i>	Smooth rattlesnake-root	*	*
<i>Pycnanthemum</i>	<i>virginianum</i>	Virginia mountain-mint	*w	
<i>Ratibida</i>	<i>pinnata</i>	Gray-headed coneflower	*	*
<i>Rudbeckia</i>	<i>hirta</i>	Black-eyed Susan	*	*
<i>Scutellaria</i>	<i>leonardi</i>	Leonard's skullcap		
<i>Silphium</i>	<i>perfoliatum</i>	Cup-plant	*w	
<i>Sisyrinchium</i>	<i>campestre</i>	Field blue-eyed grass		
<i>Smilacina</i>	<i>stellata</i>	Starry false Solomon's-seal		*
<i>Smilacina</i>	<i>racemosa</i>	Racemose false Solomon's-seal		
<i>Solidago</i>	<i>rigida</i>	Stiff goldenrod	*	*
<i>Solidago</i>	<i>canadensis</i>	Canada goldenrod	dnp	dnp
<i>Solidago</i>	<i>gigantea</i>	Giant goldenrod	*w	
<i>Solidago</i>	<i>nemoralis</i>	Gray goldenrod		*
<i>Solidago</i>	<i>missouriensis</i>	Missouri goldenrod		
<i>Solidago</i>	<i>ptarmicoides</i>	Upland white aster	*	*
<i>Solidago</i>	<i>speciosa</i>	Showy goldenrod		*
<i>Stachys</i>	<i>palustris</i>	Woundwort	*w	
<i>Thalictrum</i>	<i>dasycarpum</i>	Tall meadow-rue		
<i>Tradescantia</i>	<i>bracteata</i>	Bracted spiderwort		*
<i>Vernonia</i>	<i>fasciculata</i>	Bunched ironweed	*w	
<i>Veronicastrum</i>	<i>virginicum</i>	Culver's root	*	*
<i>Vicia</i>	<i>americana</i>	American vetch		
<i>Viola</i>	<i>pedatifida</i>	Prairie bird-foot violet		
<i>Viola</i>	<i>pedata</i>	Bird-foot violet		
<i>Viola</i>	cm4	Violet		
<i>Viola</i>	cm1	Violet		
<i>Zizia</i>	<i>aptera</i>	Heart-leaved alexanders	*	*
<i>Zizia</i>	<i>aurea</i>	Golden alexanders	*	*
  <b>Grasses, Rushes and Sedges</b>				
<i>Andropogon</i>	<i>gerardii</i>	Big bluestem	*	*
<i>Bromus</i>	<i>kalmii</i>	Kalm's brome	*	*
<i>Carex</i>	<i>bicknellii</i>	Bicknell's sedge		
<i>Carex</i>	<i>muhlenbergii</i>	Muhlenberg's sedge		
<i>Carex</i>	<i>meadii</i>	Mead's sedge		
<i>Carex</i>	<i>tenera</i>	Marsh-straw sedge		
<i>Carex</i>	<i>scoparia</i>	Pointed-broom sedge	*w	
<i>Carex</i>	<i>siccata</i>	Hay sedge		
<i>Elymus</i>	<i>wiegandii</i>	Canada wild rye		*
<i>Elymus</i>	<i>trachycaulus</i>	Slender wheatgrass		

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<i>Eragrostis</i>	<i>spectabilis</i>	Purple lovegrass		
<i>Juncus</i>	<i>greenei</i>	Greene's rush		
<i>Koeleria</i>	<i>pyramidalata</i>	June-grass		*
<i>Muhlenbergia</i>	<i>mexicana</i>	Mexican satin-grass		
<i>Muhlenbergia</i>	<i>glomerata</i>	Clustered muhly grass		
<i>Muhlenbergia</i>	<i>frondosa</i>	Swamp satin-grass		
<i>Muhlenbergia</i>	<i>racemosa</i>	Marsh muhly grass		
<i>Panicum</i>	<i>oligosanthes</i>	Few-flowered panic grass		
<i>Panicum</i>	<i>leibergii</i>	Leiberg's panic grass	*	*
<i>Panicum</i>	<i>virgatum</i>	Switchgrass	*w (not cultivar)	
<i>Panicum</i>	<i>perlongum</i>	Long-leaved panic grass	dnp	dnp
<i>Panicum</i>	<i>commonsianum</i>	White-haired panic grass	dnp	dnp
<i>Panicum</i>	<i>capillare</i>	Witch grass	dnp	dnp
<i>Schizachyrium</i>	<i>scoparium</i>	Little bluestem		*
<i>Sorghastrum</i>	<i>nutans</i>	Indian grass	*	*
<i>Spartina</i>	<i>pectinata</i>	Prairie cord-grass	*w	
<i>Sporobolus</i>	<i>heterolepis</i>	Prairie dropseed	*	*
<i>Stipa</i>	<i>spartea</i>	Porcupine-grass		*
<b>Ferns and Fern Allies</b>				
<i>Equisetum</i>	<i>laevigatum</i>	Smooth scouring-rush		
<i>Equisetum</i>	<i>hyemale</i>	Tall scouring-rush	dnp	dnp
<i>Equisetum</i>	<i>arvense</i>	Field horsetail	dnp	dnp
<b>Exotic Invasive Species - Do Not Plant</b>				
<i>Asparagus</i>	<i>officinalis</i>	Asparagus	dnp	dnp
<i>Bromus</i>	<i>inermis</i>	Smooth brome	dnp	dnp
<i>Cirsium</i>	<i>arvense</i>	Canada thistle	dnp	dnp
<i>Elytrigia</i>	<i>repens</i>	Quack grass	dnp	dnp
<i>Hieracium</i>	<i>kalmii</i>	Hawkweed	dnp	dnp
<i>Lonicera</i>	<i>tatarica</i>	Tartarian Honeysuckle	dnp	dnp
<i>Melilotus</i>	<i>spp.</i>	Sweet clover	dnp	dnp
<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	dnp	dnp
<i>Phleum</i>	<i>pratense</i>	Cultivated timothy	dnp	dnp
<i>Poa</i>	<i>pratensis</i>	Kentucky bluegrass	dnp	dnp
<i>Poa</i>	<i>compressa</i>	Canada bluegrass	dnp	dnp
<i>Polygonum</i>	<i>convolvulus</i>	Black bindweed	dnp	dnp
<i>Prunella</i>	<i>vulgaris</i>	Heal-all	dnp	dnp
<i>Rhamnus</i>	<i>cathartica</i>	Common buckthorn	dnp	dnp
<i>Setaria</i>	<i>glauca</i>	Yellow foxtail	dnp	dnp
<i>Taraxacum</i>	<i>spp.</i>	Common dandelion	dnp	dnp
<i>Tragopogon</i>	<i>dubius</i>	Yellow goat's-beard	dnp	dnp
<i>Trifolium</i>	<i>pratense</i>	Red clover	dnp	dnp
<i>Vicia</i>	<i>angustifolia</i>	Narrow-leaved vetch	dnp	dnp
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>				
<i>Eryngium</i>	<i>yuccifolium</i>	Rattlesnake-master	dnp	dnp

**Appendix B:**  
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SOUTHERN DRY-MESIC OAK FOREST (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	* = recommended for planting and slope stabilization; dnp = do not plant
<b>Canopy Trees (&gt;10m)</b>			
<i>Quercus</i>	<i>rubra</i>	Northern red oak	
<i>Quercus</i>	<i>alba</i>	White oak	
<i>Ulmus</i>	<i>americana</i>	American elm	
<i>Tilia</i>	<i>americana</i>	Basswood	
<i>Carya</i>	<i>cordiformis</i>	Bitternut hickory	
<i>Acer</i>	<i>negundo</i>	Box elder	dnp
<i>Celtis</i>	<i>occidentalis</i>	Hackberry	
<i>Betula</i>	<i>papyrifera</i>	Paper-birch	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	
<i>Prunus</i>	<i>serotina</i>	Black cherry	
<i>Quercus</i>	<i>ellipsoidalis</i>	Northern pin oak	
<i>Quercus</i>	<i>macrocarpa</i>	Bur oak	
<b>Understory Trees</b>			
<i>Carya</i>	<i>cordiformis</i>	Bitternut hickory	*
<i>Tilia</i>	<i>americana</i>	Basswood	*
<i>Prunus</i>	<i>serotina</i>	Black cherry	
<i>Ostrya</i>	<i>virginiana</i>	Ironwood	
<i>Ulmus</i>	<i>rubra</i>	Slippery elm	
<i>Ulmus</i>	<i>americana</i>	American elm	
<i>Acer</i>	<i>negundo</i>	Box elder	dnp
<i>Acer</i>	<i>saccharum</i>	Sugar maple	dnp
<i>Quercus</i>	<i>rubra</i>	Northern red oak	*
<i>Celtis</i>	<i>occidentalis</i>	Hackberry	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	*
<i>Quercus</i>	<i>alba</i>	White oak	*
<i>Betula</i>	<i>papyrifera</i>	Paper-birch	
<i>Carpinus</i>	<i>caroliniana</i>	Blue beech	
<b>Shrubs</b>			
<i>Cornus</i>	<i>racemosa</i>	Gray dogwood	*
<i>Corylus</i>	<i>americana</i>	American hazelnut	*
<i>Prunus</i>	<i>virginiana</i>	Chokecherry	*
<i>Ribes</i>	<i>cynosbati</i>	Prickly gooseberry	
<i>Symporicarpos</i>	<i>cmx</i>	Snowberry	
<i>Viburnum</i>	<i>raffinesquianum</i>	Downy arrow-wood	*
<i>Viburnum</i>	<i>lentago</i>	Nannyberry	*
<b>Forbs</b>			
<i>Actaea</i>	<i>rubra</i>	Red baneberry	*
<i>Amphicarpaea</i>	<i>bracteata</i>	Hog-peanut	*
<i>Anemone</i>	<i>quinquefolia</i>	Wood anemone	*
<i>Anemonella</i>	<i>thalictroides</i>	Rue-anemone	*
<i>Apocynum</i>	<i>androsaemifolium</i>	Spreading dogbane	*
<i>Aquilegia</i>	<i>canadensis</i>	Columbine	*
<i>Aralia</i>	<i>nudicaulis</i>	Wild sarsaparilla	*
<i>Aralia</i>	<i>racemosa</i>	American spikenard	
<i>Arisaema</i>	<i>trifolium</i>	Jack-in-the-pulpit	*
<i>Asclepias</i>	<i>exaltata</i>	Poke milkweed	*
<i>Aster</i>	<i>cordifolius</i>	Heart-leaved aster	*
<i>Campanula</i>	<i>rotundifolia</i>	Harebell	*
<i>Caulophyllum</i>	<i>thalictroides</i>	Blue cohosh	
<i>Circaeaa</i>	<i>lutetiana</i>	Canada enchanter's nightshade	*
<i>Cryptotaenia</i>	<i>canadensis</i>	Honewort	
<i>Desmodium</i>	<i>glutinosum</i>	Pointed-leaved tick-trefoil	*
<i>Eupatorium</i>	<i>rugosum</i>	Common snakeroot	*

**Appendix B:**  
**Species Lists for Restoration**

SOUTHERN DRY-MESIC OAK FOREST (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	* = recommended for planting and slope stabilization; dnp = do not plant
<i>Fragaria</i>	<i>vesca</i>	Wood strawberry	
<i>Fragaria</i>	<i>virginiana</i>	Common strawberry	*
<i>Galium</i>	<i>triflorum</i>	Three-flowered bedstraw	
<i>Galium</i>	<i>concinnum</i>	Elegant bedstraw	
<i>Galium</i>	<i>boreale</i>	Northern bedstraw	*
<i>Geranium</i>	<i>maculatum</i>	Wild geranium	*
<i>Geum</i>	<i>canadense</i>	White avens	
<i>Helianthus</i>	<i>strumosus</i>	Woodland sunflower	*
<i>Hydrophyllum</i>	<i>virginianum</i>	Virginia waterleaf	*
<i>Lathyrus</i>	<i>ochroleucus</i>	Pale vetchling	*
<i>Maianthemum</i>	<i>canadense</i>	Canada mayflower	*
<i>Mitella</i>	<i>diphylla</i>	Two-leaved miterwort	
<i>Osmorrhiza</i>	<i>claytonii</i>	Clayton's sweet cicely	*
<i>Phryma</i>	<i>leptostachya</i>	Lopseed	*
<i>Polygonatum</i>	<i>biflorum</i>	Giant Solomon's-seal	*
<i>Prenanthes</i>	<i>alba</i>	White wild lettuce	*
<i>Ranunculus</i>	<i>abortivus</i>	Kidney-leaf buttercup	
<i>Sanguinaria</i>	<i>canadensis</i>	Bloodroot	*
<i>Sanicula</i>	<i>marilandica</i>	Maryland black snakeroot	*
<i>Sanicula</i>	<i>gregaria</i>	Gregarious black snakeroot	*
<i>Smilacina</i>	<i>racemosa</i>	Racemose false Solomon's-seal	*
<i>Solidago</i>	<i>flexicaulis</i>	Zig-zag goldenrod	*
<i>Solidago</i>	<i>ulmifolia</i>	Elm-leaved goldenrod	*
<i>Smilax</i>	<i>herbacea</i>	Carrion-flower	*
<i>Thalictrum</i>	<i>dioicum</i>	Early meadow-rue	*
<i>Uvularia</i>	<i>grandiflora</i>	Yellow bellwort	*
<i>Veronicastrum</i>	<i>virginicum</i>	Culver's root	*
<i>Viola</i>	<i>cm4</i>	Violet	
<i>Zizia</i>	<i>aurea</i>	Golden alexanders	*
<b>Grasses, Rushes and Sedges</b>			
<i>Carex</i>	<i>pensylvanica</i>	Pennsylvania sedge	*
<i>Carex</i>	<i>blanda</i>	Woodland sedge	*
<i>Carex</i>	<i>gracillima</i>	Graceful sedge	
<i>Carex</i>	<i>sprengelii</i>	Sprengel's sedge	*
<i>Carex</i>	<i>peckii</i>	Peck's sedge	*
<i>Carex</i>	<i>deweyana</i>	Dewey's sedge	*
<i>Carex</i>	<i>radiata</i>	Stellate sedge	*
<i>Elymus</i>	<i>hystrix</i>	Bottlebrush grass	*
<i>Festuca</i>	<i>subverticillata</i>	Nodding fescue	*
<i>Oryzopsis</i>	<i>asperifolia</i>	Mountain rice grass	*
<b>Ferns and Fern Allies</b>			
<i>Athyrium</i>	<i>filix-femina</i>	Lady-fern	*
<i>Botrychium</i>	<i>virginianum</i>	Rattlesnakefern	
<i>Osmunda</i>	<i>claytoniana</i>	Interrupted fern	*
<b>Climbers</b>			
<i>Parthenocissus</i>	<i>inserta</i>	Virginia creeper	*
<b>Exotic Invasive Species - Do Not Plant</b>			
<i>Arctium</i>	<i>minus</i>	Common burdock	dnp
<i>Lonicera</i>	<i>tatarica</i>	Tartarian Honeysuckle	dnp
<i>Prunella</i>	<i>vulgaris</i>	Heal-all	dnp
<i>Rhamnus</i>	<i>cathartica</i>	Common buckthorn	dnp
<i>Taraxacum</i>	<i>spp.</i>	Common dandelion	dnp

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN DRY-MESIC OAK FOREST</b> (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	* = recommended for planting and slope stabilization; dnp = do not plant
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>			
<i>Juglans</i>	<i>cinerea</i>	Butternut	dnp

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MESIC OAK - BASSWOOD FOREST</b> (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	* = recommended for planting and slope stabilization; dnp = do not plant
<b>Canopy Trees (&gt;10 m)</b>			
<i>Acer</i>	<i>saccharum</i>	Sugar maple	dnp
<i>Betula</i>	<i>papyrifera</i>	Paper-birch	
<i>Carya</i>	<i>cordiformis</i>	Bitternut hickory	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	
<i>Fraxinus</i>	<i>nigra</i>	Black ash	
<i>Populus</i>	<i>tremuloides</i>	Quaking aspen	dnp
<i>Prunus</i>	<i>serotina</i>	Black cherry	
<i>Quercus</i>	<i>rubra</i>	Northern red oak	
<i>Quercus</i>	<i>alba</i>	White oak	
<i>Quercus</i>	<i>macrocarpa</i>	Bur oak	
<i>Tilia</i>	<i>americana</i>	Basswood	
<i>Ulmus</i>	<i>americana</i>	American elm	
<i>Ulmus</i>	<i>rubra</i>	Slippery elm	
<b>Understory Trees</b>			
<i>Acer</i>	<i>saccharum</i>	Sugar maple	dnp
<i>Acer</i>	<i>negundo</i>	Box elder	dnp
<i>Betula</i>	<i>papyrifera</i>	Paper-birch	
<i>Carpinus</i>	<i>caroliniana</i>	Blue beech	
<i>Carya</i>	<i>cordiformis</i>	Bitternut hickory	*
<i>Celtis</i>	<i>occidentalis</i>	Hackberry	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	*
<i>Fraxinus</i>	<i>nigra</i>	Black ash	
<i>Ostrya</i>	<i>virginiana</i>	Ironwood	
<i>Populus</i>	<i>grandidentata</i>	Big-toothed aspen	dnp
<i>Populus</i>	<i>tremuloides</i>	Quaking aspen	dnp
<i>Prunus</i>	<i>serotina</i>	Black cherry	
<i>Quercus</i>	<i>rubra</i>	Northern red oak	*
<i>Quercus</i>	<i>macrocarpa</i>	Bur oak	*
<i>Quercus</i>	<i>alba</i>	White oak	*
<i>Tilia</i>	<i>americana</i>	Basswood	*
<i>Ulmus</i>	<i>rubra</i>	Slippery elm	*
<i>Ulmus</i>	<i>americana</i>	American elm	
<b>Shrubs</b>			
<i>Amelanchier</i>	cmx.	Juneberry	*
<i>Cornus</i>	<i>alternifolia</i>	Pagoda dogwood	*
<i>Cornus</i>	<i>racemosa</i>	Gray dogwood	*
<i>Corylus</i>	<i>americana</i>	American hazelnut	*
<i>Dirca</i>	<i>palustris</i>	Leatherwood	
<i>Lonicera</i>	<i>prolifera</i>	Grape honeysuckle	
<i>Prunus</i>	<i>virginiana</i>	Chokecherry	
<i>Ribes</i>	<i>cynosbati</i>	Prickly gooseberry	
<i>Ribes</i>	<i>missouriense</i>	Missouri gooseberry	
<i>Sambucus</i>	<i>racemosa</i>	Red-berried elder	
<i>Symporicarpos</i>	cmx	Snowberry	
<i>Viburnum</i>	<i>raffinesquianum</i>	Downy arrow-wood	*
<i>Viburnum</i>	<i>lentago</i>	Nannyberry	*
<i>Viburnum</i>	<i>opulus</i>	High-bush cranberry	
<i>Zanthoxylum</i>	<i>americanum</i>	Prickly ash	dnp
<b>Low Shrubs</b>			
<i>Rubus</i>	cm1	Blackberry	dnp
<i>Rubus</i>	<i>idaeus</i>	Red raspberry	dnp

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MESIC OAK - BASSWOOD FOREST</b> (modified from Dunevitz and Lane 2004)			
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	* = recommended for planting and slope stabilization; dnp = do not plant
<i>Toxicodendron</i>	<i>rydbergii</i>	Poison ivy	dnp
<b>Vines</b>			
<i>Celastrus</i>	<i>scandens</i>	Climbing bittersweet	
<i>Clematis</i>	<i>virginiana</i>	Virgin's bower	*
<i>Menispermum</i>	<i>canadense</i>	Canada moonseed	*
<i>Parthenocissus</i>	<i>inserta</i>	Virginia creeper	*
<i>Smilax</i>	<i>hispida</i>	Green-briar	*
<i>Vitis</i>	<i>riparia</i>	Wild grape	dnp
<b>Forbs</b>			
<i>Actaea</i>	<i>rubra</i>	Red baneberry	*
<i>Allium</i>	<i>tricoccum</i>	Wild leek	
<i>Amphicarpa</i>	<i>bracteata</i>	Hog-peanut	*
<i>Anemone</i>	<i>quinquefolia</i>	Wood-anemone	*
<i>Anemone</i>	<i>acutiloba</i>	Sharp-lobed hepatica	*
<i>Anemonella</i>	<i>thalictroides</i>	Rue-anemone	
<i>Aplectrum</i>	<i>hyemale</i>	Putty-root	
<i>Apocynum</i>	<i>androsaemifolium</i>	Spreading dogbane	
<i>Aquilegia</i>	<i>canadensis</i>	Columbine	*
<i>Aralia</i>	<i>nudicaulis</i>	Wild sarsaparilla	*
<i>Aralia</i>	<i>racemosa</i>	American spikenard	*
<i>Arisaema</i>	<i>trifolium</i>	Jack-in-the-pulpit	*
<i>Asarum</i>	<i>canadense</i>	Wild ginger	*
<i>Asclepias</i>	<i>exaltata</i>	Poke milkweed	
<i>Aster</i>	<i>cordifolius</i>	Heart-leaved aster	*
<i>Aster</i>	<i>lateriflorus</i>	Side-flowering aster	*
<i>Campanula</i>	<i>americana</i>	Tall bellflower	*
<i>Cardamine</i>	<i>concatenata</i>	Cut-leaved toothwort	*
<i>Caulophyllum</i>	<i>thalictroides</i>	Blue cohosh	*
<i>Circaea</i>	<i>lutetiana</i>	Canada enchanter's nightshade	*
<i>Corallorrhiza</i>	spp	Coral-root	
<i>Cryptotaenia</i>	<i>canadensis</i>	Hewwort	*
<i>Desmodium</i>	<i>glutinosum</i>	Pointed-leaved tick-trefoil	*
<i>Dicentra</i>	<i>cucullaria</i>	Dutchman's-breeches	
<i>Dioscorea</i>	<i>villosa</i>	Wild yam	
<i>Erythronium</i>	<i>album</i>	White trout lily	*
<i>Eupatorium</i>	<i>rugosum</i>	Common snakeroot	*
<i>Fragaria</i>	<i>virginiana</i>	Common strawberry	*
<i>Galium</i>	<i>triflorum</i>	Three-flowered bedstraw	*
<i>Galium</i>	<i>aparine</i>	Cleavers	*
<i>Galium</i>	<i>concinnum</i>	Elegant bedstraw	*
<i>Geranium</i>	<i>maculatum</i>	Wild geranium	*
<i>Geum</i>	<i>canadense</i>	White avens	
<i>Hackelia</i>	cmx.	Stickseed	
<i>Hydrophyllum</i>	<i>virginianum</i>	Virginia waterleaf	*
<i>Impatiens</i>	cmx.	Spotted touch-me-not	
<i>Lactuca</i>	spp.	Wild lettuce	
<i>Laportea</i>	<i>canadensis</i>	Wood-nettle	dnp
<i>Lilium</i>	<i>michiganense</i>	Michigan lily	
<i>Maianthemum</i>	<i>canadense</i>	Canada mayflower	
<i>Mitella</i>	<i>diphylla</i>	Two-leaved miterwort	
<i>Monotropa</i>	<i>uniflora</i>	Indian pipe	

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MESIC OAK - BASSWOOD FOREST</b> (modified from Dunevitz and Lane 2004)			
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	* = recommended for planting and slope stabilization; dnp = do not plant
<i>Orchis</i>	<i>spectabilis</i>	Showy orchis	
<i>Osmorhiza</i>	<i>claytonii</i>	Clayton's sweet cicely	*
<i>Phlox</i>	<i>divaricata</i>	Blue phlox	*
<i>Phryma</i>	<i>leptostachya</i>	Lopseed	*
<i>Polygonatum</i>	<i>pubescens</i>	Hairy Solomon's-seal	*
<i>Polygonatum</i>	<i>biflorum</i>	Giant Solomon's-seal	*
<i>Prenanthes</i>	<i>alba</i>	White rattlesnake-root	*
<i>Pyrola</i>	<i>elliptica</i>	Common pyrola	
<i>Ranunculus</i>	<i>abortivus</i>	Kidney-leaf buttercup	
<i>Ranunculus</i>	<i>recurvatus</i>	Hooked crowfoot	
<i>Rudbeckia</i>	<i>laciniate</i>	Goldenglow	
<i>Sanguinaria</i>	<i>canadensis</i>	Bloodroot	*
<i>Sanicula</i>	<i>mariolandica</i>	Marioland black snakeroot	*
<i>Sanicula</i>	<i>gregaria</i>	Gregarious black snakeroot	*
<i>Smilacina</i>	<i>racemosa</i>	Racemose false Solomon's-seal	*
<i>Smilax</i>	<i>herbacea</i>	Carion-flower	
<i>Solidago</i>	<i>flexicaulis</i>	Zig-zag goldenrod	*
<i>Thalictrum</i>	<i>dioicum</i>	Early meadow-rue	*
<i>Trillium</i>	<i>cernuum</i>	Nodding trillium	
<i>Trillium</i>	<i>grandiflorum</i>	Large-flowered trillium	
<i>Triosteum</i>	<i>perfoliatum</i>	Horse-gentian	
<i>Uvularia</i>	<i>grandiflora</i>	Yellow bellwort	*
<i>Veronicastrum</i>	<i>virginicum</i>	Culver's root	
<i>Viola</i>	<i>candensis</i>	Canada violet	
<i>Viola</i>	<i>pubescens</i>	Downy yellow violet	
<i>Viola</i>	<i>sororia</i>	Common blue violet	
<i>Zizia</i>	<i>aurea</i>	Golden alexanders	*
<b>Grasses, Rushes and Sedges</b>			
<i>Brachyelytrum</i>	<i>erectum</i>	Bearded shorthusk	*
<i>Bromus</i>	<i>altissimus</i>	Broad-glumed brome	
<i>Carex</i>	<i>pedunculata</i>	Long-stalked sedge	*
<i>Carex</i>	<i>pensylvanica</i>	Pennsylvania sedge	*
<i>Carex</i>	<i>blanda</i>	Woodland sedge	*
<i>Carex</i>	<i>gracillima</i>	Graceful sedge	*
<i>Carex</i>	<i>deweyana</i>	Dewey's sedge	
<i>Carex</i>	<i>sprengelii</i>	Sprengel's sedge	*
<i>Carex</i>	<i>leptonervia</i>	Fine-nerved sedge	*
<i>Carex</i>	<i>hirtifolia</i>	Hairy-leaved sedge	*
<i>Carex</i>	<i>radiata</i>	Stellate sedge	*
<i>Carex</i>	<i>rosea</i>	Rolled-up sedge	*
<i>Elymus</i>	<i>hystrix</i>	Bottlebrush grass	*
<i>Festuca</i>	<i>subverticillata</i>	Nodding fescue	*
<i>Milium</i>	<i>effusum</i>	Woodland millet grass	*
<i>Oryzopsis</i>	<i>racemosa</i>	Black-fruited rice-grass	*
<i>Oryzopsis</i>	<i>asperifolia</i>	Moutain rice-grass	*
<i>Schizachne</i>	<i>purpurascens</i>	False melic grass	*
<b>Ferns and Fern Allies</b>			
<i>Adiantum</i>	<i>pedatum</i>	Maidenhair fern	*
<i>Athyrium</i>	<i>filix-femina</i>	Lady-fern	*
<i>Botrychium</i>	<i>virginianum</i>	Rattlesnakefern	
<i>Cystopteris</i>	<i>fragilis</i>	Fragile bladder-fern	*
<i>Dryopteris</i>	<i>carthusiana</i>	Wood fern	*

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MESIC OAK - BASSWOOD FOREST</b> (modified from Dunevitz and Lane 2004)																															
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	* = recommended for planting and slope stabilization; dnp = do not plant																												
<i>Osmunda</i>	<i>claytoniana</i>	Interrupted fern	*																												
<b>Exotic Invasive Species - Do Not Plant</b>																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td><i>Alliaria</i></td><td><i>petiolata</i></td><td>Garlic-mustard</td><td>dnp</td></tr> <tr><td><i>Phalaris</i></td><td><i>arundinacea</i></td><td>Reed canary-grass</td><td>dnp</td></tr> <tr><td><i>Polygonum</i></td><td><i>convolvulus</i></td><td>Black bindweed</td><td>dnp</td></tr> <tr><td><i>Rhamnus</i></td><td><i>cathartica</i></td><td>Common buckthorn</td><td>dnp</td></tr> <tr><td><i>Solanum</i></td><td><i>dulcamara</i></td><td>Bittersweet nightshade</td><td>dnp</td></tr> <tr><td><i>Taraxacum</i></td><td><i>spp.</i></td><td>Common dandelion</td><td>dnp</td></tr> <tr><td><i>Verbascum</i></td><td><i>thapsus</i></td><td>Common mullein</td><td>dnp</td></tr> </table>				<i>Alliaria</i>	<i>petiolata</i>	Garlic-mustard	dnp	<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	dnp	<i>Polygonum</i>	<i>convolvulus</i>	Black bindweed	dnp	<i>Rhamnus</i>	<i>cathartica</i>	Common buckthorn	dnp	<i>Solanum</i>	<i>dulcamara</i>	Bittersweet nightshade	dnp	<i>Taraxacum</i>	<i>spp.</i>	Common dandelion	dnp	<i>Verbascum</i>	<i>thapsus</i>	Common mullein	dnp
<i>Alliaria</i>	<i>petiolata</i>	Garlic-mustard	dnp																												
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<i>Carex</i>	<i>laxiculmis</i>	Loose-culmed sedge																													
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Appendix B:  
Species Lists for Restoration

<b>SOUTHERN WET ASH SWAMP</b>				
(modified from Dunevitz and Lane 2004)				
Genus	Species	Common Name	* = invasive	<sup>5</sup> Index
<b>Canopy Trees (&gt;10 m)</b>				
<i>Fraxinus</i>	<i>nigra</i>	Black ash		3400
<i>Ulmus</i>	<i>americana</i>	American elm		480
<i>Tilia</i>	<i>americana</i>	Basswood		360
<i>Acer</i>	<i>saccharum</i>	Sugar maple		300
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash		80
<i>Ulmus</i>	<i>rubra</i>	Slippery elm		60
<i>Salix</i>	<i>nigra</i>	Black willow		20
<i>Betula</i>	<i>papyrifera</i>	Paper-birch		20
<b>Understory Trees</b>				
<i>Fraxinus</i>	<i>nigra</i>	Black ash		1400
<i>Ulmus</i>	<i>americana</i>	American elm		660
<i>Tilia</i>	<i>americana</i>	Basswood		400
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash		320
<i>Ostrya</i>	<i>virginiana</i>	Ironwood		320
<i>Acer</i>	<i>negundo</i>	Box elder	*	300
<i>Acer</i>	<i>saccharum</i>	Sugar maple		300
<i>Ulmus</i>	<i>rubra</i>	Slippery elm		300
<i>Betula</i>	<i>papyrifera</i>	Paper-birch		100
<i>Celtis</i>	<i>occidentalis</i>	Hackberry		60
<i>Populus</i>	<i>tremuloides</i>	Quaking aspen		20
<b>Shrubs</b>				
<i>Cornus</i>	<i>sericea</i>	Red-osier dogwood		1040
<i>Viburnum</i>	<i>lentago</i>	Nannyberry		720
<i>Ribes</i>	<i>americanum</i>	Wild black currant		360
<i>Cornus</i>	<i>rugosa</i>	Round-leaved dogwood		300
<i>Ribes</i>	<i>missouriense</i>	Missouri gooseberry		120
<i>Viburnum</i>	<i>opulus</i>	High-bush cranberry		100
<i>Prunus</i>	<i>virginiana</i>	Chokecherry		60
<i>Cornus</i>	<i>alternifolia</i>	Pagoda dogwood		60
<i>Cornus</i>	<i>racemosa</i>	Gray dogwood		60
<i>Zanthoxylum</i>	<i>americanum</i>	Prickly ash		60
<i>Sambucus</i>	<i>racemosa</i>	Red-berried Elder		20
<b>Low Shrubs</b>				
<i>Toxicodendron</i>	<i>rydbergii</i>	Poison ivy	*	60
<i>Vitis</i>	<i>riparia</i>	Wild grape		80
<i>Menispermum</i>	<i>canadense</i>	Canada moonseed		60
<i>Rubus</i>	<i>idaeus</i>	Red raspberry	*	20
<b>Vines</b>				
<i>Parthenocissus</i>	cmx.	Virginia creeper		300
<b>Forbs</b>				
<i>Symplocarpus</i>	<i>foetidus</i>	Skunk-cabbage		4320
<i>Impatiens</i>	cmx.	Touch-me-not		2000
<i>Caltha</i>	<i>palustris</i>	Swamp marsh-marigold		960
<i>Laportea</i>	<i>canadensis</i>	Wood-nettle		560
<i>Rudbeckia</i>	<i>laciniata</i>	Goldenglow		400
<i>Pilea</i>	cmx.	Clearweed		360
<i>Asarum</i>	<i>canadense</i>	Wild ginger		360
<i>Smilacina</i>	<i>stellata</i>	Starry false Solomon's-seal		320
<i>Cryptotaenia</i>	<i>canadensis</i>	Honewort		320
<i>Lemna</i>	<i>spp.</i>	Lesser duckweed		300
<i>Stachys</i>	<i>hispida</i>	Smooth hedge-nettle		300
<i>Boehmeria</i>	<i>cylindrica</i>	False nettle		300
<i>Arisaema</i>	<i>trifolium</i>	Jack-in-the-pulpit		300
<i>Geranium</i>	<i>maculatum</i>	Wild geranium		240

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN WET ASH SWAMP</b>				
(modified from Dunlevitz and Lane 2004)				
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>* = invasive</b>	<b>Index</b>
<i>Osmorhiza</i>	<i>claytonii</i>	Clayton's sweet cicely		240
<i>Galium</i>	<i>aparine</i>	Cleavers		240
<i>Ranunculus</i>	<i>recurvatus</i>	Hooked crowfoot		180
<i>Maianthemum</i>	<i>canadense</i>	Canada mayflower		180
<i>Iris</i>	<i>versicolor</i>	Northern blue Flag		160
<i>Galium</i>	<i>triflorum</i>	Three-flowered bedstraw		120
<i>Solidago</i>	<i>flexicaulis</i>	Zig-zag goldenrod		120
<i>Cardamine</i>	<i>rhomboidea</i>	Spring cress		120
<i>Eupatorium</i>	<i>rugosum</i>	Common snakeroot		120
<i>Sanicula</i>	<i>gregaria</i>	Gregarious black snakeroot		120
<i>Lilium</i>	<i>michiganense</i>	Michigan lily		120
<i>Sanguinaria</i>	<i>canadensis</i>	Bloodroot		120
<i>Circaea</i>	<i>lutetiana</i>	Canada enchanter's nightshade		120
<i>Thalictrum</i>	<i>dasycarpum</i>	Tall meadow-rue		120
<i>Hydrophyllum</i>	<i>virginianum</i>	Virginia waterleaf		120
<i>Geum</i>	<i>canadense</i>	White avens		100
<i>Ranunculus</i>	<i>hispidus</i>	Hispid buttercup		100
<i>Galium</i>	<i>obtusum</i>	Obtuse bedstraw		100
<i>Rubus</i>	<i>pubescens</i>	Dwarf raspberry		80
<i>Scutellaria</i>	<i>lateriflora</i>	Mad-dog skullcap		80
<i>Typha</i>	spp.	Cattail	*	60
<i>Aralia</i>	<i>nudicaulis</i>	Wild sarsaparilla		60
<i>Angelica</i>	<i>atropurpurea</i>	Angelica		60
<i>Rumex</i>	<i>orbiculatus</i>	Great water dock		60
<i>Anemone</i>	<i>quinquefolia</i>	Wood-anemone		60
<i>Ranunculus</i>	<i>abortivus</i>	Kidney-leaf buttercup		60
<i>Polygonum</i>	<i>virginianum</i>	Virginia knotweed		60
<i>Polygonatum</i>	<i>pubescens</i>	Hairy Solomon's-seal		60
<i>Aster</i>	<i>ontarionis</i>	Ontario aster		60
<i>Anemone</i>	<i>acutiloba</i>	Sharp-lobed hepatica		60
<i>Cicuta</i>	<i>bulbifera</i>	Bulb-bearing water-hemlock		60
<i>Desmodium</i>	<i>glutinosum</i>	Pointed-leaved tick-trefoil		60
<i>Sagittaria</i>	<i>latifolia</i>	Broad-leaved arrowhead		60
<i>Aster</i>	<i>firmus</i>	Red-stemmed aster		60
<i>Galium</i>	<i>asprellum</i>	Rough bedstraw		60
<i>Galium</i>	<i>concinnum</i>	Elegant bedstraw		60
<i>Cardamine</i>	<i>pensylvanica</i>	Pennsylvania bitter cress		60
<i>Campanula</i>	<i>aparinoides</i>	Marsh bellflower		60
<i>Boltonia</i>	<i>asteroides</i>	Boltonia		60
<i>Lycopus</i>	<i>uniflorus</i>	Northern bugleweed		60
<i>Lysimachia</i>	<i>ciliata</i>	Fringed loosestrife		60
<i>Mitella</i>	<i>nuda</i>	Naked miterwort		60
<i>Eupatorium</i>	<i>purpureum</i>	Sweet Joe-pye weed		60
<i>Sparganium</i>	<i>eurycarpum</i>	Giant bur-reed		60
<i>Urtica</i>	<i>dioica</i>	Stinging nettle		60
<i>Uvularia</i>	<i>grandiflora</i>	Yellow bellwort		60
<i>Solidago</i>	<i>gigantea</i>	Giant goldenrod		60
<i>Uvularia</i>	<i>sessilifolia</i>	Pale bellwort		60
<i>Cuscuta</i>	spp.	Dodder		20
<i>Oxalis</i>	cmx.	Wood-sorrel		20
<i>Ranunculus</i>	<i>sceleratus</i>	Cursed crowfoot		20
<i>Cirsium</i>	<i>muticum</i>	Swamp thistle		20
<i>Prenanthes</i>	<i>alba</i>	White rattlesnake-root		20

**Appendix B:**  
**Species Lists for Restoration**

SOUTHERN WET ASH SWAMP				
(modified from Dunevitz and Lane 2004)				
Genus	Species	Common Name	* = invasive	Index
<i>Sanicula</i>	<i>marilandica</i>	Mariland black snakeroot		20
<i>Saxifraga</i>	<i>pensylvanica</i>	Swamp saxifrage		20
<i>Erigeron</i>	<i>philadelphicus</i>	Philadelphia fleabane		20
<b>Grasses, Rushes and Sedges</b>				
<i>Carex</i>	<i>lacustris</i>	Lake-sedge		420
<i>Carex</i>	<i>stricta</i>	Tussock-sedge		360
<i>Scirpus</i>	<i>microcarpus</i>	Small-fruited bulrush		300
<i>Carex</i>	<i>stipata</i>	Awl-fruited sedge		240
<i>Glyceria</i>	<i>striata</i>	Fowl manna-grass		240
<i>Carex</i>	<i>hystericina</i>	Porcupine sedge		160
<i>Elymus</i>	<i>virginicus</i>	Virginia wild rye		120
<i>Carex</i>	<i>blanda</i>	Charming sedge		120
<i>Carex</i>	<i>lupulina</i>	Hop-sedge		100
<i>Poa</i>	<i>sylvestris</i>	Woodland bluegrass		60
<i>Leersia</i>	<i>virginica</i>	White grass		60
<i>Festuca</i>	<i>subverticillata</i>	Nodding fescue		60
<i>Leersia</i>	<i>oryzoides</i>	Rice cut grass		60
<i>Carex</i>	<i>pedunculata</i>	Long-stalked sedge		60
<i>Carex</i>	<i>rosea</i>	Rolled-up sedge		60
<i>Carex</i>	<i>tenera</i>	Marsh-straw sedge		60
<i>Carex</i>	<i>disperma</i>	Soft-leaved sedge		60
<i>Carex</i>	<i>bromoides</i>	Brome-like sedge		20
<b>Ferns and Fern Allies</b>				
<i>Matteuccia</i>	<i>struthiopteris</i>	Ostrich-fern		1140
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive fern		480
<i>Equisetum</i>	<i>hyemale</i>	Tall scouring-rush		400
<i>Equisetum</i>	<i>arvense</i>	Field horsetail		240
<i>Athyrium</i>	<i>filix-femina</i>	Lady-fern		120
<i>Equisetum</i>	<i>pratense</i>	Meadow horsetail		100
<i>Adiantum</i>	<i>pedatum</i>	Maidenhair fern		60
<i>Osmunda</i>	<i>claytoniana</i>	Interrupted fern		60
<i>Cystopteris</i>	<i>bulbifera</i>	Bulblet bladder-fern		60
<i>Cystopteris</i>	<i>protrusa</i>	Protruding fragile fern		60
<i>Thelypteris</i>	<i>palustris</i>	Northern marsh-fern		60
<b>Exotic Invasive Species - Do Not Plant</b>				
<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	*	560
<i>Rhamnus</i>	<i>cathartica</i>	Common buckthorn	*	400
<i>Lysimachia</i>	<i>nummularia</i>	Moneywort	*	300
<i>Myosotis</i>	<i>scorpioides</i>	True forget-me-not	*	240
<i>Poa</i>	<i>pratensis</i>	Kentucky bluegrass	*	60
<i>Acer</i>	<i>ginnala</i>	Amur maple		20
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>				
<i>Hydrocotyle</i>	<i>americana</i>	American water pennywort		100
<i>Poa</i>	<i>paludigena</i>	Bog bluegrass		60
<i>Juglans</i>	<i>cinerea</i>	Butternut		20

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN FLOODPLAIN FOREST</b> (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	dnp = do not plant
<b>Canopy Trees (&gt;10 m)</b>			
<i>Acer</i>	<i>saccharinum</i>	Silver maple	
<i>Acer</i>	<i>negundo</i>	Box elder	dnp
<i>Celtis</i>	<i>occidentalis</i>	Hackberry	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	
<i>Populus</i>	<i>deltoides</i>	Cottonwood	
<i>Salix</i>	<i>nigra</i>	Black willow	
<i>Ulmus</i>	<i>americana</i>	American elm	
<b>Understory Trees</b>			
<i>Acer</i>	<i>saccharinum</i>	Silver maple	
<i>Acer</i>	<i>negundo</i>	Box elder	dnp
<i>Carya</i>	<i>cordiformis</i>	Bitternut hickory	
<i>Celtis</i>	<i>occidentalis</i>	Hackberry	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	
<i>Tilia</i>	<i>americana</i>	Basswood	
<i>Ulmus</i>	<i>americana</i>	American elm	
<b>Shrubs</b>			
<i>Salix</i>	<i>exigua</i>	Sandbar willow	
<i>Zanthoxylum</i>	<i>americanum</i>	Prickly ash	dnp
<b>Vines</b>			
<i>Menispermum</i>	<i>canadense</i>	Canada moonseed	
<i>Parthenocissus</i>	<i>sp.</i>	Virginia creeper	
<i>Polygonum</i>	<i>scandens</i>	False buckwheat	
<i>Smilax</i>	<i>hispida</i>	Green-briar	dnp
<i>Vitis</i>	<i>riparia</i>	Wild grape	dnp
<b>Forbs</b>			
<i>Acalypha</i>	<i>rhomboidea</i>	Three-seeded mercury	
<i>Asarum</i>	<i>canadense</i>	Wild ginger	
<i>Aster</i>	<i>ontarionis</i>	Ontario aster	
<i>Bidens</i>	<i>spp.</i>	Beggar-ticks	
<i>Boehmeria</i>	<i>cylindrica</i>	False nettle	
<i>Campanula</i>	<i>americana</i>	Tall bellflower	
<i>Cryptotaenia</i>	<i>canadensis</i>	Honewort	
<i>Cuscuta</i>	<i>spp.</i>	Dodder	
<i>Eupatorium</i>	<i>rugosum</i>	Common snakeroot	
<i>Hackelia</i>	<i>cmx.</i>	Stickseed	
<i>Helenium</i>	<i>autumnale</i>	Autumn sneezeweed	
<i>Impatiens</i>	<i>cmx.</i>	Touch-me-not	
<i>Laportea</i>	<i>canadensis</i>	Wood-nettle	dnp
<i>Lycopus</i>	<i>uniflorus</i>	Northern bugleweed	
<i>Mimulus</i>	<i>ringens</i>	Purple monkey-flower	
<i>Physalis</i>	<i>virginiana</i>	Ground-cherry	
<i>Physostegia</i>	<i>virginiana</i>	Obedient plant	
<i>Pilea</i>	<i>cmx.</i>	Clearweed	
<i>Polygonum</i>	<i>punctatum</i>	Dotted smartweed	
<i>Polygonum</i>	<i>virginianum</i>	Virginia knotweed	
<i>Ranunculus</i>	<i>abortivus</i>	Kidney-leaf buttercup	

**Appendix B:**  
**Species Lists for Restoration**

<b>SOUTHERN FLOODPLAIN FOREST</b> (modified from Dunevitz and Lane 2004)			
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>dnp = do not plant</b>
<i>Ranunculus</i>	<i>hispidus</i>	Hispid buttercup	
<i>Rudbeckia</i>	<i>laciniata</i>	Goldenglow	
<i>Scutellaria</i>	<i>lateriflora</i>	Mad-dog skullcap	
<i>Sicyos</i>	<i>angulatus</i>	Bur-cucumber	
<i>Solanum</i>	<i>nigrum</i>	Black nightshade	dnp
<i>Stachys</i>	<i>hispida</i>	Smooth hedge-nettle	
<i>Urtica</i>	<i>dioica</i>	Stinging nettle	dnp
<i>Viola</i>	cm1	Violet	
<b>Grasses, Rushes and Sedges</b>			
<i>Leersia</i>	<i>virginica</i>	White grass	
<i>Elymus</i>	<i>virginicus</i>	Virginia wild rye	
<i>Carex</i>	<i>lupulina</i>	Hop-sedge	
<i>Leersia</i>	<i>oryzoides</i>	Rice cut grass	
<i>Carex</i>	<i>intumescens</i>	Bladder sedge	
<i>Carex</i>	<i>crawfordii</i>	Crawford's sedge	
<i>Carex</i>	<i>tribuloides</i>	Blunt-broom sedge	
<i>Carex</i>	<i>blanda</i>	Charming sedge	
<b>Ferns and Fern Allies</b>			
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive fern	
<b>Exotic Invasive Species - Do Not Plant</b>			
<i>Glechoma</i>	<i>hederacea</i>	Creeping Charlie	
<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	
<i>Arctium</i>	<i>minus</i>	Common burdock	
<i>Leonurus</i>	<i>cardiaca</i>	Lion's ear	
<i>Stellaria</i>	<i>aquatica</i>	Giant chickweed	
<i>Rhamnus</i>	<i>cathartica</i>	Common buckthorn	
<i>Melilotus</i>	<i>spp.</i>	Sweet clover	
<i>Oxalis</i>	cmx.	Wood-sorrel	
<i>Taraxacum</i>	<i>spp.</i>	Common dandelion	
<i>Lysimachia</i>	<i>nummularia</i>	Moneywort	
<i>Abutilon</i>	<i>theophrasti</i>	Velvet-leaf	
<i>Potentilla</i>	<i>norvegica</i>	Rough cinquefoil	
<i>Verbascum</i>	<i>thapsus</i>	Common mullein	
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>			
<i>Carex</i>	<i>typhina</i>	Cattail-sedge	

Appendix B:  
Species Lists for Restoration

<b>SOUTHERN MIXED CATTAI MARSH</b> (modified from Dunevitz and Lane 2004)			
Genus	Species	Common Name	* = invasive species
<b>Understory Trees</b>			
<i>Acer</i>	<i>negundo</i>	Box elder	*
<b>Shrubs</b>			
<i>Amorpha</i>	<i>fruticosa</i>	False indigo	
<i>Betula</i>	<i>pumila</i>	Bog-birch	
<i>Cornus</i>	<i>sericea</i>	Red-osier dogwood	
<i>Salix</i>	<i>petiolaris</i>	Slender willow	
<i>Spiraea</i>	<i>tomentosa</i>	Steeple-bush	
<b>Forbs</b>			
<i>Acorus</i>	<i>calamus</i>	Sweet flag	
<i>Asclepias</i>	<i>incarnata</i>	Swamp milkweed	
<i>Aster</i>	<i>borealis</i>	Bog aster	
<i>Aster</i>	<i>firmus</i>	Red-stemmed aster	
<i>Aster</i>	<i>pubentior</i>	Flat-topped aster	
<i>Bidens</i>	<i>spp.</i>	Beggar-ticks	
<i>Boehmeria</i>	<i>cylindrica</i>	False nettle	
<i>Caltha</i>	<i>palustris</i>	Swamp marsh-marigold	
<i>Calystegia</i>	<i>sepium</i>	Hedge bindweed	
<i>Campanula</i>	<i>aparinoides</i>	Marsh bellflower	
<i>Cicuta</i>	<i>bulbifera</i>	Bulb-bearing water-hemlock	
<i>Cicuta</i>	<i>maculata</i>	Spotted water-hemlock	
<i>Cuscuta</i>	<i>spp.</i>	Dodder	
<i>Epilobium</i>	<i>cm2</i>	Willow-herb	
<i>Epilobium</i>	<i>cm1</i>	Willow-herb	
<i>Eupatorium</i>	<i>maculatum</i>	Spotted Joe-pye weed	
<i>Eupatorium</i>	<i>perfoliatum</i>	Common boneset	
<i>Galium</i>	<i>trifidum</i>	Three-cleft bedstraw	
<i>Galium</i>	<i>tinctorium</i>	Small bedstraw	
<i>Helianthus</i>	<i>grosseserratus</i>	Sawtooth sunflower	
<i>Impatiens</i>	<i>cmx.</i>	Touch-me-not	
<i>Lathyrus</i>	<i>palustris</i>	Marsh vetchling	
<i>Lemna</i>	<i>spp.</i>	Lesser duckweed	
<i>Liatis</i>	<i>ligulistylis</i>	Northern plains blazing star	
<i>Lobelia</i>	<i>siphilitica</i>	Great lobelia	
<i>Lycopus</i>	<i>americanus</i>	Cut-leaved bugleweed	
<i>Lycopus</i>	<i>uniflorus</i>	Northern bugleweed	
<i>Lysimachia</i>	<i>thyrsiflora</i>	Tufted loosestrife	
<i>Lysimachia</i>	<i>ciliata</i>	Fringed loosestrife	
<i>Lysimachia</i>	<i>quadriflora</i>	Prairie loosestrife	
<i>Lythrum</i>	<i>alatum</i>	Wing-angled loosestrife	
<i>Mentha</i>	<i>arvensis</i>	Common mint	
<i>Nymphaea</i>	<i>cmx.</i>	Waterlily	
<i>Pedicularis</i>	<i>lanceolata</i>	Swamp lousewort	
<i>Pilea</i>	<i>cmx.</i>	Clearweed	
<i>Polygonum</i>	<i>sagittatum</i>	Arrow-leaved tearthumb	
<i>Polygonum</i>	<i>amphibium</i>	Water smartweed	
<i>Polygonum</i>	<i>punctatum</i>	Dotted smartweed	
<i>Polygonum</i>	<i>pensylvanicum</i>	Pennsylvania smartweed	
<i>Polygonum</i>	<i>lapathifolium</i>	Nodding smartweed	
<i>Polygonum</i>	<i>amphibium</i>	Swamp smartweed	

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Species Lists for Restoration

<b>SOUTHERN MIXED CATTAI MARSH</b> (modified from Dunevitz and Lane 2004)			
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>* = invasive species</b>
<i>Rorippa</i>	<i>palustris</i>	Icelandic yellow cress	
<i>Rumex</i>	<i>orbiculatus</i>	Great water dock	
<i>Rumex</i>	<i>maritimus</i>	Golden dock	
<i>Sagittaria</i>	<i>latifolia</i>	Broad-leaved arrowhead	
<i>Scutellaria</i>	<i>galeruculata</i>	Marsh skullcap	
<i>Sium</i>	<i>suave</i>	Water-parsnip	
<i>Solidago</i>	<i>gigantea</i>	Giant goldenrod	
<i>Sparganium</i>	<i>eurycarpum</i>	Giant bur-reed	
<i>Stachys</i>	<i>palustris</i>	Woundwort	
<i>Stellaria</i>	<i>longifolia</i>	Long-leaved chickweed	
<i>Teucrium</i>	<i>canadense</i>	Germander	
<i>Thalictrum</i>	<i>dasycarpum</i>	Tall meadow-rue	
<i>Typha</i>	<i>angustifolia</i>	Narrow leaf cattail	*
<i>Typha</i>	<i>latifolia</i>	Broad leaf cattail	
<i>Viola</i>	cm1	Violet	
<b>Grasses, Rushes and Sedges</b>			
<i>Calamagrostis</i>	<i>canadensis</i>	Bluejoint	
<i>Carex</i>	<i>lacustris</i>	Lake-sedge	
<i>Carex</i>	<i>comosa</i>	Bristly sedge	
<i>Carex</i>	<i>stricta</i>	Tussock-sedge	
<i>Carex</i>	<i>hystericina</i>	Porcupine sedge	
<i>Carex</i>	<i>haydenii</i>	Hayden's sedge	
<i>Carex</i>	<i>interior</i>	Inland sedge	
<i>Carex</i>	<i>stipata</i>	Awl-fruited sedge	
<i>Carex</i>	<i>pellita</i>	Woolly sedge	
<i>Cyperus</i>	<i>odoratus</i>	Fragrant cyperus	
<i>Cyperus</i>	<i>bipartitus</i>	Brook nut sedge	
<i>Dulichium</i>	<i>arundinaceum</i>	Three-way sedge	
<i>Eleocharis</i>	<i>palustris</i>	Marsh spikerush	
<i>Leersia</i>	<i>oryzoides</i>	Rice cut grass	
<i>Muhlenbergia</i>	<i>glomerata</i>	Clustered muhly grass	
<i>Phragmites</i>	<i>australis</i>	Common reed	*
<i>Scirpus</i>	<i>acutus</i>	Hard-stemmed bulrush	
<i>Scirpus</i>	<i>validus</i>	Softstem bulrush	
<i>Scirpus</i>	<i>fluvialis</i>	River bulrush	
<i>Zizania</i>	<i>palustris</i>	Wild rice	
<b>Ferns and Fern Allies</b>			
<i>Equisetum</i>	<i>fluviatile</i>	Water horsetail	
<i>Thelypteris</i>	<i>palustris</i>	Northern marsh-fern	
<b>Exotic Invasive Species - Do Not Plant</b>			
<i>Agrostis</i>	<i>gigantea</i>	Redtop	*
<i>Echinochloa</i>	<i>crusgalli</i>	Cockspur barnyard grass	*
<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	*
<i>Polygonum</i>	<i>convolvulus</i>	Black bindweed	*
<i>Rumex</i>	<i>crispus</i>	curly dock	*
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>			
<i>Decodon</i>	<i>verticillatus</i>	waterwillow	

Appendix B:  
Species Lists for Restoration

<b>NORTHERN WET MEADOW/CARR - SEDGE MEADOW TYPE</b> (modified from Dunevitz and Lane 2004)			
<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>* = invasive species</b>
<b>Understory Trees</b>			
<i>Acer</i>	<i>negundo</i>	Box elder	*
<i>Betula</i>	<i>papyrifera</i>	Paper-birch	
<i>Fraxinus</i>	<i>pennsylvanica</i>	Green ash	
<i>Larix</i>	<i>laricina</i>	Tamarack	
<i>Populus</i>	<i>tremuloides</i>	Quaking aspen	*
<i>Ulmus</i>	<i>americana</i>	American elm	
<i>Ulmus</i>	<i>rubra</i>	Slippery elm	
<b>Shrubs</b>			
<i>Alnus</i>	<i>incana</i>	Speckled alder	
<i>Betula</i>	<i>pumila</i>	Bog-birch	
<i>Cornus</i>	<i>amomum</i>	Silky dogwood	
<i>Cornus</i>	<i>sericea</i>	Red-osier dogwood	
<i>Ilex</i>	<i>verticillata</i>	Winterberry	
<i>Salix</i>	<i>bebbiana</i>	Bebb's willow	
<i>Salix</i>	<i>candida</i>	Sage-leaved willow	
<i>Salix</i>	<i>discolor</i>	Pussy willow	
<i>Salix</i>	<i>eriocephala</i>	Heart-leaved willow	
<i>Salix</i>	<i>exigua</i>	Sandbar willow	
<i>Salix</i>	<i>pedicellaris</i>	Bog willow	
<i>Salix</i>	<i>petiolaris</i>	Slender willow	
<i>Spiraea</i>	<i>alba</i>	Meadowsweet	
<i>Spiraea</i>	<i>tomentosa</i>	Steeple-bush	
<b>Forbs</b>			
<i>Acorus</i>	<i>calamus</i>	Sweet flag	
<i>Alisma</i>	<i>triviale</i>	Ordinary water-plantain	
<i>Anemone</i>	<i>canadensis</i>	Canada anemone	
<i>Apios</i>	<i>americana</i>	Groundnut	
<i>Apocynum</i>	<i>sibiricum</i>	Clasping dogbane	
<i>Asclepias</i>	<i>incarnata</i>	Swamp milkweed	
<i>Aster</i>	<i>lanceolatus</i>	Panicled aster	
<i>Aster</i>	<i>borealis</i>	Bog aster	
<i>Aster</i>	<i>firmus</i>	Red-stemmed aster	
<i>Aster</i>	<i>umbellatus</i>	Flat-topped aster	
<i>Bidens</i>	<i>spp.</i>	Beggar-ticks	
<i>Boehmeria</i>	<i>cylindrica</i>	False nettle	
<i>Calla</i>	<i>palustris</i>	Wild calla	
<i>Caltha</i>	<i>palustris</i>	Swamp marsh-marigold	
<i>Campanula</i>	<i>aparinoides</i>	Marsh bellflower	
<i>Chelone</i>	<i>glabra</i>	White turtlehead	
<i>Cicuta</i>	<i>bulbifera</i>	Bulb-bearing water-hemlock	
<i>Cicuta</i>	<i>maculata</i>	Spotted water-hemlock	
<i>Cirsium</i>	<i>muticum</i>	Swamp thistle	
<i>Conyza</i>	<i>canadensis</i>	Horseweed	*
<i>Echinocystis</i>	<i>lobata</i>	Wild cucumber	
<i>Epilobium</i>	<i>cm2</i>	Willow-herb	
<i>Epilobium</i>	<i>cm1</i>	Willow-herb	
<i>Erechtites</i>	<i>hieracifolia</i>	Pilewort	
<i>Erigeron</i>	<i>philadelphicus</i>	Philadelphia fleabane	
<i>Eriocaulon</i>	<i>aquaticum</i>	Pipewort	
<i>Eupatorium</i>	<i>maculatum</i>	Spotted Joe-pye weed	
<i>Eupatorium</i>	<i>perfoliatum</i>	Common boneset	
<i>Fragaria</i>	<i>virginiana</i>	Common strawberry	
<i>Galium</i>	<i>trifidum</i>	Three-cleft bedstraw	
<i>Galium</i>	<i>tinctorium</i>	Small bedstraw	
<i>Galium</i>	<i>labradoricum</i>	Marsh bedstraw	

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<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>* = invasive species</b>
<i>Gentiana</i>	<i>billingtonii</i>	Closed gentian	
<i>Geum</i>	<i>aleppicum</i>	Yellow avens	
<i>Habenaria</i>	<i>psycodes</i>	Small purple fringed-orchid	
<i>Helenium</i>	<i>autumnale</i>	Autumn sneezeweed	
<i>Helianthus</i>	<i>giganteus</i>	Giant sunflower	
<i>Hypericum</i>	<i>majus</i>	Large St. John's-wort	
<i>Impatiens</i>	<i>spp.</i>	Touch-me-not	
<i>Iris</i>	<i>versicolor</i>	Northern blue Flag	
<i>Lathyrus</i>	<i>palustris</i>	Marsh vetchling	
<i>Lemna</i>	<i>spp.</i>	Lesser duckweed	
<i>Lycopus</i>	<i>uniflorus</i>	Northern bugleweed	
<i>Lycopus</i>	<i>americanus</i>	Cut-leaved bugleweed	
<i>Lycopus</i>	<i>asper</i>	Rough bugle-weed	
<i>Lysimachia</i>	<i>thyrsiflora</i>	Tufted loosestrife	
<i>Lysimachia</i>	<i>terrestris</i>	Yellow loosestrife	
<i>Mentha</i>	<i>arvensis</i>	Common mint	
<i>Nuphar</i>	<i>luteum</i>	Yellow pond-lily	
<i>Pedicularis</i>	<i>lanceolata</i>	Swamp lousewort	
<i>Pilea</i>	<i>spp.</i>	Clearweed	
<i>Polygonum</i>	<i>amphibium</i>	Water smartweed	
<i>Polygonum</i>	<i>sagittatum</i>	Arrow-leaved tearthumb	
<i>Polygonum</i>	<i>punctatum</i>	Dotted smartweed	
<i>Polygonum</i>	<i>lapathifolium</i>	Nodding smartweed	
<i>Polygonum</i>	<i>hydropiperoides</i>	Mild water-pepper	
<i>Potentilla</i>	<i>palustris</i>	Marsh cinquefoil	
<i>Potentilla</i>	<i>norvegica</i>	Rough cinquefoil	*
<i>Pycnanthemum</i>	<i>virginianum</i>	Virginia mountain-mint	
<i>Ranunculus</i>	<i>pensylvanicus</i>	Bristly buttercup	
<i>Rubus</i>	<i>pubescens</i>	Dwarf raspberry	
<i>Rumex</i>	<i>orbiculatus</i>	Great water dock	
<i>Sagittaria</i>	<i>latifolia</i>	Broad-leaved arrowhead	
<i>Saxifraga</i>	<i>pensylvanica</i>	Swamp saxifrage	
<i>Scutellaria</i>	<i>galeruculata</i>	Marsh skullcap	
<i>Scutellaria</i>	<i>lateriflora</i>	Mad-dog skullcap	
<i>Sium</i>	<i>suave</i>	Water-parsnip	
<i>Smilacina</i>	<i>stellata</i>	Starry false Solomon's-seal	
<i>Solidago</i>	<i>canadensis</i>	Canada goldenrod	
<i>Solidago</i>	<i>gigantea</i>	Giant goldenrod	
<i>Sparganium</i>	<i>eurycarpum</i>	Giant bur-reed	
<i>Stachys</i>	<i>palustris</i>	Woundwort	
<i>Stellaria</i>	<i>longifolia</i>	Long-leaved chickweed	
<i>Teucrium</i>	<i>canadense</i>	Germander	
<i>Thalictrum</i>	<i>dasycarpum</i>	Tall meadow-rue	
<i>Triadenum</i>	<i>fraseri</i>	Marsh St. John's-wort	
<i>Typha</i>	<i>angustifolia</i>	Narrow leaf cattail	*
<i>Typha</i>	<i>latifolia</i>	Broad leaf cattail	
<i>Urtica</i>	<i>dioica</i>	Stinging nettle	*
<i>Verbena</i>	<i>hastata</i>	Blue vervain	
<i>Veronica</i>	<i>scutellata</i>	Marsh speedwell	
<i>Viola</i>	<i>cm2</i>	Violet	
<i>Viola</i>	<i>renifolia</i>	Kidney-leaf violet	
<b>Grasses, Rushes and Sedges</b>			
<i>Agrostis</i>	<i>hyemalis</i>	Rough bent-grass	
<i>Bromus</i>	<i>ciliatus</i>	Fringed brome	
<i>Calamagrostis</i>	<i>canadensis</i>	Bluejoint	
<i>Carex</i>	<i>aquatilis</i>	Water sedge	

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<b>Genus</b>	<b>Species</b>	<b>Common Name</b>	<b>* = invasive species</b>
<i>Carex</i>	<i>bebbii</i>	Bebb's sedge	
<i>Carex</i>	<i>buxbaumii</i>	Buxbaum's sedge	
<i>Carex</i>	<i>cephalantha</i>	Bunched sedge	
<i>Carex</i>	<i>diandra</i>	Lesser-panicled sedge	
<i>Carex</i>	<i>haydenii</i>	Hayden's sedge	
<i>Carex</i>	<i>interior</i>	Inland sedge	
<i>Carex</i>	<i>lacustris</i>	Lake-sedge	
<i>Carex</i>	<i>lasiocarpa</i>	Wire-sedge	
<i>Carex</i>	<i>prairea</i>	Prairie sedge	
<i>Carex</i>	<i>sartwellii</i>	Sartwell's sedge	
<i>Carex</i>	<i>scoparia</i>	Pointed-broom sedge	
<i>Carex</i>	<i>stipata</i>	Awl-fruited sedge	
<i>Carex</i>	<i>stricta</i>	Tussock-sedge	
<i>Carex</i>	<i>tribuloides</i>	Blunt-broom sedge	
<i>Carex</i>	<i>vesicaria</i>	Inflated sedge	
<i>Carex</i>	<i>pellita</i>	Woolly sedge	
<i>Carex</i>	<i>utriculata</i>	Beaked sedge	
<i>Dulichium</i>	<i>arundinaceum</i>	Three-way sedge	
<i>Eleocharis</i>	<i>compressa</i>	Flattened spike-rush	
<i>Eleocharis</i>	<i>palustris</i>	Marsh spike rush	
<i>Eriophorum</i>	<i>angustifolium</i>	Narrow-leaved cotton-grass	
<i>Glyceria</i>	<i>canadensis</i>	Rattlesnake grass	
<i>Glyceria</i>	<i>grandis</i>	Tall manna-grass	
<i>Glyceria</i>	<i>striata</i>	Fowl manna-grass	
<i>Juncus</i>	<i>canadensis</i>	Canada rush	
<i>Leersia</i>	<i>oryzoides</i>	Rice cut grass	
<i>Leersia</i>	<i>virginica</i>	White grass	
<i>Muhlenbergia</i>	<i>racemosa</i>	Marsh muhly grass	
<i>Phragmites</i>	<i>australis</i>	Common reed	*
<i>Poa</i>	<i>palustris</i>	Fowl meadow-grass	
<i>Scirpus</i>	<i>acutus</i>	Hard-stemmed bulrush	
<i>Scirpus</i>	<i>atrovirens</i>	Dark green bulrush	
<i>Scirpus</i>	<i>cyperinus</i>	Wool-grass	
<i>Scirpus</i>	<i>pungens</i>	Three-square	
<i>Scirpus</i>	<i>validus</i>	Softstem bulrush	
<i>Spartina</i>	<i>pectinata</i>	Prairie cord-grass	
<b>Ferns and Fern Allies</b>			
<i>Equisetum</i>	<i>fluviatile</i>	Water horsetail	
<i>Equisetum</i>	<i>arvense</i>	Field horsetail	*
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive fern	
<i>Thelypteris</i>	<i>palustris</i>	Northern marsh-fern	
<b>Exotic Invasive Species - Do Not Plant</b>			
<i>Cirsium</i>	<i>arvense</i>	Canada thistle	*
<i>Cirsium</i>	<i>vulgare</i>	Bull thistle	*
<i>Crepis</i>	<i>tectorum</i>	Yellow hawk's-beard	*
<i>Leonurus</i>	<i>cardiaca</i>	Lion's ear	*
<i>Lythrum</i>	<i>salicaria</i>	Purple loosestrife	*
<i>Phalaris</i>	<i>arundinacea</i>	Reed canary-grass	*
<i>Poa</i>	<i>pratensis</i>	Kentucky bluegrass	*
<i>Polygonum</i>	<i>convolvulus</i>	Black bindweed	*
<i>Rumex</i>	<i>crispus</i>	Curly dock	*
<i>Ulmus</i>	<i>pumila</i>	Siberian elm	*
<b>State Listed Rare Species - Do Not Plant Without a Permit</b>			
(none)			

## Appendix C: Fact Sheets for Selected Exotic and Invasive Species

The following pages contain information on the habitat, phenology and niche of exotic and invasive plants found in Crosby Farm Park. These species are troublesome plants, both native and exotic, which compete with the native plants typical of undisturbed native communities. They threaten the integrity, structure and function of those communities. Active management to control invasive plant species is essential to restoring the health of plant communities and the habitats they provide for a diverse group of native animals.

### Invasive trees and shrubs:

Black locust	<i>Robinia pseudoacacia</i>
Box elder	<i>Acer negundo</i>
Common buckthorn *	<i>Rhamnus cathartica</i>
Tartarian Honeysuckle*	<i>Lonicera tartarica</i>
Siberian elm*	<i>Ulmus pumila</i>
Smooth sumac	<i>Rhus glabra</i>

### Invasive Forbs:

Canada thistle*	<i>Cirsium arvense</i>
Garlic mustard *	<i>Alliaria petiolata</i>
Leafy spurge*	<i>Euphorbia esula</i>
Purple loosestrife*	<i>Lythrum salicaria</i>
Spotted knapweed*	<i>Centaurea bieberstonii</i>

### Invasive Grasses:

Bluegrass *	<i>Poa pratensis, P. compressa</i>
Reed canary grass *	<i>Phalaris arundinacea</i>
Smooth brome grass*	<i>Bromus inermis</i>

\* exotic species

## Black Locust (*Robinia pseudoacacia*)

**DESCRIPTION:** Black locust is a leguminous deciduous tree that grows from 30 to 80 feet tall. It is often attacked by stem borers and other insects, causing deformed growth and dieback. It has a shallow, fibrous root system and spreads by underground rhizomes. Young saplings have smooth, green bark; older trees have deep, furrowed, shaggy, dark bark with flat-topped ridges. Leaves are alternate and pinnately compound with 7 to 21 leaflets. Leaflets are thin, elliptical, dark green above, and pale beneath. Smaller branches are armed with heavy, paired thorns. Flowers are pea-like, fragrant, white and yellow, and born in large drooping racemes. Seed pods are shiny, smooth, narrow, flat, 2 to 4 inches long, and contain 4 to 8 seeds. Black locust stands are easy to identify in spring because they typically form multiple-stemmed clones and are slow to leaf out. They produce showy flower clusters in May or June.

**DISTRIBUTION AND HABITAT:** Black locust is a translocated deciduous tree that is frequently found in upland prairies, savannas, roadsides, old fields, and woodlots. Black locust prefers humid climates with sandy, loamy, well-drained soils in open, sunny locations.

The tree is native to the slopes and forest margins of Southern Appalachia and the Ozarks. It was introduced throughout Wisconsin in the early 1900's because its aggressive growth pattern and extensive root system discourage soil erosion. Black locust wood is also valued for its durability and high fuel value, and provides good forage for bees.

**LIFE HISTORY AND EFFECTS OF INVASION:** Black locust produces abundant seeds, but a thick seed coat hinders consistently successful seed germination. The plant typically reproduces vegetatively by root suckering and stump sprouting. Root suckers arise spontaneously from established root systems, sprouting new shoots and interconnecting fibrous roots to form extensive, dense groves of clones. Damage to roots or stems (e.g. from fire, wind, cutting, disease, etc.) stimulates vigorous sprouting, root suckering, and lateral spread. Black locust is susceptible to severe insect damage from locust borers, locust leaf miners, and locust twig borers.

Black locust commonly occurs in disturbed habitats like pastures, degraded woods, thickets, old fields, and roadsides. Successful reproduction via vegetative runners has contributed to the naturalization of black locust in upland forests, prairies, and savannas. Because dense clonal stands shade out most understory vegetation, such tree groves can be detrimental to native vegetation.

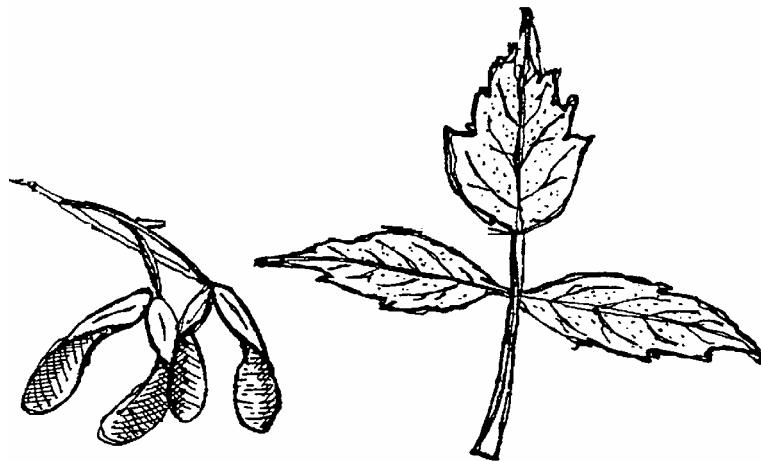
### CONTROLLING BLACK LOCUST

**Mechanical Control:** Cutting black locust stimulates sprouting and clonal spread. For this reason, some suggest to avoid simply cutting the stems. Mowing and burning temporarily control spreading, but mowing seems to promote seed germination, and burning stimulates sprouting. Girdling is ineffective because it kills the stem but does not prevent sucker formation. Annual haying may be adequate to control first year seedlings and prevent spreading in prairie communities. Bulldozing may be an option on disturbed lands.

**Chemical Control:** Treat cut stumps of black locust with Transline (clopyralid) herbicide.

**Source:** modified from the Wisconsin Department of Natural Resources, 1997,

### **Box elder (*Acer negundo*)**



#### **Effects of Invasion**

Box elder is an opportunistic species native to the United States. Extremely prolific, it will inhabit many environments disturbed by humans. Box elders produce seeds during summer and fall and the wind disperses the fruits to suitable habitats for germination. Reproduction can also take place through suckers, sprouts, and root shoots. Box elders are aggressively opportunistic and tend to shade out smaller, herbaceous flora.

**Size:** 30–50 feet in height, can reach 70 feet with spread equal to or greater than the height.

**Habit:** Usually rounded to broad-rounded in outline, branches develop irregularly to support the uneven crown.

**Leaves:** Pinnately compound with 3–5 leaflets arranged oppositely on the stem. Leaflets can be lanceolate to oblong, with margins that may be separated into several shallow lobes.

**Stem:** Green to reddish brown, often covered with a waxy whitish bloom that can be rubbed off.

**Bark:** Gray-brown, slightly ridged, and furrowed.

**Fruit:** Double-winged produced by females.

**Flower:** Male plants bear stamens in umbel-like arrangements, while the female plants produce apetalous racemes.

**Origin:** United States and southern Canada.

#### **Mechanical Control**

- Large-diameter trees can be cut with a chainsaw. Re-sprouts must be recut or herbicides may be applied to the cut stump.

#### **Chemical Control**

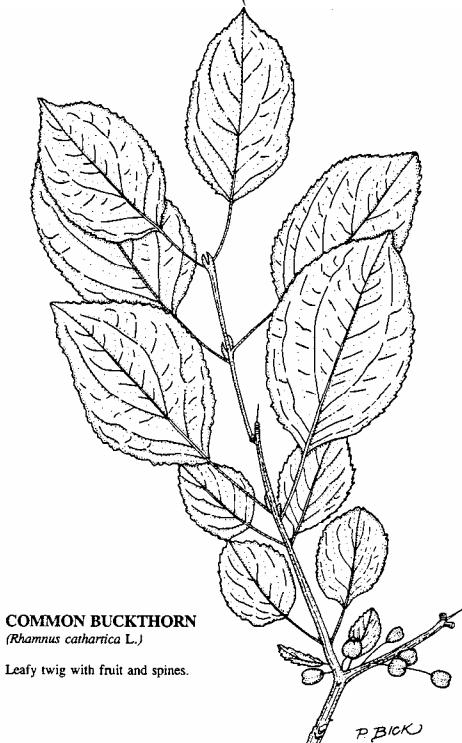
##### **Cut and spray**

- May to October (between first budding in May, through summer, to hard freeze in fall): Spray 25% glyphosate solution on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is generally less effective during the growing season and may have to be repeated on re-sprouts.

- Winter (from first hard freeze to first budding in May): Spray 25% Triclopyr (formulated for oil dilution) diluted in diesel fuel or dilutent oil on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is most effective at this time of year.
- May to October (between first budding in May, through summer, to hard freeze in fall): In high-quality natural areas and in aquatic environments where surface water is present, apply 25% glyphosate solution formulated for use over water.

**Source:** Wisconsin Department of Natural Resources, 1997.

### Common Buckthorn (*Rhamnus cathartica*)



#### Effects of Invasion

Common buckthorn is a problem species in the understory of maple-basswood and oak woodlands, oak savannas, and prairies. It is characterized by long-distance dispersal, prolific reproduction by seed, and wide habitat tolerance. The fruit has a severe laxative effect; birds readily distribute its seeds after eating the fruit. Once established, common buckthorn has the potential to spread very aggressively in large numbers because it thrives in habitats ranging from full sun to shaded understory. Common buckthorn leafs out very early and retains its leaves late in the growing season, thereby shading out herbaceous and low-shrub communities and preventing the establishment of tree seedlings.

**Size:** 18–25 feet in height with a comparable spread.

**Habit:** Large shrub or low-branched tree with a rounded, bushy crown of crooked, stoutish stems.

**Leaves:** Dull green, ovate-elliptic-shaped, and smooth on both surfaces with minute teeth on the margins, and pointed tips.

**Stem:** Slender, somewhat grayish, often having thorn-like spurs.

**Bark:** Generally gray to brown with prominent, often elongate, light-colored or silvery lenticels.

**Fruit:** Female plants have  $\frac{1}{4}$ -inch-diameter clusters of black, rounded fruit.

**Origin:** Europe and Asia.

**Range:** Nova Scotia to Saskatchewan, south to Missouri and east to New England.

#### Mechanical Control

- Prescribed burns in early spring and fall may kill seedlings, larger stems, and top-killed mature buckthorns. Burning is preferable for fire-adapted communities but should not be used if it adversely affects the community. Burning annually or biannually to control

buckthorn may need to be continued for several years depending on the extent of establishment and the seed bank, which generally lasts 3–5 years. It is usually difficult to burn in dense buckthorn stands because the understory is typically well shaded, allowing little fuel build-up.

- Hand pull or weed-wrench seedlings.
- Weed wrench saplings up to 1inch in diameter at breast height.
- Trees of 1–3 inches in diameter at breast height may be weed wrenched if they are growing in sandy soils; otherwise, cut and apply herbicide to the stump.

### **Chemical Control**

- Cut and apply herbicide to tree stumps greater than 3 inches in diameter at breast height.
- Basal bark treatment may be used on trees located near power lines, in difficult terrain, or in areas where it is not important to create openings in the woodland floor for reintroduction of native species.
- In high-quality natural areas and aquatic environments where surface water is present, apply an herbicide formulated for use over water.
- Repeat both mechanical and chemical control methods for at least 3–5 years to stop new plants emerging from the seed bank as well as the continual spread of seed from bird droppings. Underplanting disturbed areas with tolerant native species may hinder reinvasion by common buckthorn.

### **Cut and spray**

- May to October (between first budding in May, through summer, to hard freeze in fall): Spray 25% Triclopyr diluted in water on cut stumps during the growing season. Herbicide should be sprayed immediately after cutting. Avoid spring sap flow. Chemical treatment is generally less effective during the growing season, and there is more risk of affecting non-target plants.
- Winter (from first hard freeze to first budding in May): Spray 25% Triclopyr (formulated for oil dilution) diluted in diesel fuel or diluent oil on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is most effective at this time of year.
- May to October (between first budding in May, through summer, to hard freeze in fall): Apply 25% glyphosate solution formulated for use over water in high-quality natural areas and in aquatic environments where surface water is present. Herbicide should be sprayed immediately after cutting.

### **Basal bark treatment**

- Apply a band of 6% Triclopyr with oil in diesel fuel or diluent oil on the lower 10 inches of bark, including the root collar.

### **Controlled burning**

In oak woods with accumulations of oak leaf litter, controlled burning carried by oak leaves can be a successful strategy for controlling small buckthorn plants of an inch or less in diameter that remain after removal of larger buckthorn plants. In stands dominated by red oak and northern pin oak, fire to control small buckthorn works best in the spring when the trees drop their leaves. In stands dominated by white oak and bur oak, late fall after leaves drop is a better time to burn. Once buckthorn has been set back in this way after a couple of years, oak seedlings can be encouraged to grow. If desirable seedlings already exist in an area to be burned for buckthorn control, leaves can be raked or blown away from the seedling to prevent it from burning. Such seedlings can also be wet down prior to the burn.

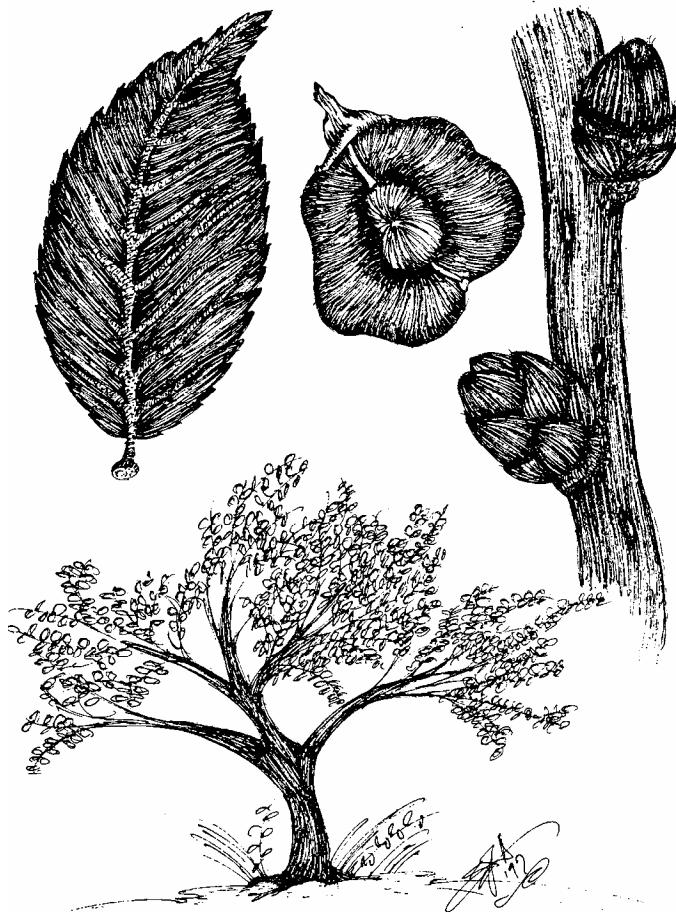
In areas that cannot be burned, buckthorn control may be accomplished by applying Krenite as a bud inhibitor or Garlon 3a as a foliar application. This can be sprayed on seedlings after an explosion of germinating seeds in a recently cleared area.

#### **Long term considerations**

Buckthorn is a plant that prefers wooded areas with thin canopies and a moderately high amount of light penetration, such as under the thin canopy of open grown oaks. Areas that are restored to forest structure with heavier tree canopies should have less buckthorn invasion due under the heavier shade. Once removed, buckthorn can be replaced with native shrubs and understory trees, though this may inhibit recruitment of desirable tree seedlings into the canopy. If there is enough light present, a good strategy would be to replace buckthorn thickets with trees such as oaks that need the light to reach the canopy.

**Source:** Wisconsin Department of Natural Resources, 1997, with additions by the author.

**Siberian Elm (*Ulmus pumila*)**



**Effects of Invasion**

Siberian elm flowers in spring before leaves begin to unfold. The fruits develop quickly and are disseminated by wind, allowing the species to form thickets of hundreds of seedlings in bare ground. Seeds germinate readily and seedlings grow rapidly.

**Size:** 50–70 feet in height with a 40–50-foot spread.

**Habit:** Open, round crown of slender, spreading branches.

**Leaves:** Small, elliptical, smooth singly toothed leaves that reach lengths of approximately 0.8–2.6 inches, tapering or rounded at their asymmetrical base.

**Stem:** Slender, brittle, very light gray or gray-green, usually smooth, can be slightly hairy, roughened by lenticellar projections.

**Bark:** Gray or brown, with shallow furrows at maturity.

**Fruit:** Single-winged circular or ovate in shape with smooth surface.

**Flower:** Greenish, lacks petals and occurs in small drooping clusters of 2–5 blossoms.

**Origin:** Eastern Siberia, northern China, Manchuria, and Korea.

**Range:** Minnesota south to Arkansas and west to Utah.

## Mechanical Control

- Girdle in late spring to mid-summer by removing a band of bark around the tree trunk, just within the bark layer (cambium). Girdling too deeply may lead to re-sprouting. Girdled trees die slowly over 1–2 years.
- Hand pull or weed-wrench seedlings.
- Conduct regular prescribed burns in fire-adapted communities. Saplings older than a few years may not be killed by fire and instead will require another control method.

## Chemical Control

### Cut and spray

- May to October (between first budding in May, through summer, to hard freeze in fall): Spray 25% glyphosate solution on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is generally less effective during the growing season and may have to be repeated on re-sprouts.
- Winter (from first hard freeze to first budding in May): Spray 25% Triclopyr (formulated for oil dilution) diluted in diesel fuel or dilutent oil on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is most effective at this time of year.
- May to October (between first budding in May, through summer, to hard freeze in fall): In high-quality natural areas and in aquatic environments where surface water is present, apply 25% glyphosate solution formulated for use over water.

**Source:** Wisconsin Department of Natural Resources, 1997.

### Tartarian Honeysuckle (*Lonicera tartarica*)



#### **Effects of Invasion**

Tartarian honeysuckle can live in a broad range of plant communities with varying moisture and shade levels. Woodlands are most affected and are particularly vulnerable if the habitat is already disturbed. The vigorous growth of Tartarian honeysuckle inhibits development of native shrub and ground-layer species; eventually, they may entirely replace native species by shading and depleting soil moisture and nutrients. The early leafing of this species is particularly injurious to spring ephemerals, which have evolved to bloom before trees and shrubs have leafed out.

**Size:** 3–10 feet in height with a 10-foot spread.

**Habit:** Upright, strongly multi-stemmed. Upper branches are arched, with the overall effect of a dense, twiggy mass.

**Leaves:** Smooth, hairless, opposite, simple, smooth beneath, ovate, bluish-green leaves. Leaf development begins early in the spring, before native species.

**Stem:** Green at first, finally brownish.

**Bark:** Older stems are shaggy.

**Fruit:** Red,  $\frac{1}{4}$ -inch-diameter berry that colors in late June into July and August.

**Flower:** Fragrant, tubular pink-to-crimson flowers arranged in pairs.

**Origin:** Central Asia to southern Russia.

**Range:** New England south to North Carolina and west to Iowa.

**Mechanical Control**

- Small to medium-sized plants can often be dug, pulled, or weed-wrenched, especially in spring, when the soil is moist. Mechanical removal can result in profuse re-sprouting of the plant if a portion of the root breaks off and remains in the soil.

**Chemical Control**

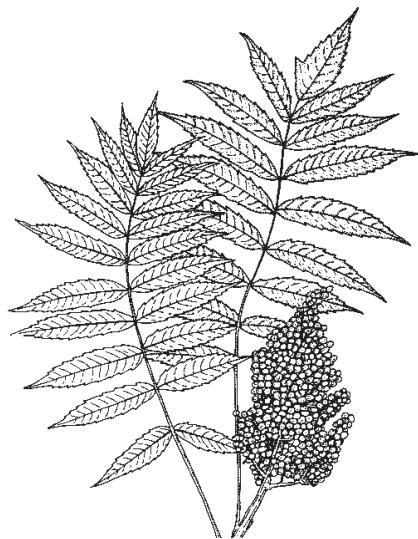
- Cut and apply herbicide to any honeysuckle regardless of size if soil conditions are not appropriate for mechanical control.
- In high-quality natural areas and in aquatic environments where surface water is present, apply an herbicide formulated for use over water.
- Repeat control methods for at least 3–5 years to stop new plants emerging from the seed bank. Underplanting disturbed areas with tolerant native species may hinder reinvasion of Tartarian honeysuckle.

**Cut and spray**

- May to October (between first budding in May, through summer, to hard freeze in fall): Spray 25% glyphosate solution on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is generally less effective during the growing season and may have to be repeated on re-sprouts.
- Winter (from first hard freeze to first budding in May): Spray 25% Triclopyr (formulated for oil dilution) diluted in diesel fuel or diluent oil on cut stumps. Herbicide should be sprayed immediately after cutting. Chemical treatment is most effective at this time of year.
- May to October (between first budding in May, through summer, to hard freeze in fall): In high-quality natural areas and in aquatic environments where surface water is present, apply 25% glyphosate solution formulated for use over water.
- This is a particularly tough shrub to control. Thorough application of at least 25% Triclopyr (Garlon) is recommended to cut stumps. Applications should not be done in the spring. Crossbow is a new herbicide with potential for foliar application on resprouts.

**Source:** Wisconsin Department of Natural Resources, 1997, with additions from the author.

**Staghorn Sumac (*Rhus typhina*)**  
**Smooth Sumac (*Rhus glabra*)**



### Effects of Invasion

Both smooth sumac and staghorn sumac are opportunistic, native prairie shrubs. These aggressive shrubs occur in clones that spread outward by rootstocks or seeds. Sumac sprouts easily and grows rapidly but requires direct sunlight to persist. Re-sprouts grow rapidly and can reach 3 feet in 1 year. Sumac can eliminate or reduce the abundance of many other species that cannot persist in the shade sumac creates. Sumac grows in a variety of habitats, including disturbed sites, such as abandoned fields, roadsides, and fence rows. Sumac also grows in native communities, such as upland prairies, oak savanna, and oak woodlands and forests. Because sumac is a native species, the management objective is usually to keep sumac under control, not to eliminate it.

**Size:** 10 feet in height with a spreading crown of dense, multi-stemmed clones.

**Habit:** A large, loose, open, spreading shrub with a flattish crown.

**Leaves:** Pinnately compound with 7–31 leaflets that are green on the upper surface and nearly white on the lower surface. Leaves turn brilliantly red in fall.

**Stem:** Twigs are smooth, stout, angular, and hairless on smooth sumac and highly pubescent on the staghorn sumac.

**Bark:** Light brown and smooth on young plants. Pubescent on older stems of staghorn sumac. Smooth sumac has smooth bark on both young and old stems.

**Fruit:** Red drupes develop at the end of the stems in late summer and persist into winter. Each drupe is round, has short hairs, and contains a single seed.

**Flower:** Dioecious, greenish yellow, June to early July. Female borne in dense hairy panicles, 4–8" long; male in a bigger, looser, wider panicle.

**Origin:** Quebec to Ontario, south to Georgia, Indiana, and Iowa.

### Mechanical Control

- Double-cut (once in July and once in August). Cutting may need to repeat for several consecutive years to effectively control in dense populations.
- Mow with a sickle-bar every year in mid to late July.
- Conduct prescribed burns for prairies in spring, then hand cut stems at ground level in July and August. Sumac will re-sprout after each cutting, but dense vegetation may prevent sumac from receiving enough sunlight, causing leaves to turn yellow and eventually die.
- Mow in mid-summer and conduct spring burns to stimulate herbaceous vegetation.
- Keep small populations under control by conducting prescribed burns every 3–4 years.

### Chemical Control

- During July and August apply a 20% concentration of glyphosate to freshly cut stumps.
- Apply oil-based Triclopyr as directed on label to the entire circumference of each stem of the clone; no cutting is done.
- Foliar application of water-based Triclopyr as directed on label or 1%–2% solution of glyphosate in areas with little to no native vegetation.

**Caution:** The sap of sumac species may cause dermatitis in some people.

**Source:** Wisconsin Department of Natural Resources, 1997

### Canada Thistle (*Cirsium arvense*)



Photo by Merel R. Black

#### **Effects of Invasion:**

Canada thistle is an alien species capable of crowding out and replacing native grasses and forbs. It is detrimental to natural areas where it occurs, particularly non-forested communities, and it can change the natural structure and species composition where it becomes well established. Prairies, barrens, savannas, and glades are susceptible, particularly those sites that have been disturbed as well as those undergoing manipulative restoration management. It is important to control this species prior to restoration work.

The plant grows in clonal patches of all female or male plants. As a result, some patches produce seeds and others do not. Seeds mature quickly and are capable of germinating within 8 to 10 days after the flowers open, even if the plants are cut when flowering. Most seeds germinate within one year, but may remain viable in the soil for up to 20 years. Seeds are mostly dispersed by wind and sometimes by water runoff. Small sections of broken roots are capable of producing new plants.

Canada thistle is considered a noxious weed under Minnesota law and should not be allowed to go to seed.

**Size:** Canada thistle is a 2 to 5 foot (0.6 to 1.5 meters) tall herbaceous plant with deep, wide spreading, horizontal roots. The root system is usually within a foot of the surface, but may extend 6 feet deep or more in loose soil. The horizontal roots stemming from the fibrous taproot

of a single plant can spread 10 to 12 feet in one season, resulting in a circular infestation 20 feet across. Aerial shoots are sent up in 2 to 6 inch intervals, and generally produce basal leaves the first year and flowering stems the next year.

**Habit:** Canada thistle is a clone-forming perennial. The grooved, slender stems branch only at the top and are slightly hairy when young; becoming covered with hair as the plant grows.

**Leaves:** The oblong, tapering, sessile leaves are deeply divided, with prickly margins. Leaves are green on both sides with a smooth or slightly downy lower surface.

**Fruit:** Seeds are small (3/16 inch or 0.5 cm long), light brown, smooth and slightly tapered, with a tuft of tan hair loosely attached to the tip.

**Flowers:** Numerous small, compact (3/4 inch or 1.9 cm. diameter), rose-purple or white flowers appear on upper stems from June to September.

**Origin:** Canada thistle is native to Europe, not Canada, as its name suggests. Its current range encompasses the northern portion of the United States east of the Rocky Mountains.

#### **Mechanical Control:**

Repeated pulling, routine mowing or selective cutting will eventually starve underground stems and effectively reduce an infestation within 3 or 4 years. The ideal time to cut is in the very early bud stage when food reserves are at their lowest point. Plants cut 8 days or more after flowers have opened should be removed from the site because seeds mature quickly. Cutting should be completed prior to flowering and seed set. If seeds are ripe, cut flower heads must be removed from the site immediately to avoid further seed dispersal. Plants should be pulled or cut at least three times during the growing season -- for example, in June, August, and September. Some persons have had success killing individual plants by cutting the top and putting table salt down the hollow stem.

Prescribed fire can be effective in controlling this species and is a preferred treatment. Late spring burns between May and June, effectively discourage this species, whereas early spring burns can increase sprouting and reproduction. During the first 3 years of control efforts, burns should be conducted annually. Healthy, dense prairie vegetation can produce enough competition to reduce the abundance of Canada thistle.

On severely disturbed sites with heavy infestations, such as cropland or abandoned cropland, the site could be plowed and sowed to a cover crop (wheat, alfalfa, and rye), if practical and desirable. The following May, the cover crop should be plowed under and desired native species should be seeded. Tillage disturbance of soil may provide ideal conditions for reinvasion and for introduction of other exotics.

Grazing is not an effective control measure as the prickles prevent livestock from grazing near Canada thistle.

#### **Chemical Control:**

Control of this species with herbicides in natural areas is not recommended, as the herbicide can damage native vegetation more than the damage caused by the thistle. However, spot application of the amine formulation of 2,4-D using a wick applicator or hand sprayer can control individual stems if necessary.

Infested lands that are not considered high quality natural areas may be controlled using a foliar application of a 1-2% active ingredient solution of glyphosate in spring when plants are 6-10 inches tall.

Spot application of Transline (a formulation of clopyralid), according to label instructions can control this plant. Individual plants of Canada thistle should be treated with a wick applicator or hand sprayer. The herbicide Transline is selective for broadleaf plants. To reduce vapor drift and improve plant up-take of the chemical, a surfactant may be added to the spray solution. Precautions should be taken to avoid contacting nontarget plants with the solution.

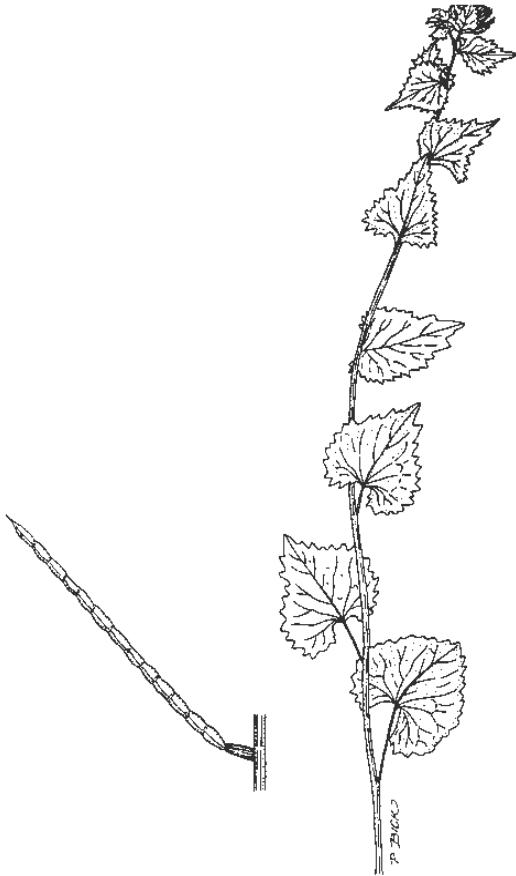
A foliar application of a 1-2% solution of Roundup (a formulation of glyphosate) applied in spring when plants are 6-10 inches (15.2 -25.4 cm) tall is an effective herbicide treatment. Individual plants should be spot-treated with a wick applicator. Roundup normally kills the entire plant, including the roots, when applied in this manner. Roundup is a nonselective herbicide and precautions should be taken to avoid contacting nontarget plants with the solution.

**Sources:**

Wisconsin Department of Natural Resources, 2002

Vegetation Management Manual, Vol. 1, No. 2. Illinois Nature Preserves Commission, approved 02/06/90

### **Garlic Mustard (*Alliaria petiolata*)**



#### **Effects of Invasion**

Garlic mustard is a rapidly spreading woodland weed that displaces native woodland wildflowers. It dominates the forest floor and can displace most native herbaceous species within 10 years. Garlic mustard is a biennial that produces hundreds of seeds per plant. Seeds are dispersed on the fur of mammals, by water, and by humans. The seeds can remain viable for 5 years.

**Size:** 12–48 inches in height as an adult flowering plant.

**Leaves:** First-year plants consist of a cluster of 3 or 4 round, scallop-edged, dark-green leaves rising 2–4 inches in a rosette. Second-year plants have alternate, round, scallop-edged, dark-green leaves progressing up the 1 or 2 stems.

**Stem:** Second-year plants generally produce 1 or 2 flowering stems.

**Fruit:** Slender capsules 1–2.5 inches long that produce a single row of oblong black seeds with ridged seed coats.

**Flower:** Second-year plants have numerous small white flowers that have 4 separate petals.

**Root:** Slender, white taproot with an S-shaped top.

**Origin:** Europe.

**Mechanical Control**

- Hand pull at or before the onset of flowering, making sure to remove at least the upper half of the root to eliminate budding at the root crown. This is not recommended for slopes, as it promotes erosion.
- Cut the flower stalk with a weed whip as close to the soil surface as possible just as flowering begins. Cutting before the plant flowers may promote re-sprouting.
- Burn in fall or early spring (before wild flower growth). Burn annually for 3–5 years until depletion of the seed bank.

**Chemical Control**

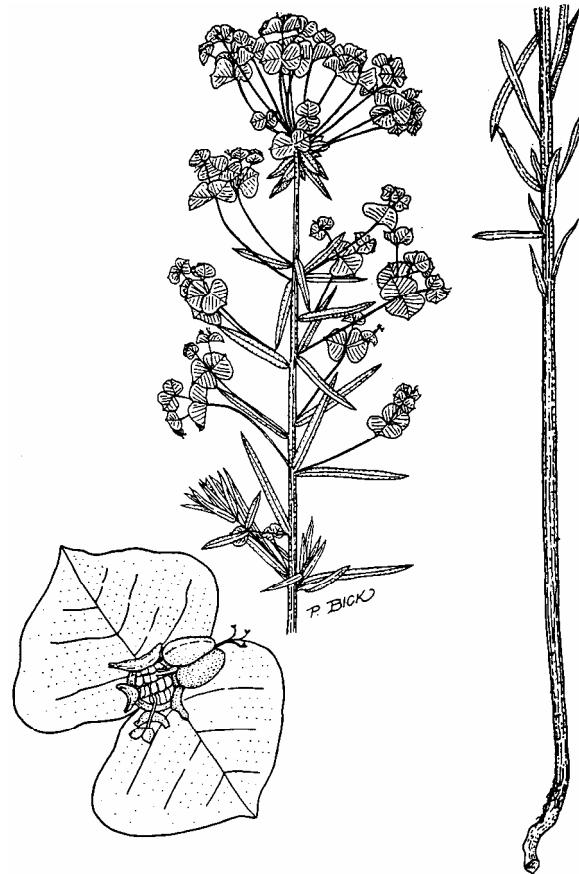
- Apply a 1%–2% glyphosate solution to the foliage during the late fall or early spring before wild flower growth.
- Apply a 1% Tryclopyp solution to the rosettes in early spring before wild flower growth.

**Source:** Wisconsin Department of Natural Resources, 1997, with additions from the author.

**Additional Comments:****Biological Control**

There are efforts underway in the Minnesota DNR to identify insects for biological control of this exotic plant. It will take several years to test potential control species before they will be released, if they find a good control agent. As with purple loosestrife, biological controls will not eradicate this plant but hopefully will keep the population down enough to allow the establishment of a continuous and diverse herbaceous plant community.

### Leafy Spurge (*Euphorbia esula*)



#### Effects of Invasion

Leafy spurge is allelopathic and spreads rapidly, crowding out desirable species. A number of spurge species hybridize with leafy spurge; they are all referred to as leafy spurge. The plant can reach densities of up to 1,800 stems per square yard. The plant's deep root system makes eradication difficult. The plant can expel its seed up to 15 feet by explosive ejection from the seed capsule. The seed of leafy spurge has a high germination rate, and the established plant spreads rapidly through vegetative reproduction. Leafy spurge can be catastrophic to grasslands for both economic and ecological reasons. In only a few years spurge can displace native grasses and forbs by shading them out and dominating available moisture and nutrients.

**Habit:** An erect, deep-rooted Eurasian perennial.

**Size:** 6–36 inches in height.

**Leaves:** Linear, alternate and apetiolate, bluish-green in color.

**Stem:** Erect and hairless

**Fruit:** Ovoid, minute mottled-brown seeds contained within a capsule.

**Flower:** A loose umbel consisting of 2 kidney-shaped flower leaves on a short stem that are topped by 2 yellow-green petal-like bracts around tiny flowers.

**Origin:** Europe and Asia.

**Mechanical Control**

- No mechanical control methods have been found to be effective.

**Biological Control**

- Pasturing goats in areas infested with leafy spurge.
- Experimental insect control with beetles and a midge species is reducing populations.
- The allelopathic effects of black walnut inhibit plant growth.

**Chemical Control**

- Scattered patches can be treated at an application rate of 2 lbs./acre of picloram in the late spring and early fall. Do not use in high-quality natural areas that lie within 30 feet of area.
- A 70% reduction of large infestations can be achieved with an annual application of .5lbs./acre of picloram in the late spring.
- An application rate of 5.7 lbs./acre of quinclorac plus a 2.8 lbs./acre picloram will provide 85% control of leafy spurge after 9 months.
- An application rate of .12lbs/acre of quinclorac applied immediately after cutting the shoot tops.
- A 90% reduction within 1 year was achieved with a 3% solution of fosamine applied to blooming plants in June and July. Follow-up application annually for 3–4 years is required.
- Repeated application of glyphosate may be used to treat small patches.

**Source:** Wisconsin Department of Natural Resources, 1997.

**Purple Loosestrife (*Lythrum salicaria*)****Effects of Invasion**

Purple loosestrife spreads mainly by seed, but it can also spread from roots or stems. A single stalk can produce 100,000–300,000 seeds per year. Sunny and partly shaded wetland is susceptible to invasion. Purple loosestrife generally builds up a large seed bank in the soil for several years before becoming dominant. After disturbance, loosestrife can spread rapidly, eventually taking over entire wetlands. Purple loosestrife degrades wetlands by displacing native wetland vegetation and decreasing habitat for wildlife species.

**Habit:** Purple loosestrife is a perennial herb 3–7 feet tall with a dense bushy growth of 1–50 stems.

**Size:** 3–7 feet tall.

**Leaves:** Leaves are opposite, nearly linear, and attached to 4-sided stems without stalks.

**Stem:** Stems range from green to purple.

**Flower:** Flowers vary from purple to magenta, have 5–6 petals and are aggregated into numerous long spikes. Flowering occurs from July to September.

**Origin:** Europe.

**Mechanical Control**

Small young plants can be hand pulled while older plants can be removed with a shovel. If possible, entire root systems should be removed to prevent re-sprouting. Soil disturbance should be minimized to prevent seedling establishment. Plants should be controlled before the onset of

seeds around the first week of August or seeds should be cut and bagged. Plant parts should be dried and disposed of accordingly. Follow-up treatments are recommended for at least 3 years after removal. Mowing and burning have not been effective with purple loosestrife. However, water-level manipulation has been successful. Water levels are reduced until loosestrife has sprouted, then levels are increased until stems are drowned.

### **Biological Control**

Biocontrol is currently considered the most viable option for purple loosestrife control. Several natural insect enemies of purple loosestrife from Europe have been introduced. A species of [weevil](#) (*Hylobius transversovittatus*) lays eggs in the stem and upper root system of the plant and its larvae eat root tissue. In addition, two species of [leaf-eating beetles](#) (*Galerucella calmariensis* and *G. pusilla*) and a weevil that feeds on flowers (*Nanophyes marmoratus*) are being used. These insects almost exclusively feed on *Lythrum salicaria* and not native plants. The insects generally do not eradicate loosestrife but reduce the population to a state where it does not dominate native habitats.

Recent data show that we will never eradicate purple loosestrife from the area by using biocontrol agents alone (Skinner, pers. comm.). Once well established, the insects will have a cyclical, boom and crash population following expansion and contraction of the loosestrife population. Once the insects have eaten down existing loosestrife, the insect population will crash. Purple loosestrife, a prolific seed producer, will eventually recover from the seed bank. After a short lag, the biocontrol insect population will also recover and then knock back the purple loosestrife population again. The insects move around and once established within the nature center, they should also eventually find other purple loosestrife stands. Their dispersal could be aided by collecting and moving insects. In spite of the boom and bust cycle of purple loosestrife under biological control, native wetland plants cover has increased greatly in experimental trials. Hand pulling of purple loosestrife while it is in flower is effective in conjunction with biological control.

### **Chemical Control**

Glyphosate is the most common chemical used for killing purple loosestrife. The formula designed for use on wet or standing water sites should be applied in late July or August. A 1% active ingredient (a.i.) solution should be used, and only 25% of the foliage of each plant needs to be covered. Glyphosate mixed to 3%–10% solution can also be used on freshly cut stems (this is effective on larger plants in areas of low loosestrife densities). Cut stems should be removed from the site and disposed of appropriately. Triclopyr formulated for water dilution is an effective herbicide for loosestrife. This broadleaf herbicide does not harm sedges or monocots. Foliar application should cover nearly all of the foliage.

**Source:** Wisconsin Department of Natural Resources, 1997, with additions from the author.

**Spotted Knapweed (*Centaurea maculosa*)**



**Effects of Invasion**

Spotted knapweed attains high densities on sunny sites, reducing the frequency of native species. Infestation can also contribute to poor water quality and erosion by increasing run-off and sedimentation. Plants average 1,000 seeds per plant. Seeds are viable for 7 years and germinate throughout the growing season.

**Habit:** Biennial or short-lived upright perennial forb.

**Size:** 3–4 feet in height.

**Leaves:** Alternate, pale, rough 1–3 inches in length. Leaf margins on lower leaves are divided about halfway to the midrib. Upper leaves are more linear in shape.

**Stem:** Slender, hairy, erect, growing in a branched pattern, 2 feet in height on drier sites and up to 4 feet in height on moister sites.

**Seeds:**  $\frac{1}{4}$  inch and brownish. Notched on one side of the base with a short tuft of bristles at the tip.

**Flower:** Lavender flower head has stiff bracts marked with fine, vertical streaks and tipped in with dark, comb-like fringes.

**Root:** Stout, elongated root.

**Origin:** Eurasia.

**Mechanical Control:**

- Dig or pull the entire root. Repeating this several years in a row is effective. Do a major pulling in June. Check and pull plants 4 to 6 times during the rest of the growing season, as knapweed blooms throughout the year.
- Conduct prescribed burn followed by selective pulling or digging.
- Black plastic put over dense infestations is effective as an alternative to chemical control.

**Chemical Control:**

- Use foliar application of a 3% water-soluble solution of Triclopyr with dye. To protect native fauna, avoid getting herbicide on the flowers.
- Apply .2-.5 lbs./acre of Piclorum for 2–3 years in the fall when the plant is in the rosette growth stage or in spring during the bud-to-bloom stage. Do not use Piclorum near water or on sandy soils with ground water 10 feet or less below the surface.
- Apply 1–2 lbs/acre of Dicamba for at least 2 years.
- Apply .25 lbs./acre of Clopyralid or a mixture of .19 lbs./acre of Clopyralid and 1 lb./acre of 2,4-D.
- During the rosette stage, spray a 2,4-D low-volatile ester, oil-soluble amine, or water-soluble amine formulation at 2 lbs./acre.

**Biological Control:**

- Biological controls include two seed-head attacking flies and root-boring insect species. Consult the Minnesota Department of Agriculture for more information about biological controls and their availability.

**Source:** Wisconsin Department of Natural Resources, 1997.

Minnesota Department of Natural Resources, 1995.

United States Department of Agriculture, 1971.

**Kentucky Bluegrass (*Poa pratensis*)**  
**Canada Bluegrass (*Poa compressa*)**



(c) John M. Randall/The Nature Conservancy

**Effects of invasion:** Because bluegrass grows early in the season (when most other species are still dormant), it can spread very quickly. However, its shallow root system makes it susceptible to high soil temperatures and low soil moisture. Bluegrass has successfully invaded both remnant and restored prairies, savannas, and barrens. Establishment can be attributed to intentional introduction, past mowing, grazing, or cessation of fire. If left unattended, bluegrass can out-compete native prairie grasses and forbs, and will dominate shaded areas resulting from woody species invasions.

**Description:** Most of the cool season grasses that begin growing early are not native to Wisconsin prairies. Bluegrass can be distinguished vegetatively from other early grasses by its narrow blade, which is V-shaped in cross section, and by the leaf tip, which is shaped like the bow of a boat. Kentucky bluegrass is distinguished from Canada bluegrass by the shape of the stem. In Kentucky bluegrass the stem is round; Canada bluegrass has a flat stem. Their effects on the natural systems are equivalent and therefore should be treated as one problem. Many of the other cool-season European grasses (brome, timothy, orchard grass, quack grass, etc.) have similar growth habits and can be controlled using the techniques discussed below.

**Distribution and habitat:** Kentucky bluegrass was introduced as a cultivar from Europe, and has been bred into multiple cultivars since its introduction. Because of its extensive use for lawns and in pastures, it is common in most grasslands, even those managed for native species. Canada bluegrass is also naturalized from Europe. Kentucky bluegrass is a common lawn and pasture grass. Canada bluegrass is often mistaken for Kentucky bluegrass, but is distinguished by forming extensive sods in dry, sterile soils (especially acidic soils) that cannot sustain the more common Kentucky bluegrass. Kentucky bluegrass is usually found on more mesic and fertile soils, although it will grow on dry neutral or alkaline soils.

## **Mechanical Control**

A controlled fire can dramatically reduce bluegrass in a native or planted prairie, savanna, or barrens. Fire will also set back the woody species whose shade encourages the proliferation of cool-season grasses. In southern Wisconsin, a late April or early May burn will destroy three to eight inches of new growth. Timing of burns may change on a year-to-year basis depending on weather conditions. Observing bluegrass growth is essential for effective control by burning. Fire is most effective when bluegrass is three to eight inches high. Burning at this time kills new growth and removes accumulated leaf litter. Burning off the moisture-retaining blanket of leaf litter increases stress on the shallow-rooted bluegrass by exposing the darkened surface to the sun. This helps reduce the competitive ability of bluegrass by encouraging summer dormancy and decreasing the chance of flowering and seed production. The effect is most pronounced on dry prairies and barrens. Burning can reduce bluegrass by more than 90%, but it is rarely 100% effective. Burning at the right time also improves the competitive advantage of native, warm-season grasses and forbs. Native species emerge later and benefit from the elimination of duff and a darkened soil surface.

When converting areas dominated by cool-season grasses into prairie, it is helpful to reduce the grass cover and seed bank before planting native seeds. This can be accomplished by any combination of tilling, smothering the grass, or applying herbicide. Till several times a year for at least one season to expose the seed bank and prevent further growth of the grass sod.

Herbicide use followed by a season of tilling is also effective. On small sites, grasses can be killed by covering with black plastic or layers of newspapers during the growing season.

## **Chemical Control**

Herbicide use is not recommended to control bluegrass on grasslands or savannas where there are native prairie plants. However, herbicide may be required on severely degraded areas or where prairie restoration is beginning. In such cases, the herbicide glyphosate has proven effective when used according to label applications.

**Source:** Wisconsin Department of Natural Resources, 2002

## Reed Canary Grass (*Phalaris arundinacea*)



### Effects of Invasion

Reed canary grass reproduces by seed or creeping rhizomes and spreads aggressively. It prefers disturbed areas but can easily move into native wetlands. In less than 12 years, reed canary grass can form large, monotypic stands that harbor few other plant species and therefore are of little use to wildlife. Reed canary grass dominates an area by building up a tremendous seed bank that can eventually erupt, germinate, and recolonize treated areas. Reed canary grass is difficult to eradicate; no single control method is universally applicable.

**Size:** 2–9 feet in height.

**Habit:** A large, coarse, cool-season, sod-forming, perennial wetland grass. Sprouts early in spring, forming a thick rhizome system that dominates the subsurface soil.

**Blades:** Erect, hairless stem with gradually tapering leaf blades 3.5–10 inches long and .25–.75 inches wide. The ligule is highly transparent.

**Panicles:** Compact, erect or slightly spreading (depending on the plant's reproductive stage), ranging from 3–16 inches long with branches .5–1.5 inches long.

**Flowers:** Single flowers occur in dense clusters in May to mid-June. They are green to purple, changing to beige over time.

**Seeds:** Shiny brown.

**Origin:** Eurasia and North America.

### **Mechanical Control**

- Small, discrete patches may be covered by black plastic for at least one growing season then seeded with native species. This method is not always effective and must be monitored because rhizomes can spread beyond the edge of the plastic.
- Prescribed burns in late spring or late fall may help reduce the population if repeated annually for 5–6 years. The application of 1.5% glyphosate solution will “brown off” reed canary grass enough to conduct burns. A late spring burn followed by mowing or wick application of glyphosate to the emerging flowering shoots will eliminate seed production for that year. Burning is ineffective in eliminating dense stands of reed canary grass that lack competition from native, fire-adapted sepias in the seed bank.
- Mowing twice yearly (early to mid-June and early October) may help control reed canary grass by removing seed heads before the seed matures and by exposing the ground to light, which promotes the growth of native wetland species. Discing the soil in combination with a mowing or burning regimen may help by opening the soil to other species.
- Hand-pulling or digging may work on small stands in the early stages of invasion.
- A bulldozer can be used to remove reed canary grass and rhizomes (12–18 inches deep), after which native species should be seeded. Discing or plowing can also be used in this way.
- Repeated cultivation for one full growing season followed by dormant seeding near the first-frost date. Combine with spot herbicide application in sections too wet for early or late cultivation.

### **Chemical Control**

- Perform foliar application of a 5% glyphosate solution designed for use in wetlands in early spring when most native species are dormant. Remove the dead leaves from the previous year before applying herbicide. Two herbicidal applications may be necessary to ensure complete coverage. Mow in mid-September then apply herbicide in October (after big bluestem is dormant).
- Perform wick application of a 5% glyphosate solution designed for use in wetlands in the first to third weeks of June, followed by a late June to mid-July burn. This technique reduces reed canary grass cover, depletes the seed bank, and stimulates native seed banks.
- In non-aquatic environments, apply Dalpon and trichloracetic in late fall or early winter at a rate of 20lbs.–40 lbs./acre on dried foliage.

**Source:** Wisconsin Department of Natural Resources, 1997.

Minnesota Department of Natural Resources, 1995.

### Smooth (Awnless) Brome (*Bromus inermis*)



Seed head

Photos: Minnesota DNR-Angela Anderson



Field of brome

**Effects of Invasion:** Smooth brome is a cool season exotic that is especially troublesome in disturbed portions of native plant communities and restorations in the tallgrass and mixed prairie regions. Although less invasive than Kentucky bluegrass, with which it often occurs and is managed, it is also less responsive to management. Smooth brome has been widely planted as a forage and cover crop. Although perhaps not as invasive as *Poa pratensis*, with which it often grows, it is highly persistent. It forms a dense sod that often appears to exclude other species, thus contributing to the reduction of species diversity in natural areas.

**Size:** *Bromus inermis* is a perennial cool season grass that grows 2 - 3' high with a hairless erect stem. Brome roots have been known to reach a depth of 4.7 feet.

**Habit:** *Bromus inermis* is a deeply rooting, rhizomatous, sod-forming perennial grass. The drought resistance of smooth brome is probably accounted for in part by its deeply penetrating root system. The heavy concentration of total root mass near the surface is the result of smooth brome's creeping rhizomatous habit. Old brome fields develop a "sod bound" condition in which shoot density is reduced and symptoms of nitrogen deficiency are exhibited. Because of its fairly distinctive foliage and habit of growing in solid patches *Bromus inermis* is easily recognized at all seasons. Its early green-up makes it especially easy to detect during the spring months.

**Leaves:** The leaf blades are smooth, flat, 4-5 inches long and 1/4-3/8 inches wide with a conspicuous "M"- or "W"-shaped constriction in the middle.

**Fruit:** Lemmas are all unawned or with very short awn.

**Flowers:** The inflorescence is an erect, open panicle with ascending branches that are sometimes reflexed, blooming May – July.

**Origin:** *Bromus inermis* is a Eurasian species ranging from France to Siberia, apparently introduced in the United States by the California Experiment Station in 1884. Within the United States smooth brome has been introduced in the northeastern and northern Great Plains states as far south as Tennessee, New Mexico and California. It has become naturalized from the maritime provinces to the Pacific coast north to Alaska to California and through the plains states. Within the United States, "northern" and "southern" agricultural strains have been developed. The southern strain is more tolerant of drought and heat than the northern strain.

**Mechanical Control**

Both experimental studies and management experience indicate that burning or cutting smooth brome in the boot stage is perhaps the most effective means of control. Smooth brome is in boot stage between mid-April and late May when the plant has reached a height of 18 to 24 inches and the flowering head is still enclosed within the sheath. This is somewhat later than would be recommended for other management purposes such as control of Kentucky bluegrass. Research indicates that a well-timed burn that treats *Bromus inermis* in boot or early flower may be more effective than mowing at the same susceptible period. It appears that late May burns would be optimal in the northern plains for reduction of smooth brome. One close mowing when the plants are 18-24 inches tall (followed ideally by 3 repetitions), may improve chances of selectively controlling this species. The best conditions for damage are hot, moist weather at the time of cutting, followed by a dry period.

**Chemical Control**

Its habit of occurring frequently in nearly pure swards renders *Bromus inermis* a good target for selective control by timed, close mowing or use of herbicides. An early study of brome control found Tordon (picloram) most effective at rates of 1.1 to 2.2 kg/ha, or treatment with Roundup (glyphosate) at 0.5 to 1.1 kg/ha before flowering. It appears that April or May applications of glyphosate at 2 kg/ha may be an effective management technique for controlling smooth brome in pure patches.

**Sources:**

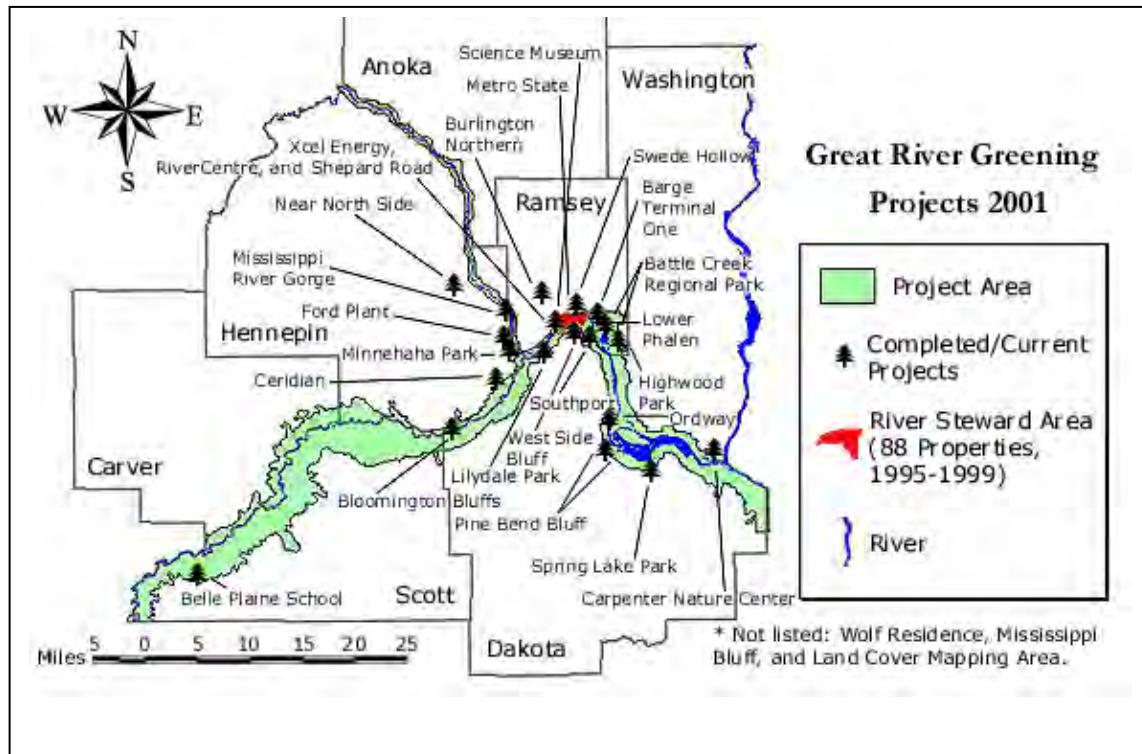
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## Appendix D: Great River Greening

*Helping communities restore, manage and learn about their natural environment through volunteer involvement.*



### The Challenge

Erosion, trash, and the invasion of exotic and invasive plant species are degrading our urban river valleys, reducing ecological diversity destroying wildlife habitat. Many public and private organizations are working to protect the river valleys, but these programs often lack long-term community involvement and stewardship.

These problems are especially pressing in the Twin Cities metropolitan region, home to more than 2 million people. The river valleys in this area:

- Hold some of the region's last intact native landscapes
- Serve as vital wildlife corridors for hundreds of migratory bird species
- Provide a water source for millions of the region's residents
- Contain some of the region's most scenic sites and vistas

### Great River Greening's response

Great River Greening, a nonprofit organization, helps coordinate a cost-effective and sustained effort to manage ecosystems of the three great river valleys of the metropolitan area: the Mississippi, Minnesota and St. Croix. We are primarily an implementing organization, providing on-the-ground ecological restoration and management of both public and private land. We

engage thousands of volunteers in the planting of native vegetation, removal of exotic and invasive weeds, native-seed collection, and stewardship—work that cultivates an informed and involved citizenry. We also act as a catalyst, creating effective partnerships among agencies, municipalities, and private landowners responsible for managing river valleys and their natural resources. Restoration ecologists and other scientists provide technical expertise.

### **Key values**

Great River Greening bases its work on these values:

1. Native trees and other vegetation have ecological and sociological value: They contribute to the health and biodiversity of ecosystems; they beautify surroundings; and they enhance a community's natural heritage and sense of place.
2. People want opportunities for direct involvement in natural resource protection and management, which help them feel connected and committed to their local natural areas.
3. Volunteer involvement in restoration and planning is one of the most effective methods of environmental education. When people work side by side to improve their environment, their communities become stronger and more vital.
4. Environmental restoration and stewardship require collaboration and inclusiveness.

### **We are committed to:**

- Citizen-based restoration, stewardship and education
- Ecologically sound implementation and evaluation
- Collaboration to help advance ecosystem-based management
- Long-term stewardship.

### Accomplishments—highlights

Since 1995, Great River Greening has involved more than 10,700 volunteers in the planting of 35,000 trees and shrubs and 16,000 wildflowers and grasses, as well as exotic-species removal, prairie-seed collection and broadcasting, plant inventories, training programs, and ongoing stewardship. In 2000 alone, we organized 30 events attended by nearly 1,500 volunteers!

We've also provided design and ecological consulting for numerous groups, including the city of Saint Paul Parks and Recreation Division, the Saint Paul Port Authority, the Science Museum of Minnesota, River Center, and the Greater Minnesota Housing Fund.

### Great River Greening's major partners

City of Saint Paul • Friends of the Minnesota Valley • Friends of the Mississippi River • Metropolitan Council • Minneapolis Park and Recreation Board • Minnesota Department of Natural Resources • National Park Service • Ramsey County Parks and Recreation • Saint Paul Audubon Society • Trust for Public Land • U.S. Fish and Wildlife Service • Private landowners

### To Contact Us

Great River Greening, 35 West Water Street, Suite 201, Saint Paul, MN 55107  
**651-665-9500** <http://www.greatrivergreening.org>

## **Summaries of work done on Hidden Falls & Crosby CPL grants in 2017/2018**

Below is our seasonal technician (Brett's) write up of all activities at Hidden Falls for 2017. I've included a brief description of 2018 work at Hidden Falls, and work done at Crosby below that. In 2016 at Hidden Falls, most of the work was canopy surveying and invasive species removal.

### ➤ **2017 Hidden Falls Restoration and Maintenance Activities**

- A modest amount of tree removal was done on the north side of the park in early spring to prepare the site for planting. Brush was added to burn piles on the north edge of the park (a map of the burn pile locations can be found on google drive "my maps"). Stumps were hauled off site but there are still quite a few on the north end.
- Greater celandine (*Chelidonium majus*) and narrow-leaf bittercress (*Cardamine impatiens*) were widespread throughout North Gate. The Conservation Corps (CCM) spent approximately 300 hours controlling both species using a combination of brush cutting and flame weeding. Both methods proved to be inadequate. Best practices are hand-pulling, which takes much more time and people. Further management efforts will continue to be explored in years to come.
- In May, 70 volunteers from North Lakes Academy planted over 250 trees and shrubs in a shelterwood section just north of the furthest South Gate parking lot. Species included swamp white oak (*Quercus bicolor*), elderberry (*Sambucus canadensis*), dogwood (*Cornus sericea*), serviceberry (*Amelanchier spp.*), American plum (*Prunus Americana*) and chokecherry (*Prunus virginiana*). Conservation Corps installed tree tubes and weed mats for the majority of tree and shrubs planted.
- Little maintenance was done the following months. In September, CCM crews weed-whipped the North Gate shelterwood pockets to prepare for a National Public Lands planting on September 30. The Saint Paul Audubon Society partnered with us to provide a birding opportunity to volunteers following the tree planting event. They also provided food and coffee. Volunteers successfully planted roughly 100 cottonwoods and 100 silver maple in the Shelterwood pocket nearest to the picnic shelter. Mary Hammes with Mississippi Park Connection led a group of 6 volunteers to plant another 200 or so in the northern shelterwood pockets. The Conservation Corps planted the rest, bringing the number of tree planted at North Gate to a total of **800**.
- **\$1,234.00** (200 tubes) was spent on Plantra tree tubes for both the North Gate and South Gate plantings. **\$1,094.12** was spent on nursery stock. Schumacher's nursery supplied the cottonwood whips, swamp white oak, and elderberry. The MN DN supplied the silver maple (we had originally ordered the cottonwood through the DNR, but the cottonwood in their nursery died while in storage). 3' X 3' weed mats were cut from rolls of nonwoven geotextile fabric purchased from Brock White Construction Materials. One 3' X 540' roll geotextile came to **\$140.98** and yielded 180 weed mats.

### ➤ **2018 Hidden Falls Restoration/Maintenance Activities**

- SPPR Natural Resources Technicians (NRT) and CCM workers were able to burn all 5 burn piles located throughout North Gate due to the late spring snowfall. These burn piles were comprised of cut brush from invasive woody

species in areas that were too far to haul cut material to be picked up by a Parks & Rec clam truck. Tree Trust was hired to remove 40 large ash trees in winter of 2018, and also hired to replace those with 100 shrubs and trees (11 total species) in June of 2018 at a large volunteer event (70 total people planted, mulched, and watered those trees in roughly an hour of time!). 100 cottonwood trees were planted throughout the 59 acre grant area. General maintenance was performed in each of the shelterwood pockets to ensure success of plantings – mainly cutting back nettle from shading out newly planted trees, as well as burdock and thistle removal. A final woody invasive species removal “sweep” was conducted throughout the project site by our CCM crew. CCM youth crews planted herbaceous native species (several designated as pollinator-friendly!) amongst the shrubs planted by Tree Trust. Volunteer groups spent 241.5 hours from January 2018-June 2018 helping to haul brush, remove herbaceous invasive plants, and plant trees.

➤ **2017 Crosby Restoration/Maintenance Activities**

- Goats grazed a total of 6 acres. NRT staff observed goats grazing on narrow-leaf bittercress, an especially pervasive invasive species in the floodplain forests.

➤ **2018 Crosby Restoration Maintenance Activities**

- CCM crews have so far removed invasive woody species in 2018 from approx.. 15 acres, and planted 700 trees, and of course the goats have worked on about 6 acres. CCM crews, St Paul staff, and volunteers have worked to remove invasive herbaceous species such as garlic mustard, narrow leaf bittercress and wild parsnip (not done with volunteer groups ☺).
- CCM youth crews are installing geotextile weed mats around all 700 trees to ensure sapling survival, in coordination with Mississippi Park Connection.
- CCM Crews and staff will continue to sweep the entire 210-acre grant area for woody invasive species (most prevalent are mulberry and buckthorn) and will spend maintenance hours on the planting area. More selective removals will occur to create shelterwood pocket openings, which will be replanted with a variety of native tree species in spring 2019.
- Goats will return to graze on the same 6 acres. Crews will go in beforehand to cut any buckthorn re-sprouts to further affect their regrowth patterns.

Prepared by:

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for the Soil and Water Conservation District of Scott County

**Crosby Farm Park: Bluff Stabilization / Restoration Feasibility Study - St. Paul, MN**



Feasibility Report 08/07/2007

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## I. Introduction

The portion of the Crosby Farm Park bluff on the south side of Shepard R., between the west end of Youngman Ave and Homer Street is a known unstable and actively degrading system. An inventory conducted by the Ramsey Conservation District identified 39 actively eroding points of interest. The majority of the head-cuts found along this bluff are a significant threat to infrastructure and natural resources. The erosion of this bluff has been rapidly accelerated by human influence. At some points, stormwater outfalls, discharging a top the bluff, have carved dramatic gorges through this bluff. Ten of the worst head-cuts have reached or are rapidly approaching the right-of-way of Shepard Road. Many of these ravines have consumed segments of stormsewer with head cuts coming within feet of Shepard Road, potentially leading to structural failure of the RH east bound lane. Down slope, this severe erosion is a serious threat to the water quality of Crosby Lake and the adjacent trail system of the Park.

Applying an appropriate solution to this complex problem will require the input of many effected stakeholders. In addition to Ramsey Conservation District, the St. Paul Parks and Recreation Department (property owner), the State of MN as road authorities for Shepard Rd (MSA road) and the Capital Region Watershed District will have considerable at stake in this project. Additional groups, such as Mississippi National River and Recreation Area, Friends of the Mississippi River and Great River Greening will also be interested stake holders in the project.

The objectives and goals of this study were to determine the best method of controlling or eliminating the bluff degradation in Crosby Farm Park that has been accelerated by man's activities primarily ever since Shepard Rd. was constructed. There were undoubtedly natural drainage paths prior to the development of this area. Evidence still exists where the fragile bedrock had formed ravines and drainage ways for passage of normal runoff down to the Mississippi River floodplain level at Crosby Lake. Subsequent changes in the land use, drainage mechanisms and vehicular and pedestrian traffic have drastically upset the previously established natural drainage patterns and destabilized the slopes along Crosby Farm Park. When reviewing the data points located by the Ramsey Conservation District's 2004 survey, we found three categories of causes to the eroded locations:

1. Stormwater piping discharge points,
2. Surface water runoff discharge points,
3. Pedestrian and recreational activities along the bluff.



The primary culprit causing the most acute damage to the bluff area is the stormsewer outfalls that were terminated at the extreme top of the bluff with no forethought as to the damage the concentrated flows would cause to the fragile bluff ecosystem. This, then, became the primary focus of our analysis and recommendations.

## II. Modeling Methodology

### General

Modeling for the Crosby Bluff was performed using XP-SWMM version 10. The XP-SWMM model represents state-of-the-art in stormwater modeling. It accurately models backwater conditions, can represent multiple scenarios simultaneously, simulates infiltration, can run real rainfall data, and has the power to run continuous simulations. The model flexibility and sophisticated features allow for the most accurate and realistic representation of real flow conditions and different flow regimes.

### Rainfall

A range of synthetic design events following the SCS Type II distribution were simulated to evaluate the systems response to both small and large rainfall events. The magnitude and duration of all events modeled was selected from the Minnesota Hydrology Guide<sup>1</sup>.

Rainfall events simulated included:

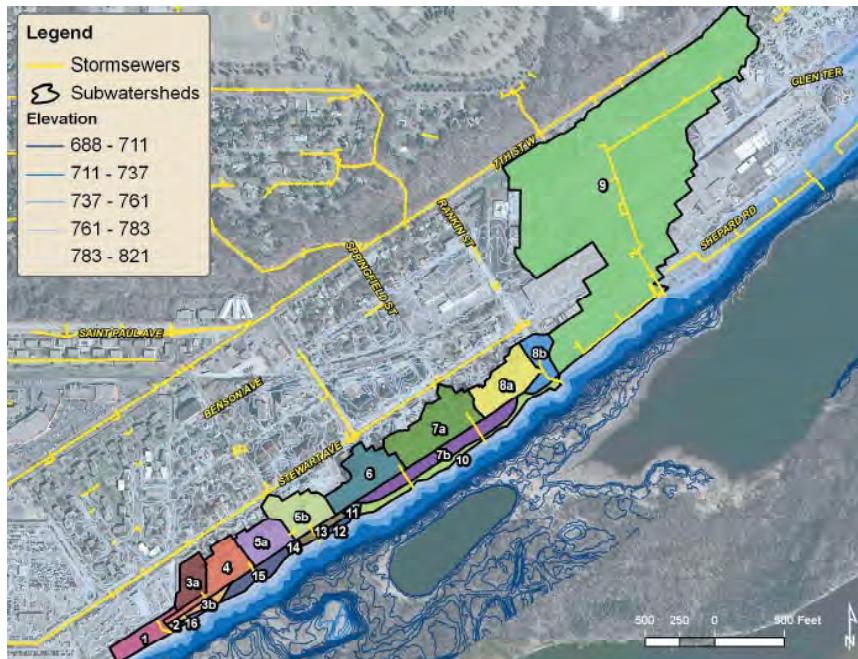
1.5-year	24-hour (2.5 inches)
2-year	24-hour (2.8 inches)
5-year	24-hour (3.6 inches)
10-year	24-hour (4.2 inches)
25-year	24-hour (4.8 inches)
50-year	24-hour (5.4 inches)
100-year	24-hour (6.0 inches)

Although the entire range of storm events were simulated during the analysis, only the 2, 50, and 100-year results are presented for a more concise summary of the model output and system response.

### Subwatersheds

The project area contributing to the targeted bluff erosion was delineated into a total of 9 major subwatersheds ranging in size from 0.1 to 44 acres (Figure 1). The average subwatershed size (excluding subwatershed 9) was approximately 1.5 acres.

Figure 1: Subwatersheds



## Runoff

Model runoff parameters defining subwatershed hydrology were estimated using the SCS methodology. Input parameters appropriate for the land use, and time of concentration were computed following the methodology and guidance outlined in the Minnesota Hydrology Guide. Model input parameters are summarized below in Table 1.

Table 1: Hydrology Model Input Data

Final Subwatershed Names	Total Acres	% Impervious (Black)	Tc (hrs)	Weighted Area CN
1	1.14	74.6	6.5	95
2	0.15	80.0	5.0	96
3a	1.42	81.0	6.8	96
3b	0.44	68.2	5.0	95
4	2.43	68.7	12.9	95
5a	1.94	64.4	15.0	94
5b	2.51	66.5	18.0	95
6	3.09	53.7	24.9	93
7a	4.47	52.6	15.0	93
7b	2.74	64.6	10.0	94
8a	2.87	68.3	10.5	95
8b	1.45	71.0	10.0	95
9	43.62	75.7	30.9	96
10	1.71	94.2	5.0	97
11	0.21	71.4	5.0	95
12	0.20	65.0	5.0	95
13	0.54	77.8	5.0	96
14	0.13	92.3	5.0	97
15	1.12	74.1	5.0	95
16	0.14	50.0	5.0	93

\* Note that the Curve Number (CN) in Table 1 is a weighted average.  
The applied pervious area CN was 88 and impervious area CN was 98.

## Hydraulics

Channel characteristics and flow patterns were determined using 1 foot topography and field investigation and verification. Pipe location, size and inverts within the project area were surveyed during the summer of 2006 and entered into the XP-SWMM model to define the project hydraulics.

## III. Modeling Results

### Existing Conditions

The existing conditions model identifies a rapidly drained, “flashy”, storm response which is typical of this type and age of intense development. The lack of BMP’s for either water quantity or quality result in minimal flow retention or treatment.

Currently, the system north of Sheppard Road generally handles flows up to the 5-year 24-hour event assuming clean (not clogged) inlet conditions. Events exceeding the 5-year frequency result in surface/ditch flooding.

The small subwatersheds on the south side of Sheppard Road (top of the bluff) drain by surface flow and concentrate at multiple points before dropping over the bluff.

Existing condition hydrology results (defining surface runoff) are summarized for the 2, 50, and 100-year 24-hour rainfall events in Table 2. The existing condition hydraulics (pipe flows and velocities) are summarized and repeated in Tables 3, 4, & 5.

Table 2: Crosby Bluff Hydrology

Subwatershed ID	Area (ac)	Rainfall Event											
		2-yr 24-hr (2.8 inches)				50-yr 24-hr (5.4 inches)				100-yr 24-hr (6.0 inches)			
		Total Runoff Depth (in)	Max Flow (cfs)	Total Runoff Volume (ac-ft)	Total Runoff Volume (cu-ft)	Total Runoff Depth (in)	Max Flow (cfs)	Total Runoff Volume (ac-ft)	Total Runoff Volume (cu-ft)	Total Runoff Depth (in)	Max Flow (cfs)	Total Runoff Volume (ac-ft)	Total Runoff Volume (cu-ft)
1	1.4	2.3	4.5	0.3	11623.7	4.8	9.2	0.6	24598.5	5.4	10.3	0.6	27608.1
2	0.2	2.4	0.5	0.0	1287.2	4.9	1.0	0.1	2694.7	5.5	1.2	0.1	3020.9
3a	1.4	2.4	4.7	0.3	12185.5	4.9	9.3	0.6	25453.4	5.5	10.4	0.7	28530.7
4	2.4	2.2	6.6	0.5	19767.6	4.8	13.6	1.0	42340.3	5.4	15.2	1.1	47588.8
5a	1.9	2.2	3.4	0.4	15549.2	4.8	7.0	0.8	33598.3	5.4	7.8	0.9	37795.5
6	3.1	2.1	6.1	0.5	23768.2	4.7	13.0	1.2	52494.2	5.3	14.5	1.4	59213.0
7a	4.5	2.1	11.0	0.8	34058.6	4.6	23.4	1.7	75402.7	5.2	26.2	2.0	85057.2
8a	2.9	2.2	8.3	0.5	23430.3	4.8	17.0	1.2	50236.1	5.4	19.0	1.3	56466.1
9	43.6	2.3	81.4	8.4	367033.5	4.9	165.8	17.8	775235.6	5.5	185.0	20.0	869923.3
7b	2.7	2.2	8.3	0.5	21931.4	4.8	17.2	1.1	47373.8	5.4	19.2	1.2	53291.7
3b	0.4	2.2	1.5	0.1	3585.7	4.8	3.0	0.2	7688.9	5.4	3.4	0.2	8642.4
5b	2.5	2.2	7.3	0.5	20372.9	4.8	15.1	1.0	43834.5	5.4	16.8	1.1	49292.1
8b	1.5	2.3	4.6	0.3	11858.7	4.8	9.3	0.6	25285.9	5.4	10.4	0.7	28401.8
11	0.2	2.3	0.7	0.0	1720.5	4.8	1.4	0.1	3665.1	5.4	1.5	0.1	4117.2
12	0.2	2.2	0.6	0.0	1592.8	4.7	1.3	0.1	3438.3	5.3	1.4	0.1	3868.1
13	0.5	2.3	1.7	0.1	4549.6	4.9	3.5	0.2	9567.7	5.5	3.9	0.2	10732.1
14	0.1	2.5	0.4	0.0	1167.0	5.0	0.9	0.1	2382.2	5.6	1.0	0.1	2662.9
15	1.1	2.3	3.3	0.2	9399.7	4.9	6.8	0.5	19913.3	5.5	7.6	0.5	22352.7
16	0.1	2.7	0.5	0.0	1356.4	5.3	0.9	0.1	2670.6	5.9	1.0	0.1	2973.5

## IV. Bluff Inventory and Evaluation

Map 1 in Appendix V is the compilation of data inventories conducted by Ramsey Conservation District and those gathered as part of this report. The matrix below is organized by subwatersheds in the study area. It is the result of extensive field research and the synthesis and analysis of all available data sets for the Crosby Bluff area.

Table 3: Site Assessment Matrix

<b>DRAINAGE AREA</b>		0.79	0.63	0.15	1.42	0.44	2.43	1.94	2.51	3.09	4.47	2.47	2.87	1.45
<b>DISCHARGE OVER BLUFF</b>		Pipe	Pipe	Pipe	Overland	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
<b>ACTIVE EROSION SEVERITY</b>		High	Medium	High	High	High	High	High	Very High	Extreme				
<b>POTENTIAL PARK INFRASTRUCTURE LOSS</b>		Low	Low	Low	Low	Low	Low	Low	High	Medium				
<b>PRIORITY (1-Low to 4-High)</b>		2	1	1	2	1	1	2	2	3	3	3	3	3

<b>DRAINAGE AREA</b>		2.80	4.30	4.53	3.69	6.65	21.66	1.71	0.21	0.20	0.54	0.13	1.12	0.14
<b>DISCHARGE OVER BLUFF</b>		Pipe				Overland	Overland	Overland	Overland	Pipe	Overland	Overland		
<b>ACTIVE EROSION SEVERITY</b>		Extreme				Medium	Medium	Low	Medium	Medium	Medium	Low		
<b>POTENTIAL PARK INFRASTRUCTURE LOSS</b>		Medium				Low	Low	Low	Medium	Low	Low	Low		
<b>PRIORITY (1-Low to 4-High)</b>		4	4	4	4	4	4	1	1	1	1	1	1	1

\* Note: erosion inventor points not directly associated with subwater point discharge

### Feasibility Study Recommends Stormwater Improvement Projects:

2 West Improvements (Youngman Ave W.) 3 Central Improvements (Youngman Ave W.) 4 North Improvements (Homer Street)

## V. Stormwater Remediation Options

By utilizing the existing conditions model, given that we now know the outfall rates, velocities and volumes that are being generated under current conditions, modifications of the model were made to represent proposed conditions or modifications that could be made to the stormwater system to reduce the erosive effects of the runoff. Multiple scenarios were investigated to determine to what extent and we could reduce the outflows by retrofitting various stormwater management techniques into the system. During this process we started with simpler, less costly, system modifications, changed the model to represent the new conditions, derived the impacts to the runoff rates, velocities and volumes as a result of the stormwater system improvements and moved on to investigate the next logical modification based on the effectiveness of the previous step. In this way, we sought out the most economical solution that would meet the goals of the study.

### South-West & Central Section Analysis

Because the composition and logistical positioning of subwatersheds 1 through 8 (excluding the small watersheds that drain directly to the bluff on the south side of Shepard Rd.) was similar and hydrologically related by the linear ditch/boulevard area that is located between Shepard Rd. and Youngman Ave. (refer to Figure 1), it was logical to utilize the 3000 feet of ditch in some fashion to mitigate the peak rates, velocities and volumes leaving this system.

## Option 1 – (Figure 2)

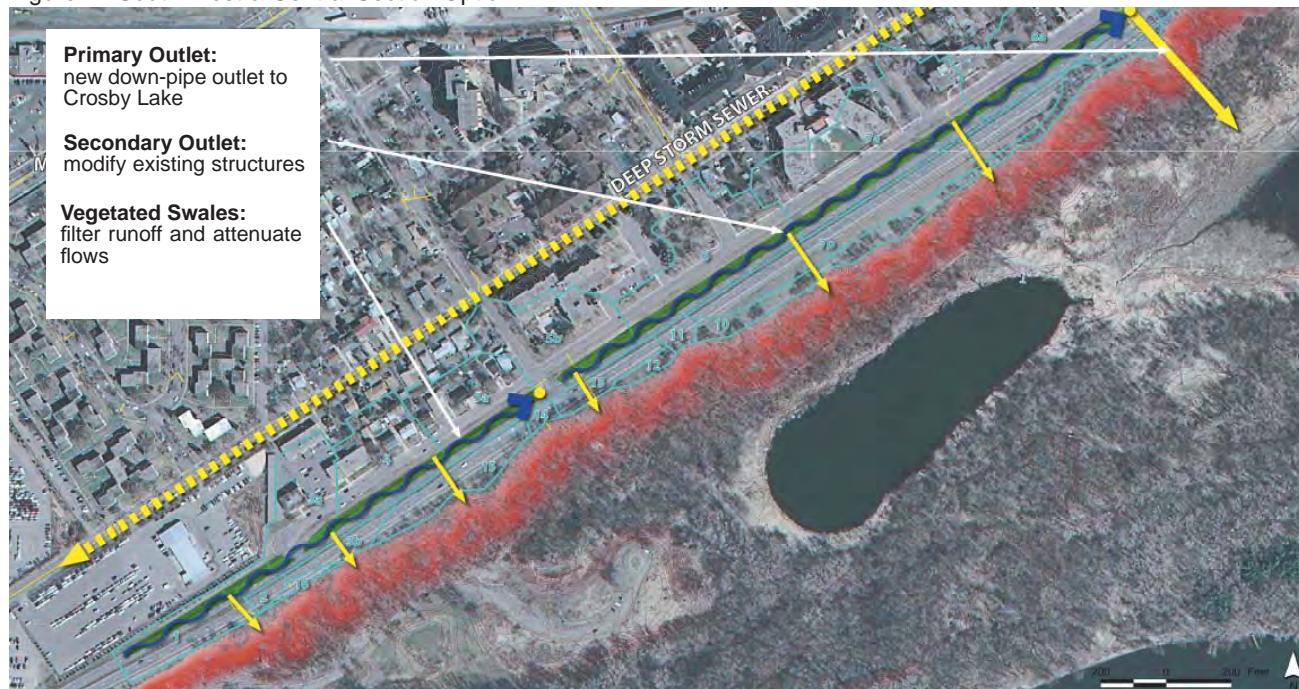
Existing ditch section along Youngman Ave. would be maintained and the outlets would all be fitted with two-stage or perforated standpipe (height approx. 1.5 feet) control structures. This scenario would utilize the existing pipes to continue discharging over the bluff.

- ▶ Benefits: Good “small storm” water quality treatment.
- ▶ Drawbacks: Ditch lacks retention volume to properly meter out “large storms”. Peak rates and velocities are not reduced.

Table 4: South-West & Central Section Option 1 Model Results

Rain Event	Subwatershed	Pipe Name	Existing Conditions		Option 1 *	
			Max Flow cfs	Max Velocity ft/s	Max Flow cfs	Max Velocity ft/s
2-Year 24-Hour	1	L1.3	2.8	4.6	1.6	4.0
	3	L3.1	5.1	4.9	2.9	4.0
	4	L4	5.0	5.9	2.4	5.1
	5	L5.2	7.7	7.1	2.7	5.9
	6	L6	2.8	2.5	1.2	1.9
	7	L7.2	9.6	5.5	2.3	3.1
	8	L8.6	8.9	11.0	6.4	10.6
	1	L1.3	5.2	5.2	5.5	5.2
50-Year 24-Hour	3	L3.1	9.5	5.7	5.4	4.8
	4	L4	7.9	6.3	2.9	5.3
	5	L5.2	11.4	9.2	9.8	8.0
	6	L6	4.3	3.6	2.2	2.3
	7	L7.2	10.6	6.1	3.0	3.4
	8	L8.6	18.1	14.9	18.9	11.8
	1	L1.3	5.5	5.2	5.7	5.2
	3	L3.1	10.1	5.8	5.9	5.0
100-Year 24-Hour	4	L4	7.9	6.4	3.1	5.4
	5	L5.2	11.6	9.3	11.3	9.1
	6	L6	4.6	3.8	2.9	2.6
	7	L7.2	10.8	6.1	3.1	3.4
	8	L8.6	18.7	11.8	19.1	11.8

Figure 2: South-West & Central Section Option 1



## Section Option 2 - (Figure 3)

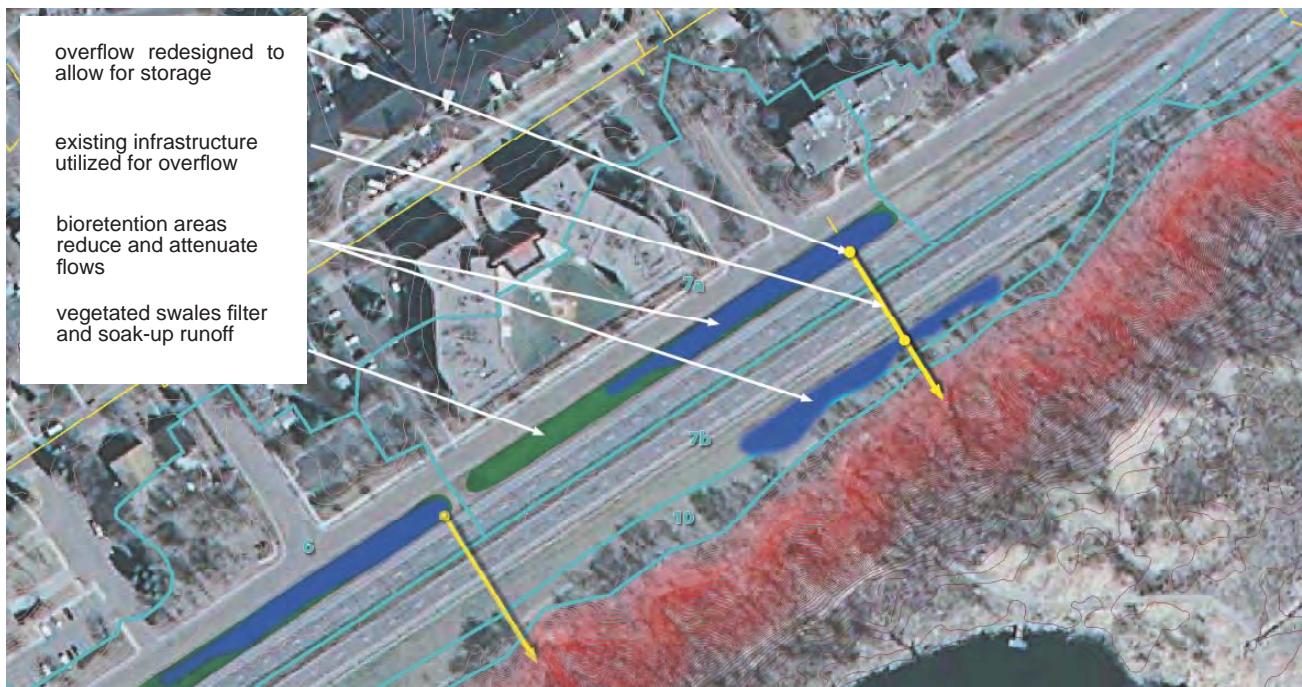
Ditch section along Youngman Ave. is slightly re-graded to bypass the existing outlets and utilize only two of the outlets as illustrated in Figure 2. Existing outlets would be fitted with 2-stage control structures (approx. height 1.5 feet). Secondary flows discharge via existing pipes to bluff.

- Benefits: Good “small storm” water quality treatment.
- Drawbacks: Reconfigured/combined ditch section also lacks retention volume to properly meter out “large storms”. Peak rates and velocities are not reduced.

Table 5: South-West & Central Section Option 2 Model Results

Rain Event	Subwatershed	Pipe Name	Existing Conditions		Option 2	
			Max Flow cfs	Max Velocity ft/s	Max Flow cfs	Max Velocity ft/s
2-Year 24-Hour	1	L1.3	2.8	4.6	0.0	0.0
	3	L3.1	5.1	4.9	1.5	3.3
	4	L4	5.0	5.9	0.0	0.0
	5	L5.2	7.7	7.1	0.0	0.0
	6	L6	2.8	2.5	0.0	0.0
	7	L7.2	9.6	5.5	0.0	0.0
	8	L8.6	8.9	11.0	14.0	11.5
	1	L1.3	5.2	5.2	0.0	0.0
50-Year 24-Hour	3	L3.1	9.5	5.7	5.2	4.8
	4	L4	7.9	6.3	1.2	4.3
	5	L5.2	11.4	9.2	0.0	1.2
	6	L6	4.3	3.6	0.0	0.0
	7	L7.2	10.6	6.1	0.1	1.3
	8	L8.6	18.1	14.9	36.4	12.5
	1	L1.3	5.5	5.2	0.0	0.0
	3	L3.1	10.1	5.8	6.6	5.1
100-Year 24-Hour	4	L4	7.9	6.4	1.8	4.8
	5	L5.2	11.6	9.3	0.6	4.0
	6	L6	4.6	3.8	0.1	0.7
	7	L7.2	10.8	6.1	0.9	2.5
	8	L8.6	18.7	11.8	39.9	12.8

Figure 3: South-West & Central Section Option 2



### Section Option 3 - (Figure 4)

Ditch section along Youngman Ave. is slightly re-graded to drain as in scenario 2 above. All existing outlet are abandoned and new outlets are installed to redirect overflows to the deep storm sewer tunnel under Stewart St.

- Benefits: Good “small storm” water quality treatment. No flows allowed to discharge over the bluff or to Crosby Lake.
- Drawbacks: Costly infrastructure improvements required.

Table 6: South-West & Central Section Option 3 Model Results

Rain Event	Subwatersheds	Existing Conditions			Option 3 *	
		Pipe Name	Max Flow cfs	Max Velocity ft/s	Max Flow cfs	Max Velocity ft/s
2-Year 24-Hour	1, 3, 4, 5 & 6	L1.3	2.8	4.6	22.2	7.7
		L3.1	5.1	4.9		
		L4	5.0	5.9		
		L5.2	7.7	7.1		
		L6	2.8	2.5		
	7 & 8	L7.2	9.6	5.5	8.9	6.4
		L8.6	8.9	11.0		
		L1.3	5.2	5.2		
		L3.1	9.5	5.7		
		L4	7.9	6.3		
50-Year 24-Hour	1, 3, 4, 5,& 6	L5.2	11.4	9.2	42.6	9.2
		L6	4.3	3.6		
		L7.2	10.6	6.1		
		L8.6	18.1	14.9		
		L1.3	5.5	5.2		
	7 & 8	L3.1	10.1	5.8		
		L4	7.9	6.4		
		L5.2	11.6	9.3		
		L6	4.6	3.8		
		L7.2	10.8	6.1		
100-Year 24-Hour	1, 3, 4, 5,& 6	L8.6	18.7	11.8	45.8	9.4
		L1.3	5.5	5.2		
		L3.1	10.1	5.8		
		L4	7.9	6.4		
		L5.2	11.6	9.3		
	7 & 8	L6	4.6	3.8		
		L7.2	10.8	6.1		
		L8.6	18.7	11.8		

Figure 4: South-West & Central Section Option 3



## North-East Section Analysis

The approach to Subwatershed 9 was slightly different. In this subwatershed, there is no predominant surface drainage feature that could be modified for stormwater mitigation purposes. Within Subwatershed 9, however, are several open green spaces located within the topography where they could collect runoff if converted into drainage features for stormwater retention and infiltration. In concert with the water quality improvements suggested above, the existing stormsewer system could also be diverted to the deep storm sewer tunnel under Stewart St.

## Surface Drainage Areas to Bluff Analysis

Of the several subwatersheds that consist of sections of the eastbound lanes of Shepard Rd. and the boulevard that exists along the south side adjacent to the bluff, only one has any size and consequential runoff, namely 7b. This subwatershed does have enough properly located green area that could be utilized to mitigate runoff by being converted into drainage features for stormwater retention and infiltration. As for the outlet itself, one of two approaches would resolve the point source erosion at the pipe outlet: 1) Modifying or replacing the existing stormsewer piping to drain back to the north side of Shepard Rd. into subwatershed 7a. or 2) Adding an extension on to the outlet piping to the east to provide a safe discharge point lower in the profile of the bluff where erosive velocities could be dissipated in a small basin or stilling pond.

## ***VI. Recommendations***

### Summary

By referring to Map1 and reviewing the data points located by the Ramsey Conservation District's 2004 survey, we found three categories of causes to the eroded locations:

1. Stormwater piping discharge points,
2. Surface water runoff discharge,
3. Pedestrian and recreational activities along the bluff.

The sections that follow contain our recommendations for resolving these three distinct causes of erosion on the bluff.

# Stormwater Piping Discharge Points

## South-West Area

Re-grade the ditch section along Youngman Ave. to drain to Alton Ave. Restoration of the new ditch will consist of minor soils amendments and native seeding and plantings. All existing outlets are abandoned and new stormsewer is installed to redirect overflows to the deep storm sewer tunnel under Stewart St. (Figure 6 Below)

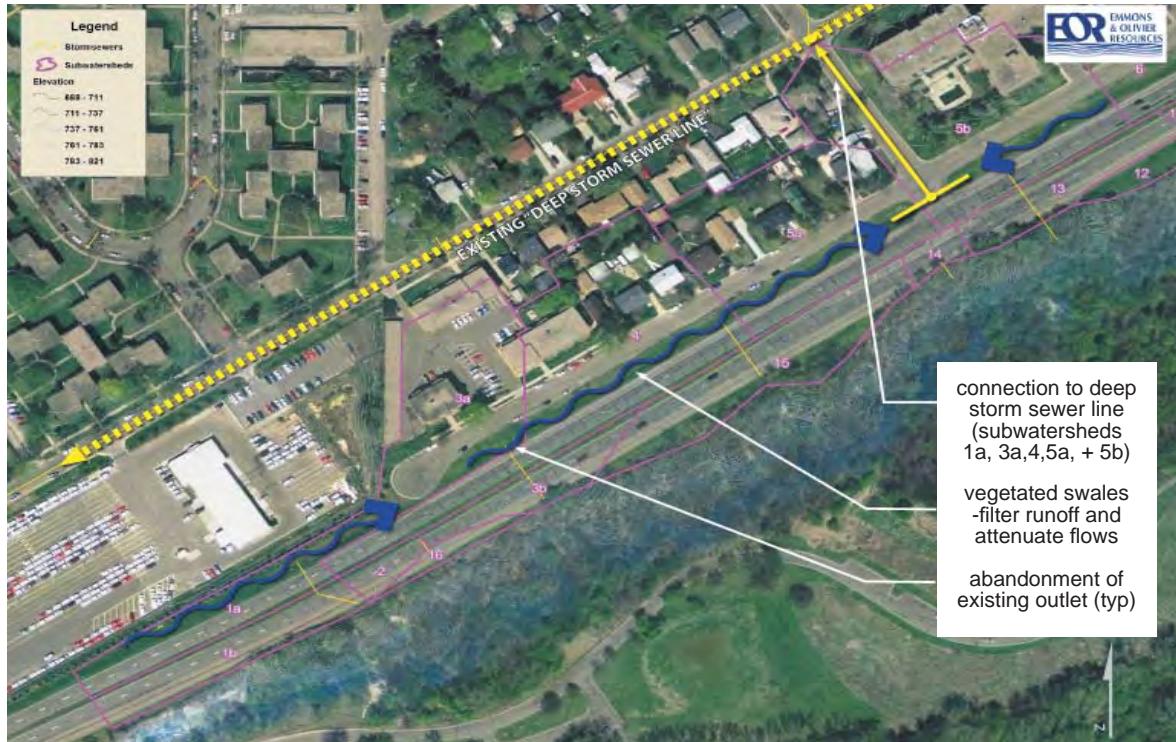
Table 7: South-West Cost Estimate

Item	Unit	Quantity	Cost	Extension
1 Ditch/Swale Improvements (Re-vegetation)	AC	1.030	\$15,000.00	\$15,450
2 Existing Outlet Standpipe Modifications*	EA	7	\$250.00	\$1,750
3 Install Deep Sewer Outlet Piping 30" RCP	LF	340	\$75.00	\$25,500
4 Upgrade Alton Crossing 24" RCP	LF	65	\$40.00	\$2,600
5 24" Apron & Trash Rack	EA	2	\$1,200.00	\$2,400
6 Manhole	EA	1	\$2,500.00	\$2,500
7 Saw cut Pavement	LF	827	\$2.50	\$2,068
8 Removals	CY	75	\$8.00	\$600
9 Replace Paving & Base	SY	440	\$12.60	\$5,544
<i>* Indicates Optional or Interim Item</i>				\$58,412

## South-West Area Description

Utilize island/ditches between west cul-de-sac on Youngman and Alton for storage/bio-infiltration area, install outlet piping in Alton to deep storm sewer at Stewart.

Figure 6: South-West Area Plan



## Central Area

Same approach as the South-West area. Re-grade the ditch section along Youngman Ave. to drain to Rankin Ave. Restoration of the new ditch will consist of minor soils amendments and native seeding and plantings. All existing outlet are abandoned and new stormsewer is installed to redirect overflows to the deep storm sewer tunnel under Stewart St. (Figure 7 Below)

Table 8: Central Area Cost Estimate

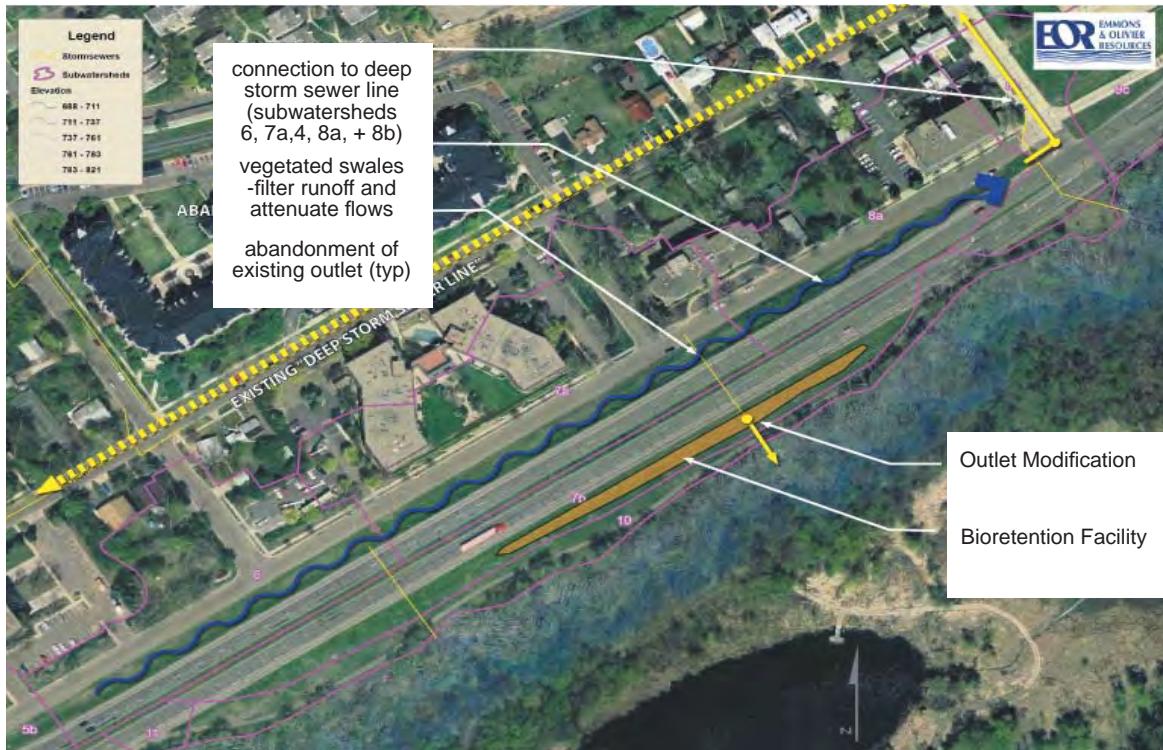
Item	Unit	Quantity	Cost	Extension
1 Ditch/Swale Improvements (Re-vegetation)	AC	1.790	\$15,000.00	\$26,850
2 Existing Outlet Standpipe Modifications*	EA	7	\$250.00	\$1,750
3 Install Deep Sewer Outlet Piping 24" RCP	LF	360	\$40.00	\$14,400
4 Manhole	EA	1	\$2,500.00	\$2,500
5 24" Apron & Trash Rack	EA	1	\$1,200.00	\$1,200
6 Saw cut Pavement	LF	754	\$2.50	\$1,885
7 Removals	CY	70	\$8.00	\$560
8 Replace Paving & Base	SY	410	\$12.60	\$5,166

\* Indicates Optional or Interim Item \$54,311

## Central Area Description

Utilize island/ditches between Alton and Rankin for storage/bio-infiltration area, install outlet piping north in Rankin to deep sewer at Stewart.

Figure 7: Central Area Plan



## North-East Area

Within subwatershed 9, several open green spaces that are located within the topography where they could be used to capture stormwater would be converted into drainage features for stormwater retention and infiltration. New stormwater features are enhanced to provide water quality benefits through minor soil amendments and native seeding and plantings. In concert with the water quality improvements suggested above, the existing stormsewer system could be diverted at Stewart St. to the deep storm sewer tunnel at Stewart St. and Rankin St. (Figure 8 Below)

Table 9: North-East Area Cost Estimate

Item	Unit	No.	Cost	Extension
1 Ditch/Swale Improvements (Re-vegetation)	AC	1.315	\$15,000.00	\$19,725
2 Existing Outlet Standpipe Modifications	EA	1	\$250.00	\$250
3 Bio-Infiltration Areas	SY	682.9	\$45.00	\$30,732
				\$50,707

## North-East Area Description

Utilize street islands, ditches, available green spaces and retrofitted parking areas for storage/bio-in-filtration areas.

Figure 8: North-East Area Plan



## Surface water runoff discharge points:

Referring to Table 3 & Map 1, Subwatersheds (16, 2, 16, 36, 15, 14, 13, 12, 11, 10) have minor influences on the active erosion occurring on the face of the bluff. These areas will be treated as part of the General bluff restoration and re-vegetation efforts (see below).

Table 10: Subwatershed 7b Cost Estimate

<b>Item</b>	<b>Unit</b>	<b>No.</b>	<b>Cost</b>	<b>Extension</b>
1 Ditch/Swale Improvements (Re-vegetation)	AC	1.315	\$15,000.00	\$19,725
2 Existing Outlet Standpipe Modifications	EA	1	\$250.00	\$250
3 Bio-Infiltration Areas	SY	682.9	\$45.00	\$30,732
				\$50,707

## Subwatershed 7b Description

Utilize existing green spaces for storage/bio-infiltration areas. Link to west cul-de-sac on Youngman ditch.

Figure 9: Subwatershed 7b Plan



## Surface Water Runoff Discharge Points

### General Surface Drainage Problems

Referring to Table 3 & Map 1, Subwatersheds 3b, 10, 11, 12, 13, 15 & 16 have erosion associated with concentration of overland flow. Most of these cases would need to be individually approached with a unique erosion control plan. Through the proper placement and maintenance of bio-rolls, heavy erosion control blanket and plantings of grasses and possibly shrubs these problems could be resolved. In conjunction with treating these “upper” areas, restoration of the bluff zones would ideally coincide to take a holistic approach (see General bluff restoration and re-vegetation section below).

### Subwatershed 7b

Referring to Figure 7 and Map 1, Subwatershed 7b has a unique opportunity to utilize the existing topography and infrastructure to retrofit a water quality treatment or rain garden feature. Through the modification of the existing surface drain and minor soils amendments and seeding/plantings to the proposed rain garden area the existing mowed sod will provide more pleasing sights and

### Pedestrian and recreational activities along the bluff:

The Crosby Farm Park bluff areas are becoming used more and more by cyclists, runners and general nature enthusiasts. Traffic on the aging trail system is taking its toll. Many of the timber shoring and cribbing walls, as well as multiple bridges, are decayed and disintegrating in many locations. The reconstruction of these structures will improve the erosion associated with the trail itself, however, there is innumerable evidence of cliff climbing, and slope scrambling off of the trails that continually degrades the vegetation that meagerly tries to establish itself. A comprehensive approach outlined in the section below may begin to deter off trail activities. In addition, signing along the paths to inform and encourage park users to take an active roll in the restoration during the revegetation process may peak peoples interest in helping preserve the new growth and have long term affects for those who experienced the process (signing example: Please Stay on Trails - Native Plant Restoration in Progress).

### General Bluff Restoration and Re-vegetation:

Referring to the Ramsey Conservation Districts erosion points survey, points 1, 2, 3, 5, 6, 7, 9, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 33, 34, & 35 are primarily associated with pedestrian traffic on the trails and bluff areas. The combined efforts of trail improvements and overall bluff restoration will address these erosion problems.

For the bluff itself and any associated upland areas, a recommended approach might be as follows:

1. Cut buckthorn, Siberian pea shrub, black locust and Siberian elm trees and shrubs. Within 24 hours of cutting, apply basal application of garlon- herbicide to cut stumps. Pile and burn all cuttings – any cuttings not burned, place in compact pile outside bluff restoration zone. Native trees and shrubs should be retained, except where the canopy exceeds approximately 40% canopy coverage. Larger trees, rather than being cut and removed, should be girdled and treated with a basal application of Garlon-4.
2. Hand rake and harrow slopes to remove woody debris and trash and to loosen soil surface. All trash should be bagged and properly disposed of. Woody debris may be burned along with invasive shrub removals.
3. Spot spray broadleaf and woody invasive species, not cut under task 3.1 with Garlon, taking care not to kill woodland woody and herbaceous species.
4. Place 1400 LF of 8-inch diameter compost sock as directed by Project Manager. A portion of cover crop seed shall be incorporated into compost in sock. Compost socks shall be placed to take advantage of stumps, rocks and topographic features that will help to provide a firm anchor. Compost socks shall be staked 2-feet on center.
5. Place of compost within gullies and highly erodible areas as directed by the Project Manager

6. Hydroseed grass/cover crop mix as a dormant seeding if work completed in fall season or as soon as conditions permit in the spring season. Seed should be installed evenly over all areas where active rill erosion is occurring, where establishment of native grasses and forbs has failed, or where stocking densities of seedlings are low. Since soil is generally loose on the slope, no further site preparation is required. Seed should be applied with a fan-type nozzle in mixture of 75 pounds of hydromulch per 500 gallons of water for each acre of slope seeded.



7. Hydroseeding – Following seeding, all slopes shall be hydromulched with a bonded fiber matrix (BFM) product such as Soil Guard. The BFM shall be installed by a contractor certified by the manufacturer to be trained in the proper procedures for mixing and application of the product. The BFM shall be mixed according to manufacturer's recommendations and contractor shall demonstrate 'free liquid' test to inspector upon request. Bonded Fiber Matrix shall be spray-applied at a rate of 3,000-4,000 LB/acre, utilizing standard hydraulically seeding equipment in successive layers as to achieve 100% coverage of all exposed soil. The BFM shall not be applied immediately before, during or after rainfall, such that the matrix will have opportunity to dry for up to 24 hours after installation.

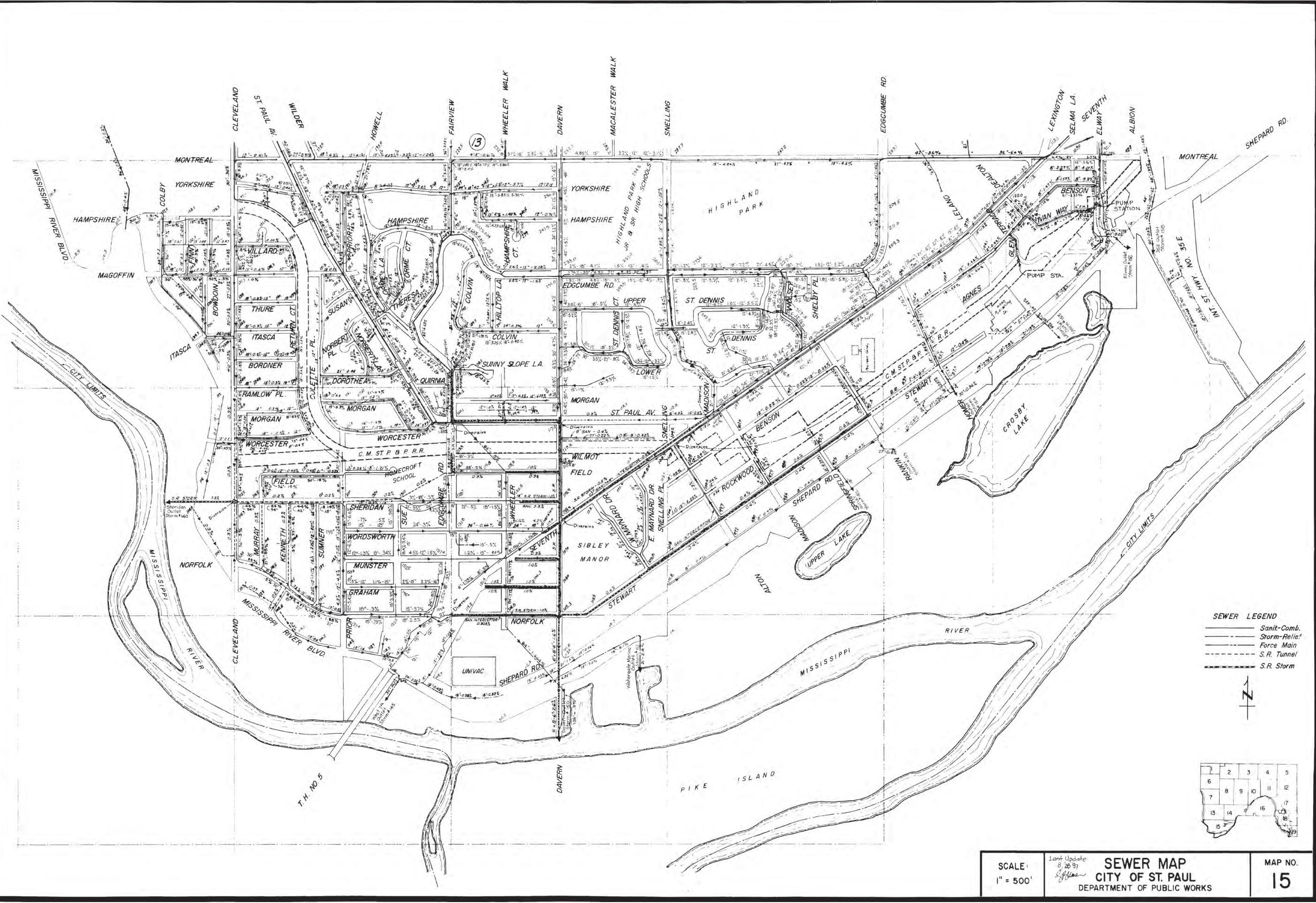


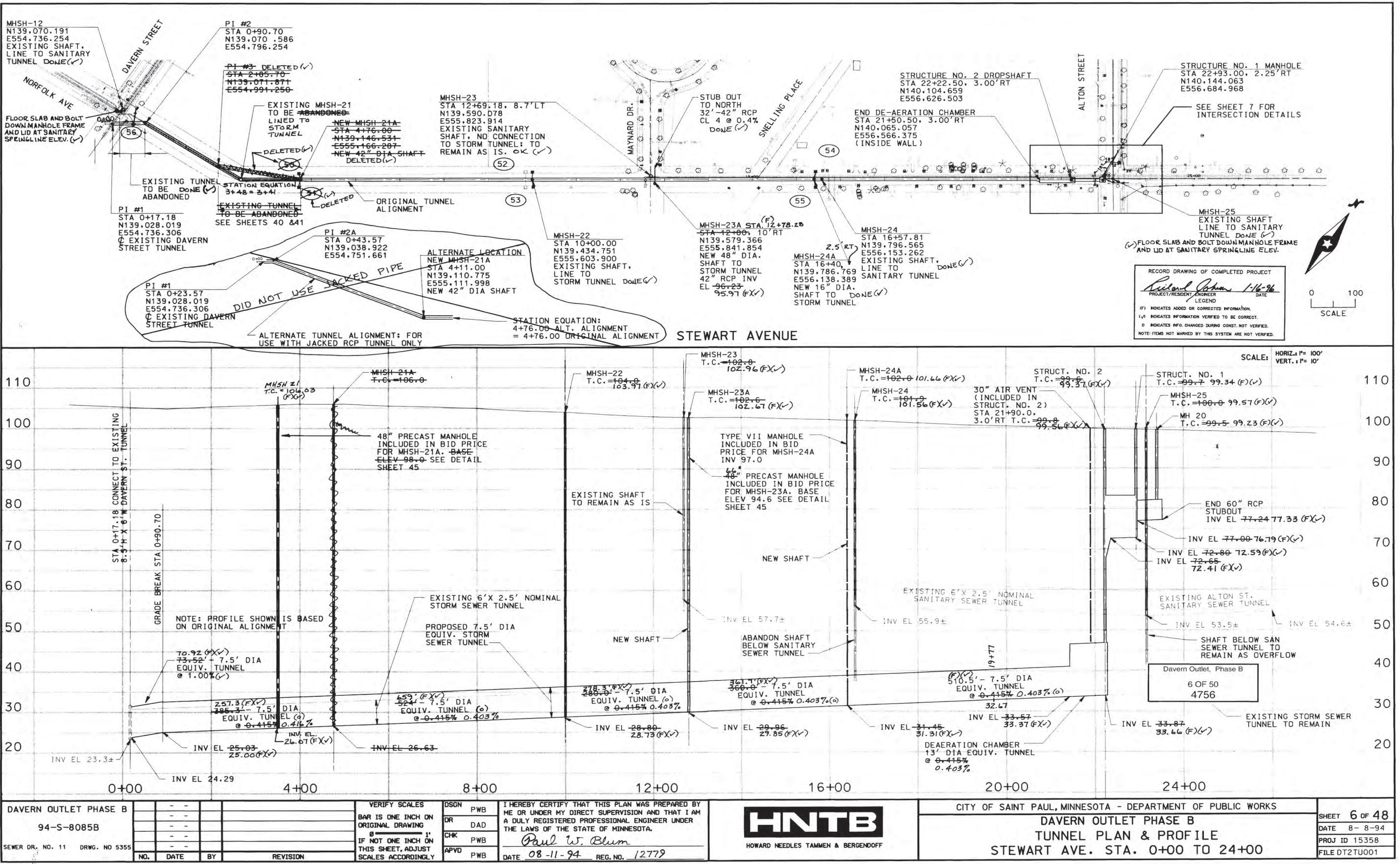
8. (Optional) Place heavy duty chain link fence (as approved by St. Paul Parks and Recreation Department) along edge of steep slope as marked by Project Manager to restrict foot travel over steep slopes. Place semi-permanent/permanent informational signs explaining need for restricted use of area on fence posts at approximate intervals of 50 feet and/or where past trails are located.

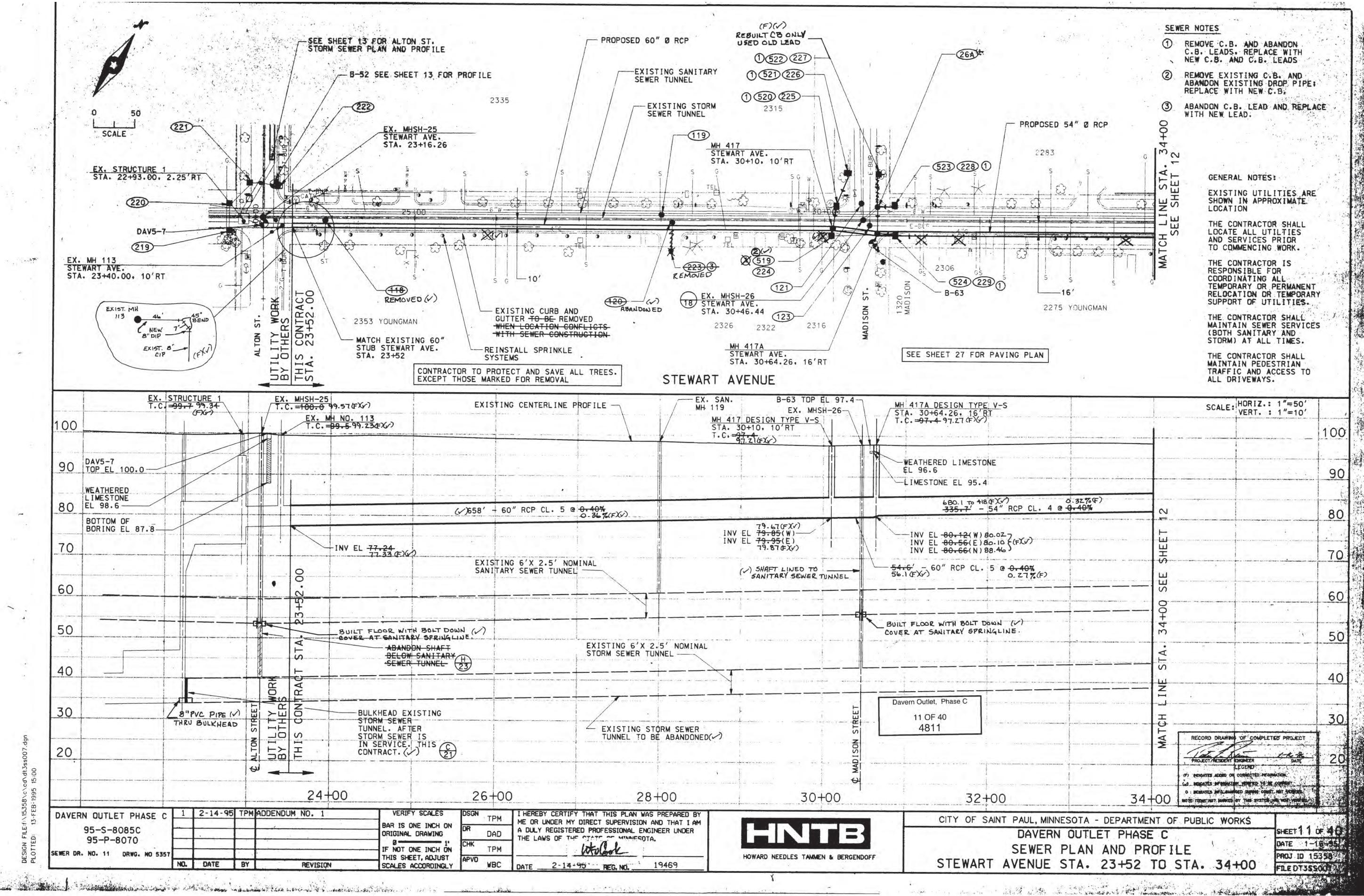


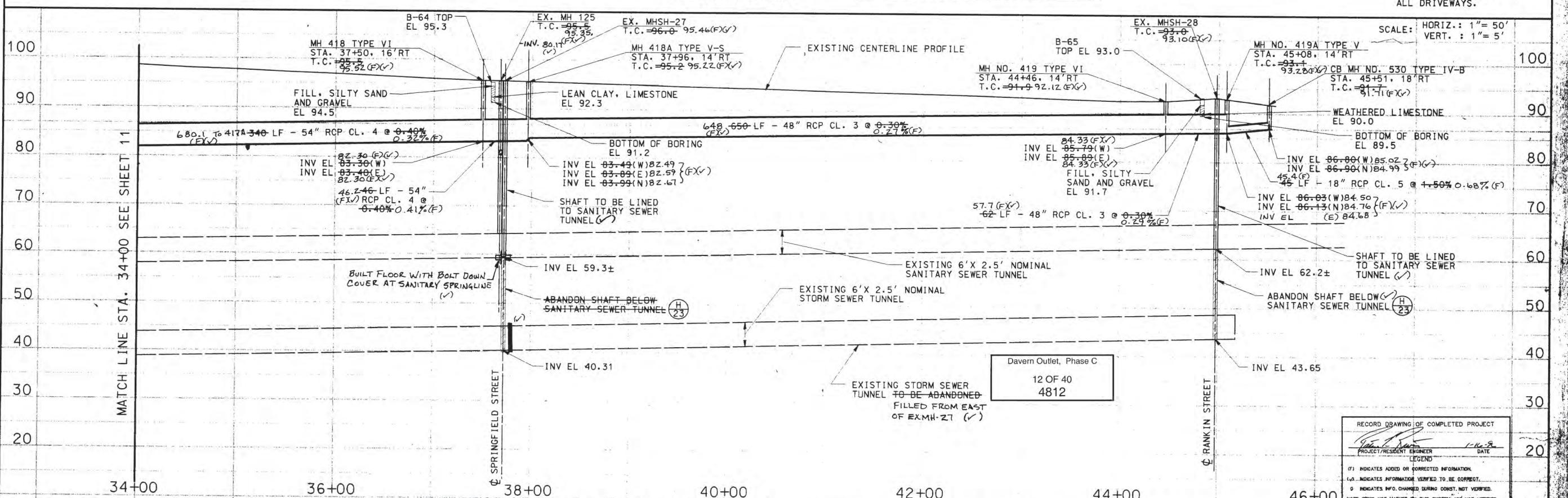
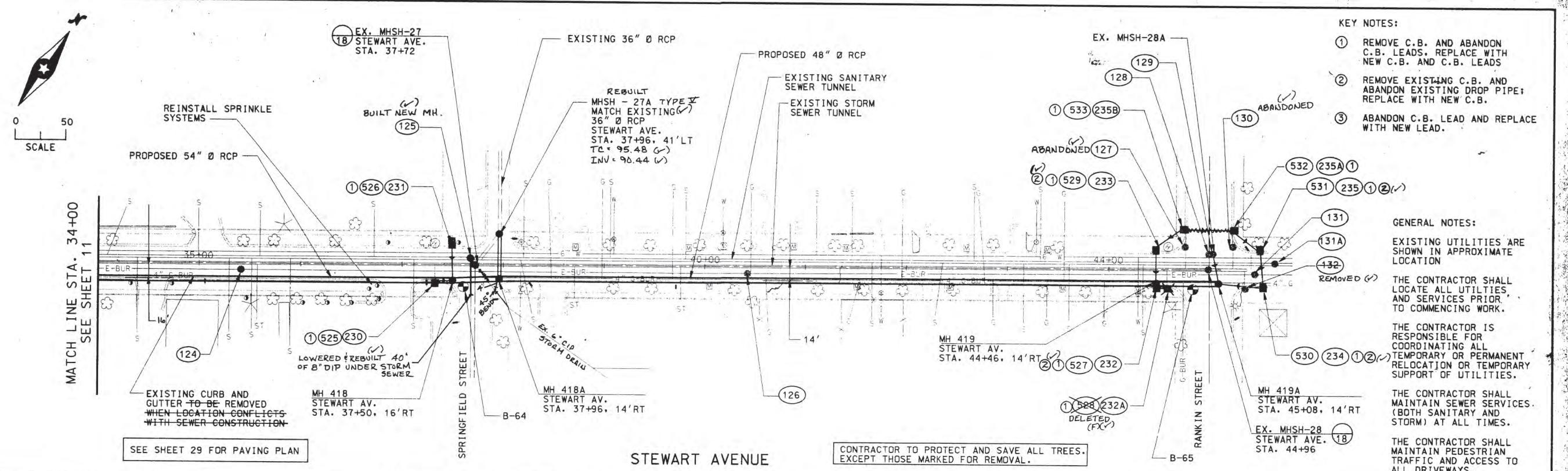
## **List of Appendices**

- I. City Storm Sewer Plates**
- II. Excerpt - Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan**
- III. Excerpt Crosby Trail Study - by Great River Greening**
- IV. Figure 1 - Subwatershed Map**









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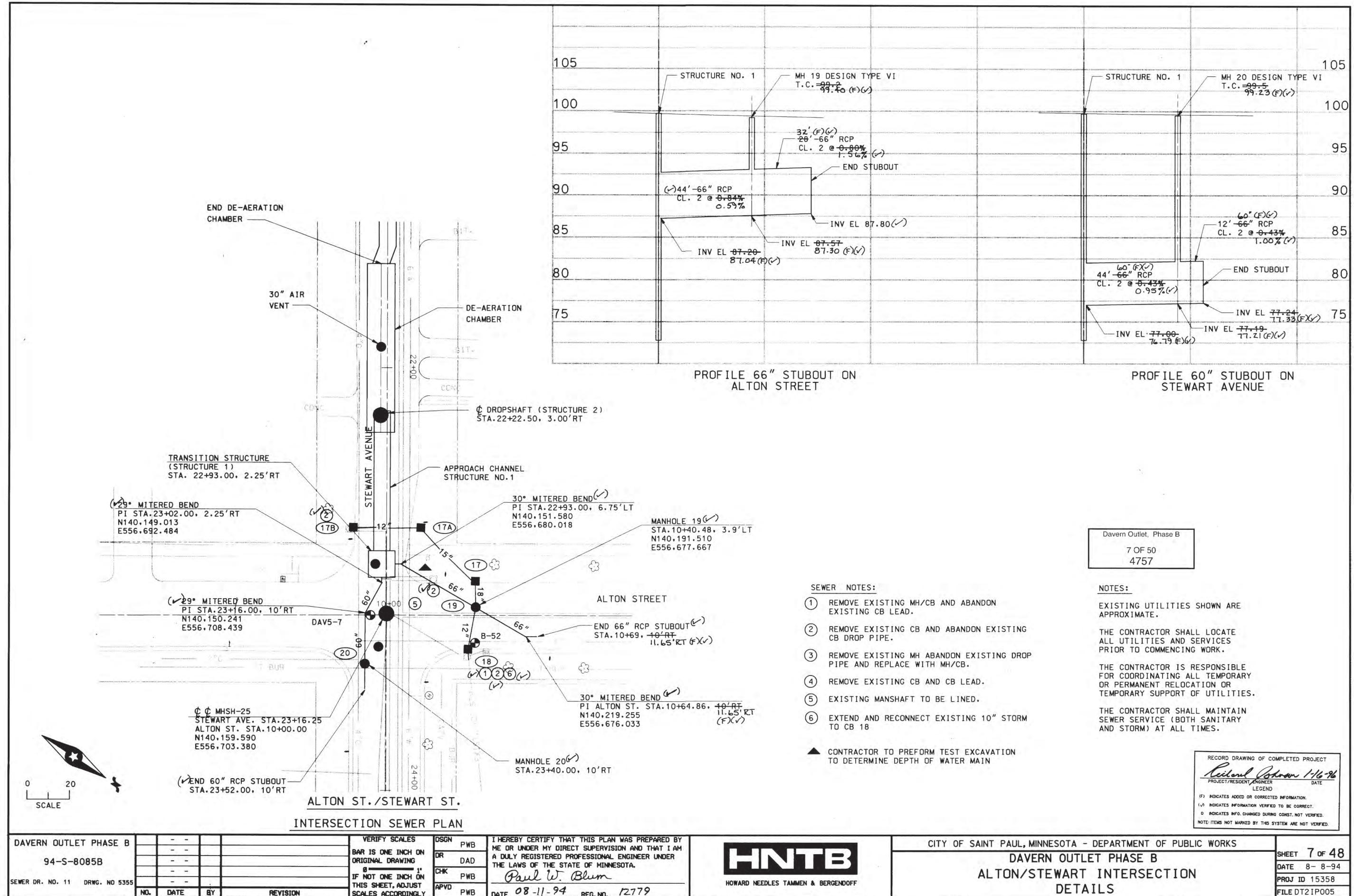
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VERIFY SCALES BAR IS ONE INCH ON ORIGINAL DRAWING  IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	DSGN DR CHK TPM APVD	TPM DAD TPM WBC	I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.  <i>W.C. Cook</i>
ON			DATE 2-14-95 REG. NO. 19469



CITY OF SAINT PAUL, MINNESOTA - DEPARTMENT OF PUBLIC WORKS  
DAVERN OUTLET PHASE C  
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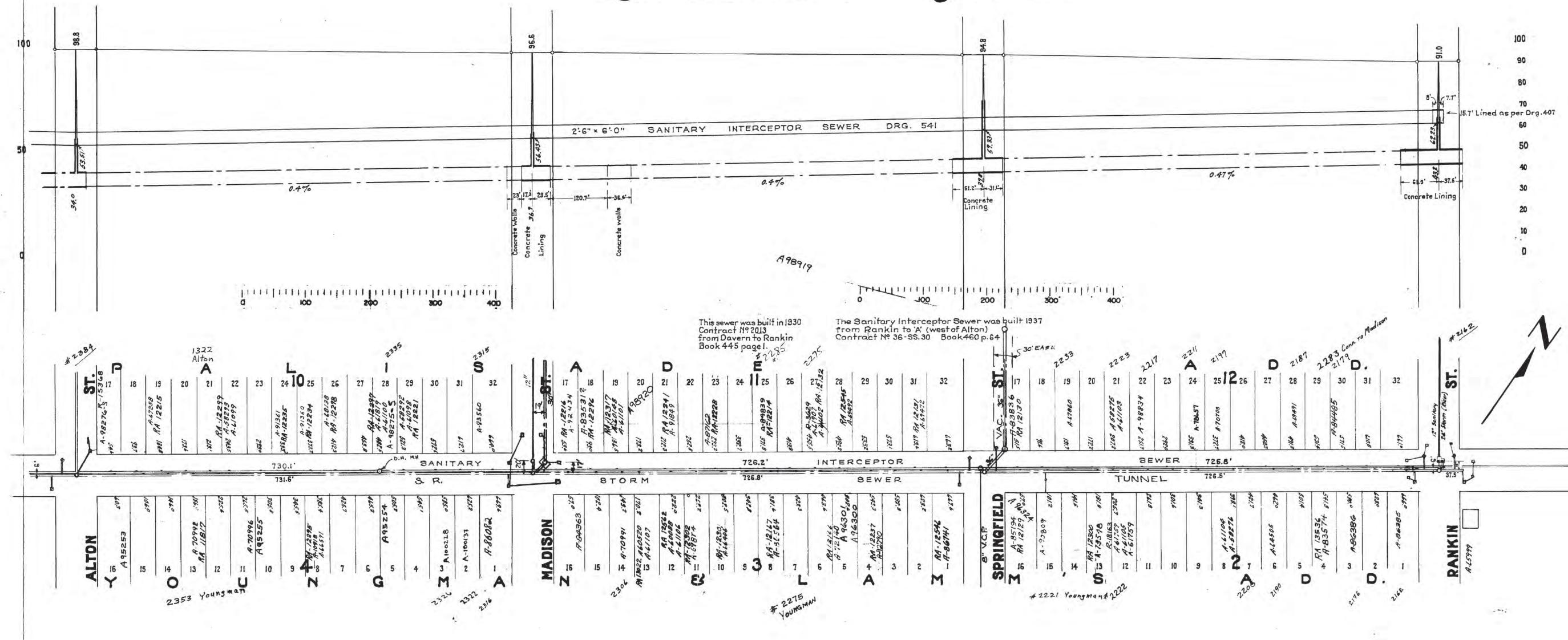


# Stewart Ave.

Stewart 2

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352



# Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan



Prepared for the City of St. Paul  
Division of Parks and Recreation  
by Great River Greening  
January 2005

With assistance from the Ramsey  
Conservation District



## **Crosby Farm Regional Park Ecological Inventory and Restoration Management Plan**

**Compiled by  
Fred Harris  
Great River Greening**

**With assistance from  
Tom Petersen, Dave Bauer, Matt Swanson  
Ramsey Conservation District**

**January 2005**

**Great River Greening (GRG)** is a nonprofit organization that restores valuable and endangered natural areas in the greater Twin Cities by engaging individuals and communities in stewardship of the Mississippi, Minnesota and St. Croix river valleys and their watersheds. Greening involves local citizens in hands-on volunteer and training programs on a larger scale than any other Twin Cities organization— 14,000 since inception in 1995. (See Appendix D for more information).

**Ramsey Conservation District (RCD)** is a special purpose local government agency responsible for promoting the conservation of Ramsey County's natural resources. The district, through its publicly elected board of supervisors and staff, assists private citizens, businesses, and other governmental agencies implement natural resource conservation practices.

**Fred Harris, Ph.D.** is the Lead Ecologist for Great River Greening. He conducts ecological inventories and writes restoration plans. Previously, he worked for many years with the Minnesota Department of Natural Resources as a plant ecologist with the Minnesota County Biological Survey and as an ecologist for the Minnesota Chapter of The Nature Conservancy.

**Tom Petersen**, Ramsey Conservation District Manager, is responsible for the administration and management of all district programs. He has 25 years of experience in urban land use conservation programs and has specialized in soil erosion control and landscape restoration technologies and wetland ecology.

**Dave Bauer**, District Conservation Technology Specialist and Mn Licensed Professional Soil Scientist, is responsible for District GIS technologies and services, applied soil science programs, and soil erosion and sediment control programs. He has nine years of experience in this area.

**Matt Swanson**, District Groundwater Specialist and Mn Licensed Professional Geologist, is responsible for developing and implementing the District's groundwater quality protection programs and geologic and hydro-geologic science programs. He has 15 years of experience, including consulting and government work.

## Executive Summary

Crosby Farm Regional Park is the largest natural park within the City of St. Paul. It is also a significant natural area within the State of Minnesota Mississippi River Critical Area Corridor and the Mississippi National River and Recreation Area (MNRRRA). The park consists of a large area of floodplain and valley side slopes, the “bluffs,” along the Mississippi River near its confluence with the Minnesota River. The park’s forests, wetlands and lakes are important refuges for a broad diversity of native wildlife species. As a natural oasis of oak woods, marshes, lakes, floodplain forests and Mississippi River shoreline in a major metropolitan area, the park attracts tens of thousands of local residents throughout the year.

A detailed vegetation inventory, analysis of management problems, and assessment of bluff trails was conducted in 2004. The bluff trails analysis completed in June focuses on recommendations for ameliorating erosion problems and improving trail design. It was published separately in a companion report entitled *Crosby Park Bluff Trail Project: Design Strategies for an Ecologically Sustainable Bluff Trail* (Shaw et al. 2004) also compiled by Great River Greening.

This report on Crosby Farm Regional Park focuses on the following main objectives: A.) preliminary documentation and assessment of bluff erosion problems; B.) detailed inventory and mapping of terrestrial and wetland native plant communities in the park; C.) identification and analysis of problem areas needing management and restoration work; and D.) identification of strategies for managing and reconstructing native plant communities in the park.

Appendices to this inventory and management plan provide technical information to supplement the recommendations, including a checklist of plants seen in the park in 2004, detailed plant species lists of target native plant communities, and information about controlling exotic species.

Preliminary examinations of the bluffs along the north side of Crosby Park reveal numerous examples of erosion from excess storm water runoff and off-trail traffic, ranging from low levels of sandstone weathering to deep canyons incised into the bluff. This erosion is compromising the integrity of the native vegetation of the bluffs, washing out portions of the park’s trail system, and depositing silt and sand into the park’s lakes.

Crosby Park has a broad range of terrestrial and wetland native plant communities containing over 300 plant species. Vegetation survey highlights include areas of intact sedge meadow, black ash seepage swamps, areas of diverse spring ephemeral wildflowers, a colony of Kentucky coffee trees, and large tracts of intact floodplain forest.

This project was not intended to inventory the wildlife species, aquatic environments or recreation/environmental education values of the park – subjects that should be addressed in future inventory and management plans.

## Acknowledgements

This project was made possible with major funding from the Capitol Region Watershed District, the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative Commission on Minnesota Resources, and the U.S. National Park Service via the Mississippi National River and Recreation Area. Additional financial or in-kind contributions to the project were provided by the Ramsey Conservation District, the City of St. Paul Division of Parks and Recreation, the Carolyn Foundation, and Great River Greening.

This project would not have existed without the leadership of Patricia Freeman, Environmental Resource Specialist for St. Paul Parks and Recreation, who initiated the project, brought a diverse group of resource professionals together for input, and organized funding to make it a reality. Dan Tix assisted air photo interpretations, vegetation surveys, and plant identification. Alan Olson and Richard Peterson, Minnesota DNR Foresters, provided extensive advice on strategies for forest restoration. Michael Varien, Melissa Peterson, Katie Anderson, and Adam DeKeyrel mapped the park's buckthorn concentrations. Dan Shaw, Wiley Buck, Cade Hammerschmidt, Patricia Freeman, Mark Doneaux, Cy Kosel, Nancy Duncan, John Grzybek, and Kelly Osborn reviewed and commented on drafts of the report.

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# Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



# Crosby Park: Bluff Trail Project

Produced for the City of St. Paul, Minnesota  
by  
Great River Greening



Authors:  
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Ryan Holdorf

June 2004

## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



Right and below: Aerial photos  
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Urban Landscape.)



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# Introduction

## Purpose

This plan provides recommendations for improving the Bluff Trail at Crosby Park in St. Paul, Minnesota. The plan includes a study of current trail conditions and provides a detailed trail plan and constructions details. The plan will help the City of St. Paul manage the site in a way that meets the various needs of local residents and visitors while also being cost-effective and ecologically sustainable. The plan will also act as a model for similar projects in the Twin Cities area. This trail plan is a companion document to a natural resources inventory and ecological restoration plan that is also being developed by Great River Greening and will be completed in the fall of 2004.

Funding for this project came from the Legislative Commission on Minnesota Resources and project partners included the City of Saint Paul, Great River Greening, and the Ramsey Soil and Water Conservation District.

## Crosby Park

Crosby Park is the largest natural park in St. Paul, Minnesota. The park is located on the east side of the Mississippi River as it flows along the western edge of St. Paul. It is very popular regionally, due to its access to the Mississippi River, diversity of plant communities, rock outcroppings, abundant wildlife and extensive trail network. The park is owned by the City of St. Paul, but it is also part of the National Park Service's Mississippi National River and Recreation Area and is an important corridor for migratory birds.

## The Trail Network

Trails play an important role within Crosby Park. They provide access to natural features such as the river, bluffs, and wetlands and provide many opportunities for the exploration of nature. The trails are heavily used by a combination of walkers, runners, and bicyclists. The trails in Crosby Park connect with other trails that follow a network of parks that parallel the Mississippi as it flows through the Twin Cities.



# Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Introduction

### The Bluff Trail

This plan focuses on the re-construction and restoration of the bluff trail, one of the most unique trails in the park. The bluff trail follows the contours of the bluffs that parallel the Mississippi River. A large section of the trail is situated half way up the bluff in a mesic oak forest, where it meanders in and out of moist ravines. This trail is unique in that it provides hikers with opportunities to observe a variety of natural habitats and the plants and animals that they support. In addition to ravines, hikers also experience dry ridges with mature oak trees, and as the trail drops in elevation it traverses floodplain forest, lowland hardwood forest, and black ash seepage swamps.

Although the bluff trail existed as an undeveloped trail for many years, it was formally designed by Les Blacklock in the early 1970s. The original building materials are still at the site and consist of recycled telephone poles, rail road ties and wooden fence posts. The trail was well constructed, but over the last 30 years it has received a significant amount of use and has degraded due to soil erosion and the decomposition of building materials.

Erosion has resulted from routine use but also from storm sewer outlets at the top of the bluff, the tires of mountain bikes, and runoff from slopes that are bare due to trampling by animals and people and the presence of invasive plant species. As a result of the erosion there is very little organic material on the slopes to help sustain plant growth. Organic matter plays an important role in controlling erosion on the bluffs by slowing the flow of water, absorbing moisture, and providing nutrients for ground-layer woodland plant species. The organic layer also provides a good insulating layer for plants during the winter.

### The Trail Plan

The trail plan focuses on the development of sustainable and ecologically sound construction techniques that will retain the character and natural experience of the site while solving erosion issues and structural problems. The plan also investigates areas for interpretation or wildlife viewing. The plan is organized with an analysis of current conditions at the beginning, followed by the plan with proposed trail improvements. The plan references construction details for specific areas along the trail and these details are included at the end of the document. The severity of problems along the trail are defined in the plan to aid in the determination of where construction work should begin.

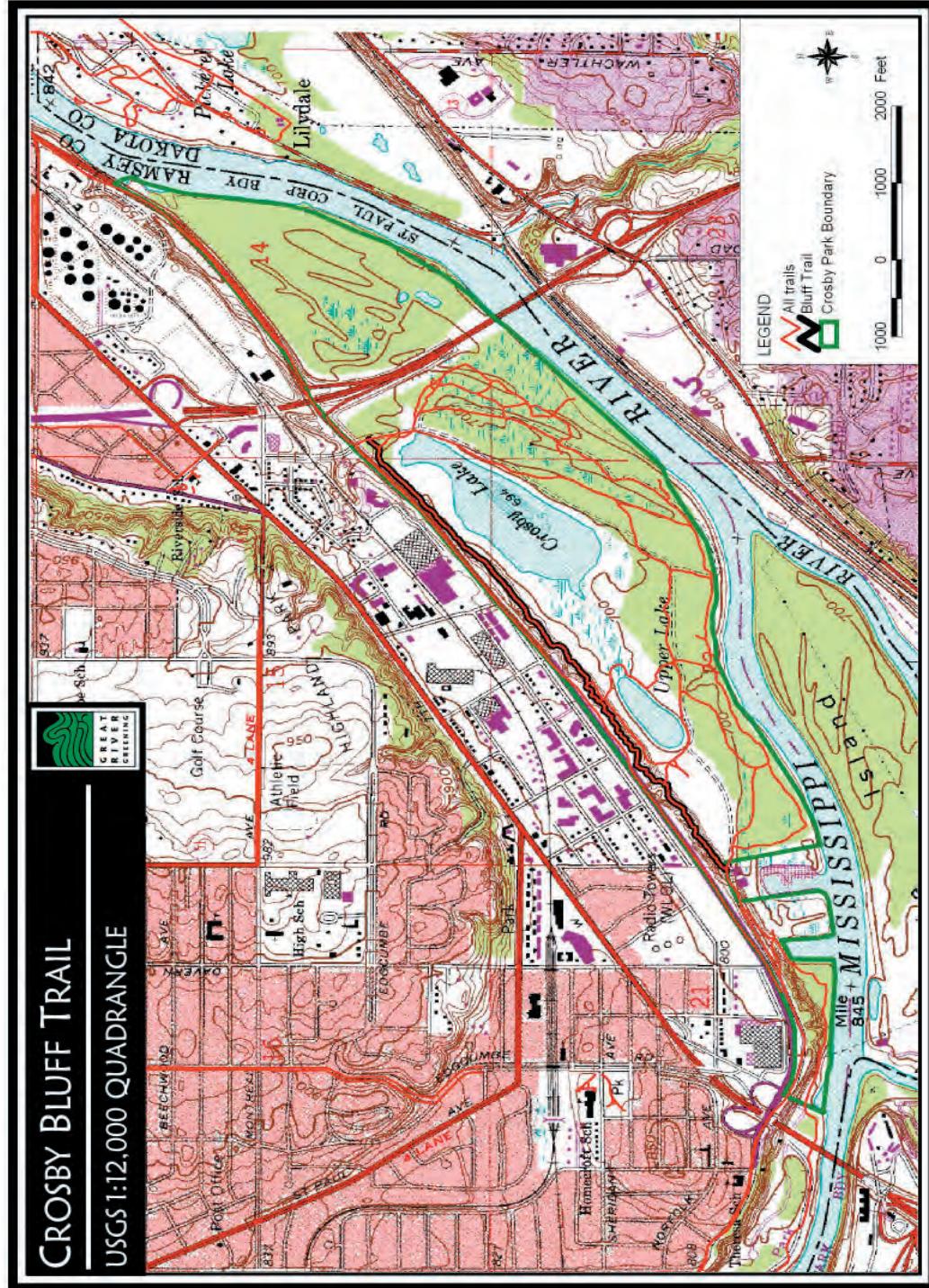
### Trail Use

The soils on the bluff are highly erodable and as a result, trail use other than hiking should be discouraged. Mountain biking should be restricted to trails that are less prone to erosion and people and animals should be persuaded to stay on the trail. The trail plan recommends the removal of some unnecessary trails in the park to prevent further erosion problems.

### Trail Monitoring

Periodic monitoring of the Bluff Trail will help prevent small problems from becoming more serious. Neighborhood residents can play an important role in monitoring for problems as part of the City of St. Paul's Eco Stewards program. Through this program, volunteers adopt project sites and conduct activities such as monitoring and invasive species control.

## Resource Analysis of Intrinsic Qualities



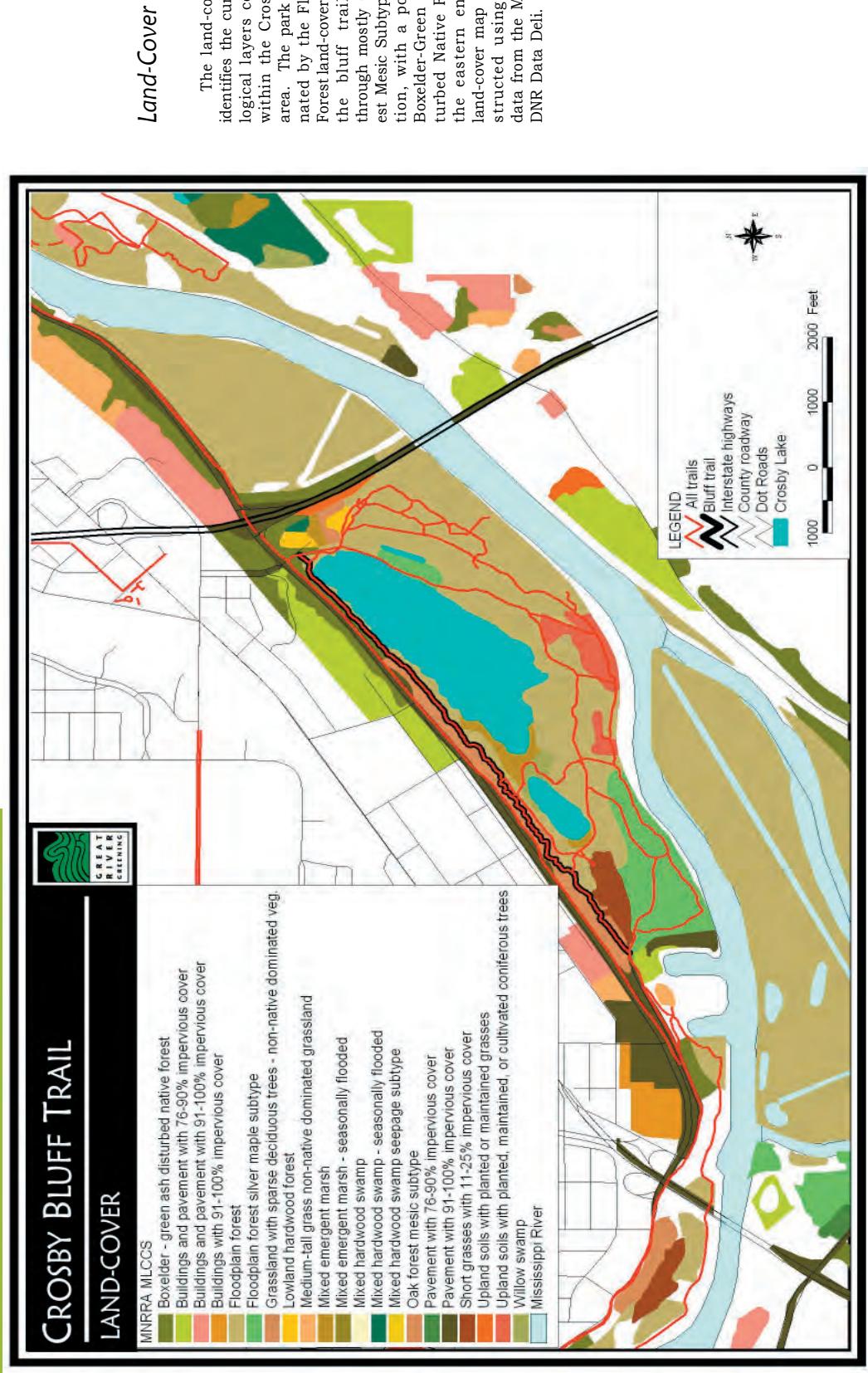
**USGS Quadrangle**

The USGS map shows constructed elements around Crosby Park such as local roads, county roads, highways, building footprints, political boundaries and parking lots. The park is framed by Shephard Road on the northwest, and by the Mississippi River on the other sides. The area directly north of Shephard Road features a number of light industrial and commercial structures with large parking lots, and is characterized by a large amount of impervious surface. Further north are the residential blocks of the Highland Park neighborhood, as well as the Highland Park Golf Course.

## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

# Resource Analysis of Intrinsic Qualities



# Resource Analysis of Intrinsic Qualities

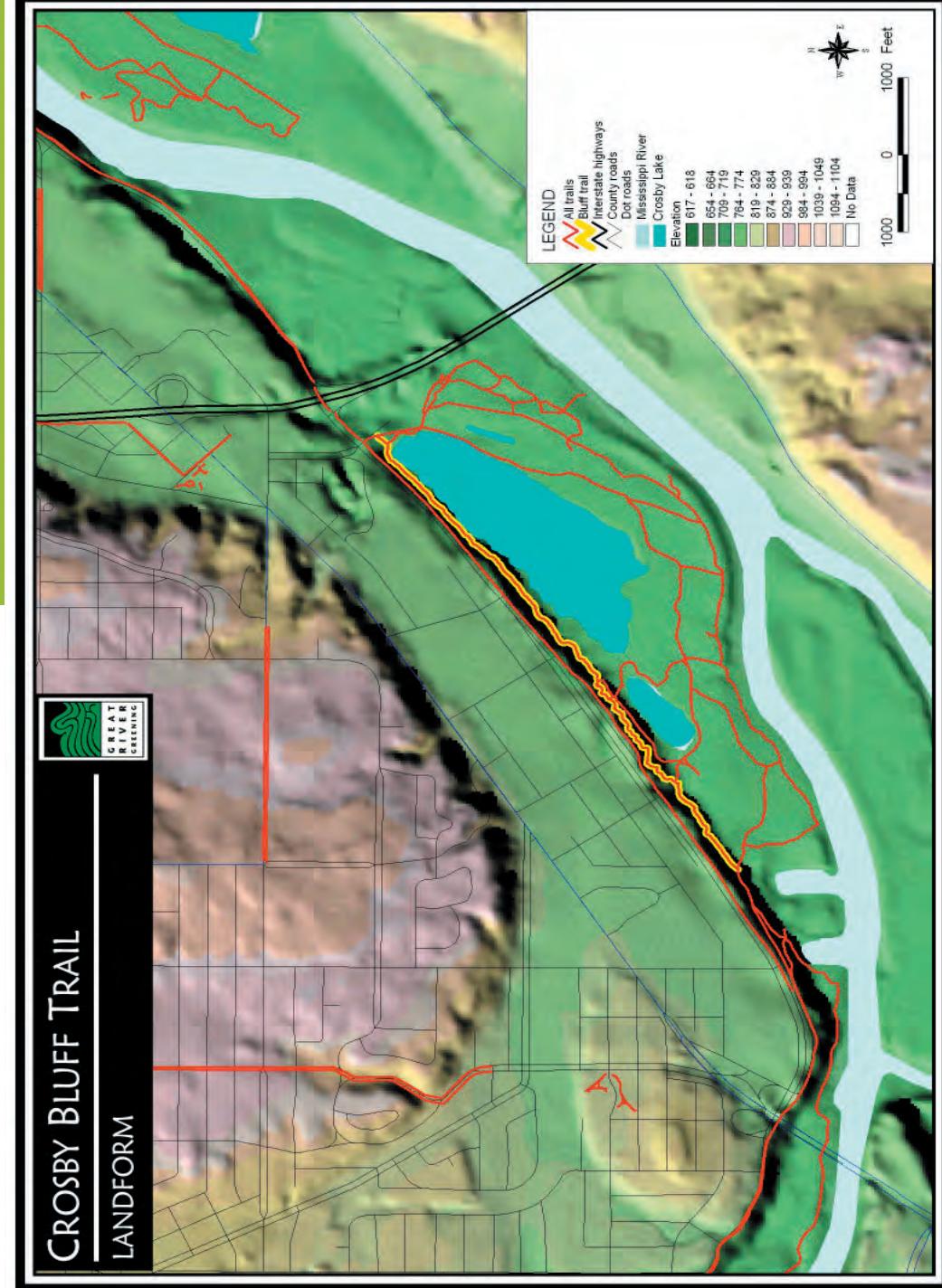
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



### CROSBY BLUFF TRAIL

#### LANDFORM



#### Landform

The landform map illustrates the physical form of the Crosby Park area in order to 1) identify how water moves through the site, 2) using a 3-dimensional model, locate where steep slopes exist and where shallow slopes exist, 3) identify which direction the slopes face (aspect) and their corresponding access to solar radiation, and 4) give a sense of how physical form can play a role in how one might experience or interpret the bluff trail. The bluff trail is located on or at the base of a steep southeast-facing slope.

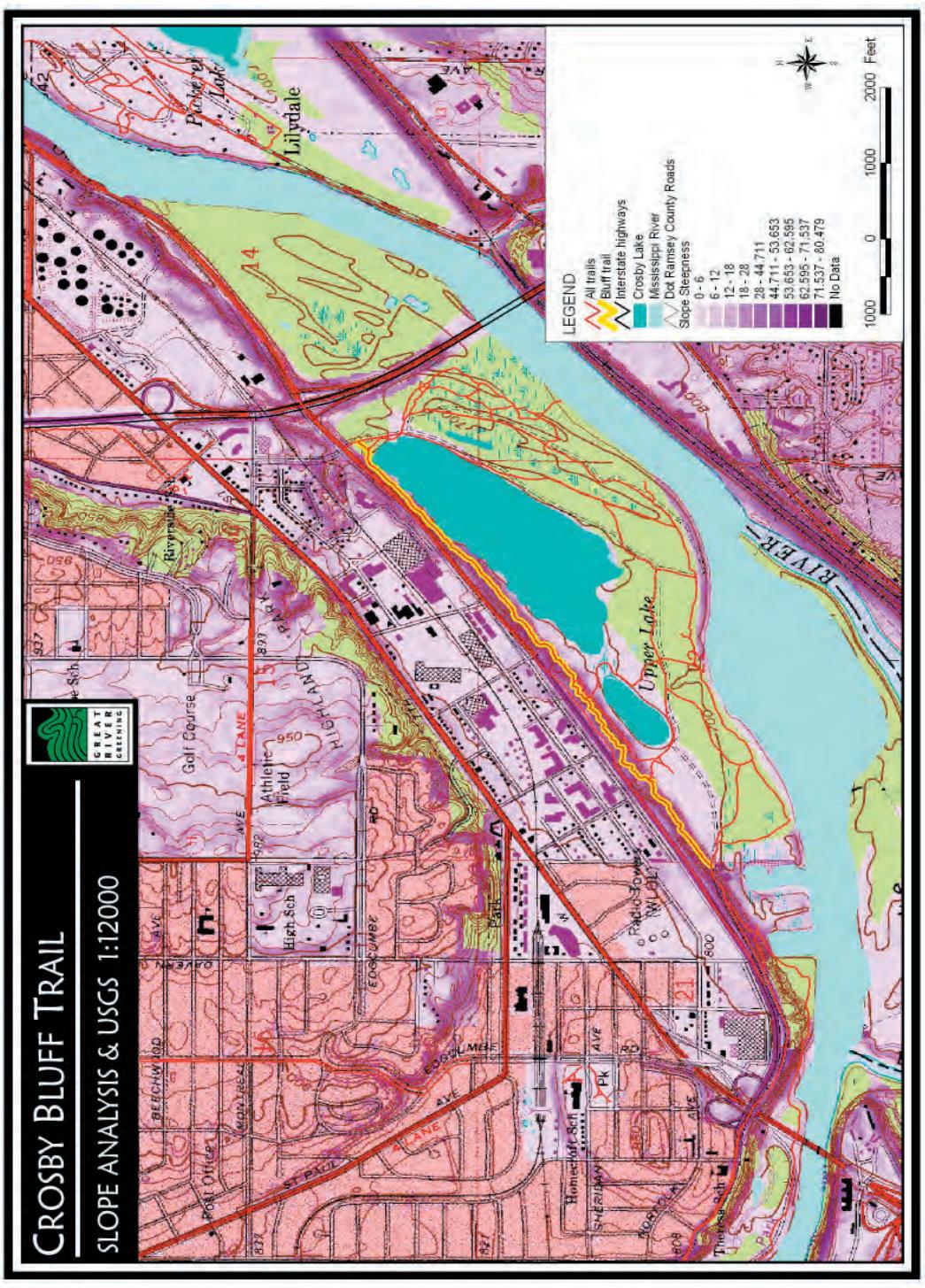
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

## Resource Analysis of Intrinsic Qualities

### Slope

The Slope Analysis overlay on the USGS 1:12000 map identifies the steepness of slopes in and around the site. A measurement of slope steepness is useful in understanding the process of erosion, and the relationship between slope, soil stability, stormwater movement, and vegetation. Vegetation often has difficulty taking hold in steep areas, yet at the same time is essential for the stabilization of soils on the slope. The slope analysis helps to pinpoint areas where the risk of erosion is high and to guide the placement of erosion control elements along the trail. The entire bluff trail runs along areas of steep slopes.



# Resource Analysis of Intrinsic Qualities

## Crosby Park: Bluff Trail Project

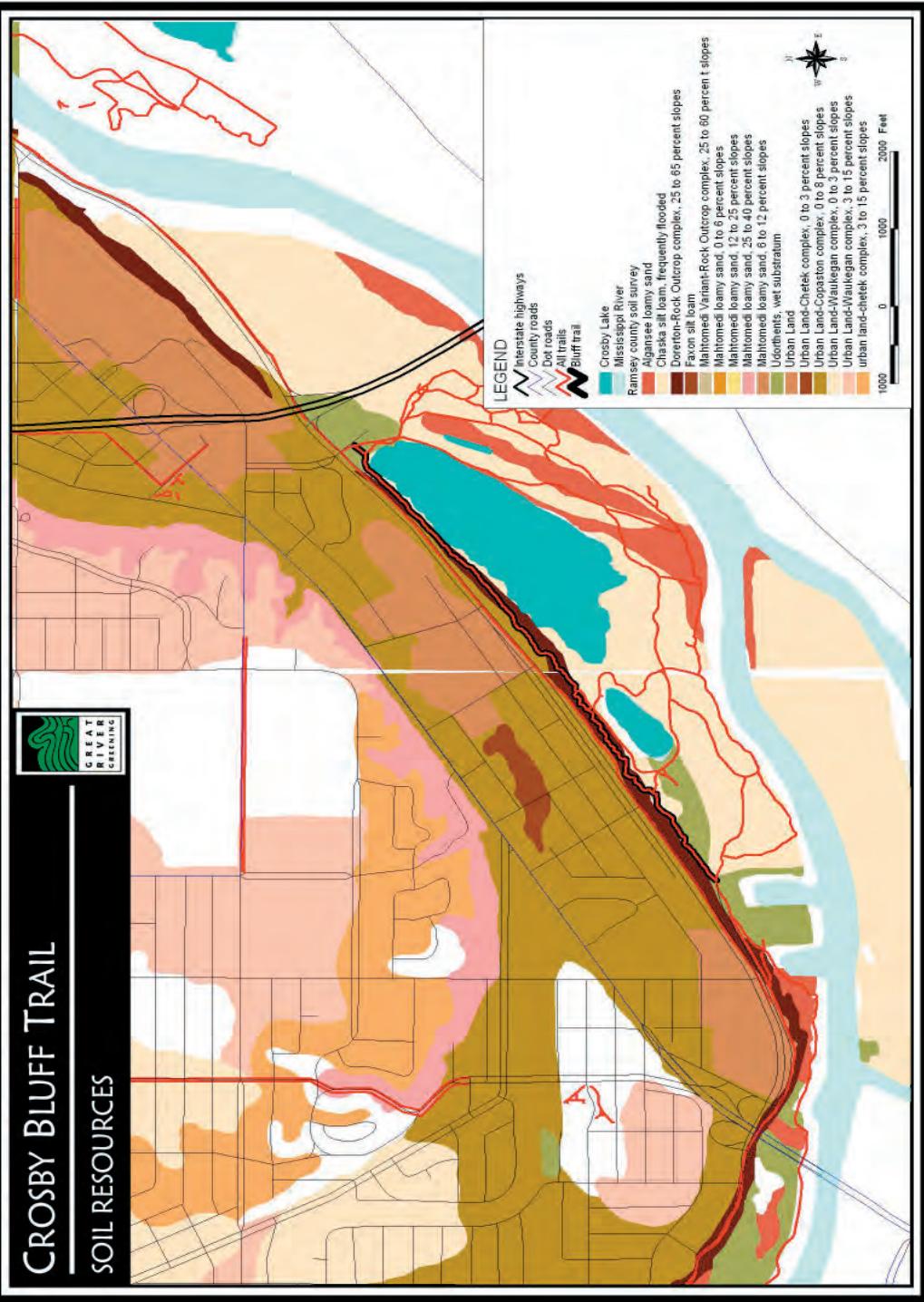
Design Strategies for an Ecologically Sustainable Bluff Trail



### CROSBY BLUFF TRAIL SOIL RESOURCES

#### Soils

The Soil Resources map was constructed using the Ramsey County Soil Survey. The key contains those soils found within or around Crosby Park. It is also important to note that a slope percentage is often indicated after each individual soil ID, which is useful when determining the "workability" of a particular soil group. Most of Crosby Park is dominated by Chaska Silt Loam (frequently flooded) and Alganssee Loamy Sand. The bluff trail moves through areas of Doretton-Rock Outcrop Complex, with 25% to 65% slopes.



## Crosby Park: Bluff Trail Project

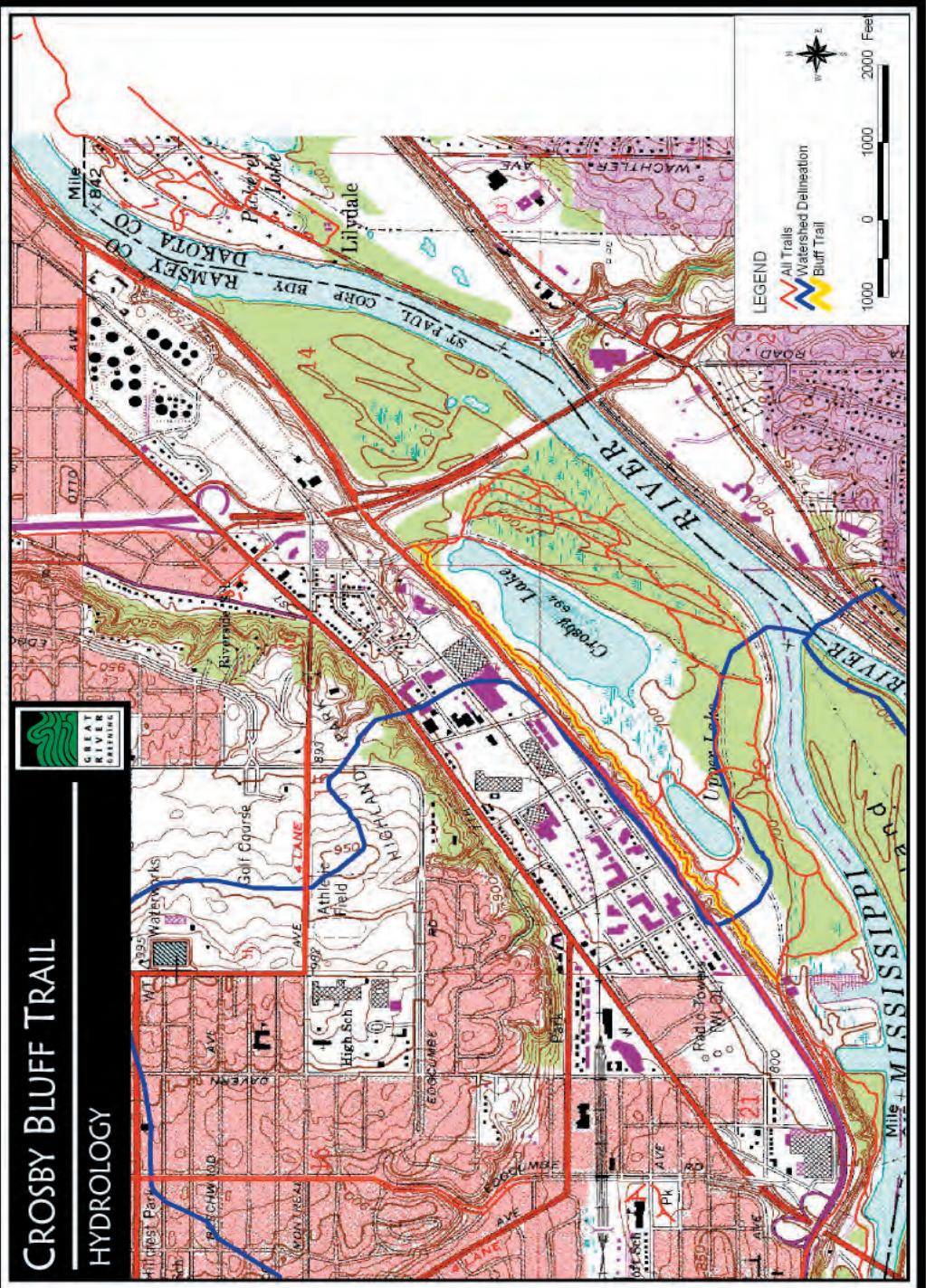
Design Strategies for an Ecologically Sustainable Bluff Trail

# Resource Analysis of Intrinsic Qualities

## HYDROLOGY

## CROSBY BLUFF TRAIL

The Hydrology map identifies watershed boundaries in relation to trail location and the extent of Crosby Park. A watershed boundary divides the bluff trail into two portions. Stormwater in the area around the larger portion (to the east) drains into Crosby Lake. Stormwater in the area around the smaller, western portion collects in the black ash seepage swamp at the foot of the slope.

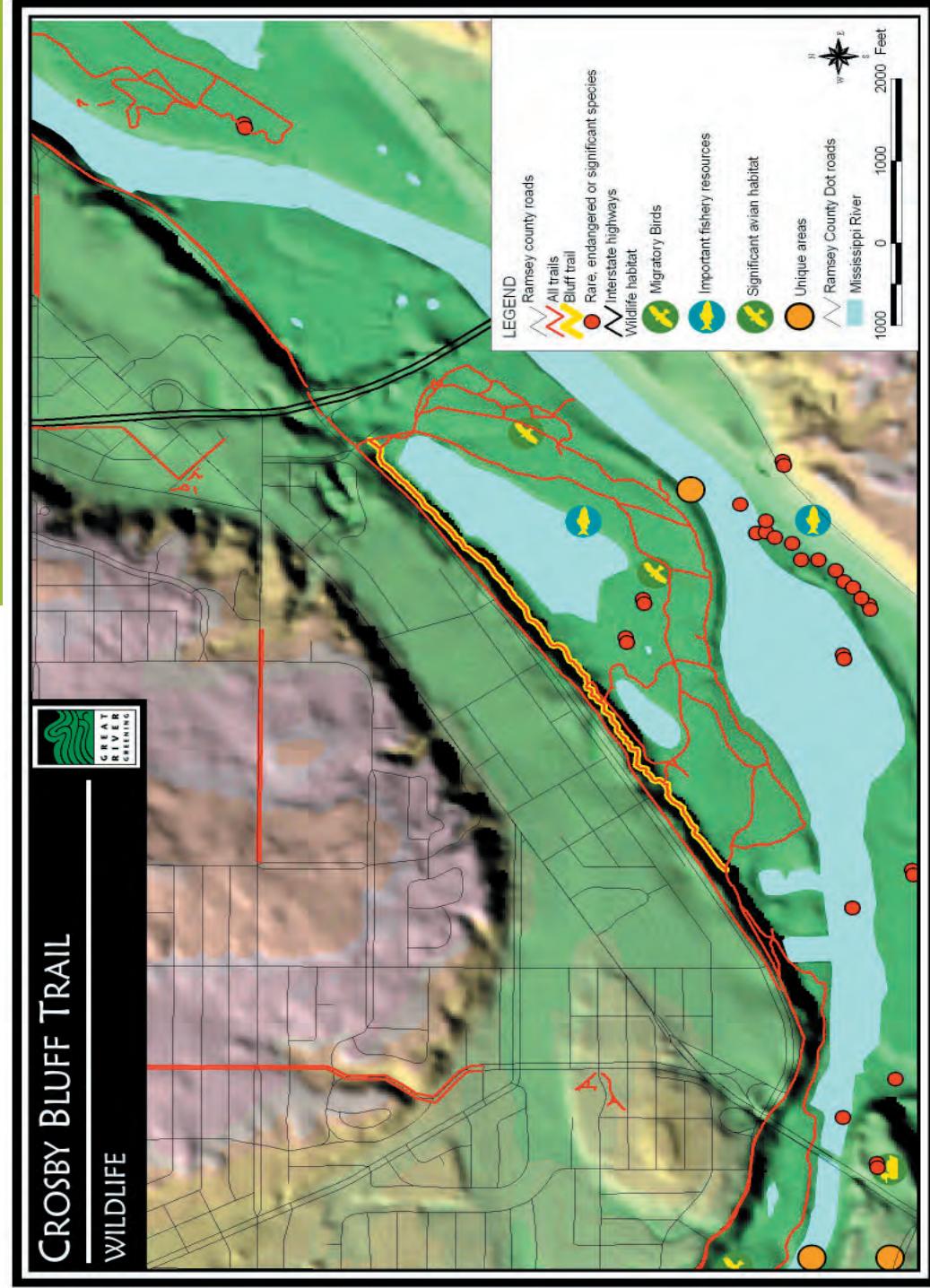


## Resource Analysis of Intrinsic Qualities



### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



### Wildlife

The Wildlife map indicates areas within or near Crosby Park that are ecologically significant to wildlife. Ecological significance is defined in terms of breeding habitat, use as food source, or the location of rare, endangered or ecologically significant species to the Mississippi River Valley Region. Crosby Park contains valuable aquatic and avian habitat, as well as a number of rare, endangered, or significant species.

## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



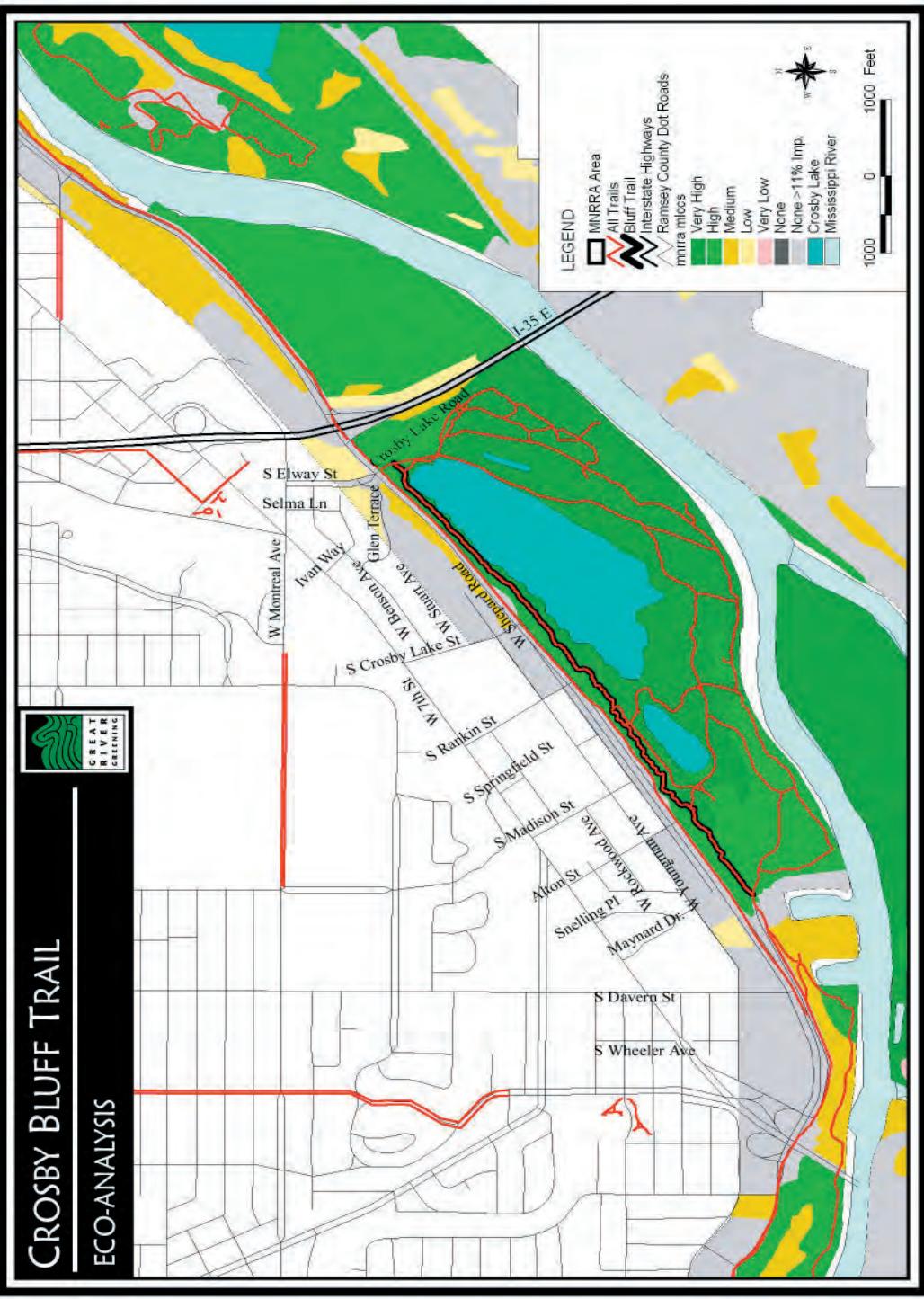
## Resource Analysis of Intrinsic Qualities

### CROSBY BLUFF TRAIL

#### ECO-ANALYSIS

#### Eco-Analysis

The Eco-Analysis map identifies which areas in and around Crosby Park that contain the greatest ecological value to guide an informed design and set of recommendations. Areas were rated by using the ecological protocol for open space protection opportunities in the Mississippi National River and Recreation Area (MNRRRA). The protocol evaluates MLCCS (Minnesota Land Cover Classification System) polygons and classifies each polygon by numerical ranking. Numerical values are then grouped together to give a simplified ranking, ranging from very high to very low. Nearly all of Crosby Park ranks as high or very high in ecological value.

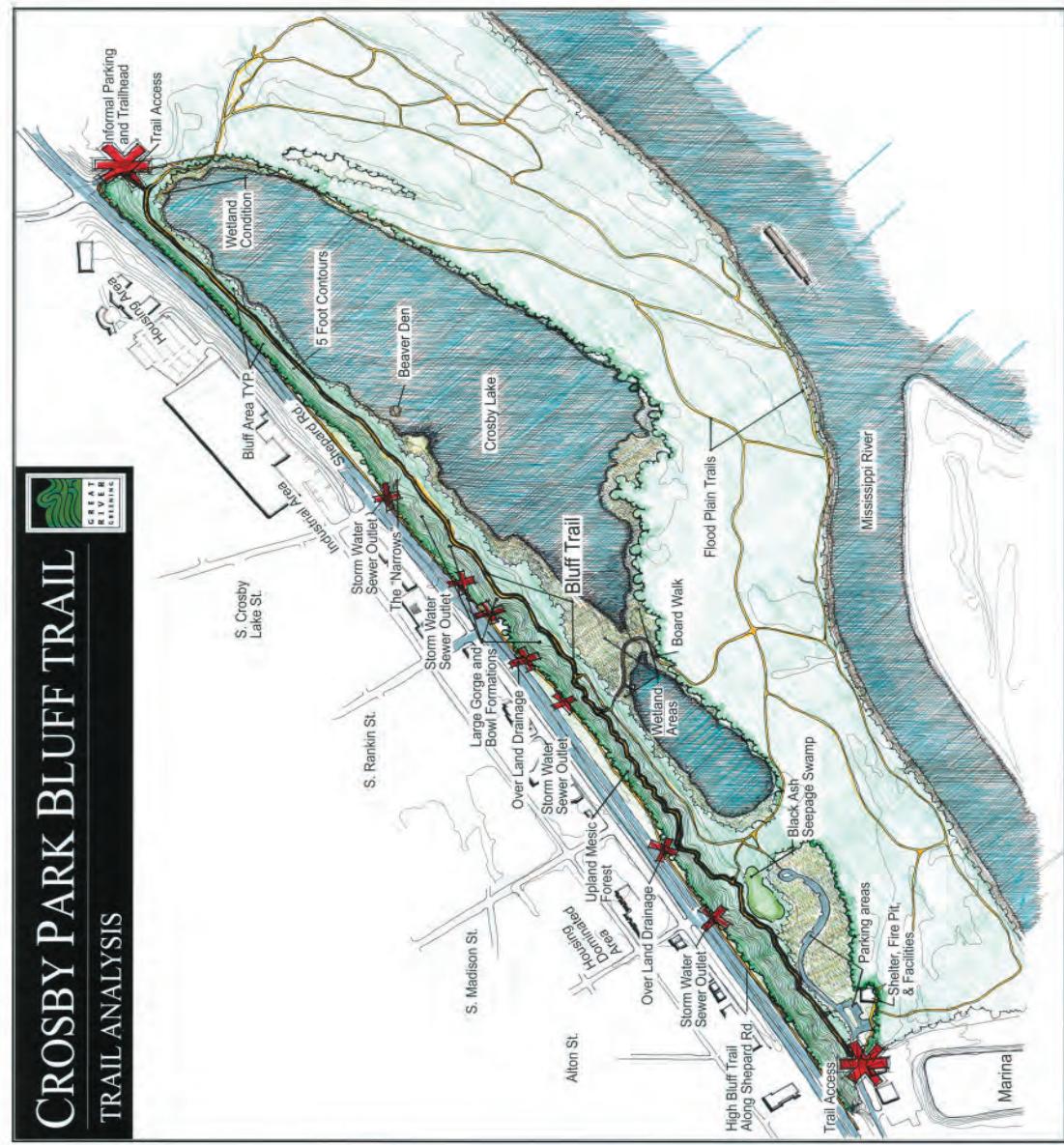


## Site Analysis



### Crosby Park: Bluff Trail Project

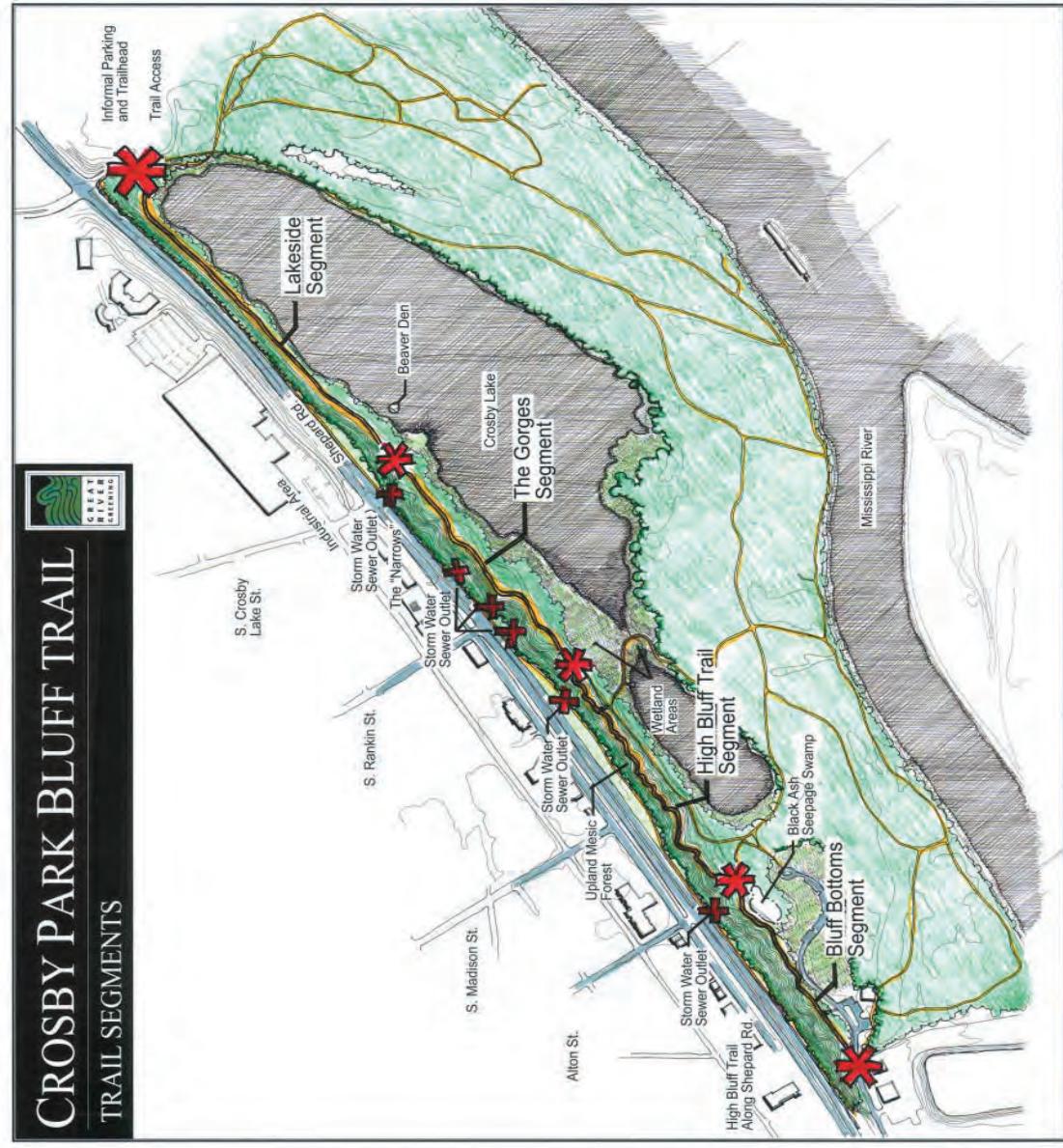
Design Strategies for an Ecologically Sustainable Bluff Trail



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

## Bluff Trail Plan



# Trail Segment Plans

## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Bluff Trail Segments:

The Bluff Trail can be divided into four distinct segments, each with its own special character.

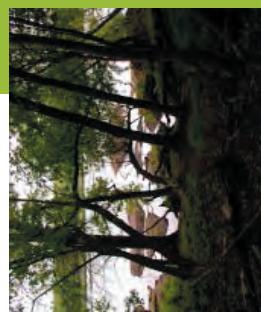
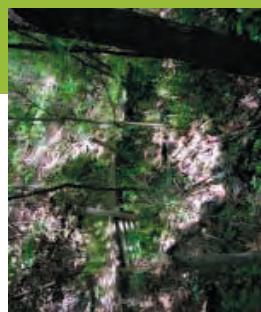
Moving from west to east, the first segment is the Bluff Bottoms segment. It is characterized by the location of the trail at the base of the bluffs, first near the west parking lot and then along the edge of a black ash seepage swamp.

The second segment is the High Bluff Trail segment. It is characterized by the elevated location of the trail and the experience of being up in the trees and upon the steep bluff slopes.

The third segment is the Gorges segment. Here the trail moves down to the base of the bluffs once more, which features a number of broad, bowl-shaped ravines and narrow, eroded gorges.

The fourth and final segment is the Lakeside segment. Here the trail moves near the edge of Crosby Lake, with framed views to the water.

On the following pages, each trail segment is dealt with individually, identifying specific problem areas along the trail. For each portion of the trail, the current condition of the trail and supporting structures is given, followed by design recommendations to improve the condition. The number(s) listed with each recommendation refer to specific design details, arranged by number, in the final portion of the document. Restoration of native vegetation is needed along the entire trail, so there are no specific points indicated for this recommendation. For planting details and considerations, see Design Details #7, #8, and #9.



Bluff Bottoms

High Bluff

The Gorges

Lakeside

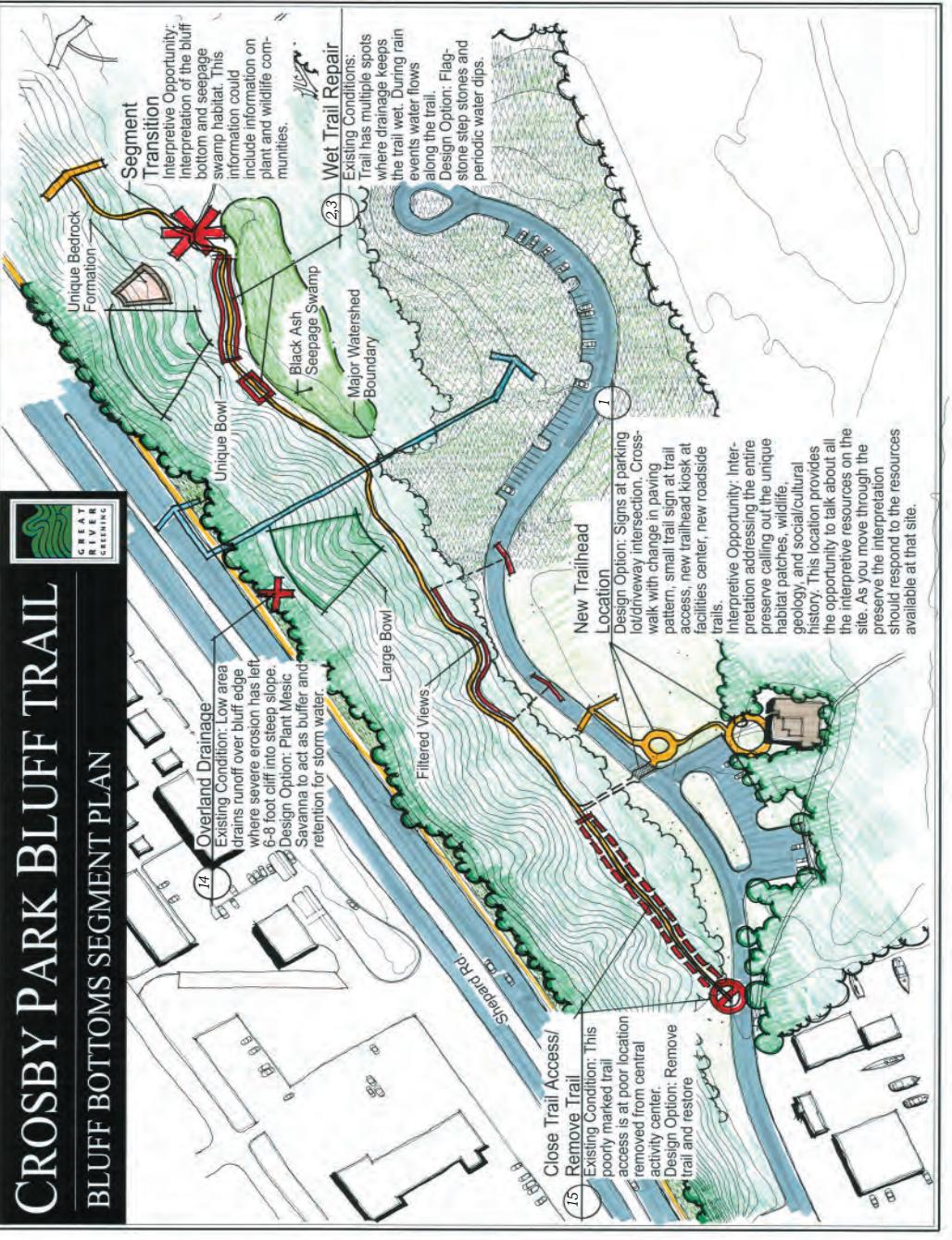
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Trail Segment Plans

### CROSBY PARK BLUFF TRAIL BLUFF BOTTOMS SEGMENT PLAN



# Trail Segment Plans

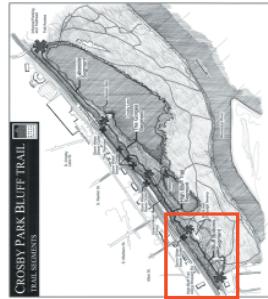


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Trail Segment 1: Bluff Bottoms

The Bluff Bottoms Trail Segment begins at the park's west parking lot and ends where the trail climbs the bluff slope. It begins with a strong sense of enclosure, pressed between the park access road and the bluff. Soon the space between the trail and road expands, and the rest of this trail segment runs between the bluff and a black ash seepage swamp. In the swamp the understory is open, filled with the slender trunks of black ash trees. This entire segment is characterized by wet soil conditions, with muddy trails after rain. The depressed area between the trail and road becomes inundated after storms, and there is no outlet for this stormwater except for slow infiltration into the ground. In general, the native vegetation is relatively high in quality along this segment of the trail, with patches of wild ginger, jack-in-the-pulpit, bloodroot, and trout lily. Infestations of garlic mustard are less severe here than in the other segments.



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

# CROSBY PARK BLUFF TRAIL

## HIGH BLUFF SEGMENT PLAN



## Trail Segment Plans



## Trail Segment Plans



### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

#### Trail Segment 2: High Bluff

The Upper Bluff Trail Segment begins where the trail climbs the bluff slope, and ends where the trail descends again near the west end of Crosby Lake. The segment is characterized by an intimate relationship with the bluff and a feeling of prospect as the trail runs roughly halfway up the bluff slope. The trail twists and turns with each ridge and draw, hugging the fissured topography. Though Shephard Road is not far away at the top of the slope, the presence of its traffic is not strongly felt. However, the impact of stormwater from its surface is seen in the eroded draws. At many points the trail position is quite precarious, with steep slopes above and below. The understory vegetation is open enough to allow views to the flatland below and well up the bluff slope. Erosion is a serious issue along the entire length of this segment, both on the trail itself and on the adjacent slopes. Of all the segments, this is the one on which mountain biking should be most discouraged. The presence of staircases at either end of the trail segment should help keep bikes on the lower trails that are less prone to erosion. A staircase already exists at the east end of the segment, and we recommend adding one at the west end.



Start of segment, stairs recommended.



Abandoned trail to old overlook.



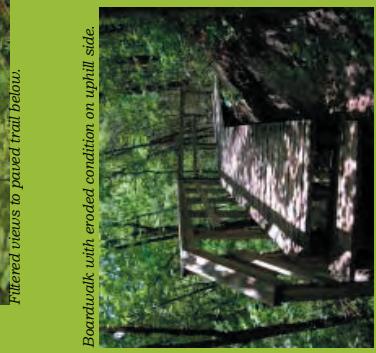
Limestone outcropping at top of bluff.



Limestone outcropping at top of bluff.



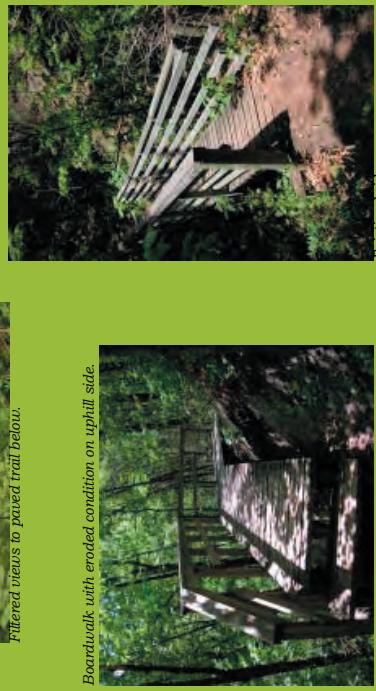
Existing bridge.



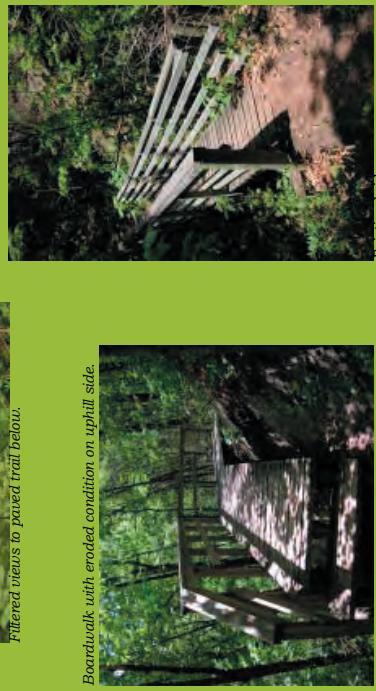
Water on trail gash is recommended.



Boardwalk with eroded condition on uphill side.



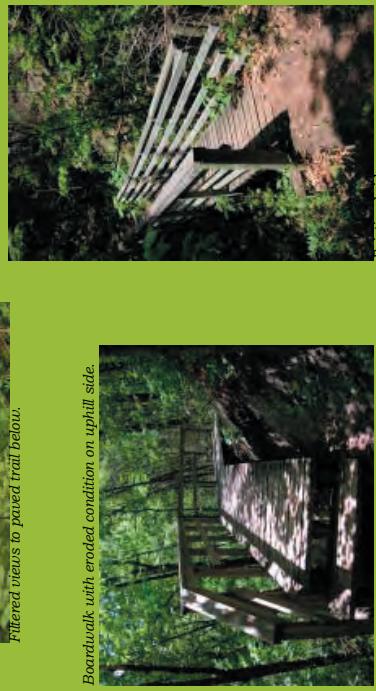
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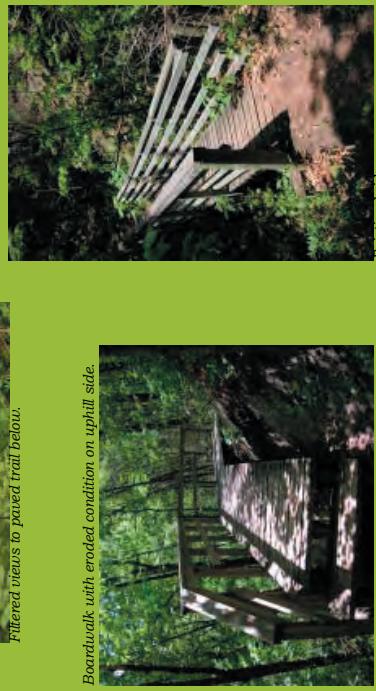
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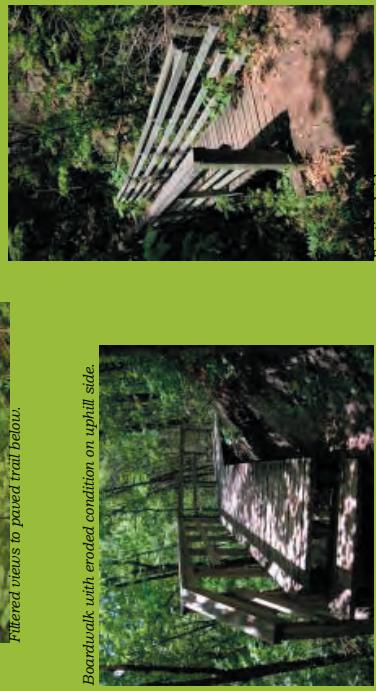
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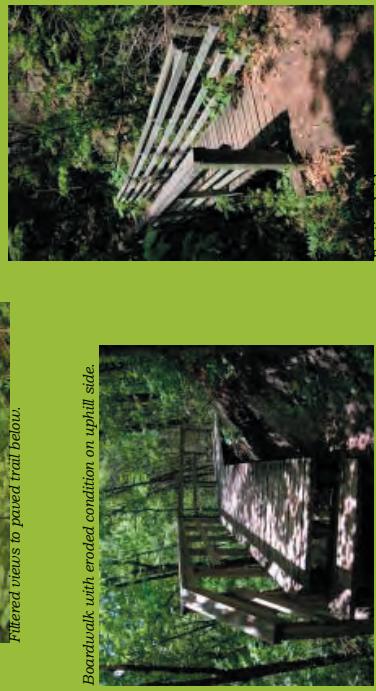
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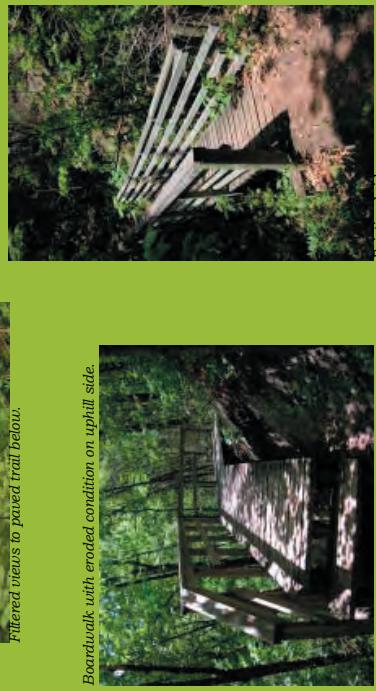
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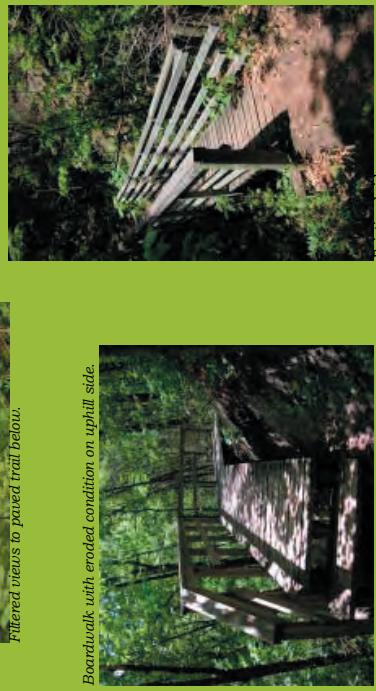
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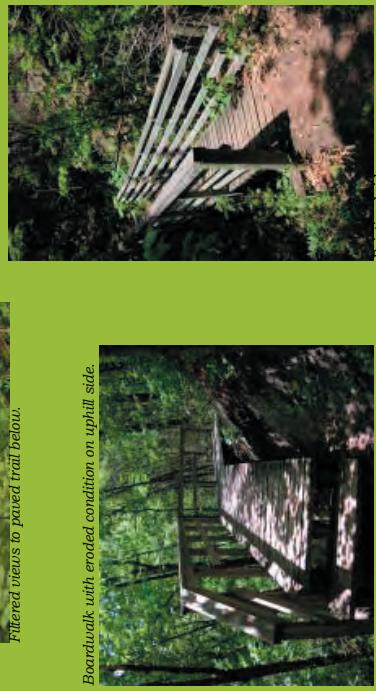
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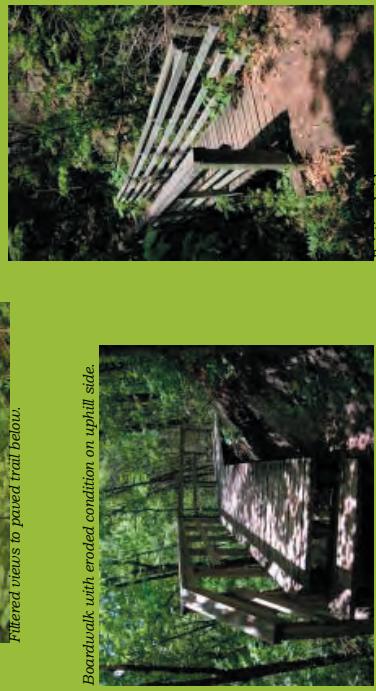
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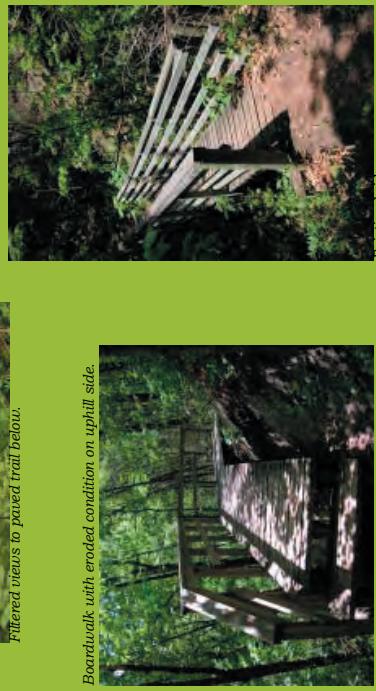
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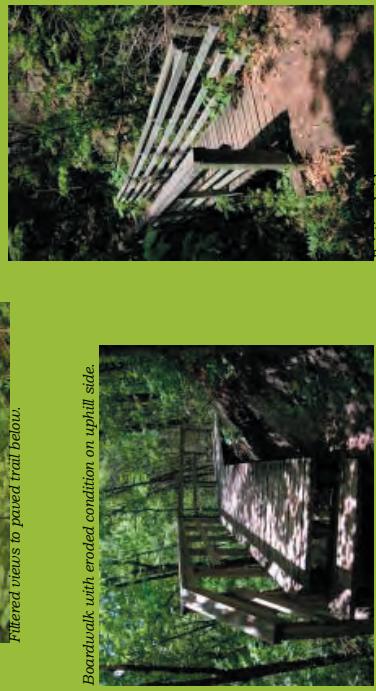
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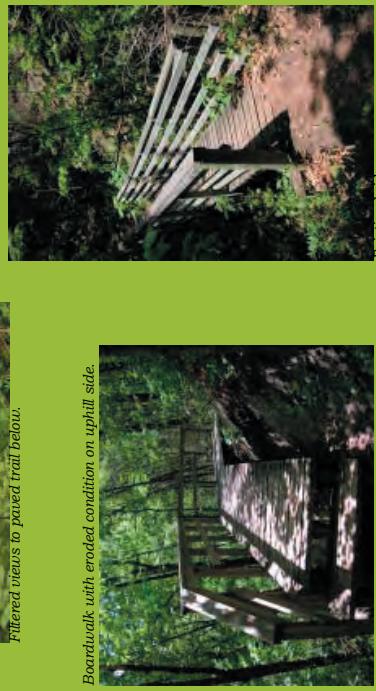
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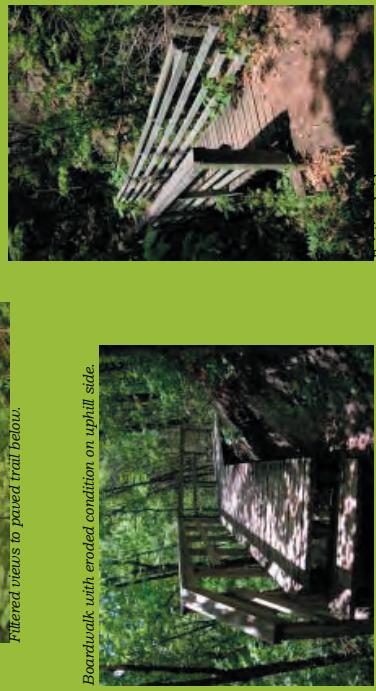
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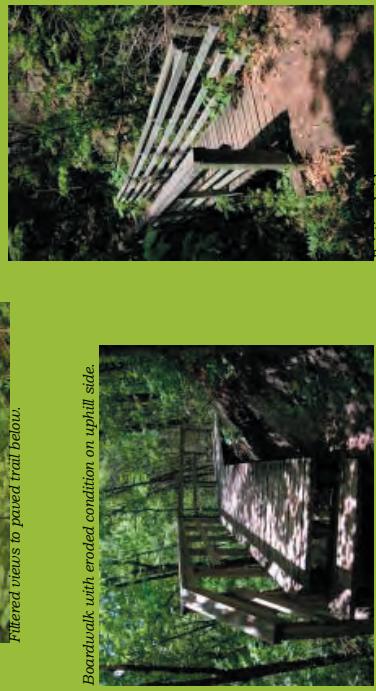
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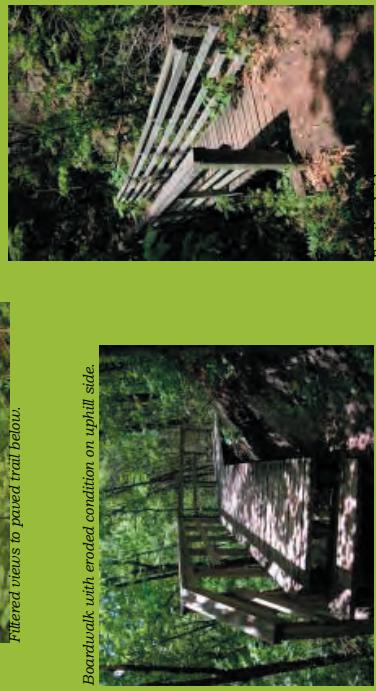
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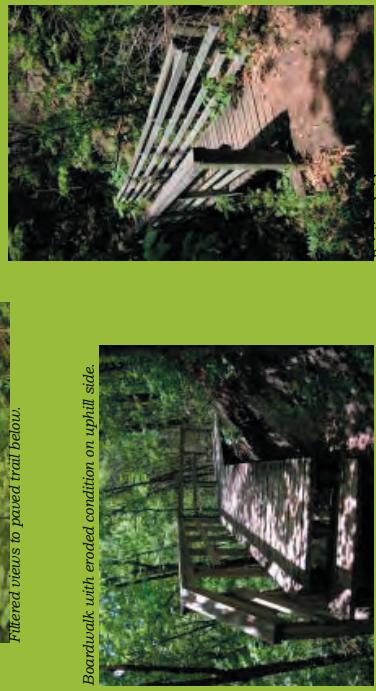
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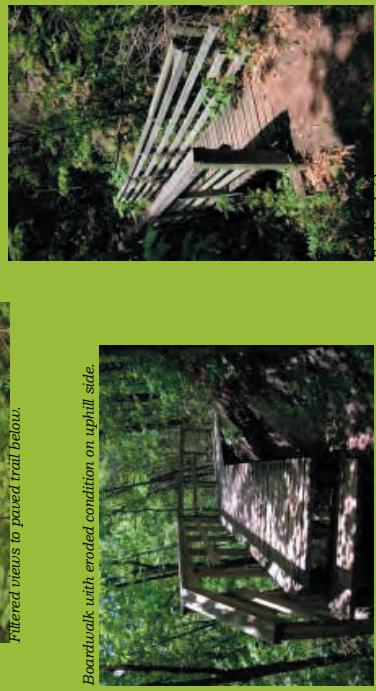
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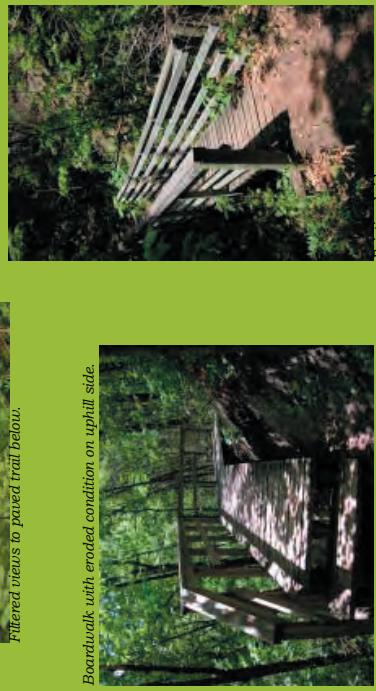
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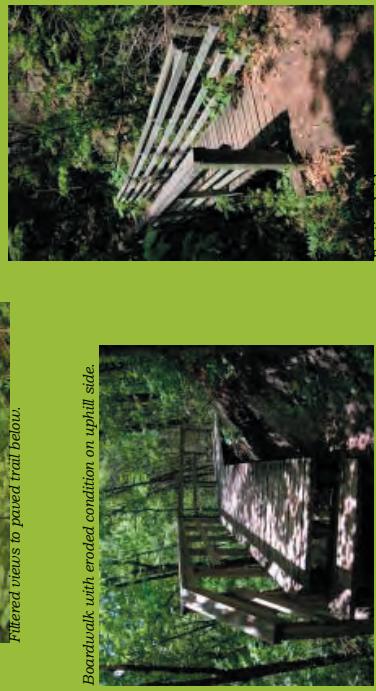
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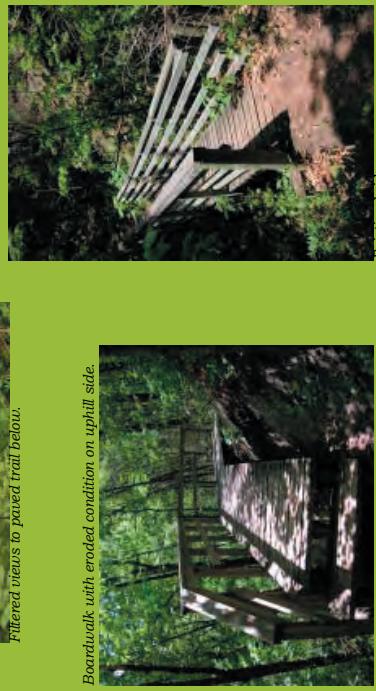
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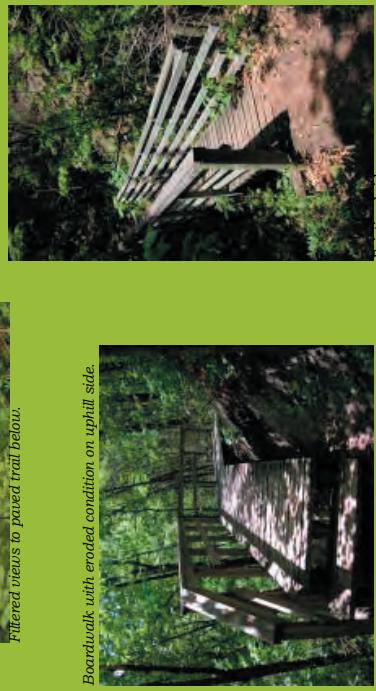
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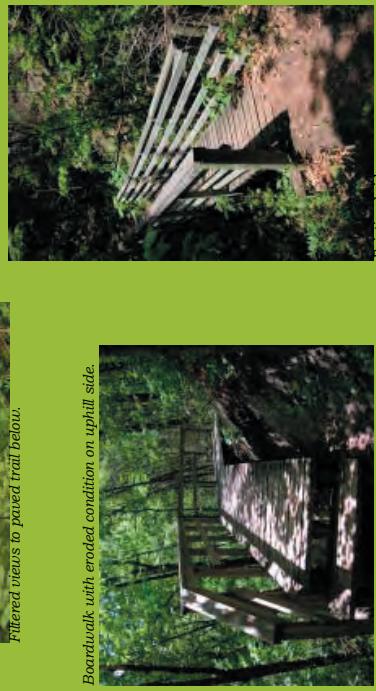
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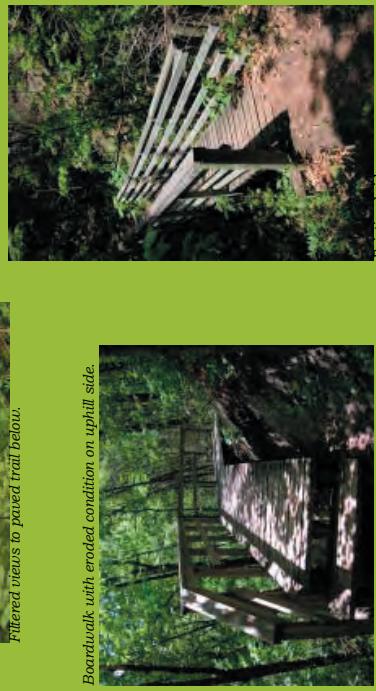
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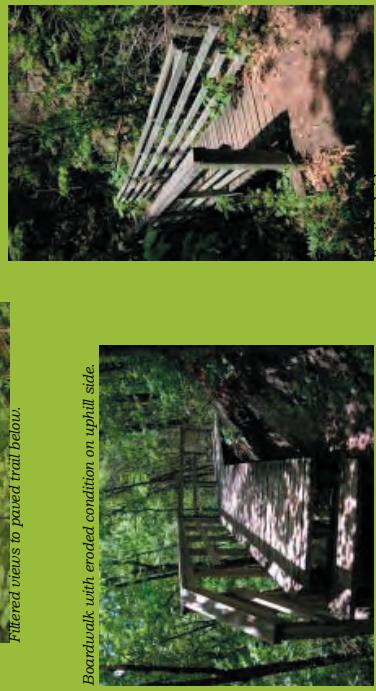
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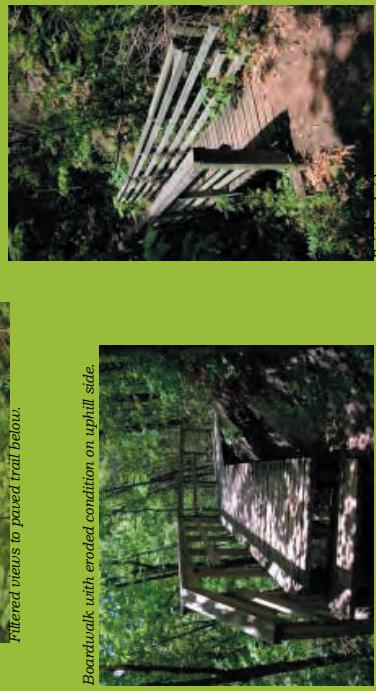
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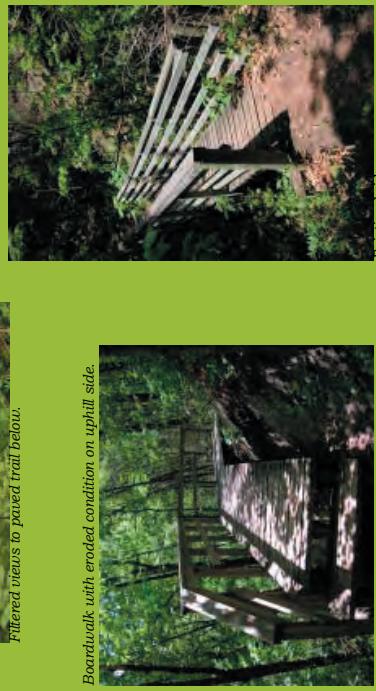
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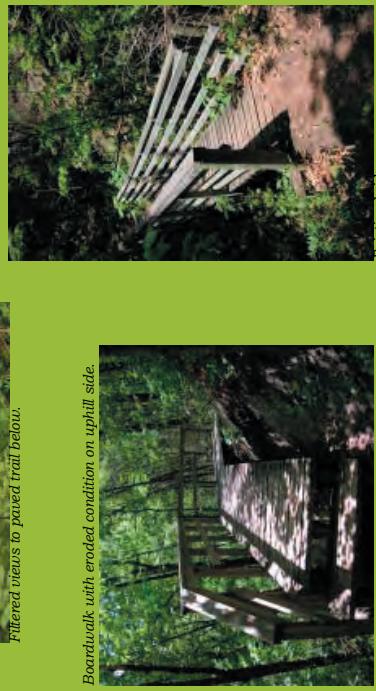
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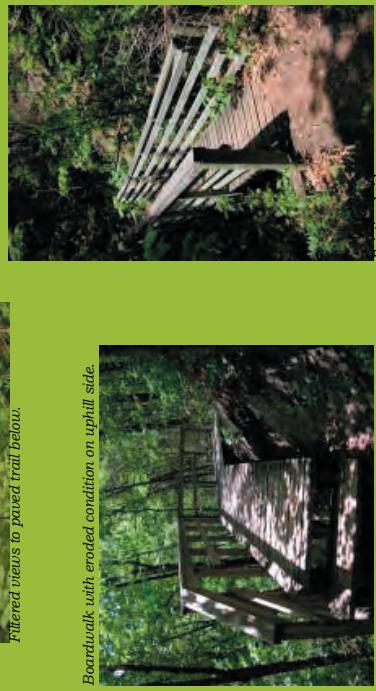
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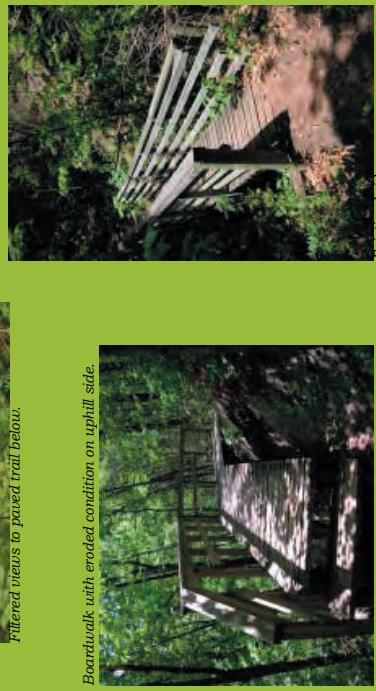
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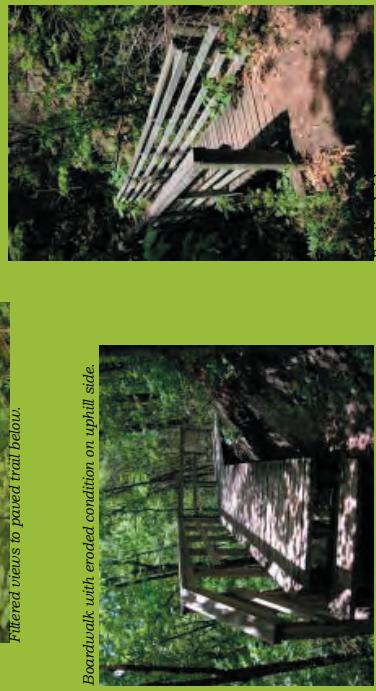
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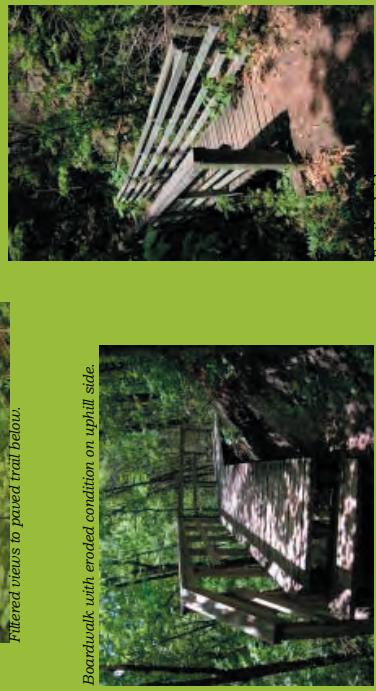
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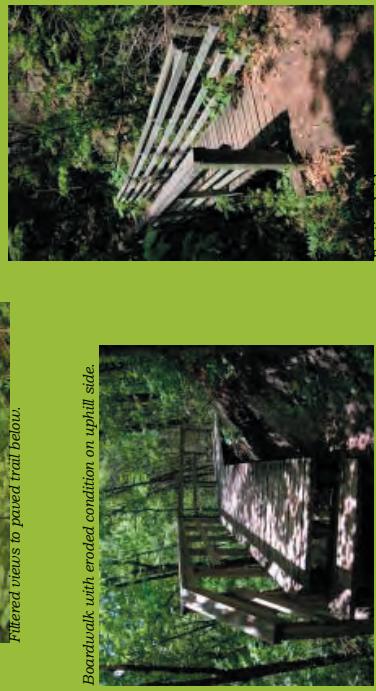
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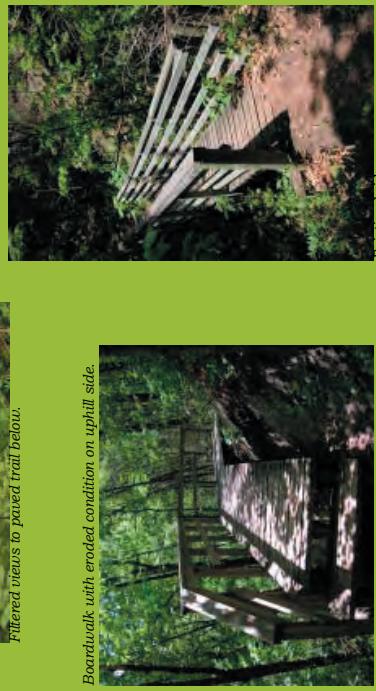
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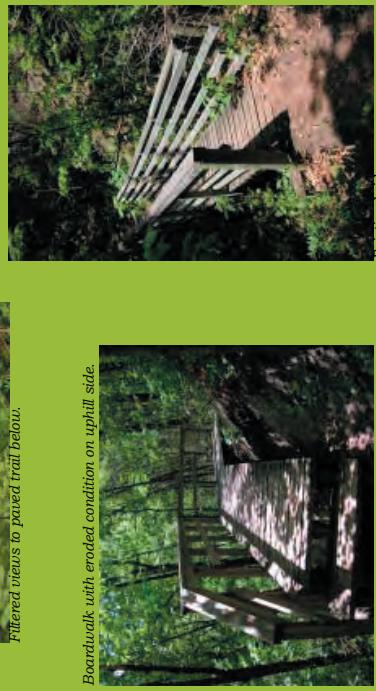
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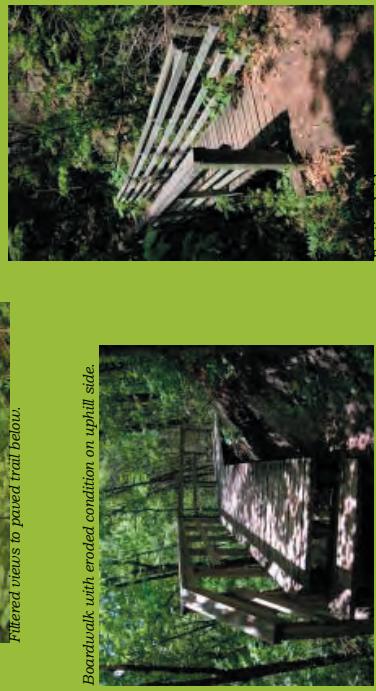
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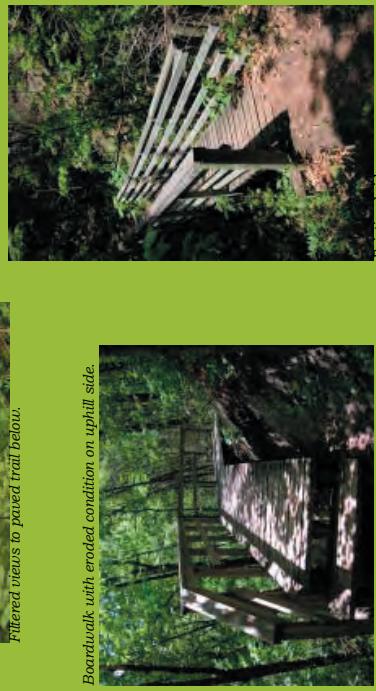
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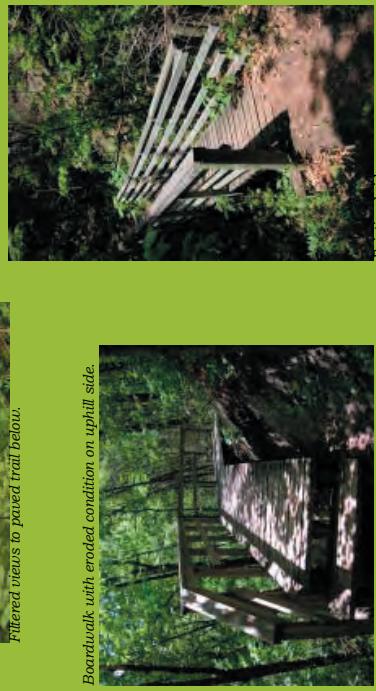
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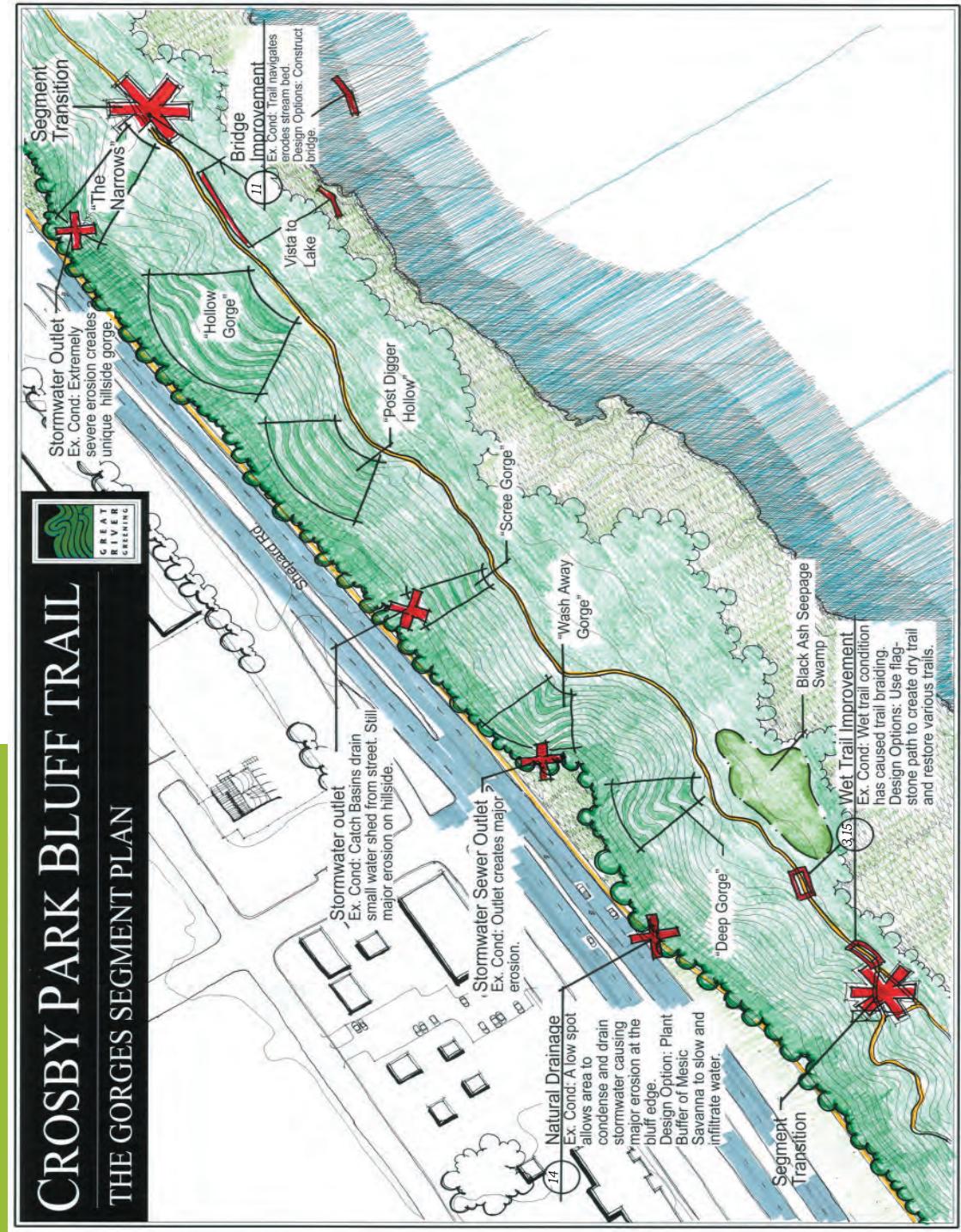


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Trail Segment Plans



## Trail Segment Plans



### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

#### Trail Segment 3: The Gorges

The Gorges Trail Segment begins at the staircase near the west end of Crosby Lake and ends at the dramatic canyon feature referred to in this document as "The Narrows." Here the trail is at the base of the bluff, with a few short climbs over ridges that reach across the trail. The bluff has a strong presence here, experienced as a series of broad, bowl-shaped draws and narrower ravines. The south side of the trail alternates between open black ash seepage swamp and more enclosed lowland forest, with occasional filtered views of the lake. Many of the draws are severely and spectacularly eroded, the result of several stormwater outlets at the top of the bluff. The most dramatic of all the gorges, The Narrows, marks the end of this segment. It is a narrow, twisting canyon carved directly out of the sandstone bedrock and cutting straight back into the bluff. Where runoff from the narrows enters Crosby Lake, there is a large sandy delta.



A particularly severe infestation of garlic mustard.



One of several severely eroded gorges, with sculpted sandstone walls and filled with rubble.



The entrance to the Narrows.



The falls at the top of the Narrows, only a trickle in dry weather.

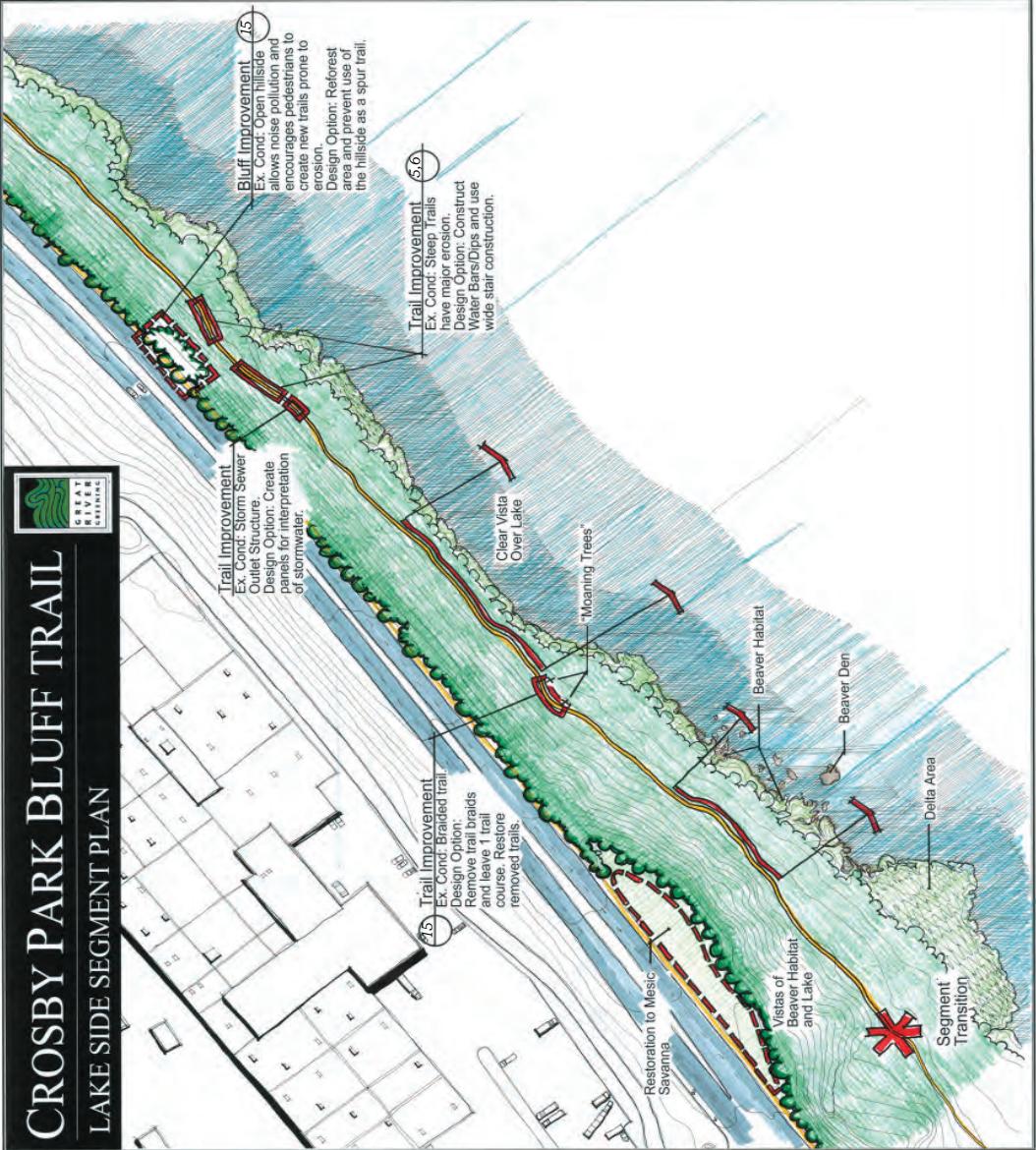
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

# Trail Segment Plans

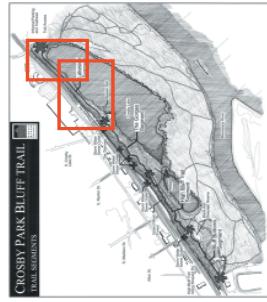


## CROSBY PARK BLUFF TRAIL LAKE SIDE SEGMENT PLAN



### Trail Segment 4: Lakeside

The Lakeside Trail Segment begins at The Narrows and ends at the access road at the east end of Crosby Lake. This is the longest segment of the trail. It runs mostly at the base of the bluff, with a few short climbs up the slope followed shortly by descents. Here the distance between the bluff and the lake is quite narrow, so the trail remains relatively close to the water's edge. If the experience of the previous segment was dominated by the bluff, this segment is dominated by the water. The segment begins with views to a massive beaver lodge, surrounded by evidence of the beavers' handiwork on the vegetation and in the lake itself. There is also evidence of human activity in this area in the form of small concrete foundations and a large cave carved out of a sandstone ridge. As the trail moves eastward, the presence of traffic on Shephard Road becomes more noticeable as the road slowly descends with the diminishing bluff. A significant feature near the end of the segment is a massive stormwater outlet structure. Beyond the outlet structure, the trail becomes more enclosed as it winds through an area where dense stands of buckthorn have not yet been removed.



CROSBY PARK BLUFF TRAIL  
TRAIL ALIGNMENTS

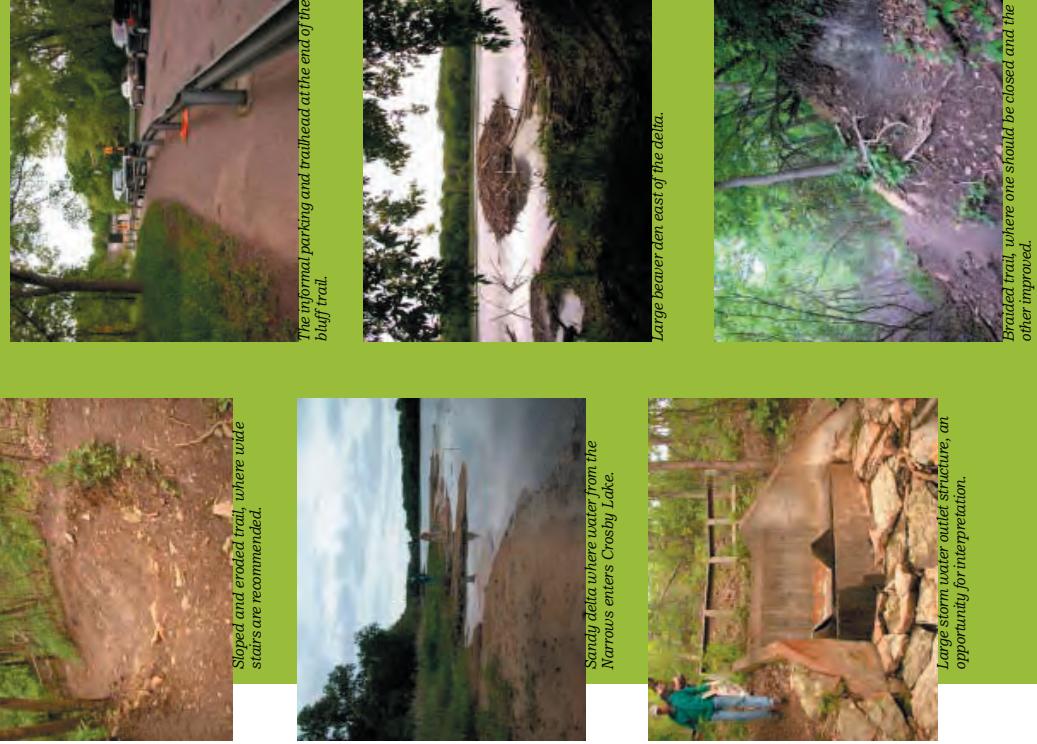
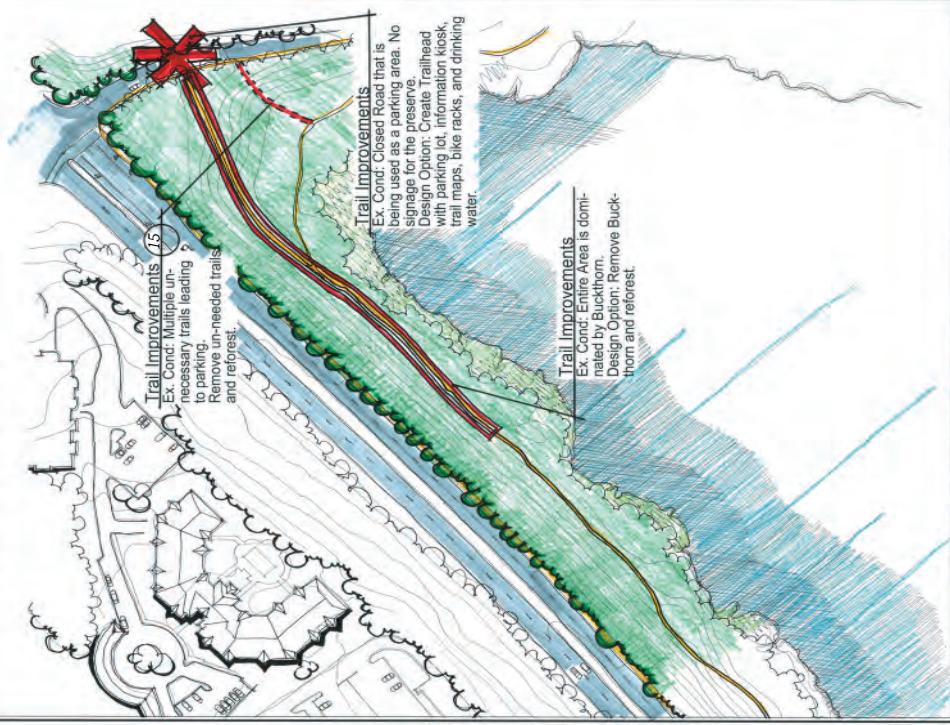
## Trail Segment Plans



### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### CROSBY PARK BLUFF TRAIL LAKE SIDE SEGMENT PLAN



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

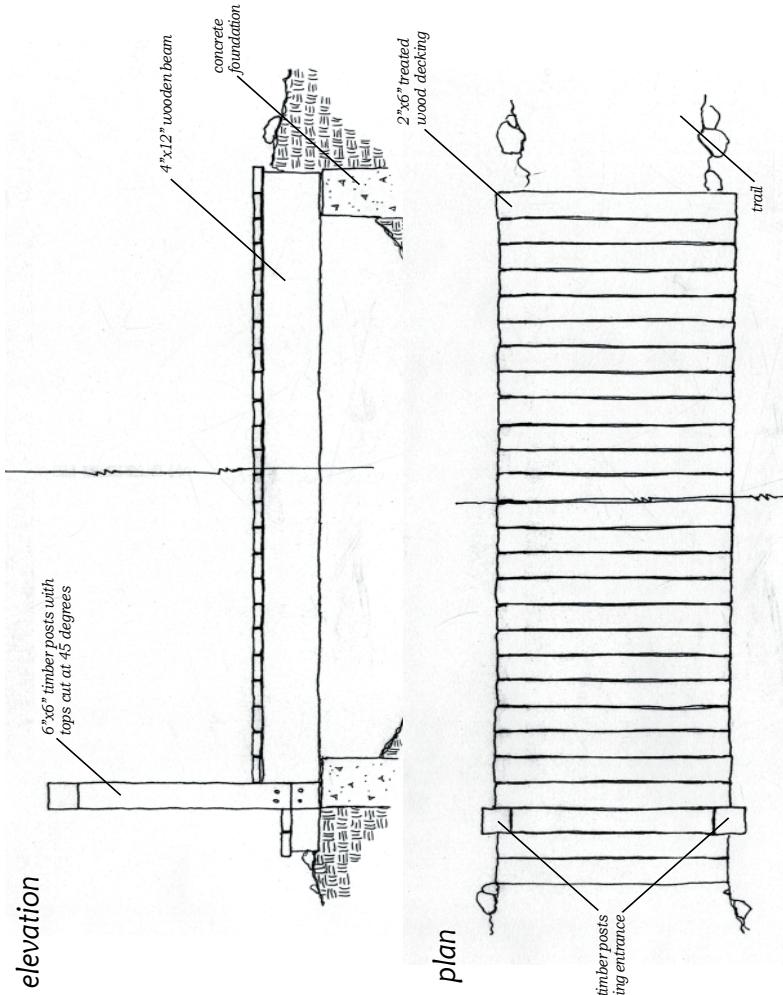


## Design Details

### Bluff Bottom, Wet Condition

There are many areas at the bottom of the bluff where the flow and accumulation of water is a problem. The goal in these areas is to allow both the passage of water and the movement of people, without one impeding the other.

#### Detail #1: Trailhead Bridge



-Bridge is simple boardwalk without railing.

-6x6" posts, with tops cut at a 45 degree angle, mark the transition from the road crossing to the trailhead bridge. Timber posts bring design vocabulary of retaining walls to bridge structures.

-See Detail #11 for beam-foundation connection.

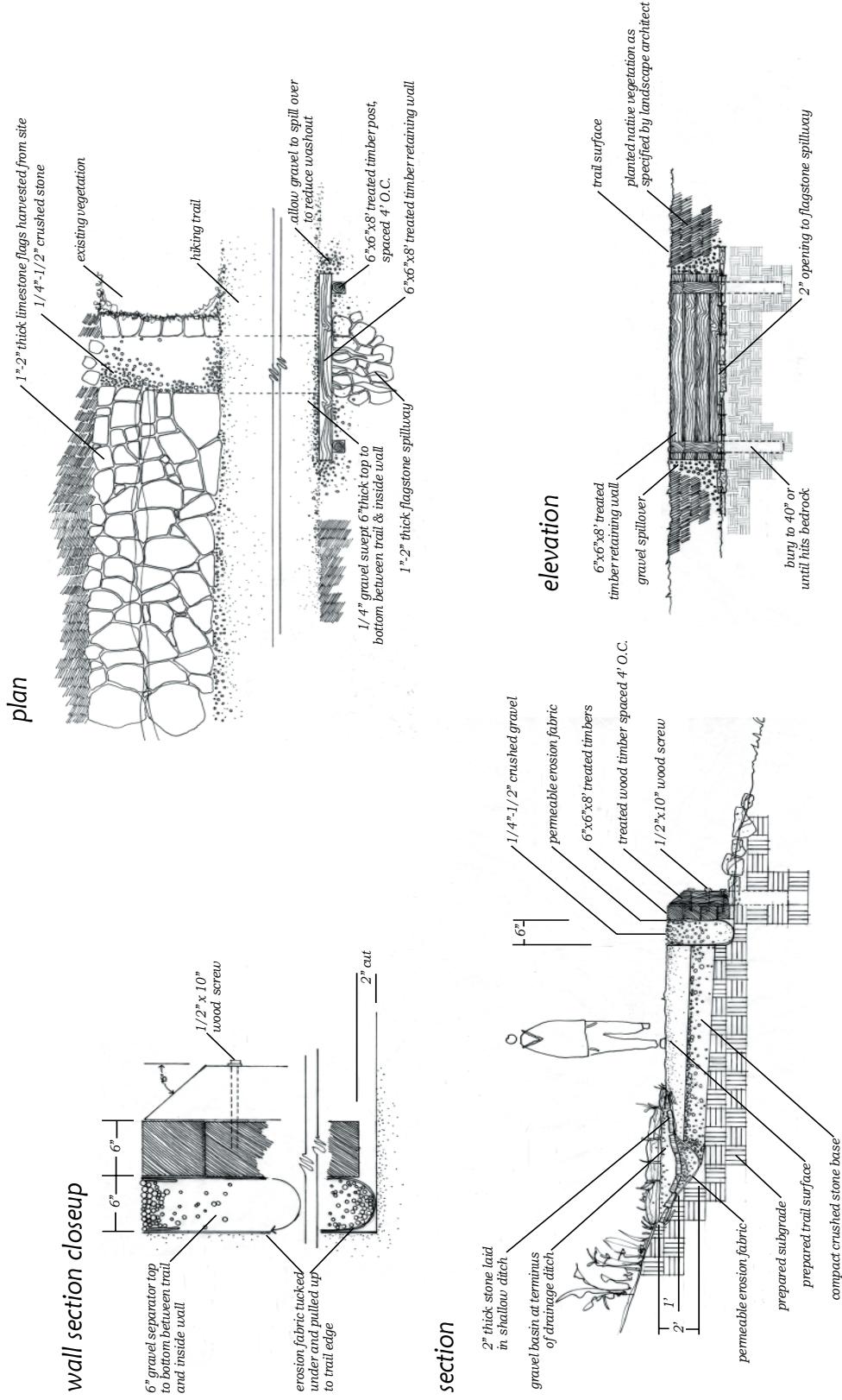
## Design Details



### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

#### Detail #2: Drainage Ditch w/ Crossing



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

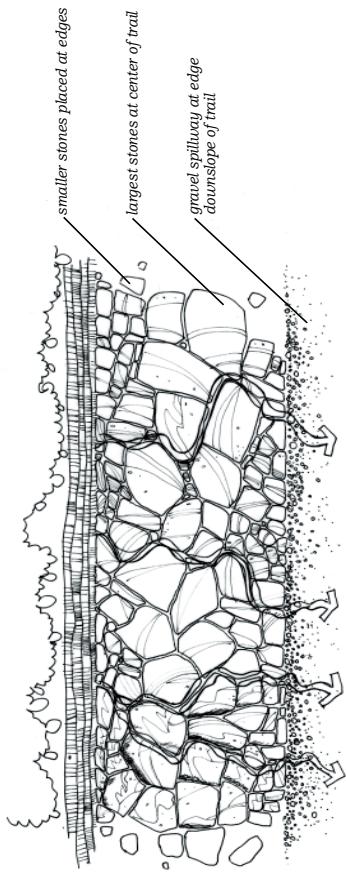


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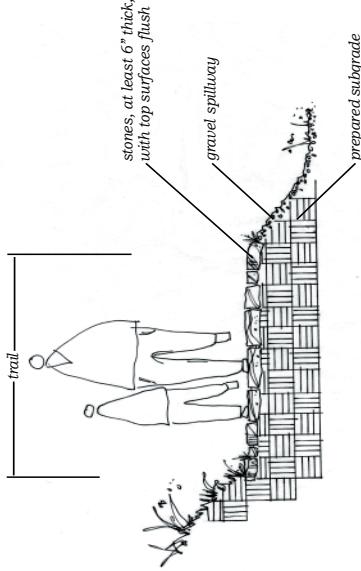
### Detail #3: Stepping Stone Path

The purpose of the Stepping Stone Path detail is to keep the path dry for foot traffic, and to avoid the formation of large muddy patches in the trail after rain. It is meant to be applied in areas where heavy foot traffic intensifies the erosion process. Successful implementation of this design requires that the stepping stones be thick enough (approx. 6") and firmly set into the trail so that washout does not occur. Limestone rubble of appropriate dimensions found on site may be used. The gravel spillway functions to slow down sheet flow off the trail.

#### plan



#### section



# Design Details

## Steep Slope Condition

Erosion as a result of steep slopes is a problem all along the bluff, both on and off the trail. The following details offer solutions on these slopes. They seek to stabilize the slopes, allowing movement of people and water without excess movement of soil.

-Construct walls with 6 by 6 timber posts and rails.

-Use 3/8" galvanized spikes 10 - 12" long.

-Utilize a minimum of 4 spikes per 8', with 2 spikes at connection points.

-Replace existing telephone pole walls with timber walls as they decompose.

-Utilize gravel or limestone debris and erosion fabric behind timber walls to facilitate infiltration of rainwater.

-Utilize drainage dips (see detail #5) along wall sections to divert water.

-Bury posts 3.5 feet deep or to the depth of bedrock.

-Bury at least one rail into the ground for sufficient stability.

-Double walls should be utilized for walls higher than 3-feet to break up the visual effect and help divert water.

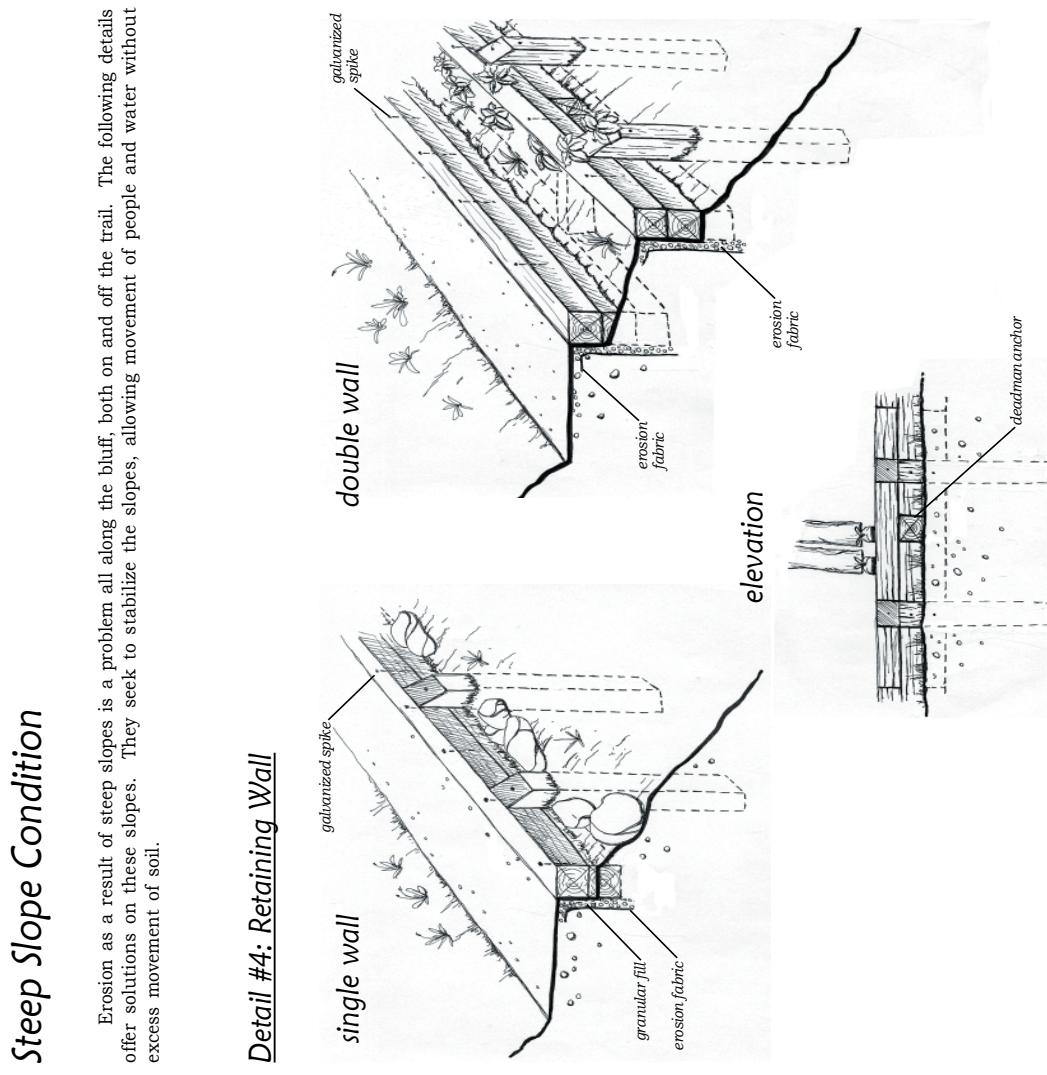
-Utilize dead man anchoring with double walls.

-Utilize plantings between double walls to soften edges and increase absorption of rainwater.



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Crosby Park: Bluff Trail Project

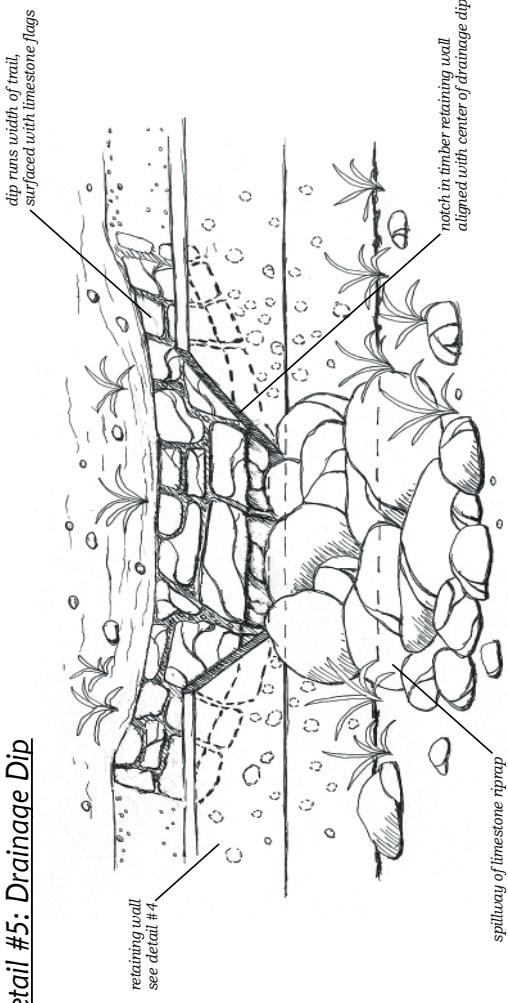
Design Strategies for an Ecologically Sustainable Bluff Trail

- The drainage dip is a method of diverting rainwater from the trail surface, similar to a water bar.
- Drainage dips utilize gaps in timber walls where water is directed via stone depressions from the trail surface.
- Gaps between the rocks that compose the stone depressions should be filled with a porous material such as gravel.
- Utilize stone riprap to slow the flow of water off of the trail

### Drainage Dip Spacing

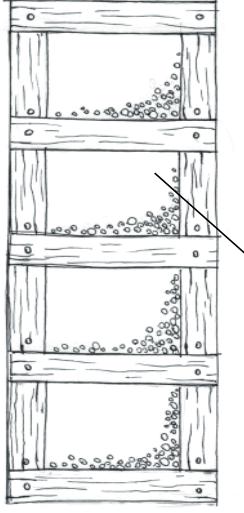
Percent Grade	Spacing between Drainage Dips
5	80 ft.
10	40 ft.
15	30 ft.
25+	20 ft.

### Detail #5: Drainage Dip

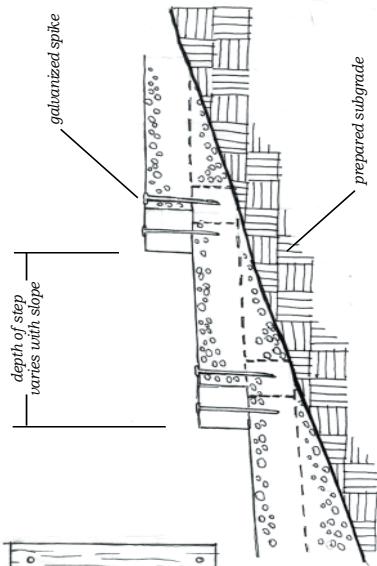


### Detail #6: Stairs

#### plan



#### section



- Each step consist of a timber box that is constructed with 6 by 6 treated timbers that are connected with spikes
- The size of timber boxes will vary depending on the required width of the trail segment and the steepness of the slope being navigated.

- During construction, each box should be filled with class 5 limestone and boxes should overlap one another, leaving a tread depth that is appropriate for the slope.

- Stairs should be placed to follow the contours of the slope to minimize grading

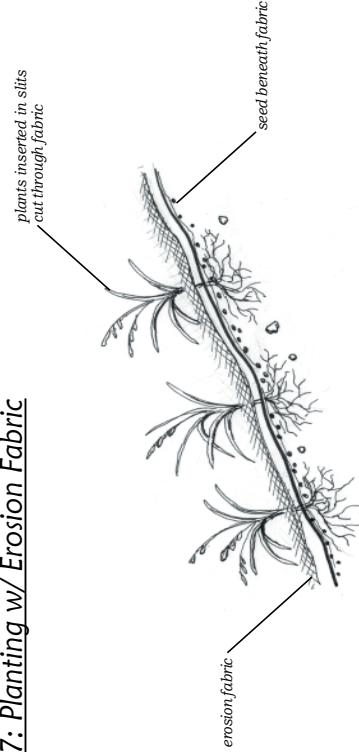
# Design Details



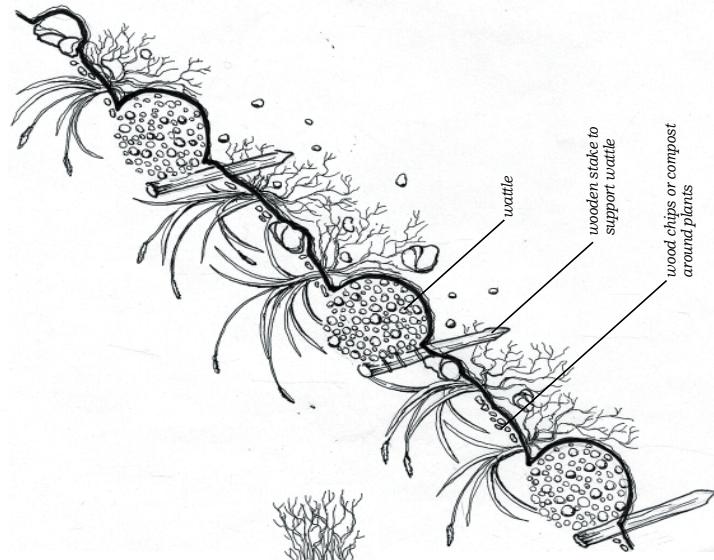
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

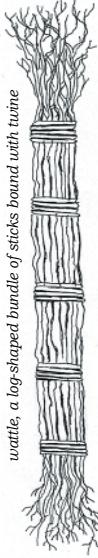
- Erosion fabric should be utilized wherever seeding will be a component of a planting.
- Seeding is generally recommended when relatively large areas are being planted and containerized plantings are not cost effective. If local seed is available it is often a good idea to utilize it in addition to installing mature plants in case the planting is unsuccessful.
- The use of erosion fabric may be preferred over wattles for large areas, as it is easier to install. The drawback of only using erosion fabric is that it does not create changes in topography where moisture and organic material can collect.
- In addition to seed, mature plants can be installed with erosion fabric. Slits can be cut in the fabric for the installation of plants.
- Erosion fabric can also be utilized in combination with wattles. In this instance, trenches for the wattles are dug and then the fabric is laid. Subsequently, the wattles should be placed over the fabric.
- Use wire or cornstarch staples to secure erosion fabric and wooden stakes to secure wattles.



Detail #7: Planting w/ Erosion Fabric



Detail #8: Planting w/ Wattles



- Brush wattles or biologs can be utilized to stabilize slopes and create plateaus where plants can receive increased moisture.
- Once plants are established, their root systems will help stabilize the slope.
- Bundle wattles together with twine. Bury about half of the wattle into the slope and utilize wood stakes to secure them to the slope.
- Wattles should be installed before seed and plants are installed.
- Two or three inches of wood chips should be spread around plants.
- Compost should be used instead of wood chips for slopes greater than 3:1. The compost will hold better to the slope than wood chip, but will decompose more quickly.
- In areas of severe erosion, an engineer should be involved to provide stabilization recommendations.

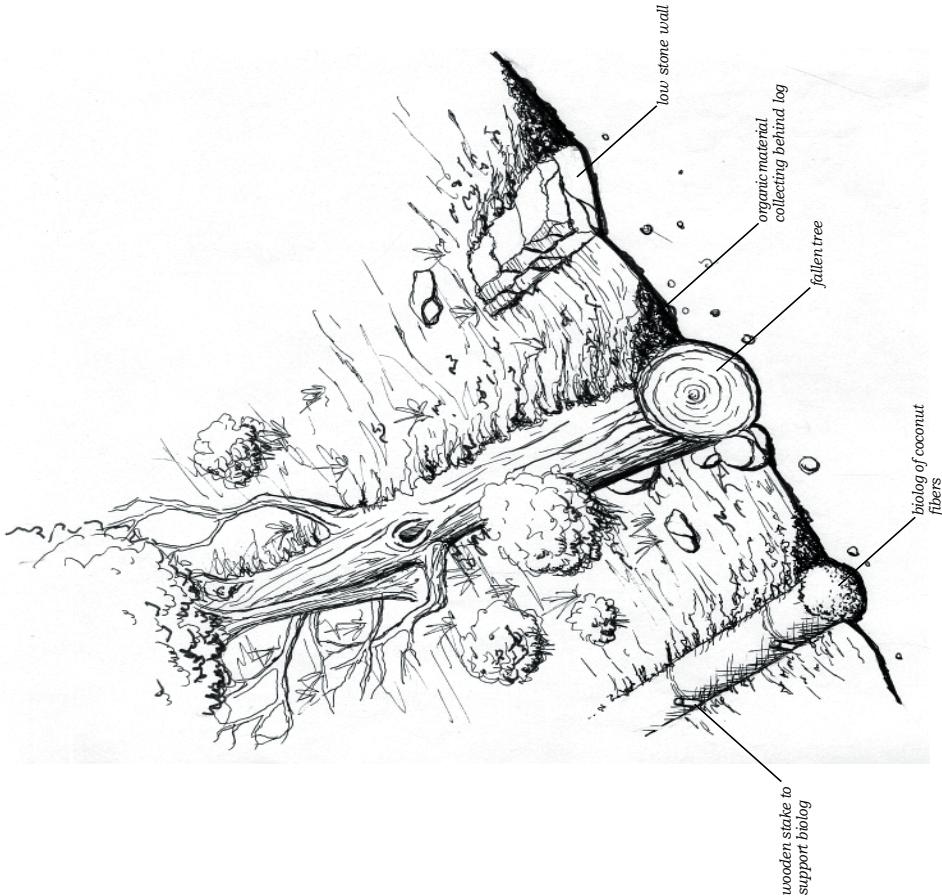
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Design Details

### Detail #9: Organic Collectors



- A primary need is to stop the movement of soil and encourage the build-up of organic material that will aid in stabilization and plant establishment.
- Downed trees, biologs made from coconut fiber and small rock walls can be utilized as checks to stop erosion and collect organic material.

# Design Details

## Plants for Stabilization:

-Key groundlayer plant species for stabilization include:

### Wet ravines:

Lady fern	<i>Athyrium filix-femina</i>
Jack in the pulpit	<i>Arisaema triphyllum</i>
Wild ginger	<i>Asarum canadense</i>
Woodland sedge	<i>Carex blanda</i>
Wild geranium	<i>Geranium maculatum</i>
Virginia waterleaf	<i>Hydrophyllum virginianum*</i>
Ostrich fern	<i>Matteuccia struthiopteris</i>
Virginia creeper	<i>Parthenocissus inserta</i>
Bloodroot	<i>Sanguinaria canadensis</i>
Woodland meadow rue	<i>Thalictrum dioicum*</i>

Wild Ginger - *Asarum canadense*



Jack in the pulpit  
*Arisaema triphyllum*



Jack in the pulpit  
*Arisaema triphyllum*

Wild Geranium - *Geranium maculatum*



Hydrophyllum virginianum\*



Virginia Waterleaf  
*Hydrophyllum virginianum*

Matteuccia struthiopteris



Ostrich fern

Parthenocissus inserta



Virginia Creeper

Sanguinaria canadensis



Bloodroot

Thalictrum dioicum\*



Woodland Meadow Rue

Northern Bedstraw - *Galium boreale*



Northern Bedstraw

Galium boreale\*



Northern Bedstraw

Note: \* Denotes that the species can be planted from seed as well as containers. See companion ecological restoration plan for Crosby park for more extensive lists for bluff restoration.



Virginia Waterleaf  
*Hydrophyllum virginianum*

## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

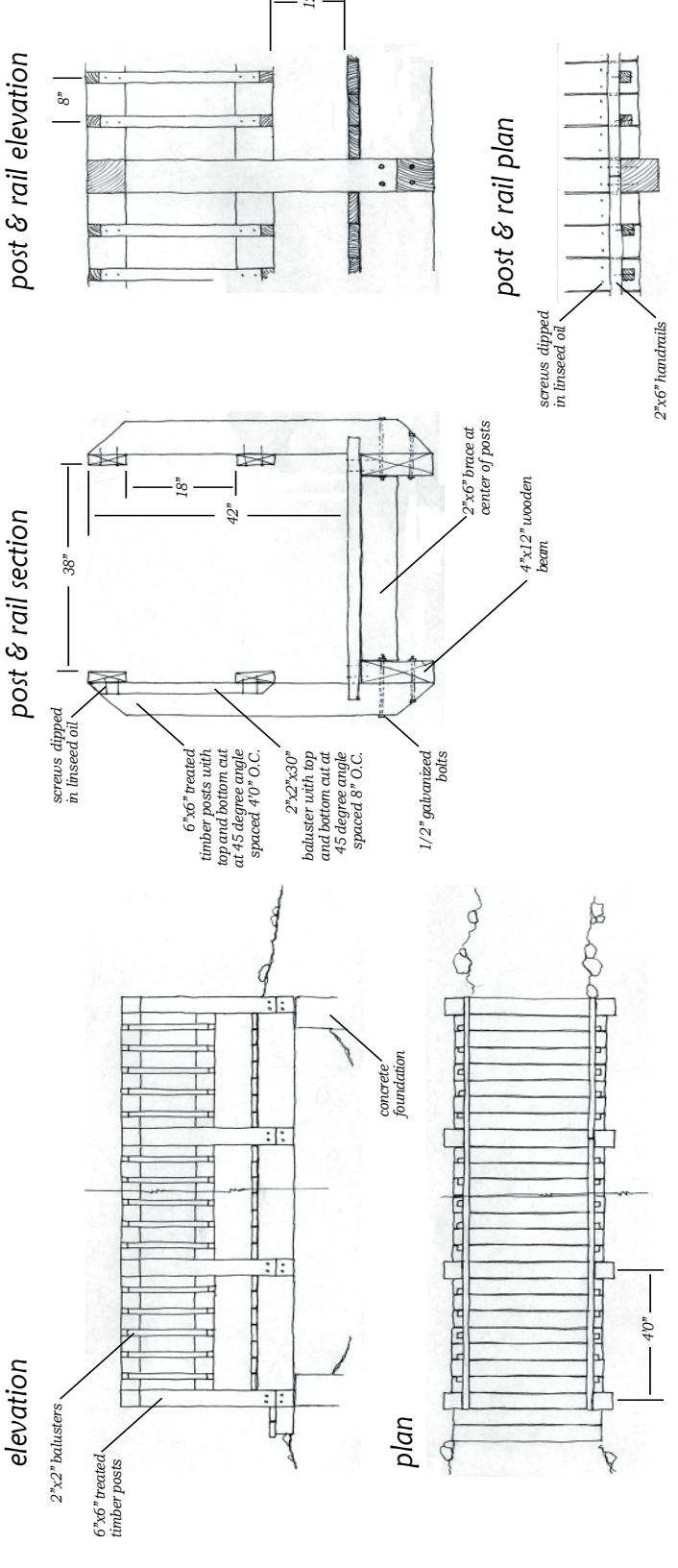


## Design Details

### Wet Ravine Condition

The most severely eroded areas of the bluff trail are in the ravines, where stormwater repeatedly scours out the base of the ravines and the sides collapse. Some such erosion is a naturally-occurring condition, but here it is aggravated by the presence of storm water outlets at the top of the bluff, bringing water in much larger quantities than would naturally exist. This dramatic erosion cannot be slowed or stopped without dealing with the stormwater outlets. However, we can help people navigate the ravines while still allowing water to pass through.

### Detail #10: Bridge

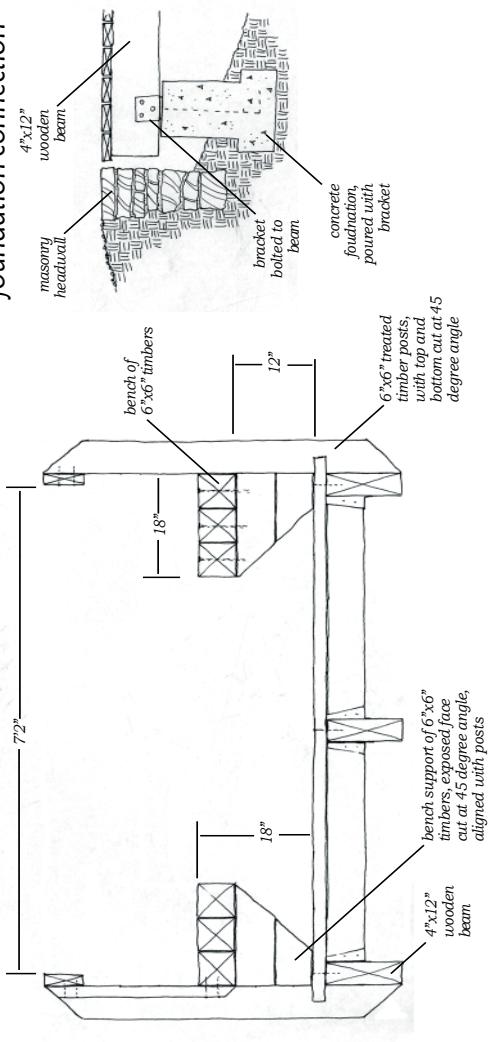


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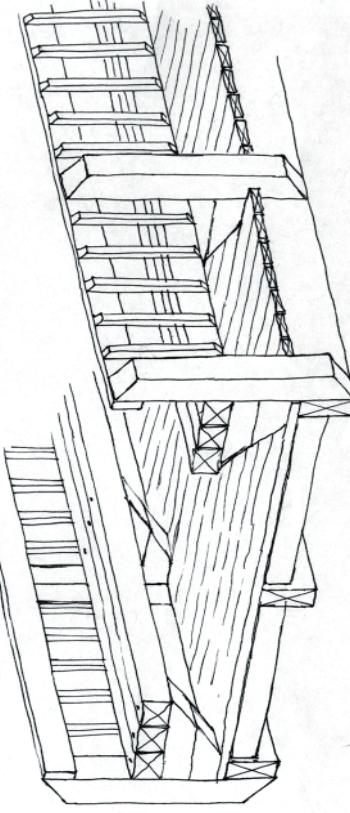


Detail #11: Bridge w/ Seating

section



axon



## Crosby Park: Bluff Trail Project

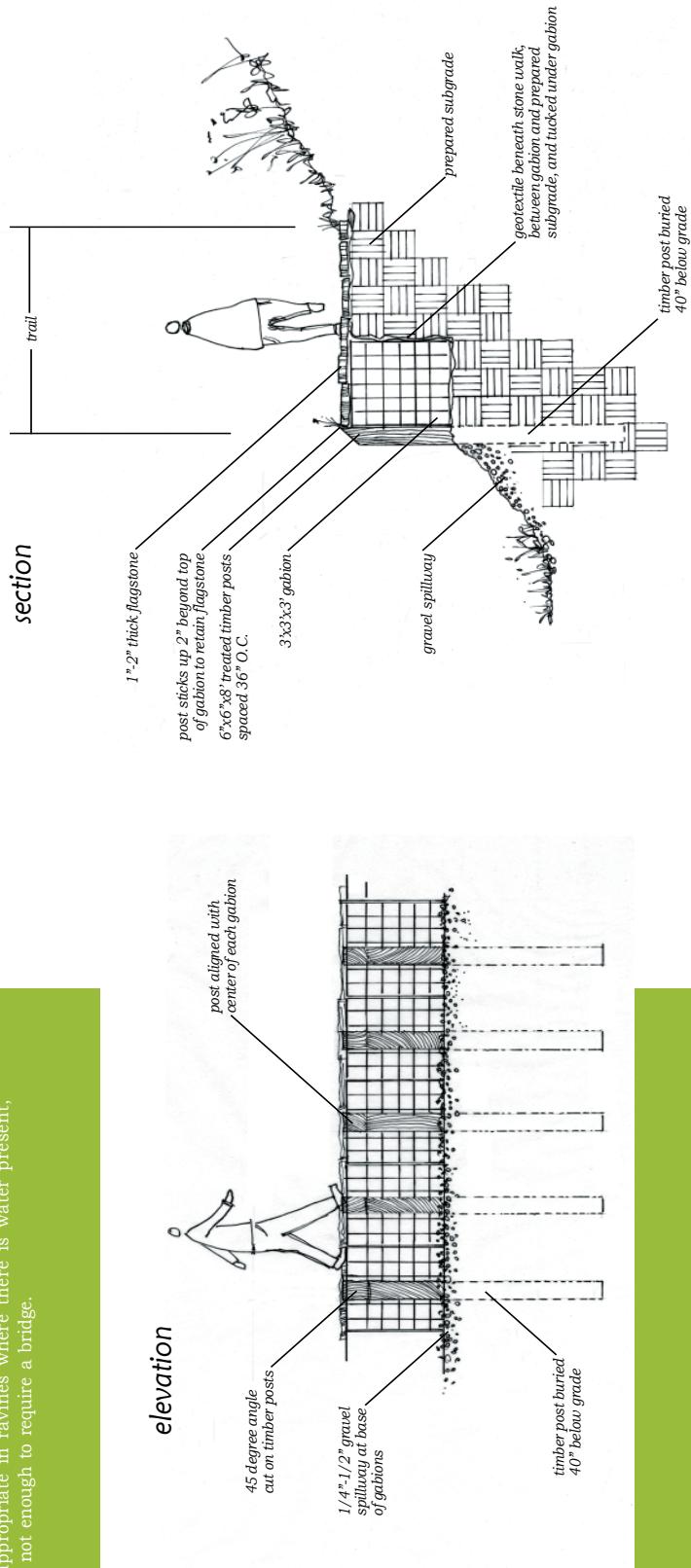
Design Strategies for an Ecologically Sustainable Bluff Trail



## Design Details

### Detail #12: Gabion Wall

A gabion wall is a good solution where damp ravines exist along the bluff trail, and in areas where seeps along the trail contribute to trail washout and degradation. The gabion design allows water to pass beneath the trail while still maintaining the trail at a level grade. This structure is appropriate in ravines where there is water present, but not enough to require a bridge.



## Design Details

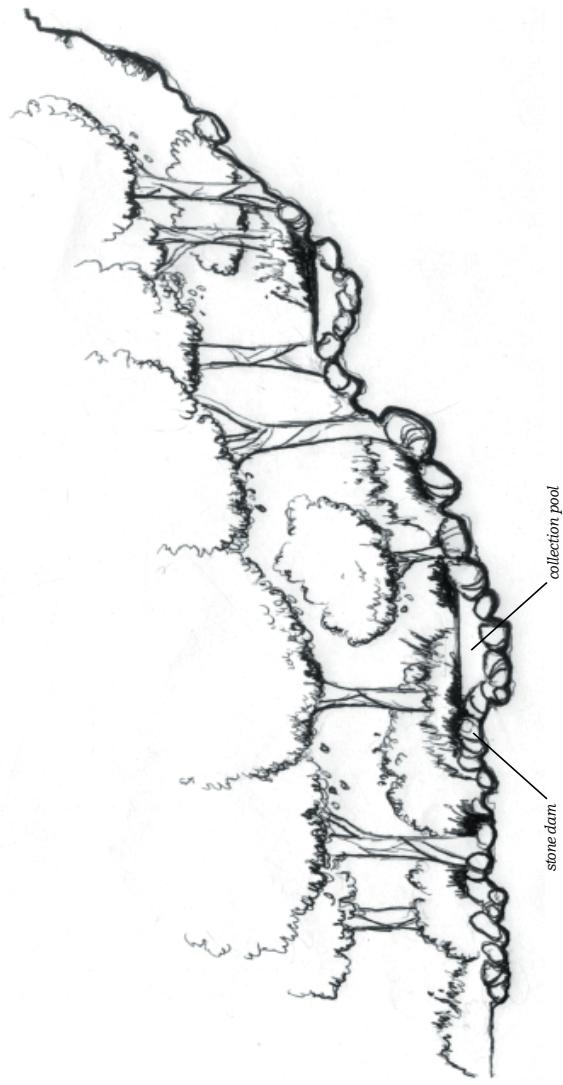


### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

#### Detail #13: Collection Pools

- Collection Pools are designed to provide a water source for plants and animals that utilize the bluff.
- Pools should be constructed in ravines where there is at least a periodic flow of water and a significant amount of stone to move around.
- Pools are constructed by moving stone to create depressions behind small dams that will collect water. Typically, pools will be around 3 by 3 feet and 2-feet deep.



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Design Details

### Bluff Top Condition

-An infiltration area should be constructed at the top of the bluff in the existing lawn.

-Currently there is no curb and gutter along this section of Shepard Road and stormwater flows over the bluff.

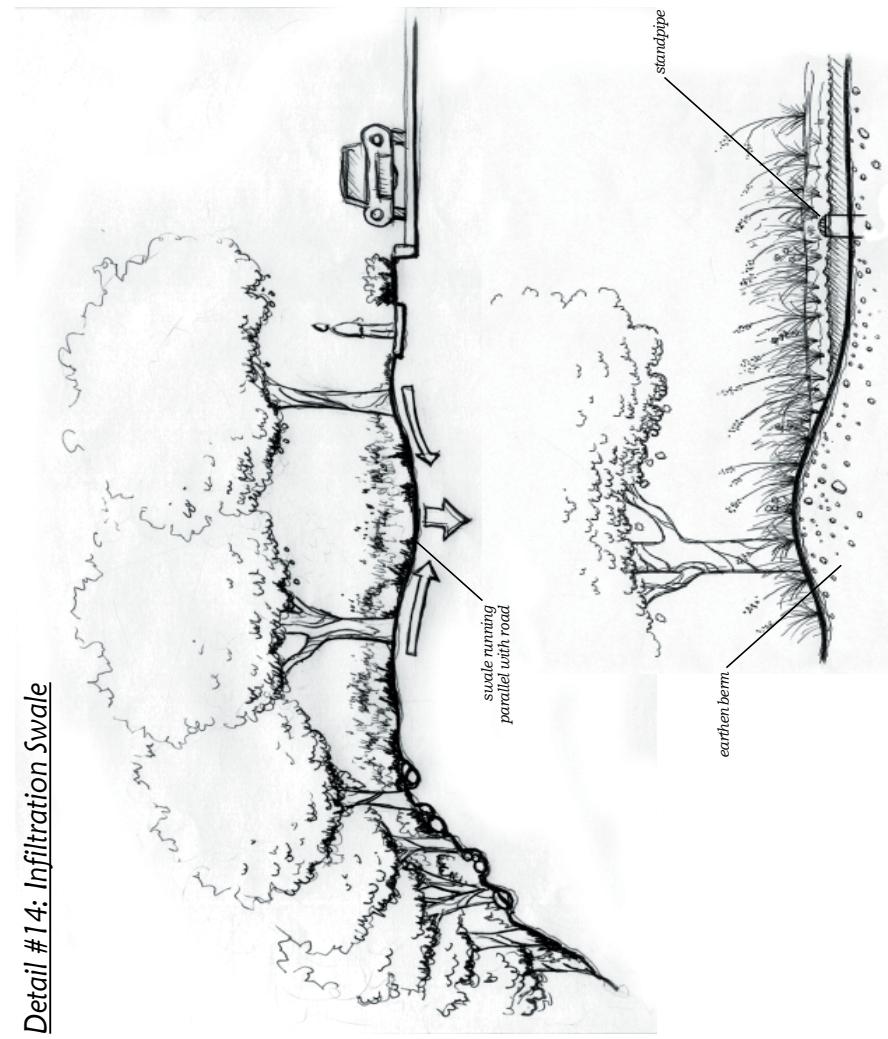
-Water flowing over the bluff is a significant source of erosion in ravines.

-The combination of constructing a berm and digging a gentle depression would allow water to pool and infiltrate on top of the bluff. There is currently a catch basin in the lawn that would require a standpipe.

-Mesic oak savanna and wet meadow species should be planted in the infiltration swale to aid in the treatment of stormwater, increase wildlife habitat and increase the buffer between Shepard Road and the bluff.

Many erosion problems along the bluff are due to stormwater runoff from the top of the bluff. Infiltrating stormwater at the top of the bluff would help alleviate this condition.

### Detail #14: Infiltration Swale



## Design Details



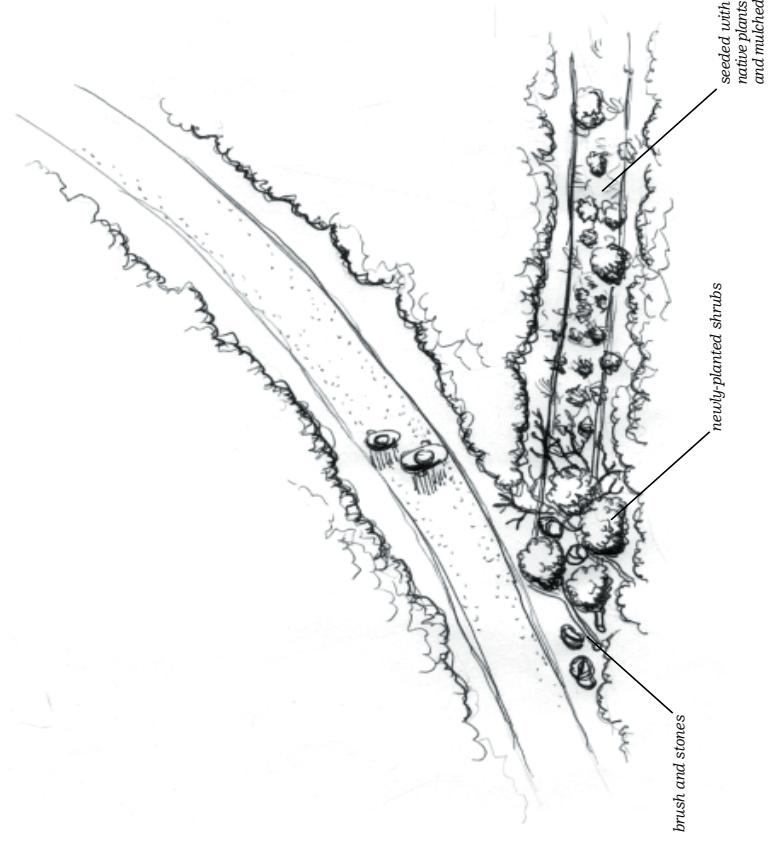
### Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

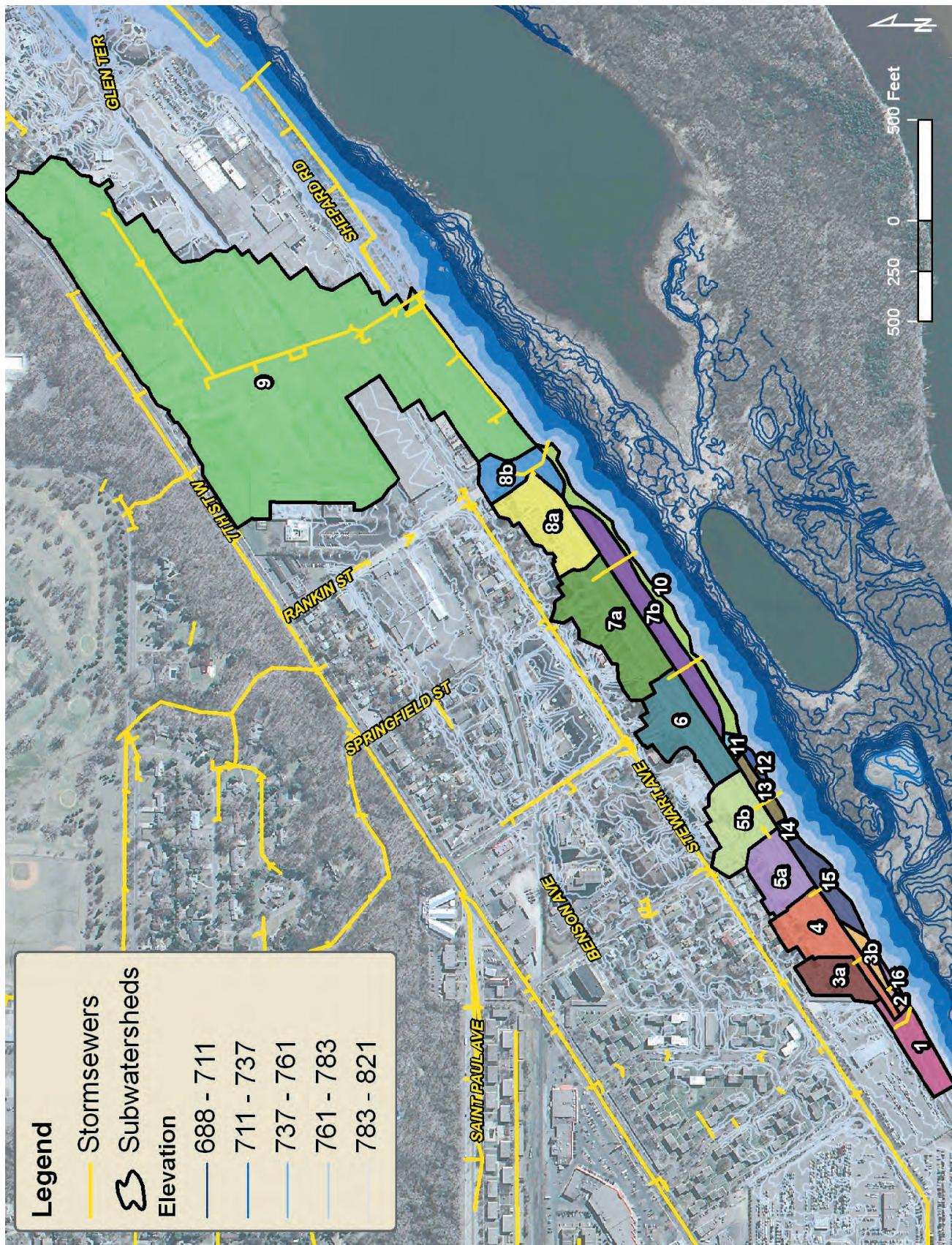
#### Miscellaneous

##### Detail #15: Trail Closure

- A combination of shrubs, stone, and brush should be utilized to close trails.
- Shrubs help camouflage trail openings and block access. Species with thorns, such as wild rose and native gooseberry, can be especially effective deterrents.
- Rock should be buried part way into the ground and will help deter walkers.
- Brush should be stacked near the entrance to the trail and will also camouflage the entrance to the trail and deter walkers.
- Trail surfaces should be lightly tilled and re-seeded with a native seed mix suited to the site. The seedling should then be rolled with a lawn roller and mulched with clean straw. Erosion fabric should be used on slopes steeper than 4:1 (See Detail #7).



**Figure 1**





# Crosby Park: Bluff Trail Project

Produced for the City of St. Paul, Minnesota  
by  
Great River Greening



Authors:  
Dan Shaw  
Carlos Fernandez  
Courtney Skybak  
Ryan Holdorf

June 2004

# Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



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*Right and below: Aerial photos of Crosby Park. (Copyright 2003 Regents of the University of Minnesota. All rights reserved. Used with the permission of the Design Center for the American Urban Landscape.)*



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# Introduction



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Purpose

This plan provides recommendations for improving the Bluff Trail at Crosby Park in St. Paul, Minnesota. The plan includes a study of current trail conditions and provides a detailed trail plan and constructions details. The plan will help the City of St. Paul manage the site in a way that meets the various needs of local residents and visitors while also being cost-effective and ecologically sustainable. The plan will also act as a model for similar projects in the Twin Cities area. This trail plan is a companion document to a natural resources inventory and ecological restoration plan that is also being developed by Great River Greening and will be completed in the fall of 2004.

Funding for this project came from the Legislative Commission on Minnesota Resources and project partners included the City of Saint Paul, Great River Greening, and the Ramsey Soil and Water Conservation District.

### Crosby Park

Crosby Park is the largest natural park in St. Paul, Minnesota. The park is located on the east side of the Mississippi River as it flows along the western edge of St. Paul. It is very popular regionally, due to its access to the Mississippi River, diversity of plant communities, rock outcroppings, abundant wildlife and extensive trail network. The park is owned by the City of St. Paul, but it is also part of the National Park Service's Mississippi National River and Recreation Area and is an important corridor for migratory birds.

### The Trail Network

Trails play an important role within Crosby Park. They provide access to natural features such as the river, bluffs, and wetlands and provide many opportunities for the exploration of nature. The trails are heavily used by a combination of walkers, runners, and bicyclists. The trails in Crosby Park connect with other trails that follow a network of parks that parallel the Mississippi as it flows through the Twin Cities.



# Introduction

## *The Bluff Trail*

This plan focuses on the re-construction and restoration of the bluff trail, one of the most unique trails in the park. The bluff trail follows the contours of the bluffs that parallel the Mississippi River. A large section of the trail is situated half way up the bluff in a mesic oak forest, where it meanders in and out of moist ravines. This trail is unique in that it provides hikers with opportunities to observe a variety of natural habitats and the plants and animals that they support. In addition to ravines, hikers also experience dry ridges with mature oak trees, and as the trail drops in elevation it traverses floodplain forest, lowland hardwood forest, and black ash seepage swamps.

Although the bluff trail existed as an undeveloped trail for many years, it was formally designed by Les Blacklock in the early 1970s. The original building materials are still at the site and consist of recycled telephone poles, rail road ties and wooden fence posts. The trail was well constructed, but over the last 30 years it has received a significant amount of use and has degraded due to soil erosion and the decomposition of building materials.

Erosion has resulted from routine use but also from storm sewer outlets at the top of the bluff, the tires of mountain bikes, and runoff from slopes that are bare due to trampling by animals and people and the presence of invasive plant species. As a result of the erosion there is very little organic material on the slopes to help sustain plant growth. Organic matter plays an important role in controlling erosion on the bluffs by slowing the flow of water, absorbing moisture, and providing nutrients for ground-layer woodland plant species. The organic layer also provides a good insulating layer for plants during the winter.

## *The Trail Plan*

The trail plan focuses on the development of sustainable and ecologically sound construction techniques that will retain the character and natural experience of the site while solving erosion issues and structural problems. The plan also investigates areas for interpretation or wildlife viewing. The plan is organized with an analysis of current conditions at the beginning, followed by the plan with proposed trail improvements. The plan references construction details for specific areas along the trail and these details are included at the end of the document. The severity of problems along the trail are defined in the plan to aid in the determination of where construction work should begin.

## *Trail Use*

The soils on the bluff are highly erodable and as a result, trail use other than hiking should be discouraged. Mountain biking should be restricted to trails that are less prone to erosion and people and animals should be persuaded to stay on the trail. The trail plan recommends the removal of some unnecessary trails in the park to prevent further erosion problems.

## *Trail Monitoring*

Periodic monitoring of the Bluff Trail will help prevent small problems from becoming more serious. Neighborhood residents can play an important role in monitoring for problems as part of the City of St. Paul's Eco Stewards program. Through this program, volunteers adopt project sites and conduct activities such as monitoring and invasive species control.

# Resource Analysis of Intrinsic Qualities

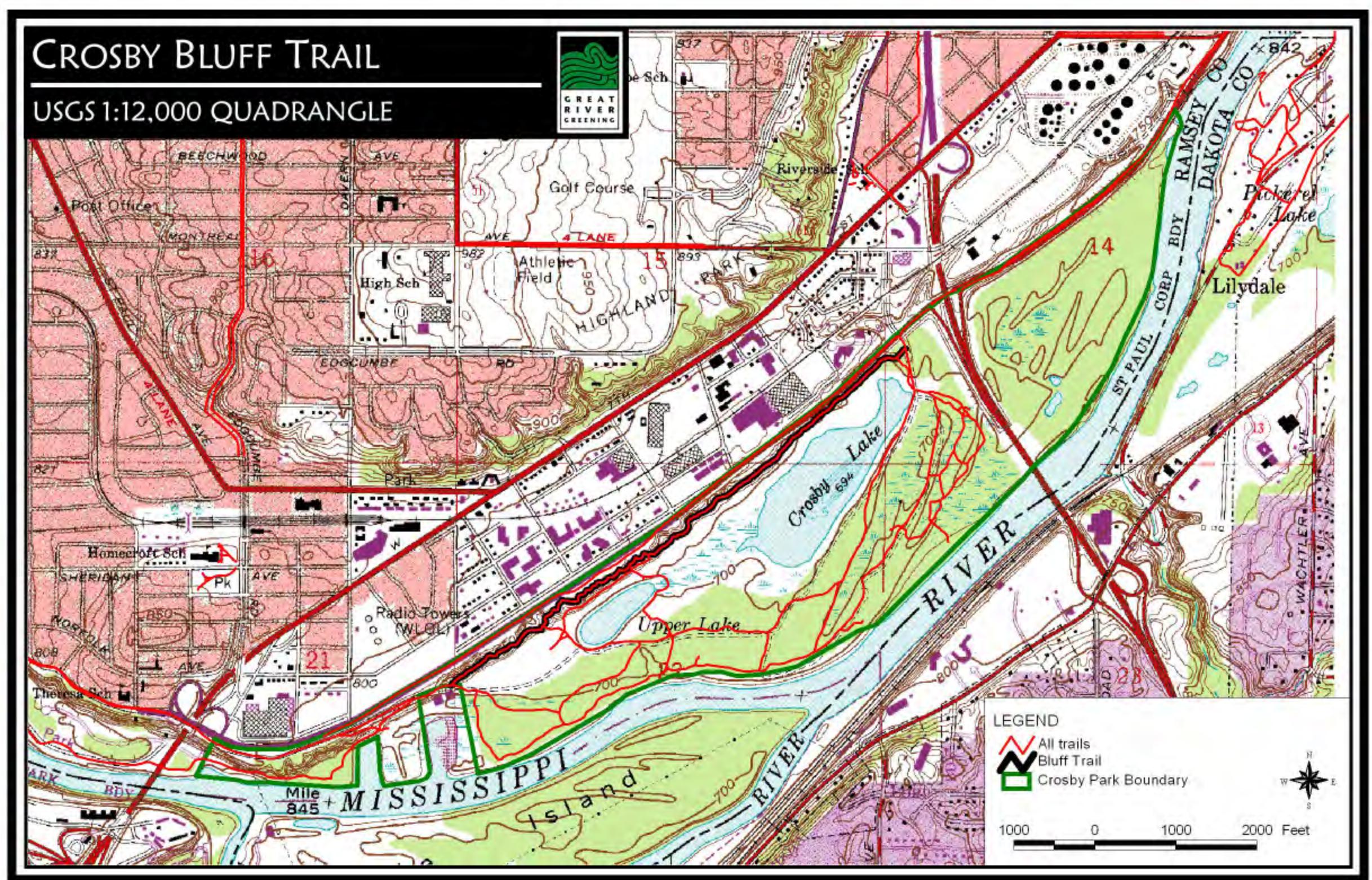


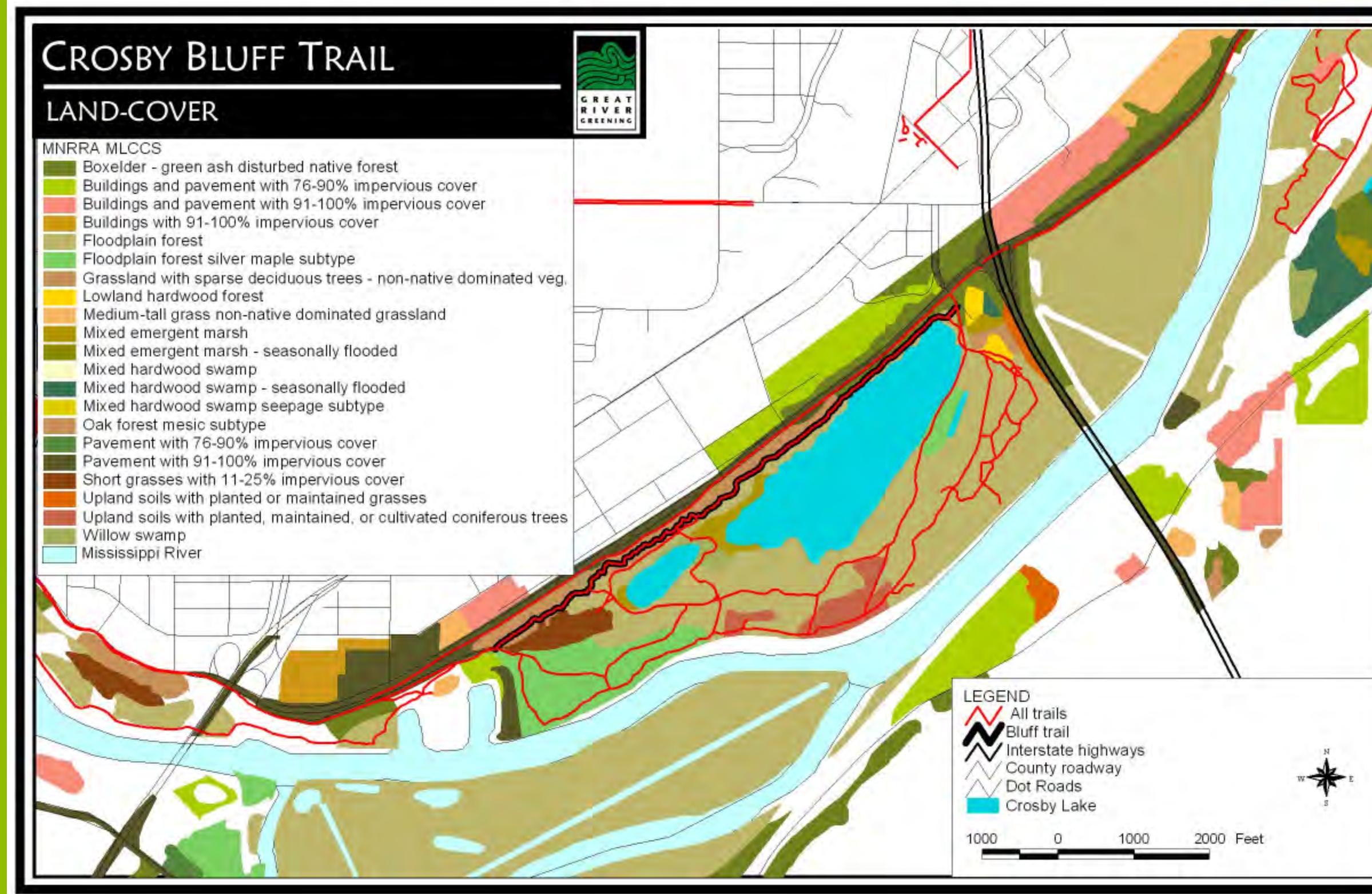
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### USGS Quadrangle

The USGS map shows constructed elements around Crosby Park such as local roads, county roads, highways, building footprints, political boundaries and parking lots. The park is framed by Shephard Road on the northwest, and by the Mississippi River on the other sides. The area directly north of Shephard Road features a number of light industrial and commercial structures with large parking lots, and is characterized by a large amount of impervious surface. Further north are the residential blocks of the Highland Park neighborhood, as well as the Highland Park Golf Course.





### Land-Cover

The land-cover map identifies the current biological layers contained within the Crosby Park area. The park is dominated by the Floodplain Forest land-cover type, but the bluff trail moves through mostly Oak Forest Mesic Subtype vegetation, with a portion of Boxelder-Green Ash Disturbed Native Forest at the eastern end. The land-cover map was constructed using MLCCS data from the Minnesota DNR Data Deli.

# Resource Analysis of Intrinsic Qualities

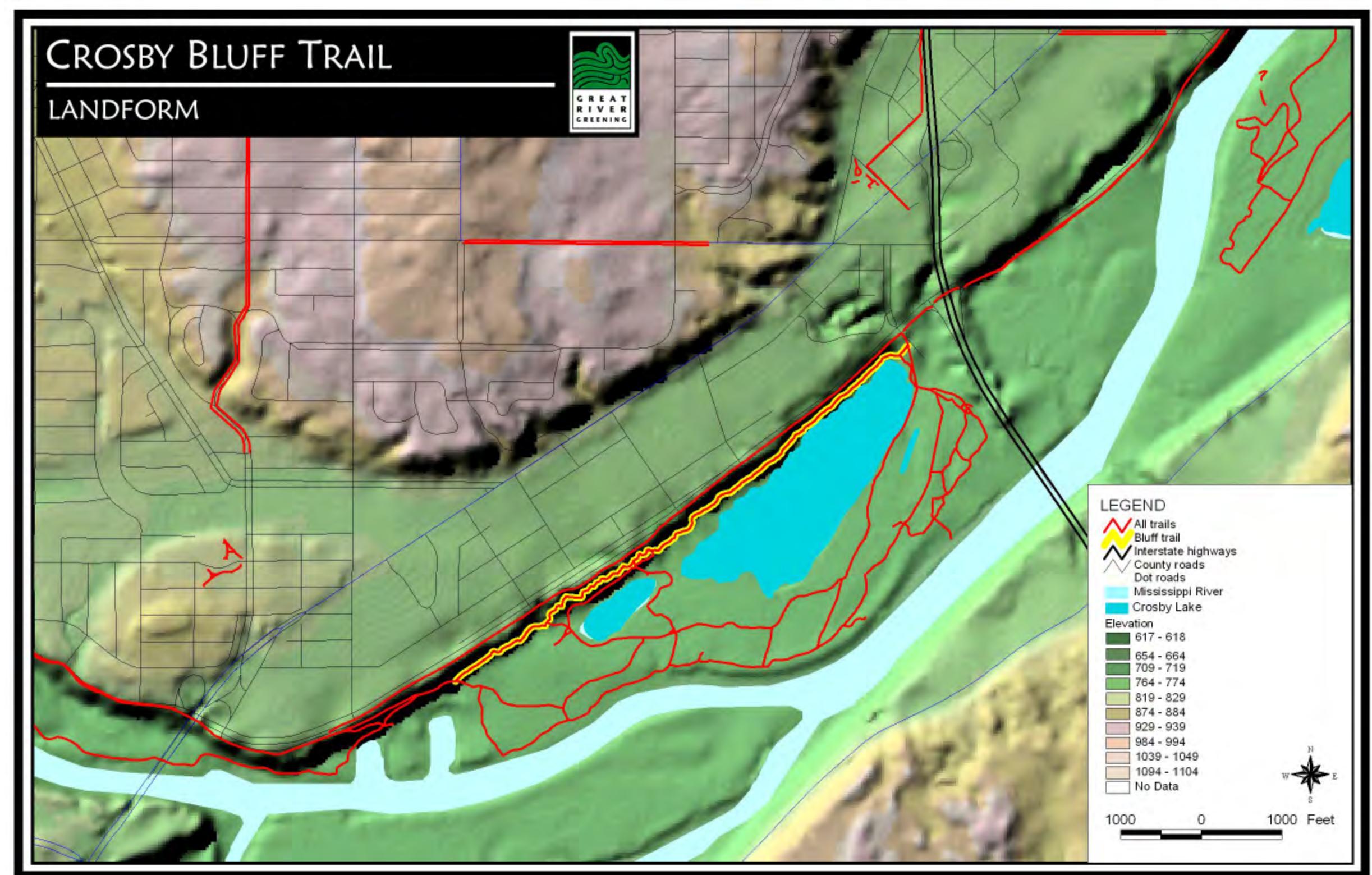


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

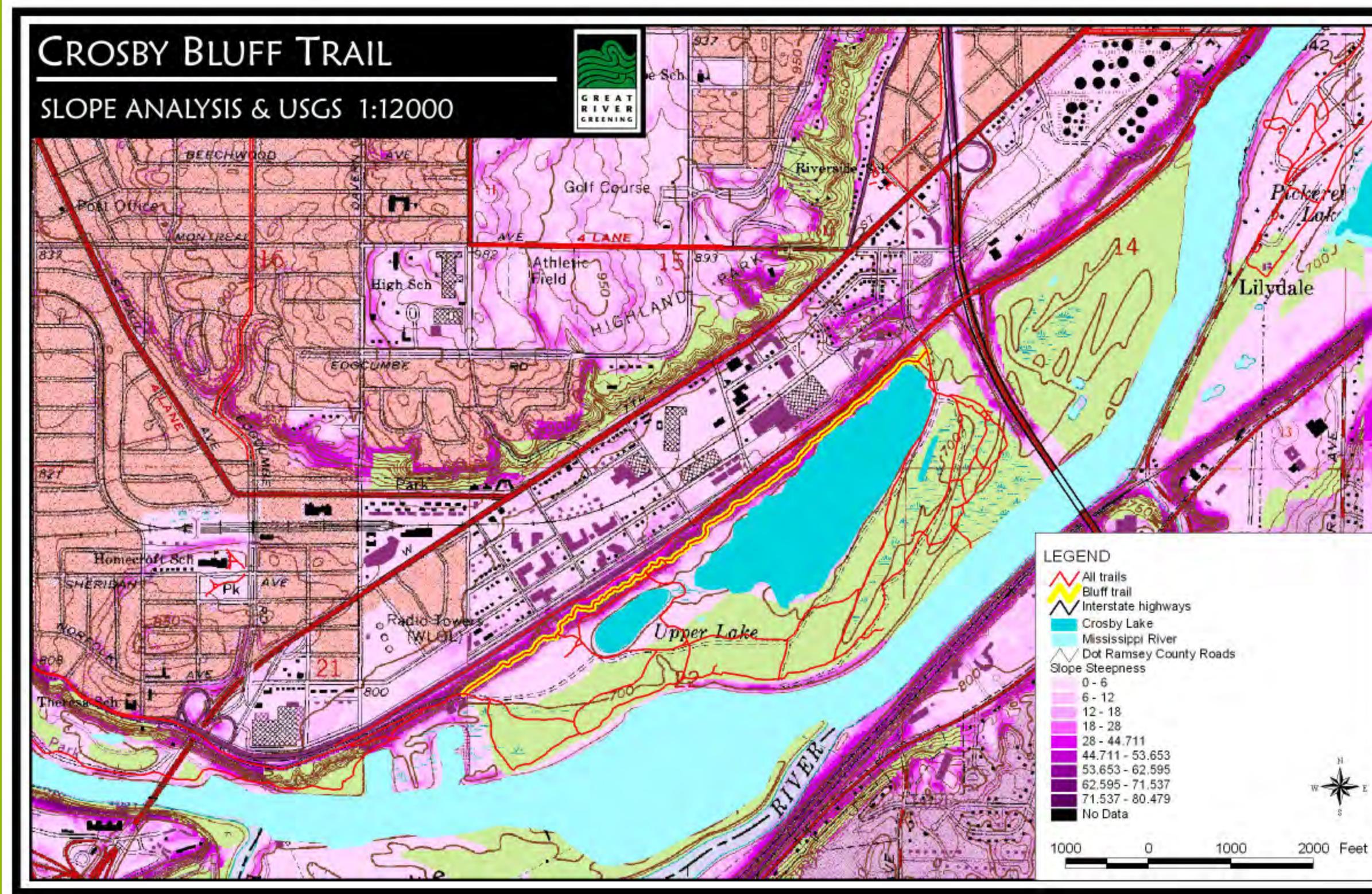
### Landform

The landform map illustrates the physical form of the Crosby Park area in order to 1) identify how water moves through the site, 2) using a 3-dimensional model, locate where steep slopes exist and where shallow slopes exist, 3) identify which direction the slopes face (aspect) and their corresponding access to solar radiation, and 4) give a sense of how physical form can play a role in how one might experience or interpret the bluff trail. The bluff trail is located on or at the base of a steep southeast-facing slope.





# Resource Analysis of Intrinsic Qualities



## Slope

The Slope Analysis overlay on the USGS 1:12000 map identifies the steepness of slopes in and around the site. A measurement of slope steepness is useful in understanding the process of erosion, and the relationship between slope, soil stability, stormwater movement, and vegetation. Vegetation often has difficulty taking hold in steep areas, yet at the same time is essential for the stabilization of soils on the slope. The slope analysis helps to pinpoint areas where the risk of erosion is high and to guide the placement of erosion control elements along the trail. The entire bluff trail runs along areas of steep slopes.

# Resource Analysis of Intrinsic Qualities

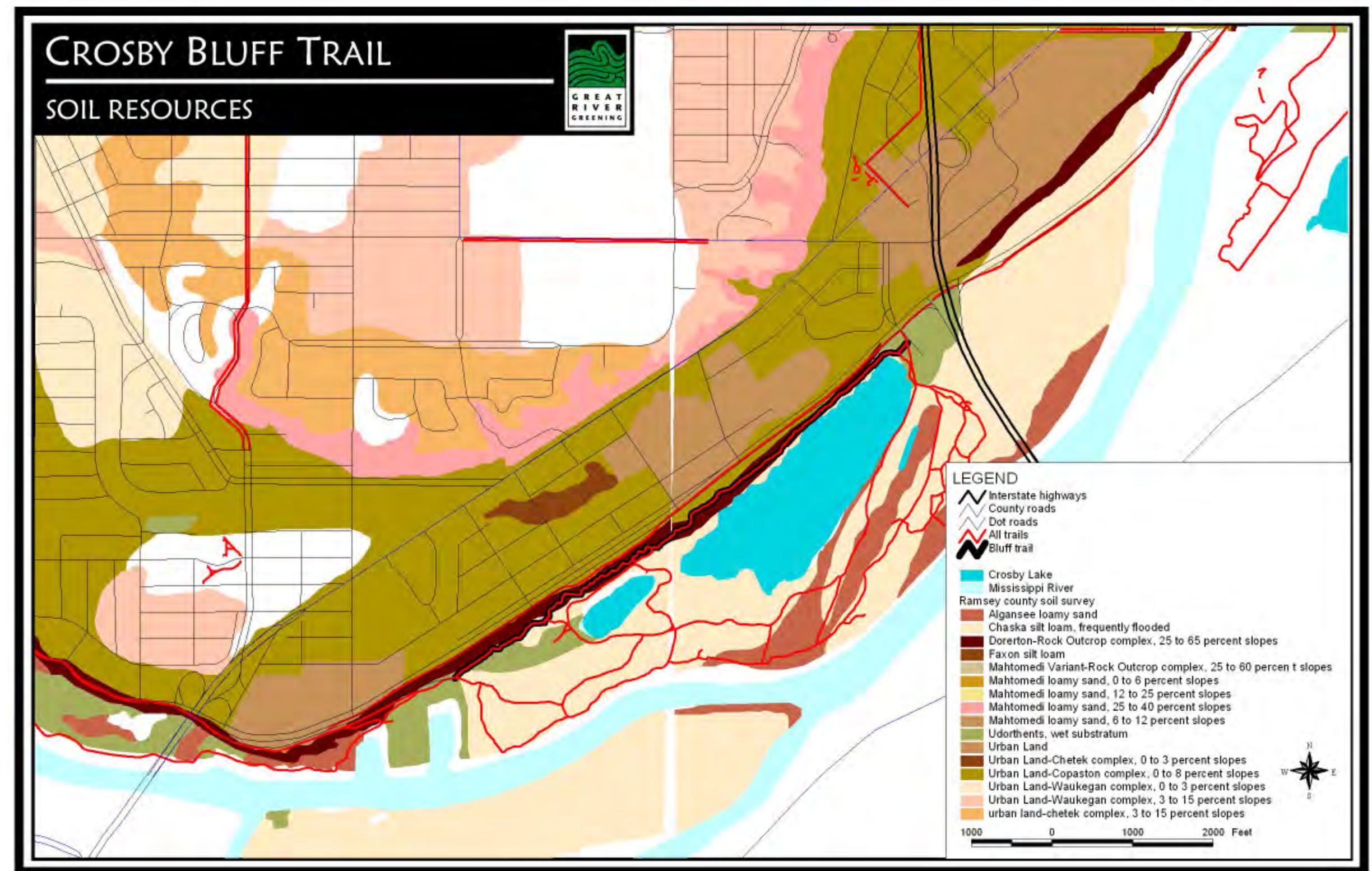


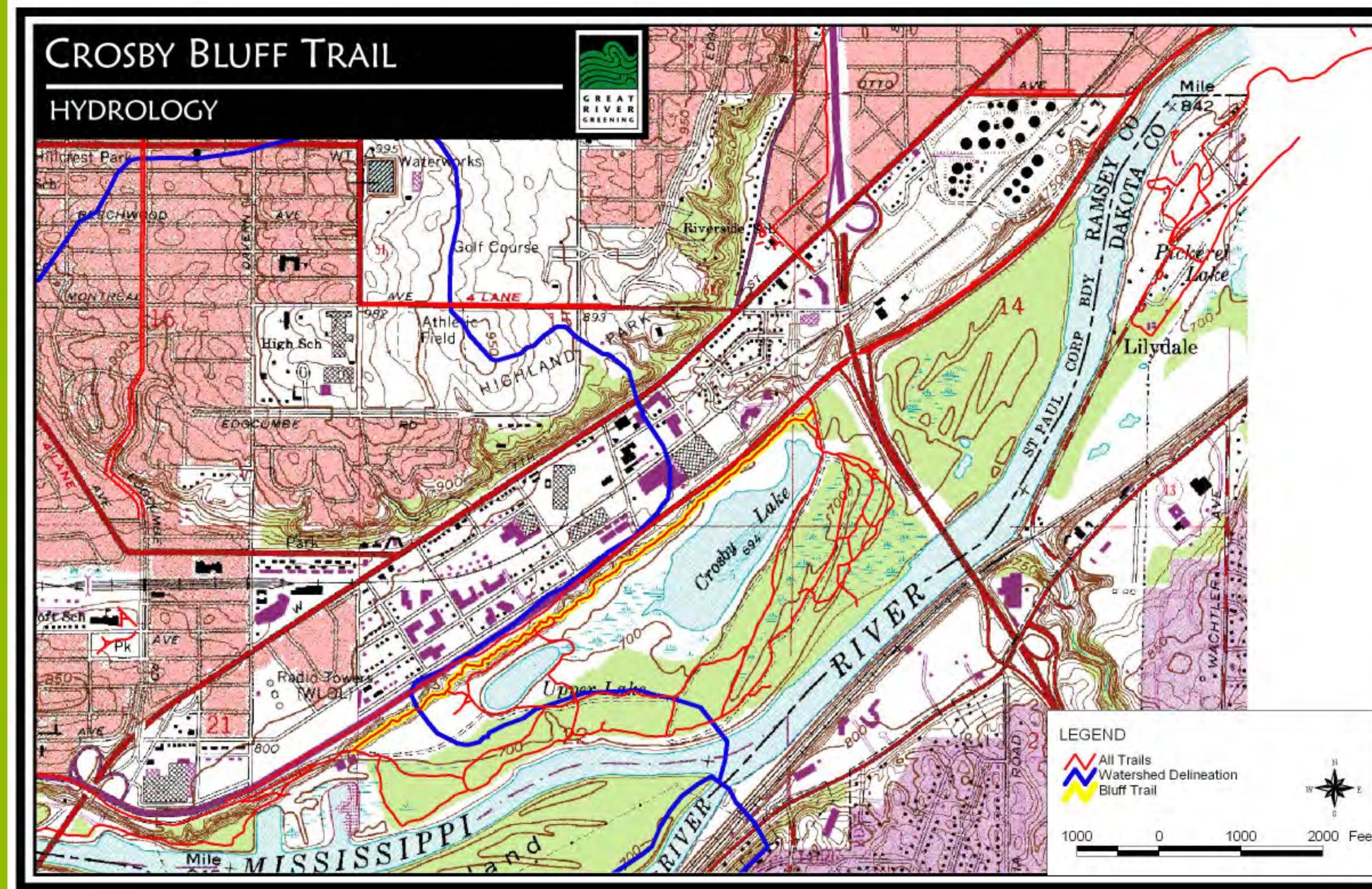
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Soils

The Soil Resources map was constructed using the Ramsey County Soil Survey. The key contains those soils found within or around Crosby Park. It is also important to note that a slope percentage is often indicated after each individual soil ID, which is useful when determining the "workability" of a particular soil group. Most of Crosby Park is dominated by Chaska Silt Loam (frequently flooded) and Alganssee Loamy Sand. The bluff trail moves through areas of Dorerton-Rock Outcrop Complex, with 25% to 65% slopes.





# Resource Analysis of Intrinsic Qualities

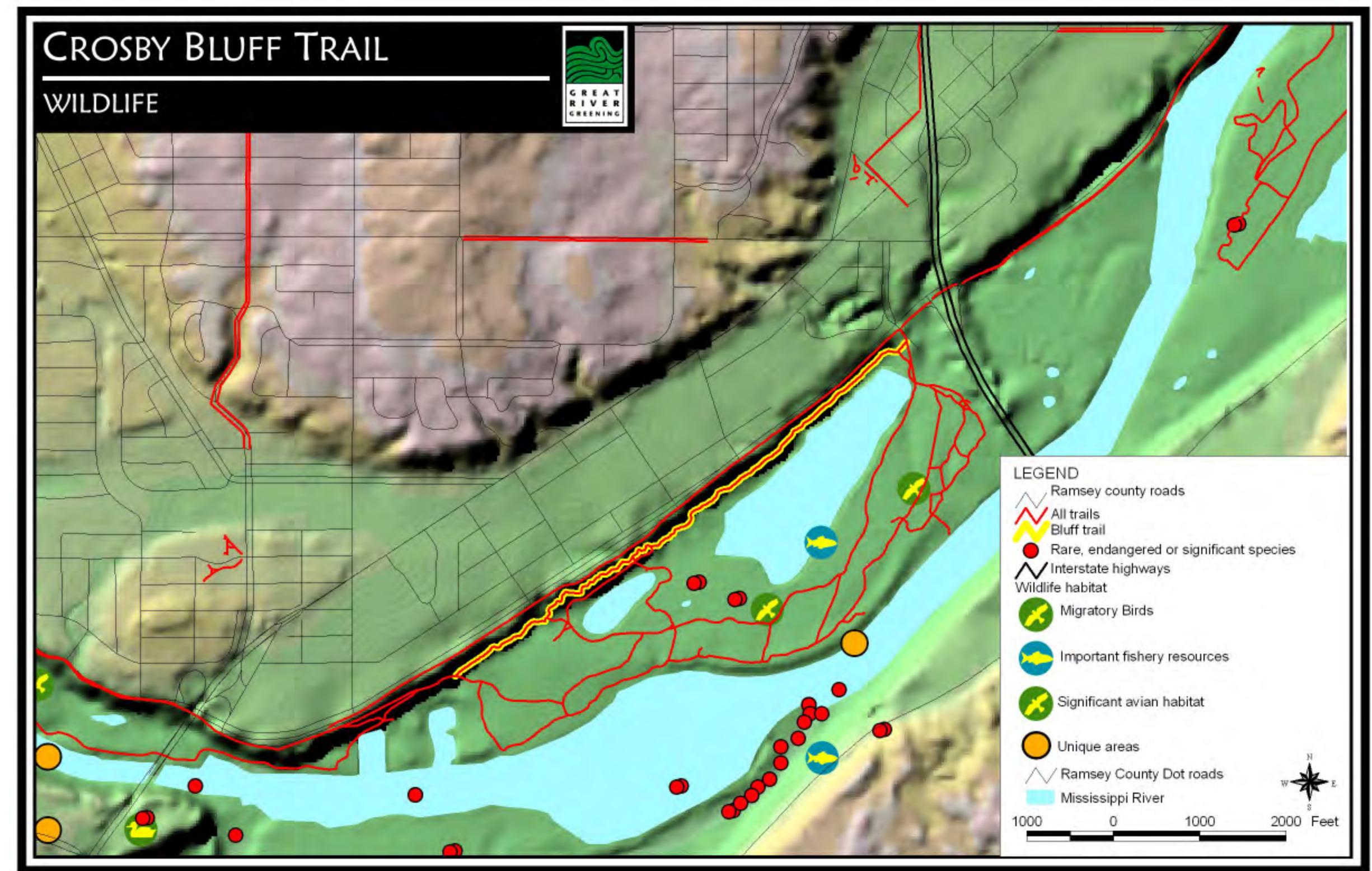


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

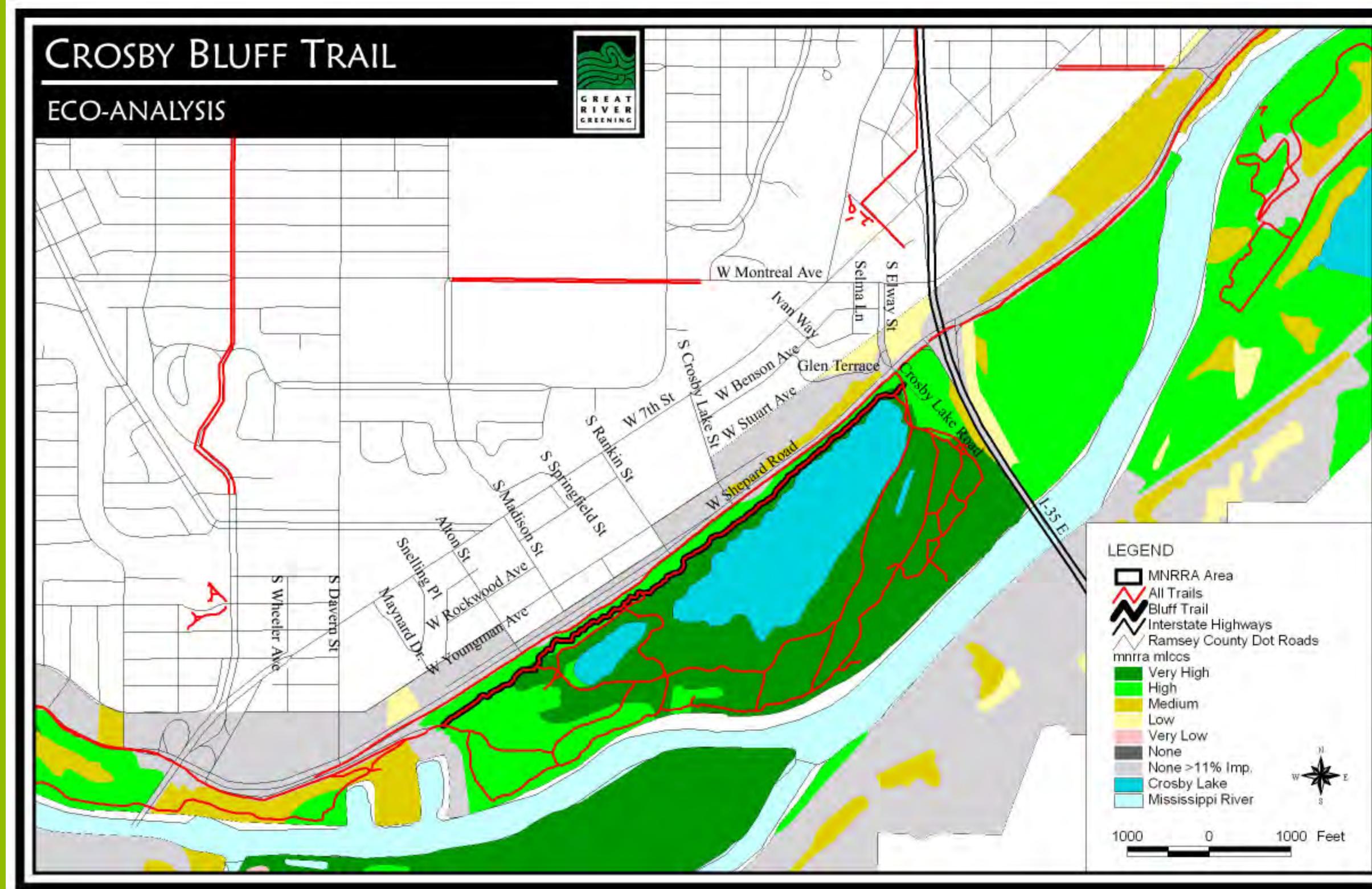
### Wildlife

The Wildlife map indicates areas within or near Crosby Park that are ecologically significant to wildlife. Ecological significance is defined in terms of breeding habitat, use as food source, or the location of rare, endangered or ecologically significant species to the Mississippi River Valley Region. Crosby Park contains valuable aquatic and avian habitat, as well as a number of rare, endangered, or significant species.





# Resource Analysis of Intrinsic Qualities



## Eco-Analysis

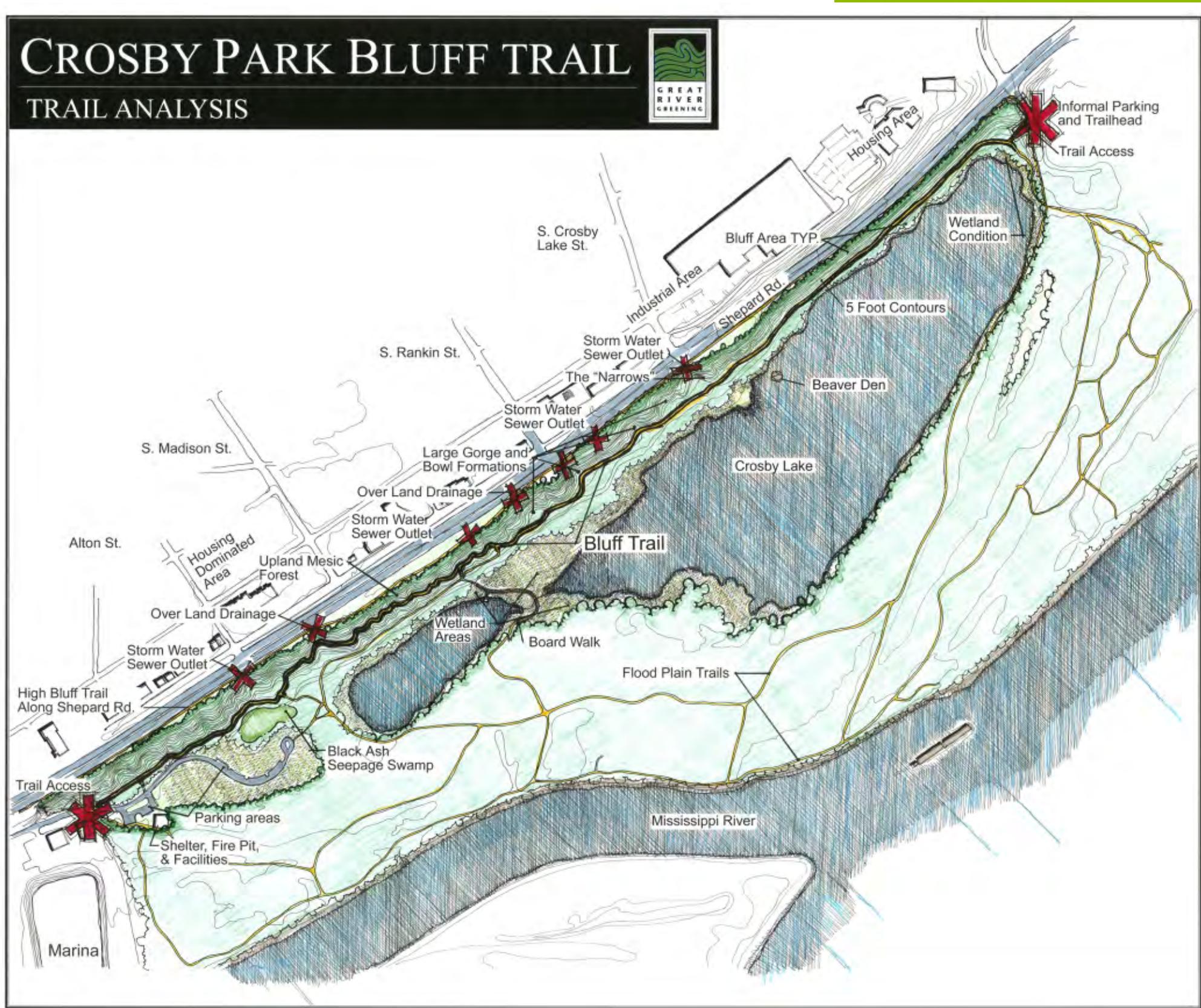
The Eco-Analysis map identifies which areas in and around Crosby Park that contain the greatest ecological value to guide an informed design and set of recommendations. Areas were rated by using the ecological protocol for open space protection opportunities in the Mississippi National River and Recreation Area (MNRRRA). The protocol evaluates MLCCS (Minnesota Land Cover Classification System) polygons and classifies each polygon by numerical ranking. Numerical values are then grouped together to give a simplified ranking: ranging from very high to very low. Nearly all of Crosby Park ranks as high or very high in ecological value.

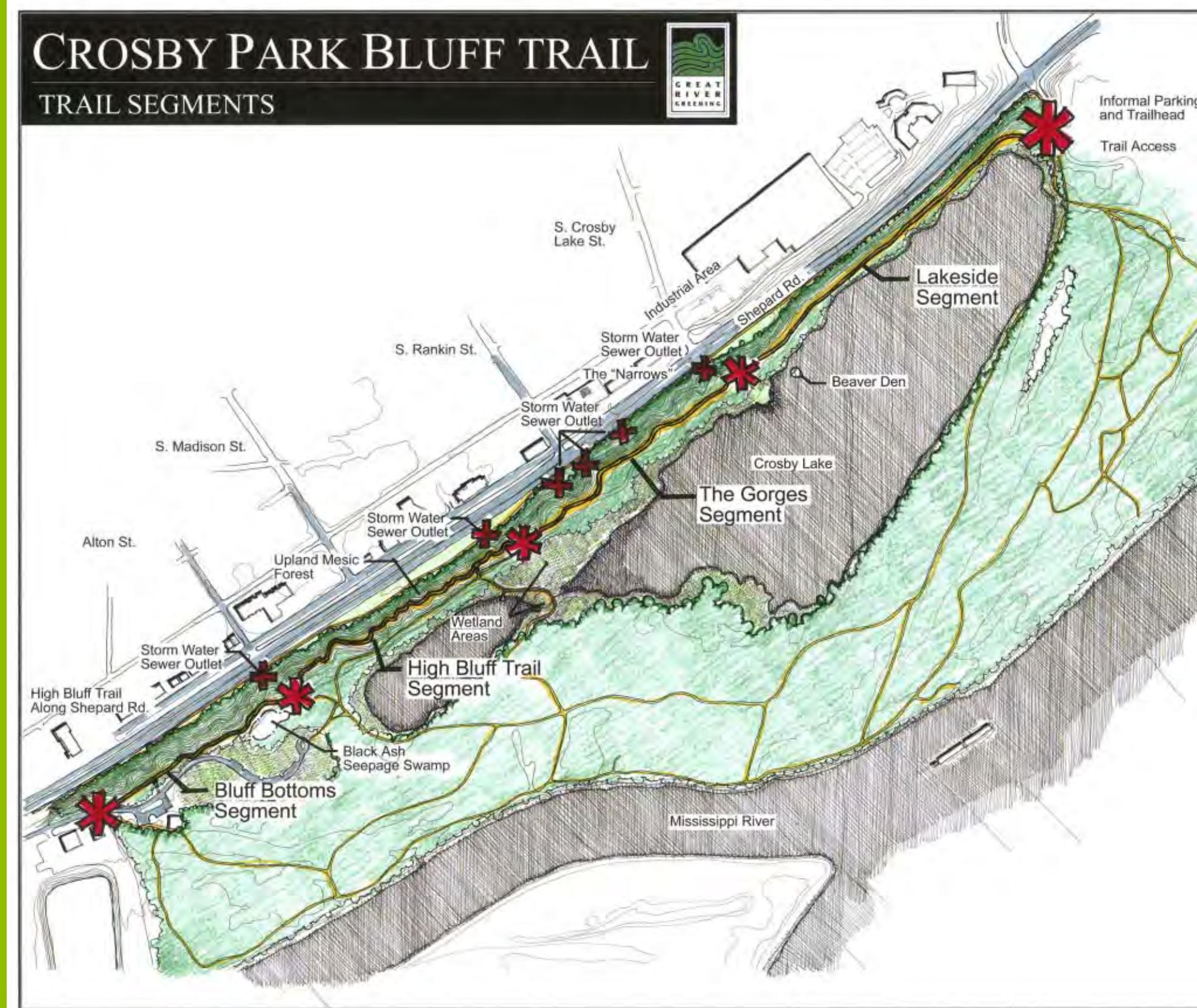
# Site Analysis



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail





# Trail Segment Plans



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Bluff Trail Segments:

The Bluff Trail can be divided into four distinct segments, each with its own special character.

Moving from west to east, the first segment is the Bluff Bottoms segment. It is characterized by the location of the trail at the base of the bluffs, first near the west parking lot and then along the edge of a black ash seepage swamp.

The second segment is the High Bluff Trail segment. It is characterized by the elevated location of the trail and the experience of being up in the trees and upon the steep bluff slopes.

The third segment is the Gorges segment. Here the trail moves down to the base of the bluffs once more, which features a number of broad, bowl-shaped ravines and narrow, eroded gorges.

The fourth and final segment is the Lakeside segment. Here the trail moves near the edge of Crosby Lake, with framed views to the water.

On the following pages, each trail segment is dealt with individually, identifying specific problem areas along the trail. For each portion of the trail, the current condition of the trail and supporting structures is given, followed by design recommendations to improve the condition. The number(s) listed with each recommendation refer to specific design details, arranged by number, in the final portion of the document. Restoration of native vegetation is needed along the entire trail, so there are no specific points indicated for this recommendation. For planting details and considerations, see Design Details #7, #8, and #9.

Bluff Bottoms



High Bluff

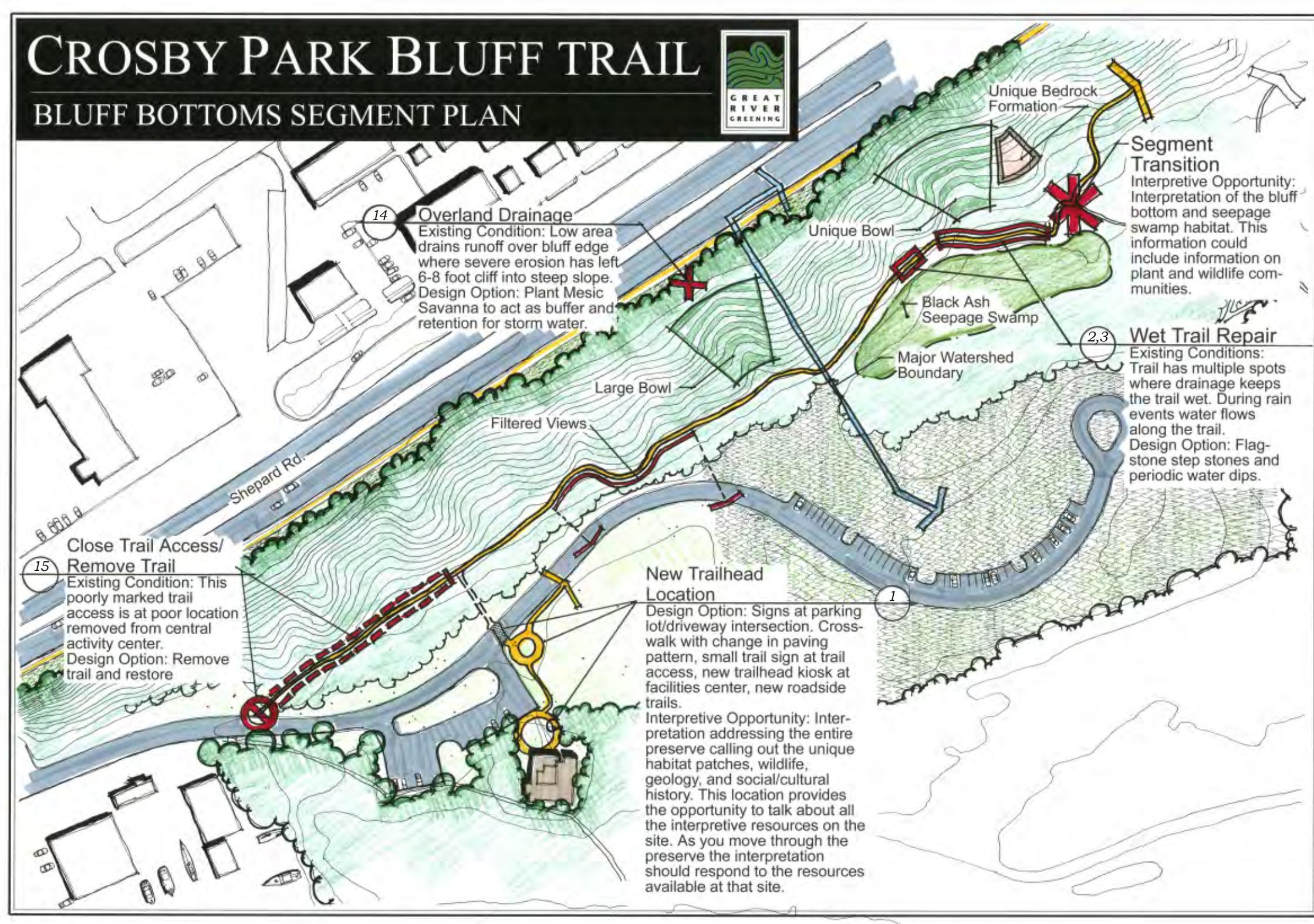


The Gorges



Lakeside





# Trail Segment Plans

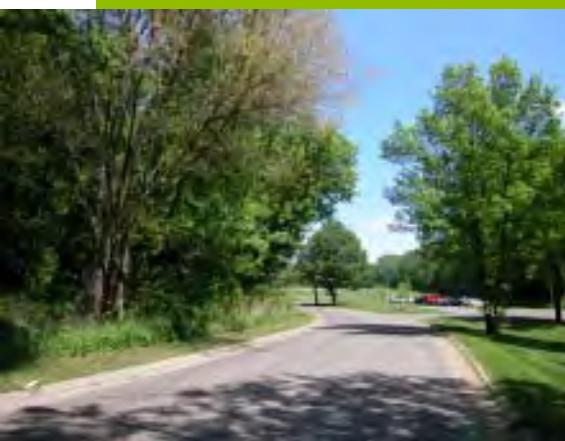


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Trail Segment 1: Bluff Bottoms

The Bluff Bottoms Trail Segment begins at the park's west parking lot and ends where the trail climbs the bluff slope. It begins with a strong sense of enclosure, pressed between the park access road and the bluff. Soon the space between the trail and road expands, and the rest of this trail segment runs between the bluff and a black ash seepage swamp. In the swamp the understory is open, filled with the slender trunks of black ash trees. This entire segment is characterized by wet soil conditions, with muddy trails after rain. The depressed area between the trail and road becomes inundated after storms, and there is no outlet for this stormwater except for slow infiltration into the ground. In general, the native vegetation is relatively high in quality along this segment of the trail, with patches of wild ginger, jack-in-the-pulpit, bloodroot, and trout lily. Infestations of garlic mustard are less severe here than in the other segments.



*The entrance and parking lot, at the bluff trail's beginning.*



*The black ash seepage swamp, along which the trail winds.*



*Sandstone bedrock exposed near the trail.*



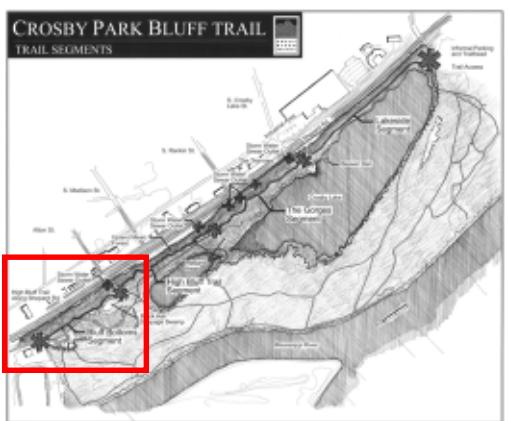
*Filtered views from the trail to the access road and lawn area.*

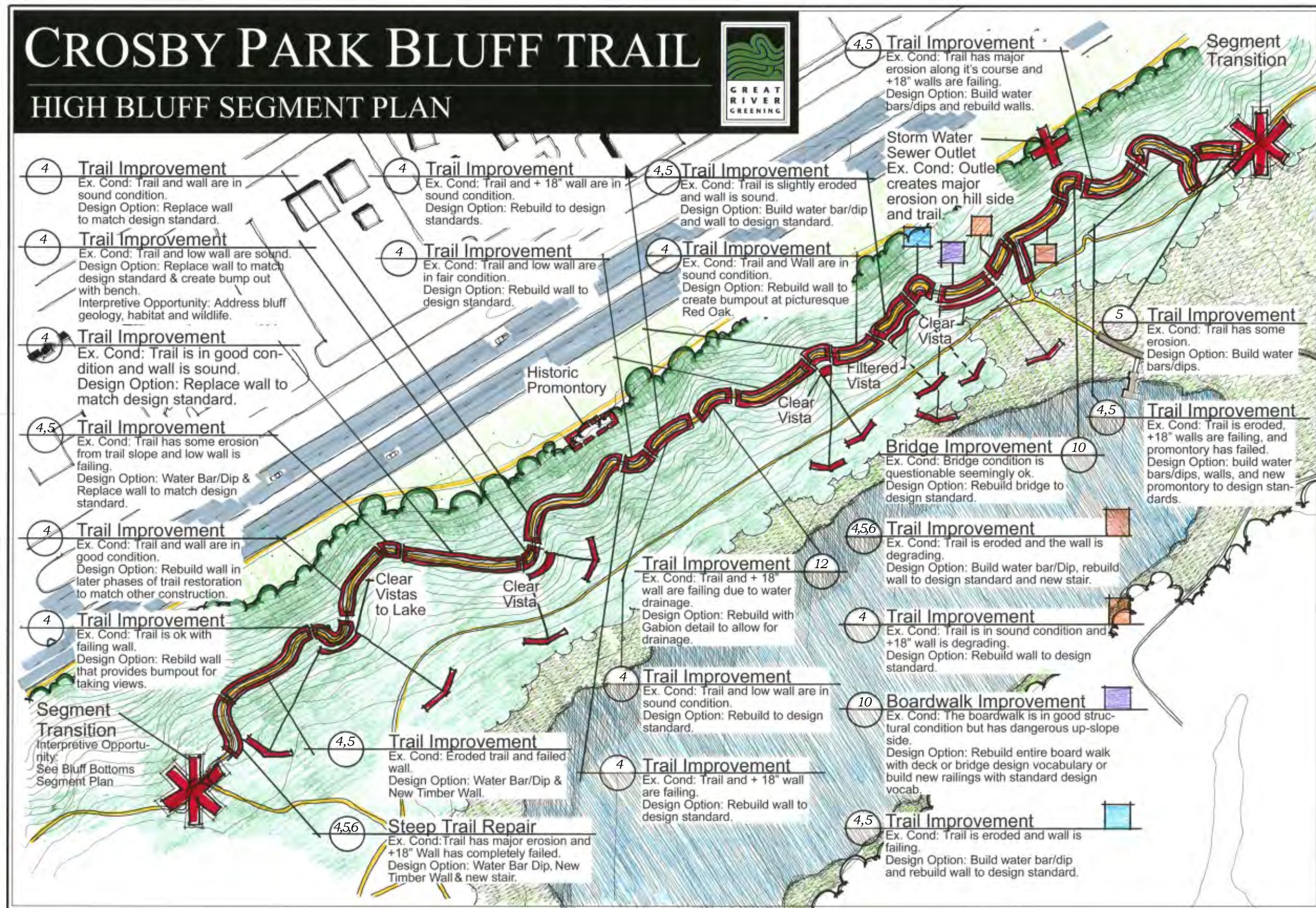


*Water running through the trail after rain.*



*The unique bowl, filled and stabilized with rubble dumped from the top of the bluff.*





# Trail Segment Plans

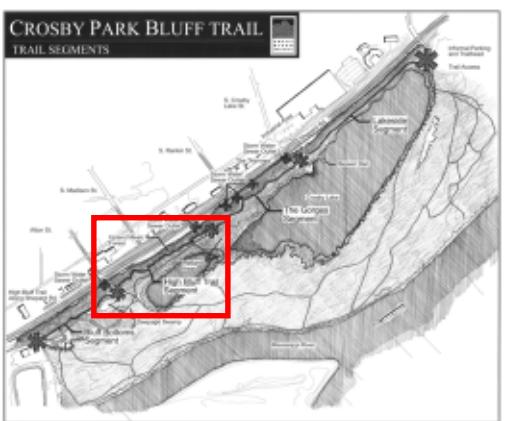


## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Trail Segment 2: High Bluff

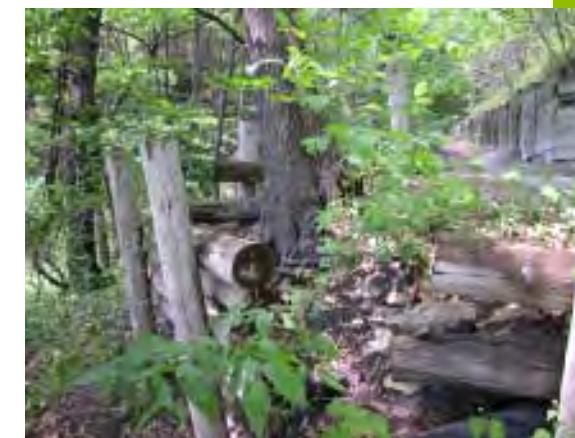
The Upper Bluff Trail Segment begins where the trail climbs the bluff slope, and ends where the trail descends again near the west end of Crosby Lake. The segment is characterized by an intimate relationship with the bluff and a feeling of prospect as the trail runs roughly halfway up the bluff slope. The trail twists and turns with each ridge and draw, hugging the fissured topography. Though Shephard Road is not far away at the top of the slope, the presence of its traffic is not strongly felt. However, the impact of stormwater from its surface is seen in the eroded draws. At many points the trail position is quite precarious, with steep slopes above and below. The understory vegetation is open enough to allow views to the flatland below and well up the bluff slope. Erosion is a serious issue along the entire length of this segment, both on the trail itself and on the adjacent slopes. Of all the segments, this is the one on which mountain biking should be most discouraged. The presence of staircases at either end of the trail segment should help keep bikes on the lower trails that are less prone to erosion. A staircase already exists at the east end of the segment, and we recommend adding one at the west end.



Start of segment, stairs recommended.



Abandoned trail to old overlook.



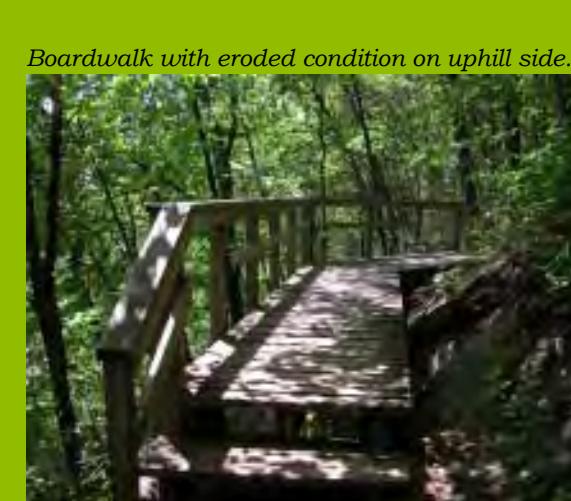
Severely eroded promontory.



Filtered views to paved trail below.



Most recent, sturdy timber wall.



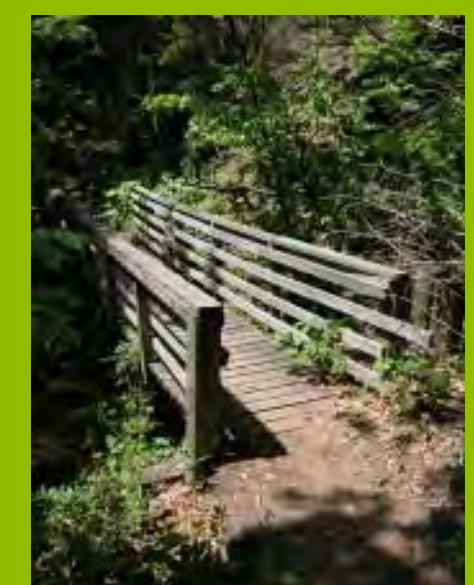
Boardwalk with eroded condition on uphill side.



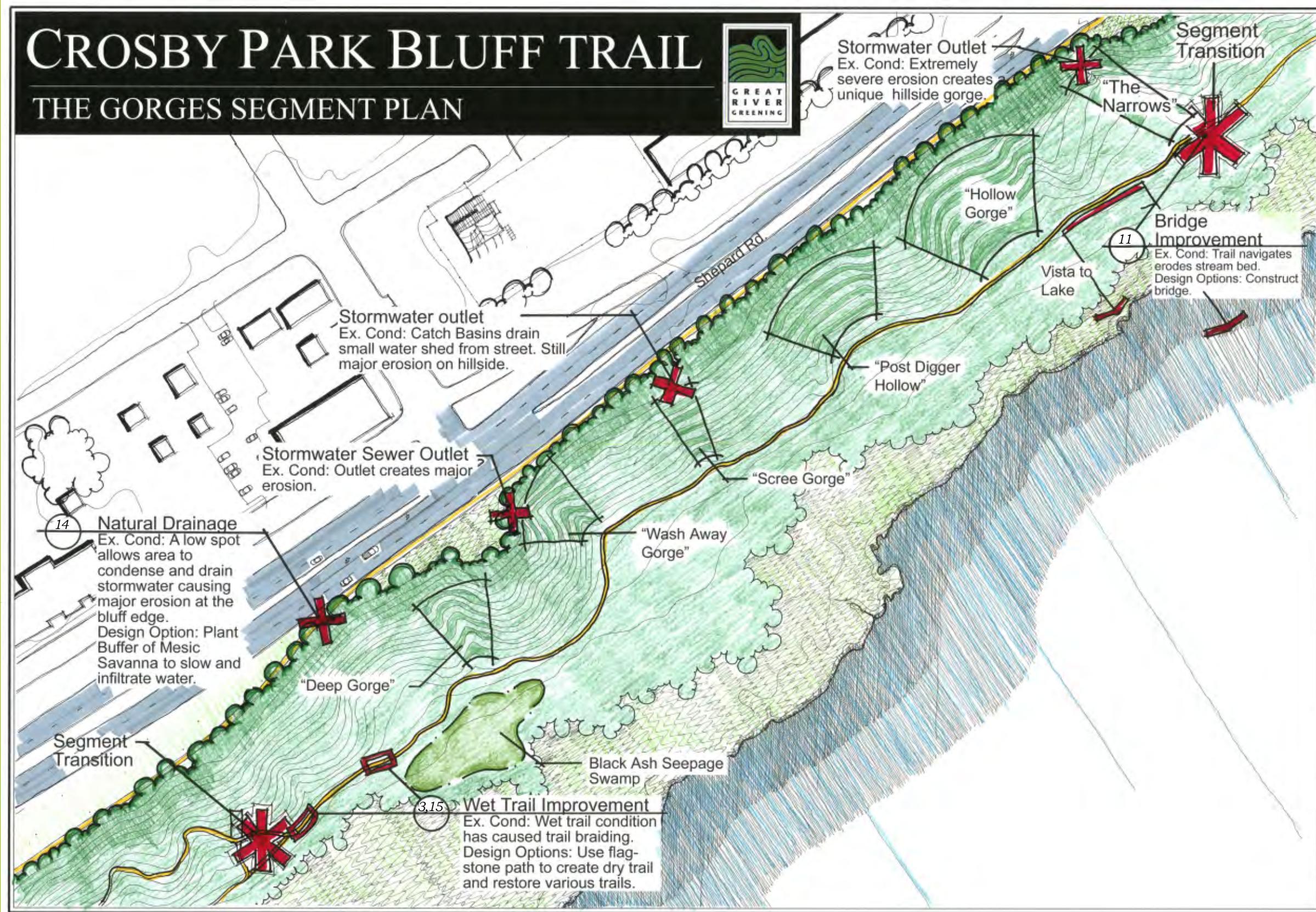
Limestone outcropping at top of bluff.



Water on trail, gabion's recommended.



Existing bridge.



# Trail Segment Plans



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Trail Segment 3: The Gorges

The Gorges Trail Segment begins at the staircase near the west end of Crosby Lake and ends at the dramatic canyon feature referred to in this document as "The Narrows." Here the trail is at the base of the bluff, with a few short climbs over ridges that reach across the trail. The bluff has a strong presence here, experienced as a series of broad, bowl-shaped draws and narrower ravines. The south side of the trail alternates between open black ash seepage swamp and more enclosed lowland forest, with occasional filtered views of the lake. Many of the draws are severely and spectacularly eroded, the result of several stormwater outlets at the top of the bluff. The most dramatic of all the gorges, The Narrows, marks the end of this segment. It is a narrow, twisting canyon carved directly out of the sandstone bedrock and cutting straight back into the bluff. Where runoff from the narrows enters Crosby Lake, there is a large sandy delta.



A particularly severe infestation of garlic mustard.



The entrance to the Narrows.



The falls at the top of the Narrows, only a trickle in dry weather.

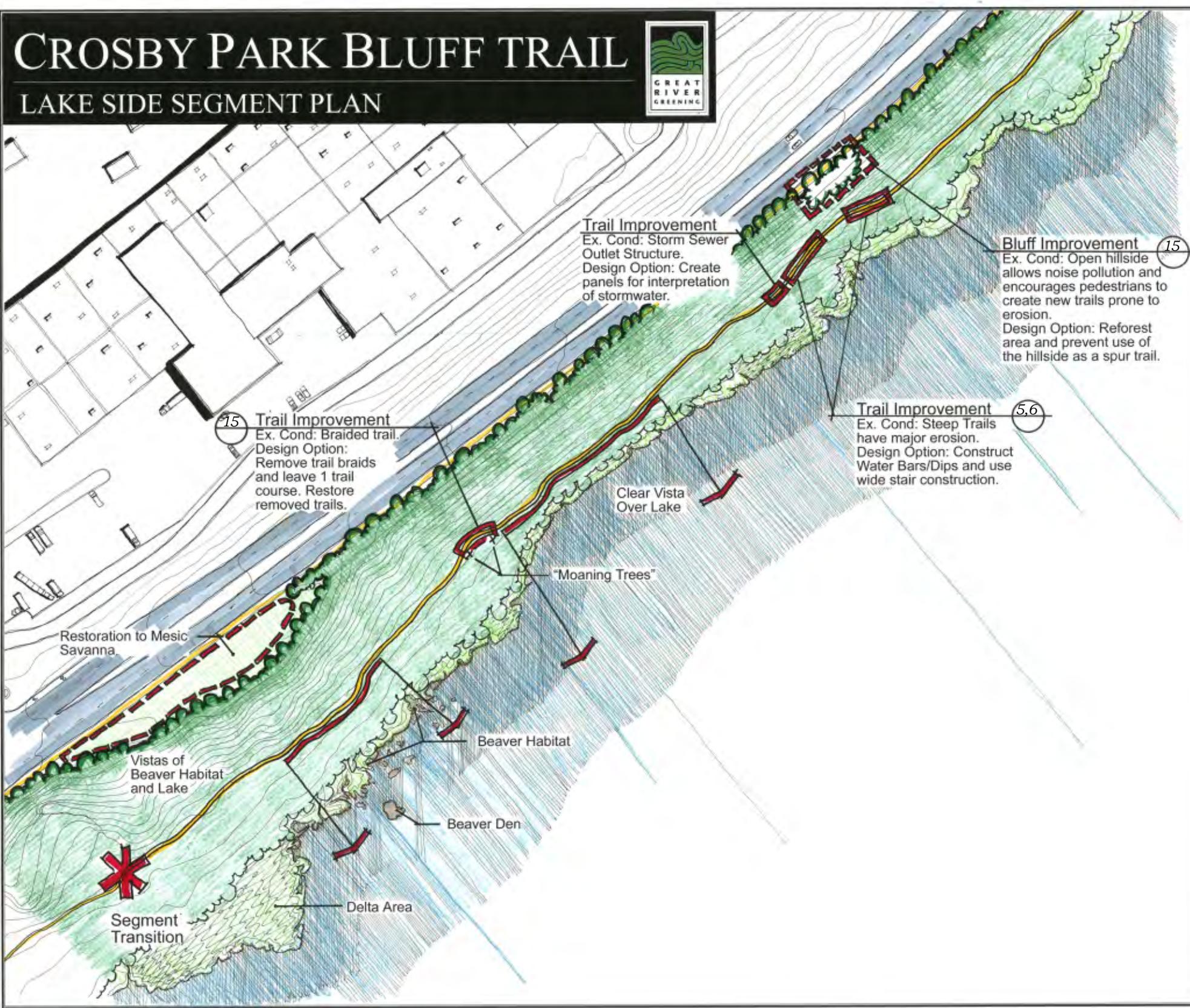


One of several severely eroded gorges, with sculpted sandstone walls and filled with rubble.



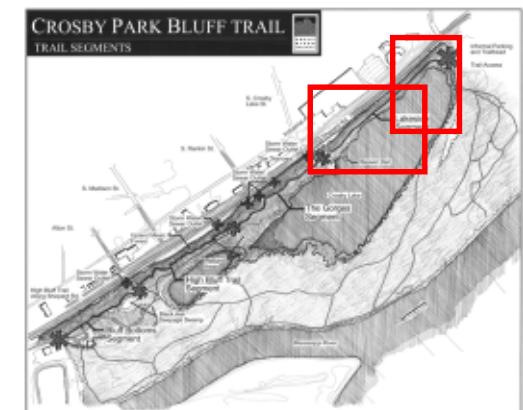
Another severely eroded gorge, above, with the cause of its erosion, a storm water pipe, below.





### Trail Segment 4: Lakeside

The Lakeside Trail Segment begins at The Narrows and ends at the access road at the east end of Crosby Lake. This is the longest segment of the trail. It runs mostly at the base of the bluff, with a few short climbs up the slope followed shortly by descents. Here the distance between the bluff and the lake is quite narrow, so the trail remains relatively close to the water's edge. If the experience of the previous segment was dominated by the bluff, this segment is dominated by the water. The segment begins with views to a massive beaver lodge, surrounded by evidence of the beavers' handiwork on the vegetation and in the lake itself. There is also evidence of human activity in this area in the form of small concrete foundations and a large cave carved out of a sandstone ridge. As the trail moves eastward, the presence of traffic on Shephard Road becomes more noticeable as the road slowly descends with the diminishing bluff. A significant feature near the end of the segment is a massive stormwater outlet structure. Beyond the outlet structure, the trail becomes more enclosed as it winds through an area where dense stands of buckthorn have not yet been removed.

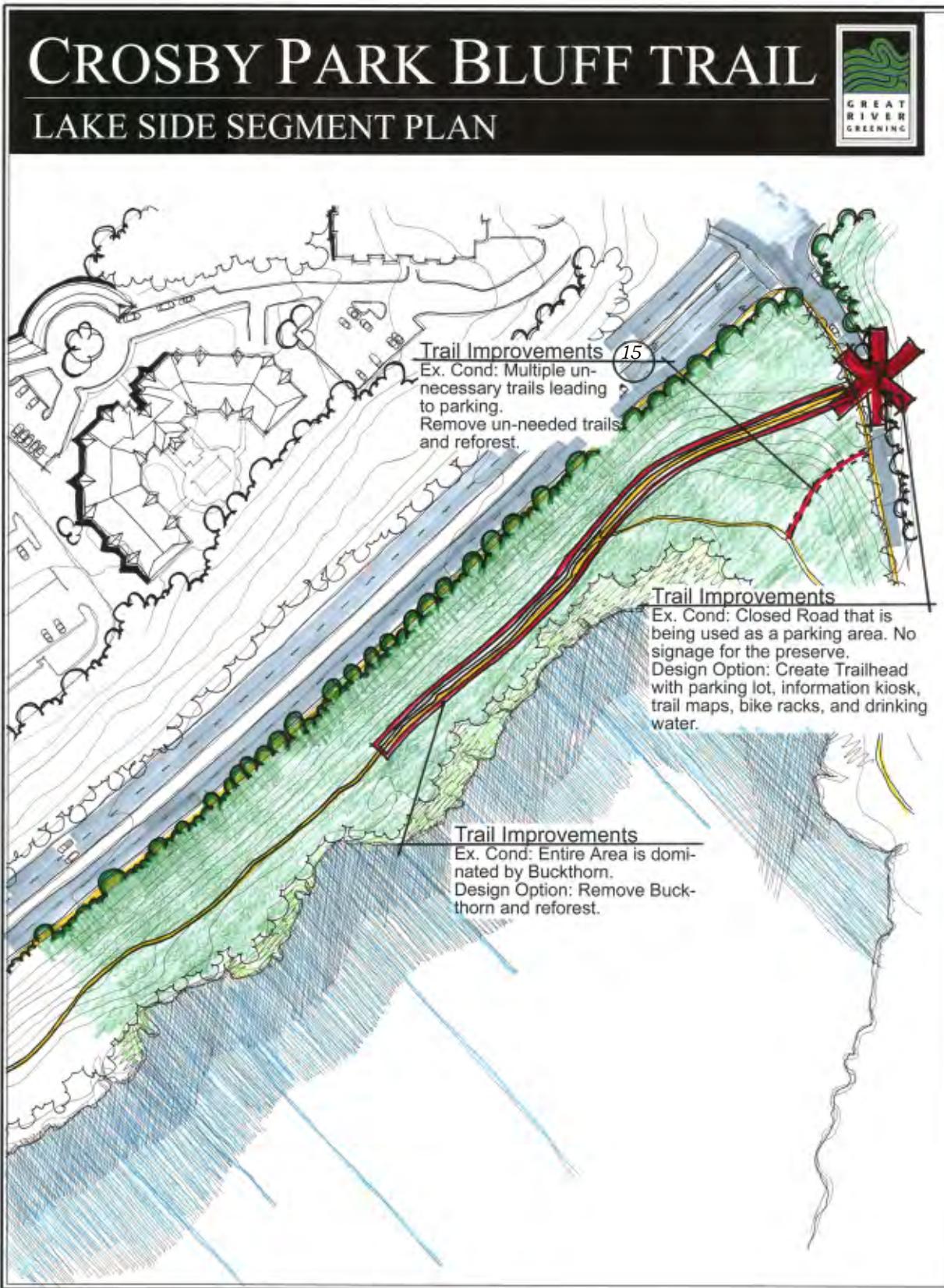


# Trail Segment Plans



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



Sloped and eroded trail, where wide stairs are recommended.



Sandy delta where water from the Narrows enters Crosby Lake.



Large storm water outlet structure, an opportunity for interpretation.



The informal parking and trailhead at the end of the bluff trail.



Large beaver den east of the delta.



Braided trail, where one should be closed and the other improved.

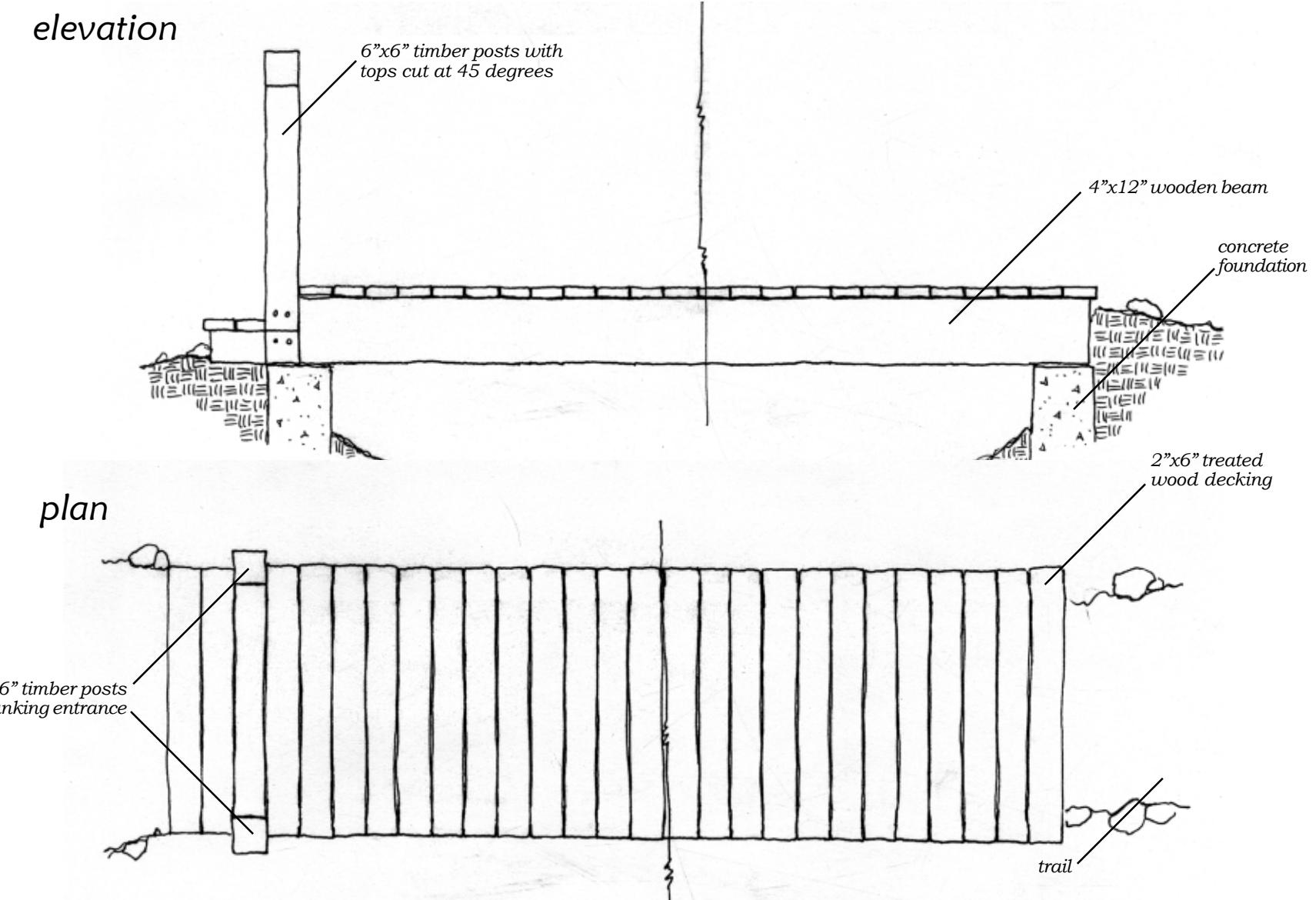


### Bluff Bottom, Wet Condition

There are many areas at the bottom of the bluff where the flow and accumulation of water is a problem. The goal in these areas is to allow both the passage of water and the movement of people, without one impeding the other.

#### Detail #1: Trailhead Bridge

- Bridge is simple boardwalk without railing.
- 6x6" posts, with tops cut at a 45 degree angle, mark the transition from the road crossing to the trailhead bridge. Timber posts bring design vocabulary of retaining walls to bridge structures.
- See Detail #11 for beam-foundation connection.

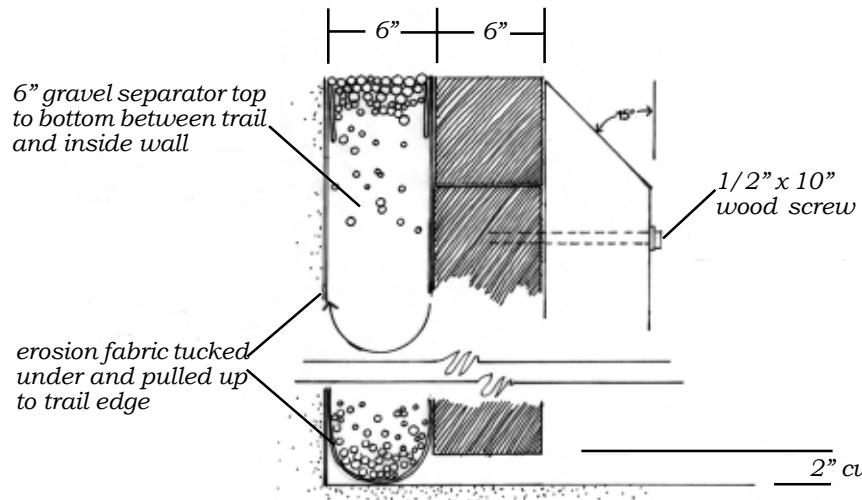


# Design Details

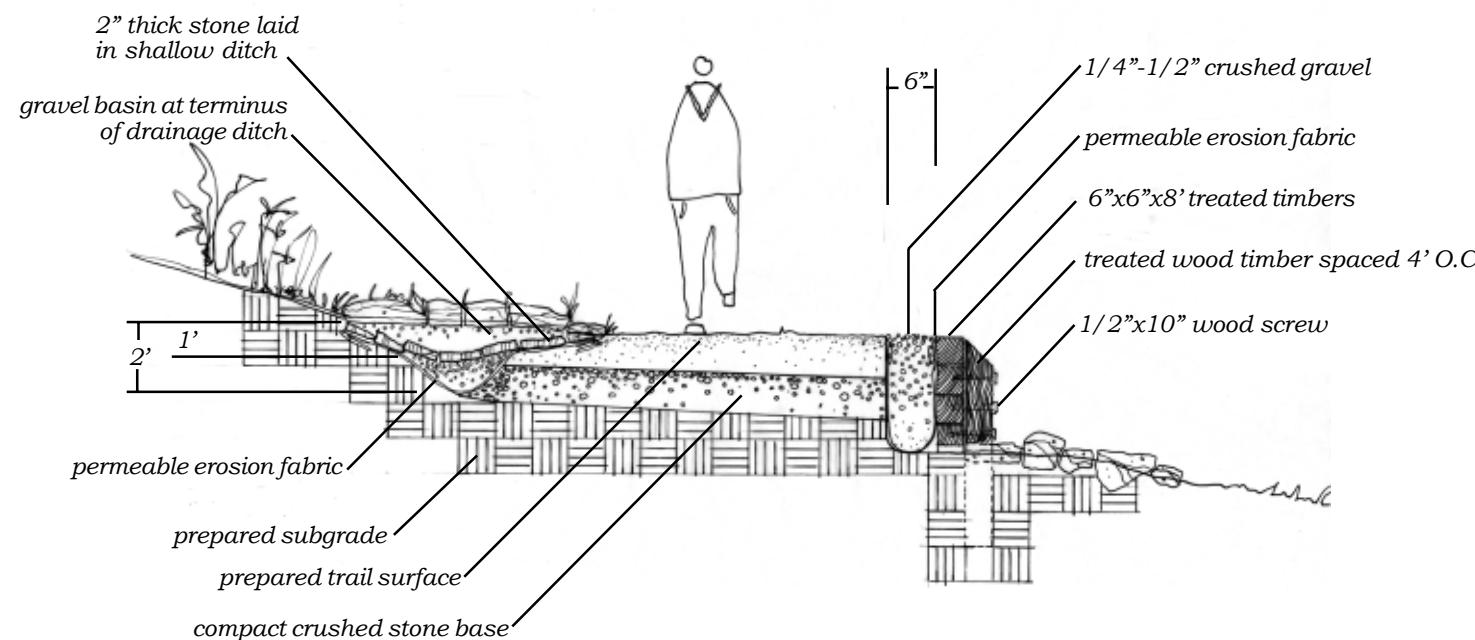


## Detail #2: Drainage Ditch w/ Crossing

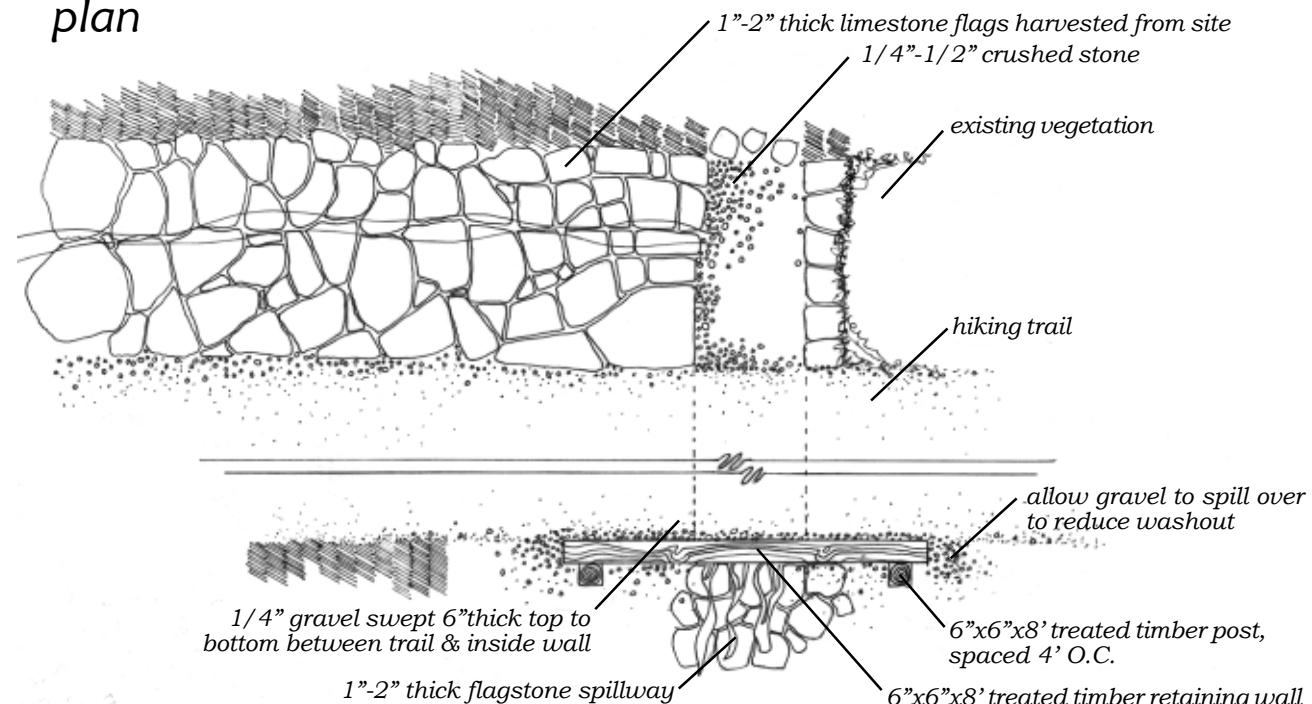
### wall section closeup



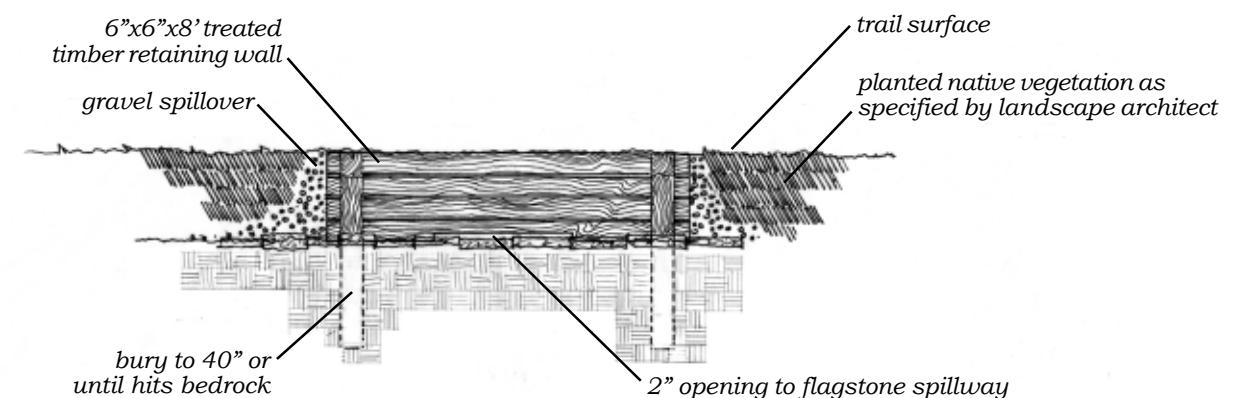
### section



### plan



### elevation



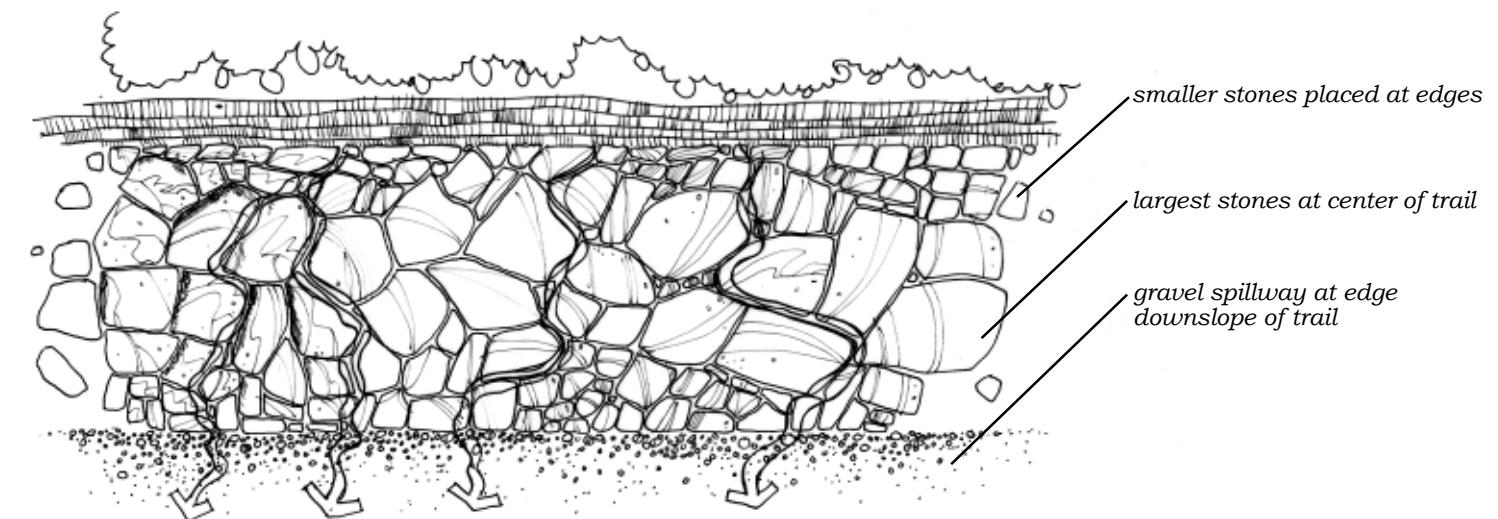


## Design Details

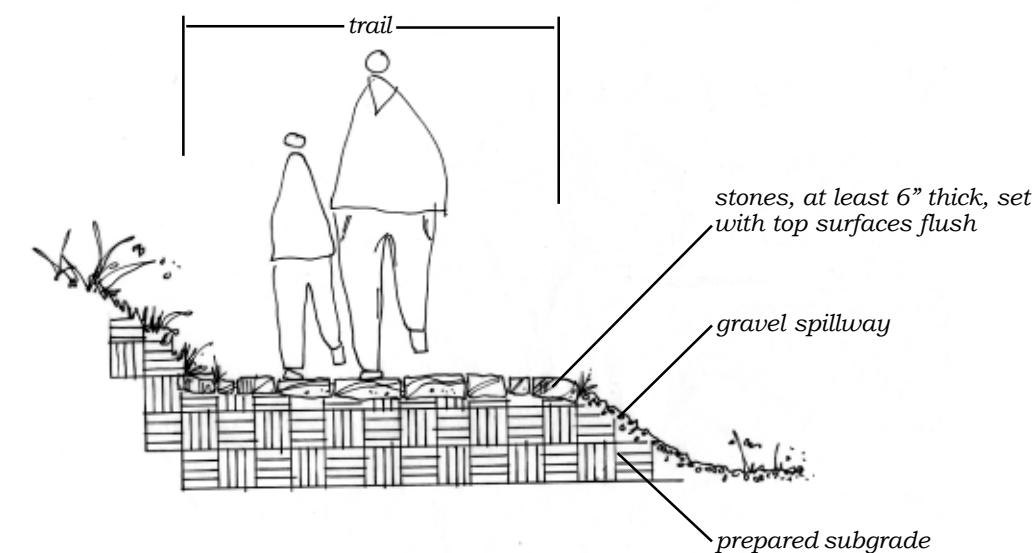
The purpose of the Stepping Stone Path detail is to keep the path dry for foot traffic, and to avoid the formation of large muddy patches in the trail after rain. It is meant to be applied in areas where heavy foot traffic intensifies the erosion process. Successful implementation of this design requires that the stepping stones be thick enough (approx. 6") and firmly set into the trail so that washout does not occur. Limestone rubble of appropriate dimensions found on site may be used. The gravel spillway functions to slow down sheet flow off the trail.

### Detail #3: Stepping Stone Path

*plan*



*section*



# Design Details



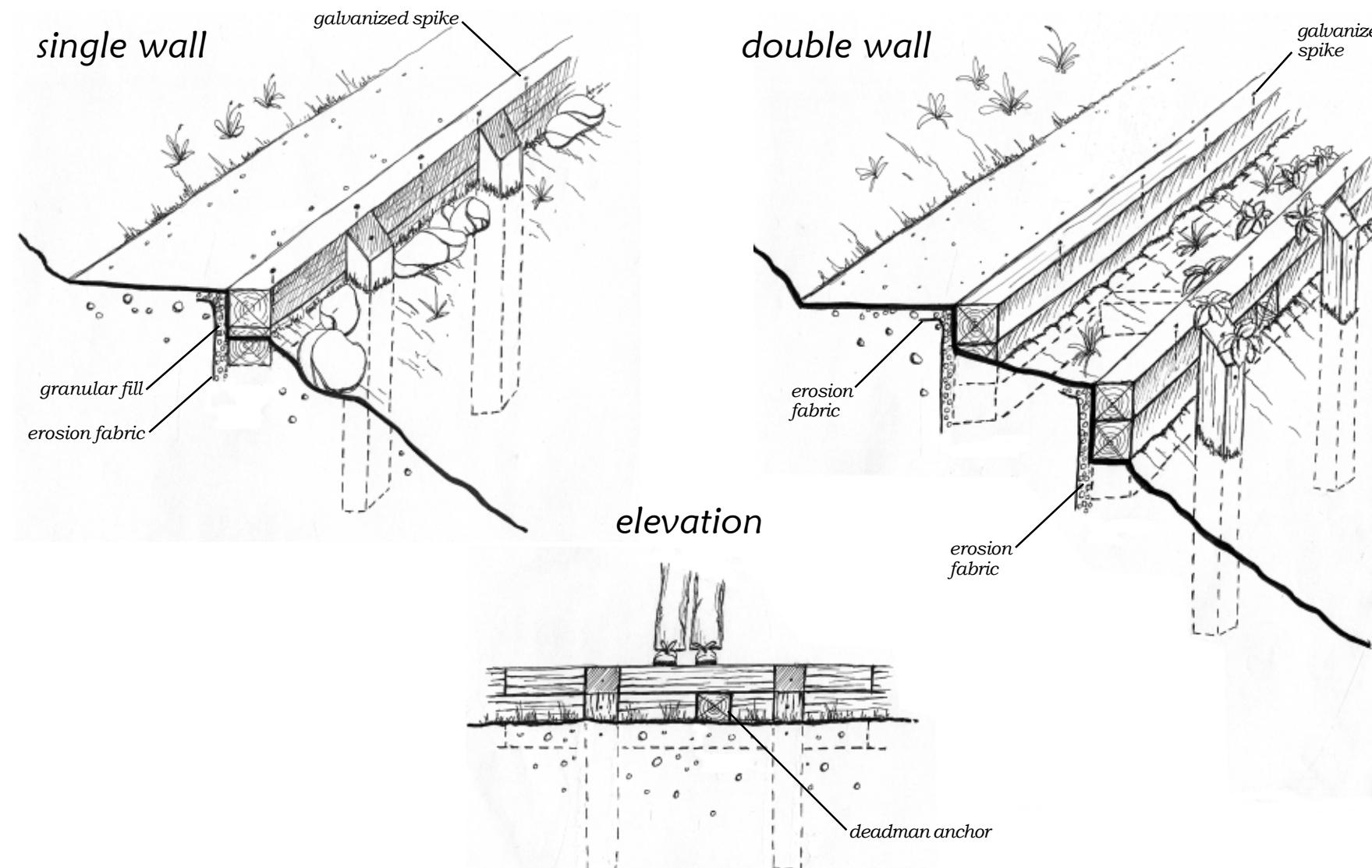
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Steep Slope Condition

Erosion as a result of steep slopes is a problem all along the bluff, both on and off the trail. The following details offer solutions on these slopes. They seek to stabilize the slopes, allowing movement of people and water without excess movement of soil.

#### Detail #4: Retaining Wall



- Construct walls with 6 by 6 timber posts and rails.
- Use 3/8" galvanized spikes 10 - 12" long.
- Utilize a minimum of 4 spikes per 8', with 2 spikes at connection points.
- Replace existing telephone pole walls with timber walls as they decompose.
- Utilize gravel or limestone debris and erosion fabric behind timber walls to facilitate infiltration of rainwater.
- Utilize drainage dips (see detail #5) along wall sections to divert water.
- Bury posts 3.5 feet deep or to the depth of bedrock.
- Bury at least one rail into the ground for sufficient stability.
- Double walls should be utilized for walls higher than 3-feet to break up the visual effect and help divert water.
- Utilize dead man anchoring with double walls.
- Utilize plantings between double walls to soften edges and increase absorption of rainwater.

# Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail



## Design Details

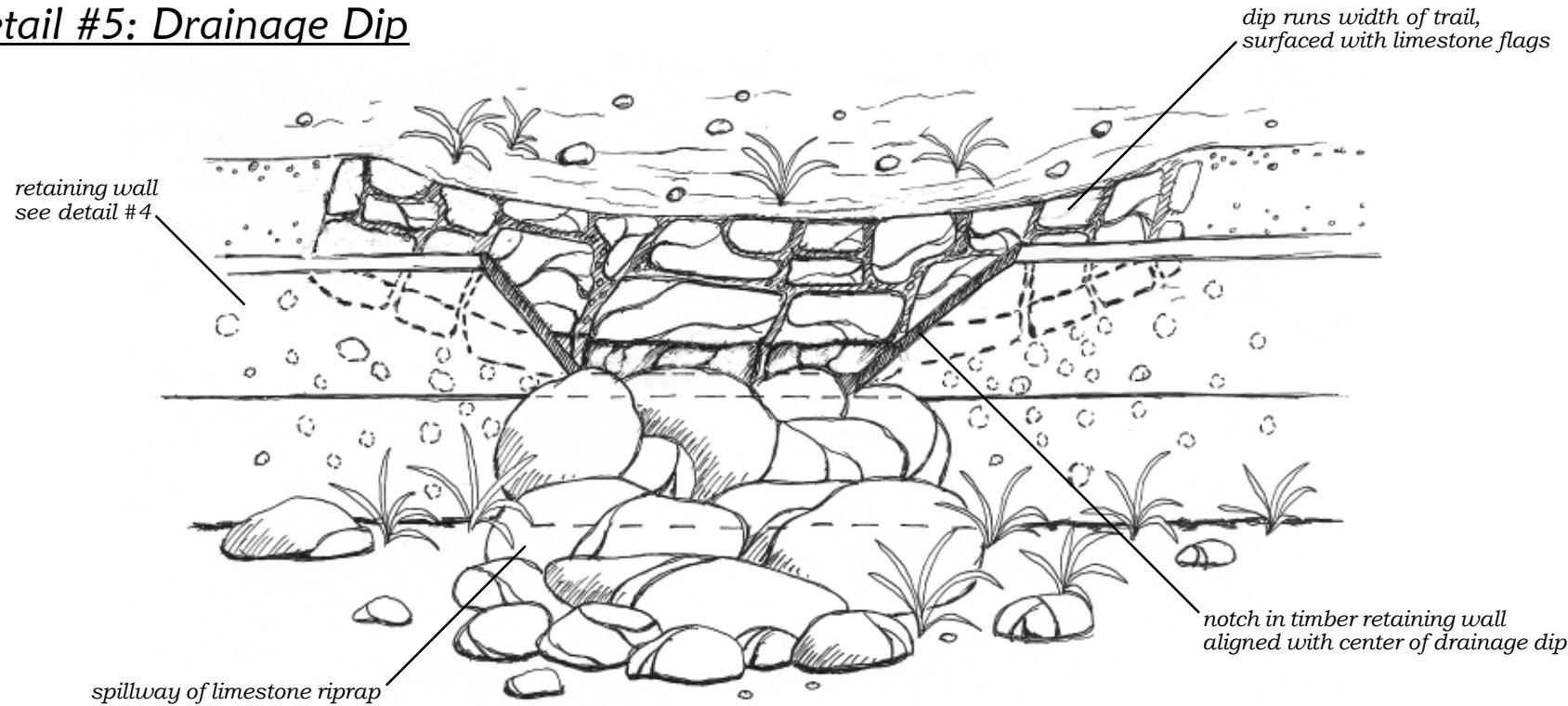
- The drainage dip is a method of diverting rainwater from the trail surface, similar to a water bar.
- Drainage dips utilize gaps in timber walls where water is directed via stone depressions from the trail surface.
- Gaps between the rocks that compose the stone depressions should be filled with a porous material such as gravel.
- Utilize stone rip-rap to slow the flow of water off of the trail

### Drainage Dip Spacing

Percent Grade	Spacing between Drainage Dips
5	80 ft.
10	40 ft.
15	30 ft.
25+	20 ft.

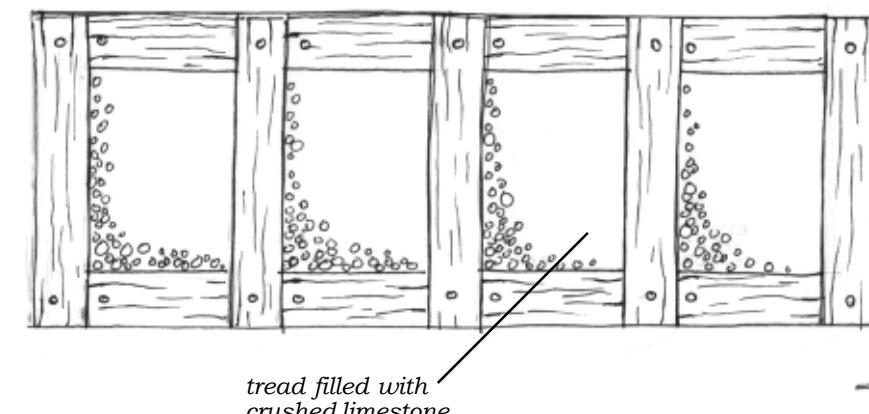
- Each step consist of a timber box that is constructed with 6 by 6 treated timbers that are connected with spikes
- The size of timber boxes will vary depending on the required width of the trail segment and the steepness of the slope being navigated.
- During construction, each box should be filled with class 5 limestone and boxes should overlap one another, leaving a tread depth that is appropriate for the slope.
- Stairs should be placed to follow the contours of the slope to minimize grading

### Detail #5: Drainage Dip

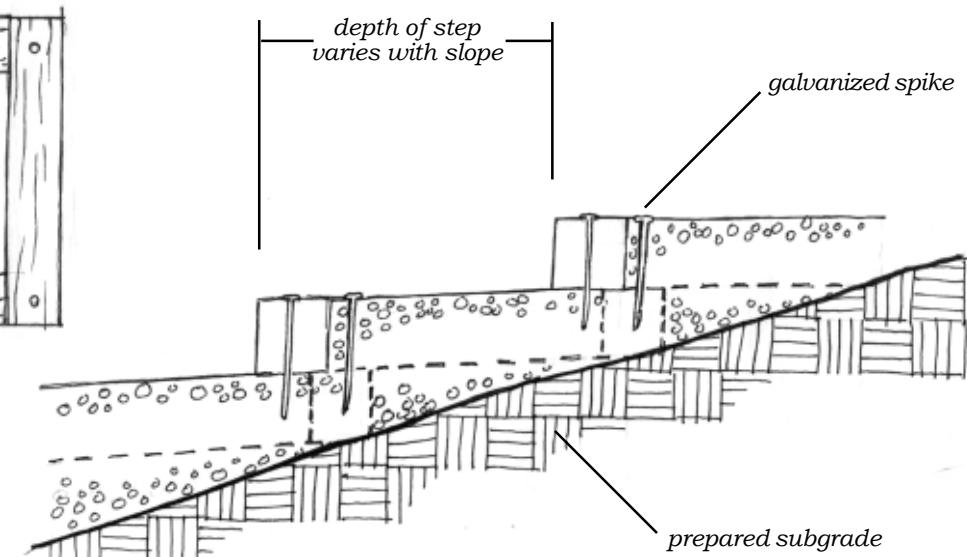


### Detail #6: Stairs

#### *plan*



#### *section*



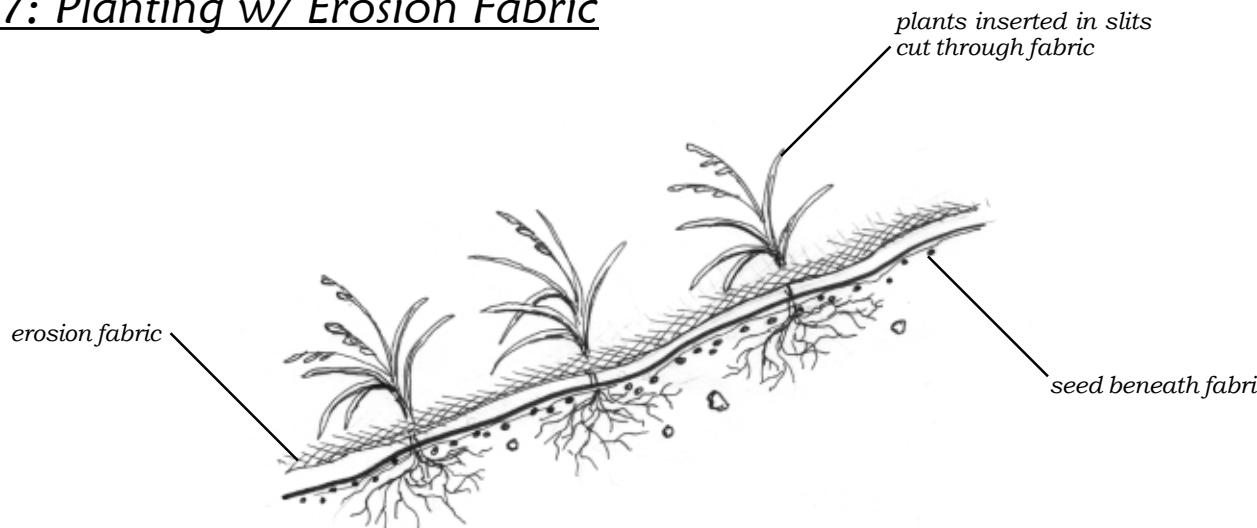
# Design Details



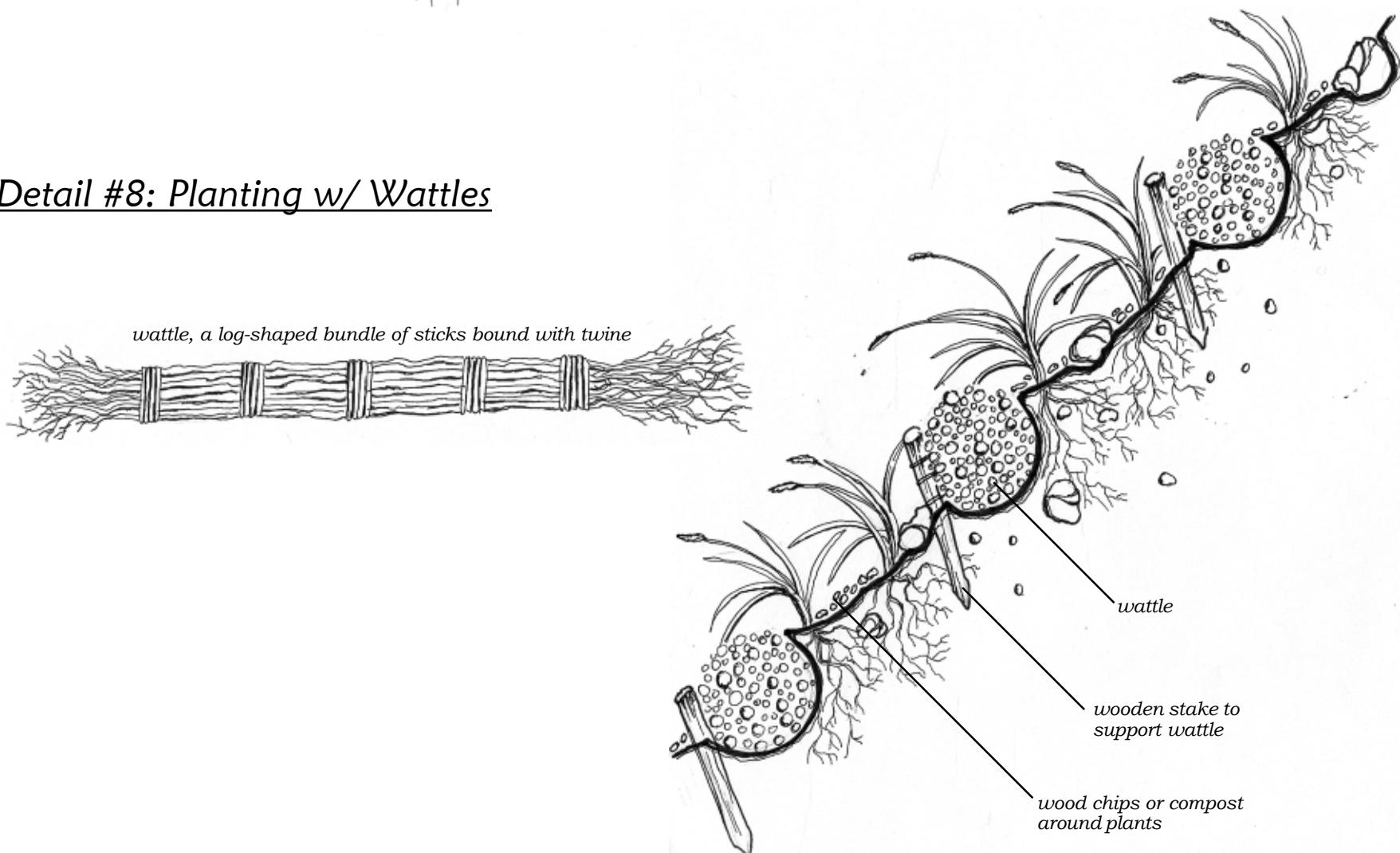
## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Detail #7: Planting w/ Erosion Fabric



### Detail #8: Planting w/ Wattles



-Erosion fabric should be utilized wherever seeding will be a component of a planting.

-Seeding is generally recommended when relatively large areas are being planted and containerized plantings are not cost effective. If local seed is available it is often a good idea to utilize it in addition to installing mature plants in case the planting is unsuccessful.

-The use of erosion fabric may be preferred over wattles for large areas, as it is easier to install. The drawback of only using erosion fabric is that it does not create changes in topography where moisture and organic material can collect.

-In addition to seed, mature plants can be installed with erosion fabric. Slits can be cut in the fabric for the installation of plants.

-Erosion fabric can also be utilized in combination with wattles. In this instance, trenches for the wattles are dug and then the fabric is laid. Subsequently, the wattles should be placed over the fabric.

-Use wire or cornstarch staples to secure erosion fabric and wooden stakes to secure wattles.

-Brush wattles or biologs can be utilized to stabilize slopes and create plateaus where plants can receive increased moisture.

-Once plants are established, their root systems will help stabilize the slope.

-Bundle wattles together with twine. Bury about half of the wattle into the slope and utilize wood stakes to secure them to the slope.

-Wattles should be installed before seed and plants are installed.

-Two or three inches of wood chips should be spread around plants.

-Compost should be used instead of wood chips for slopes greater than 3:1. The compost will hold better to the slope than wood chip, but will decompose more quickly.

-In areas of severe erosion, an engineer should be involved to provide stabilization recommendations.

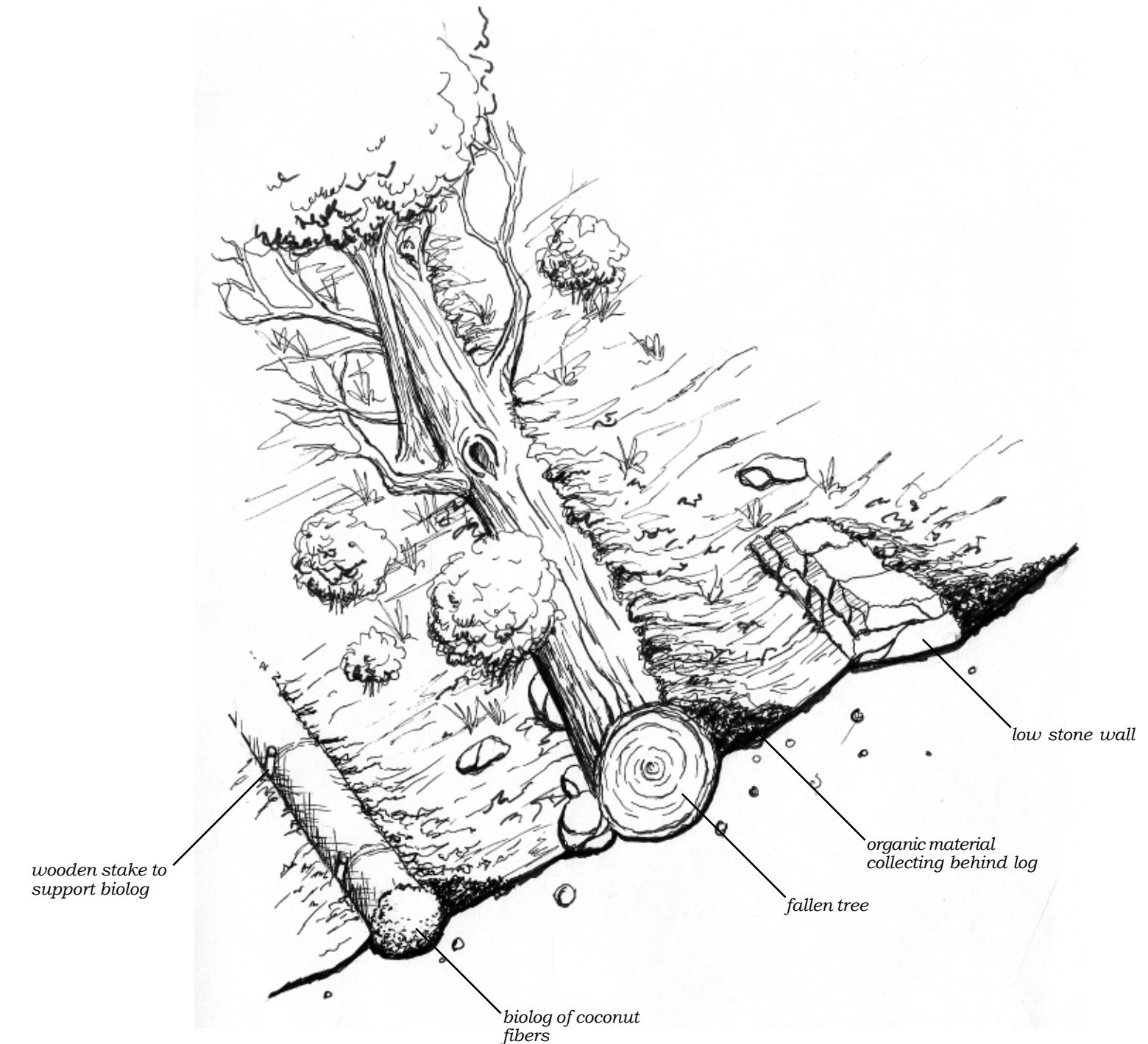


## Design Details

-A primary need is to stop the movement of soil and encourage the build-up of organic material that will aid in stabilization and plant establishment.

-Downed trees, biologs made from coconut fiber and small rock walls can be utilized as checks to stop erosion and collect organic material.

### Detail #9: Organic Collectors



# Design Details



### Plants for Stabilization:

-Key groundlayer plant species for stabilization include:

#### Wet ravines:

Lady fern	<i>Athyrium filix-femina</i>
Jack in the pulpit	<i>Artemisia triphyllum</i>
Wild ginger	<i>Asarum canadense</i>
Woodland sedge	<i>Carex blanda</i>
Wild geranium	<i>Geranium maculatum</i>
Virginia waterleaf	<i>Hydrophyllum virginianum*</i>
Ostrich fern	<i>Matteuccia struthiopteris</i>
Virginia creeper	<i>Parthenocissus inserta</i>
Bloodroot	<i>Sanguinaria canadensis</i>
Woodland meadow rue	<i>Thalictrum dioicum*</i>

#### Dry ridges:

Thimbleweed	<i>Anemone cylindrica*</i>
Columbine	<i>Aquilegia canadensis*</i>
Heart leaved aster	<i>Aster cordifolius*</i>
Harebell	<i>Campanula rotundifolia*</i>
Pennsylvania sedge	<i>Carex pennsylvanica</i>
Curly-styled wood sedge	<i>Carex rosea</i>
Sprengel's sedge	<i>Carex sprengelii*</i>
Northern bedstraw	<i>Galium boreale*</i>
Woodland sunflower	<i>Helianthus divaricatus*</i>
False Solomon's seal	<i>Smilacina racemosa*</i>
Zig Zig goldenrod	<i>Solidago flexicaulis*</i>

Note: \* Denotes that the species can be planted from seed as well as containers. See companion ecological restoration plan for Crosby park for more extensive lists for bluff restoration.



Wild Ginger - *Asarum canadense*



Wild Geranium - *Geranium maculatum*



Northern Bedstraw - *Galium boreale*



Bloodroot - *Sanguinaria canadensis*



Jack in the pulpit  
*Arisaema triphyllum*



Sprengel's Sedge  
*Carex sprengelii*



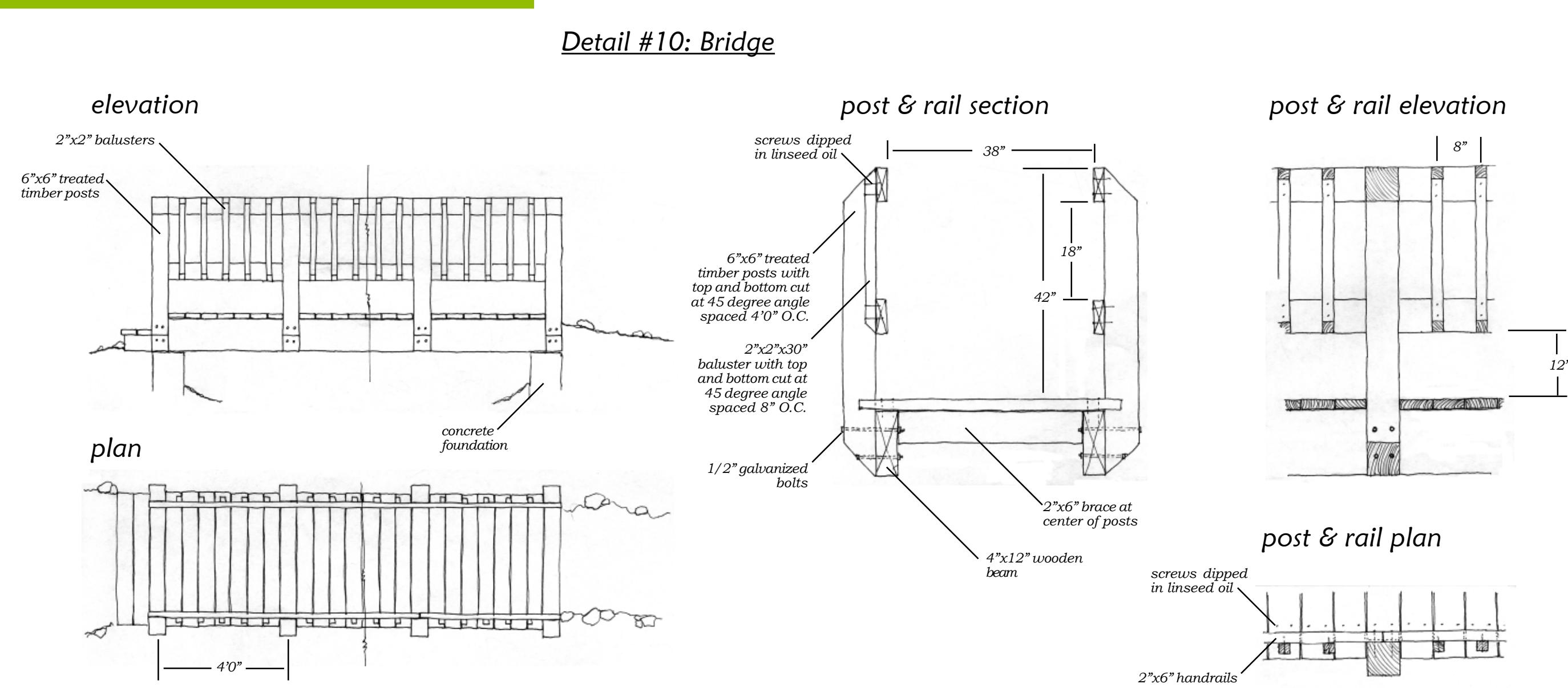
Virginia Waterleaf  
*Hydrophyllum virginianum*



### Wet Ravine Condition

The most severely eroded areas of the bluff trail are in the ravines, where stormwater repeatedly scours out the base of the ravines and the sides collapse. Some such erosion is a naturally-occurring condition, but here it is aggravated by the presence of storm water outlets at the top of the bluff, bringing water in much larger quantities than would naturally exist. This dramatic erosion cannot be slowed or stopped without dealing with the stormwater outlets. However, we can help people navigate the ravines while still allowing water to pass through.

#### Detail #10: Bridge



# Design Details

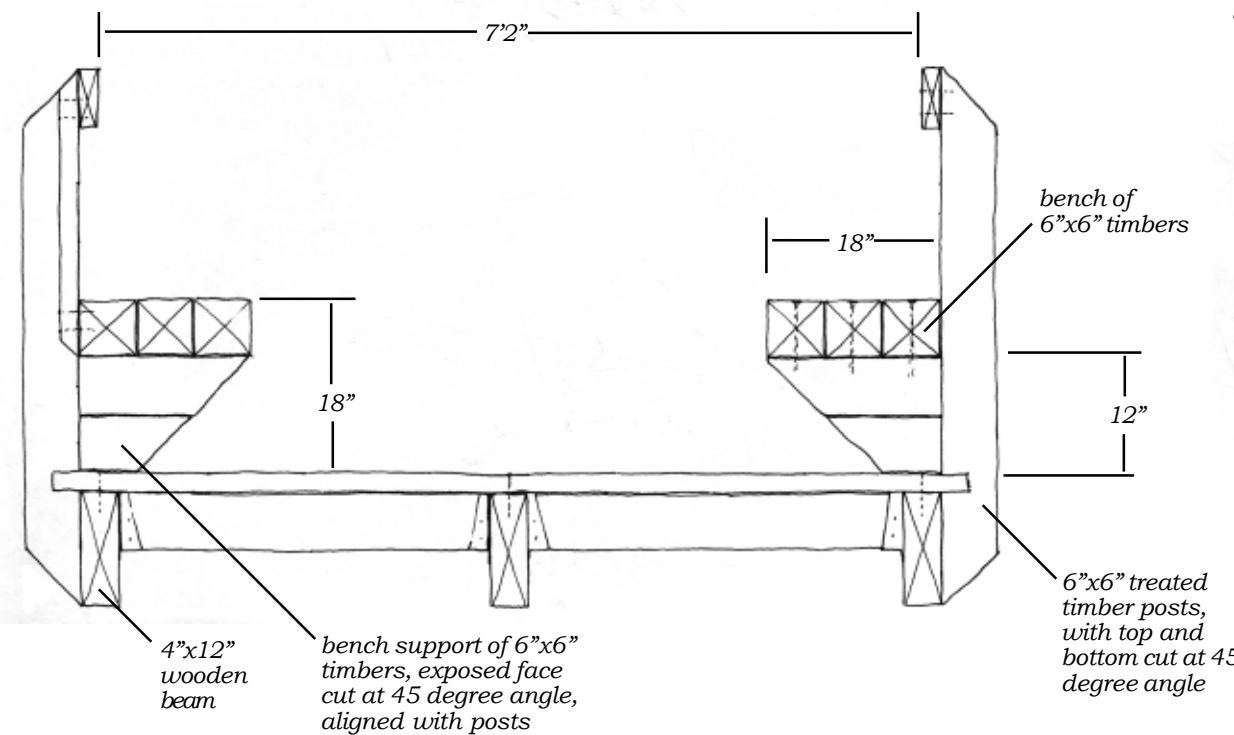


Crosby Park: Bluff Trail Project

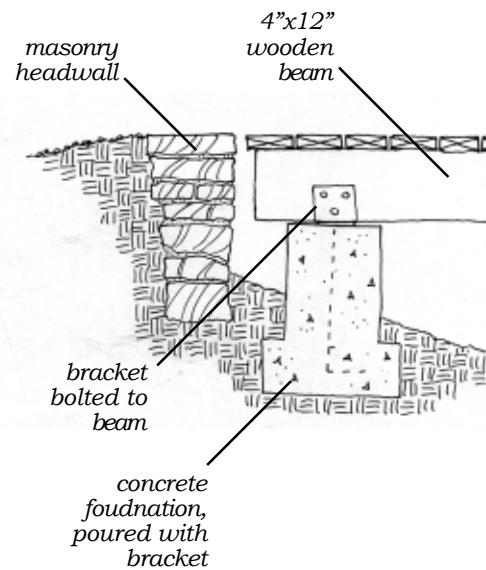
Design Strategies for an Ecologically Sustainable Bluff Trail

## Detail #11: Bridge w/ Seating

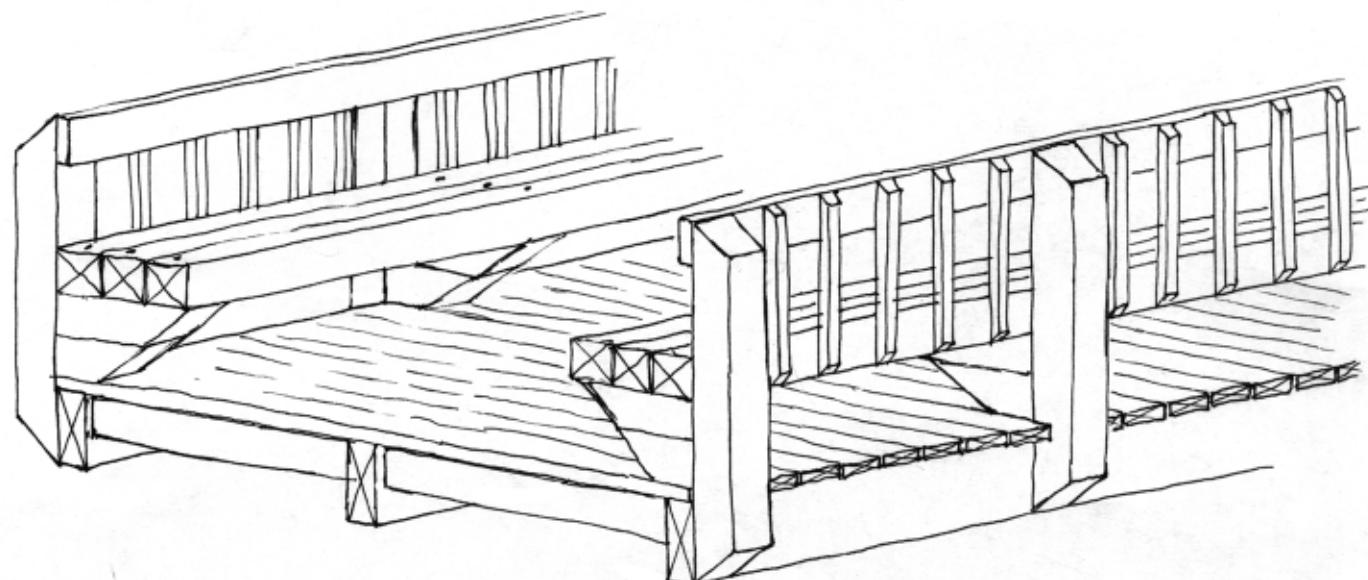
section



foundation connection



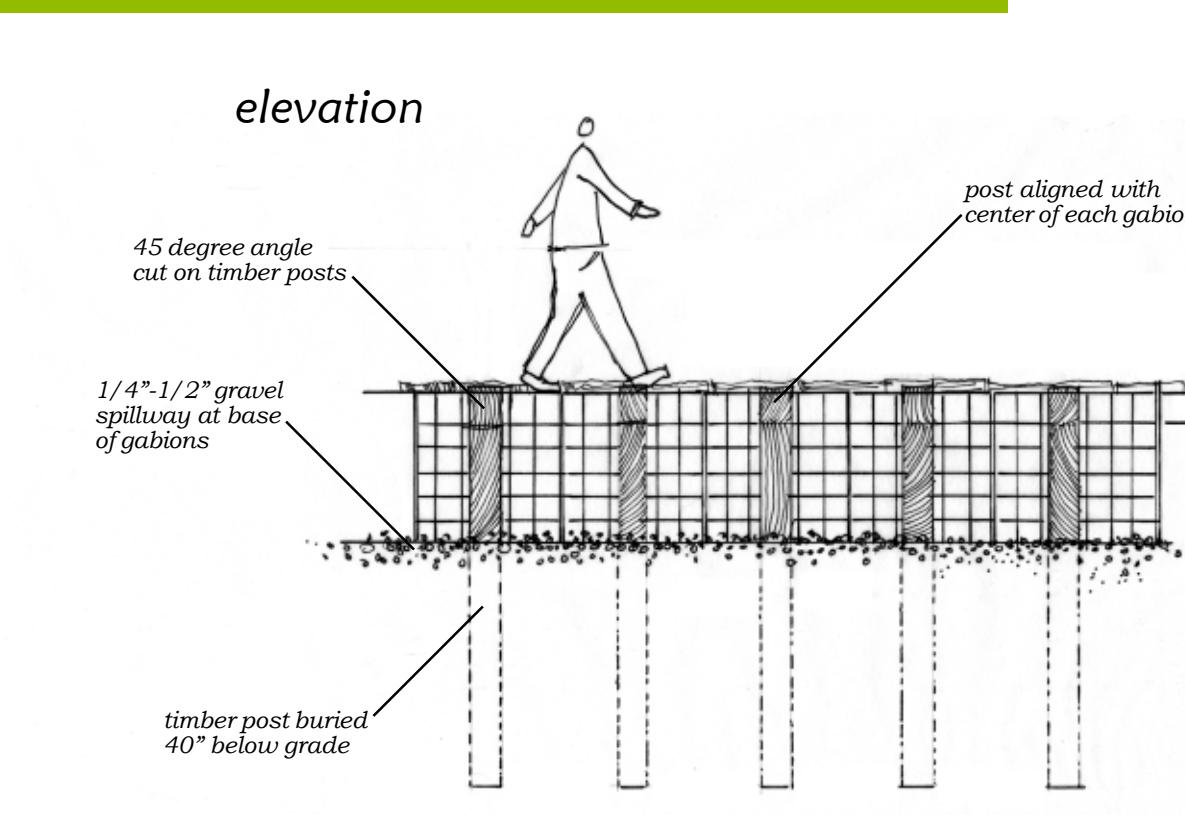
axon



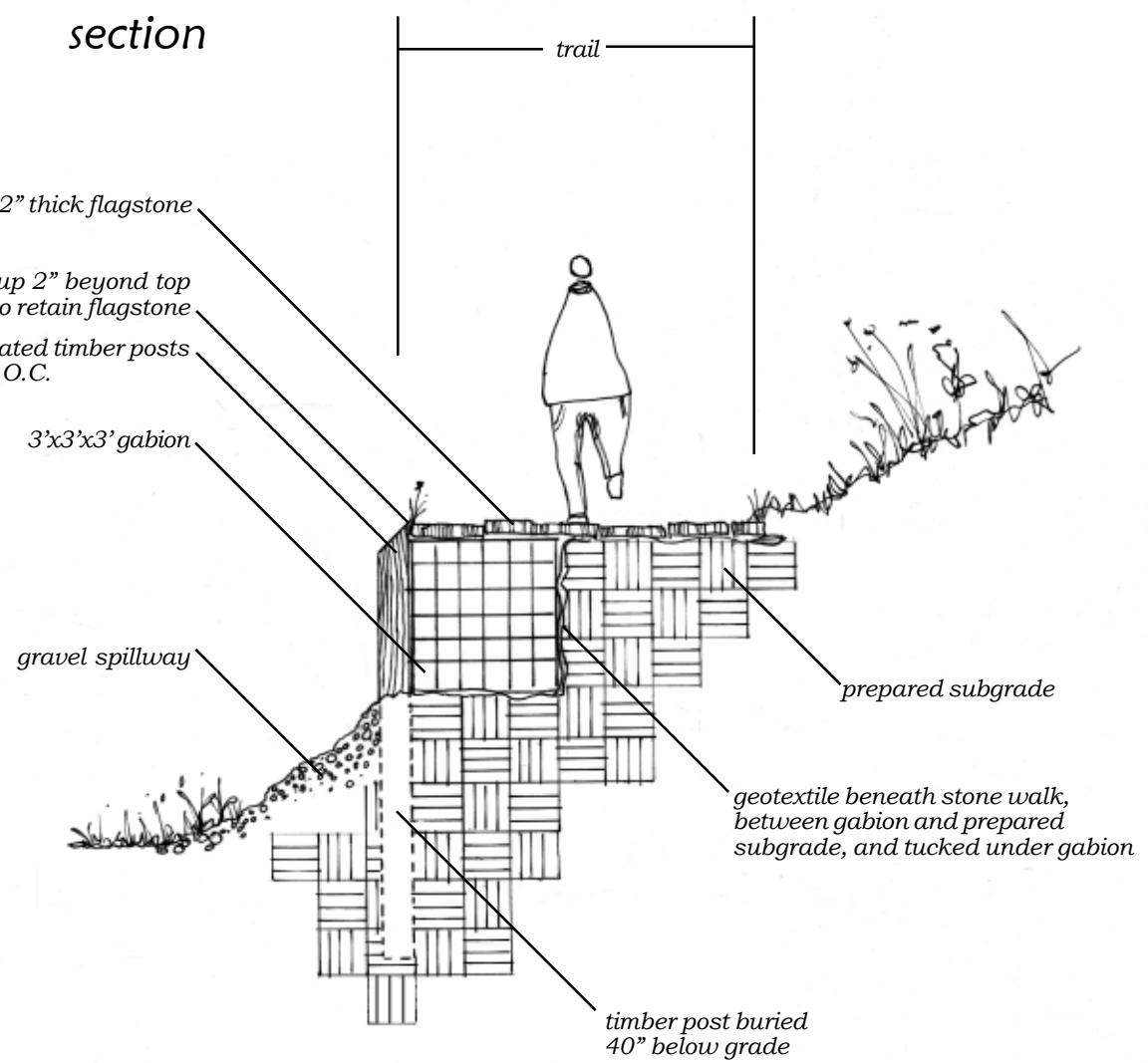


## Design Details

A gabion wall is a good solution where damp ravines exist along the bluff trail, and in areas where seeps along the trail contribute to trail washout and degradation. The gabion design allows water to pass beneath the trail while still maintaining the trail at a level grade. This structure is appropriate in ravines where there is water present, but not enough to require a bridge.



### Detail #12: Gabion Wall



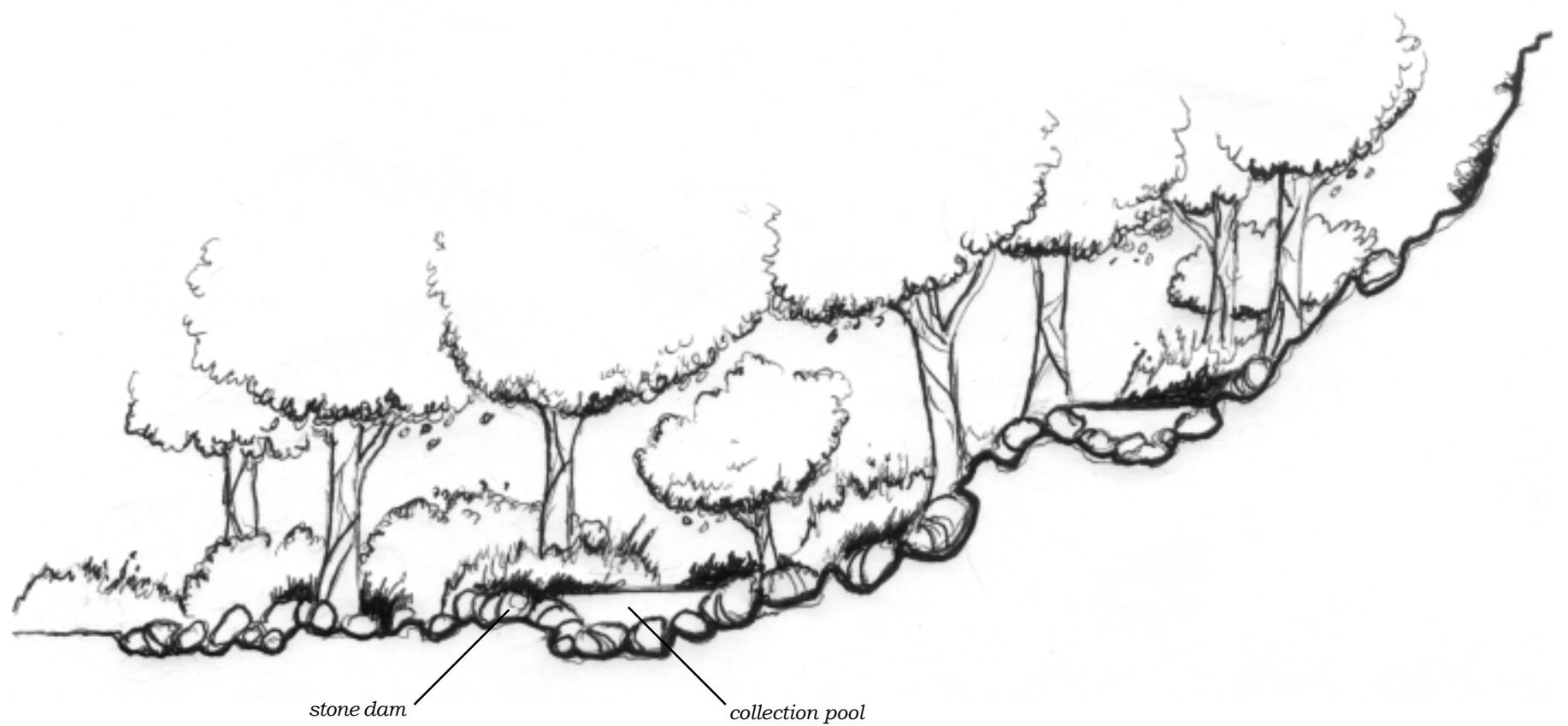
# Design Details



## Crosby Park: Bluff Trail Project

Design Strategies for an Ecologically Sustainable Bluff Trail

### Detail #13: Collection Pools



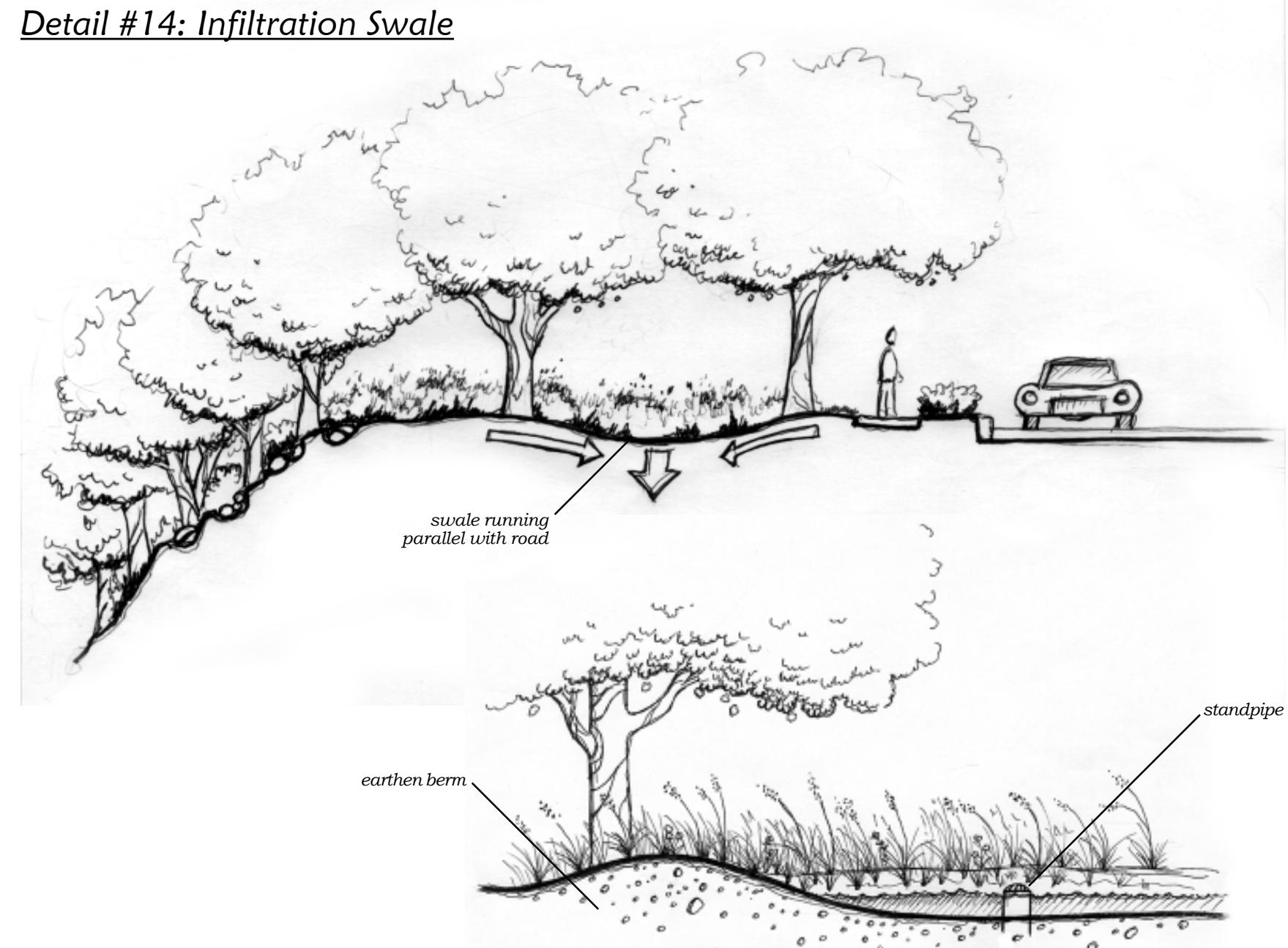
- Collection Pools are designed to provide a water source for plants and animals that utilize the bluff.
- Pools should be constructed in ravines where there is at least a periodic flow of water and a significant amount of stone to move around.
- Pools are constructed by moving stone to create depressions behind small dams that will collect water. Typically, pools will be around 3 by 3 feet and 2-feet deep.



### Bluff Top Condition

Many erosion problems along the bluff are due to stormwater runoff from the top of the bluff. Infiltrating stormwater at the top of the bluff would help alleviate this condition.

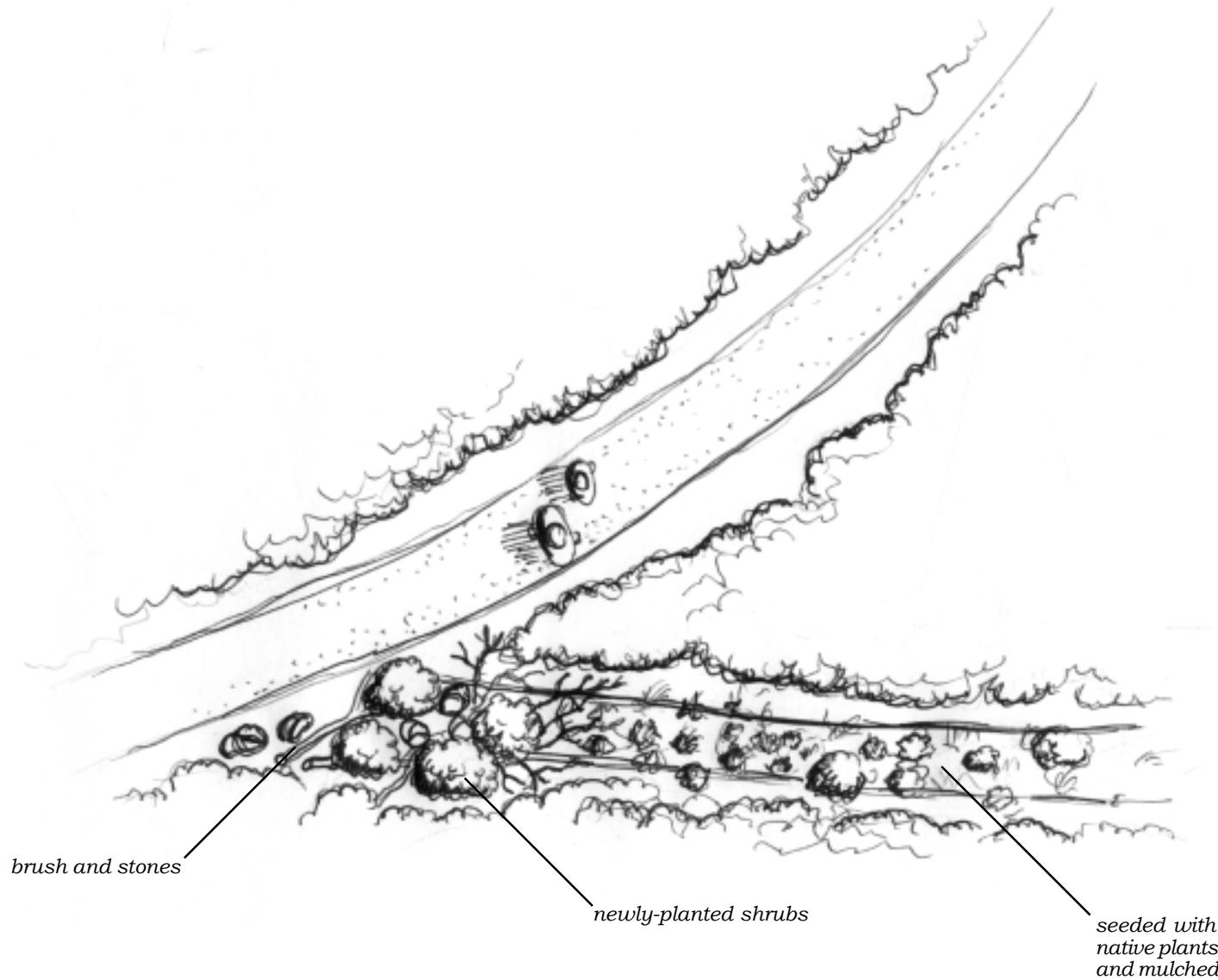
#### Detail #14: Infiltration Swale





### Miscellaneous

#### Detail #15: Trail Closure



-A combination of shrubs, stone, and brush should be utilized to close trails.

-Shrubs help camouflage trail openings and block access. Species with thorns, such as wild rose and native gooseberry, can be especially effective deterrents.

-Rock should be buried part way into the ground and will help deter walkers.

-Brush should be stacked near the entrance to the trail and will also camouflage the entrance to the trail and deter walkers.

-Trail surfaces should be lightly tilled and re-seeded with a native seed mix suited to the site. The seeding should then be rolled with a lawn roller and mulched with clean straw. Erosion fabric should be used on slopes steeper than 4:1 (See Detail #7).



## Hidden Falls Water Resource Development Feasibility Study

FINAL REPORT: NOVEMBER 11, 2014

**PREPARED FOR:**

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**APPENDIX A – SOIL BORING REPORT**

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**APPENDIX C – CONCEPT SKETCH**

## EXECUTIVE SUMMARY

The City of Saint Paul Department of Parks and Recreation, in partnership with the Capitol Region Watershed District, commissioned this feasibility study to evaluate and make recommendations regarding potential enhancement of water features at Hidden Falls Regional Park. The primary water feature considered is Hidden Falls Creek, which emerges from a storm sewer at the north end of the site, drops quickly in elevation through a water fall and a series of concrete lined steps, and flows through a wide, incised channel before passing through a very flat, stable channel to the Mississippi River.

The current condition of Hidden Falls Creek reflects the geologic history of the region as well as much more recent human activity. As glacial melt water carved the Minnesota and Mississippi River corridors, erosive processes similar to those that created Saint Anthony Falls, created Hidden Falls. The stream drops almost 100 ft along its relatively short route, creating a high energy, erosive system. Changes in the watershed have exacerbated this erosion potential by increasing flows associated with stormwater. During the 1930's and again in the 1980's, attempts were made to halt erosion of stream bed and bank materials by building stone walls in the upper reaches of the creek. The 1980's era work included extensive use of concrete to lock the channel bed and banks in place. The lower reach of the creek, where it flows through the Mississippi River floodplain, has remained stable and generally unmodified.

The Hidden Falls Creek watershed is expected to undergo significant changes in the next several years. Approximately two thirds of the watershed consists of a decommissioned Ford Motor Company Plant that is slated for redevelopment. The manner in which this site is developed together with the nature of the stormwater management system that is employed at the site will have a dramatic impact on the quality and quantity of stormwater that is delivered to Hidden Falls Creek. As part of this study, a range of potential future development scenarios and anticipated stormwater flows that may result from each were reviewed. If the site is developed with only the minimum required stormwater management practices, forces on stream bed and bank materials will be high and will necessitate use of very large rock material in constructing a stable channel. Due to the cost and impracticality of using extremely large stone in building the channel, we recommend that state of the art stormwater management practices be incorporated into the redevelopment of the Ford Plant site with a design goal of achieving pre-development peak stormwater flow rates from this site. In addition to reducing peak flow rates, stormwater management features that improve water quality should be incorporated to improve aesthetics and suitability for wildlife.

Several stream configuration alternatives were evaluated for their sustainability, value as park amenities, ecological and water resource benefits, and costs. Based on this evaluation, we offer several recommendations for enhancing Hidden Falls Creek.

In the upper reaches of the stream, we recommend eliminating the 1980's era wall that forms the east bank of the creek for much of the reach, and naturalizing that bank with stone and vegetation. This will decrease energy in several areas of the stream and reduce the need for concrete within the channel boundaries. It will also improve the stream for human and wildlife access. In this upper reach we also recommend removing the concrete along the channel bed and creating a more natural step-pool channel form. This form is very efficient at dissipating energy and consists of a series of drops over large stone material with a small pool at the base of each drop. We recommend leaving the west bank walls in place and restoring it where necessary to ensure that there remains room for a trail along that side of the stream. Access down to the water's edge from the trail may be incorporated where the valley is wide enough to accommodate such features.

At the downstream end of the enhanced step pool reach, we recommend incorporation of a final drop into a pool that is large enough to be visible and audible from the park pavilion area. This would be located where the stream currently makes a sharp bend to the west along the west valley wall. The intent is to draw people to the stream at that location, create a destination for sitting to enjoy the stream, and encourage exploration both upstream and downstream from that point. The pool at this location would be larger, and stable access to the edge of the water would be incorporated.

Downstream of this final step and pool, where the existing stream consists of natural but eroding materials, we recommend grading the south bank back to a sustainable slope and stabilizing it with natural vegetation. The bed of the channel in this reach is overly wide and should be sculpted to create a more concentrated low flow channel, while maintaining flood benches to allow stability during high flows. Just upstream of the pedestrian bridge in this reach, we propose removing the concrete bank stabilization structure and extending the grading and vegetation enhancement through that area. Downstream of this bridge, the stream is quite stable as it flows across the floodplain to the Mississippi River. We recommend leaving the stream as it currently exists through this reach to minimize disturbance of existing trees. See Figures 1 and 2 for an illustration of these recommendations.

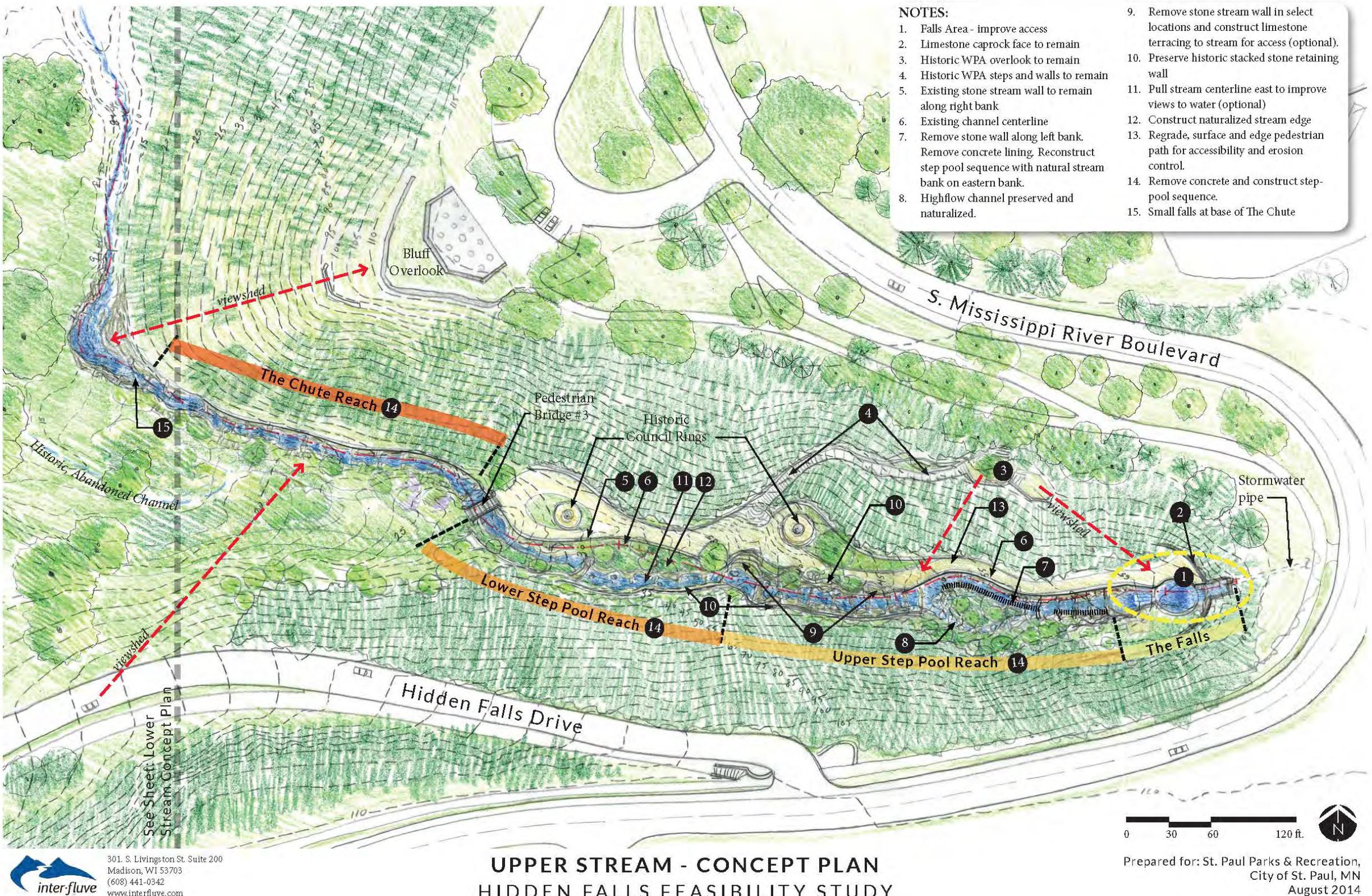


Figure 1: Recommendations for upper reaches of Hidden Falls Creek

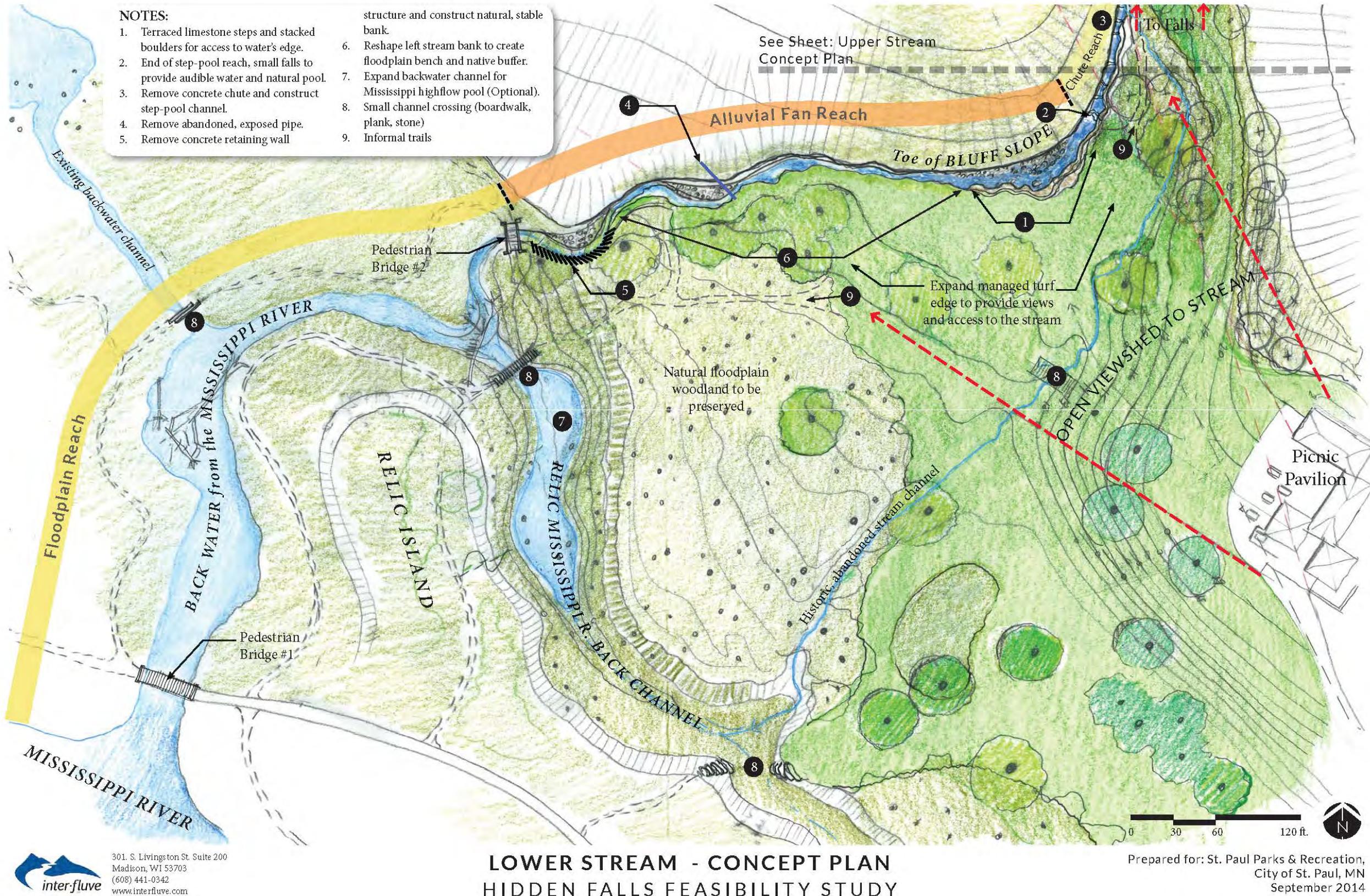


Figure 2: Recommendations for lower reaches of Hidden Falls Creek

## INTRODUCTION

Hidden Falls Regional Park is a City of Saint Paul park located adjacent to the Mississippi River just over 2.5 miles upstream of the confluence of the Mississippi and Minnesota Rivers. The park features access to the Mississippi River, wooded trails, and a stream that drops dramatically from its outlet from the city storm sewer down a series of falls and manipulated step pools and across the Mississippi River floodplain to its confluence with the Mississippi River. The watershed of the stream includes older residential development, parkway and the abandoned Ford Plant Site, which is slated for redevelopment over the course of the next several years. At this time, the nature of the redevelopment has not been determined. The City of Saint Paul anticipates updating the Master Plan for Hidden Falls Park after key decisions regarding the redevelopment have been made. Prior to updating the Master Plan, the City is interested in better understanding the potential for enhancing the water features within the park. The City is coordinating with Capitol Region Watershed District (CRWD) to utilize this opportunity to enhance city residents' awareness, experience and understanding of water resources within the District, consistent with CRWD's watershed management plan theme, "Bring Water Back to St Paul."

The goals of this feasibility study are to:

- Evaluate the future stream flow sources and dynamics;
- Provide guidance regarding changes to the flow regime that will improve the quality of water features at the park;
- Identify alternative modifications to water features at the park and evaluate them relative to identified water feature objectives; and
- Provide concept-level analysis, drawings, and cost estimate for the preferred alternative.

The goals of water feature enhancement at Hidden Falls Park are:

- To provide high quality, sustainable, natural, low maintenance water resources for park users;
- To enhance park user interaction with and enjoyment of those features;
- To provide educational opportunities to enhance park users' understanding of water resources; and
- To enhance ecological function of water features.

This report reflects the research and analysis that was conducted to identify alternatives for enhancing the stream as it flows through the park. It also identifies impacts that the redevelopment project may have on and opportunities that it offers for enhancement of the stream at Hidden Falls Park.

# HIDDEN FALLS PARK BACKGROUND

## PROJECT LOCATION

Hidden Falls Regional Park is located in Saint Paul, Minnesota, adjacent to the Mississippi River just over 2.5 miles upstream of the confluence of the Mississippi and Minnesota Rivers (Figure 3). The geographic scope of this study is restricted to existing and proposed water features within the park.

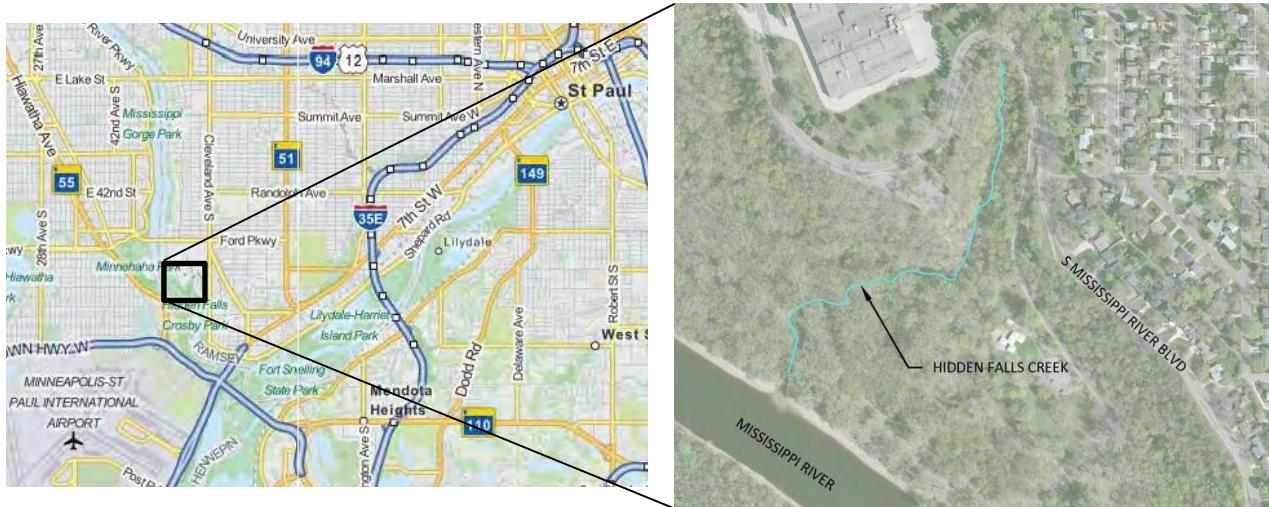


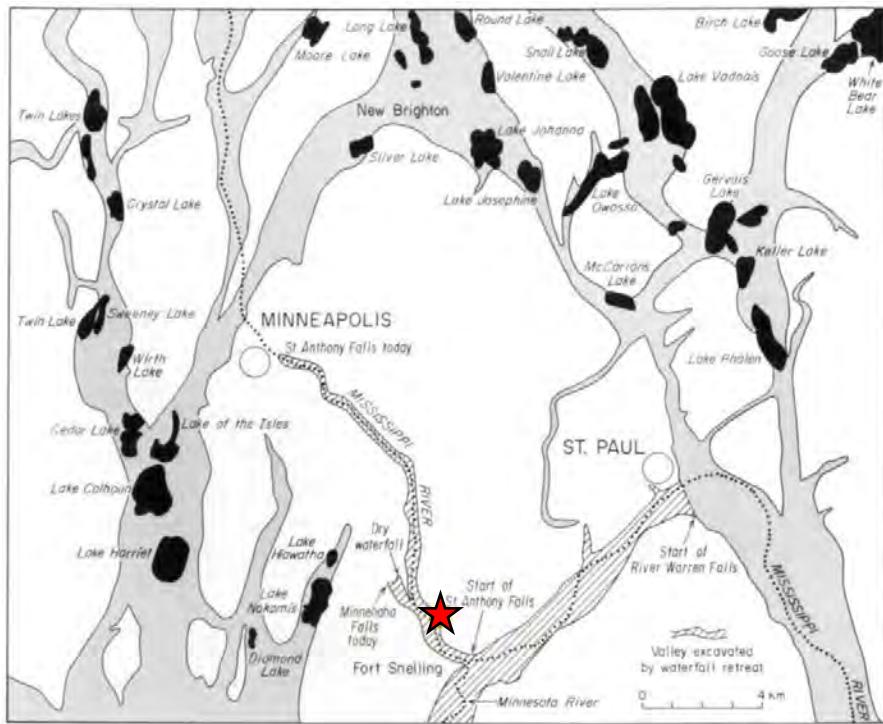
Figure 3: Project Location

## GEOLOGIC HISTORY

To appreciate the scenic landscape of Hidden Falls Park and consider options for enhancing water features on the site, it is helpful to understand the fluvial geomorphological processes which formed it. Obvious features of the Mississippi River in this reach are the dramatic limestone and sandstone bluffs of a nearly 100 ft deep river gorge (Figure 4). The gorge was shaped starting at the end of the last ice age by glacial melt-water. Glacial Lake Agassiz—the largest of the glacial lakes from this age—drained southeast through Minnesota in Glacial River Warren from 11,700 to 9,500 years ago. In the vicinity of the Twin Cities, Glacial River Warren formed a valley in what is the present-day Minnesota River valley. When the River Warren reached and descended into a buried, pre-glacial river valley, east of St. Paul, an impressive waterfall formed. (Figure 5)



**Figure 4:** The sandstone and limestone bluffs on the right Mississippi River bank as visible from Hidden Falls



**Figure 5:** Diagram of the River Warren Falls and St. Anthony falls which carved the Mississippi River Gorge. The location of Hidden Falls Park is indicated by the star. (Wright, 1990)

River Warren Falls eroded through the bedrock, carving a gorge upstream through the force of a 60 m tall fall (Wright, 1990). The bedrock geology of this area is composed of sedimentary rock

layers of sandstone, shale and limestone, formed 450 million years ago during the Ordovician age when this part of the earth was covered by an inland sea. From oldest (deepest) to youngest (nearest the surface) they include: St. Peters Sandstone, Glenwood Shale and Platteville Limestone. As the softer sandstone and shales eroded away, they undercut the more durable limestone above. This “caprock,” more erosion resistant rock underlain by more erodible material, reduced the rate of headcut progression but over time continued to succumb to the erosive energy of the flowing water. The undermined limestone caprock that made up the river bed of River Warren broke away in large blocks and slabs, and the incision upstream, or headcut, progressed.

At the location of Fort Snelling, as the River Warren Falls continued to migrate up river, the Mississippi River confluence was undercut and another headcut and falls began to carve out the Mississippi River Gorge we see today. This waterfall became St. Anthony Falls and is currently located 8 miles upstream of the confluence of the Minnesota and Mississippi Rivers, at Hennepin Island in downtown Minneapolis.

#### **GEOLOGIC HISTORY OF HIDDEN FALLS PARK**

The river terrace above the limestone visible along the bluff outlooks is topped with a mixture of stone and soil material deposited by retreating glaciers, referred to as glacial till. Eventually, the landscape developed into a rolling prairie and savanna on this higher terrace. Tributaries to the Mississippi River were left perched when the Saint Anthony falls migrated upstream. The energy of these tributaries falling into the incised Mississippi River channel eventually began to wear away at the limestone caprock, creating falls near the mouths of these tributaries. The Minnehaha Creek falls and Hidden Falls are good examples of these features. Based on the subsurface investigations at Hidden Falls Park, it appears likely that following this bedrock weathering, the Mississippi River deposited fine materials within the gorge as the head cut proceeded up the gorge. The elevation at which fine material was found suggests that the Mississippi River had not incised as deeply as it is today when those materials were deposited. This process of deposition in backwater areas adjacent to the river created layers of fine material under the coarse gravels and cobbles that later washed down the channel or rolled down the steep slopes as the head cut continued to migrate. Some of the weathered rock material from the gorge continued to wash down the ravine and was deposited in a fan formation at the base of the bluff and the edge of the Mississippi. Such alluvial fans are commonly found where the slope of a stream channel quickly transitions from very steep to very flat. As the incision progressed up the valley and delivered more rock to the alluvial fan, the channel through the fan likely increased in elevation due to deposited material, or aggraded, causing the channel to periodically abandon its channel and cut new channels down the fan. As is common with alluvial fan streams, the stream eventually moved to one side of the fan and now hugs the valley wall.



**Figure 6: View of Hidden Falls showing the worn and undercut Platteville Limestone caprock, fallen limestone blocks and existing pools and cascades of upper falls**

#### **FORMATION OF THE LOWER PARK LANDSCAPE**

The more recent fluvial processes of the Mississippi River have influenced the shape and topography of the lower areas within Hidden Falls Park. Through cyclic flooding and overbank flow, sediment deposits create bars, levees and floodplain surfaces with sizes and shapes that shift with flood events. Topographic patterns, historic aerial photos, and older maps all suggest that there have periodically been islands and backwater channels through the area. The evidence of these backwater channels is found in the landscape as swale-like features that are inundated when the river is high and dry when the river is low.

## **CULTURAL HISTORY OF THE PARK**

#### **THE PARK'S EARLY VISION**

Early in the Twin City's history, the impressive natural beauty of the Mississippi River gorge was recognized and protected by planning visionaries. One such visionary was Horace William Shaler Cleveland (1814-1900), a prominent landscape architect who advocated for natural preservation of the riverway for the enjoyment by all (Figure 7). In 1887, Hidden Falls Park was envisioned by Horace Cleveland as one of four original park areas in the St. Paul area to be connected by, "an inter-linking network of scenic drives, parks, and river boulevards for the "United Cities" (Martin, 2001). Cleveland's philosophy "to preserve landscape features and the

nature that shaped those features" (NPS, 2013), is very relevant today. He was known to advocate for using the existing topography and existing plants to keep his designs as natural as possible and create parks that could be enjoyed by everybody.

At Hidden Falls Park, though a portion of the land temporarily served as a tree nursery, few other improvements were made in the park until 1936-37. During the mid 1930s, the Works Progress Administration (WPA) carried out extensive activities on the site, including construction of many of the stone walls that remain today. In the mid-1960s, work began on the park's four primary use areas, including the primitive areas, boat launching areas, general picnic area, and the scenic falls area. This work created the form and function of the park as it exists today. (Martin, 2001)

#### SCENIC FALLS AREA

In the upper channel, the WPA project built extensive dry-stacked limestone walls to create a series of overlooks, retaining walls, a grand staircase and large council rings along the western side of the ravine (Figure 8). It is possible that at least a portion of the stone used may have been salvaged from the site.



**Figure 7: H.W.S. Cleveland, Landscape Architect, undated, Ramsey County Historical Society**



**Figure 8: WPA era walls and grand staircase along the eastern edge of Hidden Falls Ravine**

Hidden Falls Park and the overlook area at the falls do not appear on the National Register of Historic Places (<http://www.mnhs.org/shpo/>). Neither the Minnesota Historical Society, nor the Northwest Architectural Archives at the University of Minnesota hold archival architectural records of the construction of the WPA project. Structural modifications to the pools and falls were made in the 1980s, at which time new stone and concrete grout were placed in several areas.

#### GENERAL PICNIC AREA

The Picnic Pavilion is an architecturally interesting example of early 70s park architecture, centrally sited mid-distance between Hidden Falls and the Mississippi River (Figure 9). Construction documents for the pavilion, dated 1973, are archived in the Northwest Architectural Archives. Drawings illustrate construction plans and details for the pavilion as well as the boat launch and parking areas along the Mississippi River. Soil boring reports at the location of the pavilion provide further geotechnical information about soils in the alluvial fan (see Soils Section). Stone building materials and sources are also referenced (Lannon Stone quarried by Halquist Stone Company in Sussex, WI).

The Picnic Pavilion is still a relevant piece of architecture and part of the park plan. Its use can be reactivated through landscape design and trail planning to create better connections and visibility to the park water features, including the bluff, stream, and falls.



**Figure 9: Picnic Pavilion, Looking north towards bluff**

#### BOAT LAUNCH AREA

The boat launch area was designed at the same time as the general picnic pavilion and is sited at the far southern corner of the park where the Mississippi River bends to the south. A concrete boat ramp provides access for motorized craft with a sizeable parking

lot for boaters, anglers and other park users. Grading and filling has eliminated any backwater or relic channel features that may have existed in this area.



**Figure 10: Boat Launch area with limestone walls and fishing access**

#### PARK CIRCULATION

Manicured turf landscape surrounds the picnic pavilion and boat launch areas, but the remainder of Hidden Falls Park is passively managed and is dominated by native vegetation. An asphalt pathway, southwest of the picnic pavilion, takes visitors to the levee along the Mississippi River and terminates at a laminated wood bridge which crosses the mouth of the Hidden Falls Creek. The trail along the cascade and falls portion of the creek is the only pathway along the stream. Bridges cross the stream at three locations – near the downstream end of the cascade reach, near the transition from alluvial fan to floodplain, and near the mouth of the stream. Primitive pathways have been forged by park goers. Circulation through the site could be improved by connecting pathways. Various site furnishings (picnic tables, benches and pedestrian structures) are decades old and many are in poor condition.



**Figure 11: Mississippi R bank with picnic table**



**Figure 12: Bridge across Hidden Falls Creek at the Mississippi River**

## FUTURE RIVER, PARK, AND DEVELOPMENT PLANS

### GREAT RIVER PASSAGE PLAN

The most recent masterplanning effort for Hidden Falls Park was part of the larger visioning of the Mississippi River corridor, *The Great River Passage: A Master Plan for St. Paul's 17 miles of Mississippi River Parklands*, adopted in April 2013. The masterplan is the product of a multi-partner collaboration of leaders with expertise regarding the river resource, and it thoughtfully and graphically offers a plan for the river corridor's future that is "more natural, more urban and more connected." The vision for the Hidden Falls Regional Park is described as follows:

*Integration of the scenic and natural qualities of Hidden Falls with nature-based recreation will draw a wider variety of people to the river. A focus for expanding the recreation potential of the Upper Hidden Falls Park will be to restore and celebrate the park's existing natural qualities. Hidden Falls Creek would be restored and stabilized, and trail access to it improved, so that it becomes a premier destination in the park. Ford Plant site redevelopment would create a direct ecological and pedestrian link between the river corridor and the neighborhood. (City of Saint Paul Department of Parks and Recreation, 2012)*

The renderings in the Master Plan document for Hidden Falls depict an enhanced falls area that include the historic walls and a trail along the west side of the stream, a naturalized bank on the east side, and replacement of the stormsewer outlet with a bridge and daylighted stream upstream of Mississippi River Boulevard. A sketch of the lower reach of the stream shows access to the stream that allows visitor interaction with the water.

### FORD MOTOR PLANT REDEVELOPMENT

The Ford Motor Company Plant, which is located just north and west of Hidden Falls Park and represents the vast majority of the watershed to the creek, closed in 2011 and was decommissioned in 2013. Removal of buildings and foundations is underway and is expected to be completed in 2015. The redevelopment of this site offers an exciting opportunity to re-create the space in a way that fits well with the adjacent neighborhood. The Ford redevelopment is also an opportunity to incorporate state-of-the-art stormwater management that will provide cleaner water, higher base flow, and lower peak flows for Hidden Falls Creek. Phase 1 of a planning study was concluded in 2007 and documents five potential development scenarios for the site – (1) industrial, (2) mixed use – light industrial/flex tech, (3) mixed use – office/institutional, (4) mixed use – urban village, and (5) mixed use – high density urban transit village (EDAW, 2007). The ultimate development plan is unknown at this time.

A study of the feasibility of incorporating low impact stormwater management practices into the development was conducted (Barr Engineering, 2009). This study contained several

suggestions for stormwater management practices at the redevelopment site. Incorporating such practices into the site will be critical for improving water quality and reducing the flashy nature of flows in Hidden Falls Creek.

## EXISTING CONDITIONS

### TOPOGRAPHY

Topography of the park is characterized by the Mississippi River gorge and bluffs; the Hidden Falls Park ravine and alluvial fan; and the active floodplain and relic floodplain terraces and backwater channels of the Mississippi River. A cross-section through the Mississippi gorge, upstream of the Hidden Falls ravine, shows the typical dimensions of the gorge: roughly 750 feet between the gorge walls, with a steep, nearly vertical slope from a river terrace at an elevation of 800 feet down to the existing floodplain near 700 feet. The Mississippi River channel hugs the toe of the bluff at river right (southern bluff), and a relatively flat floodplain surface slopes gently to the toe of the left (or northern) bluff (Figure 13).

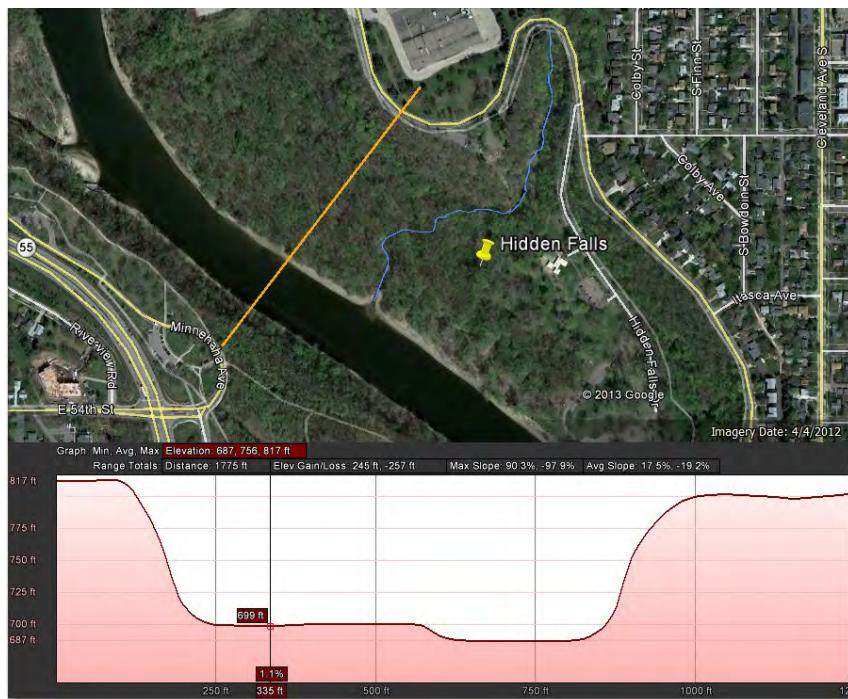
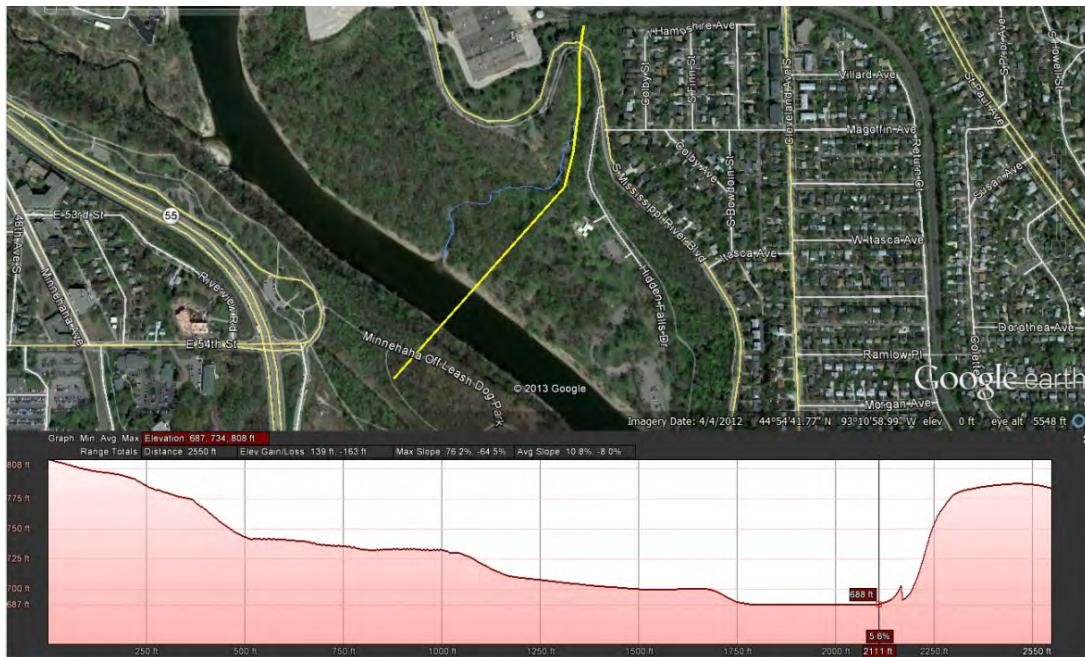


Figure 13: Google™ Earth Section of Mississippi River Gorge facing downstream

A cross-section through the Hidden Falls ravine shows the extent of ravine erosion from the face of the historic bluff, the extent and slope of the alluvial fan, and the floodplain of the Mississippi (Figure 14).



**Figure 14: Google™ Earth section of Hidden Falls Ravine, through the park floodplain and across the Mississippi facing downstream**

## SOILS AND SUBSURFACE INVESTIGATIONS

### WATERSHED SOILS

The landform of the upper watershed (above the falls) is a glacial outwash terrace. Soil development in the shallowly sloped, rolling plain has led to the development of silt loam layers characteristic of the broad prairies in the pre-settlement landscape. Since then, the watershed has been completely urbanized. The northeastern watershed is single-family residential development, while the northwestern watershed is currently dominated by the impervious expanse of the abandoned Ford Motor Plant. The USDA Web soil survey delineates two primary soil types of the residentially developed terrace in the watershed: Copaston and Waukegon complex soils, which are primarily loam and sand.

The USDA data base does not contain detailed information regarding soils underneath the Ford Plant Site. Borings drilled in that area as part of the redevelopment planning process suggest that a wide range of fill material, including gravel, sand, silt and clay, is present on the site (Barr, 2009). When environmental testing at the Ford site is completed by 2015, more information about the nature of the soils will be available. Site soils may change slightly as restoration and remediation activities, including establishment of interim stormwater management features, are completed over the next few years.

## SITE SURFACE AND SUBSURFACE MATERIALS

The USDA data shows Dorerton-Rock outcrop complex along the edge of the bluff and ravine and floodplain soils in the lower regions of the site. This information was augmented with soil borings that were drilled on site, both through this feasibility study and during the pavilion design in the 1970s. The three borings taken in the vicinity of the pavilion showed 4-7 ft of clayey sand and silty clay fill material over 2 – 3.5 ft of micaceous silty sand. Beneath the micaceous silty sand, inorganic alluvial sand and silt lenses, characteristic of floodplain deposition, were found.

Ten borings were drilled on the site as part of this feasibility study (Braun Intertec Corp, 2014, attached as Appendix A). Boring locations are shown in Figure 15. Borings PP-1 to PP-4 were drilled in the steep section of the valley. These borings all showed a layer of poorly graded gravel below the topsoil layer. This gravel was identified as dolostone or limestone from the surrounding bluffs. The void space in the gravel was filled with finer material that likely infiltrated into the interstitial spaces after the gravel deposited. The lower borings in this area showed layers of clay and other fine material under the gravel deposits but above the bedrock elevation. This suggests potential deposition of fine material that may have been carried by the Mississippi River at a time before it had incised as deeply as it is today and before the headcut continued up the ravine to cover the deposits with the gravel. Bedrock elevations in these borings ranged from 728.8 at the northern most boring (PP-1) to 704.7 at the southern most boring (PP-4) and ranged from 11.5 to 22.5 ft below the existing ground elevation.

Borings PP-5 to PP-7 were drilled in the alluvial fan section of the valley. The northern most boring in this area (PP-5) showed a 3 ft layer of gravel just below the topsoil layer. Below the gravel layer, several layers of finer material were found with gravel mixed in. The other two borings did not contain layers dominated by gravel, but gravel was present in several of the layers.

Borings PP-8 to PP-10 were drilled in the Mississippi River floodplain section of the valley. They are characterized by distinct layering of primarily finer material including sands, silts and clays, which is consistent with a historical pattern of episodic flooding and deposition. Gravel that likely originated in the Hidden Falls ravine is present in some of the layers. PP-9 also contains several layers of fill, including bituminous material, which may reflect a previous trail or access road in that area.

In addition to the geotechnical borings that were drilled on the site, Inter-Fluve dug three hand cores (3-in diameter) in the alluvial fan area of the site. They were generally located east of borings PP-6 and PP-7, with two of them in the low part of what appears to be an historic channel through the alluvial fan (Figure 13). The third is at a higher elevation on what appears to be the former top of bank of an historic channel. At the northern location (CORE-3 in Figure

15) the ground elevation was 708.4, and the depth of the core was 6 ft. Therefore, the depth of the core was 702.4. The thalweg of the existing channel at the location nearest the core, 80 ft downstream of the end of the concrete chute, is 706.3. Through the coring, we found that the top 2 ft of soil was sand with gravel and angular cobbles. The 0.5 ft below the rocky layer was silt with clay. Below that, we encountered sand with silt.

At the core further down slope within the historic channel (CORE-2 in Figure 15), the ground elevation was 706.3, the deepest elevation of the core was 702.3, and the nearest stream thalweg elevation, near the bend in the stream, was 704.75. Similar to the core further upslope, the top 1.5 ft of the core contained sand, gravel and angular cobbles, while material below it was comprised of sand, clay, and silt. These cores suggest that if the historic channel did follow this path, it was near the existing ground surface, where the larger rock material is found. A third core (CORE-1 in Figure 13) was extracted approximately 20 ft northwest of this downslope core. It was outside of the dry channel and the existing ground was an elevation approximately 1 ft higher than the core taken within the channel. At this location there was a similar layer of sand with gravel and angular cobbles at the surface to a depth of approximately 1.5 ft.

Neither PP-6 nor PP-7 showed a similar dominant layer of large gravel and cobble at the surface. The ground elevation at the locations of the cores at the bottom of what appears to be an old channel (see Figure 15) is approximately 2 ft higher than the thalweg elevation in the existing channel near those locations. The presence of more gravel in this area at the surface and at a higher elevation than the current channel suggests that deposition of fractured material in the former active channel may have caused aggradation in and adjacent to that former channel. At some point, the stream flow likely spilled out of this aggraded channel to the side of the valley where it began to incise through relatively smaller material. Over time coarse material washed down to armor the new channel. This is consistent with typical alluvial fan evolution (Bridge 2003, Schumm 1987). Therefore, although it is likely that this channel historically served as the primary route across the alluvial fan, it is also likely that it shifted to its current position through natural evolutionary processes.

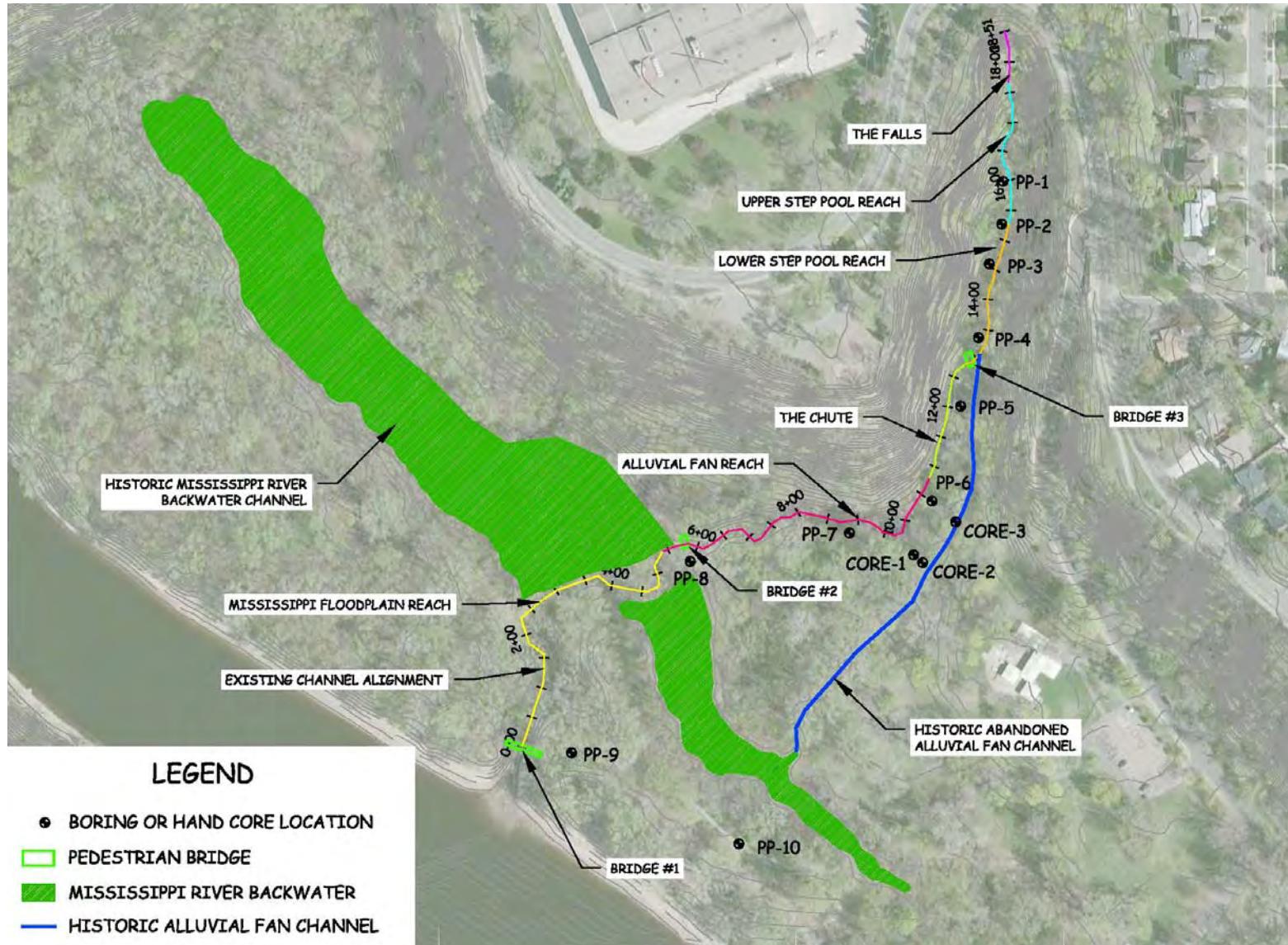


Figure 15 – Existing and Historic Water Features at Hidden Falls Park

## HIDDEN FALLS CREEK REACHES

We have divided Hidden Falls Creek into six reaches defined by break points in channel slope. For the purpose of this report they are called: Floodplain Reach, Alluvial Fan Reach, The Chute, Lower Step Pool, Upper Step Pool, and The Falls (Figure 15). Table 1 shows measurements of channel reach lengths, elevations (feet), and slope based on a longitudinal-profile of the channel thalweg (low flow path of the channel) surveyed by Inter-Fluve in April, 2013.

Table 1 – Hidden Falls Creek Subreaches

Reach	Stations	Channel Length	US/DS Elev.	Δ Elev.	Slope %
Floodplain	0+00 – 5+39	539	693.21 – 688.96	4.25	0.79
Alluvial Fan	5+39 – 10+78	539	708.47 – 693.21	15.26	2.8
The Chute	10+78 – 12+77	199	716.43 – 708.47	7.96	4.0
Lower Step Pool	12+77 – 15+26	249	730.07 – 716.43	13.64	5.5
Upper Step Pool	15+26 – 17+64	238	753.89 – 730.07	23.81	10.0
The Falls	17+64 – 18+32	68	780.34 – 753.89	26.45	38.9

The Falls reach consists of two dramatic drops – a 19.2 ft drop from the emergence of the stream from the culvert to the large pool at the head of the reach, and a 7.2 ft drop below the pool.

Downstream of these two large drops a series of steps and pools consisting of stone and concrete convey the stream for almost 500 ft before the stream passes under pedestrian bridge #3. The upper portion of this stretch (Upper Step Pool reach) is significantly steeper than the lower portion (Lower Step Pool reach). In both reaches, manmade stone walls hem the stream in and act as retaining walls to allow a foot path along the west side of the stream. Downstream of the bridge, the stream consists of a concrete chute with no steps for approximately 150 ft and a scoured unlined pool at the downstream end of the concrete channel (The Chute reach).

Downstream of The Chute, the stream substrate transitions to native stone and sand as it flows across the alluvial fan that developed as the Hidden Falls ravine carved itself into the limestone and sandstone bluff. Historic incision and active bank erosion is evident in this Alluvial Fan reach as it appears widened and entrenched. Downstream of pedestrian bridge #2, the stream transitions to a flat sandy reach that appears to be regularly backwatered by the Mississippi River (Floodplain Reach). After passing under pedestrian bridge #1, the stream joins the

Mississippi River. Figures 17 through 25 illustrate the distinctive character of each of these reaches. Figure 16 illustrates the profile of these reaches.

Additional discussion of the characteristics of these reaches, typical characteristics of similar natural streams, and the relevance to preliminary design is provided in the Stream Design Considerations and Alternatives section of this report.

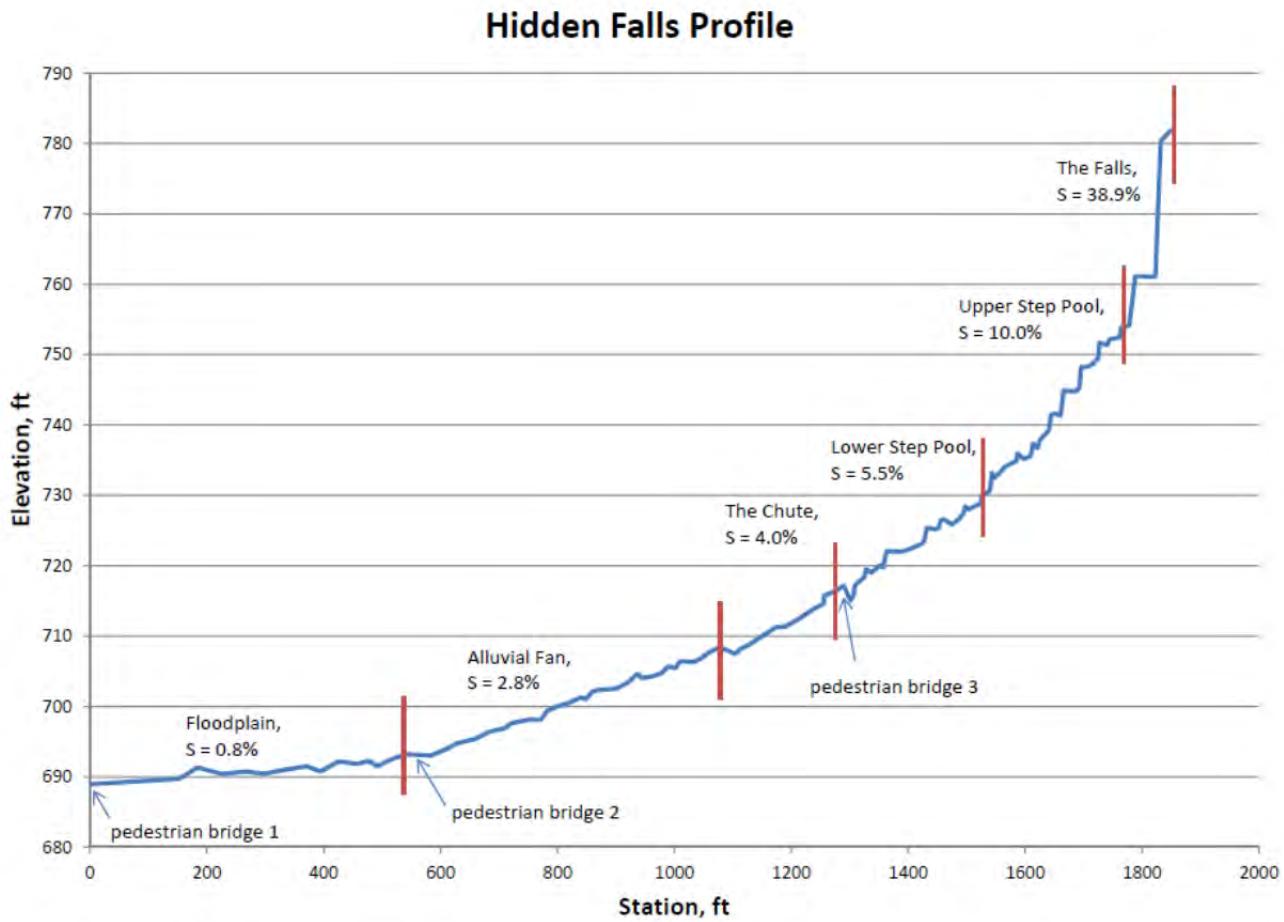


Figure 16: Longitudinal-profile - Existing Channel



Figure 17: The Falls

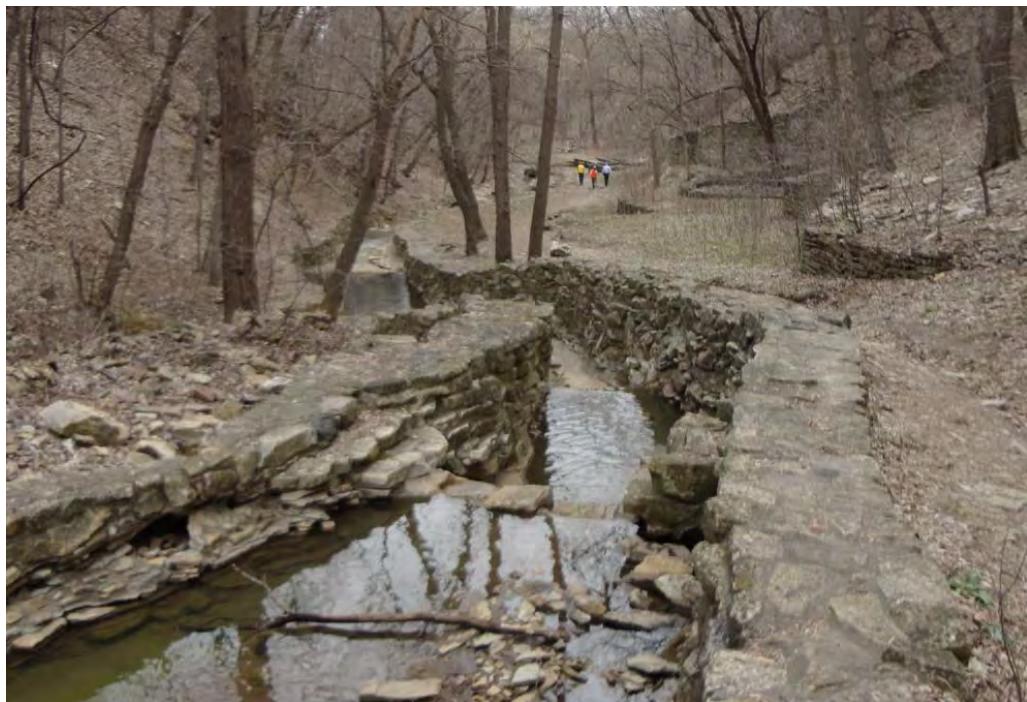


Figure 18: Upper Step Pool Reach looking downstream through the walls of the upper cascades and the ravine valley



Figure 19: Looking downstream from approximately Station 15+00 at the Lower Step Pool channel



Figure 20: Looking upstream from bridge #3 at Station 12+85 at the Lower Step Pool Reach



Figure 21: Looking upstream at The Chute along the base of bluff near Station 11+00 – 12+50



Figure 22: Alluvial Fan Reach - Bar development at toe of bluff upstream from Station 9+00

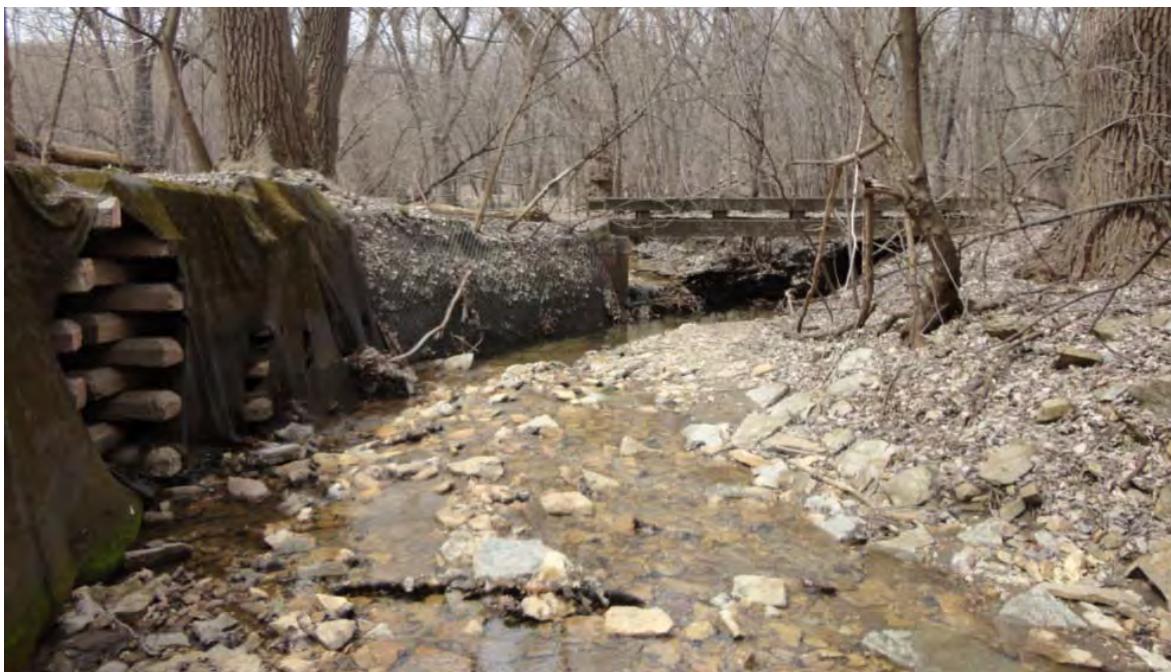


Figure 23: Alluvial Fan Reach - Bank erosion project on channel left looking downstream at Station 6+00 to bridge #2 crossing



Figure 24: Floodplain Reach, near Station 4+00



Figure 25: Floodplain Reach upstream from pedestrian bridge #1

## HYDROLOGY

The hydrology of Hidden Falls Creek is determined by the flows generated as stormwater runoff from the watershed and conditions in the Mississippi River. The hydrology of the upper reaches will typically be independent of the water level in the Mississippi River, but in the floodplain and alluvial fan reaches, the water surface elevation of the river influences local hydraulics and sediment transport within the creek. When the Mississippi River is at high stage, the floodplain reach will fill with water that flows in from the Mississippi, high groundwater, and water from Hidden Falls that is backed up by high water downstream. When the Mississippi River is low, the groundwater level drops and the floodplain reach typically becomes dry as water that enters the reach from upstream quickly infiltrates into the sandy, rocky substrate.

Because the watershed of Hidden Falls Creek is very small and that of the Mississippi River is quite large, high flow conditions in the creek do not necessarily coincide with high flow conditions in the river. Mississippi River flows typically gradually rise seasonally, while flows in Hidden Falls Creek will be flashy and tied to localized weather events. Therefore, when considering critical conditions in the stream, particularly in those reaches potentially affected by backwater from the river, we will need to consider a range of flows in Hidden Falls Creek under both high and low water conditions within the Mississippi River.

## STORMWATER QUANTITY ANALYSIS

Stream flow rates will have a significant impact on the design of all reaches of the stream. Larger flows will generally require larger stream cross sections and larger material lining the bed and banks to ensure long term sustainability. Peak stormwater discharge rates for a range of site conditions were determined for the Hidden Falls outfall. The analysis included a subwatershed analysis for the approximately 108 out of 116 acres of the Ford Plant potentially routed to the outfall and approximately 50.5 acres of a primarily residential area adjacent to the Ford Plant currently draining to the Hidden Falls outfall at the South Mississippi River Blvd crossing. The minor contribution to flows from the small, primarily pervious areas within the park that drain to the creek were assumed to be negligible for this study. Several watershed conditions were included to determine a full range of potential peak flows that were, are currently or could be directed to the outfall.

## MODEL INPUT

Peak flows were estimated based on SCS and TR 20 methodology and applying the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall values for the immediate

area. All modeling was completed in HydroCAD. The 2, 10 and 100-year rainfall depths for a 24-hour storm duration are presented in Table 2.

**Table 2 – NOAA Atlas 14 Rainfall Depths**

Reoccurrence Interval (yr)	Rainfall Depth (in)
2	2.83
10	4.24
100	7.49

Although the City of Saint Paul's approved rainfall depths are less than the Atlas 14 values, it is anticipated that since the Atlas 14 values are fairly new, governmental agencies will be incorporating the Atlas 14 values into local and state ordinances in the near future. Existing curve numbers were generated from reviewing 2005 Land Use data and aerial photography. Watershed delineation and runoff overland flow paths were determined based on current LiDAR data transformed into two foot contours and the City of Saint Paul's storm sewer data.

## SUBWATERSHED AREAS

The subwatershed areas and the corresponding drainage areas are depicted in Figure 23. Under existing conditions approximately 24.2 acres of the Ford Plant Subwatershed #1 area (bound by dashed purple line in Figure 26), are directed via a storm sewer to an outfall north or upstream of the Hidden Falls outfall. However, in the proposed and pre-settlement conditions, it's assumed that this additional area will be and was conveyed to the Hidden Falls outlet. In addition, based on the review of the Ford Plant's engineers existing and proposed condition delineation and design, it was assumed that 7.9 acres, comprising the Ford Plant Subwatershed #2 in the northwestern most portion of the site, will continue to be directed to an upstream outfall. Therefore, this area was not considered in the peak flow analysis for Hidden Falls. Lastly, it was assumed that although the ground surface topography indicates that approximately 12.75 acres of the Offsite B Subwatershed drain to the Ford Plant property, this area appears to be contained and conveyed through private storm sewer to the City's storm sewer network along Ford Parkway and/or Cleveland Ave. This should be verified during final design.



Figure 26: Subwatershed Areas

## MODELED CONDITIONS

Four watershed conditions were modeled to determine a suite of potential design flows for Hidden Falls Creek. The conditions and the associated peak flows are described below and shown in Table 3.

*Condition 1: Existing conditions.* Hydrologic properties of the subwatersheds were based on the review of the Ford Plant's Existing Conditions Drainage Map and development of hydrologic properties for the Offsite A Subwatershed area. It was determined that the hydrologic inputs provided by the Ford Plant engineering study (TKDA, 2012) were appropriate and the data provided in that documentation was directly incorporated into our model.

*Condition 2: Pre-settlement Conditions.* A scenario that estimates the pre-settlement runoff condition was modeled to provide an estimate of the lowest peak flows that may someday be possible from the subwatersheds that drain to Hidden Falls. Although a portion of the watershed was developed at a time before significant stormwater management was incorporated into development, the Ford Plant redevelopment offers an opportunity to incorporate state of the art stormwater management that may approximate pre-settlement conditions. This scenario is based on the assumption that approximately 108 acres of the Ford Plant was directed to the Hidden Falls outfall and that the entire watershed area directed to the outfall was heavily wooded and consisted of hydrologic soil group B soils. Current soils indicate the watershed is mainly comprised of urban fill materials. Generated curve numbers and time of concentration values were based on typical values for a wooded area.

*Condition 3: Proposed Interim Conditions.* This scenario approximates conditions for the Ford Plant area and Railroad during the time between Ford Plant demolition and remediation and the time of redevelopment. It is our understanding that the enhancement of Hidden Falls Creek would occur after redevelopment of the Ford Plant site, but given uncertainty with the ultimate timing of redevelopment, it is worth considering the interim hydrologic conditions. The watershed and stormwater runoff properties were based on the Ford Plant's Proposed Conditions Drainage Area Map. Their proposed condition analysis provides preliminary sizing of select best management devices and identifies the amount of impervious cover within the transformed Ford Plant. The design includes approximately 14 acre-feet of live pool stormwater storage and accounts for 29 acres of impervious area within the 108 acre Ford Plant Site. For this condition, it was assumed that the railroad would be transformed into an open space area and 108 acres of the Ford Plant would be directed to the Hidden Falls Outfall. This analysis did not consider volume reduction provisions set by Capitol Region Watershed District. Although volume reduction devices can have a dramatic effect on flow conditions that occur during most of the time, they typically have a negligible effect on peak stream flow conditions during

extreme events, which are the basis for establishing the size of the channel materials in this type of system.

*Condition 4: Light Industrial Development.* This scenario reflects conditions at the Ford Plant Site described as Scenario 1 outlined within the “Redevelopment of the Ford Motor Company Site” Phase 1 Summary Report, October 17, 2007 (EDAW, 2007). The proposed site curve number and time of concentration have been increased and decreased, respectively to reflect the development scenario. The BMPs applied to this condition are the same as the BMP’s applied under Condition 3. Condition 4 assumes the railroad area would be transformed into open space. This development scenario represents a worst case scenario for runoff rates and peak flow rates potentially delivered to Hidden Falls Creek for storm events smaller than the 100 year event. The worst case scenario for the 100 yr event is limited by the City of Saint Paul’s peak flow limitation as described in Condition 5. It should be noted that although the Light Industrial Development scenario was used to generate worst case flows, this type of development does not necessarily preclude delivery of better quality and quantity of water to Hidden Falls. If the site is developed for light industry, additional stormwater management practices can and should be considered to reduce the impact on local waterways.

*Condition 5 – Maximum Peak Flow.* This scenario was analyzed to determine the maximum peak stormwater runoff flow from the proposed reconstructed area based on applying the City of Saint Paul’s peak flow limitation of 1.64 cfs/acre for the 100-year storm event. It was assumed that approximately 108 acres of the Ford Plant and 14.5 acres of the railroad would be held to this regulation during redevelopment, for a total regulated area of 122.5 acres. For the Offsite A subwatershed it was assumed that approximately 36 acres of the existing residential neighborhood would be unregulated. Individual peak flows for the Ford Plant and Railroad and the remaining residential neighborhood were added directly to determine a final outflow value directed to the Hidden Falls outlet.

Table 3 – Peak Flows for each Condition

Condition	Watershed Area (acres)	Peak Flows (cfs)		
		2-year	10-year	100-year
1	134.4	233	401	792
2	158.6	4	31	161
3	158.6	93	191	443
4	158.6	112	225	542
5	158.6	N/A	N/A	415

Consequently, the range of potential 2 and 10 year peak flows for the downstream channel is anticipated to be between Conditions 2 and 4. The range of potential flows for the 100 year event is expected to be between Conditions 2 and 5. All flows represent substantial reductions from the estimated existing condition (Condition 1).

## STORMWATER QUALITY

Although it does not have as large an influence on the design parameters of the stream as water flow rates, stormwater quality will have an important influence on the project success. Better water quality in the stream will contribute to the park users' enjoyment of the creek and improve wildlife use of it. Full characterization of the existing chemical water quality in Hidden Falls is beyond the scope of this study. However, it is obvious that there are water quality deficiencies. Near the falls, there is a petrochemical smell emanating from the water that is quite unpleasant.

The redevelopment of the Ford Plant Site presents an exciting opportunity to achieve a higher standard of water quality within the creek. This will be important for improving park visitor's experience of the creek, improving suitability for wildlife, and offering critical educational opportunities. Transforming this stream to a clear, clean, vibrant stream will tell an inspiring story of renewed stewardship of water resources in Saint Paul.

## STREAM DESIGN AND ALTERNATIVES

We examined the existing channel form in each of the reaches identified to determine the extent to which it conforms to natural channel form in these reaches. In enhancing the form and function of the stream through the park, understanding, accommodating, and mimicking the natural evolution of these types of streams will improve the sustainability and educational value of the project.

## STEP POOL REACHES

### NATURAL STEP POOL FORM

In natural streams with slopes greater than 3-5%, the bedform of the stream is typically observed as a series of steps and pools (Chin, et al., 2009). In channels with a wide range of substrate particle sizes, Curran and Wilcock (2005) observed step formation in a laboratory to occur through three primary mechanisms. One means of step formation was observed to begin with deposition of a large piece of bed material that subsequently traps additional material until the jam spans the entire channel width to form a step. Flow over this step then scours a pool downstream of the step. A second means of step formation was observed to occur when a large

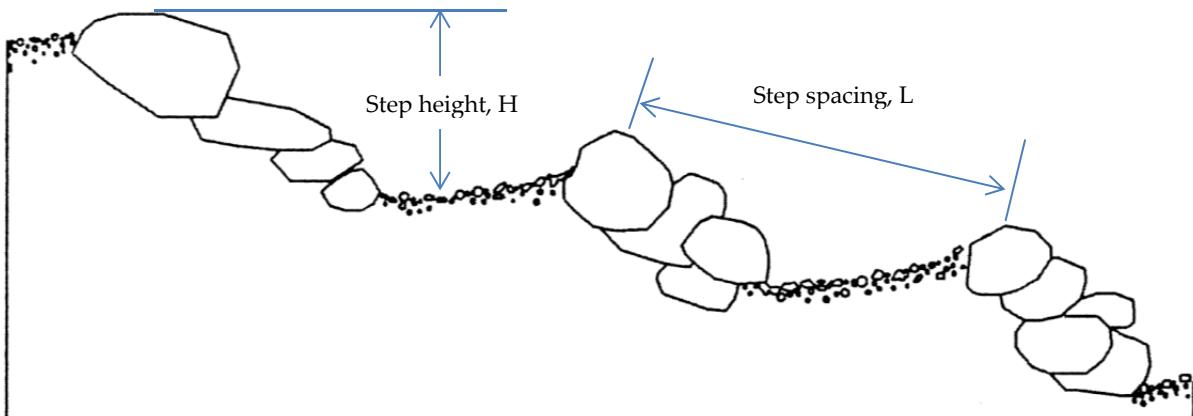
piece of bed material already exists in a particular location. Localized scour around that particle exposes it and allows it to begin trapping additional material that moves downstream creating a step and promoting scour on the downstream side, similar to the first mechanism. A mechanism that was less common in the laboratory runs was through periodic dune formation as smaller particles create bed deformation and surface wave development. While the step spacing is very regular for the dune formation, the step spacing appeared more random in the cases where steps formed due to deposition or exposure of an existing large grain.

These mechanisms are worth considering as we design a step pool system at Hidden Falls. The channel will be locked in place, and no significant sediment supply will be provided from the upstream watershed, which will continue to be a mix of stormsewer and non-deformable, non-erodible material. Therefore, steps will not be able to form on their own, and if the steps we install do not persist, we cannot expect the steps to re-form in a self-sustaining way. We propose mimicking the first and second mechanisms by installing the large material that forms the anchor elements of each step and locking smaller material against the larger pieces similar to the way natural transport mechanisms would arrange the steps. We propose excavating scour pools at the downstream sides of the steps to similarly mimic the natural step pool form.

We propose using typical geometric patterns as described in the literature to create the step pool form at Hidden Falls. In addition to the overall slope of the step pool reach, important variables in such channels include the step spacing, the step height, and the stone size (Figure 27). Although some researchers have found that step location and spacing is somewhat random depending on the location of key substrate pieces, many researchers have noted empirical relationships between these variables. Not surprisingly, the length and height of steps are typically related to the channel slope, with step length decreasing and step height increasing with increasing slope. Step height is usually 1 – 1.5 times the stone size that makes up the step.

The relationship between step height and step spacing has been studied by many researchers (Chin et al., 2009). Ideal step pool geometry has been described as having steps that are somewhat regularly spaced and a ratio of step height to step length ( $H/L$ ) of approximately 1.5 times the slope of the channel. Abrahams et al. (1995) suggested this form has the greatest flow resistance and greatest stability. Empirical data suggests that  $(H/L)/S$  is typically between 1 and 2 (Chin et al., 2009).

Step length has also been correlated with channel width for step pool channels. Chin et al. (2009) noted that step length ranges from 1 to 4 times the channel width, with most step lengths in the range of 1 – 2 channel widths.



**Figure 27: Step pool dimensions**

### EXISTING STEP POOL FORM AT HIDDEN FALLS

We examined the existing step pool channel form and compared it to the typical geometry patterns described in the literature to determine the extent to which the existing step geometry is within the range of typical step pool channel parameters. There is no historical record of the geomorphic form of Hidden Falls Creek prior to modification during the WPA era or even prior to the later modifications. There is no information available that indicates whether there was some perceived instability prior to either of the modifications. However, it is likely that the slope of the stream was not modified substantially and it is likely that the steep reaches of the stream existed as falls, cascades, and step pool systems prior to modification. It is possible that the modifications primarily cemented steps into their previous locations. A summary of the channel geometry as it exists in the upper two reaches is shown in Table 4.

Table 4 Existing Reach Average Channel Geometry for Step Pool Reaches

	Lower Step Pool Reach	Upper Step Pool Reach
Slope (S) ft/ft	0.055	0.10
Step Spacing (L), ft	30	24
Step Height (H), ft	2.0	2.4
(H/L)/S	1.23	1.02
Channel Width (W), ft	11	10
L/W	2.7	2.3

The channel width was most likely reduced in the areas where stone walls are now creating vertical banks, so the L/W was probably originally smaller than it is now. Regardless, the current values are within a typical range for natural step pool channels. The (Hs/L)/S ratio is lower than expected for the upper reach. The value near 1 suggests little to no pool depth below

the drops, which is consistent with field observations. However, it is likely that pools were deeper before the concrete was placed in them. The presence of concrete currently eliminates scour potential in the pools.



**Figure 28: Existing step pool reach at Hidden Falls Creek**

The immobility of the concrete chute has precluded development of any step pool form in that reach. The slope in this reach suggests that continuation of a step pool channel in this reach is appropriate.

## STEP POOL PRELIMINARY DESIGN

As described above, the step spacing and general form of the existing step pool reaches is within the range of what is typically observed in natural channels. However, the channel width is artificially constricted by the constructed stone walls in several locations, and the pool depth is restricted by presence of concrete. With respect to the overall form, we recommend increasing channel width, removing concrete lining and increasing the pool depth. In the concrete chute reach, we recommend removing the concrete and extending the step pool form through this reach using typical ratios for L/W and (H/L)/S.

Because much of the step pool design depends on the step height and the step height depends on the available stone size, a key component of the channel design is determining the minimum stone size that is expected to remain immobile for a range of flows. The recommended method for determining stone size for this application is the US Army Corps of Engineers' steep slope

riprap design method. This method is appropriate for straight channels, with slopes ranging from 2 to 20% and entails application of the following equation:

$$D_{30} = (1.95 S^{0.555} q^{2/3})/g^{1/3}, \text{ where}$$

$D_{30}$  = stone size for which 30% of the stone in the mix is smaller

$S$  = slope of the bed

$q$  = unit discharge = total flow/channel bottom width

$g$  = acceleration due to gravity = 32.2 ft/s<sup>2</sup>

Without dramatically changing the topography of the site by importing or exporting a large quantity of material, the slope of the channel will not change significantly. The variables we can manipulate are the total flow and/or the channel bottom width to achieve a reasonable stone size for forming the steps. Modifying the channel width in the upper reaches will require complete dismantling and potential rebuilding of the stone wall on one side of the stream in some locations. If a naturalized bank is desired on one side of the stream, consistent with the renderings developed for the Great River Passage Plan, rebuilding will not be necessary.

Many natural step pool channels become mobile and are reorganized as frequently as during a 25 yr flow event, but because investment in adjacent park features such as trails and bridges is not compatible with active channel evolution, the step pool reach of Hidden Falls should be designed to be immobile during larger flows. Flows with a 100 yr recurrence interval and smaller are appropriate for design. Using the USACE steep slope method, there is a positive relationship between discharge and  $D_{30}$ , and therefore using the largest flow in the range of design flows will provide the most conservative stone size. We calculated stone size for 100 yr flows of 160 cfs, which reflects the pre-settlement flow estimate, 300 cfs, which represents a flow between the pre-settlement estimate and the St Paul maximum allowable 100 yr flow, and 415 cfs which is the maximum allowable 100 yr flow. Table 5 summarizes the results of applying the Corps steep slope method of sizing stone to this plausible range of values for the variables over which we may have some control. A safety factor of 1.5 was applied, and the  $D_{90}$  (size for which 90% of the stone in the mix is smaller) was set at 1.45\*D<sub>30</sub> consistent with standard gradation tables (ACOE, 1994).

Not surprisingly, steeper narrow reaches subjected to larger flows require larger stone to achieve immobility. We recommend using limestone slab to match the native stone in the ravine, rather than using large rounded boulders. The economy of acquiring, transporting and placing smaller rock adds incentive for widening the channel consistent with the discussion of natural step pool channel form. Additionally, reducing peak flows within the channel will be very beneficial to the long term stability of the channel and should be emphasized in the redevelopment of the Ford Plant Site.

Table 5 – Estimated Stone Size Required (sizes in ft)

	w, ft	Width = 6 ft			Width = 10 ft			Width = 14 ft		
	Q <sub>100</sub> , cfs	160	300	415	160	300	415	160	300	415
Upper Step Pool Reach	D <sub>30</sub> (ft)	2.3	3.5	4.3	1.6	2.5	3.1	1.3	2.0	2.5
	D <sub>90</sub> (ft)	3.3	5.0	6.3	2.4	3.6	4.5	1.9	2.9	3.6
Lower Step Pool Reach	D <sub>30</sub> (ft)	1.6	2.5	3.1	1.2	1.8	2.2	0.9	1.4	1.8
	D <sub>90</sub> (ft)	2.4	3.6	4.5	1.7	2.6	3.2	1.4	2.1	2.6
The Chute Reach	D <sub>30</sub> (ft)	1.4	2.1	2.6	1.0	1.5	1.8	0.8	1.2	1.5
	D <sub>90</sub> (ft)	2.0	3.0	3.8	1.4	2.2	2.7	1.1	1.7	2.1

## ALTERNATIVES

Dramatic changes to public places often trigger opposition from people who currently appreciate the place. In enhancing the stream at Hidden Falls Park, we should be sensitive to this fact and try to maintain the qualities of the park that people enjoy while improving features that are less functional and less attractive. We propose maintaining the Falls reach of the stream. The first two drops can remain functionally as they are with improvements to the park space around them. The stone walls around the first pool can be restored where necessary, but the overall dimensions of the falls and the pool can remain the same.

A few alternatives are feasible for enhancing the step pool reaches. Given the value of increasing the width of the channel, removing the concrete lining from the channel bed, and using natural material that matches the surrounding environment, all of the alternatives include these features. For all alternatives, access to the channel may be improved by incorporating steps down from the trail to the channel, if desired. The key variables distinguishing the alternatives are (1) whether the mortared stone 1980's era walls are removed entirely on one side of the channel to achieve the greater width or simply moved and rebuilt (Figure 29); and (2) whether the channel is lined with clay to restrict infiltration. The value of these alternatives is summarized in Table 6 together with a no action alternative for comparison.



Figure 29: Upper step pool reach showing 1980's era walls considered for removal

Table 6 - Evaluation of Alternatives for Upper Reaches of Hidden Falls Creek

	Park Planning Considerations (Aesthetics, accessibility; education opportunities)	Ecological, Water Resource and Sustainability Considerations	Cost Considerations
Alternative 1 - No change	<ul style="list-style-type: none"> <li>No change to existing aesthetics; visible concrete; crumbling walls in some areas</li> <li>Stream generally not accessible</li> <li>Potential safety concerns with high steep walls with varying integrity</li> </ul>	<ul style="list-style-type: none"> <li>No change to existing conditions</li> <li>Stream not very accessible to wildlife</li> <li>Stream not very attractive to wildlife</li> </ul>	<ul style="list-style-type: none"> <li>No initial cost</li> <li>Costs associated with repair of trail and bridge infrastructure as stream erosion progresses; ongoing costs of repairing walls and stream bed</li> </ul>
Alternative 2 – Remove concrete bed lining; eliminate 1980's era mortared wall on east side of channel; build steps using limestone slab; access from the trail down to the stream may be incorporated	<ul style="list-style-type: none"> <li>Natural aesthetic replaces wall on east side of stream (this will be a positive change for some, negative for others)</li> <li>Access can be incorporated to allow visitors to get down to the creek</li> <li>Safety improved with ease of getting out of stream</li> </ul>	<ul style="list-style-type: none"> <li>Wildlife access (ingress and egress) possible along east side</li> <li>Naturalized bank suitable habitat for wildlife</li> <li>Naturalized stream bed may support macroinvertebrates if water quality improved</li> <li>Filtration and infiltration of water through natural stream bed</li> </ul>	<ul style="list-style-type: none"> <li>Lower cost than Alt 2a, 3, 3a</li> <li>Primary costs associated with wall and concrete removal; step pool construction, bank stabilization on east bank, wall repair on west bank</li> </ul>
Alternative 2a – Same as Alt 2 but with addition of clay liner at bottom of pools to restrict infiltration	<ul style="list-style-type: none"> <li>Similar to Alt 2</li> <li>Less filtration and infiltration</li> <li>More water delivered downstream to keep pools full</li> </ul>	<ul style="list-style-type: none"> <li>Similar to Alt 2</li> <li>Less filtration and infiltration</li> <li>More water delivered to downstream reaches</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alt 2 but with addition of clay liner cost</li> </ul>
Alternative 3 – Remove concrete bed lining; move and/or lower 1980's era mortared wall on east side to widen channel in some locations; build steps using limestone slab	<ul style="list-style-type: none"> <li>Wall aesthetic maintained on east bank (positive for some, negative for others)</li> <li>Access can be incorporated to allow visitors to get down to the creek</li> <li>Safety improved slightly with access areas, but not as good as Alt 2</li> </ul>	<ul style="list-style-type: none"> <li>Wildlife access remains limited</li> <li>Naturalized stream bed may support macroinvertebrates if water quality improved</li> <li>Filtration and infiltration of water through natural stream bed</li> </ul>	<ul style="list-style-type: none"> <li>Higher cost than Alt 2</li> <li>Primary costs similar to Alt 2 but with additional reconstruction of walls instead of bank stabilization</li> <li>Ongoing maintenance cost of walls higher than Alt 2</li> </ul>
Alternative 3a – Same as Alt 3 but with addition of clay liner	<ul style="list-style-type: none"> <li>Similar to Alt 3</li> </ul>	<ul style="list-style-type: none"> <li>Similar to Alt 3</li> <li>Less filtration and infiltration</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alt 3 but with addition of clay liner cost</li> </ul>

## ALLUVIAL FAN AND FLOODPLAIN REACHES

### NATURAL ALLUVIAL FAN AND FLOODPLAIN FORM

Alluvial fans tend to develop in areas where a stream transitions rapidly from an area with a very steep slope to one of a very flat slope. The high shear stress in the steep slope area results in a corresponding high sediment transport rate. The sediment transport capacity quickly decreases as the stream moves into the flat slope area, and bed material delivered from the steep slope area is deposited. The fan shape may appear similar to a delta with branching streams, but typically not all of the channels are active at the same time. Instead, historic channels are often abandoned as deposition within the channel leads to local aggradation and the stream ultimately avulses. Avulsions occur during high flow conditions after significant aggradation has elevated the channel bed above other regions of the fan, and new channels are then cut through finer material in another region of the fan. The channel near the upstream end of the fan is often incised and steep. This new channel then begins to form a depositional lobe starting at the downstream end of the new channel and progressing upstream until aggradation in this new channel causes another avulsion.

Floodplains are areas that become inundated during high flow events. They are typically depositional areas. As turbulent flood flows carrying high sediment loads spread into vegetated floodplains, the water slows and is no longer capable of keeping sediment in suspension. The sediments deposit, and the flood waters recede. This episodic deposition pattern produces discrete strata in floodplain cores. In rivers with large supply of water and sediment, braiding can occur, causing island formation within the channel.

### EXISTING STREAM FORM

In the Alluvial Fan reach of Hidden Falls Creek, the upper portion of the creek is incised. It is possible that the concrete chute was constructed to halt what was perceived to be problematic incision through that area. There is evidence of typical alluvial fan deposition patterns within the channel. As the slope decreases, there is considerable deposition of fragmented sedimentary rock that was likely delivered from the eroding ravine upstream.

There is also what appears to be an abandoned channel more centrally located on the alluvial fan. We examined the soil cores that we hand dug at two locations along the northern part of this alternative alignment to document potential evidence that this is an historic channel. As described previously in the subsurface investigation subsection, we cored to a depth of 4-6 ft at each location and found a layer of rock and sand at the surface.

Soil borings further from this channel do not show similar large rock in the upper soil layers. This suggests that this channel aggraded through deposition of rock material that washed down the ravine. The existing ground elevation in the abandoned channel further suggests that the channels evolved as expected in alluvial fan development. The elevation of the bed of the abandoned channel is approximately 2 feet higher than the bed elevation of the current channel. This is evidence that aggradation occurred in the historic channel to the point that a flood flow spilled out and was able to cut through finer material into a lower, steeper sloped channel.

Interestingly, the historic channel appears to cease at the location of a former Mississippi River backwater channel. This may be due to the timing of the abandonment of that channel relative to the formation and subsequent aggradation of the backwater channels. The former alluvial fan channel may have pre-dated Mississippi River deposition that formed the braiding and island development in this area, or it may have existing concurrently with the backwater channel. Aggradation of the Mississippi River floodplain in this area may have contributed to decreasing the slope of the alluvial fan channel, accelerating deposition and the avulsion to a new channel.



**Figure 30: Incised alluvial fan channel with abandoned pipe**

Imposed on the geologic evolution of the alluvial fan are the shorter term impacts of human modifications to the watershed and the stream. Continued erosion of the ravine has been halted through the concrete stabilization and the stormsewer pipe within the watershed. Even if a portion of the stream is daylighted upstream of the Mississippi River Blvd crossing, development adjacent to the stream will probably necessitate incorporation of stabilizing features that will continue to limit sediment supply to this reach. At the same time, increased

impervious area within the watershed has increased peak flow rates and the erosive energy associated with storm events. While much of the ravine is locked in place with concrete, the erosive energy of these flows has continued to cut into the alluvial fan reach of the stream below the concrete chute.

The character of the Floodplain Reach of Hidden Falls Creek is dominated by the effects of the Mississippi River. The landforms that comprise the riparian area are the result of deposition from the Mississippi River, and they include evidence of historic island and backwater channel formation. The soil borings within this region of the park are indicative of floodplain soils, characterized by multiple distinct layers of alluvium. The backwater channels continue to become inundated during high flow in the river, and Hidden Falls Creek is backwatered by the Mississippi River during high flows. We would expect the mouth of Hidden Falls Creek to become a depositional area for material being transported by the large river, but the effect of dam construction and dredging associated with navigation in the river has limited the supply of sediment to this reach. When the Mississippi River is low, the lower reach of Hidden Falls Creek typically loses water to infiltration into the sands and gravels that comprise the floodplain in this area. This reach is often dry in the summer due to such infiltration.

## LOWER REACH STREAM DESIGN

The lower reach of the stream transitions from a step pool system to a pool/riffle system that is dominated by its geologic history and the backwatering effects of the Mississippi River. The existing Alluvial Fan reach hugs the steep ravine slope on the right side and appears to have incised such that it is no longer connected to its floodplain. Smaller material has winnowed out of the stream bed in this reach such that it is now armored with the fragmented bedrock that has washed down the ravine and adjacent steep slope. Although the stream is characterized by active erosion in this reach, this is typical in alluvial fans.

Downstream of the existing pedestrian bridge #2, the Floodplain reach is a much flatter reach that is clearly backwatered by the Mississippi River during high flow conditions. The stream banks appear fairly stable and able to withstand the forces imparted by the lower energy flows through this reach. Because the stream banks are stable and the dimensions of the creek seem sufficiently well suited to the hydrologic conditions in this reach, no improvements to the stream form and function are required in this reach. Amenities to improve visitor access, understanding, and enjoyment of this reach should be considered.

## ALTERNATIVES

The options for enhancing the stream in the lower reaches include doing nothing; leaving the channel in its existing alignment with modifications to the cross section to improve floodplain connectivity, bank stability, aesthetics and access in the Alluvial Fan reach; and moving the

channel to a new location. These alternatives are detailed in the following sections and summarized in Table 7.

#### Alternative A – No Change

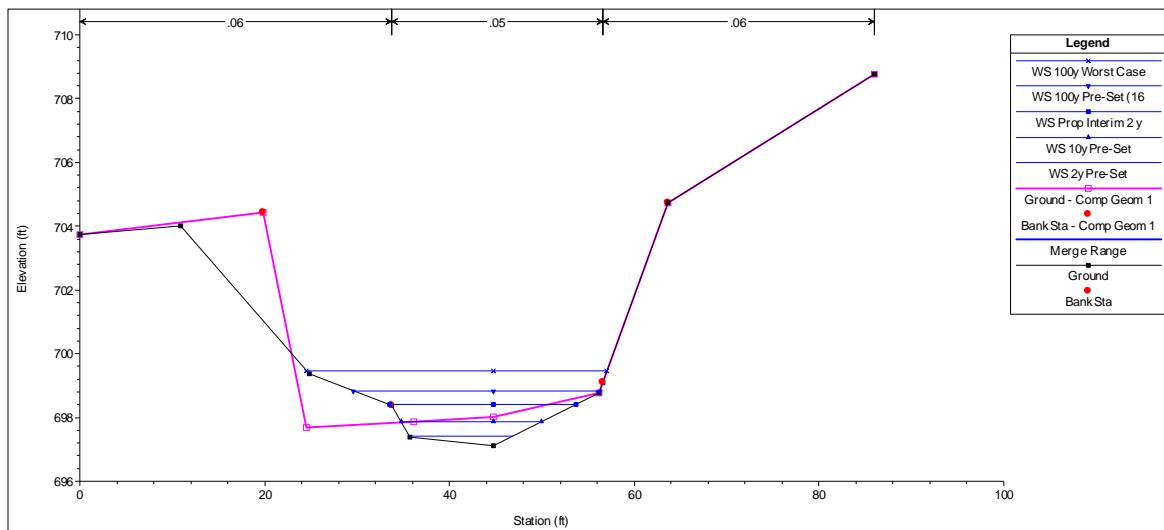
One option is to leave the lower reach alone and allow it to continue to evolve on its own. As described previously, the incision and active erosion evident in this reach is, at least to some degree, natural in an alluvial fan system. However, continued natural evolution of the reach may be hampered by limited sediment supply and increased flood flow rates due to human alterations. Although the existing condition of this reach offers an interesting geology story and provides educational opportunities for telling that story, the active erosion of the stream may be incompatible with maintaining park features, such as trails, adjacent to the stream.

#### Alternative B – Maintain Alignment and Modify Banks

A second option entails leaving the stream in its current alignment while improving the stability of the Alluvial Fan reach and improving park user access to it. The lower channel would continue to have distinct characteristics in the Alluvial Fan and Floodplain reaches. To improve stability, we would reshape the channel in this reach to include a connected floodplain bench. This would entail cutting into the left bank (looking downstream), and likely narrowing the base of the channel in some locations to construct a low flow channel. By cutting into the existing steep bank, we would also improve park user access to the stream as well as wildlife access to the stream. The abandoned pipe that has become exposed in this reach would be removed, and the concrete wall that currently forms the right bank just upstream of the pedestrian bridge would be removed entirely and replaced with a stable, natural bank.

The slope in the Alluvial Fan reach would be slightly higher than 2%. Streams with slopes of this magnitude typically have low sinuosity, and while they have some connection to a floodplain, they are often moderately entrenched. In the Rosgen stream classification system parlance, they are typically B channels which typically have a bankfull width to depth ratio that is greater than 12 and entrenchment ratio (floodprone area width/ bankfull width) between 1.4 and 2.2. An example of the modification anticipated for the channel cross section is illustrated in Figure 31.

The Floodplain reach channel would remain unchanged. This reach is regularly backwatered by the Mississippi River, and when the Mississippi River is low, it regularly is dry as the sandy/rocky floodplain allows all of the water to infiltrate. The slope in this reach is very flat, and banks appear fairly stable. Any park amenities that are considered for this area should be designed with consideration of the intermittent nature of this reach. For example, stream access locations would be attractive when there is water in the channel, but designers should also consider the aesthetics when the channel is dry.



**Figure 31: Existing cross section (pink) and potential proposed cross section (black) in the Alluvial Fan Reach**

If Alternative B is selected, we propose extending the step pool reach approximately 100 ft past the end of the existing chute reach and have a final drop into a pool near station 10+00. This location is a bend in the stream and is closest to the pavilion area of the park. Its proximity to the parking area and pavilion suggest making this location a destination for park users. The sound and sight of the final drop from the step pool reach will be an attraction for park users. Further, since it is located at the end of the step pool reach before the stream traverses through the sandy floodplain, it is likely to perennially hold water. The area between the parking lot and this destination can be modified to include a path to this location or a larger swath of understory may be removed to create a more open space that directs people to this location. The stream bank can be augmented with natural stone to allow for access to the water without damage to the strembank.

#### Alternative C – Re-Occupy Historic Channel

An alternative to leaving the stream in its existing alignment is to pull it further south and east starting just upstream of the existing pedestrian bridge #2 to re-occupy the historic channel until it intersects with an existing backwater channel area. At this location, the channel would be routed north and west to re-join the existing alignment downstream of pedestrian bridge #2. The modified alignment would replace 850 feet of the existing channel with 1178 feet of new channel. The character of the reach from the upstream end to the junction with the former backwater channel (794 ft length) would be that of an alluvial fan channel with an average slope of 2.5%. The character of the lower part of this new channel (384 ft length) would be similar to the floodplain reach with a slope of approximately 1%.

As described previously, the information from the soil borings, the hand cores, and the topography in the park is consistent with the theory that this is an historic channel. The evidence also suggests that this channel was abandoned through typical alluvial fan evolution processes of aggradation and avulsion. Given that the elevation of the historic channel is 2 ft higher than the existing channel, placing the channel back in this historic channel would be counter to the direction of natural evolution of the channel. In order to increase the sustainability of the channel in this location and account for adjustments that had been made in upstream reaches when the channel avulsed, if the stream is relocated to this former alignment, the channel should be excavated so it is not perched above the other potential flow paths. Otherwise, there is risk of avulsion similar to what occurred historically. The rock layer near the existing ground surface could be removed and stockpiled, and a portion of the fine material underneath could be removed to achieve the proper grade. The salvaged rock would be replaced and augmented with material from offsite. Fine material could be used in part to fill the existing channel, but larger material should also be used to fill the existing channel to minimize the risk of avulsion. This would require considerable material handling and incur additional costs.

#### Alternative D – Re-Occupy Historic Channel and Cut New Floodplain Reach

A final option would be to relocate the alluvial fan reach as described in Alternative C but rather than route the stream back to the existing floodplain reach, the channel would be routed along the former backwater channel and an additional channel would be cut such that the creek enters the Mississippi River near the boat launch. The upper portion of this would be the same slope and length as described for Alternative C. The lower portion would be approximately 850 ft long with a slope of 0.5%. This would require considerably more excavation and bank stabilization features due to the added length. Additionally, forcing the stream to the south and east will require filling the historic channel to the north and west, which interrupts the historic backwater channel in that area and introduces regulatory complications associated with floodplain fill.

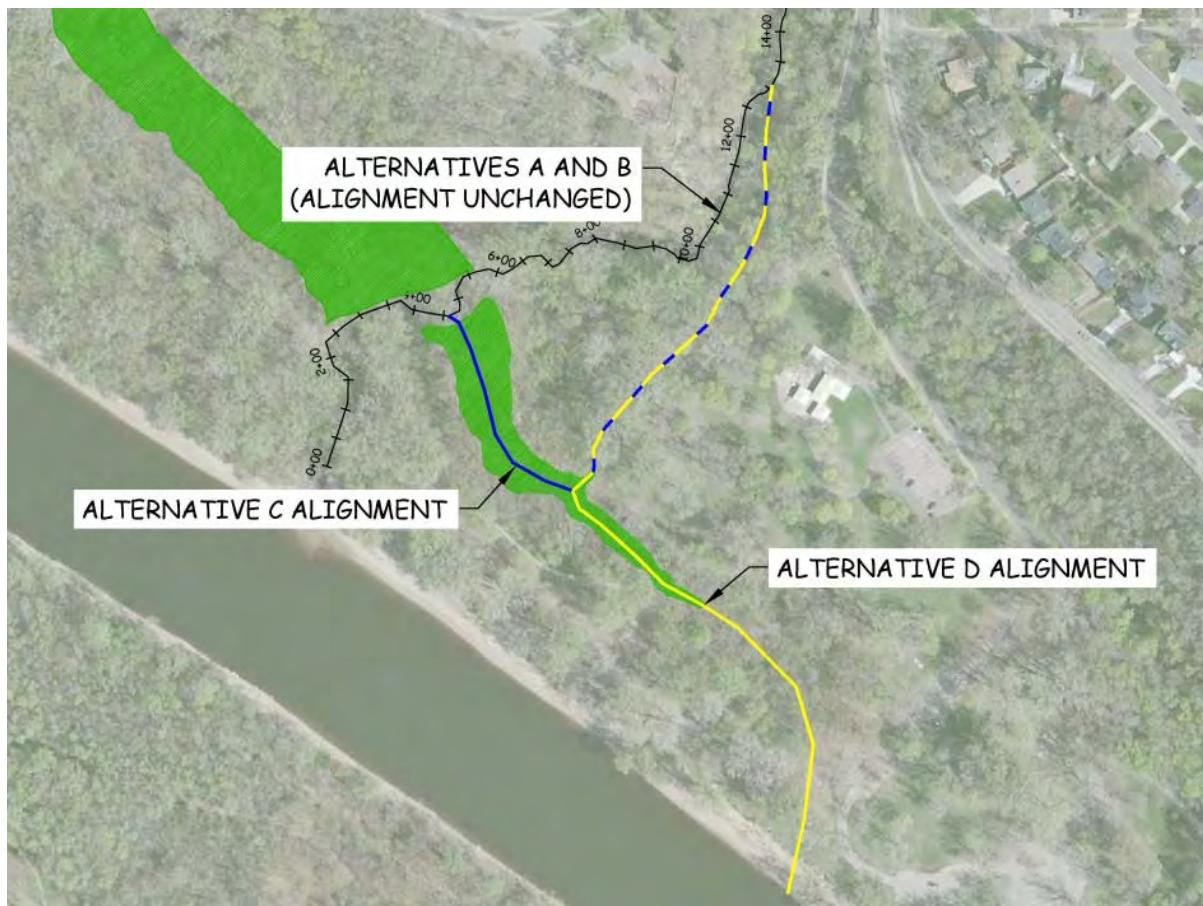


Figure 32: Alternative Alignment Options

Table 7 – Evaluation of Alternatives for Lower Reaches of Hidden Falls Creek

	Park Planning Considerations (Aesthetics, accessibility; education opportunities)	Ecological, Water Resource and Sustainability Considerations	Cost Considerations
Alternative A – No change	<ul style="list-style-type: none"> <li>Eroding streambanks, abandoned pipe, and wall treatments are unattractive</li> <li>High steep banks preclude access</li> <li>Preserves geologic story</li> </ul>	<ul style="list-style-type: none"> <li>Floodplain remains disconnected</li> <li>Least disturbance of existing riparian vegetation</li> <li>Evolution of channel continues through erosion</li> </ul>	<ul style="list-style-type: none"> <li>No initial cost</li> <li>Costs associated with repair of trail and bridge infrastructure as stream erosion progresses</li> </ul>
Alternative B - Maintain existing alignment – stabilize banks and bed in alluvial fan reach	<ul style="list-style-type: none"> <li>Eroding streambanks unattractive</li> <li>Access to stream improved</li> <li>Preserves most of geologic story</li> </ul>	<ul style="list-style-type: none"> <li>Improved floodplain connection</li> <li>Better access to stream for wildlife</li> <li>Less disturbance of existing vegetation than Alt C or D</li> <li>More likely to persist than Alt C or D</li> </ul>	<ul style="list-style-type: none"> <li>Lower than Alt C or D</li> <li>Primary cost items include earthwork to cut and fill along one bank; additional stone toe and bank stabilization along one bank</li> </ul>
Alternative C – Occupy historic alluvial fan alignment; maintain existing floodplain reach	<ul style="list-style-type: none"> <li>Stream would be ~70 ft closer to existing shelter area</li> <li>Access to stream improved</li> <li>Reverses geologic history of alluvial fan</li> </ul>	<ul style="list-style-type: none"> <li>Improved floodplain connection</li> <li>Better access to stream for wildlife</li> <li>More site disturbance than Alt B</li> <li>Avulsion to new channel is a risk</li> </ul>	<ul style="list-style-type: none"> <li>Considerably higher than Alt B; lower than Alt D</li> <li>Primary cost items include earthwork to lower alluvial fan channel; additional stone for stream bed; bank stabilization on both sides</li> </ul>
Alternative D – Occupy historic alluvial fan alignment; abandon floodplain reach and route new channel to boat launch area	<ul style="list-style-type: none"> <li>Stream would be ~70 ft closer to existing shelter area</li> <li>Access to stream improved</li> <li>Reverses geologic history of alluvial fan</li> <li>More modification of Mississippi River backwater channel than Alt C</li> </ul>	<ul style="list-style-type: none"> <li>Improved floodplain connection</li> <li>Better access to stream for wildlife</li> <li>Greatest site disturbance</li> <li>Avulsion to new channel is a risk</li> </ul>	<ul style="list-style-type: none"> <li>Highest Cost</li> <li>Primary cost items include earthwork to lower alluvial fan channel and new floodplain channel; additional stone for stream bed; bank stabilization on both sides</li> </ul>

## RECOMMENDED ALTERNATIVES AND COST ESTIMATES

Inter-Fluve staff met with St Paul Parks and Recreation staff and Capitol Region Watershed District staff to discuss the alternatives for the upper and lower reaches of Hidden Falls Creek. The objective of the meeting was to reach consensus regarding preferred alternatives for which concept drawings and a conceptual cost estimate could be developed. It was agreed that based on information available at this point, Alternative 2 or 2a is preferred for the upper reach and Alternative B is preferred for the lower reach. Alternative 2 and B are preferred for several reasons including that they:

1. Provide the most sustainable stream channel;
2. Improve riparian and in-stream habitat;
3. Create a more natural aesthetic;
4. Balance cost and benefit;
5. Create the best opportunities for access and education;
6. Promote better usage of currently under-utilized areas of the park

These alternatives are described in more detail below and illustrated in the Concept Design Drawings in Appendix B and the plan view sketch attached as Appendix C.

### UPPER REACHES

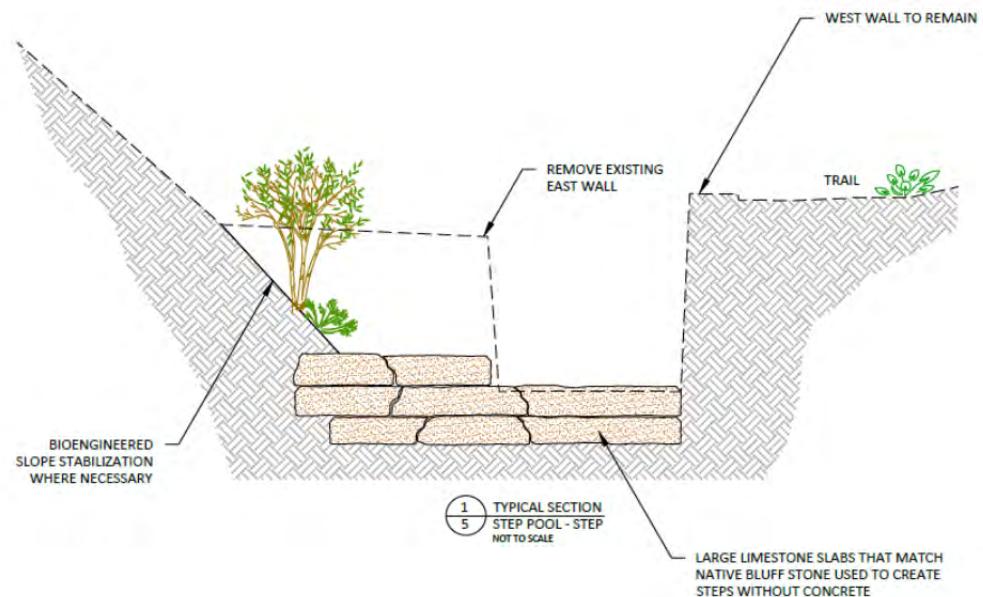
In the upper reaches of the creek, we recommend that all dry stacked WPA era walls remain in place and be repaired where necessary. We also recommend leaving the falls relatively unchanged. Some of the mortared stone around the pools may be replaced with natural stone, but the overall form should remain similar. The 1980's era wall on the east side of the stream should be removed to allow a wider channel to more effectively dissipate energy and allow use of smaller stone in the channel. The east bank should be graded back to a stable slope. The soils are very rocky due to material sliding down the steep valley slope, but vegetation should be incorporated to the extent possible. The west bank wall should remain and be repaired where necessary to serve as a retaining wall to continue to allow trail access on that side. Access to the stream from the trail is possible where there is room to incorporate steps from the trail down to the stream. To the extent possible, water flow through and across the mortar between the stones of this wall should be minimized to increase the lifespan of the mortar.

The concrete in the channel bottom should be removed and replaced with natural stone substrate throughout the reach. To achieve a naturally functioning system, smaller material can be used to make up the bottom of the pools, and a gradient from small to larger material should exist as the pool ends and transitions to the step. The steps should be comprised of material large enough to resist movement during a full range of flow conditions (see Table 5). The stone

should match the limestone within the valley and can be placed to give the appearance of fractured bedrock typical of step pool channels. The steps should be spaced and configured to simulate natural step pools (see previous section “Natural Step Pool Form”).



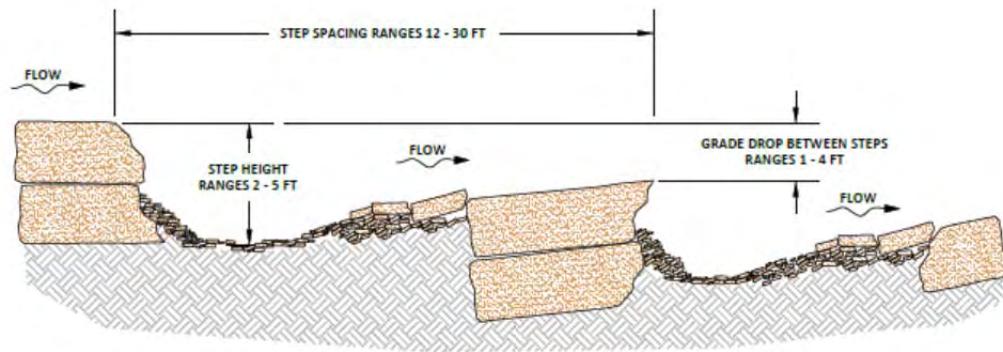
**Figure 33 – East wall and concrete lining should be removed in the upper step pool reach.**



**Figure 34: Detail of proposed wall removal and step construction**



**Figure 35: Proposed changes in lower step pool reach**



**Figure 36: Detail of longitudinal profile of stream with naturalized steps and pools**

The entire concrete chute should be removed and replaced with the same natural step pool form. We propose ending the step pool reach just upstream of the existing bend in the stream, near Station 10+00 (see Concept Drawings, Appendix B and Figure 1). A final step should be designed with a larger drop that creates a small water fall into a pool. This location can be an attractive stream access feature that is visible and audible from the pavilion and can draw people to the creek.



Figure 37: This bend in the stream should be designed as the final drop from the step pool reach into a large pool that is accessible to park users.

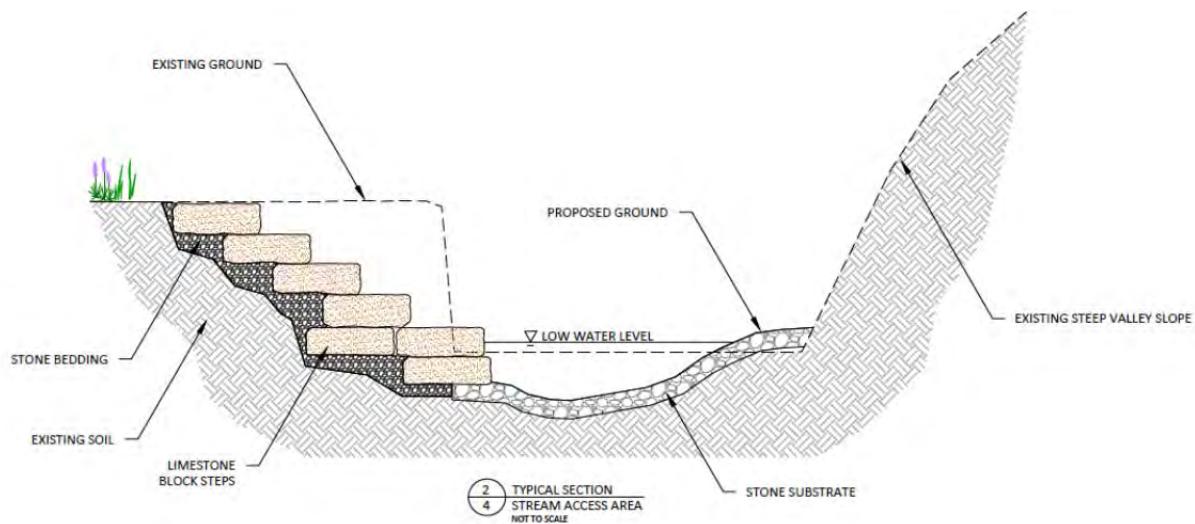


Figure 38: Detail cross section of stream access and pool near final drop.

State-of-the-art stormwater management should be incorporated into the redevelopment of the Ford site. The objective of these features should be to store and slowly release baseflow with the greatest duration practical and reduce peak stream flows to mimic pre-development runoff rates. Peak flows estimated as representative of pre-development conditions are described in

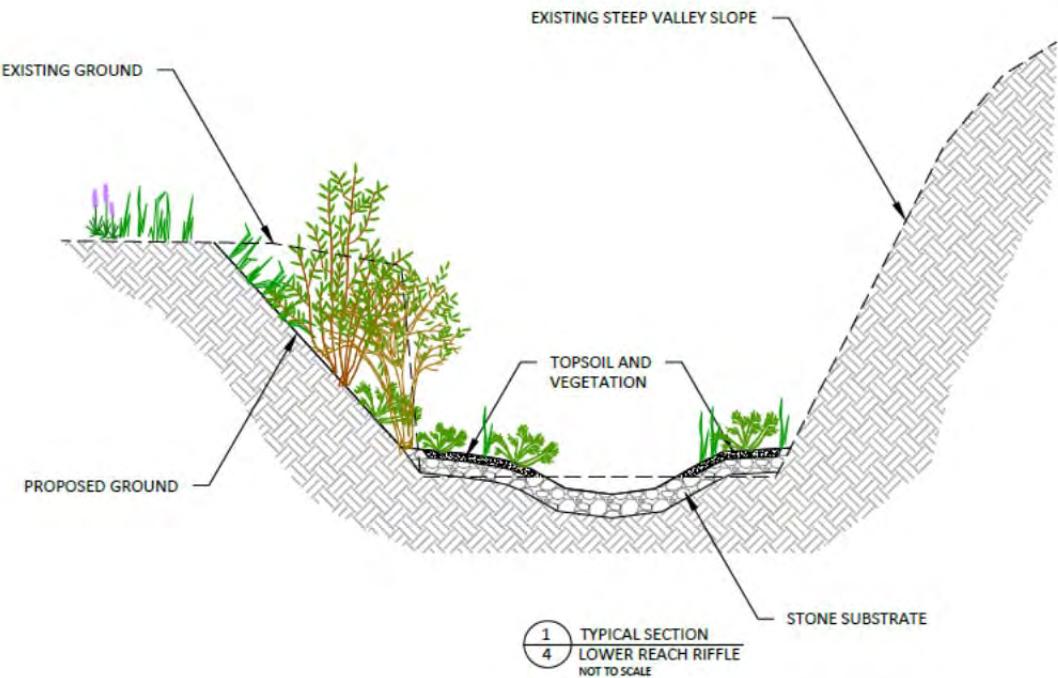
the Hydrology section of this report – the 2 yr, 10 yr, and 100 y peak flows were estimated as 4, 31 and 161 cfs, respectively. If nearly continuous baseflow is possible, clay liners should not be necessary in the pools. If baseflow remains negligible for much of the time, a clay liner may be considered for a portion of the pools, particularly the larger pool near Station 10+00 that is to serve as a point of access.

## LOWER REACHES

To maximize long term sustainability of the stream, we propose leaving the stream in its current alignment through the lower reaches. From the end of the step pool reach to the middle pedestrian bridge, the stream cross section should be modified to improve channel stability and aesthetics. The valley wall on the right side of the stream (looking downstream) contains large quantities of fractured rock that provides adequate stability on that side. Additionally, there are currently no trails on that side of the stream and there is not room for future trails that could be subject to damage by erosion. Therefore, the right bank can remain unchanged. The left bank is very high and steep, and it appears to be actively eroding. The channel is wide. We propose reshaping the stream bed, supplementing with additional stone as necessary to create a low flow channel and floodplain bench. The left bank should be graded back to achieve a maximum slope of 3:1. It should be covered with temporary erosion control fabrics to provide short term stability and planted with native vegetation along the entire slope to provide long term stability.



**Figure 39: Stable right bank and steep, eroding left bank. Left bank should be graded and stabilized. Channel bed should be reshaped to include a low flow channel and floodplain bench.**



**Figure 40: Detail of recommended grading and slope stabilization in lower reach.**

The existing pipe located in this reach should be removed. Given that the history of this pipe is uncertain, additional investigation will be necessary to safely remove it. The existing concrete bank stabilization upstream of bridge 2 should also be removed. The bank should be graded and stabilized as described above.

The historic abandoned alluvial fan channel is an interesting geologic relic and presents an opportunity. We recommend incorporating crossings over this channel into the trails system within the park and highlighting the geologic history of the site through interpretive signage at these crossings. Additional hydraulic modeling should be conducted during final design when future flow conditions are better understood to determine if this channel can and should serve as an overflow channel during peak flows.



**Figure 41: Existing bank armor to be removed.**



**Figure 42: Pipe to be removed.**

We recommend leaving the floodplain reach downstream of bridge 2 unchanged. This reach appears to be very stable. The hydrology of this reach depends heavily on the stage of the Mississippi River and is therefore quite variable. Park planning efforts should account for this variability to ensure landscape features accommodate a flooded stream as well as a dry sand channel depending on the season.

## COST ESTIMATE

Conceptual cost estimates are shown in Table 8. These costs only reflect the costs associated with improvements to the stream and stream banks. Other site improvement costs, such as additional foot bridges, site cleanup, expansion of managed turf, and potential changes to the historic alluvial fan channel, are not included. There is significant uncertainty in these estimates, particularly given the uncertainty related to future development of the Ford site and related hydrology. Additionally, the site is unique and several of the work items listed are atypical. As such, bids from different contractors can be expected to vary widely.

Table 8 – Conceptual Cost Estimate

Item	Task	Quantity	Unit	Unit Cost	Total Est. Cost
1	<b>Mobilization, Access, ESC</b>	1	LS		\$ 69,200
2	<b>Clearing</b>	0.5	ACRE	\$ 6,000	\$ 3,000
3	<b>Grouted Stone Removal</b>	60	CY	\$ 150	\$ 9,000
4	<b>Concrete Channel Lining Removal</b>	130	CY	\$ 150	\$ 19,500
5	<b>Bank Armor Removal</b>	100	CY	\$ 150	\$ 15,000
6	<b>Pipe Removal</b>	50	LF	\$ 30	\$ 1,500
7	<b>Stone Wall Repair</b>	600	SF	\$ 40	\$ 24,000
8	<b>Earthwork - Bank Grading</b>	2000	CY	\$ 15	\$ 30,000
9	<b>Limestone Slab</b>	650	TON	\$ 400	\$ 260,000
10	<b>Stream Substrate Stone</b>	300	CY	\$ 80	\$ 24,000
11	<b>Surface Fabric</b>	1500	SY	\$ 6	\$ 9,000
12	<b>Riparian plantings along new bank</b>	2200	SY	\$ 30	\$ 66,200
<b>Contingency</b>					30%
<b>Total</b>					\$ 690,000

## REFERENCES

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## APPENDIX A – SOIL BORING REPORT

February 14, 2014

Project SP-13-07975

Brian C. Tourtelotte  
Senior Landscape Architect  
Saint Paul Parks and Recreation  
25 W. 4<sup>th</sup> Street, Suite 400  
Saint Paul, MN 55102

Re: Factual Report of Subsurface Investigation  
Hidden Falls Regional Park  
St. Paul, Minnesota

Dear Mr. Tourtelotte:

We are pleased to present this factual report describing our subsurface evaluation conducted at Hidden Falls Regional Park in St. Paul Minnesota. The scope of the project is illustrated in the CAD drawing included as an attachment to this report. A summary of the subsurface profile encountered and groundwater conditions are included with the attached Log of Boring.

Based on the Request for Proposal (RFP) contained in an email from Mr. Tourtelotte dated, December 4, 2013, the project includes the restoration of the stream which flows into the Mississippi River at Hidden Falls Regional Park in St. Paul Minnesota. Four segments of the stream were analyzed as listed below:

- The *Upper Reach* extends approximately 500 feet and is underlain with shallow bedrock. Four borings were drilled adjacent to the stream. Bedrock was encountered from 11 ½ to 22 ½ feet below grade which represents 10.4 to 34.5 feet based on St. Paul datum elevation.
- The *Chute* is a relatively steep section of the stream which flows in a concrete-lined channel for approximately 200 ft. Two borings were drilled adjacent to the Chute to approximate 10 feet.
- The *Lower Reach* extends approximately 900 feet. Three borings were drilled to an approximate depth of 10 feet.
- One boring was drilled to approximately of 20 feet in the *Flood Plain*.

## Project Background and Purpose

We understand that the overall goal of this subsurface evaluation was to prove preliminary information for stream restoration through Hidden Falls Regional Park in St. Paul Minnesota. Further geotechnical investigation will be necessary as funding becomes available.

## Log of Borings

Log of Boring sheets for our geo-probe borings are included as an attachment. These logs identify and describe the geologic materials that were penetrated and groundwater measurements.

Soil classification of the retrieved continuous sampling was completed by a geotechnical engineer. A photographic log was also completed during this analysis describing the soil samples retrieved from each boring. The continuous sample was retrieved from the bore hole in five foot sample tubes. Gravel or cobbles larger in diameter than the continuous sampler diameter can restrict the opening and minimize sample retrieval. With the large amount of gravel and cobbles in the exploration site due to slough off from the surrounding bluffs, some quantities retrieved were approximately 50% or less, although the majority of the sample tubes were recovered with 67% or greater.

Gravel identified in the samples is generally fragmented dolostone or limestone from the surrounding bluffs. Fragments to 1 ½ inches were recovered in the continuous sampling tube.

Strata boundaries were inferred from changes in the recovered samples. Due to the fact that 100% of each sample was not recovered, the strata boundary depths are approximate in most cases. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

## Groundwater

Groundwater was observed in two of the ten borings. The groundwater summary is included in Table 1 below.

**Table 1. Summary of Groundwater**

Boring #	Depth to Groundwater [ft]	Groundwater Elevation [ft] MSL	Groundwater Elevation [ft] St. Paul Datum *
PP-8	8	691.1	-3.2
PP-10	12	689.8	-4.5

\*St. Paul datum = 694.26 [ft] MSL as reported, <http://survey.ci.stpaul.mn.us/benches/leg-notes.pdf>

Given the general cohesive nature of the geologic materials encountered, it is likely that insufficient time was available for groundwater to seep into the borings and rise to its hydrostatic level. Piezometers or monitoring wells would be required to confirm if groundwater was present within the depths explored. Seasonal and annual fluctuations of groundwater should also be anticipated.

## Bedrock

Borings PP-1 through PP-4 were drilled in the upper reach of the stream to refusal depth (bedrock) which was anticipated at 15 feet below existing grade. Table 2 summarizes bedrock elevations encountered in the upper reach.

**Table 2. Summary of Bedrock Elevations**

Boring #	Depth to Bedrock [ft]	Bedrock Elevation [ft] MSL	Bedrock Elevation [ft] St. Paul Datum *
PP-1	11 ½	728.8	34.5
PP-2	22 ½	711.4	17.1
PP-3	14	714.8	20.5
PP-4	17 ½	704.7	10.4

\*St. Paul datum = 694.26 [ft] MSL as reported, <http://survey.ci.stpaul.mn.us/benches/leg-notes.pdf>

## Remarks

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

If you have any questions about this report, please contact Robert Malecha at 612.910.1779.

Sincerely,

BRAUN INTERTEC CORPORATION

Robert Malecha, EIT

Staff Engineer

Loren W. Braun, PE

Senior Engineer

Attachments:

Log of Borings

Photo Log of Continuous Sample

CAD Sketch of Project Extent

Boring Geo-Spatial Data

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-1</b> <b>LOCATION:</b> See attached sketch.			
DRILLER: M. Barber				METHOD: Geoprobe			
Elev. feet 46.0	Depth feet 0.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL
45.0	1.0	SM	SILTY SAND with GRAVEL, black, frozen. (Top Soil)				
41.0	5.0	GP-GM	POORLY GRADED GRAVEL with SILT, Clay deposits, brown, frozen to moist. (Alluvium)				
37.0	9.0	GP-GC	POORLY GRADED GRAVEL with CLAY, brown, moist. (Alluvium)				
36.0	10.0	GP-GC	POORLY GRADED GRAVEL with CLAY, with Gravel, gray to green, moist. (Alluvium)				
34.5	11.5	SC	CLAYEY SAND with GRAVEL, gray to green, wet. (Alluvium)  REFUSAL OF AUGER AT 11 1/2 FEET.  Water not observed while drilling.  Boring then backfilled with dry bentonite chips.				

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-2</b> <b>LOCATION:</b> See attached sketch.							
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'					
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes			
39.6	0.0	PT	PEAT, interbedded with Sand and Peat, frozen. (Top Soil)								
38.1	1.5	GP-GM	POORLY GRADED GRAVEL with SILT, sluff rock layers of LEAN CLAY Sand seams. brown, frozen to moist. (Alluvium)								
28.6	11.0	CL	LEAN CLAY with GRAVEL, brown, moist. (Alluvium)								
27.1	12.5	CL	LEAN CLAY, trace of Gravel, green to gray, wet. (Alluvium)								
23.6	16.0	CL	LEAN CLAY with SAND, trace of Gravel, brown, wet. (Alluvium)								
19.6	20.0	CL	LEAN CLAY, trace of Gravel, reddish-brown, wet. (Alluvium)								
17.1	22.5		END OF BORING.  REFUSAL OF AUGER AT 22 1/2 FEET.  Boring then backfilled with dry bentonite chips.								

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-3</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
34.5	0.0	SM	SILTY SAND with GRAVEL, organic, dark brown, frozen.						
32.5	2.0	GP-GM	Poorly Graded GRAVEL with SILT, Clay deposits, brown, frozen to moist. (Alluvium)						
26.0	8.5	SP-SM	Poorly Graded SAND with SILT, gray to brown, moist. (Alluvium)						
24.5	10.0	CL	SANDY LEAN CLAY with GRAVEL, brown, moist. (Alluvium)						
21.0	13.5								
20.5	14.0	SP	Poorly Graded SAND, fine-grained, light brown, moist. Possible decomposed limestone. (Alluvium) REFUSAL OF AUGER AT 14 FEET.  Water not observed while drilling.  Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-4</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
27.9	0.0	SM	SILTY SAND with GRAVEL, black, frozen. (Top Soil)						
26.4	1.5	SP-SM	POORLY GRADED SAND with SILT, light brown. (Alluvium)						
25.9	2.0	CL	SANDY LEAN CLAY with GRAVEL, brown, frozen to moist. (Alluvium)						
22.9	5.0	CL	LEAN CLAY, trace of Gravel, organic, black, moist. (Alluvium)						
21.9	6.0	GP-GM	POORLY GRADED GRAVEL with SILT, Clay deposits, brown, moist. (Alluvium)						
13.9	14.0	CL	SANDY LEAN CLAY, reddish-brown, wet. (Alluvium)						
10.4	17.5		REFUSAL OF AUGER AT 17 1/2 FEET. Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-5</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
23.0	0.0		SILTY SAND, fine-grained, interbedded with Peat and Sand, black, frozen.						
22.0	1.0	SM	SILTY SAND, fine-grained, interbedded with Peat and Sand, black, frozen.  (Top Soil)						
19.0	4.0	GP-GM	POORLY GRADED GRAVEL with SILT, with gravel to 1 1/2" Gravel, brown, frozen.  (Alluvium)						
18.0	5.0	CL	SANDY LEAN CLAY with GRAVEL, dark brown, moist.  (Alluvium)						
		SP-SM	POORLY GRADED SAND with SILT, with Gravel, brown, moist.  (Alluvium)						
14.0	9.0		SILTY SAND, with gravel to 1 1/2" Gravel, dark brown, moist.  (Alluvium)						
13.0	10.0	SM	END OF BORING.  Water not observed while drilling.  Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-6</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
17.4	0.0	SP	POORLY GRADED SAND, fine- to medium-grained, brown, frozen.						
15.9	1.5				(Alluvium)				
15.4	2.0	PT	PEAT, trace of roots/leaves, black, frozen.						
		SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel up to 1 1/2", brown, wet.						
			(Alluvium)						
12.4	5.0	ML	SILT, trace of Gravel, dark SILT layering at 6', light brown, moist.						
9.9	7.5	ML	SANDY SILT, trace of Gravel, dark brown, moist.						
			(Alluvium)						
7.4	10.0		END OF BORING.						
			Water not observed while drilling.						
			Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-7</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber			METHOD: Geoprobe	DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM110-1-2908)			BPF	WL	Tests or Notes	
13.5	0.0	ML	SANDY SILT, interbedded Sand and Peat, black, frozen.						
12.0	1.5	SM	SILTY SAND, trace of roots, trace of Gravel, dark brown, frozen.	(Top Soil)					
10.5	3.0	ML	SILT, light brown to reddish-brown, frozen.	(Alluvium)					
9.0	4.5	ML	SANDY SILT, trace of Gravel, Sand seam at 6 1/2' and 9", dark brown, moist.	(Alluvium)					
3.5	10.0		END OF BORING.						
			Water not observed while drilling.						
			Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-8</b> <b>LOCATION:</b> See attached sketch.		
DRILLER: M. Barber		METHOD: Geoprobe		DATE: 1/29/14		SCALE: 1" = 4'
Elev. feet 4.8	Depth feet 0.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			Tests or Notes
-3.3	1.5	ML	SANDY SILT, interbedded with Sand/Peat, black, frozen. (Top Soil)			
-1.8	3.0	SM	SILTY SAND, fine-grained, brown, frozen. (Alluvium)			
-1.3	3.5	SP	POORLY GRADED SAND, fine-grained, trace of Gravel, light brown, moist.			
-0.8	4.0	ML	ML			
-0.3	4.5	ML	POORLY GRADED SAND, fine-grained, trace of Gravel, light brown, moist. (Alluvium)			
-0.2	5.0	ML	SILT, Clay deposits, dark brown, moist. (Alluvium)			
		ML	SILT, Clay deposits, reddish-brown, moist. (Alluvium)			
-2.7	7.5	CL	SILT, light brown, moist. (Alluvium)			
-4.2	9.0	CL	SILT, light brown to reddish-brown, moist to waterbearing. (Alluvium)			
-4.7	9.5	CL	LEAN CLAY, with Silt seams, gray, waterbearing. (Alluvium)			
-5.2	10.0	ML	LEAN CLAY, reddish-brown, waterbearing. (Alluvium)			
			SILT, fat Clay seams, gray to red, waterbearing. (Alluvium)			
END OF BORING.						
Water observed at 8 feet while drilling.						
Boring then backfilled with dry bentonite chips.						



An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling.

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-9</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber		METHOD: Geoprobe		DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet 4.4	Depth feet 0.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
3.8	0.6	TS	Organic, interbedded Sand and Peat, black, frozen.						
2.9	1.5	FILL	FILL: Poorly Graded Sand with Silt, brown, frozen.						
2.4	2.0	FILL	FILL: Bituminous, possible buried trail, black.						
1.9	2.5	FILL	FILL: GP-GM, possible Class V aggregate base, brn, frozen.						
1.4	3.0	FILL	FILL: Sandy Silt, brown.						
0.9	3.5	FILL	FILL: Bituminous, possible buried trail, black.						
-0.6	5.0	SM	SILTY SAND, fine-grained, light brown, moist. (Alluvium)						
-2.6	7.0	ML	SANDY SILT, brown, moist. (Alluvium)						
-4.1	8.5	GP-GM	POORLY GRADED GRAVEL with SILT, brown, moist. (Alluvium)						
-5.6	10.0	ML	SILT, fat Clay lens, light brown, moist. (Alluvium)						
			END OF BORING.						
			Water not observed while drilling.						
			Boring then backfilled with dry bentonite chips.						

(See Descriptive Terminology sheet for explanation of abbreviations)

<b>Braun Project SP-13-07975</b> <b>Geotechnical Evaluation</b> <b>Hidden Falls</b> <b>Mississippi River Boulevard/Hidden Falls Drive</b> <b>St. Paul, Minnesota</b>				<b>BORING:</b> <b>PP-10</b> <b>LOCATION:</b> See attached sketch.					
DRILLER: M. Barber		METHOD: Geoprobe		DATE: 1/29/14		SCALE: 1" = 4'			
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)			BPF	WL	Tests or Notes	
6.5	0.0	PT	PEAT, interbedded with Peat and Sand, black, frozen. (Top Soil)						
5.5	1.0	CL	LEAN CLAY with GRAVEL, green to brown, frozen. (Alluvium)						
4.5	2.0	GP-GM	POORLY GRADED GRAVEL with SILT, medium- to coarse-grained, brown, frozen. (Alluvium)						
4.0	2.5	SM	SILTY SAND, trace of Gravel, dark brown, moist. (Alluvium)						
3.0	3.5	SP-SM	SILTY SAND, dark brown, moist. (Alluvium)						
1.5	5.0	SM	POORLY GRADED SAND with SILT. (Alluvium)						
0.5	6.0	SP-SM	SILTY SAND, dark brown, moist. (Alluvium)						
			POORLY GRADED SAND with SILT, fine- to medium-grained, light brown, moist. (Alluvium)						
-6.5	13.0	SP-SM	POORLY GRADED SAND with SILT, gray to brown, wet to waterbearing. (Alluvium)						
-10.5	17.0	GP-GM	POORLY GRADED GRAVEL with SILT, gray, waterbearing. (Alluvium)						
-13.5	20.0		END OF BORING.  Water observed at 17 feet while drilling.  Boring then backfilled with dry bentonite chips.						

Photo 1



Boring:

PP1

Project: SP-13-07975

Depth:

Surface to 5 feet

Recovery:

42 inches

Date:

2/3/14



Photo 2



Boring: PP1  
Depth: 5 feet to 10 feet  
Recovery: 28 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 3



Boring: PP1  
Depth: 10 feet to 11.5 feet  
Recovery: 18 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 4



Boring:

PP2

Project: SP-13-07975

Depth:

Surface to 5 feet



Recovery:

36 inches

Date:

2/3/14

Photo 5



Boring: PP2  
Depth: 5 feet to 10 feet  
Recovery: 26 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 6



Boring: PP2  
Depth: 10 feet to 15 feet  
Recovery: 38 inches  
Date: 2/3/14

Project: SP-13-07975





Boring: PP2  
Depth: 15 feet to 20 feet  
Recovery: 38 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 8



Boring: PP2  
Depth: 20 feet to 22.5 feet  
Recovery: 26 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 9



Boring: PP3  
Depth: Surface to 5 feet  
Recovery: 40 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 10



Boring: PP3  
Depth: 5 feet to 10 feet  
Recovery: 32 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 11



Boring: PP3  
Depth: 10 feet to 14 feet  
Recovery: 24 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 12



Boring: PP4  
Depth: Surface to 5 feet  
Recovery: 34 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 13



Boring: PP4  
Depth: 5 feet to 10 feet  
Recovery: 22 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 14



Boring:	PP4
Depth:	10 feet to 15 feet
Recovery:	20 inches
Date:	2/3/14

Photo 15



Boring: PP4  
Depth: 15 feet to 17.5 feet  
Recovery: 18 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 16



Boring: PP5  
Depth: Surface to 5 feet  
Recovery: 40 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 17

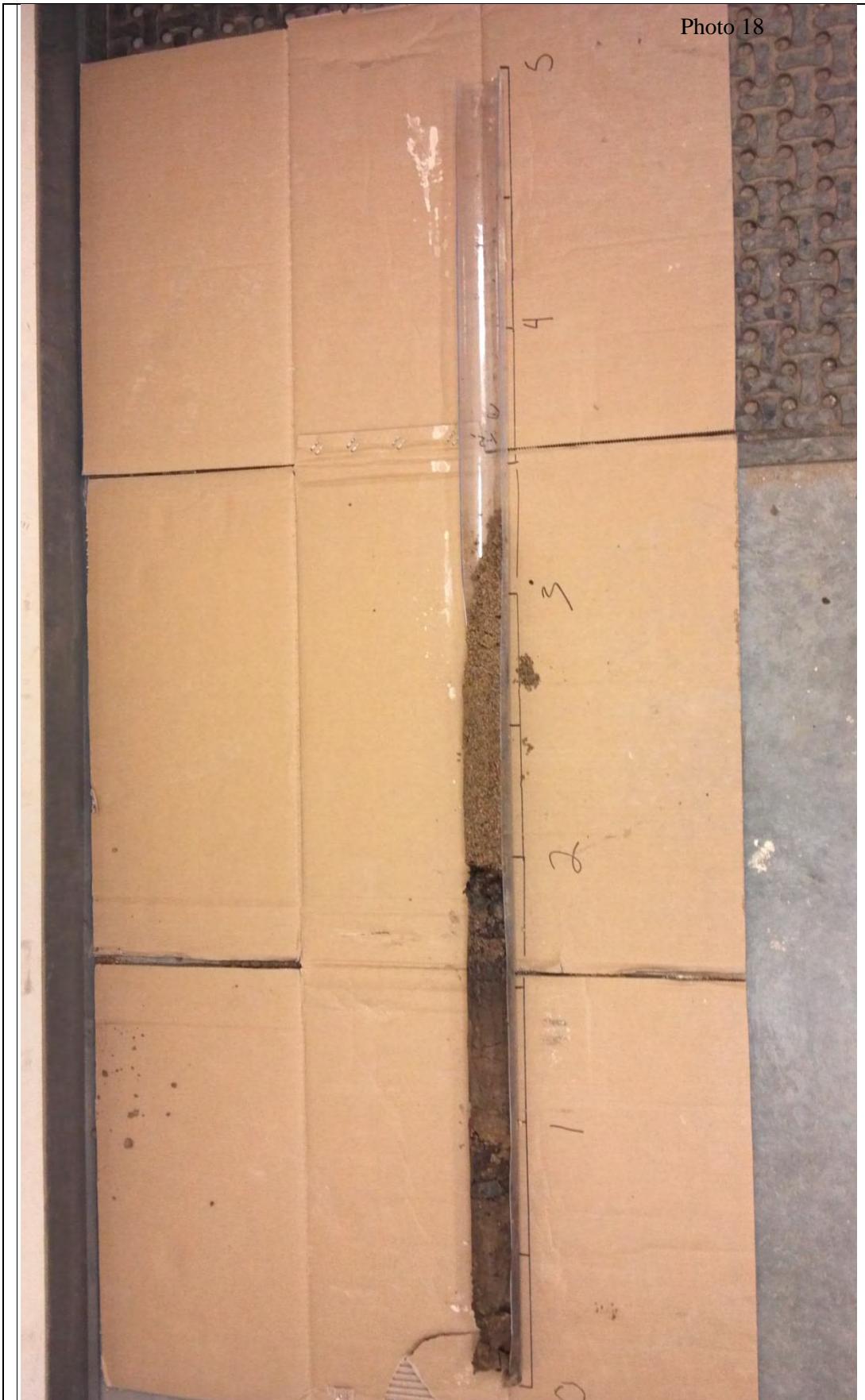


Boring: PP5  
Depth: 5 feet to 10 feet  
Recovery: 28 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 18



Boring: PP6  
Depth: Surface to 5 feet  
Recovery: 34 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 19



Boring: PP6  
Depth: 5 feet to 10 feet  
Recovery: 42 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 20



Boring: PP7  
Depth: Surface to 5 feet  
Recovery: 48 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 21



Boring: PP7  
Depth: 5 feet to 10 feet  
Recovery: 40 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 22



Boring: PP8  
Depth: Surface to 5 feet  
Recovery: 38 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 23



Boring: PP8  
Depth: 5 feet to 10 feet  
Recovery: 60 inches  
Date: 2/3/14

Project: SP-13-07975



Photo24



Boring:

PP9

Project: SP-13-07975

Depth:

Surface to 5 feet

Recovery:

45inches

BRAUN  
INTERTEC

Date:

2/3/14

Photo 25



Boring: PP9  
Depth: 5 feet to 10 feet  
Recovery: 40 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 26



Boring: PP9  
Depth: 8.5 feet to 10 feet  
Recovery: N/A  
Date: 2/3/14

Project: SP-13-07975



Photo 27



Boring: PP10  
Depth: Surface to 5 feet  
Recovery: 45 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 28



Boring: PP10  
Depth: 5 feet to 10 feet  
Recovery: 30 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 29



Boring: PP10  
Depth: 10 feet to 15 feet  
Recovery: 32 inches  
Date: 2/3/14

Project: SP-13-07975



Photo 30



Boring: PP10  
Depth: 15 feet to 20 feet  
Recovery: 16 inches  
Date: 2/3/14

Project: SP-13-07975





Photo 31

**Geo Probe on Re-enforced Bridge**

Project: SP-13-07975



Date: 2/3/14



◆ DENOTES APPROXIMATE LOCATION  
OF PUSH PROBE BORING



75' 0 150'  
SCALE: 1" = 150'

PUSH PROBE BORING LOCATION SKETCH  
GEOTECHNICAL EVALUATION  
HIDDEN FALLS  
MISSISSIPPI RIVER BLVD / HIDDEN FALLS DR  
SAINT PAUL, MINNESOTA

Project No:  
SP1307975  
Drawing No:  
SP1307975  
Scale:  
1" = 150'  
Drawn By:  
BJB  
Date Drawn:  
1/31/14  
Checked By:  
BM  
Last Modified:  
1/31/14  
Sheet:  
of  
Fig:

# Points

**Project : sp1307975**

<b>User name</b>	bbertram	<b>Date &amp; Time</b>	10:57:24 AM 1/31/2014
<b>Coordinate System</b>	Ramsey99	<b>Zone</b>	Ramsey99
<b>Project Datum</b>	Ramsey96		
<b>Vertical Datum</b>		<b>Geoid Model</b>	Minn99 (Geoid99 Conus)
<b>Coordinate Units</b>	US survey feet		
<b>Distance Units</b>	US survey feet		
<b>Height Units</b>	US survey feet		

---

Point listing

Name	Northing	Easting	Elevation	Feature	Code
110	143207.059	549499.808	740.296		PP-1
109	143137.564	549497.724	733.906		PP-2
108	143073.059	549477.507	728.769		PP-3
107	142953.381	549459.977	722.154		PP-4
106	142842.016	549430.838	717.288		PP-5
105	142688.113	549384.651	711.677		PP-6
104	142636.211	549250.470	707.789		PP-7
101	142131.759	549070.947	700.770		PP-10
103	142590.173	548991.959	699.057		PP-8
102	142279.514	548799.231	698.725		PP-9

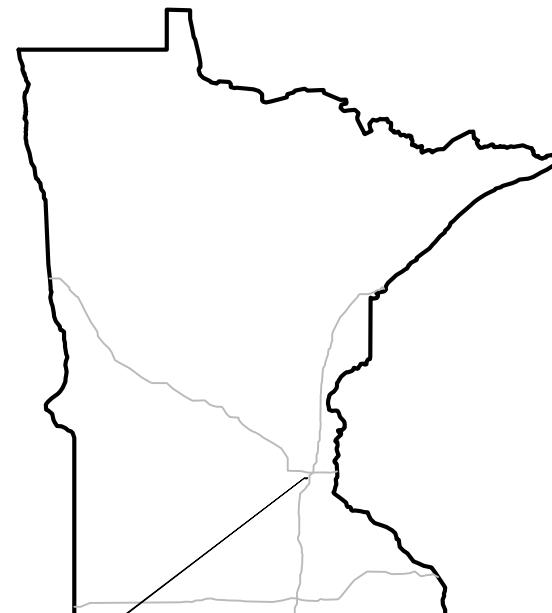
[Back to top](#)

## APPENDIX B – CONCEPT DRAWINGS

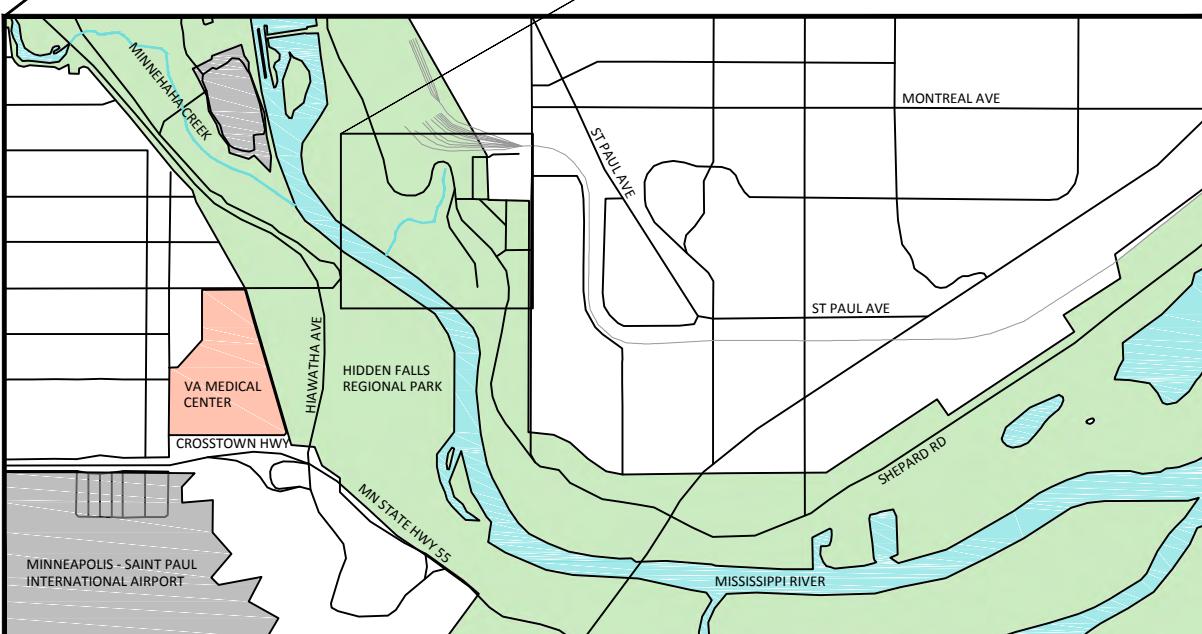
# HIDDEN FALLS FEASIBILITY STUDY

## CITY OF ST PAUL, MN

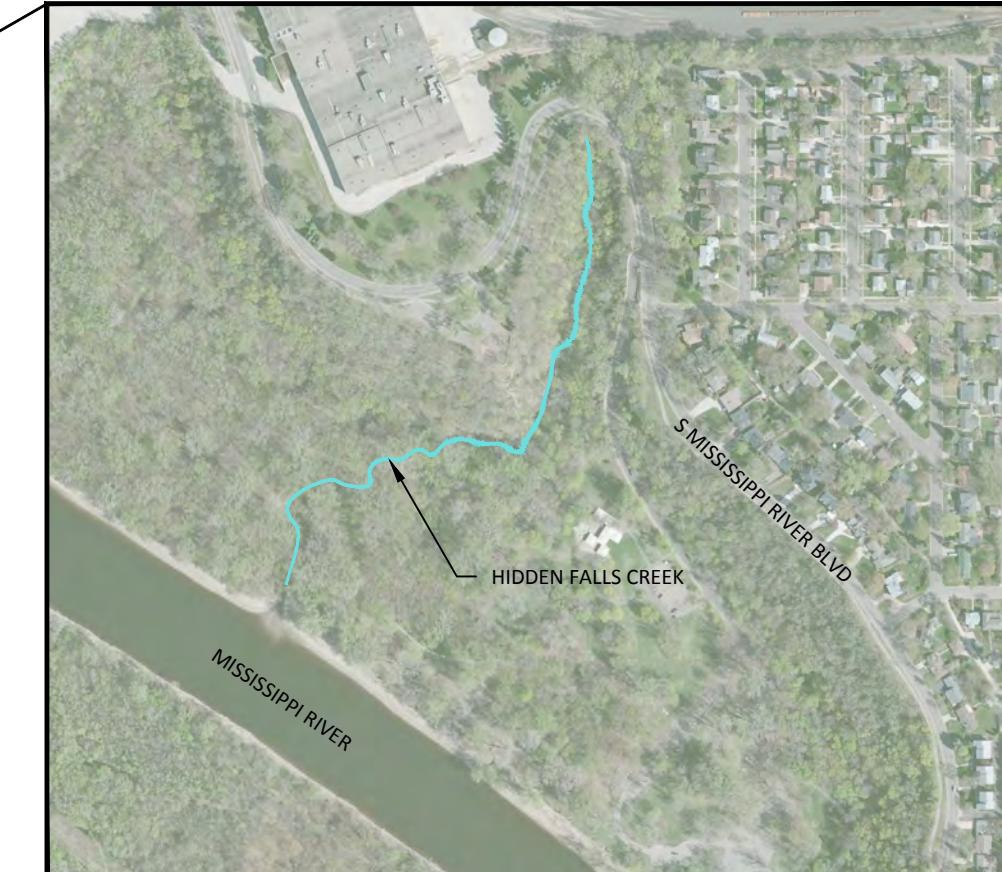
## ST PAUL PARKS & RECREATION



**MINNESOTA STATE MAP**  
NOT TO SCALE



**VICINITY MAP**  
NOT TO SCALE



**LOCATION MAP**  
SCALE: 1" = 500'

### SHEET INDEX:

- 1 - TITLE, SHEET INDEX & MAPS
- 2 - EXISTING CONDITIONS
- 3 - PROPOSED CONDITIONS PLAN & PROFILE
- 4 - TYPICAL SECTIONS SHEET 1 OF 2
- 5 - TYPICAL SECTIONS SHEET 2 OF 2

1	XX/XX/14	30% SUBMITTAL

CP DRAWN BW APPROVED	BW DESIGNED 8/15/2014 DATE	BW, MM CHECKED ---- PROJECT

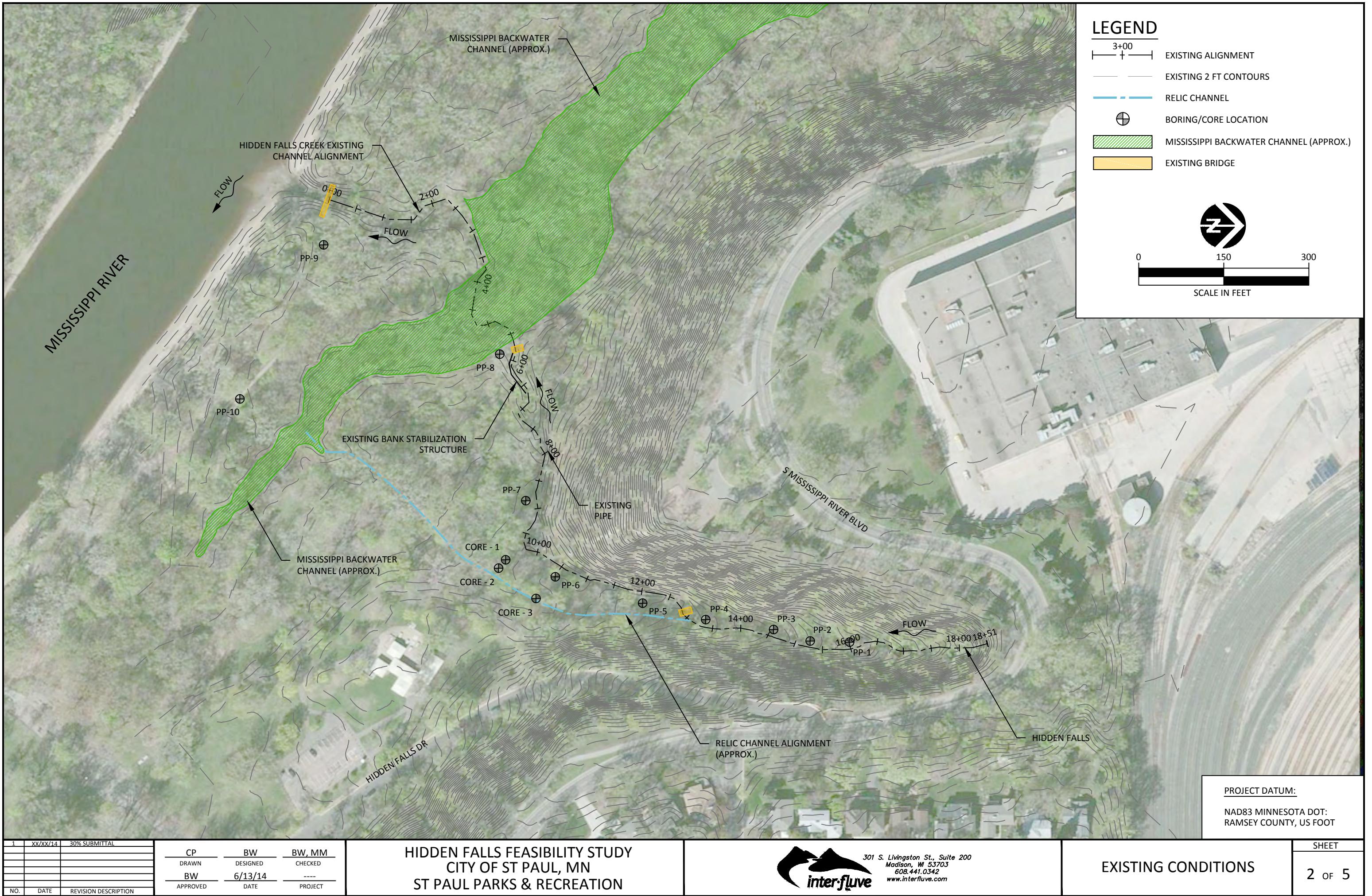
**HIDDEN FALLS FEASIBILITY STUDY**  
**CITY OF ST PAUL, MN**  
**ST PAUL PARKS & RECREATION**

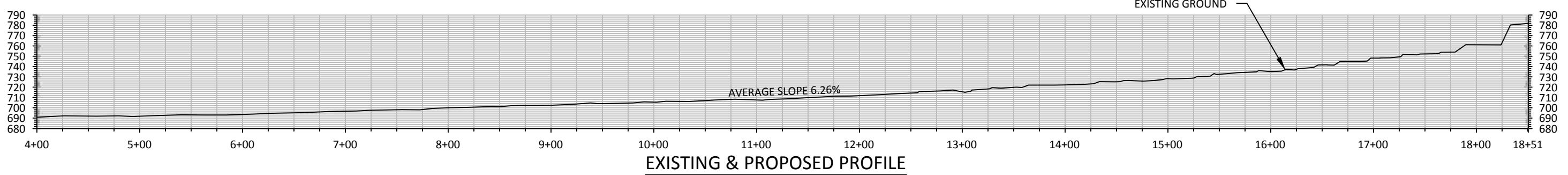
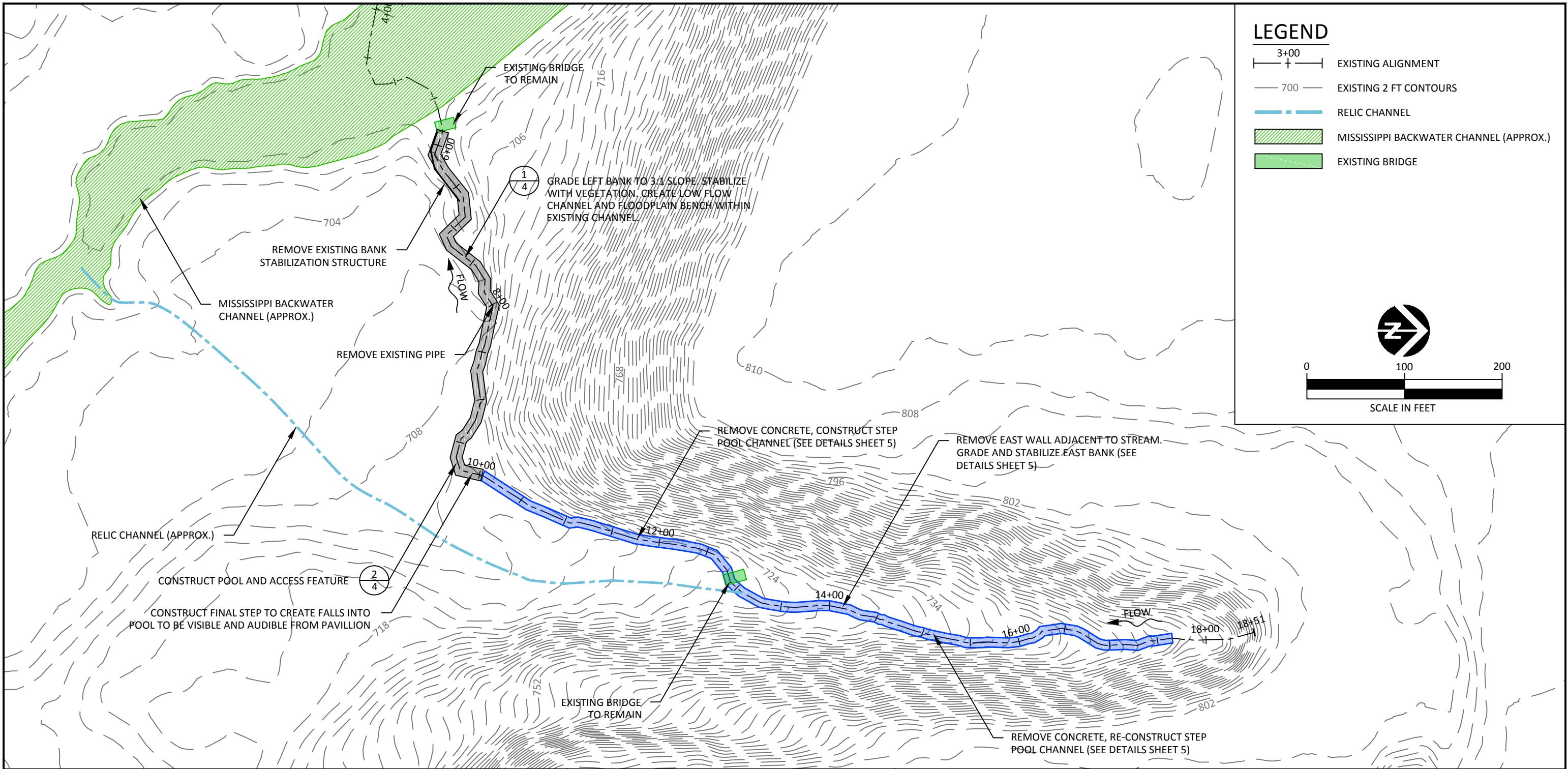


301 S. Livingston St., Suite 200  
Madison, WI 53703  
608.441.0342  
[www.interfluve.com](http://www.interfluve.com)

**TITLE, SHEET INDEX &  
MAPS**

**SHEET**  
**1 OF 5**





1	XX/XX/14	30% SUBMITTAL
NO.	DATE	REVISION DESCRIPTION

CP DRAWN	BW DESIGNED	BW, MM CHECKED
BW APPROVED	6/13/14 DATE	---- PROJECT

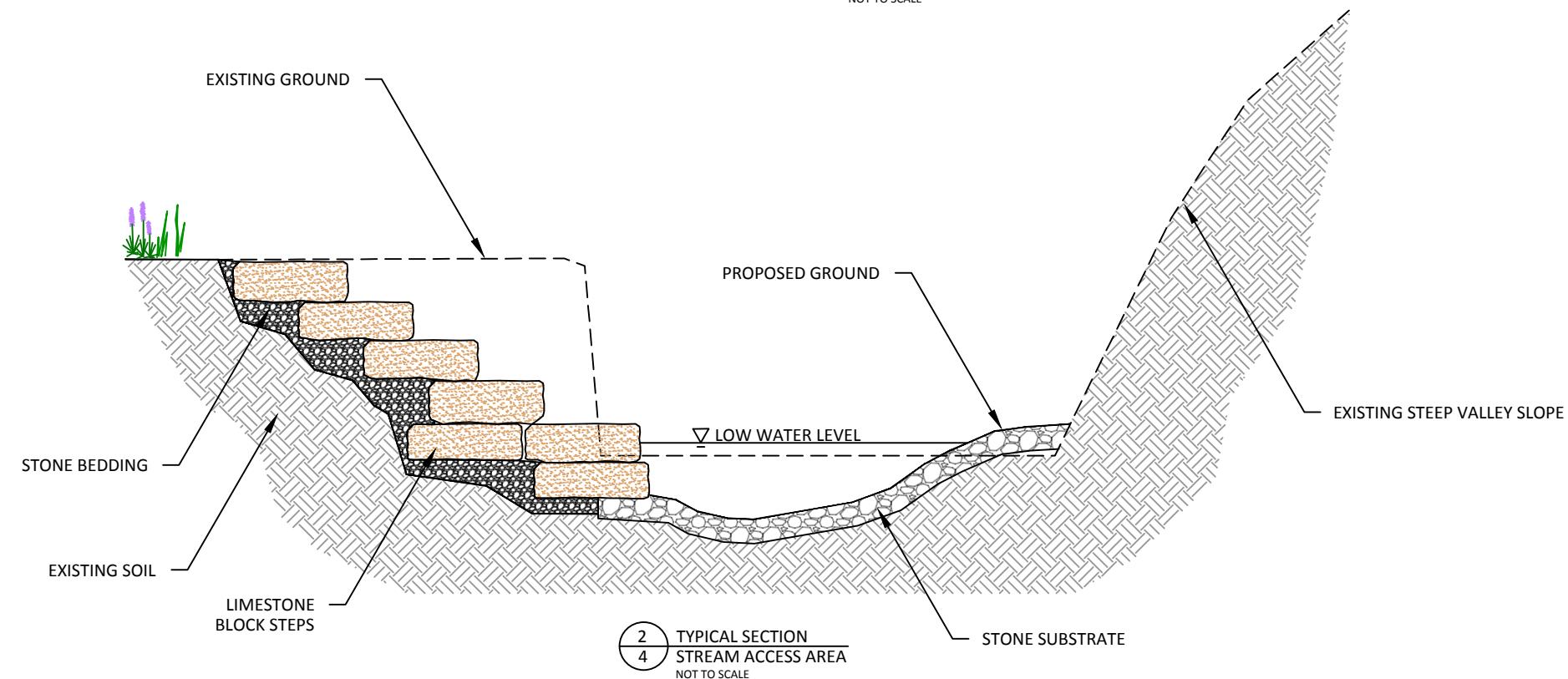
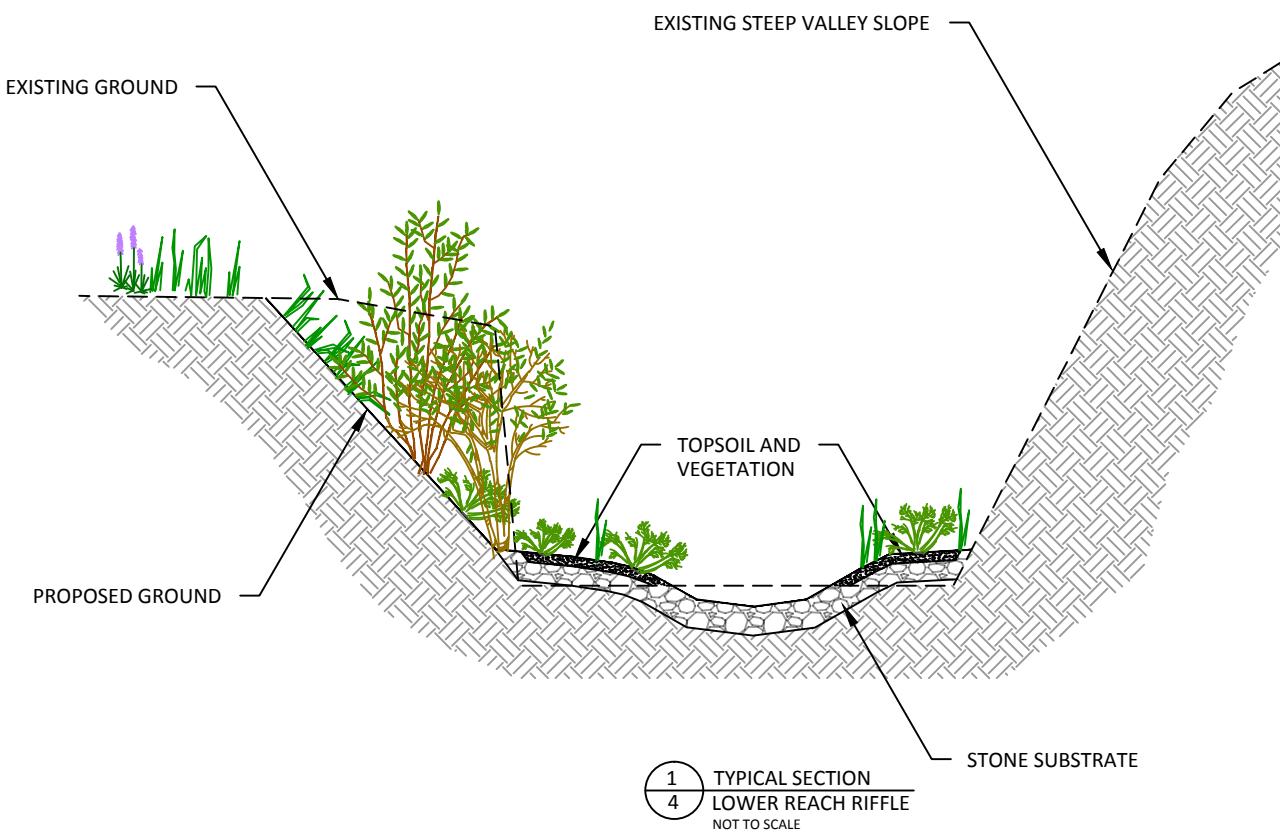
HIDDEN FALLS FEASIBILITY STUDY  
CITY OF ST PAUL, MN  
ST PAUL PARKS & RECREATION



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PROPOSED CONDITIONS  
PLAN & PROFILE

SHEET  
3 OF 5



1	XX/XX/14	30% SUBMITTAL
NO.	DATE	REVISION DESCRIPTION

CP DRAWN	BW DESIGNED	BW, MM CHECKED
BW APPROVED	6/13/14 DATE	---- PROJECT

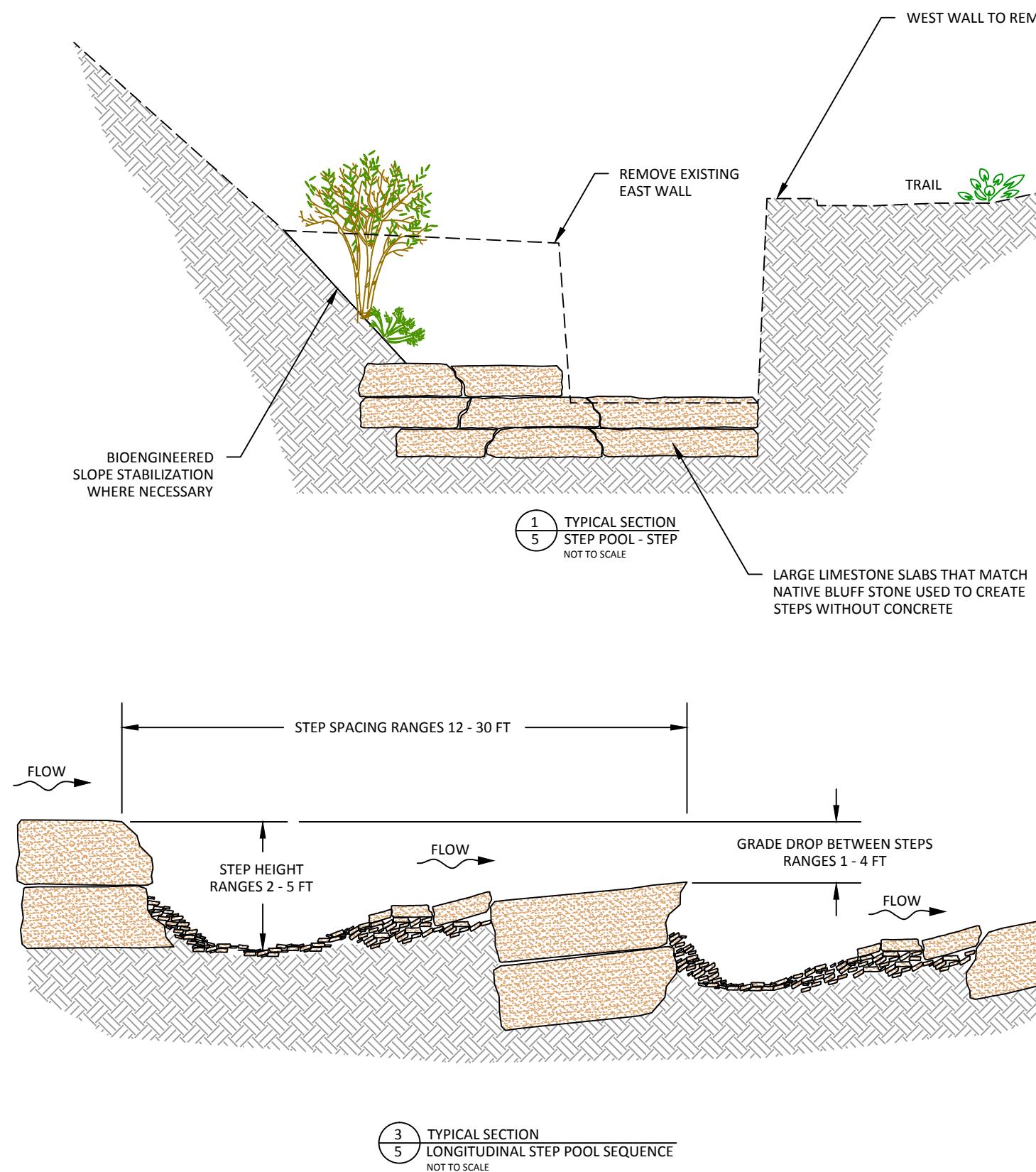
HIDDEN FALLS FEASIBILITY STUDY  
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TYPICAL SECTIONS  
SHEET 1 OF 2

SHEET  
4 OF 5



1	XX/XX/14	30% SUBMITTAL
NO.	DATE	REVISION DESCRIPTION

CP DRAWN	BW DESIGNED	BW, MM CHECKED
BW APPROVED	6/13/14 DATE	---- PROJECT

## HIDDEN FALLS FEASIBILITY STUDY CITY OF ST PAUL, MN ST PAUL PARKS & RECREATION



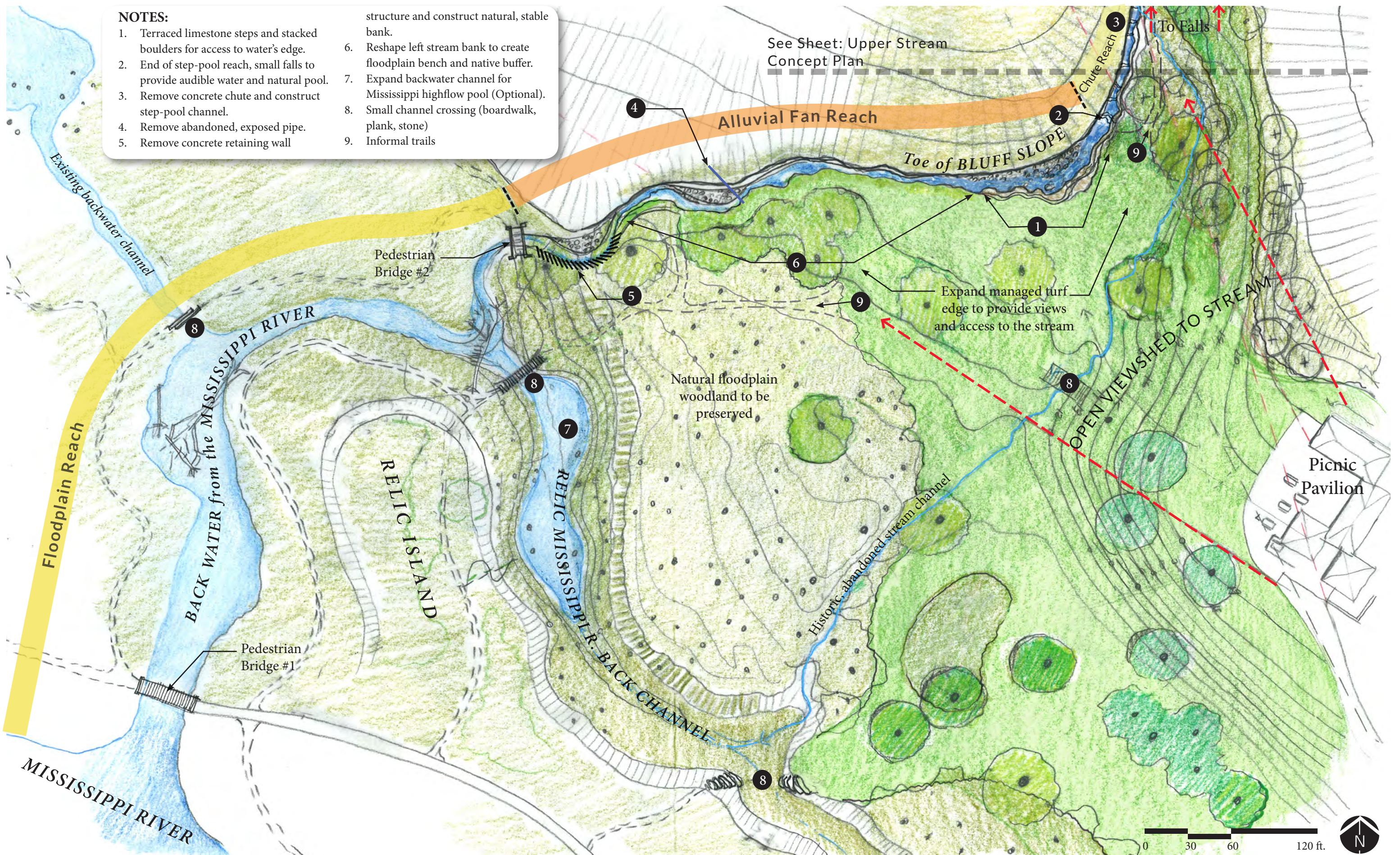
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608.441.0342  
[www.interfluve.com](http://www.interfluve.com)

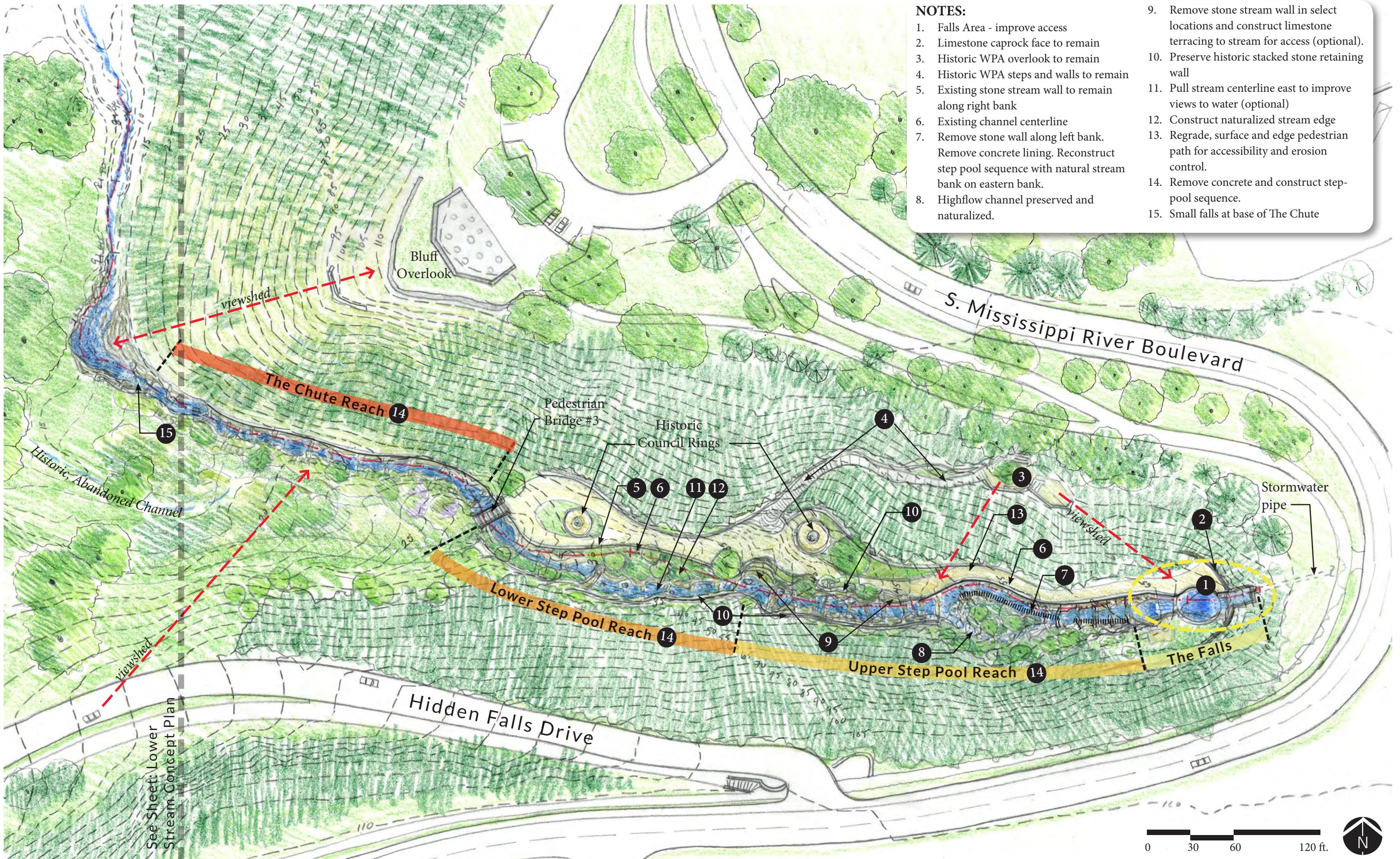
TYPICAL SECTIONS  
SHEET 2 OF 2

SHEET  
5 OF 5

## APPENDIX C – CONCEPT SKETCH







## Hidden Falls Regional Park Vision

Integration of the scenic and natural qualities of Hidden Falls with nature based recreation will draw a wider variety of people to the river. A focus for expanding the recreation potential of Hidden Falls Park will be to restore and celebrate the park's existing natural qualities. Hidden Falls Creek will be restored and stabilized, and trail access to it improved, so that it becomes a premier destination in the park. The Ford Plant site redevelopment will create a direct ecological and pedestrian link between the river corridor and the neighborhood.



*Weddings, group picnics and other community events are held in the park's meadows*



*The restored Hidden Falls Creek is complemented by a new Mississippi River Boulevard Bridge*



*The restored Creek allows visitors to "touch" the water*

*This plan is a concept only, and is subject to further planning, design and public input.*



This plan is a concept only, and is subject to further planning, design and public input.

## Expand nature-based recreation

A variety of outdoor, river oriented recreational uses and activities will be expanded in River Park areas. Improved access and parking will allow users of all ages to visit the park. Improved access for non-motorized boats, hikers and mountain bikes will attract a wide variety of recreational users. Enhanced natural areas will support nature-based recreation in the river valley.

Through subtle changes in landscape design and management, a variety of intimate areas for passive recreation use and river access would be created. River Parks are created in areas of lower habitat value allowing for a broader range of recreational uses compatible with the area's natural qualities.

## Explore restoration of Hidden Falls Creek

Explore the restoration of the historic WPA-era construction of Hidden Falls, the creek, and its associated trails, while developing an open space connection as part of the proposed Ford Plant redevelopment. Hidden Falls' historic stonework should be restored and the existing culvert replaced with a bridge that complements it. Restoration also provides a regional attraction for such lifetime events as weddings, reunions and holiday, art and cultural activities. The restored creek will invite the public to enjoy the added passive recreation opportunities in the Valley.

Stormwater treatment on the Ford site will improve water quality and stabilize flows in the Creek. Improved water quality will provide more safe opportunities for interaction between people and the water.

## Explore acquisition of part of the Ford Property

Expand Hidden Falls Regional Park by investigating the acquisition of a part of the Ford site west of Mississippi River Boulevard. Park expansion will allow for additional recreation use areas along the river while protecting the bluff ecosystem.

Over the decades the Ford Plant was in operation, waste and other debris was buried on this parcel, forming a large area of fill. A thorough investigation of the contents of this dump site should be carried-out to determine the potential risk of contamination of groundwater and the Mississippi River. The costs and environmental impacts of remediating this site should be estimated so that, if it is determined that some type of action is necessary to protect environmental and public health, a feasible solution is pursued and the parcel improved for potential park use.

## 6.1 Hidden Falls Regional Park

Chapter 6: Plan Recommendations - The Gorge Reach

### STRATEGIES & PROJECTS

Strategies and Projects	Agency/Partners	Est. Cost	Phasing
<b>Hidden Falls Regional Park Management</b>			
Update Hidden Falls Regional Park Master Plan that is consistent with the Great River Passage master plan		\$ 100,000	short
Develop a master plan for the Ford Plant site redevelopment that includes neighborhood parks, natural areas with restored creek and enhanced connections to the Great River Passage	Developer, PED	n/a	
Explore acquisition of a portion of the former Ford Plant site below the Lock for open space expansion		n/a	
Establish partnerships with mountain bike organizations to design, maintain and manage trails		n/a	
Work with Dakota to provide interpretive signage and native language place names	Dakota Tribe	n/a	
Continue to program cultural events such as "Barebones"		n/a	
<b>Design and Construction</b>			
<b>Roads and Trails</b>			
Replace culvert at Hidden Falls Creek with bridge for grade separated street crossing	Developer	\$ 2,000,000	
Add porous paving BMPs in Boulevard parallel parking areas	CRWD	\$ 700,000	med
Improve trail connection from Fort Road bridge to MRT by replacing stair with accessible trail connection	SPPW	\$ 75,000	short
Renovate existing park access roads to accommodate bicycles and pedestrians		\$ 350,000	short
Add parking at Ford site expansion area		\$ 100,000	med
Create a driveway loop and improve parking areas		\$ 500,000	short
Improve and extend Park trails		\$ 600,000	short
Add Rustic trails with access to the shoreline		\$ 180,000	short
Develop managed mountain bike trail loops utilizing IMBC best practices	MORC	\$ 180,000	short
Reconstruct (1) existing bluff stair		\$ 100,000	short
<b>Structures and Related Improvements</b>			
Reconstruct (6) large and small picnic shelters		\$ 1,100,000	short
Renovate (2) existing restroom structures		\$ 300,000	short
Construct (2) small boat storage areas		\$ 100,000	short
<b>Recreation Improvements/Use Areas</b>			
Restore (2) scenic overlooks		\$ 150,000	short
Construct nature based recreation areas with wooded and open glades for passive and programmed activities		\$ 1,000,000	med
Construct (1) large and (1) small nature-based children's adventure play area		\$ 650,000	short
Restore meadows to improve passive recreation and picnic areas for large and small group events		\$ 1,000,000	short
Restore shoreline to provide hiking and fishing access		\$ 400,000	short
Improve boat ramp and trailer parking		\$ 100,000	short
Add (2) canoe/kayak landing areas		\$ 50,000	short
Add dog park at Ford site expansion area		\$ 200,000	med
<b>Landscape improvements</b>			
Restore Hidden Falls Creek to incorporate water quality treatment and habitat enhancement		\$ 1,000,000	med
Selectively manage floodplain understory vegetation of invasive species in passive activity areas		\$ 200,000	short
Remove invasive vegetation, restore native plants and clear overlook sight lines		\$ 45,000	short

### Summary Plan Recommendations:

#### Hidden Falls Regional Park

Hidden Falls Park will be a destination for river-oriented, passive day use recreation. Nature-based active recreational uses will be added and expanded, and a variety of trails improved and extended in areas that have lower habitat value. Hidden Falls and Hidden Falls Creek will be restored, and the park will be expanded into the Ford site along the river, and into the redevelopment site.

Lower Hidden Falls will be scaled for smaller groups, with more rustic facilities and improvements. The River would be made more accessible by minor expansion of the road network, and non-motorized boat and fishing access expanded in close proximity to the River.

- Protect, enhance and manage natural areas
- Restore Hidden Falls and Hidden Falls Creek
- Expand overall park area by adding connections to the Ford plant site
- Expand picnic areas for a variety of individuals and groups near the river
- Enhance nature-based recreation opportunities
- Improve recreation use areas to accommodate children and seniors
- Provide river-oriented children's play areas
- Improve park roads to provide alternatives for river access
- Improve parking and fishing access
- Develop non-motorized boat landings and boat storage
- Create a hierarchy of trails that appeals to a broad range of recreation users
- Create trail links to the Gorge and Crosby Farm Regional Parks
- Expand the park by acquiring portions of the Ford property



key map

**Water Resources**

Wetland Restoration

Redevelopment Treatment Area

Park Treatment Area

Bluff Treatment Area

Creek Restoration Opportunity

Shoreline Restoration

**Park Types**

Gathering Place

Active Nature Based Recreation

Natural Areas

Natural Preserves

**Land Use**

Existing Industrial

Mixed-Use

**Roads & Trails**

Regional Trail

Park or Local Trail

Rustic Trail at Airport

Rustic Trail

On-Road Bikeway

Multimodal Park Access St.

Park Access Road

**Special Features**

River Balcony / Riverwalk

Grand Round Extension

Green Connection

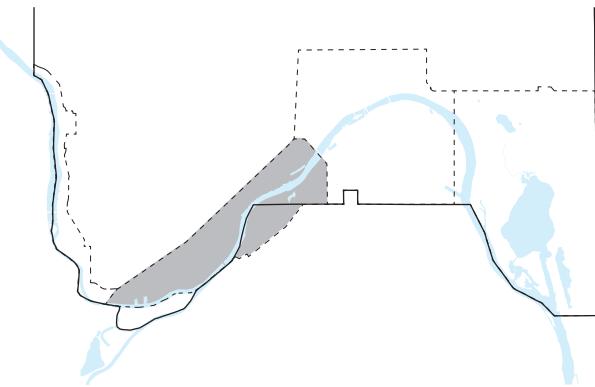
Commuter Rail Corridor

Light Rail Corridor

County Owned Park Land

- |                        |                       |
|------------------------|-----------------------|
| Camping                | Dog Park              |
| Picnic                 | Refreshments          |
| Wildlife Viewing       | Restrooms             |
| Scenic Overlook        | Marina                |
| Point of Interest      | Information           |
| Fishing Access         | Pedestrian Underpass  |
| Canoe/Kayak Landing    | Pedestrian Overpass   |
| Motorized Boat Launch  | Vehicle Parking       |
| Swimming Area          | Transit Station       |
| Mountain Biking Trail  | Bus Stop              |
| Multi-Use Trail        | Stairway or Ramp      |
| Hiking Trail           | Vehicular Park Access |
| Nature-based Play Area |                       |

\* Red icons represent proposed items.



## The Valley

---

The vertical bluffs of the Gorge give way to the steeply wooded slopes of the Valley at the confluence of the Mississippi and Minnesota Rivers. The Valley Reach extends from the Fort Road Bridge to Downtown. The Valley is a broad floodplain of expansive swamp forests, wetlands, ponds, and lakes. Its features were formed by dynamic natural processes and frequent flood events that inundate much of the area. The Valley is a place of constant change, and most areas within this reach are undeveloped, except for widely scattered high points at the valley's edges.

Recommendations for the Valley Reach focus on protecting and enhancing natural areas, creating gathering places, and improving access by transforming Shepard Road.

## Preserve and enhance the natural qualities of the Valley

Preservation of the valley edge natural areas will include developing a systematic approach to natural areas management by clearing invasive plants and opening vistas to the river, by restoring historic streams, improving water quality and providing stormwater treatment areas that reduce polluted runoff to the River. Environmentally and culturally significant sites will be identified and protected by establishing Natural Areas and Preserves. Natural Areas and Preserves provide new ways to protect and interpret the area's natural, agricultural, and industrial legacy.

## Create gathering places by expanding and repurposing existing iconic places

As part of a public-private partnership, transform the vacant Island Station power plant into a gathering place that is a magnet for non-profits and environmental organizations, artists, adventure sports enthusiasts, entrepreneurs and nature-based commercial ventures.

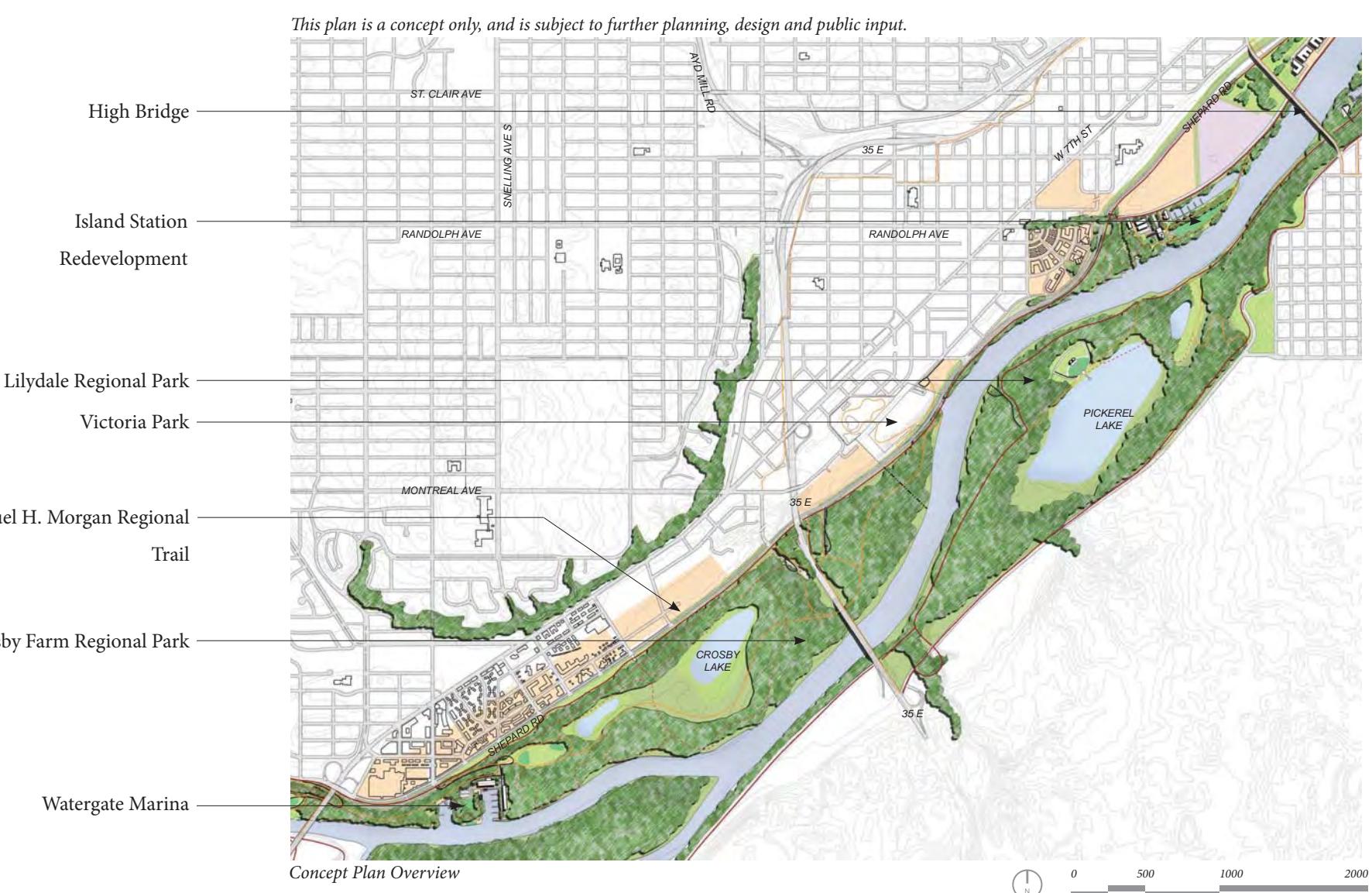
Redevelop Watergate Marina to create a gathering place that improves public river access and an environmental education center for the City. The improved marina will include facilities for community recreation, all types of boaters, marina and fishing support shops, and a cafe-type restaurant.

## Transform Shepard Road to become a key part of Saint Paul's parkway and boulevard network

By improving Shepard Road to give it a parkway-like character - by limiting traffic speeds, improving landscape, lighting, signage, and making access to the river safer and more convenient for pedestrians and bicyclists - Shepard Road will become an integral part of the historic Grand Round. It will also become an essential part of the larger interconnected parkway and boulevard system that links the City to the River.

## Develop a hierarchy of pedestrian trails and trailhead access points

Improved access to parks and trails will be provided through new and improved park access roads, parking areas and trail heads. The improved network of trails along the bluff and in the valley will vastly improve connections between the neighborhoods and the river parks. A new hierarchy of trail types, with boardwalks and wildlife viewing areas in more sensitive areas, will provide for community recreation needs and improve access to bluff top overlooks with river vistas.



Saint Paul is known for its historic caves



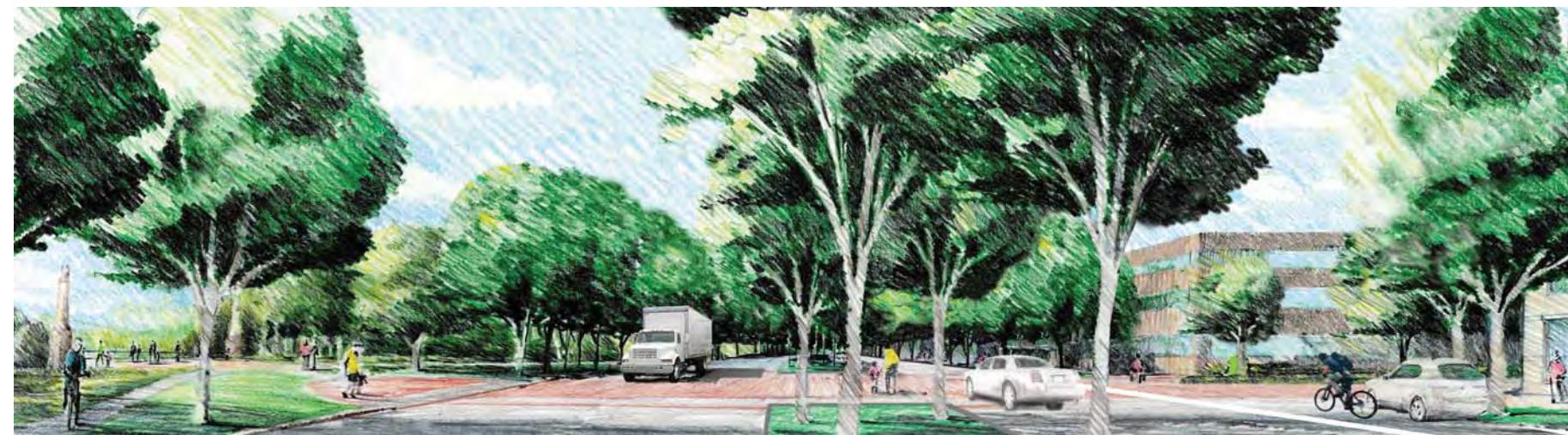
Boardwalks provide access to sensitive ecologies



A bike trail provides access to natural areas in the valley

## 6.2 Shepard Road Recommendations

### GOALS & OBJECTIVES



Enhanced crossings, plantings, and river edge overlook along Shepard Road.

#### GRP Master Plan: Recommended Roadway Improvements

- Retrofit with parkway - like enhancements - roadway design and/or landscaping
- Traffic-calmed segment with enhanced at-grade intersections
- Gateway/speed zone transition feature
- Proposed Grand Round alternative
- Multimodal Park Access Street

#### Unique Transportation Corridors

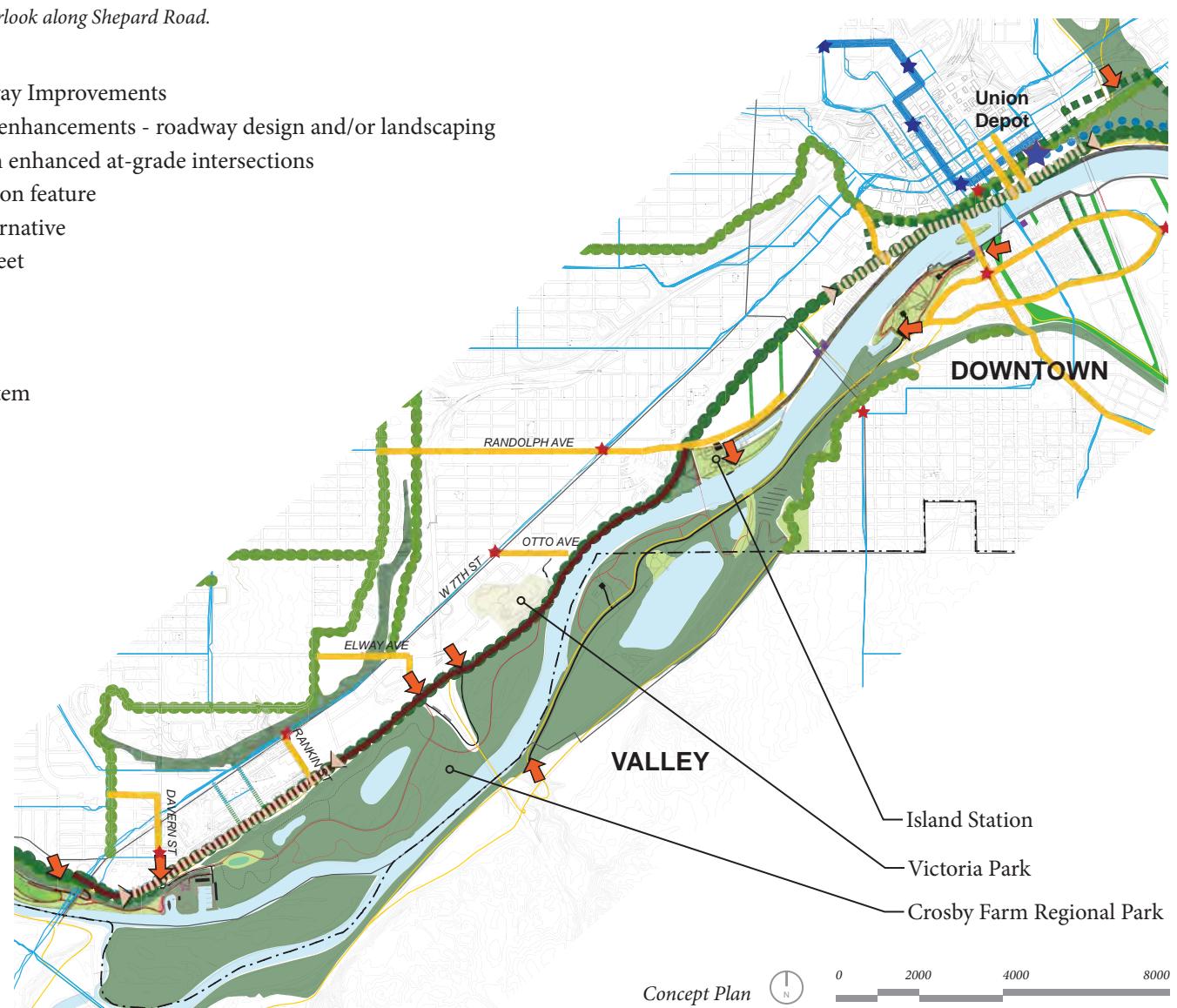
- The Grand Round
- Parkway and Boulevard System

#### GRP Vehicular Access

- Internal Park Roads
- Park Entrances

#### Transit Access

- 2030 Local Bus Routes
- Light Rail Corridor
- Commuter Rail Corridor
- ★ Key GRP Bus Stops
- ★ Key GRP Transit Stations
- ★ Transit Stations



### Enhance the parkway-like qualities of Shepard Road

By adding parkway improvements, such as enhanced landscaping, lighting, signs, guard rails, pedestrian walkways and bike lanes, Shepard Road can become the main gateway into Saint Paul, allowing visitors to experience the extraordinary views of the Mississippi River as they approach the City. As part of the historic Grand Round, Shepard Road can continue to support necessary levels of vehicle and commercial traffic, while accommodating transportation alternatives, such as walking and bicycling.

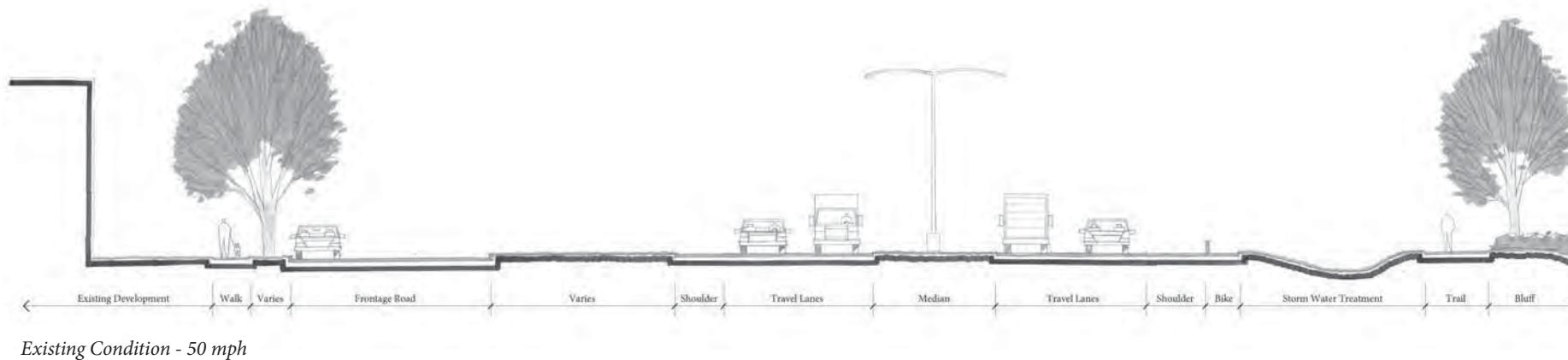
The City's goal is to balance traffic volumes – allowing for potential reductions on West 7th Street and increases on Shepard Road - and keep speeds compatible with surrounding land uses in both corridors.

### Vary the design of Shepard Road, through context-sensitive design, to respond to opportunities

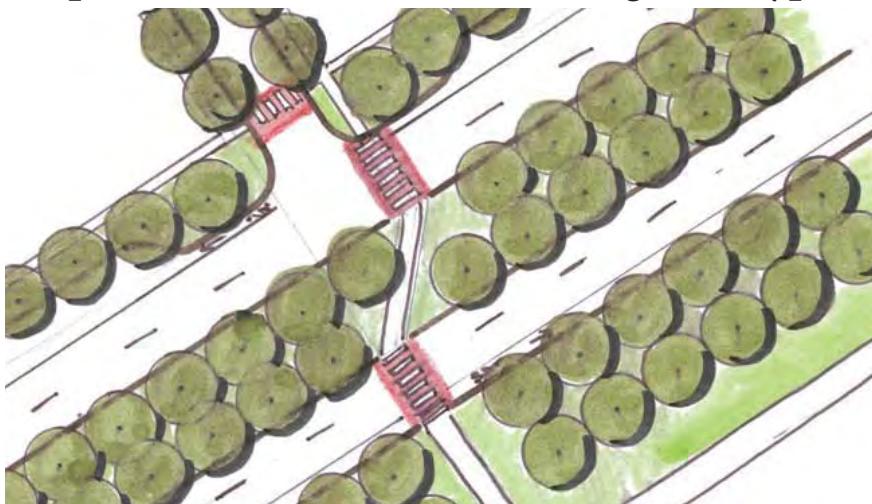
A variety of roadway edge conditions, including differing land uses and levels of connectivity with adjacent neighborhoods, require a variety of design responses in different areas of the corridor. Barriers are created by rail lines, steep slopes and a wide road cross-section. Recommendations recognize unique opportunities in each section of Shepard Road, while providing continuity through unified Parkway elements. Enhancements include improved pedestrian and bicycle access, visual and physical links to the River and parkway type landscape amenities. The following pages describe the range of characteristics of an improved Shepard Road corridor.



Open up river vistas at key overlooks, streets along the river, and entries to the City.

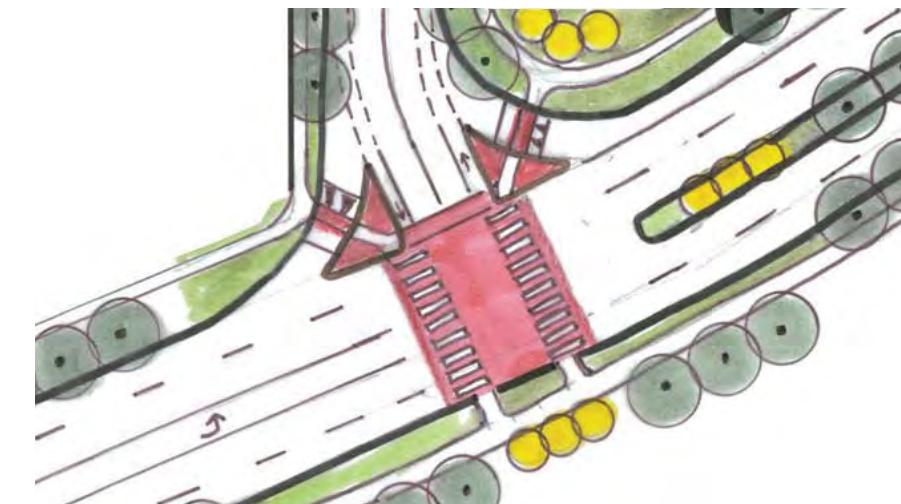


### Shephard Road Pedestrian Crossing Prototypes



#### Limited access, non-signalized intersection prototype

Provide pedestrian crosswalks where the roadway median allows for a pedestrian refuge. At pedestrian crossings provide clear pedestrian zones with crosswalk pavement markings, median refuges, guard rail breaks, contrasting pavement types and/or raised traffic tables.



#### Full access, signalized intersection prototype

Raised colored speed tables, pedestrian refuge islands, smaller turning radii and high visibility crosswalks protect pedestrians and cyclists, and slow traffic to improve safety at crosswalks. Provide appropriate signs, signal timing with user activation for pedestrians and bicycles at all pedestrian crossings.



### Redesign streets to improve park access and enhance private development potential

The alignment and cross-section of Shepard Road in this area has significant potential to be modified because of the pending redevelopment projected for the areas to the west.

As part of planning and design of adjacent redevelopment sites, evaluate alternative Shepard Road alignments that remove the existing frontage road, expand potential development and increase park area along the bluff edge. Alternative roadway designs should minimize required roadway width, improve intersections, enhance park aesthetics, expand park land and integrate improved local storm water treatment strategies.

### Integrate bluff edge park enhancements

When Shepard Road is realigned, integrate added bluff edge park to support multimodal transportation as well as recreation needs of the corridor. Provide for continuous and connected bicycle and pedestrian systems on both sides of Shepard Road. Integrate local stormwater treatment with landscape enhancements in medians and swales where space allows. Clear overlooks and provide enhanced river vistas from the road and the trails.

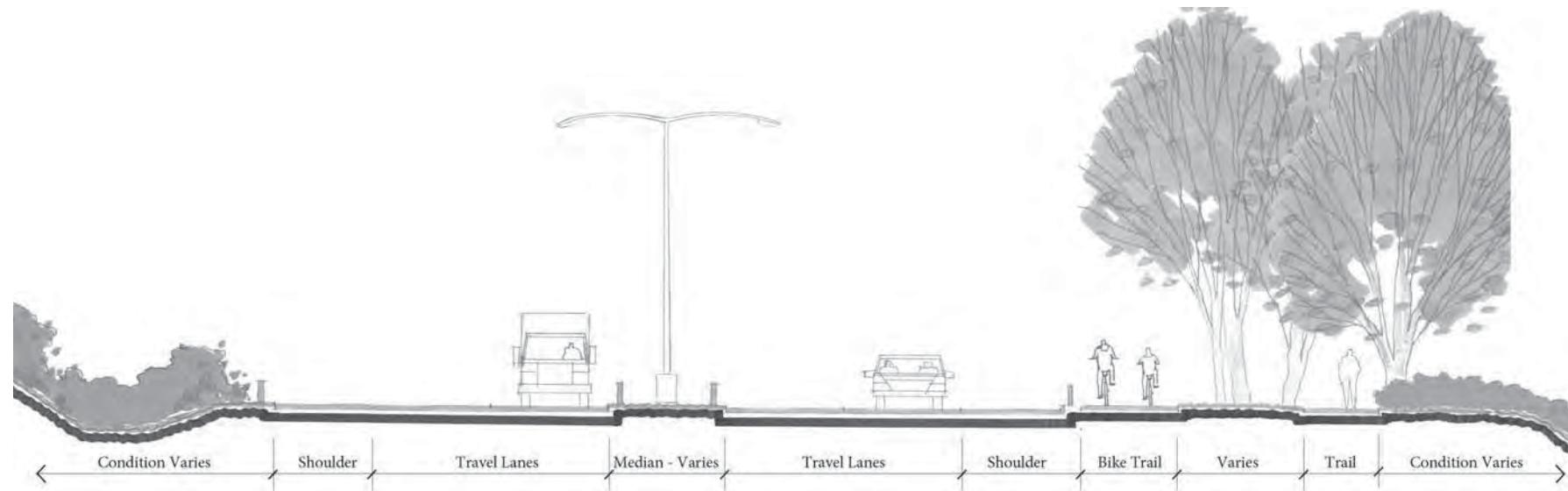
### Reduce traffic speeds

Reduced roadway speeds will provide a safer environment for pedestrians and bicyclists while accommodating projected volumes of all traffic types including commercial vehicles.

## 6.2 Shepard Road Recommendations

Chapter 6: Plan Recommendations - The Valley Reach

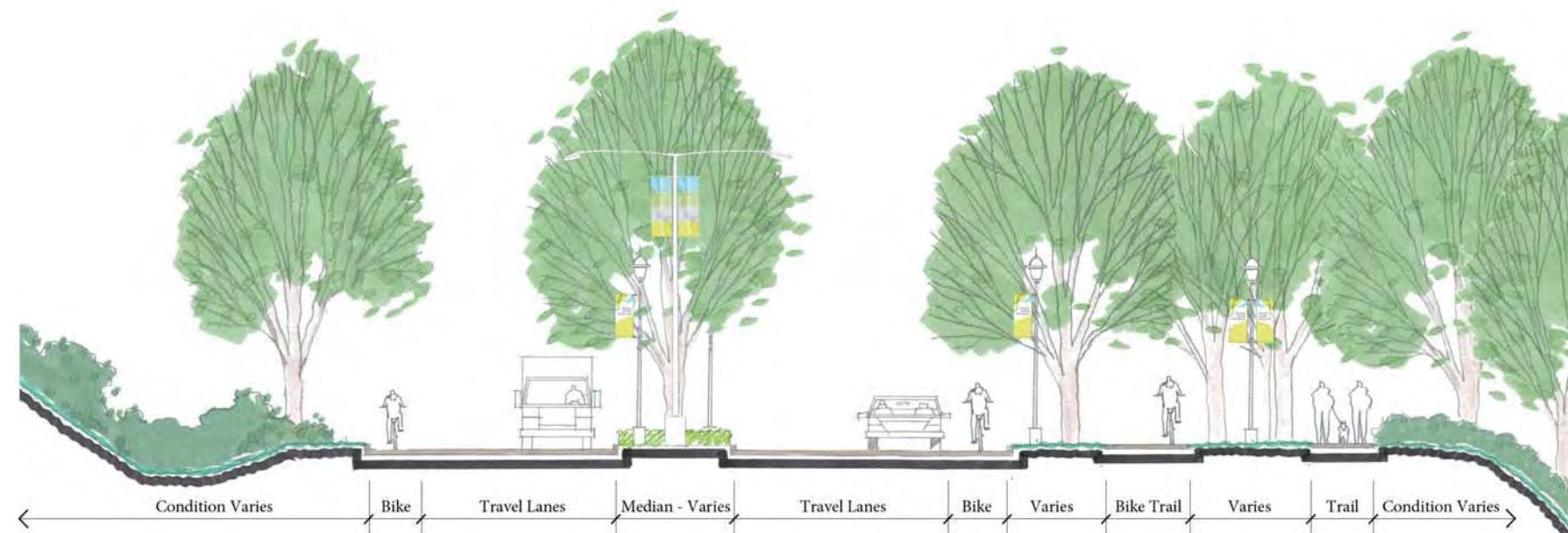
### GOALS & OBJECTIVES



Cross section of Shepard Road: Speed Limit = 35-50 mph.



Key Map - Homer St. to Eagle Pkwy..



Parkway treatment of Shepard Road: Speed Limit = 35 mph.

### Provide access across barriers

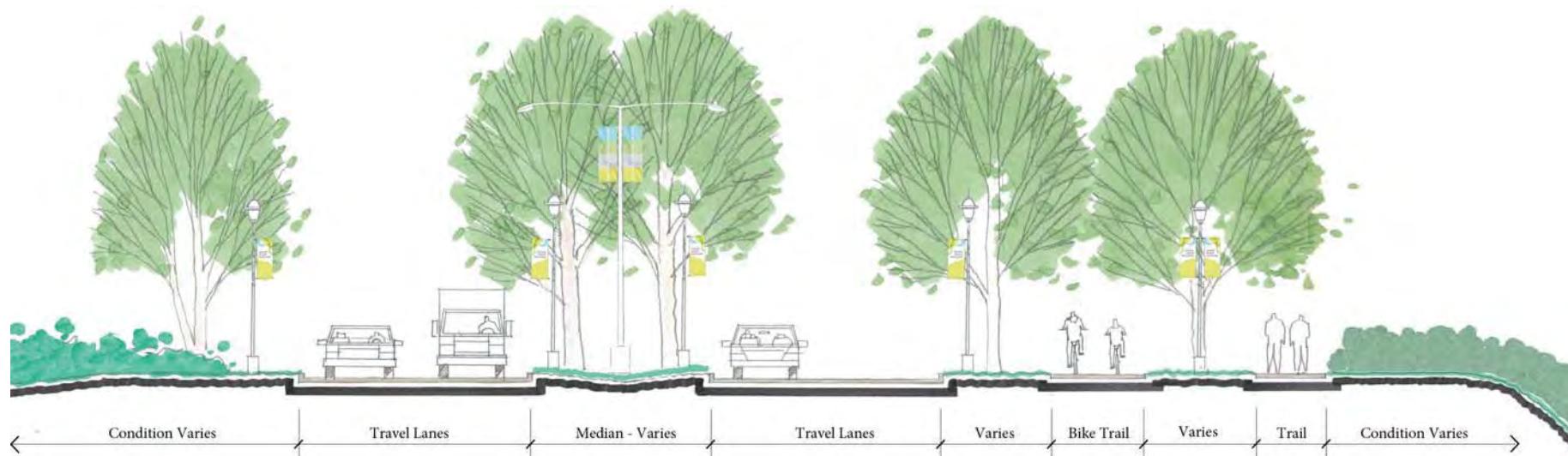
This portion of Shepard Road extends past existing neighborhoods, industrial sites in transition, and along steep bluffs and railroads that limit access from the city to the river. Where at grade crossings are not feasible, work with the neighborhoods and public agencies to provide grade separated crossings at key locations across bluffs, railroad lines, bridges and other barriers. Where ever possible utilize existing bridges and tunnel crossings. Support the efforts of individual neighborhoods to provide localized access to the park and improve links from neighborhoods to the river.

### Promote pedestrian and bicycle access from adjacent neighborhoods

Support Public Works and PED implementation of Multimodal Park Access Streets that will improve neighborhood access to the parks. Complete accessible sidewalks, crosswalks, wayfinding signs and landscape amenities that allow safer and more convenient pedestrian and bicycle access to and across Shepard Road and other existing barriers.

### Enhance trail users' experience to promote commuting alternatives

Provide on-street bicycle lanes on Shepard Road to encourage bicycle commuting. Improve regional trails to separate pedestrian and bicycles, and provide a sufficient buffer from Shepard Road in order to enhance the trail user's experience and safety, while accommodating varied speeds.

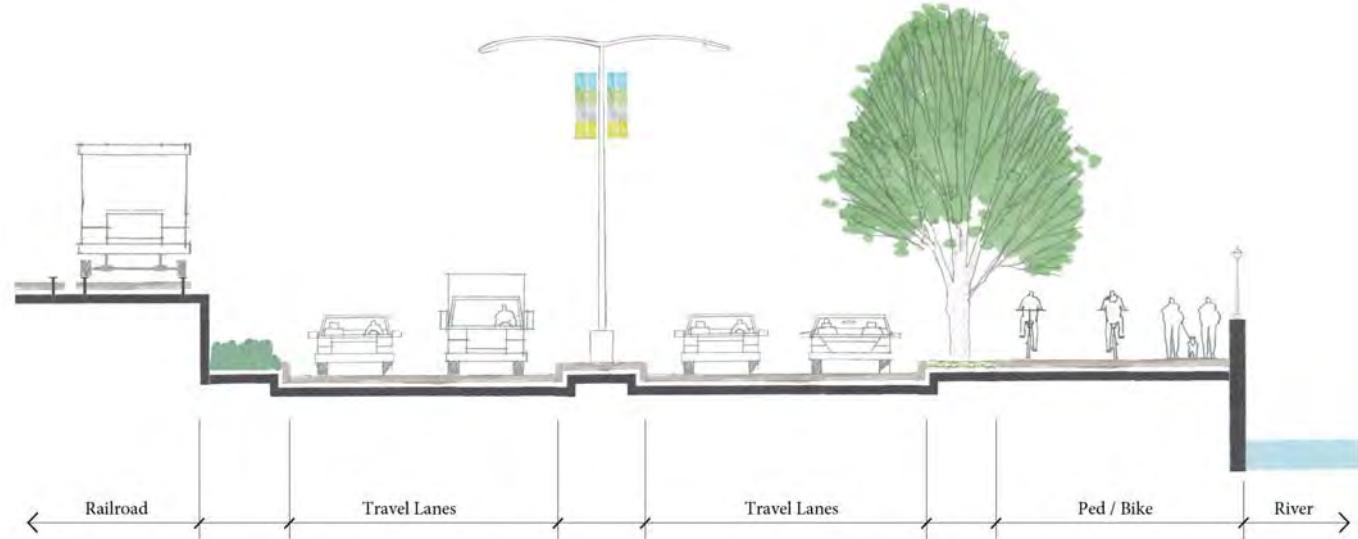


Warner Road Prototype: Speed Limit = 35-50 mph.



### Develop a unified parkway-like design to improve landscape aesthetics

Establish continuous plantings of street trees, shrubs, lawns and natural areas consistent with city parkway standards and regional best practices. Include parkway type lighting, guard rails, wayfinding and identity signs, markers and park amenities that help beautify Shepard Road and Warner Road as gateways to Saint Paul.



Downtown Section - 35 mph

### Provide improved pedestrian and bicycle access

Improve at-grade pedestrian and bicycle crossings at all park access streets. Where at grade crossings are not feasible, provide grade separated bridges and underpasses, utilizing existing structures where possible, combined with stream restoration, trail improvements, bridge repurposing and other related infrastructure projects.

### Encourage river-oriented redevelopment

A riverfront address is highly sought after. Proximity to views and recreation opportunities adds value to private land in the corridor. Development of denser neighborhoods with pedestrian and bicycle friendly streets and green connections to the river will help pay for improved access and desired park improvements.

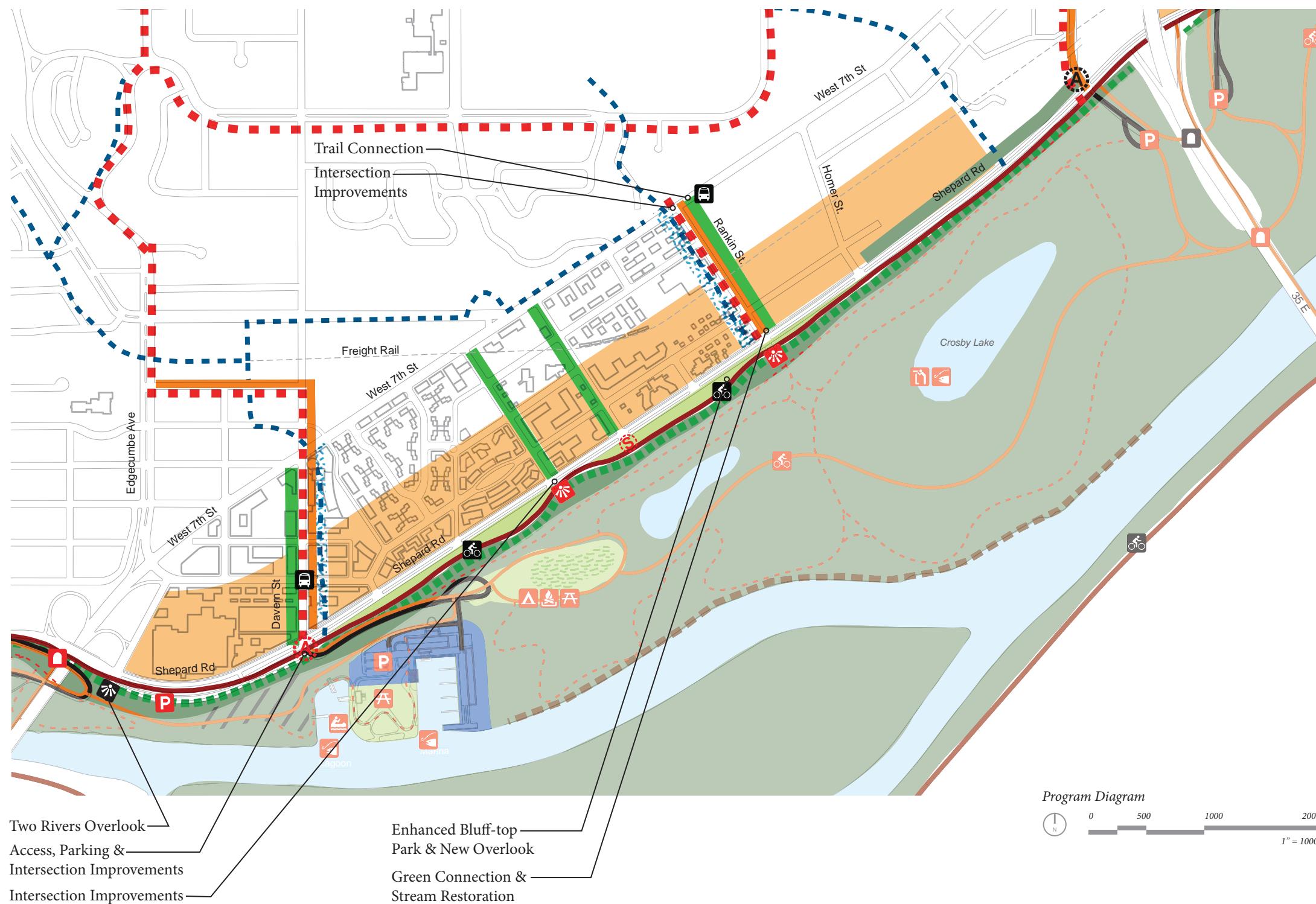
## 6.2 Shepard Road

### Chapter 6: Plan Recommendations - The Valley Reach

#### STRATEGIES & PROJECTS

Strategies and Projects	Agency/Partners	Est. Cost	Phasing
<b>Shepard Road</b>			
<b>Convert Shepard Road to an urban parkway-like roadway, with 35 mph design speed</b>			
Recommended design includes two lanes in each direction, consideration for on-street parking and bike lanes, regular intersections with pedestrian crossings and guard rail breaks, enhanced landscape in median and shoulders, detached sidewalks and/or multi-use trails and parkway-like amenities and lighting	SPPW	\$ 16,500,000	long
Balance the volume and speed of traffic on Shepard Road with that on Fort Road/ West Seventh Street, striving to improve the pedestrian friendliness of both corridors. Retain unique role of each street - Fort Road/West Seventh shall remain more mixed use, compact and retail oriented, while Shepard Road will become an urban parkway-like roadway.	Mn/DOT, SPPW		long
<b>Apply context sensitive design approach for two identified activity zones:</b>			
- The Shepard/Davern Gateway neighborhood (between Fort Road and Rankin Street)	SPPW		med
- Adjacent to Downtown (from Eagle/Old Chestnut to Trout Brook Parkway)	Ramsey County, SPPW		long
<b>Enhance intersection design treatments to provide frequently spaced crossings:</b>			
- Gannon Road, Davern Street, Norfolk, Snelling Place, Alton Street, S. Rankin Street	SPPW	\$ 750,000	med
- Elway Street, Otto Avenue, Randolph Avenue	Ramsey County, SPPW	\$ 375,000	
- Chestnut/Eagle Pkwy, Ontario St, Jackson St, Sibley St, Broadway St	Ramsey County, SPPW	\$ 700,000	
<b>Add signals at key bike/pedestrian crossings while maintaining vehicular traffic flow</b>			
Implement in conjunction with adjacent land development and user needs	SPPW	\$100,000 each	long
<b>From Davern to Rankin - evaluate removing parallel frontage road (Youngman Ave)</b>			
Introduce a more curvilinear road alignment, add parkway-like landscaping, enhance local access, shorten pedestrian crossing distances, add bicycle lanes and potential on-street parking, and increase development potential close to the parkway	SPPW		
Use public art or other gateway treatments to mark speed transition zones	Ramsey County, SPPW		med
<b>From Homer to Randolph - reduce width of existing highway shoulders</b>			
Retain four travel lanes, narrow shoulders to bike lane standards, add parkway-like landscaping, use high visibility crossing treatments at all signalized intersections.	SPPW		
<b>From Randolph to Sibley - manage speeds and improve crossings</b>			
Posted speed limits are currently higher than desired design speed - consider lowering speed limit as levels of multimodal river access increase	Mn/DOT, Ramsey County, SPPW		med
Use public art, change in landscaping or other gateway treatments to mark a speed transition zone prior to approaching the Eagle Parkway/Chestnut Street intersection	Ramsey County, SPPW		med
Between Jackson and Sibley, enhance the intersection designs, landscape treatments, and public art features to signify an urban activity node at Lamberts/ Lower Landing. Enhance aesthetics of blank walls and implement a potential arcade treatment north of the railroad tracks on the back side of the parking structure	Ramsey County, SPPW		med
Improve the riverfront promenade by looking for opportunities to provide added width and separation from the roadway			long
<b>I-35E / Shepard Road Interchange</b>			
Ensure that the feasibility study for developing a full interchange addresses the needs of people on foot and bike as well as the desire to move traffic efficiently			
Limit use of acceleration and deceleration lanes on Shepard Road and ensure that design speed of the interchange ramps is consistent with the desired 35 mph speed	Mn/DOT, SPPW		long
Provide a continuous regional trail along Shepard under I-35E that is built to trail standards to provide a more direct route of travel for Samuel H. Morgan Trail users	Mn/DOT, SPPW	\$ 2,500,000	long
<b>Shepard Road and West 7th Redevelopment areas (including Shepard Davern Gateway, Victoria Park and ADM/Schmidt Brewery sites)</b>			
<b>Amend existing Area Plans to include the following relative to the Great River Passage:</b>			
Complete a connected street network that provides controlled grade level intersection crossings of Shepard Road at specific locations between the Fort Road bridge and 35E	SPPW		short
Realign, redesign and reduce the width of Shepard Road to become more parkway-like	SPPW		short
Adopt building forms that reinforce Shepard Road as an urban parkway and that are oriented toward the river.	Port Authority, PED		short
Extend continuous public "green fingers" connecting redevelopment areas from West 7th Street to the Riverfront and study parking impacts along the West 7th Street Corridor.	PED, District Councils		short
Preserve and enhance views and trail connections from West 7th Street through new development to the River			short
Daylight and restore historic streams - from Highland Golf Course along Rankin, and Cascade Creek in the Island Station area	SPPW		short
<b>Great River Passage</b>			
<b>Amend existing Area Plans to include the following relative to the Great River Passage:</b>			
Complete a connected street network that provides controlled grade level intersection crossings of Shepard Road at specific locations between the Fort Road bridge and 35E	District Councils		short
Realign, redesign and reduce the width of Shepard Road to become more parkway-like	SPPW		short

Note: The Strategies and Projects matrix for Shepard Road is included as an initial outline of potential projects anticipated. Since much of the indicated work is dependent on and related to private redevelopment and large scale public works projects that are not currently fully identified, the list is not complete in terms of potential project partners, estimated costs or phasing.



key map

## Water Resources

Wetland Restoration

Redevelopment Treatment Area

Park Treatment Area

Bluff Treatment Area

Creek Restoration Opportunity

Shoreline Restoration

## Park Types

Gathering Place

Active Nature Based Recreation

Natural Areas

Natural Preserves

## Land Use

Existing Industrial

Mixed-Use

## Roads &amp; Trails

Regional Trail

Park or Local Trail

Rustic Trail at Airport

Rustic Trail

On-Road Bikeway

Multimodal Park Access St.

Park Access Road

## Special Features

River Balcony / Riverwalk

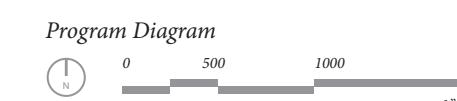
Grand Round Extension

Green Connection

Commuter Rail Corridor

Light Rail Corridor

County Owned Park Land



- |                          |                         |
|--------------------------|-------------------------|
| ▲ Camping                | ☒ Dog Park              |
| ☒ Picnic                 | ☒ Refreshments          |
| ☒ Wildlife Viewing       | ☒ Restrooms             |
| ☒ Scenic Overlook        | ☒ Marina                |
| ☒ Point of Interest      | ☒ Information           |
| ☒ Fishing Access         | ☒ Pedestrian Underpass  |
| ☒ Canoe/Kayak Landing    | ☒ Pedestrian Overpass   |
| ☒ Motorized Boat Launch  | ☒ Vehicle Parking       |
| ☒ Swimming Area          | ☒ Transit Station       |
| ☒ Mountain Biking Trail  | ☒ Bus Stop              |
| ☒ Multi-Use Trail        | ☒ Stairway or Ramp      |
| ☒ Hiking Trail           | ☒ Vehicular Park Access |
| ☒ Nature-based Play Area |                         |

\* Red icons represent proposed items.

## Watergate Marina Vision

Watergate Marina will be a great place to meet on the river and learn about the natural world. It will be the primary location for the City's Environmental Education programs, and will be expanded to provide access for various types of recreational boating. It will be a great place to spend the day picnicking, boating, fishing, or hiking the trails in nearby natural areas.



*This plan is a concept only, and is subject to further planning, design and public input.*

**LEGEND**

1. Environmental Education Center
2. Marina Shop and Outfitter
3. Cafe
4. Natural Area
5. Marina Boat Storage
6. Restored Lagoon
7. Picnicking / Day Use
8. Trail Connection to Hidden Falls
9. Restored Watergate Marina
10. Trail Connection to Crosby Farm
11. Improved Fishing Access
12. Parking
13. Relocated Park Access - (if feasible)



This plan is a concept only, and is subject to further planning, design and public input.

## Redevelop Watergate Marina as a key river gateway, gathering place and environmental education center

Watergate Marina will be transformed to accommodate not only its current use as a river marina, but to become the center of Saint Paul's environmental and outdoor education programs. By restoring the environmentally degraded marina site and the abandoned lagoon area, the marina will become a hub for paddle sports and river oriented community recreation and a starting point for nature walks into Crosby Farm and Hidden Falls Regional Parks. The design and construction of the new facility will be in keeping with the concept of a natural resource based park and environmental education center. A marina and bait shop, rental facilities for bicycles, skis, and kayaks, and a signature café similar to Sea Salt in Minneapolis' Minnehaha Park, will make it a year-round activity center for all ages. The redeveloped marina and associated structures and facilities will be sensitively designed and scaled to minimize intrusion on the natural characteristics of the park and river.

## Improve access to the Great River Passage

The transformation of Watergate Marina will allow significant improvements to park access at Crosby Farm Regional Park. If feasible, the relocation of the Sheppard Road park access to a signalized intersection at Davern Street, would dramatically improve access from the neighborhood. The park access road would be improved to better accommodate pedestrians and bicycles and give park visitors a choice of ways to get to the river.



The Watergate Lagoon will be a major access point for canoes and kayaks and a trailhead for the River Trail.



Community recreation includes picnicking along the river's edge.

## 6.2 Watergate Marina

### STRATEGIES & PROJECTS

Strategies and Projects	Agency/Partners	Est. Cost	Phasing
<b>Watergate Marina Management</b>			
Create a master plan redesign and construction documents for Watergate Marina consistent with the Great River Passage master plan		\$ 200,000	short
Identify not-for-profit or public-private partnership to build, operate and maintain the marina center		n/a	short
Implement programs for environmental education in conjunction with Watergate center	MNRRRA	n/a	med
Work with Dakota people to provide interpretive signage and native language place names	Dakota Tribe	n/a	
<b>Design and Construction</b>			
<b>Roads and Trails</b>			
Redesign and improve the Shepard Road Park entrance to improve pedestrian and bicycle access and crossing at Shepard Road.		\$ 500,000	short
Renovate existing park access road to accommodate bicycles and pedestrians		\$ 100,000	short
Adapt the existing access road to provide parking for the Fort Road overlook		\$ 150,000	short
Rebuild and expand parking for the multiple use marina/environmental education center and lagoon access		\$ 350,000	short
Provide Park Trail loops and links to Hidden Falls and Crosby Farm trails		\$ 250,000	short
<b>Structures and Related Improvements</b>			
Construct a new multi-use marina/café/restaurant/environmental education center	Marina	\$ 7,500,000	short
Include public restrooms in the lagoon day use area		\$ 300,000	short
Construct covered marina boat storage facility	Marina	\$ 2,500,000	med
Rehabilitate existing marina docks, slips and support facilities	Marina	\$ 1,500,000	med
Provide access to lagoon and river edge with accessible fishing/overlook piers		\$ 300,000	short
Implement signage and wayfinding systems		\$ 40,000	short
<b>Recreation Improvements/Use Areas</b>			
Provide day use recreation area including picnic and activity lawn areas		\$ 850,000	short
Provide small boat landing at lagoon area with vehicular access ramp and small boat storage		\$ 75,000	short
<b>Landscape/Site Improvements</b>			
Remove debris, regrade and restore native vegetation in lagoon area as part of improving river access		\$ 1,000,000	short
Identify and protect sensitive ecologies such as wetlands, spring ephemerals, mussel beds		\$ 50,000	short

### Summary Plan Recommendations:

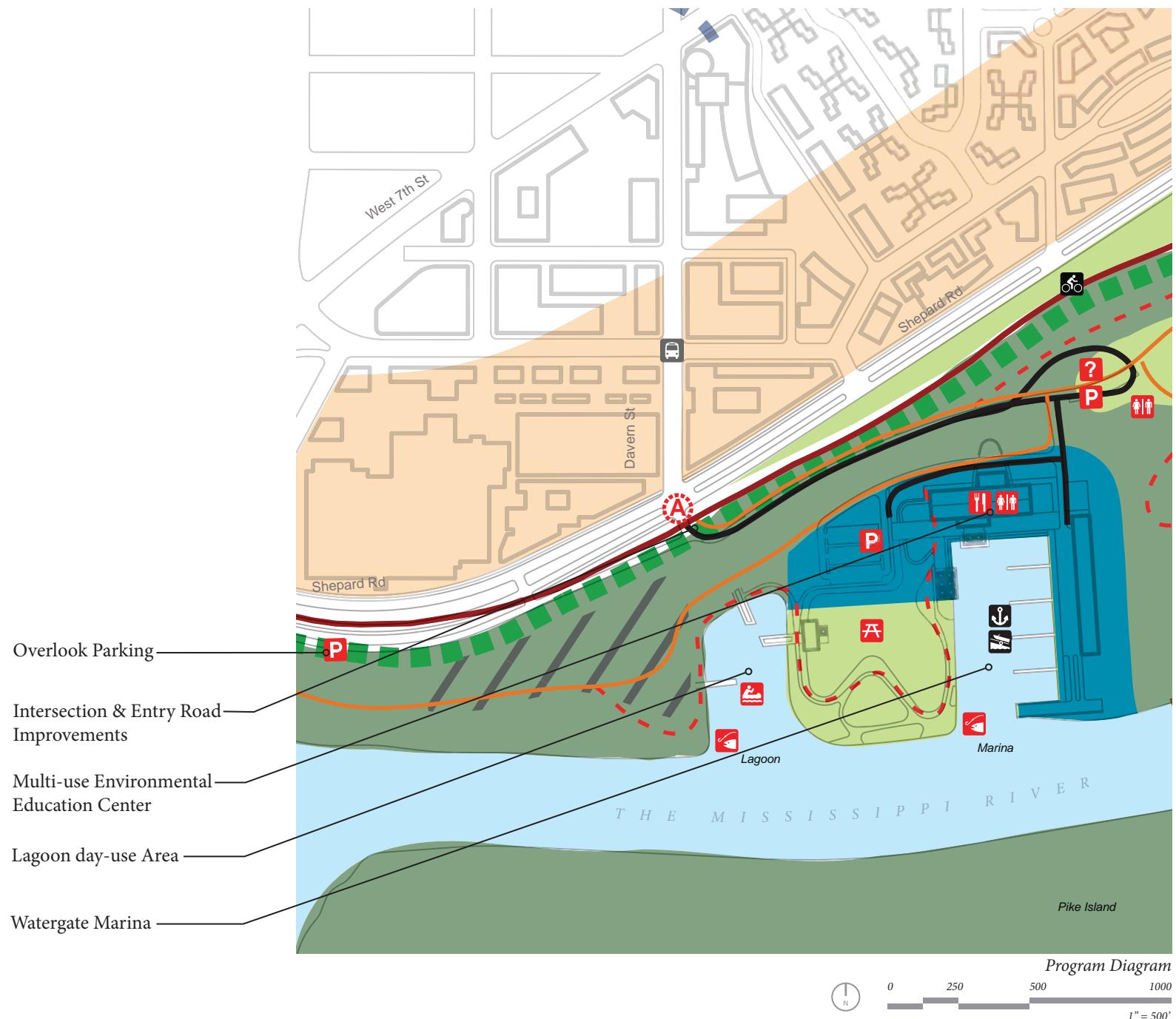
#### Watergate Marina

The Watergate Marina will be redeveloped to accommodate river-oriented uses and activities in a more environmentally friendly manor. The lagoon area will be restored removing debris and restoring the shoreline. A new environmental and river oriented recreation center will be developed with participation from public and private entities. Facilities will include motorized and non-motorized boat launch, storage and repair, recreational equipment rentals, park support facilities and a seasonal or year round café. It will have facilities to support environmental education and community events.

Redevelop the marina to maintain current uses and expand to include:

- Natural resource interpretive and education center
- Café or small restaurant
- Canoe and kayak access and storage
- Outdoor recreation sales, rentals and repair for bicycling, skiing and boating equipment
- Improved vehicular, bicycle and pedestrian access for day use of adjacent park areas

Connect environmental education facilities to trails at Crosby Farm and Hidden Falls Regional Parks and provide improved access to the river's edge.



key map

Water Resources	Roads & Trails
Wetland Restoration	Regional Trail
Redevelopment Treatment Area	Park or Local Trail
Park Treatment Area	Rustic Trail at Airport
Bluff Treatment Area	Rustic Trail
Creek Restoration Opportunity	On-Road Bikeway
Shoreline Restoration	Multimodal Park Access St.
Park Types	Park Access Road
Gathering Place	Park Access Road
Active Nature Based Recreation	River Balcony / Riverwalk
Natural Areas	Grand Round Extension
Natural Preserves	Green Connection
Land Use	Special Features
Existing Industrial	Commuter Rail Corridor
Mixed-Use	Light Rail Corridor
	County Owned Park Land

Overlook Parking	Camping
Intersection & Entry Road Improvements	Picnic
Multi-use Environmental Education Center	Wildlife Viewing
Lagoon day-use Area	Scenic Overlook
Watergate Marina	Point of Interest
	Fishing Access
	Canoe/Kayak Landing
	Motorized Boat Launch
	Swimming Area
	Mountain Biking Trail
	Multi-Use Trail
	Hiking Trail
	Nature-based Play Area
	Dog Park
	Refreshments
	Restrooms
	Marina
	Information
	Pedestrian Underpass
	Pedestrian Overpass
	Vehicle Parking
	Transit Station
	Bus Stop
	Stairway or Ramp
	Vehicular Park Access

\* Red icons represent proposed items.

## Crosby Farm Regional Park Vision

Crosby Farm Regional Park will be a place to learn about the ecology and wildlife of the river valley through programs that will be offered at the new Watergate Environmental Education Center. The ecological diversity and scenic qualities of the park are of great value to the community and to the river ecosystem. The natural resources of these areas will be preserved and enhanced, while limited recreational uses are accommodated.



*This plan is a concept only, and is subject to further planning, design and public input.*

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#### LEGEND

- 1. Restored Meadow / Picnic Areas / Camping
- 2. Expanded Bluff-top Park (w/ Sheppard Road Realignment)
- 3. Managed Natural Areas
- 4. Bluff Protection Area
- 5. Improved Access and Parking
- 6. Main Park Trail
- 7. Rustic Hiking Trails
- 8. Fishing Access
- 9. Restored Shelter & Restrooms
- 10. Scenic Overlook
- 11. Potential Trail/Stair

Concept Plan  
0 500 1000 2000  
1" = 1000'



Boardwalks have a light environmental footprint.



Organized group camping supports city-wide recreation programs.

## Create a Natural Resource Park that showcases the valley ecology

Preservation and enhancement of the valley edge's natural areas will require establishing protocols to protect and manage ecological value and diversity. Improved natural areas offer opportunities to interpret the area's natural, cultural and agricultural legacy.

Crosby Farm Regional Park could become a botanic garden for natural resources; identifying and encouraging better understanding of native flora, fauna, hydrology and cultural resources in the valley. The park could also include provisions for group camping for Scouts or other urban youth in conjunction with the city's environmental and outdoor programming.

## Develop a hierarchy of park access and trails

A hierarchy of park access points and trails will provide better connections between city neighborhoods, Crosby Farm Regional Park, Victoria Park and Hidden Falls Regional Park. Trail improvements include the development of a network of rustic trails, boardwalks, fishing platforms, overlooks, and parking and trailhead improvements at existing and proposed park access points.

## Improve connections between the bluffs and the valley bottom

Improve park access roads to better accommodate vehicles, bicycles, and pedestrians. Provide frequent, safe crossings of Sheppard Road at key neighborhood and park entrances that connect with regional and park trails. Restore the mid-bluff trail below Sheppard Road in Crosby Farm Regional Park and, where feasible, restore historic park stairways along the bluff.

*Limit recreation improvements to trails, interpretive areas and rustic facilities that support environmental education and interpretation.*

## 6.2 Crosby Farm Regional Park

Chapter 6: Plan Recommendations - The Valley Reach

### STRATEGIES & PROJECTS

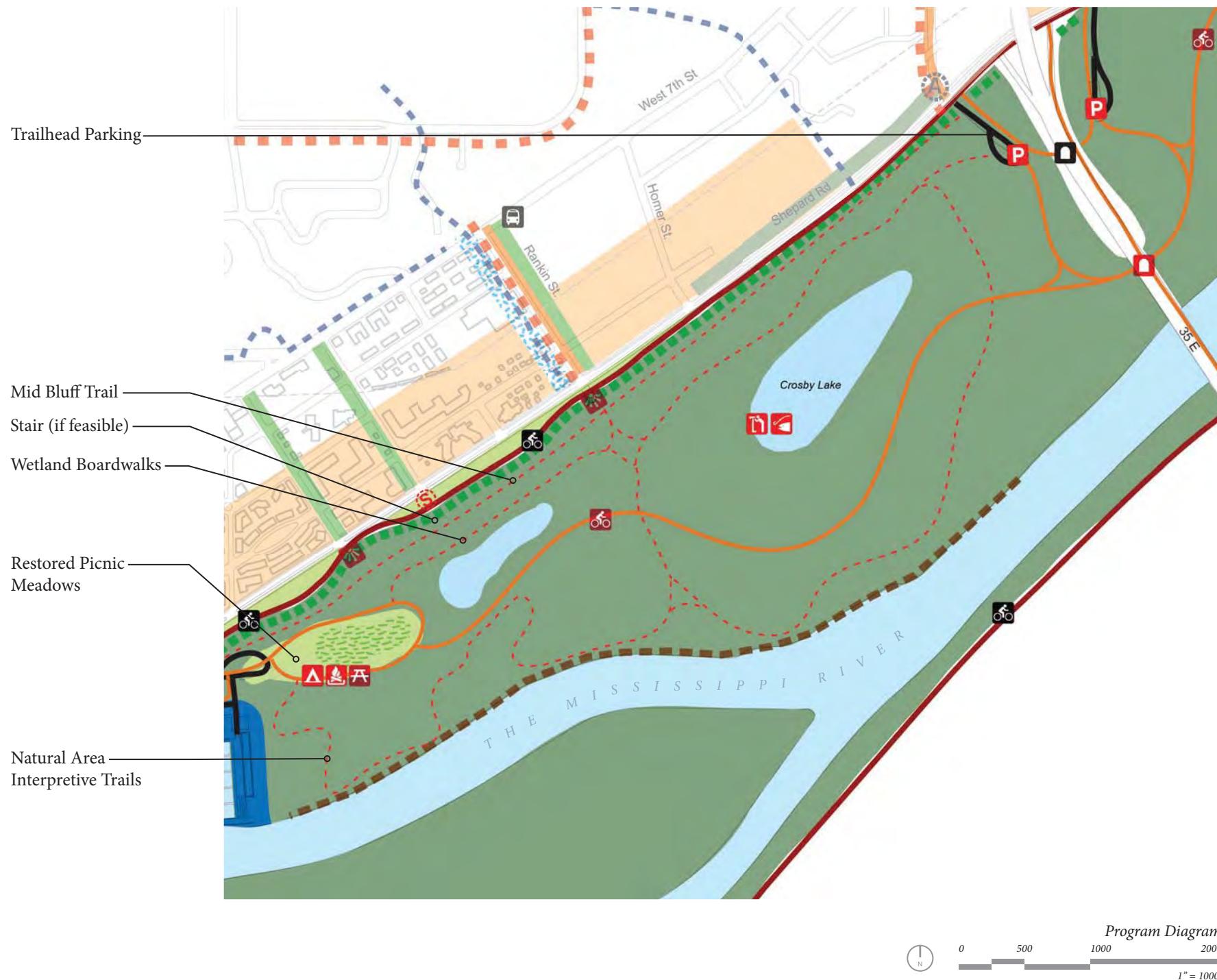
Strategies and Projects	Agency/Partners	Est. Cost	Phasing
<b>Crosby Farm Regional Park</b>			
<b>Management</b>			
Update Crosby Farm Regional Park Master Plan to be consistent with the Great River Passage master plan		\$ 100,000	short
Develop Natural Areas Management plan that includes shoreline and wetland restoration and stormwater management	FMR, USACE	n/a	
Implement programs for environmental education in conjunction with Watergate center	MNRRA	n/a	
Work with Dakota to provide interpretive signage and native language place names	Dakota Tribe	n/a	
<b>Design and Construction</b>			
<b>Roads and Trails</b>			
Redesign main park entry to align with Davern (if feasible - study with Shepard Road redesign)		n/a	
Redesign Park entry and add paved parking loop at Shepard Road west side of 35-E	completed		
Remove and relocate main parking areas, adding park across road loop closer to park entrance	completed in fall 2012		
Improve and extend Park trails from Watergate to Lower Crosby Farm and connecting to new parking areas		\$ 500,000	med
Add local trail loops to provide accessible routes to natural areas		\$ 250,000	med
Add looped rustic nature trails that provide a variety of opportunities for nature hikes including the mid-bluff trail		\$ 250,000	med
Add boardwalk trails at wetland areas around Crosby and Upper Lakes		\$ 300,000	med
Evaluate the feasibility of adding (1) bluff stair near Rankin green connection		\$ 50,000	med
<b>Structures and Related Improvements</b>			
Restore existing picnic shelter and restroom		\$ 250,000	med
Provide fishing dock, boardwalk, wildlife observation decks and blinds near lake	MNRRA	\$ 200,000	short
Implement signage and wayfinding systems		\$ 50,000	short
<b>Recreation Improvements/Use Areas</b>			
Develop rustic group tent camping area	MNRRA	\$ 300,000	med
Provide a variety of different size group and individual picnic sites		\$ 300,000	med
Improve fishing access at lakes' and river's edge		\$ 500,000	short
<b>Landscape/Site Improvements</b>			
Selectively manage understory of invasive vegetation species in passive activity areas		\$ 250,000	short
Restore native floodplain meadows to include water quality treatment in appropriate areas	CRWD	\$ 1,000,000	med
Restore wetland areas around lake and near storm outfalls	DNR	\$ 2,000,000	long
Provide stormwater treatment at top of bluff and in non-sensitive areas	CRWD	\$ 150,000	short

### Summary Plan Recommendations:

#### Crosby Farm Regional Park

Crosby Farm Regional Park will remain primarily a natural area park. The existing network of trails will be improved and expanded, and a more distinct hierarchy of accessible and more challenging walking trails will be created to serve a wide range of user abilities. Wildlife viewing, fishing, natural and interpretive areas will be created to support environmental education and recreational photography while protecting sensitive environments. The existing park access roads, parking areas and park facilities will be renovated to improve recreational user access and experience.

- Improve nature based recreation areas to support a variety of group and individual picnicking and supervised group camping opportunities.
- Improve and manage access to lake and river shorelines for hiking, fishing and environmental observation.
- Expand trail network, fishing and wildlife viewing opportunities.
- Improve access road and trailhead parking at both ends of the park.
- Renovate the existing restrooms and group picnic shelters.
- Provide increased management of natural areas.



Water Resources	Roads & Trails
Wetland Restoration	Regional Trail
Redevelopment Treatment Area	Park or Local Trail
Park Treatment Area	Rustic Trail at Airport
Bluff Treatment Area	Rustic Trail
Creek Restoration Opportunity	On-Road Bikeway
Shoreline Restoration	Multimodal Park Access St.
Park Types	Park Access Road
Gathering Place	Special Features
Active Nature Based Recreation	River Balcony / Riverwalk
Natural Areas	Grand Round Extension
Natural Preserves	Green Connection
Land Use	Commuter Rail Corridor
Existing Industrial	Light Rail Corridor
Mixed-Use	County Owned Park Land

△	Camping	☒	Dog Park
Ⓐ	Picnic	🍴	Refreshments
ⓘ	Wildlife Viewing	🚻	Restrooms
✿	Scenic Overlook	⚓	Marina
✳	Point of Interest	?	Information
🎣	Fishing Access	🔒	Pedestrian Underpass
🛶	Canoe/Kayak Landing	✖	Pedestrian Overpass
⛵	Motorized Boat Launch	P	Vehicle Parking
🏊	Swimming Area	T	Transit Station
🚵	Mountain Biking Trail	🚌	Bus Stop
🚴	Multi-Use Trail	🌀	Stairway or Ramp
🚶	Hiking Trail	Ⓐ	Vehicular Park Access
🤾	Nature-based Play Area		

\* Red icons represent proposed items.

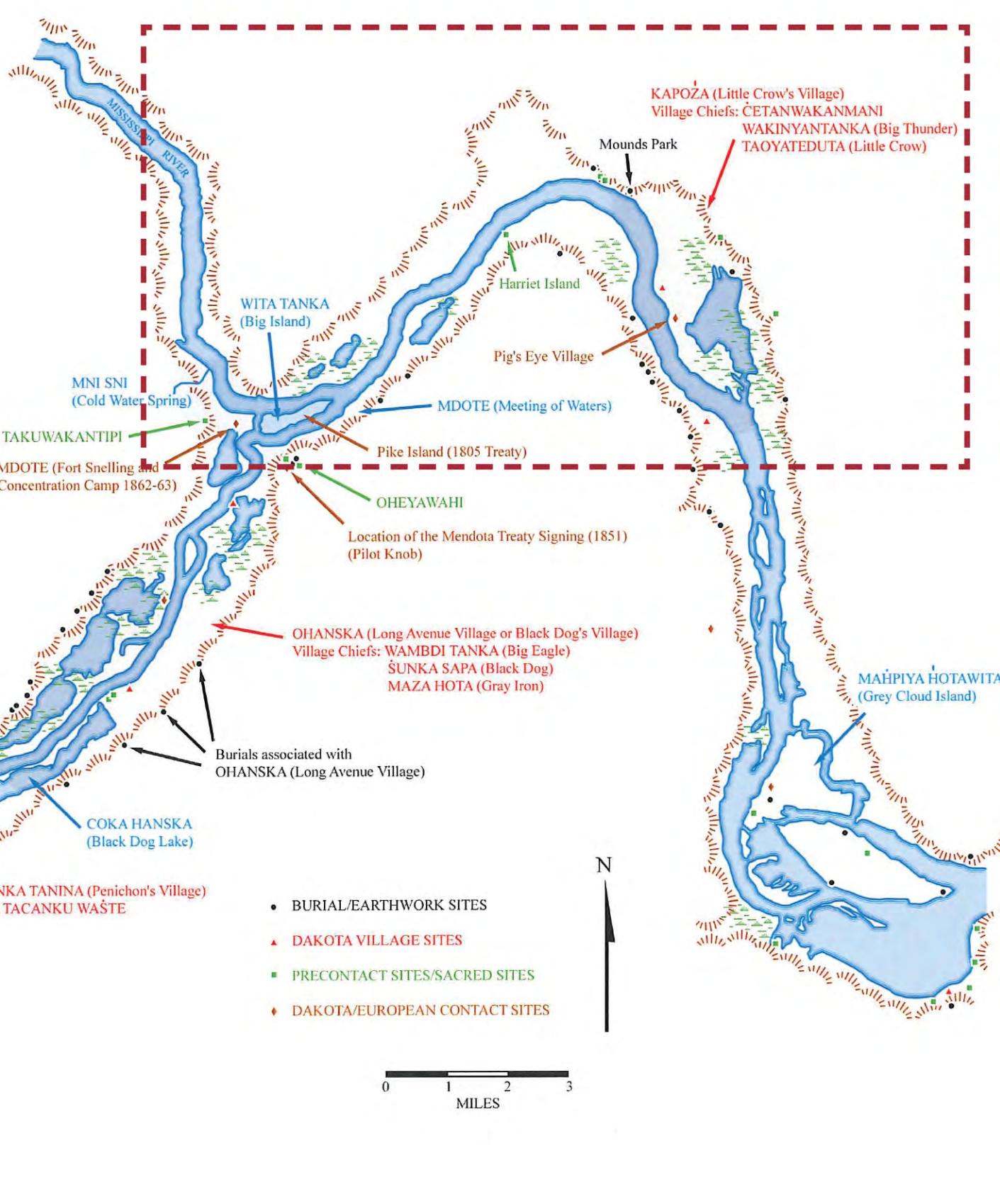
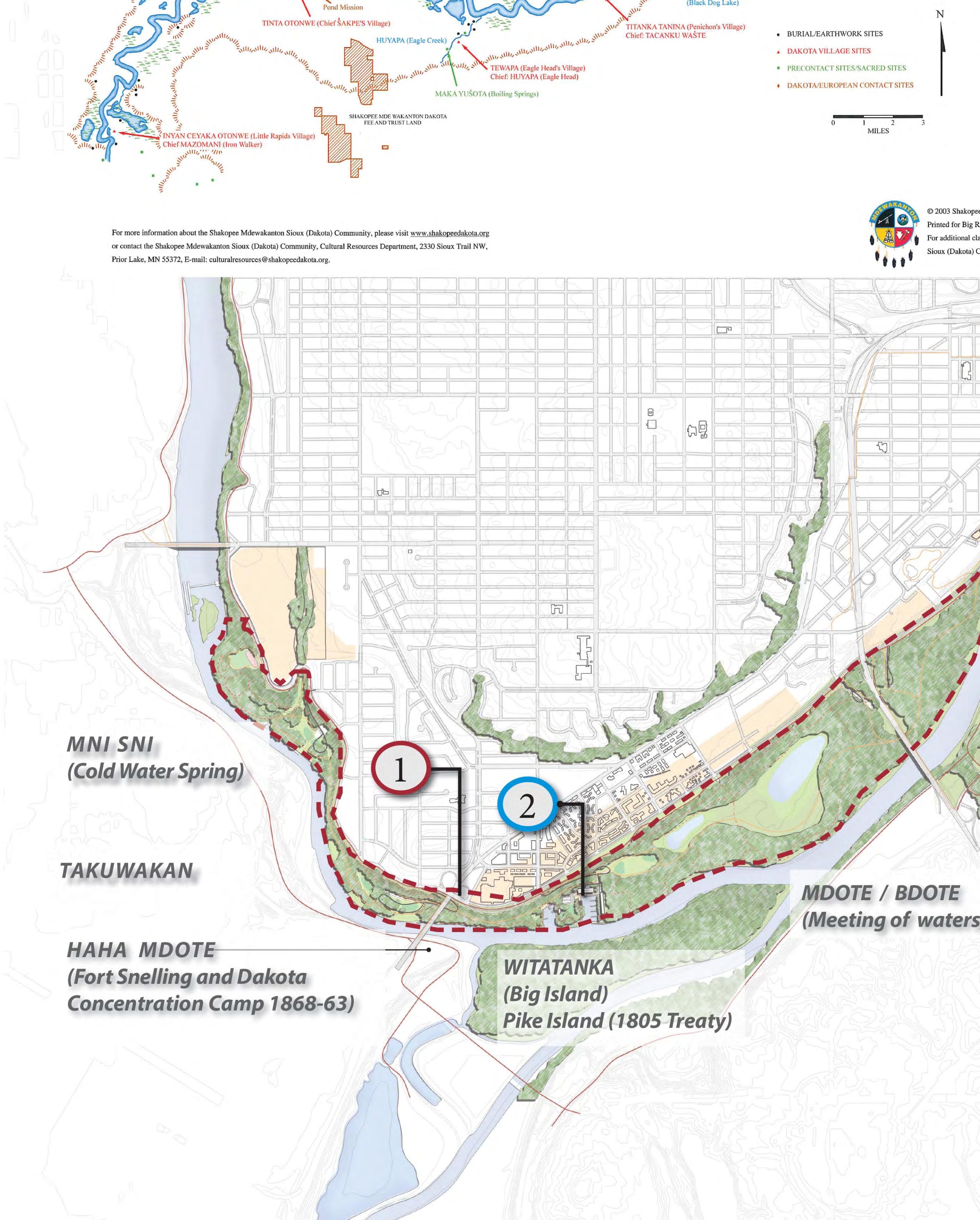
# Dakota Presence in the River Valley

The Minnesota and Mississippi river valleys have been home to the Dakota for hundreds of years, and the existence of our ancestors was sustained by their relationship with the earth and their surroundings.

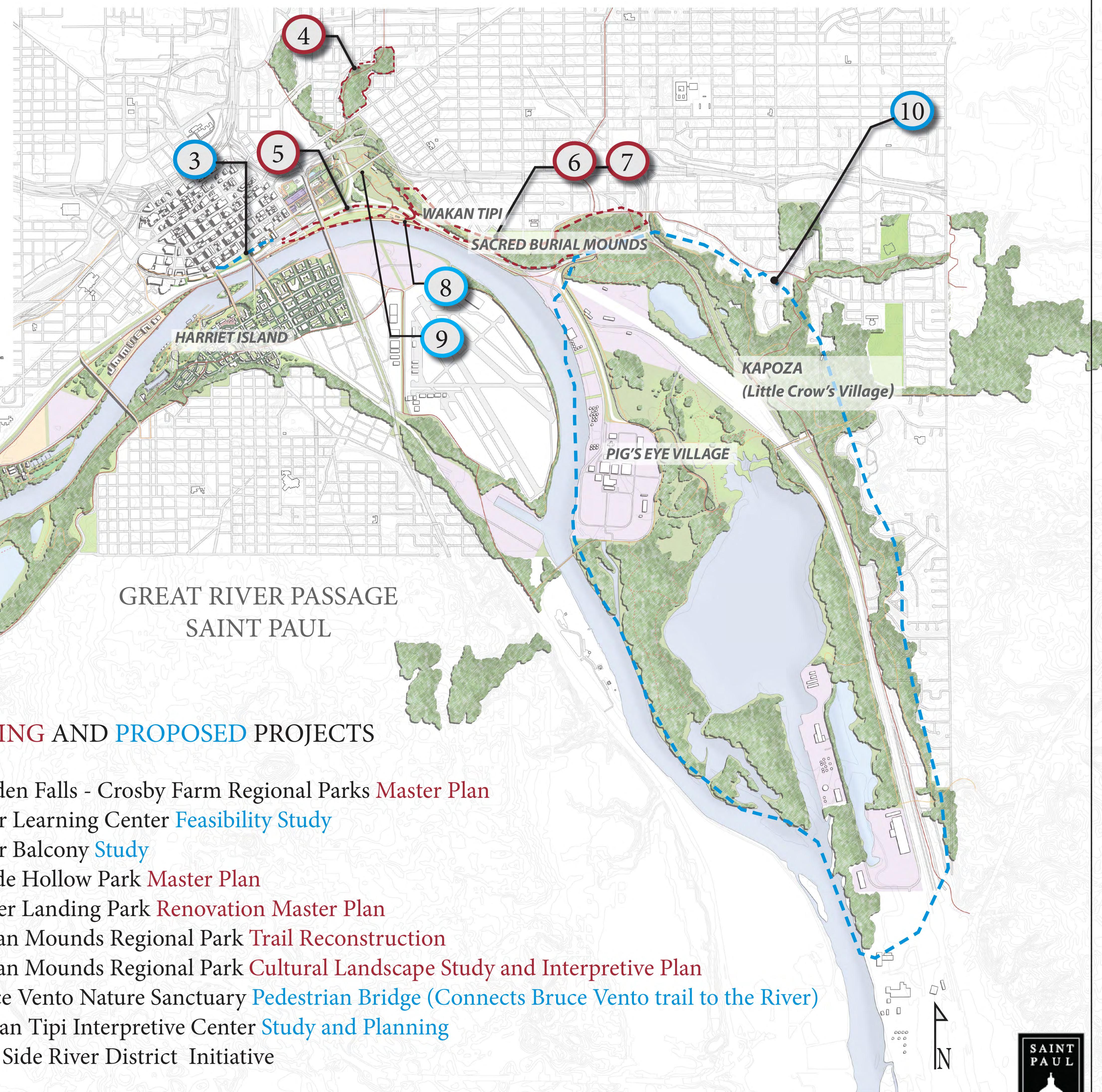
For generations, Dakota families fished from the rivers, gathered rice from area lakes, and hunted game on the prairies and in the river valley woodlands.

Along the riverbanks, leaders of the Eastern Dakota, including S'SAKPE, CASKE, MAZOMANI, WAMBDITANKA, HUYAPA, TACANKU WASTE, AND TAOYATEDUTA, established villages.

From these homes sites, the Eastern Dakota traveled for hunting, gathering, and meeting with other bands of Dakota. Our ancestors lived in harmony with the world around them, and Dakota culture flourished.



THE CITY OF SAINT PAUL ACKNOWLEDGES THIS PLACE WE CALL SAINT PAUL  
IS CENTRAL TO THE INDEGENOUS COMMUNITIES AND HOMELAND TO THE DAKOTA PEOPLE



# ONGOING AND PROPOSED PROJECTS

- 
  - 1 - Hidden Falls - Crosby Farm Regional Parks **Master Plan**
  - 2 - River Learning Center **Feasibility Study**
  - 3 - River Balcony **Study**
  - 4 - Swede Hollow Park **Master Plan**
  - 5 - Lower Landing Park **Renovation Master Plan**
  - 6 - Indian Mounds Regional Park Trail Reconstruction
  - 7 - Indian Mounds Regional Park **Cultural Landscape Study and Interpretive Plan**
  - 8 - Bruce Vento Nature Sanctuary **Pedestrian Bridge (Connects Bruce Vento trail to the River)**
  - 9 - Wakan Tipi Interpretive Center **Study and Planning**
  - 10- East Side River District Initiative

# CITY OF SAINT PAUL PROJECTS AND STUDIES ALONG THE MISSISSIPPI RIVER

