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EXECUTIVE SUMMARY

Mountain biking is an increasingly popular activity among all ages. The community desire for mountain bike trails in the city is evident by the number of residents showing their support for the project over the last two years through feedback gathered during the Imagine Minnetonka process, park board meetings, public engagement meetings and online forums. The potential for mountain bike trails has also seen opposition from community members who are concerned with the impacts on the natural environment, wildlife and the overall park user experience.

In February 2018, the park board directed staff to study Lone Lake Park as a potential site for mountain bike trails in the city of Minnetonka. Lone Lake Park is a 146-acre community park and preserve with 14 acres of developed land that includes amenities such as tennis courts, soccer field, playgrounds, parking lots and pickleball (summer 2018). Of the 132 acres of undeveloped land in the park, 52 of those acres are usable acres for potential mountain bike trails. The proposed trail concept plan presents 4.7 miles of mountain bike trails, 18-24” inches in width, totaling approximately 1.2 acres. The park has approximately 140 paved parking spots and is safely reachable by bike via regional trails and sidewalks.

As a community with a dynamic population, it can be expected that the needs of individuals and families living in Minnetonka will continue to change and evolve through time. The research, field work and creation of this study was a collaborative effort by city staff from Natural Resources, Public Works and Recreation Services as well as a third party biological assessment conducted by Short Elliott Hendrickson Inc. (SEH). City staff are committed to providing a comprehensive, balanced and sustainable system of parks, open space/natural areas, trails and recreation oriented activities/programs that respond to the community’s values.

It is important to note that city staff recognize that if mountain bike trails are built in Lone Lake Park there will be an environmental impact. Trails cannot be built through a woodland area without impact. The addition of mountain bike trails to the park would have some environmental impacts that may include loss of vegetation, soil erosion, spreading of invasive species and disturbance to wildlife. The environmental impacts of mountain biking are on par with the impacts from hiking (see Appendix C). If the project is approved, the city is committed to following International Mountain Bike Association (IMBA) Essential Elements of Sustainable Trail Design to minimize environmental impacts. A general maintenance plan would include daily, weekly and monthly inspection and maintenance.

Staff believes that it is feasible to build mountain bike trails in Lone Lake Park. The city has always tried to balance the preservation of its natural environment with providing the services and amenities desired by the community. The creation of mountain bike trails would be no different. If the park board and city council advance the project, it will be staff’s charge to minimize the impact of the trail construction and long-term maintenance. This includes properly siting and building sustainable trails to minimize impacts to trees, slopes and the general woodland environment. Through careful sustainable design, thoughtful construction and ongoing management, the potential negative impacts can be reasonably mitigated.
CHAPTER 1 BACKGROUND

Throughout the summer and fall of 2016, the City of Minnetonka asked residents to provide feedback for a community-wide visioning and strategic planning project called Imagine Minnetonka. Residents of all ages were asked to share their responses to the question: “How do you want your city to look and feel in the next 20 years?” Through this process, residents expressed interest in the creation of more trails in the city, including mountain bike trails.

An initial request for the addition of mountain bike trails to the city’s park system was introduced to the park board at their September 7, 2016 meeting by a Minnetonka resident, along with students and staff from the Minnetonka and Hopkins school districts. The park board directed staff to work with representatives of the mountain biking community, including the Minnetonka High School VANTAGE program, to prepare a proposal for park board consideration.

At the December 7, 2016 park board meeting, students from the VANTAGE program presented their findings and recommendations to the park board. The plan involved placing trails in Big Willow Park and Civic Center Park connected by the existing regional trail. In addition, the west side of the I-494 corridor from Stone Road to I-394 was considered as a future expansion to the initial two mountain biking trails. Following the presentation, the park board directed staff to work with students from the VANTAGE program and other community mountain biking enthusiasts to complete a feasibility study to determine the requirements and challenges for adding mountain biking to the Minnetonka park system.

At the June 7, 2017 park board meeting, Trail Source LLC provided a feasibility study and concept plans for potential mountain bike trails in Civic Center and Big Willow Parks. There was both support and opposition for trails in these parks. At this point, staff decided to take a step back to gain more feedback from the public and assess all of Minnetonka’s parks for the feasibility of adding mountain bike trails.

WSB and Associates was contracted in the fall of 2017 to assist in community outreach and engagement for the prospective mountain bike trails project. This outreach included four separate public meetings (see Community Engagement Process, Chapter 2, for additional details on this process).

At the February 7, 2018 park board meeting, staff presented the results of the public engagement process as well as the criteria created to determine the feasibility of a park to sustain mountain bike trails. That criteria was used to analyze all city parks in Minnetonka and Lone Lake Park was the only park that met the requirements. The park board then directed city staff to further study and develop a concept plan for mountain bike trails in Lone Lake Park.

The mission of the Minnetonka Park & Recreation Board is to proactively advise the City Council in ways that will:

- Protect and enhance Minnetonka’s natural environment
- Promote quality recreation opportunities and facilities
- Provide a forum for citizen engagement in our parks, trails, athletic facilities and open space
CHAPTER 2  COMMUNITY ENGAGEMENT PROCESS

2.1 Meetings and Engagement

Since September 2016, the potential for mountain biking trails has been on numerous park board agendas, advertised in the Minnetonka Memo, posted on the city website’s project page and updates have been sent to the over 700 email subscribers to the project on a regular basis.

The city hired WSB and Associates to conduct additional community engagement and outreach for the potential mountain bike trails project. Focus groups and public meetings occurred on Nov. 8, Nov. 16, Dec. 13, 2017 and Jan. 8, 2018 and drew over 400 total people at the four meetings.

In November 2017, Minnetonka residents were invited to two focus groups to share their thoughts on the concept of creating mountain bike trails in Minnetonka. The first focus group was aimed at residents concerned about the potential trails, while the second focus group convened residents who were advocates for mountain bike trails. Each group provided feedback on the prospect of trails and expressed priorities for the potential project.

Below is a summary of the findings from those focus groups:

Focus group #1:

Concerns for Trails

Generally, focus group #1 attendees expressed concern for the safety of park users, bikers and pedestrians alike. They also wondered how the trails would add to parking pressures, noise pollution and environmental deterioration. Attendees also voiced a desire for increased communication and engagement surrounding the issue.
Focus group #2:

**Priorities for Trails**

![Pie chart showing priorities for trails]

- Location
- Expediency/Time it takes to implement
- Length of trails
- Design considerations
- Broad user appeal
- Hours of access/operation
- Connection to other facilities
- Other

Generally, focus group #2 attendees expressed excitement at the prospect of mountain bike trails in Minnetonka. They see this as a growing sport that has potential to draw new/young people to outdoor recreation and physical activity. Similar to concerned residents, they prioritize safety and the mitigation of trail user conflict. They are also concerned with the design and construction of the trail, desiring a course that is high quality and challenging.

In December 2017, Minnetonka residents were invited to attend community conversations to share their thoughts on the concept of creating mountain bike trails in Minnetonka. They were presented with three options and asked for their opinion on each option. The options were:

A. Design mountain bike trails in Big Willow Park and/or adjacent city-owned location(s)
B. Design mountain biking trails in other city-owned location(s)
C. Do not build mountain bike trails

Residents were asked to write down the pros and cons of each option:

**Option A, representative comments:**

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
</table>
| • Big Willow is close to potential trail users; they would not have to drive to the park  
• Big Willow is connected to the LRT  
• Big Willow’s terrain is variable and suitable for mountain biking  
• Trails at Big Willow would help local businesses | • There is not enough parking at Big Willow  
• There may be conflict between bikers and walkers at trail intersections and on the bridge  
• The neighborhood would be disrupted  
• Big Willow is not a large enough park to support additional trails |

**Option B, representative comments:**

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
</table>
| • Other parks in Minnetonka are bigger and better able to accommodate trails  
• Less controversy at other locations | • Other locations would be farther from Hopkins high school  
• Other sites would be less accessible/central for users |
• If there are trails at multiple parks, the impact would be lessened and dispersed
• There may be fewer environmental concerns at other locations

• Less connectivity to regional trail system
• Other parks are flat – would not make for good mountain biking

Option C, representative comments:

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
</table>
| • Current parks would not be disrupted  
• No money would be spent  
• Less influx of non-Minnetonka residents to use the parks | • Makes Minnetonka less appealing to young families  
• Does not support mountain bike community  
• Unsanctioned use of trails for biking will continue |

In January 2018, Minnetonka residents were invited to attend the fourth public engagement meeting. Residents filled out a questionnaire indicating their feelings on topics like space constraints, environmental protection and user conflict.

The following matrix shows responses to survey questions. Some residents did not respond to all questions.

<table>
<thead>
<tr>
<th>Adequate Space</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A trail system should be able to sustain a minimum of 4 miles of single track trails. This could include a single park on its own or a circuit of parks in close proximity to one another. Staff believes that less than 4 miles would not be utilized.</td>
<td>79%</td>
<td>21%</td>
</tr>
<tr>
<td>If a circuit of parks is considered, a given park within the circuit should be able to support a minimum of 2 miles of mountain bike trails on its own.</td>
<td>73%</td>
<td>27%</td>
</tr>
<tr>
<td>If a circuit of multiple parks are needed, the parks should be located within one mile of another.</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>A mountain bike trail system should be within one mile of a regional bike trail.</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>A park must contain a minimum of 20 usable acres to be considered. Usable acreage is undeveloped acreage that could be used to build mountain bike trails. Acreage does not include wetlands, creeks, ponds, etc.</td>
<td>71%</td>
<td>29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Protection</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trails should be built using the highest standards for development and pursuant of sustainable trail guidelines. This would limit erosion, vegetation loss and water quality problems.</td>
<td>99%</td>
<td>1%</td>
</tr>
<tr>
<td>Areas containing uncommon plants and high quality restoration areas (per city natural resources staff) should be avoided.</td>
<td>92%</td>
<td>8%</td>
</tr>
<tr>
<td>Generally, narrow trails (approximately 24&quot;) should be built to reduce the total area of intensive tread disturbance, slow trail users and minimize vegetation and soil compaction.</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Site should be designed to minimize tree impact and removal.</td>
<td>97%</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimize User Conflict</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The majority of existing mountain bike trails in the Twin Cities are one-way to avoid head on interactions. If built in Minnetonka, trails should also be one-way.</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td>Mountain bike trails should be built to minimally intersect existing maintained trails and high use informal foot paths.</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>Mountain bike trails should not displace existing maintained trails and high-use informal foot paths.</td>
<td>78%</td>
<td>22%</td>
</tr>
</tbody>
</table>
Mountain bike trails should be designated as multi-use (open to runners, bird watchers, hikers, snowshoers, bikers, etc.). Ninety-two percent of all mountain bike trails in the Twin Cities are multi-use.

Adequate parking should be available at each proposed park.

### 2.2 Site Evaluation Criteria

The following criteria was used to evaluate parks in Minnetonka to determine the feasibility of adding mountain bike trails.

#### ADEQUATE SPACE

A trail system should be able to sustain a minimum of 4 miles of single track trails. This could include a single park on its own or a circuit of parks in close proximity to one another. Staff believes that less than 4 miles would not be utilized.

If a circuit of parks is considered, a given park within the circuit should be able to support a minimum of 2 miles of mountain bike trails on its own.

If a circuit of multiple parks are needed, the parks should be located within 1 mile of another and provide safe, easy and navigable travel between each location.

A mountain bike trail system should be within 1 mile of a regional bike trail and provide safe, easy and navigable travel between.

A park must contain a minimum of 20 usable acres to be considered. *Usable acreage is undeveloped acreage that could be used to build mountain bike trails. Acreage does not include wetlands, creeks, ponds, etc.*

#### ENVIRONMENTAL PROTECTION

Trails should be built using the highest standards for development and pursuant of sustainable trail guidelines. This would limit erosion, vegetation loss and water quality problems.

Areas containing uncommon plants and high quality restoration areas (per city natural resources staff) should be avoided.

Generally, narrow trails (approximately 24”) should be built to reduce the total area of intensive tread disturbance, slow down trail users and minimize vegetation and soil compaction.

Site should be designed to minimize tree impact and removal.

#### MINIMIZE USER CONFLICT

The majority of existing mountain bike trails in the Twin Cities are one-way to avoid head on interactions. If built in Minnetonka, trails should also be one-way.

Mountain bike trails should be built to minimally intersect existing maintained trails and high-use informal foot paths. (High-use informal foot paths are trails that receive similar use as maintained trails and have experienced significant widening, erosion and impact as a result.)
Mountain bike trails should not displace existing maintained trails and high-use informal foot paths. (High-use informal foot paths are trails that receive similar use as maintained trails and have experienced significant widening, erosion and impact as a result.)

Mountain bike trails should be designated as multi-use (open to runners, bird watchers, hikers, snowshoers, bikers, etc.). Ninety-two percent of all mountain bike trails in the Twin Cities are multi-use.

Adequate parking should be available at each proposed park.

### 2.3 Minnetonka Parks Applied to Criteria

<table>
<thead>
<tr>
<th>Parks</th>
<th>Adequate Space</th>
<th>Environmental Protection</th>
<th>Minimize User Conflict/Maximize Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 miles of trail per location</td>
<td>Trail width approx. 24&quot;</td>
<td>One way trails</td>
</tr>
<tr>
<td>Lone Lake</td>
<td>X X X X X X *</td>
<td>X X X X X X X X</td>
<td>Minimally intersect maintained/high traffic footpaths</td>
</tr>
<tr>
<td>494 Corridor</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Do not displace maintained/high traffic footpaths</td>
</tr>
<tr>
<td>Purgatory</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Multi-use</td>
</tr>
<tr>
<td>Hilloway</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Victoria-Evergreen</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Big Willow</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Civic Center</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Jidana</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Meadow</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Covington</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Mooney</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Lake Rose</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
<tr>
<td>Crane Lake</td>
<td>X X X X X X</td>
<td>X X X X X X</td>
<td>Adequate parking</td>
</tr>
</tbody>
</table>

*To be determined. If selected, would require further research.

Based on the applied criteria, staff recommended to the park board at the February 7, 2018 meeting that Lone Lake Park be further studied as the only site for potential mountain bike trails. The board followed that recommendation and motioned for staff to move ahead with studying Lone Lake Park and creating a concept plan. See Appendix A for the full park board report from the February meeting.
CHAPTER 3  
MOUNTAIN BIKING AT LONE LAKE PARK

3.1 What is Mountain Biking?

Mountain biking is the non-motorized sport of riding bicycles off-road. Mountain bikes are retrofitted with wider tires than a traditional bike designed for travel on pavement or gravel. This wider tire increases traction, balance and maneuverability, while mitigating the impact to the trail by increasing the surface area of contact between dirt and tire. The surface area of a mountain bike’s two tires can be seen as similar to that of a hiker’s two feet. In addition to wider tires, mountain bikes are typically also retrofitted with a front and sometimes a rear shock. These shocks further increase a rider’s experience by absorbing the bike’s impact with the trail.

Mountain biking is a broad term with a number of subcategories including: cross-country, trail riding, all mountain, downhill, freeride and dirt jumping. These subcategories support a wide variety of user groups and vary significantly in their appearance, trail impact, trail design and geographic location. Cross-country mountain bike riding is the most prevalent type of mountain biking in the Twin Cities and is the proposed style of trail at Lone Lake Park in Minnetonka.

3.2 Proposed Trails at Lone Lake Park

The mountain bike trails proposed at Lone Lake Park would be narrow trails called single-track. Once established, single-track trails average 18-24” in width, are not paved, vary in difficulty and are designed to flow through natural areas with gradual inclines and declines in topography. These single-track trails can be seen as similar to a narrow hiking path with the exception that mountain bike trails would be closed to the public when saturated with water after a significant rainfall, melting snow or melting frost, and would remain closed until dry to avoid erosion. Modern trail design and construction uses sustainable trail building techniques (for more details on sustainable trail building, please see Chapter 4). Single-track trails have been shown to have minimal impact on the environment, resist erosion through proper design, construction and maintenance, co-exist with the natural environment and blend with the surrounding area.

Mountain biking can vary in difficulty. Similar to Nordic and alpine skiing, trails are rated as easy (green), intermediate (blue), difficult (black) and extremely difficulty (double black). A trail rating takes into account the trail width, surface and grade; natural obstacles and technical trail features. Trail design at Lone Lake Park would be rated as mostly easy with sections of intermediate due to portions of sustained incline or decline in topography. The focus on developing a predominantly easy and intermediate mountain bike trail system would be to support a robust user-group, including younger riders, families and a variety of ability levels, including beginners.
3.3 Shifting Trends in Recreation

The Physical Activity Council, which tracks participation and trends in sports, fitness and recreation in the United States, has shown that while 72% of the U.S. population ages six and over are active, the level of activity continues to trend toward a lesser frequency. Further, trends in how people recreate continue to shift away from organized sports and toward more individualized activities and outdoor recreation, including mountain biking. The City of Minnetonka and surrounding communities’ recreation departments have seen a decline in the number of teams registering for softball, basketball, kickball and football leagues. Though not specific to the United States, recent publications by the Australian Sports Commission explored this trend, noting that participation in many organized sports is in decline, while non-organized sports are growing in popularity. Reasons cited for this shift include:

- Organized sports focus too heavily on competition rather than fun and enjoyment
- Organized sports choose teams on the basis of talent rather than friendship groups
- Organized sports lack flexibility around scheduling
- Organized sports provide limited opportunities for people with poor sporting competency
- Many adolescents report being self-conscious about poor sporting ability and find organized sporting environments intimidating and humiliating

Mountain biking enables people to ride for fun and enjoyment, as well as competition. People are able to choose their own riding groups - generally close friends. Mountain biking can be done anytime; it doesn’t require a minimum level of competency (other than the ability to ride a bicycle) and allows people to choose trails to match their ability. People that may be self-conscious about their ability can choose whom, where and when they ride.

Winter mountain biking, or fat tire biking, is also a fast growing activity among Minnesotans. As our climate continues to shift and the average annual snowfall decreases, opportunities for traditional winter activities, such as Nordic skiing, have seen a decrease in participation. Fat biking provides access to winter recreation without the need for ample snow. Fat biking uses the same trails as mountain biking, but the style of bike (specifically the increased width of the tire) provides easy riding through snow and ice. Winter bikers follow the same trail closure rules. The proposed trails would be open for winter biking, but there are no immediate plans for grooming the trails in the winter. Winter fat biking would increase park use during the underutilized time of year.

3.4 Growth in Mountain Biking

Recreational shifts toward an increased participation in mountain biking can be seen in a number of indices, including the level of support by the Minnetonka Mountain Bike Trail Advocates. Since the initial proposal for mountain bike trails in Minnetonka back in 2000, local advocacy for mountain biking has grown from a small group of local bikers to a large well-organized community of advocates. Mountain bike advocates in the Twin Cities have lobbied through the years to increase the number of miles of mountain bike trails from 10 miles in the late 1990’s to over 85 miles in the Twin Cities today.
A survey conducted by City of Minnetonka staff (see Appendix B) of local mountain bike land managers suggests that mountain bike trail heads within the Twin Cities see a range of 150 - 2,500 weekly users (dependent on location and time of year). Larger destination trail systems are seeing significantly higher use (Three Rivers Park District, Theodore Wirth and Lebanon Hills). Trail systems similar in size and scope (Carver Lake, Salem Hills, and Hillside) to the proposed trails at Lone Lake Park see an average of 140-300 users per week depending on the time of year. This robust use of mountain bike trails is expected to grow. Market research anticipates a compound annual growth rate of 9.84% in mountain bike sales from 2017-2021.

Organized sports continue to see a decline in participation, especially contact sports. The Minnesota High School Cycling League, founded in 2012, started with 150 student athletes, representing 16 teams. Today it has grown to 1,300 student athletes, on 60 teams that cover over 100 schools with 550 coaches in Minnesota. Minnetonka and Hopkins schools have started cycling teams and their clubs have close to 100 participants collectively. As family time continues to be stretched, parents and children look to share in recreational opportunities. The sport of mountain biking provides activity for the entire family. Compared to many organized sports, mountain biking is a healthy, lifelong recreational activity that individuals can easily participate in over the course of their life.

3.5 Access to Mountain Bike Trails

As trends in recreation shift toward access to more outdoor and individual based recreation, community members are seeking these experiences closer to home. A trail close to home removes a barrier to access for people who don’t have a car. Access to mountain bike trails in Minnetonka is not readily available and requires an increase in time and drive commitments (see table below). As mountain biking grows in popularity, users are requesting access similar to traditional sports. This is similar to a softball team requiring a local field to practice and play on without having to drive to another community to access their facilities. Users are also looking for access to mountain biking from a regional trail system allowing them to keep the car at home, warm up on their way to the trail and cool down on their way home. Lone Lake Park is conveniently located 0.6 miles from the Minnesota River Bluffs Regional Trail with a well-developed trail connecting the regional trail to a potential Lone Lake mountain bike trail. It also provides easy access to both Minnetonka and Hopkins schools (representing large populations of Minnetonka residents). Lone Lake Park is located within a 5-mile bike ride to either school and connects with the Regional Trail System.

<table>
<thead>
<tr>
<th>Trail Name</th>
<th>Location</th>
<th>Driving Distance in Miles (from Mtka City Hall)</th>
<th>Miles of Trail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theodore Wirth</td>
<td>Minneapolis</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>MN River Trail</td>
<td>Bloomington</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Murphy Hanrehan</td>
<td>Prior Lake</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Elm Creek</td>
<td>Champlin</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Lake Rebecca</td>
<td>Rockford</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Lebanon Hills</td>
<td>Eagan</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td>Terrace Oaks</td>
<td>Burnsville</td>
<td>23</td>
<td>2</td>
</tr>
</tbody>
</table>
CHAPTER 4 TRAIL DESIGN AND BUILDING

4.1 Trail Design

The goal of all types of sustainable trails is to get water off the trail and keep users on it. Thoughtful trail design can simultaneously mitigate environmental impacts as well as minimize user conflict. For instance, singletrack trails (where users generally travel single file) tend to make trails more exciting, improve visibility of other users, and slow speeds of mountain bikers. These trails are typically 18"-24" in width and tend to wind around natural elements such as rocks, trees and landforms.

Thoughtfully designed mountain bike trails blend with and protect the surrounding environment, meet the needs of users, minimize conflicts between user groups and require little maintenance. All trails have environmental impacts, and mountain bike trail impacts have been found to be on par with those of hiking trails (see Appendix C).

4.2 Sustainable Trail Design Principles

Rolling contour trails gently travel alongside slopes and follow existing contours. These types of trails have undulating slopes of less than 10% called grade reversal and serve to minimize erosion potential. Trail treads should tilt slightly toward the downhill in order to allow water to drain in a non-erosive manner. Fall lines (the shortest route down a hill) and flat areas should be avoided in siting trails in order to further minimize erosion potential.

4.3 The IMBA 11 Essential Elements of Sustainable Trails

The International Mountain Bike Association (IMBA), founded in 1988, is a worldwide, non-profit organization that provides land managers guidance and best practices in the creation, enhancement and preservation of mountain bike trails. They promote responsible mountain biking, support volunteer trail work, assist land managers with trail management issues and work to enhance relations among trail user groups. IMBA members annually contribute more than one million hours to trail work projects on public land.
1. **Trail location:** Side slope trails are best to minimize erosion potential.

![Trail Location: Sidehill Trails Are the Best](image)

2. **Sustainable trail alignment:** Avoid the fall line.

3. **The Half Rule:** A trail’s grade should not exceed half the grade of the hillside or side slope that the trail traverses.

![Half Rule](image)

4. **The ten percent average guideline:** An average trail grade of 10% or less is the most sustainable and least likely to experience erosion.

5. **Maximum sustainable grade:** The maximum grade that will still result in a sustainable trail (generally less than 15% and varies based on soil type).

6. **Grade reversals:** A spot where a climbing trail levels out and then changes direction, dropping subtly for 10-50 linear feet before rising again, directing water off the trail before it gains too much momentum.
7. **Outslope:** The outer edge of the trail tread should tilt slightly downhill to encourage water to sheet off the trail and minimize erosion.

8. **Adapt trail design to soil texture:** Understand the soil types and their different physical properties and texture.

9. **Minimize user-caused soil displacement:** Gentle grades, side slop location, consistent flow, in-sloped turns, and potentially tread hardening (the addition of gravel to trails) all serve to minimize user-caused soil displacement.

10. **Prevent user-created trails:** The intended trail should provide a better experience than traveling off-trail, in addition to educational signage, prevents a majority of informal trail creation.
11. Maintenance: Routine trail maintenance includes removing leaf litter from the trail to promote drying, selectively trimming encroaching branches, removing fallen trees and assessing the condition of the trail to identify potential erosion issues before they become problematic.

4.4 Trail Signage

Trail signage types are either: informational/directional, regulatory/warning or educational/interpretive. They are for trail identification, route selection by riders, guidance to key points of interest, inform regulations and use, visitor education and etiquette, resource protection and hazard description.

Trailhead Signs/Kiosks: This signage typically includes a map and description of the trail segments including length and difficulty, trail regulations, safety tips, emergency contact information and educational messages. Trailhead kiosks can also include information about volunteer opportunities, natural and cultural resources, a message board or fliers. Appropriate language and messaging is important in order to ensure effective adherence to trail rules. For instance, engaging messages such as “restoration area, please remain on trail” is proven to be more effective than simply stating “keep out!”

Examples of trailhead signs:
Waymark and Trail Intersection Signs: Trail waymarkers are small and simple aluminum or plastic signs that can be fixed to a flexible post and serve to mark the way of the trail and provide mile markers. These signs allow riders to have a self-guided experience as well as serve to provide location information in the event of emergencies. Trail intersection signs provide directional information about how to return to the trailhead or continue along the trail.

Example of a waymarker:
4.5 Budget

The City of Minnetonka allocated $130,000 for mountain biking in its Capital Improvement Plan for 2018. Local students raised an additional $5,000 through online fundraising. To date, the city has used $35,000 for trail design, public engagement and a natural resources assessment. After a site visit and analysis of Lone Lake Park, the estimated cost to build a mountain bike trail including signage, trailheads and gates is $175,000 - $200,000. The difference of $75,000 - $100,000 is anticipated to be funded through grant opportunities and/or amending the CIP.

<table>
<thead>
<tr>
<th>Mountain Bike Trail Construction</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trail Build 24,816 Linear ft. x $7</td>
<td>$173,712</td>
</tr>
<tr>
<td>Trailheads (kiosks &amp; gates) 2 kiosks, 3 gates</td>
<td>$10,000</td>
</tr>
<tr>
<td>Signs Waymark signs</td>
<td>$5,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$188,712</strong></td>
</tr>
</tbody>
</table>

CHAPTER 5  TRAIL MAINTENANCE AND MANAGEMENT

5.1 Minnesota Off-Road Cycling (MORC)

The local offshoot of IMBA, Minnesota Off-Road Cyclists (MORC), works to uphold the same principles as IMBA and is highly regarded by local land managers. MORC partners with area land managers to help enhance the sport of mountain biking in the Minneapolis/St. Paul metro area. MORC currently maintains approximately 85 miles of trail at 11 locations in the Twin Cities area. It is MORC’s mission to safeguard the future of mountain biking in Minnesota through the promotion of responsible riding, establishment and maintenance of mountain biking trails and preservation of Minnesota's natural resources.

If trails are approved, the City of Minnetonka would enter into an agreement with MORC for services at Lone Lake Park. An agreement with MORC may include, but is not limited to, assistance with:

- Volunteer organization, recruitment and training
- Elements of trail construction
- Routine maintenance
- Seasonal invasive species removal and park restoration (see chapter 6)
- Inspection and hand-work maintenance of the trail
- Washout repair and downed tree removal
- Closing and opening the trail based on trail conditions

MORC would work closely with city staff and must receive prior approval for any significant maintenance or trail changes.

5.2 Maintenance Plan

Trail maintenance is an important aspect for keeping mountain bike trails sustainable for public use. It is imperative that the trails be built in a sustainable manner to minimize ongoing maintenance as the trail ages. A general maintenance plan could include:
Daily: Trail stewards take turns riding the trail each day to determine and report on its condition. Each steward to be assigned specific days of the week to conduct inspection rides.

Weekly: Volunteer nights including 8-10 people providing trail maintenance for two hours. Trail stewards act as the group supervisor and ensure the proper tools and supplies are available.

Monthly: Stakeholder groups work on specific trail maintenance projects. Trail stewards serve as the volunteer leaders, providing group instruction and supervision.

5.3 Staff and Volunteer Needs

It is estimated that approximately 40 hours of city staff time per year will be dedicated to maintaining the mountain bike trails. The city of Woodbury, who operates the Carver Lake Park trails, provided City of Minnetonka staff with this estimate. The Carver Lake Park trails are similar to those being studied in Lone Lake Park. This estimate does not include winter grooming of the trail and assumes that the trail is well designed and built in a sustainable way.

Volunteers are needed to assist with the maintenance schedule throughout the year. Hundreds of community members have expressed interest in volunteering with trail maintenance, management and overall park clean up and restoration. The following is a breakdown of the number of people who have already indicated that they are interested in volunteering, by volunteer opportunity:

- 379 - Park clean up (general clean up, invasive species removal, etc.)
- 412 - Trail maintenance
- 131 - Trail management (opening and closing gates, etc.)

5.4 Rules of the Trail

One of the unique characteristics of the mountain bike community is that users share in the responsibility of maintenance, restoration, oversight and fundraising for the trail system. This hands-on approach has been shown to create buy-in from users and reduce the cost of maintaining a trail system for land managers and tax payers. MORC’s relationship with local land managers is highly regarded as noted in the Land Managers Survey (see Appendix B). This mountain biking culture is further outlined by IMBA’s Rules of the Trail which focuses on creating responsible and courteous conduct while mountain biking. Its teachings are passed down to new riders through education at local trail heads, word-of-mouth and action:

IMBA’s Rules of the Trail:

A. Ride on open trails only: Respect trail and road closures – ask a land manager for clarification if you are uncertain about the status of a trail. Do no trespass on private land.
B. Leave no trace: Be sensitive to the dirt beneath you. Wet and muddy trails are more vulnerable to damage than dry ones. When the trail is soft, consider other riding options.
Stay on existing trails and do not create new ones or switchbacks. Pack out at least as much as you pack in.

C. Control your bike: Inattention for even a moment could put yourself and others at risk. Obey all bicycle speed regulations and recommendations and ride within your limits.

D. Yield to others: Do your utmost to let your fellow trail users know you’re coming—a friendly greeting or bell ring are good methods. Try to anticipate other trail users as you ride around corners. Bicyclists should yield to all other trail users, unless the trail is clearly signed for bike-only travel. Bicyclists traveling downhill should yield to ones headed uphill, unless the trail is clearly signed for one-way or downhill-only traffic. Strive to make each pass a safe and courteous one.

E. Never scare animals: Animals are easily startled by an unannounced approach, a sudden movement or a loud noise. Give animals enough room and time to adjust to you.

F. Plan ahead: Know your equipment, your ability and the area in which you are riding—and prepare accordingly. Strive to be self-sufficient: keep your equipment in good repair and carry necessary supplies for changes in weather or other conditions. Always wear a helmet and appropriate safety gear.

Mountain bike trail rules would be enforced similar to other park rules such as off-leash dogs, smoking, alcohol use and damage to park property. Signs will inform and educate trail users of the trail rules and etiquette.

5.5 Trail Closures

Single-track trails can be seen as similar to a narrow hiking path with the exception that trails are closed to the public when saturated with water after a storm, melting snow or melting frost. Trails remain closed until dry to avoid erosion, including tire and foot imprints in the dirt. It is in the interest of the mountain bike community to maintain low-impact, high quality, smooth surfaced trails. This enhances the users’ biking experience and reduces the maintenance needs by volunteers. Trail heads and main access points would be managed with three-foot wide farm gates and minimal fencing to inhibit users from access when the trail is deemed closed. MORC volunteers would coordinate with city staff to determine who is best suited to close the trails. Signage and education kiosks would be used to further educate the public on trail closure procedures and best practices. When the trail is deemed closed, communication with the public would be done through social media, MORC’s trail condition webpage and city websites.

5.6 Multi-Use Trails

The majority of mountain bike trails in the Twin Cities are considered multi-use trails. These trails are open to mountain bikers, hikers and trail runners, with the exception that many trails do not allow dogs. Dakota County’s Lebanon Hills is the only mountain bike specific trail system in the area. Multi-use trail systems are commonplace throughout the United States. Responsible bike use has been shown to be compatible with most other types of use. When all visitors observe basic trail etiquette, their encounters with other users will be harmonious and most people will have a satisfying experience on the trail. Further, trail design takes into account user interactions and works to build lines-of-sight and reduce biker speed.
5.7 One-Way Trails

The majority of mountain bike trails in the Twin Cities are designed to be ridden one-directionally. One-way trails have been shown to alleviate congestion, provide a more predictable experience (no on-coming trail users) and reduce the number of passes between users.

5.8 Events and Programming

The City of Minnetonka does not currently have any programs or events planned around the proposed mountain bike trail. In the future, there could be programming and event opportunities facilitated by Recreation Services. Any outside event or program would need to go through the same permitting process as any other park or facility in Minnetonka. Similar sized mountain bike trail systems in the Twin Cities see very few event and programming requests. The City of Minnetonka does not anticipate a large number of outside groups requesting permits for programs and/or events.

5.9 Managing Potential User Conflicts

Many conflicts between users along a trail are based on perception and can include environmental, safety or social differences. A misconception is that mountain bikers are less concerned about the environment and are not respectful of other trail users. In fact, most trail users share the similar value of enjoying nature while getting some fresh air and exercise. These perceived differences among users can be mitigated through education, design, experience and regulation. Land managers should understand, distinguish and document perceived and actual conflicts in order to determine if and when intervention or change is necessary.

Several studies indicate the environmental impacts of mountain biking are on par with those of hiking trails (see Appendix C). In fact, these impacts are mainly related to the design of the trail itself rather than the travel mode. All trail user types displace soil. The key is trail design that reflects site topography and soil types, keeping users on the trail and thoughtful management of trails during muddy conditions.

Another concern is safety threats due to fast riders causing collisions or near misses. This perception of conflict is often greater than the reality due to thoughtful trail design. The most effective way to address perceived and actual safety conflicts is to design the trail so these encounters do not occur in the first place. There are a number of ways to control rider speed and behavior including informative signage about trail rules, utilizing turns, narrow trail design (chokes) and coralling the trail (natural objects placed along the trail). Social conflicts can be mitigated through shared experiences that build trust and understanding between user groups. Opening channels for communication and ongoing dialogue between user groups is an essential tool to manage these relationships. Events such as trail maintenance or ecological restoration activities can serve to not only improve the environment, but also to enhance relationships.
Dogs would not be allowed on the designated mountain bike trails. Per park regulations, off-leash dogs under voice command are allowed in unmaintained areas.

5.10 Emergency Response

Mile markers would be posted along the mountain bike trail to assist responders in the event of an emergency. The Minnetonka Fire and Police departments would have access to trail maps that indicate access points, mile markers and trail heads. The Minnetonka Fire Department has a six-wheel drive Polaris Ranger that can be used for major park and trail emergencies.

5.11 Liability

The city of Minnetonka contacted the League of Minnesota Cities Insurance Trust (LMCIT) regarding liability of mountain bike trails. The LMCIT provided the city with the following information:

- Mountain biking activities would be treated just like any other recreational programs offered by the city.
- From an overall perspective, there is some increased risk to the city in offering mountain biking. That is true with any recreational activity. However, with the strong park and recreation immunity protection that cities have in Minnesota, the liability risk to the city is fairly low.
- Minnetonka offers many recreational activities. It is predicted that the effect on the city’s LMCIT premium by offering biking trails would be negligible. As a whole, recreation programs are not a big driver of the city’s overall LMCIT premium. Therefore, cost issues related to liability would not have much of an impact on the city’s decision to create mountain biking trails.

CHAPTER 6 NATURAL RESOURCES ASSESSMENT

City of Minnetonka Natural Resources staff provided background and content related to restoration activities at Lone Lake Park. The city hired SEH to provide an independent biological assessment (see Appendix D) of natural resources at Lone Lake Park. SEH is an employee-owned engineering, architectural, environmental and planning company that helps government, industrial and commercial clients find answers to complex challenges. Chapter 6 contains information from both city staff and the independent consultant.

6.1 POST Plan Designations

The POST Plan is a 17-year-old planning document created to guide decision making regarding parks and open spaces in the city. The mission states: “The purpose of the Minnetonka Parks, Open Space, and Trail system is to provide a comprehensive, balanced, and sustainable system of parks, open spaces/natural areas, trails, and recreation-oriented activities/programs for the city residents to use and enjoy in as cost effective manner as possible.” The POST plan is not a city ordinance.

The POST Plan identifies Lone Lake Park as not only a Community Park, but also a Community Preserve. Community Parks focus on meeting community-based recreational needs, as well as
preserving unique landscapes and open spaces. Community Preserves are lands set aside for
the preservation of natural resources, remnant landscapes, open space and visual
aesthetics/buffering that also provide passive use opportunities (i.e. nature type trails, overlook,
interpretive program, etc.). Similar to hiking trails, multi-use mountain bike trails can be viewed
as a nature type trail for riders, hikers and trail runners. According to the plan, the west, south,
and southwest areas of the park make up the community preserve portion of the larger park. In
addition, the POST plan notes that as needs change in future years, the system plan itself must
also change. The most important principle as identified in the POST plan is to implement a
balanced system plan that offers multiple community values.

Over the past 17 years, since the adoption of the POST Plan, the natural landscapes have
begun to change. One example is the area on the south side of the park adjacent to the water
tower. This area is identified in the plan as old fields and was once used as a ski hill. This area
is now reverting to forested land generally covered by red maple and oak due to restoration
work undertaken by the city, contractors and volunteers.

6.2 Natural Resources Stewardship Program

Given that Lone Lake Park has been part of the Natural Resources Stewardship Program (NRSP) for over 20 years,
it is important to discuss the history of restoration of this park as well as the current
restoration efforts.

In 1995, the City of Minnetonka commissioned a study of the five community parks and three creek corridors to assess their
environmental health and quality. The study found that all vegetation
types throughout the city were seriously deteriorated or deteriorating. The NRSP for restoration
and improvement of degraded ecosystems in parks began in 1995. The goal was to achieve a
sustainable landscape quality to be maintained indefinitely.

The council policy for natural resource restoration and management followed, setting priorities
for the city’s five major parks (Big Willow, Civic Center, Lone Lake, Meadow and Purgatory) and
three creek corridors (Minnehaha, Purgatory and Nine Mile). The program was to be expanded,
under appropriate circumstances and available funding, to include other open space areas.

An ecological system based approach to restoration and management is promoted and used.
General goals include:

- Protect or enhance ecosystem health and biological diversity of native habitats
- Provide balance between preservation, recreational use and community growth
- Maintain natural and historical integrity
- Establish partnerships and stakeholder involvement to perpetuate sustainable resources

6.3 Lone Lake Park Restoration Efforts

- 1995: Lone Lake was the first park researched for consideration of habitat restoration.
• 1996: Work began with the first large-scale buckthorn removal in the city. This was followed by prairie restoration of the mesic and wet/mesic sites located to the west, adjoining Nine Mile Creek.
• 2002: 75 percent of the upland areas had buckthorn removed.
• 2006: Restoration expanded to include noxious and invasive weed control and added new areas of upland buckthorn control.
• 2006-2009: Four large rain gardens were planted in and around the main parking lot south of the lake.
• 2013-2015: Greater than 50 percent of the upland areas were re-cut (approximately 32 acres of buckthorn and Asian honeysuckle).
• 2014-2017: Transition from meadow weeds to new prairie occurred at the Rowland Road entrance and trail junction.
• 2017: Lakeshore buffers were planted for pollinators and water quality improvement.

Over the past ten years, $233,881 has been spent on habitat restoration. The following table and graphic outlines and illustrates these costs.

<table>
<thead>
<tr>
<th>Year</th>
<th>Buckthorn</th>
<th>Garlic Mustard</th>
<th>Rain Gardens</th>
<th>Prairie</th>
<th>Noxious Weeds</th>
<th>Other</th>
<th>Yearly Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$12,562.50</td>
<td>$2,992.44</td>
<td>$423.00</td>
<td>$1,123.33</td>
<td>$17,101.27</td>
<td></td>
<td></td>
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<tr>
<td>2009</td>
<td>$6,066.00</td>
<td>$2,334.18</td>
<td>$1,188.75</td>
<td>$179.73</td>
<td>$1,673.81</td>
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</tr>
<tr>
<td>2010</td>
<td>$12,527.88</td>
<td>$3,404.46</td>
<td>$1,161.74</td>
<td>$1,383.76</td>
<td>$721.39</td>
<td>$240.70</td>
<td>$19,439.93</td>
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<td>2011</td>
<td>$3,429.23</td>
<td>$3,045.00</td>
<td>$714.45</td>
<td>$341.90</td>
<td>$156.30</td>
<td>$184.62</td>
<td>$7,871.50</td>
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<td>2012</td>
<td>$2,056.45</td>
<td>$403.99</td>
<td>$180.00</td>
<td>$361.25</td>
<td>$ -</td>
<td>$ -</td>
<td>$3,001.69</td>
</tr>
<tr>
<td>2013</td>
<td>$4,519.21</td>
<td>$3,592.90</td>
<td>$2,802.94</td>
<td>$ -</td>
<td>$520.00</td>
<td>$ -</td>
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<td>2014</td>
<td>$50,419.70</td>
<td>$6,219.55</td>
<td>$1,388.75</td>
<td>$2,205.00</td>
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<td>2015</td>
<td>$49,434.13</td>
<td>$8,846.86</td>
<td>$4,110.00</td>
<td>$2,916.00</td>
<td>$571.00</td>
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<td>2016</td>
<td>$887.50</td>
<td>$14,869.86</td>
<td>$100.00</td>
<td>$6,331.40</td>
<td>$ -</td>
<td>$480.00</td>
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<td>2017</td>
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<td>$9,463.91</td>
<td>$552.50</td>
<td>$1,276.25</td>
<td>$855.00</td>
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<td>Totals</td>
<td>$130,555.10</td>
<td>$64,743.21</td>
<td>$15,191.57</td>
<td>$14,995.29</td>
<td>$5,095.50</td>
<td>$3,300.36</td>
<td>$233,881.03</td>
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</tbody>
</table>

Restoration continues within four habitat types within the park: the woodlands, the prairie, rain gardens and lakeshore. More than 95 percent of the restoration work in Lone Lake Park is controlling invasive species and noxious weeds. Although volunteers have assisted with restoration efforts, contractors and work crews have completed most of the work. The inclusion of mountain bike trails through these areas would not counteract the restoration work done to date. If mountain biking is approved, volunteers will be an essential component in restoring and maintaining the habitat and in controlling the invasive species throughout the park.
6.4 Land Cover Types

In 2004, the city conducted a Minnesota Land Cover Classification System (MLCCS) that identified the land cover of the community. The MLCCS identified a range of cover types including areas such as hard surfaces, wetland types, disturbed non-native vegetation and remnant eco-types. The MLCCS is reflected on Hennepin County’s Interactive Map and each cover type is illustrated on the map below.

6.5 Native and Invasive Vegetation *excerpted from SEH study

The primary vegetative resource within the park is the extensive wooded hills that surround the lake. Overall, the wooded areas are dominated by red and white oaks throughout the park, although there are portions where co-dominant species are also present, such as pockets of bigtooth aspen, basswood, red maple, and red cedar. Overall plant diversity is high, and the community is developing into a mature stand with a closed canopy. A list of the observed species is presented in the Table 1: below, based on a March 29 and May 2, 2018 field review by SEH.

Table 1: Observed Tree Species

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box elder</td>
<td>Acer negundo</td>
</tr>
<tr>
<td>Red maple</td>
<td>Acer rubrum</td>
</tr>
<tr>
<td>Buckeye</td>
<td>Aesculus glabra</td>
</tr>
</tbody>
</table>
The wooded communities present are identified by the Minnesota Department of Natural Resources as a Southern Dry-Mesic Oak Forest. Mesic hardwood forest communities are present within the larger eastern broadleaf forest province where soils retain moisture, and wildfires are infrequent. These forests have continuous dense canopies of deciduous trees, with an understory of successively shorter strata composed of shade-adapted seedlings, shrubs, and herbaceous cover. Within Lone Lake Park, the dominant trees are red and white oak, although as is typical of mesic forests, other deciduous species such as maple, basswood, bigtooth aspen, ironwood, and black cherry trees are also present.

Coniferous trees are less frequent, but are present; including a few large white pine trees, which were planted. Red cedar trees are also present in a few larger areas, where it is locally dominant; particularly along the ridge west of Lone Lake. The red cedar trees are also mature, and likely have been present for a long period of time. Red cedar can be controlled by fire, which has likely been suppressed since settlement. Red cedar tend to be more of a nuisance species within prairie ecosystems, but are not likely to be problematic in a mature forested community.

Under the tree canopy, there is a moderately dense layer of native shrubs and vines. The invasive European buckthorn has been effectively controlled through extensive management, but can still be located in isolated areas of the park, such as the southeast corner, and where it is encroaching from adjacent areas. The shrub layer is healthy, and appropriate in composition for the mixed oak forest that is present. Shrub density is controlled by the limits of light penetration, and is naturally low density with the full canopy present, particularly on the north
and east facing slopes that naturally receive less sunlight. Table 2 is a summary of the observed shrub species based on a field review by SEH on March 29 and May 2, 2018.

Table 2: Observed Shrub and Vine Species

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey dogwood</td>
<td>Cornus racemosa</td>
</tr>
<tr>
<td>Red osier dogwood</td>
<td>Cornus sericea</td>
</tr>
<tr>
<td>Tatarian honeysuckle</td>
<td>Lonicera tatarica</td>
</tr>
<tr>
<td>Virginia creeper</td>
<td>Parthenocissus quinquefolia</td>
</tr>
<tr>
<td>Wild plum</td>
<td>Prunus americana</td>
</tr>
<tr>
<td>Common buckthorn</td>
<td>Rhamnus cathartica</td>
</tr>
<tr>
<td>Gooseberry</td>
<td>Ribes spp</td>
</tr>
<tr>
<td>Staghorn sumac</td>
<td>Rhus typhina</td>
</tr>
<tr>
<td>Riverbank grape</td>
<td>Vitis riparia</td>
</tr>
<tr>
<td>Prickly ash</td>
<td>Xanthoxylum americanum</td>
</tr>
</tbody>
</table>

Prairie and grassland habitat is a cover type in the western area of Lone Lake Park. Additionally, there is a larger area of non-native smooth brome grass on the southeast corner of the park where a south-facing slope is present. On the western side of the central ridge is small elevated meadow, which may be a historic open area, but is not remnant. Vegetation within this small meadow area includes smooth brome grass, Canada goldenrod, and black raspberry. Box elder trees are encroaching into this area. Overall, it is an open space, but is not high quality prairie.

Many of the woodlands in the metro area have been infested with a wide range of invasive species, including common buckthorn, garlic mustard, leafy spurge, and Tatarian honeysuckle. Through extensive efforts by the City of Minnetonka, Lone Lake Park is relatively free of these species, but this effort to manage for invasive species requires constant diligence to prevent reestablishment and spreading.

Overall, the occurrences of invasive species is low, which is a significant factor in the overall evaluation of habitat quality, and serves as an example of how continuous management can be successful in managing these species.

6.6 Wildlife and Endangered Species *excerpted from SEH study

Lone Lake Park is of sufficient size that is likely supports a diverse mammal population, including white tailed deer, raccoons, squirrels, rabbits, skunks, woodchucks, and probably the occasional red fox or coyote. All of these species are common within the region, and would be attracted to the wooded slopes where they can find food, shelter, and habitat. The support of mammals is likely high, but not unusual for species that have adapted to living within an urban area.

Similarly, the presence of reptiles and amphibians would be supported by the quality of the habitat, which would be expected to support multiple frog and snake species. The wetlands being free of predatory fish is advantageous to amphibian reproduction, and the abundant habitat within the steep slopes, trees, and rocky would support several of the woodland favoring
snakes, such as the common garter snake and brown snake. Turtles would be present within Lone Lake, and would utilize the sandy soils for ideal nesting habitat.

Of all the wildlife that may use the park, the ones with the greatest benefit may be the birds. While common species such as cardinals, chickadees, blue jays, wild turkeys, and crows would be expected to use the wooded areas of the park, the large intact wooded areas are also an attraction to less common species. Evidence was observed that woodpeckers are common, including the common downy and hairy woodpeckers, but also the large and prominent pileated woodpecker. Owls are likely residents within the woods, as are hawks, with areas open for roosting, nesting and hunting. Seasonally, migratory birds would use the woods for resting, and would include the various warblers, vireos, and other songbirds that are temporary residents. Breeding birds which are less common, but utilize large, intact, mature woods for their primary habitat include the scarlet tanager, rose-breasted grosbeak, catbirds, pewees, and flycatchers.

The use of the park for wildlife overall is likely average for a park of this size, but is higher for many of the woodland bird species, that require the larger areas of intact woods that Lone Lake Park provides.

City staff notes that local experts have identified 99 species of birds in the park over the past nine years (see Appendix E).

In addition to species that may just be less common, or are unique to the habitat present, there is the potential for Lone Lake Park to harbor plant and animal species that are listed by the State of Minnesota or the federal government as legally protected.

In order to determine if any state or federally listed species have been documented within Lone Lake Park, a review of the Minnesota Department of Natural Resources (MNDNR) Natural Resources Information Systems (NHIS) database was completed. This database identifies the known locations of listed species, critical habitats, and other unique resources that have been positively identified. Because some species are mobile, a one-mile buffer was used to identify any species that has been documented within or adjacent to the park, to ensure that a sufficient area was included. The database review failed to identify any species of concern within or adjacent to the park. While this doesn’t mean that a state listed species couldn’t be present, it is generally considered sufficient for meeting state requirements for sensitive species reviews.

Federally, Lone Lake Park is within the range of two listed species, the northern long-eared bat, and the more recently listed rusty patched bumble bee.

The northern long-eared bat utilizes wooded habitats during the summer, where it roosts under the bark of large trees, singly or in small colonies. Pups are also raised in these wooded habitats. During the winter, the bats congregate in hibernaculum, which usually consists of caves, structures, and sometimes large trees or snags. The wooded habitat present within the park would generally by suitable to this species during the roosting and pupping period, and potentially could offer some areas of hibernaculum. Current guidelines by the U.S Fish and Wildlife Service discuss tree removal, and limiting activities during the roosting period. These resources also identify the townships in which roosting trees and hibernaculum have been positively identified. While one hibernaculum has been positively identified within Hennepin County, it is not within the area of the park. Under federal guidelines, there would be no
restrictions on park amenities based on the known distribution of the bats, even though the habitat may be present.

While it cannot be confirmed that the northern long-eared bat is not utilizing Lone Lake Park, the biggest concern for this species is tree removal, loss of hibernaculum, and spreading of the white nosed fungus. The inclusion of bike trails is not expected to remove a large number of trees, and would not impact hibernaculum or influence the spread of the white nosed fungus.

The rusty patched bumble bee is a recently listed species, and was added following an alarming trend of declining populations of pollinator species. Like other bee species, the rusty patched bumble bee relies on pollen from flowering plants for sustenance, and has been harmed by a loss of prairies, grasslands, and other critical habitats; and potentially overuse of herbicides and insecticides. The bees nest underground, often using rodent burrows, but require relatively undisturbed conditions to flourish. The rusty patched bumble bee has been positively identified within Lone Lake Park, as reported to bee-tracking websites, utilizing the flowering plants in the rain gardens for nectar. Other have been positively confirmed in the area, and because they are mobile, are presumed to be present, although positive nesting is harder to document than foraging individuals. Nectar producing vegetation is generally absent from the wooded areas, as it is too shady for the primary nectar species to be present. Fringe areas may support more nectar species, as would some open areas, but overall the amount of nectar species is generally low within the park. It is unlikely that the inclusion of bike trails would decrease the availability of nectar plants. Direct habitat loss is possible, but given the limited direct area of disturbance, it is unlikely that a bumble bee nest would coincide with a trail.

While it cannot be definitively proven, it is unlikely that the inclusion of mountain bike trails within Lone Lake Park would have an effect on the northern long-eared bat or the rusty patched bumble bee.

6.7 Soils and Topography *excerpted from SEH study

Soils within Lone Lake Park include the loamy soils associated with the lake, South Fork of Ninemile Creek and the associated wetlands and the sandy loam soils that dominate the adjacent hillsides. The dominant soil within the park is the Kingsley-Gotham Complex. The Kingsley component consists of very deep, well drained soils that formed in loamy glacial till on glacial moraines. These soils have moderate to moderately slow permeability, and slopes that range from 2 to 40 percent. The Gotham component consists of very deep, somewhat excessively drained soils formed in sandy glaciofluvial deposits on moraines, outwash plains, stream terraces, and glacial lake basins. Permeability is rapid, and slopes range from 0 to 35 percent.

One of the unique features of Lone Lake Park are the frequent hills and steep slopes. Elevations within the park are highly variable, and range from approximately 900 feet at Lone Lake and along the South Fork of Ninemile Creek, to a high elevation of 1,060 feet in the southeast portion of the park. These hills are glacial features, and are composed of till material dominated by sand and sandy loam. The hills can be separated into the tallest peak in the southeast corner, the northern slope and ravines in the southeast portion north of the water tower, the central north-south aligned ridge west of the lake, and the isolated peak located west of the creek.
The City of Minnetonka has steep slope and shoreland ordinances which regulate slopes. Large portions of the park are considered to be slopes or bluffs under the city definition and would be regulated. Pervious trails are a permitted use under these ordinances and a stormwater pollution prevention plan during construction disturbance would need to be created.

The majority of the hillsides are 20% slope, and except for areas of wetland, flatter areas would require crossing steep slopes to reach them. Smaller areas are 30% slopes, which is very steep and would be difficult areas to traverse.

6.8 Existing Formal and Informal Trails

There are currently 1.6 miles of maintained trails in Lone Lake Park that are 8’ wide. There is a paved section of maintained trail that is 1.3 miles long, and a crushed limestone trail that is 0.3 miles long. These trails are not maintained during winter months, but are open for use. These trails also provide regional connections to the Minnesota River Bluffs LRT Trail, Bryant Lake Park and Shady Oak Beach.

There are 2.72 miles of informal footpaths present throughout Lone Lake Park (see map below). These footpaths were created and are used by hikers, dog walkers, and bird watchers to get closer to nature and viewpoints, and are not maintained. These trails are not surfaced with gravel or pavement and are never formally closed from use, which has led to erosion issues in some locations where the trail has been established along a fall line.

Map of existing formal and informal footpaths at Lone Lake Park (Formal: black, Informal, red):
Photos of eroded footpaths at Lone Lake Park:

Some informal footpaths would be able to remain in the park for use by hikers and dog walkers wishing to avoid the multi-use mountain biking trail. Others that are located along fall lines or those causing significant erosion will need to be closed and revegetated. Signage will need to be included along the multi-use trail and informal footpaths at intersection points so all users are aware of potential interactions. The following map indicates which informal footpaths would be closed (red), remain open (light blue) and which would be converted to multi-use mountain bike trails (dark blue).
6.9 Lessons Learned from other Natural Resource Managers

Minnetonka’s natural resources staff contacted their peers from other Twin Cities parks that contain mountain bike trails. While each park is unique, other natural resource managers indicated that “constant” disturbance, the spread of invasive species, erosion, and having a few rogue bikers riding when the trail was closed were the most common problems. Two managers wished they would have provided more detailed specifications for trail building specifically in areas around trees where “too much [was] cut into banks,” and in areas where erosion was a problem.

At Three Rivers Elm Creek Park, dedicated mountain bike volunteers monitor for invasive species, organized their group and adopted areas. The manager indicated that they created a “dream volunteer situation… above and beyond average volunteers” allowing habitat restoration to improve beyond what was possible prior to mountain bike trails.

6.10 Going Forward

If approved, trails should be built using the highest standards for development and pursuant to sustainable trail guidelines in order to limit erosion, vegetation loss and water quality problems. Regardless of whether mountain bike trails are approved, the existing informal footpaths should be evaluated and addressed to minimize negative environmental impact.

City natural resources staff have identified areas containing uncommon plants and high quality restoration areas (see map on next page). For this study, high quality restoration areas are defined as areas in Lone Lake Park where investment (effort and dollars) have been focused over the past 15 years.

The site evaluation criteria related to environmental protection states that areas containing uncommon plants and high quality restoration areas (per city natural resources staff) should be avoided. The concept plan was created with the guidance of city natural resources staff to minimize trails in areas of high restoration. In these areas, trails are limited to connecting segments and maintaining a sustainable trail design.

If approved, city natural resources staff would participate in field siting the trail to minimize tree impact and removal, salvage uncommon native plant material (ideally April through May) and to protect native species close to the trail corridor.

The final trail design would be reviewed by staff as it relates to the city’s environmental ordinances to ensure it meets city code. The area considered for multi-use mountain bike trails is within the ‘bluff impact zone’ as regulated under the shoreline ordinance. If approved the mountain bike trails will also be regulated under the steep slope ordinance, wetland ordinance and floodplain ordinance. Pervious trails and footbridges are generally permitted uses within these regulated areas as long as impacts to surface waters do not occur. If approved, this project would demonstrate that:

A. demonstrate that soil erosion will not occur as a result of the project activity;
B. demonstrate preservation of the existing vegetation to the extent practical; and
C. provide screening of structures such as buildings and vehicles as viewed from the water in summer leaf on conditions. *does not apply to this project*

Due to the narrow width of the trail and the dirt material, rainwater will infiltrate into the adjacent landscape. The mountain bike trail would be considered pervious and self mitigating in terms of stormwater. If the mountain bike trail is approved staff will review the final trail location, obtain any required permits and ensure that the trails meet city code.

Trail users would need to be educated about the spread of invasive species and the importance of staying on the trail. Just as the sticky, clinging seeds of invasive species attach to wildlife, hikers and dogs, the seeds could also attach to mountain bikers’ clothing and bikes. In addition, volunteers would be needed to:

- Mulch disturbed areas
- Water salvaged transplanted plant material
- Prune diseased or damaged limbs as directed by natural resources staff
- Remove invasive plant material such as garlic mustard, buckthorn, grape vines, stickseed, and burdock and other summer weeds before they go to seed
- Monitor trail segments for new invasive species
- Monitor trail segments for muddy conditions or erosion potential
- Other needs as identified by staff and agreed upon by volunteers

Mountain bike trails would have an impact on the natural resources at Lone Lake Park. Through careful sustainable design, thoughtful construction and ongoing management, the potential negative impacts can be reasonably mitigated. Through meaningful partnerships with
volunteers, there could be an opportunity to expand the already robust restoration efforts at this park.

CHAPTER 7  CONCEPT PLAN

7.1  Concept Design

The trail concept was designed using International Mountain Bike Association sustainable trail principles, local experts and natural resources staff expertise. It has been reviewed by City of Minnetonka recreation, natural resources, and public works staff. This concept design more heavily utilizes areas of Lone Lake Park that have not been a focus of environmental restoration. Trails have been minimized in areas of high restoration. In these areas, trails are limited to connecting segments and maintaining a sustainable trail design.

The mountain bike trail segments were designed to minimize interactions with existing maintained walking trails through the park. There is only one trail segment that uses a 200’ portion of the maintained trail to connect the two southwest trailheads, and there are no trail crossings with the maintained trail. Trail design at both southwest trailheads manage bikers speed as they exit the proposed mountain bike trail onto the maintained trail. This would reduce the speed of the biker and prevent potential user conflicts. The trail layout is stacked, meaning riders have a number of turnaround points that allow them to ride only a portion of trail. This allows riders to reduce their mileage if needed, re-ride desired locations, prevents users from creating rogue trails and provides an easy out in the case of inclement weather or injury.

Trail segments may appear close together on the concept plan, but in reality would be a minimum of 25 feet from one another and much farther apart in most cases. This separation of trail will reduce the impact to the critical root zones of trees, reduce density and mitigate the overall impact of the trail. The proposed trail is projected to be 4.7 miles, which is an 11:1 ratio of usable acres per mile of trail. This density of acres per mile is consistent with other trail systems in the Twin Cities. Trail building would require an initial 3’ cut to build the trail. Revegetation would follow trail building. Once established, the trail would average 18-24” in width. An established 4.7 mile trail would equal approximately 1.2 acres of impact.

The majority of the trail segments through Lone Lake Park are designed as beginner trails with areas that would be considered intermediate due to prolonged inclines and declines. These segments would challenge beginners from a physicality standpoint, but not technically. This trail concept does not include any technical features including rock gardens, ladders, retaining walls, switchbacks, jumps or drops. Trails average 5% slope to minimize erosion potential, support a wide range of biking abilities and increase the flow and enjoyment of the trail.

As indicated in Chapter 6.8, there are currently 2.72 miles of informally built footpaths at Lone Lake Park. There are a few locations where these informal footpaths can be used, specifically in the high restoration area south of the basketball courts, lower parking lot and picnic area (water tower ridge). Informal footpaths in this area would be utilized when possible, reducing the amount of new impact in high restoration areas. It would be a future effort to restore informal footpaths that are causing significant erosion and direct hikers toward more sustainably built trails.
The three trail head locations were selected based on trail access and the ability to install gates to close the trail during muddy and wet conditions. Mile markers would be placed along the trail to assist in user navigation and communication in the event of an emergency. Markers would also be used in areas to assist with navigation including directional signs and wrong way signs. Design of the signage for the trailhead kiosks and waymarks would follow best practices of other local municipalities. Kiosks would be used to educate the public on trail etiquette, safety, invasive species prevention, trail layout and volunteer opportunities.

The concept layout, if approved, would be finalized in the field with the use of a clinometer and GPS to verify grades. It would also be field located with City of Minnetonka natural resources staff to avoid critical root zones of trees and other native plant material. This means the actual layout may change slightly from the concept plan prior to construction. It is not anticipated that the segments would deviate more than 10 feet in either direction. Distance between trail segments would be maintained or increased as much as possible.

7.2 Trail Construction Restrictions

If developed, a number of restrictions to mitigate the impact of trail building would be required of the trail builder. These restrictions will help balance the impact of a new amenity with the preservation and restoration of the park:

- Trail building machinery must be limited to under 36” of tread with the goal of a 3’ or less cut trail (use of a micro excavator or similar).
- Trail building must work with volunteers to finish trail, salvage plants and revegetate disrupted soil.
- Must gain approval from natural resources staff before any deviation from the originally sighted trail.
- Must gain approval for the removal of any trees with the goal of not removing any mature trees and limiting removal to very small, immature, low quality trees.
- Avoid side casting of soil in order to prevent the growth of invasive species, working soil into the rolling contours of the trail.
- Access to the trail with equipment and machinery will be limited to pre-approved access points including recently cut trails, high impact informal trails and maintained trails.
- Extreme caution must be taken while working around the trees and plants adjacent to the proposed trail.
- Trail builder must follow IMBA’s Sustainable Trail Building techniques.

See next page for trail concept map.
Minnetonka Park Board Item 5A
Meeting of Feb. 7, 2018

<table>
<thead>
<tr>
<th>Subject:</th>
<th>Mountain biking report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park Board related goal:</td>
<td>To renew and maintain parks and trails</td>
</tr>
<tr>
<td>Park Board related objective:</td>
<td>Renew, expand and maintain a trail system to encourage outdoor recreation and improve the connectivity and walkability of the community</td>
</tr>
<tr>
<td>Brief Description:</td>
<td>Review the report for potential mountain biking trails and hear public comment.</td>
</tr>
</tbody>
</table>

**Background**

Interest in mountain bike trail development was first expressed by residents through the communitywide *Imagine Minnetonka* visioning process the city conducted in 2016. During that strategic planning effort interest in mountain biking was brought forward to the Park Board by a group of resident students associated with the Minnetonka High School VANTAGE Program. Staff worked with interested residents and Trail Source Inc. to provide and present a possible concept to the park board. That grassroots effort focused primarily on only two of Minnetonka’s 51 parks, Big Willow and Civic Center. Since that time, city staff heard from many residents regarding the potential creation of mountain biking trails. While many residents support the idea of trails, others have voiced concern over the potential project.

Therefore, staff decided to take a step back and engage with the community through a more in-depth, targeted process. The city of Minnetonka engaged with the consulting firm WSB and Associates to assist in the community outreach and engagement for the prospective mountain biking trails project. At the October 2017 Park Board meeting the park board directed staff to the population-based outreach option, consisting of two focus groups and two public meetings.

**Community Engagement Process**

Between November 2017 and January 2018, the city of Minnetonka hosted four engagement events to discuss proposed new mountain bike trails in Minnetonka parks. The events occurred on Nov. 8, Nov. 16, Dec. 13, 2017 and Jan. 8, 2018. Each event used a specific format.

- The first two meetings were designed as focus groups meant to get feedback on concerns and priorities from people who were concerned or interested in the trails.
- The third event was a large community conversation on three potential outcomes of the engagement process: the construction of trails in Big Willow Park, the construction of trails in a different city-owned location, and no construction of trails. Community members discussed the pros and cons of each option.
- The final meeting was a large community meeting that delved into more detail about the trail proposal, asking residents to comment on specific issues surrounding adequate space, environmental protection, and user conflict.

The engagement process highlighted key resident concerns and showed that there is enthusiasm behind the trail proposals. All feedback will be considered as this process moves forward and it is attached for review.

**Discussion Points:**

- Does the park board have any questions regarding the community engagement process?
Site Evaluation Criteria

At the Jan. 8 general public meeting, attendees were presented with a list of criteria established based on feedback to determine if Minnetonka’s parks could support mountain bike trails. The public used a worksheet (see attachment) to indicate if they agreed or disagreed with the criteria and provided comments. The public overwhelmingly agreed with the proposed criteria as a whole. Based on the feedback, staff made some minor adjustments/additions (shown in blue) to the criteria.

<table>
<thead>
<tr>
<th>ADEQUATE SPACE</th>
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<tbody>
<tr>
<td>A trail system should be able to sustain a minimum of 4 miles of single track trails. This could include a single park on its own or a circuit of parks in close proximity to one another. Staff believes that less than 4 miles would not be utilized.</td>
</tr>
<tr>
<td>If a circuit of parks is considered, a given park within the circuit should be able to support a minimum of 2 miles of mountain bike trails on its own.</td>
</tr>
<tr>
<td>If a circuit of multiple parks are needed, the parks should be located within 1 mile of another and provide safe, easy and navigable travel between each location.</td>
</tr>
<tr>
<td>A mountain bike trail system should be within 1 mile of a regional bike trail and provide safe, easy and navigable travel between.</td>
</tr>
<tr>
<td>A park must contain a minimum of 20 usable acres to be considered. <em>Usable Acreage is undeveloped acreage that could be used to build mountain bike trails. Acreage does not include wetlands, creeks, ponds, etc.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL PROTECTION</th>
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<tbody>
<tr>
<td>Trails should be built using the highest standards for development and pursuant of sustainable trail guidelines. This would limit erosion, vegetation loss and water quality problems.</td>
</tr>
<tr>
<td>Areas containing uncommon plants and high quality restoration areas (per city natural resources staff) should be avoided.</td>
</tr>
<tr>
<td>Generally, narrow trails (approximately 24&quot;) should be built to reduce the total area of intensive tread disturbance, slow down trail users and minimize vegetation and soil compaction.</td>
</tr>
<tr>
<td>Site should be designed to minimize tree impact and removal.</td>
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<table>
<thead>
<tr>
<th>MINIMIZE USER CONFLICT</th>
</tr>
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<tbody>
<tr>
<td>The majority of existing mountain bike trails in the Twin Cities are one-way to avoid head on interactions. If built in Minnetonka, trails should also be one-way.</td>
</tr>
<tr>
<td>Mountain bike trails should be built to minimally intersect existing maintained trails and high-use informal foot paths. <em>(High-use informal foot paths are trails that receive similar use as maintained trails and have experienced significant widening, erosion and impact as a result).</em></td>
</tr>
</tbody>
</table>
Mountain bike trails should not displace existing maintained trails and high-use informal foot paths. (High-use informal foot paths are trails that receive similar use as maintained trails and have experienced significant widening, erosion and impact as a result)

Mountain bike trails should be designated as multi-use (open to runners, bird watchers, hikers, snowshoers, bikers, etc.). Ninety-two percent of all mountain bike trails in the Twin Cities are multi-use.

Adequate parking should be available at each proposed park.

Discussion Points:

- Does the park board agree with the proposed criteria?

Matrix

The following matrix shows a list of Minnetonka’s parks that have over 20 undeveloped acres and how they match with the proposed criteria.

<table>
<thead>
<tr>
<th>Parks</th>
<th>Adequate Space</th>
<th>Environmental Protection</th>
<th>Minimize User Conflict/Maximize Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 miles of trail total</td>
<td>11 circuit, 2 miles per location</td>
<td>11 circuit, 1 mile from another</td>
</tr>
<tr>
<td>Lone Lake</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>494 Corridor</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Purgatory</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hillway</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Victoria-Evergreen</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Big Willow</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Civic Center</td>
<td>X</td>
<td>X</td>
<td>*</td>
</tr>
<tr>
<td>Jidana</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Meadow</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Covington</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mooney</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lake Rose</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Crane Lake</td>
<td></td>
<td></td>
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</tbody>
</table>

*To be determined. If selected, would require further research.

Location Summaries:

Big Willow Park
Big Willow is a designated community preserve and athletic complex. While it is large in acreage, many of those acres have already been developed or are undevelopable. It has connectivity with the Lake Minnetonka Regional Trail. Parking is a concern at Big Willow Park. While there is parking for the six ball fields and one soccer field, these parking lots are at max capacity during high use times (weekends and evenings, April through October). Adding mountain bike trails would inevitably bring in bikers who wish to drive to the destination.
Big Willow is highly utilized by patrons. In addition to the maintained trails, a number of high-use informal trails that span up to six feet wide are located throughout the park. It would be difficult to create a safe trail concept that does not displace or minimally intersect the maintained and high-use informal trails. Usable acreage within the park consists of land north and south of the railroad. Bikers would have to use the maintained trail that parallels the Minnehaha Creek and crosses under the train tracks. This trail is frequently flooded during the year because of high creek levels. This leads to potentially unsafe passage between the north and south sections of the park and could potentially encourage bikers (and walkers) to cross the train tracks, trespassing on the BNSF Railway property.

With only 29 usable acres to build mountain bike trails, the ratio of acres-per-mile would be too dense to support four miles of trail. The southern half of the park contains high quality natural areas. Potential trails would put pressure on the restored woodland in this area. Big Willow is not recommended as a potential stand-alone site or circuit of trails.

*On January 30, 2018 staff received a petition regarding ‘Mountain Bike Trails being considered at Big Willow Park’. This petition is attached.

Hilloway Park
Hilloway is a medium sized community preserve that is tucked back into a secluded neighborhood. This park is relatively undeveloped and while it could provide mountain bike trail opportunities, it has a number of limitations. A network of high-use informal trails have been created throughout the park by walkers. These trails are up to six feet wide in locations and it would be difficult to avoid intersections with a mountain bike trail system. Further, very limited parking is available. There is no designated parking lot for this park. Adding mountain bike trails would inevitably bring in bikers who wish to drive to the destination. This would increase the number of cars parking on neighborhood streets. Patrons removing bikes from cars and gearing-up on the street would create safety concerns. Lastly, Hilloway could not sustain four plus miles of mountain bike trails on its own. In theory, it could be part of a circuit and support approximately two miles of trail.

Civic Center Park
Civic Center is a special use community park that is host to large scale facilities, hiking trails and soccer fields. Civic Center has connectivity to the regional trail system, ample parking and opportunity to connect with other potential trail systems. However, with only 15 usable acres and environmental concerns, a trail of two miles or more would not sustainably fit within this small footprint. Also, it would be difficult to create a safe trail concept that does not displace or minimally intersect the maintained and high-use informal trails. A park with less than 20 useable acres should not be considered.

I-494 Corridor
The I-494 Corridor is a parcel of city land on the west side of I-494 that narrowly stretches between I-394 and McGinty Road W. There is currently a maintained paved path that runs parallel to I-494. A mountain bike trail system could potentially run north on the east side of the maintained trail and turn back heading south on the west side of the maintained trail. It would be difficult to build a sustainable trail within this narrow footprint due to the topography. There are a few areas where slope gain could cause erosion issues and passage through low-land could be problematic. There are also areas where bikers would be detoured onto the maintained paved path before reentering a mountain bike trail. There is insufficient parking at this location.
**Victoria Evergreen Park**
Victoria Evergreen is a relatively undeveloped community preserve tucked back in a quiet residential neighborhood. It has good topography to support mountain bike trails. However, there is already a network of maintained trails that circumnavigate the park. If mountain bike trails were built, it would be difficult to avoid intersecting the maintained trail. Parking is a concern with only 8 spots. The addition of trails would bring in more cars and lead to an increase of users parking on residential streets. Further, this park has limited usable acreage for trail development and could not sustain a trail system on its own. It is within close proximity of the Lake Minnetonka Regional Trail, yet over a mile from another adequate park.

**Purgatory Park**
Purgatory Park is a community preserve that stretches and intertwines within a number of neighborhoods between Excelsior Boulevard and Townline Road. While this park is rich in acreage, much of that acreage is low-land that would not be suitable for mountain bike trails. Four plus miles of mountain bike trail in 37 usable acres is too dense of an acres-per-mile ratio. Staff recommends a minimum 10:1 ratio (usable acres per mile). The 37 usable acres in the most southern section of the park could not support four plus miles of mountain bike trails on its own and there is not a viable park in close proximity to create a circuit.

Purgatory does not have adequate parking. There is a small lot in the northern section of the park that would require bikers to ride over a half mile on the maintained walking paths in order to access potential mountain bike trails in the southern section of the park. And Purgatory Park is more than two miles from a Minnesota River Bluffs regional trail.

There are also environmental concerns with building mountain bike trails in Purgatory Park. The ridges and hilly knolls that are desirable for bikers contain the high quality woodland areas south of the creek and the remnant prairie on the east side of the park. About 10 acres of hilly land located south of the high quality woodland areas could be utilized without compromising the restoration efforts, however this amount of land area is inadequate for a trail system.

Lastly, Purgatory Park is used heavily by off-leash dog walkers which poses a safety concern with bikers.

**Lone Lake Park**
Lone Lake Park is a community park and preserve that has a soccer field, playground, tennis courts, picnic shelter, maintained trails and the addition of pickleball courts in 2018. A 0.6 mile paved path connects the park with the Minnesota River Bluffs Regional Trail. With over 52 usable acres and ample parking, it is foreseeable that Lone Lake could support four plus miles of mountain bike trails on its own. This acres-per-mile ratio is similar to other mountain bike trail systems in the twin cities.

While there is a network of maintained trails throughout portions of the park, the usable land to be considered is located away from maintained trails. There are some low-use informal trails within the usable land that would require further research for possible displacement or intersection. Lastly, restoration projects have taken place throughout the years in Lone Lake and should be evaluated when aligning a potential trail system.

Lone Lake was evaluated once prior for the addition of mountain biking trails beginning in 2000. The Park Board supported the staff recommendation to deny the proposed mountain biking plan for reasons of cost, natural resource management and budget at the April 2001 regular meeting. Since that time Lone Lake has undergone other changes.
In 2007/8 Lone Lake Park underwent the Park Renewal Process as a result of the 2001 voter-approved Park and Open Space referendum. After an involved neighborhood and park board review process, changes were made to the park infrastructure resulting in an updated basketball court, dock structure, picnic shelter modifications, trail improvements, water quality investments, parking lot changes, entrance realignment to Shady Oak Road, athletic field improvements and erosion control improvements from the water tower. Mountain biking was not brought up during that input process.

In 2009 Lone Lake Park was evaluated as a potential location to establish a dog park in the south east corner of the park adjacent to Shady Oak Road and Bren Road. This would have established an off-leash area north of the parking lot accessed via Rowland Road, east of Whitewater Dr. This area was an old homestead north and east of the walking trail, approximately 500 feet into the park. During the March 9, 2009 park board review of an off-leash dog park, the board voted 3-1 to “exclude Lone Lake Park from consideration for a dog park location and continue to support the concept of adding a dog park to the park system by identifying alternative locations with reduced impacts on residential properties.”

As noted, over time Lone Lake Park has been a focal point for the addition of new amenities to the park and trail system. Construction of six to eight (depending on bids) pickleball courts is scheduled for 2018. The addition of this amenity will increase the number of park patrons as well as parking demands in this high-use community park.

Staff Recommendation

By using the established criteria, staff recommends that Lone Lake Park be further studied as the site for potential mountain bike trails. Staff does not recommend any other park or open space be considered for mountain bike trails at this time.

If the park board recommends moving ahead with studying Lone Lake Park, the next steps in the process include:

- Establish a communication/notification plan
- Evaluate areas of environmental concern
- Create trail concept(s)
- Conduct community and neighborhood meeting(s) for public input
- Present study and concept(s) to the Park Board

Discussion Points:

- Does the park board agree with staff’s recommendation?

Recommended Park Board Action: Receive and discuss the mountain biking report. Allow for public input. Provide staff direction on mountain bike trails in Minnetonka.

Attachments:
Feedback provided to Staff
Feedback from Minnetonka Matters
Community Engagement Summary from WSB & Associates
Community Engagement Results from WSB & Associates
Twin Cities Mountain Bike Trails and Minnetonka Parks Comparison
Proposed Core Criteria Worksheet
Park Board reports and minutes – 2000/2001 Lone Lake Park Mountain biking study
Mountain Bike Trails being considered at Big Willow Park petition
APPENDIX B
LAND MANAGER SURVEY
Q1 Name (first and last):

Katie Pata

Q2 Job Title:

Visitor Services Coordinator

Q3 Name of trail system(s) managed:

Lebanon Hills Regional Park, Dakota County Parks

Q4 Age of trail system.

~20 years

Q5 How many miles of trail do you offer?

12 miles

Q6 Approximate number of users daily.

Varies each season. This a high-use facility and trail system. We have annual visit estimations (Met Council). Anecdotally: 50 on a winter weekend day (peak) over the course of the day, 500 on a summer weekend day (peak), over the course of the day.

Q7 Approximate number of users weekly.

Varies each season. This a high-use facility and trail system. We have annual visit estimations (Met Council). Anecdotally: 150 on a winter week, 2250 on a summer week.

Q8 Approximate number of users weekly.

Varies each season. This a high-use facility and trail system. We have annual visit estimations (Met Council). Anecdotally: 150 on a winter week, 2250 on a summer week.
Q9 What days of the week have the highest usage?
Saturday and Sunday

Q10 What months have the highest usage?
May-September

Q11 What time of day has the highest usage?
10 AM-3 PM on weekends.

Q12 How many parking spots are available at your trail head(s)?
150

Q13 Do you experience parking shortages or other parking issues?
We used to when our parking lot capacity was 75. We added paved parking capacity last year and now have parking onsite for 150. 150 seems to be the sweet spot, though we have on street and neighborhood parking too around the park, which is hard to measure.

Q14 Are your trails one-way for bikers? Yes

Q15 Are your trails multi-use? No

Q16 If your trails are multi-use, do the non-bikers have to go one-way? N/A

Q17 Please describe any multi-use related issues including any dog/bike conflicts.
I would strongly recommend no multi-use trails with mountain bikers. Their trails have unique and specific needs.

Q18 Do you allow winter riding on your trails? Yes,
Comments::
Yes, it's a growing use we expect to continue to grow.

Q19 Are dog walkers allowed on your mountain bike trails? No

Q20 If yes, do you groom your trails in the winter? N/A
Q21 Does your staff or volunteers groom the trails?  
Volunteers

Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?

Yes, this is a booming new recreational use bringing in all sorts of new park users in new demographics we're not serving in other ways (teens). We love working with MORC--we have some of the best mountain bike trails in the state because of our close collaboration and partnership with MORC.

Q23 What are the biggest challenges you face with your trail system?

Opening and closing mountain bike trails when they are wet for erosion control. We have several entrances to the trail system (4) and need to gate and close all four. It would be easier and save in staff $ if we had one entry point and a way to automate gate/trail closure.

Q24 Does your organization work with MORC?  
Yes

Q25 If yes, do you have a written agreement with MORC?

Yes

Q26 Please describe the pros and cons of partnering with MORC.

Only pros--we have the best dirt bosses who care deeply about the trails and more importantly, about our working relationship. They bring valuable incite and expertise to the planning table, are creative and get the "operations" side of things. They are passionate--we would not have the trails we do, nor at the quality we do, without them. I can't say enough about our relationship with MORC.

Q27 Do you have an emergency response/personnel plan for emergencies on the trail?  
Yes

Q28 How often do incidents occur on your trail?

It's can be common for 2 ambulance visits per day on a busy weekend. Lebanon Hills is a challenging and very technical trail system. We have a volunteer mountain bike patrol program to help with minor incidents and securing the scene helping EMS.

Q29 How many hours of maintenance per month are required on your trails?

Dakota County do not do any trail maintenance. MORC does it all and last year put in 988 total man hours.

Q30 What percentage of your maintenance is done by staff?  
0

Q31 What percentage of your maintenance is done by volunteers?  
100
Q32 What was the cost per mile to build your trails?

Unknown, MORC built nearly all the trails.

Q33 Do you allocate annual funds for environmental restoration? If yes, how much?

A county-wide and park-wide level, yes. Much is grant-funded with Legacy $.

Q34 What are your approximate annual maintenance costs?

We clean and maintain a full service trailhead with restroom facilities and picnicking. Are you asking for annual maintenance costs to Dakota County as it related to just the mountain bike trails? Or are you wanting something more comprehensive to the trailhead that serves mountain bike trails?
Q1 Name (first and last):

Tyler Pederson

Q2 Job Title:

Design Project Manager

Q3 Name of trail system(s) managed:

Theodore Wirth and Brownie Lake Parks

Q4 Age of trail system.

16 years

Q5 How many miles of trail do you offer?

About 10.5 miles

Q6 Approximate number of users daily.

Anywhere from 0 to 450 or more

Q7 Approximate number of users weekly.

1000 plus in summer

Q8 Approximate number of users weekly.

I assume you mean yearly. About 40,000
Q9 What days of the week have the highest usage?

Saturdays

Q10 What months have the highest usage?

Depends. Good weather means more riders. High School Leagues contribute many riders too.

Q11 What time of day has the highest usage?

Afternoons

Q12 How many parking spots are available at your trail head(s)?

200 or so, but it is shared with many other uses (beach, picnic, golf, ski, nature areas, etc.)

Q13 Do you experience parking shortages or other parking issues?

Yes, during peak hours. but a lot of bikers ride to the trails too.

Q14 Are your trails one-way for bikers? Yes

Q15 Are your trails multi-use? Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way? No

Q17 Please describe any multi-use related issues including any dog/bike conflicts.

only bike and foot travel is allowed. dogs have to be on a leash. there is always conflicts when you introduce modes of travel with different speeds. bikes must yield to all other foot travel users.

Q18 Do you allow winter riding on your trails? Yes, Comments:: trails closed to winter riding on the shoulder seasons due to slushy trails and potential damage to trail treads.

Q19 Are dog walkers allowed on your mountain bike trails? Yes

Q20 If yes, do you groom your trails in the winter? No
<table>
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<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Q21 Does your staff or volunteers groom the trails?</td>
<td>Volunteers</td>
</tr>
<tr>
<td>Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?</td>
<td>yes, of course.</td>
</tr>
<tr>
<td>Q23 What are the biggest challenges you face with your trail system?</td>
<td>having to close the trails when it rains or is too warm for winter riding. Most riders get it, but some like to ride in the mud. We have to close the trails to keep them in good condition. Our volunteers can't maintain a trail that is open during muddy or slushy times.</td>
</tr>
<tr>
<td>Q24 Does your organization work with MORC?</td>
<td>Yes</td>
</tr>
<tr>
<td>Q25 If yes, do you have a written agreement with MORC?</td>
<td>Yes</td>
</tr>
<tr>
<td>Q26 Please describe the pros and cons of partnering with MORC.</td>
<td>All pros. They are a great group with many resources for your agency. Plus they know how to design a trail system. Don't attempt to do it without their help or another professional trail builder's help. IT IS NOT AS EASY AS BLAZING A TRAIL THROUGH THE WOODS! :)</td>
</tr>
<tr>
<td>Q27 Do you have an emergency response/personnel plan for emergencies on the trail?</td>
<td>Yes</td>
</tr>
<tr>
<td>Q28 How often do incidents occur on your trail?</td>
<td>Every so often, but nothing major. There is just as much danger in playing a round of golf as there is riding a mountain bike. Areas of advanced trails that have jumps or drops will increase chances, however. Providing trails with beginner, intermediate, and advanced segments will be the best at alleviating any safety issues.</td>
</tr>
<tr>
<td>Q29 How many hours of maintenance per month are required on your trails?</td>
<td>Maybe 10, however more is always welcome, especially in spring.</td>
</tr>
<tr>
<td>Q30 What percentage of your maintenance is done by staff?</td>
<td>0</td>
</tr>
<tr>
<td>Q31 What percentage of your maintenance is done by volunteers?</td>
<td>100</td>
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</table>
Q32 What was the cost per mile to build your trails?

depends on the trail. usually between $2-4 per foot on relatively flat areas. can be upwards of $5-10 per foot on steeper side slopes. for technical features it is about $1000 per day (berms, jumps, boardwalks, etc)

Q33 Do you allocate annual funds for environmental restoration? If yes, how much?

no, there is no real need, other than seeding the front and back slopes of the trails. natural surface trails are very gentle on the environment. certainly, there may need to be some invasive species removal too, and natural surface trails will help that and support more volunteers to help remove buckthorn and such.

Q34 What are your approximate annual maintenance costs?

$0
Q1 Name (first and last):
Tracy Petersen

Q2 Job Title:
Recreation Superintendent

Q3 Name of trail system(s) managed:
Salem Hills Mountain Bike Course, Inver Grove Heights

Q4 Age of trail system.
18

Q5 How many miles of trail do you offer?
4.3 miles

Q6 Approximate number of users daily.
20-30

Q7 Approximate number of users weekly.
200-250

Q8 Approximate number of users weekly.
see above
Q9 What days of the week have the highest usage?

weekends

Q10 What months have the highest usage?

May-Oct

Q11 What time of day has the highest usage?

early mornings, evenings

Q12 How many parking spots are available at your trail head(s)?

25

Q13 Do you experience parking shortages or other parking issues?

No

Q14 Are your trails one-way for bikers?

Yes

Q15 Are your trails multi-use?

Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way?

No

Q17 Please describe any multi-use related issues including any dog/bike conflicts.

Walkers and bikers can use course simultaneously. We have had issues with unleashed dogs.

Q18 Do you allow winter riding on your trails?

Yes,

Comments::

Trails are not groomed during the winter

Q19 Are dog walkers allowed on your mountain bike trails?

Yes

Q20 If yes, do you groom your trails in the winter?

No
Q21 Does your staff or volunteers groom the trails?  

Volunteers

Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?

The mountain bike course has been a great amenity for our parks system and is a highly used park.

Q23 What are the biggest challenges you face with your trail system?

erosion issues, downed trees, having staff and volunteers to maintain the course on a consistent basis.

Q24 Does your organization work with MORC?  

Yes

Q25 If yes, do you have a written agreement with MORC?

Yes

Q26 Please describe the pros and cons of partnering with MORC.

They have been a great partner but over the years we have seen less work being done by the group to maintain the course to our expectation.  We hope that our new service agreement helps with this issues and outlines who is responsible for what duties.

Q27 Do you have an emergency response/personnel plan for emergencies on the trail?

No

Q28 How often do incidents occur on your trail?

rarely

Q29 How many hours of maintenance per month are required on your trails?

8-10 hours per month

Q30 What percentage of your maintenance is done by staff?

70

Q31 What percentage of your maintenance is done by volunteers?

30

Q32 What was the cost per mile to build your trails?

not sure
Q33 Do you allocate annual funds for environmental restoration? If yes, how much?
we utilize funds from our parks maintenance budget

Q34 What are your approximate annual maintenance costs?
I do not have answer- Parks Superintendent would have that information
Q1 Name (first and last):
Tim Sevcik

Q2 Job Title:
Public Works Superintendent

Q3 Name of trail system(s) managed:
Hillside City Park

Q4 Age of trail system.
25 years, reconstruction however in 2017-2018.

Q5 How many miles of trail do you offer?
9

Q6 Approximate number of users daily.
30

Q7 Approximate number of users weekly.
300

Q8 Approximate number of users weekly.
300
Q9 What days of the week have the highest usage?
Saturday and Sunday

Q10 What months have the highest usage?
May-October

Q11 What time of day has the highest usage?
Evenings

Q12 How many parking spots are available at your trail head(s)?
20

Q13 Do you experience parking shortages or other parking issues?
Occasionally, but infrequent

Q14 Are your trails one-way for bikers?  Yes

Q15 Are your trails multi-use?  Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way?  Yes

Q17 Please describe any multi-use related issues including any dog/bike conflicts.
Bikers being rude to walkers on trails

Q18 Do you allow winter riding on your trails?  Yes

Q19 Are dog walkers allowed on your mountain bike trails?  Yes

Q20 If yes, do you groom your trails in the winter?  Yes

Q21 Does your staff or volunteers groom the trails?  Volunteers
**Q22** Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?

Yes, Yes

**Q23** What are the biggest challenges you face with your trail system?

Ongoing maintenance, having enough volunteers to maintain the trail surface from erosion. Ongoing tree maintenance by staff, specifically hazardous tree removal.

**Q24** Does your organization work with MORC?

Yes

**Q25** If yes, do you have a written agreement with MORC?

Yes

**Q26** Please describe the pros and cons of partnering with MORC.

Pros- Trained volunteers, assistance with trail construction to include design and RFQ, public outreach and information sharing.  
Cons- None to date.

**Q27** Do you have an emergency response/personnel plan for emergencies on the trail?

No

**Q28** How often do incidents occur on your trail?

Infrequent, less than 5 per year reported.

**Q29** How many hours of maintenance per month are required on your trails?

40-80

**Q30** What percentage of your maintenance is done by staff?

40

**Q31** What percentage of your maintenance is done by volunteers?

60

**Q32** What was the cost per mile to build your trails?

$13,300

**Q33** Do you allocate annual funds for environmental restoration? If yes, how much?

No
Q34 What are your approximate annual maintenance costs?

$95,000
Q1 Name (first and last):

Bri Koch

Q2 Job Title:

Park Operations Supervisor

Q3 Name of trail system(s) managed:

Lake Rebecca Singletrack

Q4 Age of trail system.

2 years

Q5 How many miles of trail do you offer?

13.3

Q6 Approximate number of users daily.

8

Q7 Approximate number of users weekly.

Respondent skipped this question

Q8 Approximate number of users weekly.

Respondent skipped this question

Q9 What days of the week have the highest usage?

Weekends
Q10 What months have the highest usage?

summer

Q11 What time of day has the highest usage?  
Respondent skipped this question

Q12 How many parking spots are available at your trail head(s)?

114

Q13 Do you experience parking shortages or other parking issues?

No.

Q14 Are your trails one-way for bikers?  
Yes

Q15 Are your trails multi-use?  
Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way?  
No

Q17 Please describe any multi-use related issues including any dog/bike conflicts.

We do not allow dogs on our turf trails. Only hikers.

Q18 Do you allow winter riding on your trails?  
Yes

Q19 Are dog walkers allowed on your mountain bike trails?  
No

Q20 If yes, do you groom your trails in the winter?  
Yes

Q21 Does your staff or volunteers groom the trails?  
Volunteers

Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?

Yes, I believe it is a nice addition.
<table>
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<tr>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>Q23 What are the biggest challenges you face with your trail system?</td>
<td>Opening and closing the trails, as weather conditions change.</td>
</tr>
<tr>
<td>Q24 Does your organization work with MORC?</td>
<td>Yes</td>
</tr>
<tr>
<td>Q25 If yes, do you have a written agreement with MORC?</td>
<td>N/A</td>
</tr>
<tr>
<td>Q26 Please describe the pros and cons of partnering with MORC.</td>
<td>They have been great to partner with! MORC has taken the lead on the trail maintenance and assist with open/closing.</td>
</tr>
<tr>
<td>Q27 Do you have an emergency response/personnel plan for emergencies on the trail?</td>
<td>Yes</td>
</tr>
<tr>
<td>Q28 How often do incidents occur on your trail?</td>
<td>Rarely.</td>
</tr>
<tr>
<td>Q29 How many hours of maintenance per month are required on your trails?</td>
<td>Respondent skipped this question</td>
</tr>
<tr>
<td>Q30 What percentage of your maintenance is done by staff?</td>
<td>Respondent skipped this question</td>
</tr>
<tr>
<td>Q31 What percentage of your maintenance is done by volunteers?</td>
<td>Respondent skipped this question</td>
</tr>
<tr>
<td>Q32 What was the cost per mile to build your trails?</td>
<td>Respondent skipped this question</td>
</tr>
<tr>
<td>Q33 Do you allocate annual funds for environmental restoration? If yes, how much?</td>
<td>Respondent skipped this question</td>
</tr>
<tr>
<td>Q34 What are your approximate annual maintenance costs?</td>
<td>Respondent skipped this question</td>
</tr>
</tbody>
</table>
Q1 Name (first and last):
Jay Thompson

Q2 Job Title:
Project Technician

Q3 Name of trail system(s) managed:
Murphy-Hanrehan, Elm Creek, Lake Rebecca

Q4 Age of trail system.
M-H - 7 yrs, EC - 7 yrs, LR - 2 yrs

Q5 How many miles of trail do you offer?
Approximately 40 mi

Q6 Approximate number of users daily.
Approximate average 200-400 daily

Q7 Approximate number of users weekly.
1500 to 2500

Q8 Approximate number of users weekly.
1500 to 2500
Q9 What days of the week have the highest usage?
Saturday-Sunday

Q10 What months have the highest usage?
June thru October

Q11 What time of day has the highest usage?
PM

Q12 How many parking spots are available at your trail head(s)?
Depending on location 50 to 125

Q13 Do you experience parking shortages or other parking issues?
Elm Creek experiences shortages frequently, but that trail is probably the most popular of our three trails and it has the smallest parking area.

Q14 Are your trails one-way for bikers?  Yes

Q15 Are your trails multi-use?  Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way?  Yes

Q17 Please describe any multi-use related issues including any dog/bike conflicts.
Dog are not allowed on our singletrack trails

Q18 Do you allow winter riding on your trails?  Yes

Q19 Are dog walkers allowed on your mountain bike trails?  No

Q20 If yes, do you groom your trails in the winter?  Yes

Q21 Does your staff or volunteers groom the trails?  Volunteers
Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?
Very positive, very worthwhile.

Q23 What are the biggest challenges you face with your trail system?
Challenge in terms of problem? I can't say the trails have created any unforeseen challenges.

Q24 Does your organization work with MORC?  
Yes

Q25 If yes, do you have a written agreement with MORC?  
Yes

Q26 Please describe the pros and cons of partnering with MORC.
To date the relationship has been nothing but positive. The value that MORC provides is outstanding

Q27 Do you have an emergency response/personnel plan for emergencies on the trail?  
Yes

Q28 How often do incidents occur on your trail?
Incidents do occur but I'm not certain it's possible to estimate an average number

Q29 How many hours of maintenance per month are required on your trails?
Most maintenance is provided by volunteers. It's hard to put a number on what is required

Q30 What percentage of your maintenance is done by staff?  
10

Q31 What percentage of your maintenance is done by volunteers?  
90

Q32 What was the cost per mile to build your trails?
By a contractor? you can estimate $20K to $30K per/mi depending on terrain, specifications, design, etc.

Q33 Do you allocate annual funds for environmental restoration? If yes, how much?
none at this time
Q34 What are your approximate annual maintenance costs?

nominal because of the assistance from MORC
Q1 Name (first and last):
Reed Smidt

Q2 Job Title:
Recreation Manager

Q3 Name of trail system(s) managed:
Carver Lake Park Off-Road Cycling Trail

Q4 Age of trail system.
8 years since opening for use

Q5 How many miles of trail do you offer?
5.5

Q6 Approximate number of users daily.
20 avg. per day (over a year) Peak days over 100 and several days at zero due to closures or weather.

Q7 Approximate number of users weekly.
We don't have officials counts. This depends on the season. Average per week over a year is probably 140+ and that might be low.

Q8 Approximate number of users weekly.
Respondent skipped this question

Q9 What days of the week have the highest usage?
Wednesdays and Weekends
Q10 What months have the highest usage?
May, June, July & August

Q11 What time of day has the highest usage?
4-8 p.m. weekdays, spread out over the weekends.

Q12 How many parking spots are available at your trail head(s)?
140

Q13 Do you experience parking shortages or other parking issues?
Only when the swimming beach is at peak use - 4th of july for example. The mtb parking is never an issue.

Q14 Are your trails one-way for bikers?
Yes

Q15 Are your trails multi-use?
Yes

Q16 If your trails are multi-use, do the non-bikers have to go one-way?
Yes

Q17 Please describe any multi-use related issues including any dog/bike conflicts.
We have some conflicts with dogs off leash on the trail.

trail runners, snowshoers, and walkers have all been able to get along and enjoy the trail with minimal conflict.

Trail runners and walkers tend to ignore trail closures which is frustrating.

Q18 Do you allow winter riding on your trails?
Yes

Q19 Are dog walkers allowed on your mountain bike trails?
No

Q20 If yes, do you groom your trails in the winter?
Yes

Q21 Does your staff or volunteers groom the trails?
Volunteers
Q22 Has the addition of mountain bike trails been positive for your park(s)? Was the project worth it?

It was well worth it and has been a great addition to the community. We provide recreation programs that are well attended and the mountain bike community is very respectful and willing to help out with other park improvement projects or clean-up projects that are not directly related to mtb trail. We have a park wide clean-up event on May 12 that is organized by the volunteer trail crew.

Q23 What are the biggest challenges you face with your trail system?

Popularity is a challenge, lots of riders during the peak season. Maintenance has very easy to keep up with. We had a couple user conflicts, but those have been addressed and improved. Its like any new facility....Adjustments need to be made that will improve the facility or park for all users.

Q24 Does your organization work with MORC?  Yes

Q25 If yes, do you have a written agreement with MORC?  Yes

Q26 Please describe the pros and cons of partnering with MORC.

MORC provides funding, volunteer support and visibility for the trail system. They take a lot of the work load off of the City and follow the Memorandum of Agreement perfectly.

Con- not a Woodbury based group, but they service the Twin Cities Metro area. The MORC volunteers are from Woodbury.

Q27 Do you have an emergency response/personnel plan for emergencies on the trail?  Yes

Q28 How often do incidents occur on your trail?

Occasionally. The frequency is very similar to a twisted ankle on an athletic field, pickleball court or a playground mishap.

Q29 How many hours of maintenance per month are required on your trails?

Approximately 8 hours, but that is by choice of the dedicated volunteers. It could honestly be lower, but they take a lot of pride in the trail and go above and beyond.

Q30 What percentage of your maintenance is done by staff?  10

Q31 What percentage of your maintenance is done by volunteers?  90
Q32 What was the cost per mile to build your trails?
Avg. $20,000 per mile

Q33 Do you allocate annual funds for environmental restoration? If yes, how much?
Yes, but not directly related to this trail, but within our parks maint. budget.

Q34 What are your approximate annual maintenance costs?
Specifically for maintenance(not including new trail features): Under $500
Trail Impact Studies - References


APPENDIX D
SEH LONE LAKE PARK
BIOLOGICAL ASSESSMENT
I hereby certify that this Wetland Permit Application was prepared by me. The procedures and field methods used to delineation wetlands within the area of interest constitute an official wetland delineation in accordance with the 1987 U.S. Army Corps of Engineers Wetlands Delineation Manual and applicable Regional Supplement.

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date: May 15, 2018

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Executive Summary

The City of Minnetonka is considering the inclusion of mountain bike trails within Lone Lake Park. As part of this consideration, the City has requested an assessment of the biological resources present, and a discussion of how incorporation of trails within the park may impact these resources.

Lone Lake Park contains Lone Lake, South Fork of Ninemile Creek, and an abundance of oak-dominated woodlands on relatively steep topography. While not old-growth, the quality of the woods are high, with intact tracts, high diversity, and mature trees present. Invasive species coverage is light, in part due to extensive management by the City of Minnetonka.

Wildlife use within the park is above average for a metro area, as it is largely intact, and supports high quality and diverse habitats. This habitat quality encourages the presence of typical urban wildlife species, but also may support some species that are less common and require the critical habitat that mature forests provide. Wildlife within Lone Lake Park may potentially include some federally listed species such as the long-eared bat, and the rusty patched bumblebee.

While the park contains approximately 1.6 miles of formal asphalt and crushed limestone trails, the hillsides and wooded portions of the park currently contain an abundance (more than three miles) of unofficial trails that have been formed over years of pedestrian use. These existing trails have had some impacts on the parks biota.

The inclusion of mountain biking within Lone Lake Park would potentially have some environmental impacts, and may include the following:

1. Removal of trees, shrubs, and herbaceous vegetation to establish trail routes, and loss of vegetation from frequent travel over routes
2. Spreading of invasive species
3. Soil erosion from bare soil, and compaction from frequent use
4. Disturbance to wildlife, particularly to woodland bird species
5. Impacts to sensitive species and/or encroachment into critical habitats
6. Increases in noise and dust generation compared to pedestrian users, and from a potential increase in the number of overall trail users
7. Disruption of solitude for other park users
The extent of potential impact is highly variable depending on the trail design and any implemented limitations for trail use. Inclusion of graded trails that could allow for multiple riders and grading of the hillslopes would likely have a significant impact. A less extensive design using “sustainable” and “low impact” techniques that limit grading, and establish narrow one-way paths could reduce impacts to negligible levels.

The following are considerations that may avoid or minimize impacts to the park’s natural resources:

- Minimize the trail design to single-file, and one-way routes
- Minimize tree removal, and select smaller trees of less desirable species when removal cannot be avoided
- Limit routing or decrease trail density within sensitive or highest quality areas
- Minimize steep slopes to limit erosion by routing the trail along contours and keeping grades to 5% or less.
- Where gully crossings are required, consider boardwalks, elevated trails, or routing to maintain contours.
- Avoid all crossings of wetlands or areas where concentrated overland flow from rain or snowmelt may occur.
- Restrict seasonal use to avoid spring snowmelt and periods where muddy conditions are prevalent.
- Maintain a diligent invasive species control program to limit sources of material from within the park, and install bike wash stations to reduce import from off-site.
- Develop trail rules for mountain bikers, and post informational signage on trail etiquette for all users. This may include consideration limitations on use of trails by pets.

1.1 Location

The project site is located at 5624 Shady Oak Drive, which is within Section 35 in Township 117 North, Range 32 West in Minnetonka, Hennepin County, Minnesota as shown on Figure 1. The park is accessible via Shady Oak Drive, where there are four areas where parking is allowed adjacent to the soccer fields, tennis courts, and playground. The trail system on the west side of the park is accessible from a smaller parking area located off of Rowland Road.

Although not formal, access to the park is also possible from several adjacent areas including trails from adjacent private residents and trailheads originating from the water tower.

2 Existing Features

Lone Lake Park is 146 acres in size, and is distinguished by Lone Lake as a central feature. South Fork of Ninemile Creek also flows through the park, but is separated from Lone Lake by a central wooded ridge. A portion of the park is utilized for soccer fields, tennis courts, and a small playground, but the main features are the steep slopes and oak woods that instill a sense of isolation for park users.
Both paved and crushed limestone trails are present, and offer 1.6 miles of walking and running paths in the summertime. These trails are not maintained in winter, and can be used for snowshoeing or walking depending on snow cover. These trails connect regionally to Bryant Lake Regional Park to the south, north to Shady Oak Beach along Shady Oak Road, and from the south parking lot to the Three Rivers Parks Minnesota River Bluffs LRT Trail.

2.1 Historic Conditions

Historically, Lone Lake Park was located within the central mixed hardwoods, and would have included a mixture of oak, maple, basswood, and prairie areas on the southern and western facing slopes.

With European settlement, much of the landscape was dramatically changed to support agricultural purposes. Trees and prairie were cleared to create fields and pastures. Lone Lake Park was considerably different in the 1930s, when the area was farmed, and the only wooded portions were located on the west side of Lone Lake and pockets on the slopes below the current water tower ridge.

Photo 1: 1937 aerial photograph of Lone Lake Park

With the reduction in agricultural use as the Minneapolis metropolitan area developed and Minnetonka because a suburban community, the trees within the park grew back, and the park began to progress toward the familiar conditions observed today.

As a rough midway point from the 1937 to 2018, we can observe the conditions in 1971, where agriculture use has ceased, and there is increasing development for residential homes.

In 1971, the wooded component of the park is returning, including expansion from the oldest trees on the western lake ridge southward, and on the slopes below the current water tower. Of
note is the cleared area on the water tower ridge, which was not vegetated at the time to allow for skiing and sledding, and a road on the western side that generally follows the current trail system, with the northern half abandoned.

Photo 2: 1971 aerial photograph of Lone Lake Park

The review of historic aerial photographs allows us to understand the former land use, and the types of stressors and land changes that have occurred to allow the current conditions to be present. It also allows us to determine the age of features, which is a significant component of establishing biological integrity. The maturity of a wooded landscape is critical to determining the status as old growth, versus regrowth, or ecologically primary features, versus later successional species.

Based on the historic aerial photography, the majority of the trees within Lone Lake Park are relatively young, with the majority being less than 50 years old.

3 Biological Resources

While a portion of the park is used for active sports (soccer, tennis, basketball, playground, open areas), the majority is preserved and managed as open space. The majority of the park is wooded, and the City of Minnetonka has spent considerable effort in managing the site for control of invasive species, encouraging a healthy and diverse cover type, and educating park users about the resources around them. The following sections will discuss these resources, and provide an opinion on the quality of these resources.
3.1 Trees, Shrubs, and Vegetation

The primary vegetative resources within the park are the extensive wooded hills that surround the lake. Overall, the wooded areas are dominated by red and white oaks throughout the park, although there are portions where co-dominate species are also present, such as pockets of bigtooth aspen, basswood, red maple, and red cedar. Overall plant diversity is high, and the community is developing into a mature stand with a closed canopy. A list if the observed species is presented in Table 1, based on a March 29 and May 2, 2018 field review by SEH.

Table 1: Observed Tree Species

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box elder</td>
<td>Acer negundo</td>
</tr>
<tr>
<td>Red maple</td>
<td>Acer rubrum</td>
</tr>
<tr>
<td>Buckeye</td>
<td>Aesculus glabra</td>
</tr>
<tr>
<td>River birch</td>
<td>Betula nigra</td>
</tr>
<tr>
<td>Paper birch</td>
<td>Betula papyrifera</td>
</tr>
<tr>
<td>Hackberry</td>
<td>Celtis Occidentalis</td>
</tr>
<tr>
<td>Hawthorn</td>
<td>Crataegus sp.</td>
</tr>
<tr>
<td>Black walnut</td>
<td>Juglans nigra</td>
</tr>
<tr>
<td>Red cedar</td>
<td>Juniperus virginiana</td>
</tr>
<tr>
<td>Ironwood</td>
<td>Ostrya virginiana</td>
</tr>
<tr>
<td>White pine</td>
<td>Pinus strobus</td>
</tr>
<tr>
<td>Cottonwood</td>
<td>Populus deltoides</td>
</tr>
<tr>
<td>Bigtooth aspen</td>
<td>Populus grandidentata</td>
</tr>
<tr>
<td>Quaking aspen</td>
<td>Populus tremuloides</td>
</tr>
<tr>
<td>Black cherry</td>
<td>Prunus serotina</td>
</tr>
<tr>
<td>White oak</td>
<td>Quercus alba</td>
</tr>
<tr>
<td>Northern pin oak</td>
<td>Quercus ellipsoidalis</td>
</tr>
<tr>
<td>Burr oak</td>
<td>Quercus macrocarpa</td>
</tr>
<tr>
<td>Red oak</td>
<td>Quercus rubra</td>
</tr>
<tr>
<td>Black locust</td>
<td>Robinia psuedoacacia</td>
</tr>
<tr>
<td>Black willow</td>
<td>Salix nigra</td>
</tr>
<tr>
<td>Basswood</td>
<td>Tilia americana</td>
</tr>
<tr>
<td>American elm</td>
<td>Ulmus americana</td>
</tr>
</tbody>
</table>

The wooded communities present are identified by the Minnesota Department of Natural Resources as a Southern Dry-Mesic Oak Forest. Mesic hardwood forest communities are present within the larger eastern broadleaf forest province where soils retain moisture, and wildfires are infrequent. These forests have continuous dense canopies of deciduous trees, with an understory of successively shorter strata composed of shade-adapted seedlings, shrubs, and herbaceous cover. Within Lone Lake Park, the dominant trees are red and white oak, although as is typical of mesic forests, other deciduous species such as maple, basswood, bigtooth aspen, ironwood, and black cherry trees are also present.
Coniferous trees are less frequent, but are present; including a few large white pine trees, which were planted. Red cedar trees are also present in a few larger areas, where it is locally dominant; particularly along the ridge west of Lone Lake. The red cedar trees are also mature, and likely have been present for a long period of time. Red cedar can be controlled by fire, which has likely been suppressed since settlement. Red cedar tend to be more of a nuisance species within prairie ecosystems, but are not likely to be problematic in a mature forested community.
Under the tree canopy, there is a moderately dense layer of native shrubs and vines. The invasive European buckthorn has been effectively controlled through extensive management, but can still be located in isolated areas of the park, such as the southeast corner, and where it is encroaching from adjacent areas. The shrub layer is healthy, and appropriate in composition for the mixed-oak woods that are present. Shrub density is controlled by the limits of light penetration, and is naturally low density with the full canopy present, particularly on the north and east facing slopes that naturally receive less sunlight. Table 2 is a summary of the observed shrub species based on a field review by SEH on March 29 and May 2, 2018.

**Table 2: Observed Shrub and Vine Species**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey dogwood</td>
<td>Cornus racemosa</td>
</tr>
<tr>
<td>Red osier dogwood</td>
<td>Cornus sericea</td>
</tr>
<tr>
<td>Tatarian honeysuckle</td>
<td>Lonicera tatarica</td>
</tr>
<tr>
<td>Virginia creeper</td>
<td>Parthenocissus quinquefolia</td>
</tr>
<tr>
<td>Wild plum</td>
<td>Prunus americana</td>
</tr>
<tr>
<td>Common buckthorn</td>
<td>Rhamnus cathartica</td>
</tr>
<tr>
<td>Gooseberry</td>
<td>Ribes spp</td>
</tr>
<tr>
<td>Staghorn sumac</td>
<td>Rhus typhina</td>
</tr>
<tr>
<td>Riverbank grape</td>
<td>Vitis riparia</td>
</tr>
<tr>
<td>Prickly ash</td>
<td>Xanthoxylum americanum</td>
</tr>
</tbody>
</table>

*Photo 5: Small stand of native shrubs in southeast portion of the park*

Prairie and grassland habitat is a cover type in the western area of Lone Lake Park. Additionally, there is a larger area of non-native smooth brome grass on the southeast corner of the park where a south-facing slope is present. On the western side of the central ridge is small elevated
meadow, which may be a historic open area, but is not remnant. Vegetation within this small meadow area includes smooth brome grass, Canada goldenrod, and black raspberry. Box elder trees and shrubs are encroaching into this area. Overall, it is an open space, but is not high quality prairie.

Photo 4: Small elevated meadow in western portion of the park with encroaching vegetation

3.2 Invasive Species

Many of the woodlands in the metro area have been infested with a wide range of invasive species, including common buckthorn, garlic mustard, leafy spurge, and Tatarian honeysuckle. Through extensive efforts by the City of Minnetonka, Lone Lake Park is relatively free of these species, but this effort to manage for invasive species requires constant diligence to prevent reestablishment and spreading.

Wooded habitats do contain some occurrences of European buckthorn, but much of the park is managed periodically to ensure a low density, and limit the species to seedling that do not mature and bare fruits. Garlic mustard is an emerging concern, and is currently limited to more of the disturbed wooded edges than within the intact community. The City is currently completing garlic mustard management through herbicide applications to try and limit the spread of this species. Tatarian honeysuckle was observed, but only isolated individuals were located, and this does not seem to require active management to control.

The wet prairies are dominated by dense reed canary grass, and some occurrences of individual purple loosestrife, which are being actively managed in an effort to restore native vegetation to these areas. Plantings of native vegetation have occurred to promote a healthy a diverse shoreline and assist with discouraging establishment of invasive species.
Overall, the occurrences of invasive species is relatively low, which is a significant factor in the overall evaluation of habitat quality, and serves as an example of how continuous management can be successful in managing these species.

### 3.3 Aquatic Resources

Lone Lake is the primary aquatic feature within Lone Lake Park. Lone Lake is an approximately 17-acre kettle lake, formed by blocks of glacial ice which melted and formed the majority of shallow isolated lakes within the state. Lone Lake is relatively shallow, with a maximum depth of 27 feet based on Minnesota Department of Natural Resources data, although the majority of the lake is considerably shallower. Aquatic macrophytes are present, and form dense beds, including large areas of floating leaved vegetation dominated by a variety of lily pad species.

Publicly available fisheries data indicate that Lone Lake is dominated by warm water species, such as black bullhead, bluegill, and hybrid sunfish. Water clarity is moderate, with clarity ranging from 2 to 4 feet.

The Minnesota Pollution Control considers Lone Lake to be eutrophic, although for water clarity, it has been borderline mesotrophic, which indicates some nutrient enrichment, but generally a favorable assessment for a lake within a developed watershed. Good water quality is a benefit from the immediate watershed area being in a natural condition, and the lack of direct storm water discharge into the lake. The constructed rain gardens to treat parking lot runoff prior to discharge into the lake are certainly assisting with maintaining good water quality standards within the lake. Likely a result of the late ice-out conditions, there was some spring algal accumulations along the lake shoreline in May 2018.

The South Fork of Ninemile Creek is also present in the western portion of the park, where it flows from north to south, and is the reach between Minnetoga and Bryant Lakes. The stream is relatively small and shallow in this reach, and is not a significant fishery, with fathead minnows, central mudminnow, brook stickleback, and creek chub being the species observed by the Minnesota Pollution Control Agency (2003-2005 biological sampling).

Adjacent to the creek are areas of wet meadow, shallow marsh, shrub carr, and floodplain habitats. The creek and these associated wetland features dominate the western one fifth of the park, but are generally lower in quality with reed canary grass and hybrid cattails dominated the wetlands and creek watercourse.

In the central area of the park is a small wetland, which is bisected with an elevated trail. This isolated wetland is dominated by shallow open water, with a wet meadow fringe and several small trees. The vegetation within this wetland is dominated by reed canary grass, with some cattails and purple loosestrife observed. Trees within the wetland fringe include box elder, which are also lower in quality. While not a high quality assemblage of vegetative species, this central wetland contains no fish, and is a significant shallow area for amphibians such as frogs, toads, and salamanders to reproduce without predation.
3.4 **Wildlife**

Lone Lake Park is of sufficient size that is likely supports a diverse mammal population, including white tailed deer, raccoons, squirrels, rabbits, skunks, woodchucks, and probably the occasional red fox or coyote. All of these species are common within the region, and would be attracted to the wooded slopes where they can find food, shelter, and habitat. The support of mammals is likely high, but not unusual for species that have adapted to living within an urban area.

Similarly, the presence of reptiles and amphibians would be supported by the quality of the habitat, which would be expected to support multiple frog and snake species. The wetlands being free of predatory fish is advantageous to amphibian reproduction, and the abundant habitat within the steep slopes, trees, and rocky would support several of the woodland favoring snakes, such as the common garter snake and brown snake. Turtles would be present within Lone Lake, and would utilize the sandy soils for ideal nesting habitat.

Of all the wildlife that may use the park, the ones with the greatest benefit may be the birds, sometimes referred to as avifauna. While common species such as cardinals, chickadees, blue jays, wild turkeys, and crows would be expected to use the wooded areas of the park, the large intact wooded areas are also an attraction to less common species. Evidence was observed that woodpeckers are common, including the common downy and hairy woodpeckers, but also the large and prominent pileated woodpecker. Owls are likely residents within the woods, as are hawks, with areas open for roosting, nesting and hunting. Seasonally, migratory birds would use the woods for resting, and would include the various warblers, vireos, and other songbirds that are temporary residents. Breeding birds which are less common, but utilize large, intact, mature woods for their primary habitat include the scarlet tanager, rose-breasted grosbeak, catbirds, pewees, and flycatchers.
The use of the park for wildlife overall is likely average for a park of this size, but is higher for many of the woodland bird species that require the larger areas of intact woods that Lone Lake Park provides.

### 3.5 Threatened and Endangered Species

In addition to species that may just be less common, or are unique to the habitat present, there is the potential for Lone Lake Park to harbor plant and animal species that are listed by the State of Minnesota or the federal government as legally protected.

In order to determine if any state or federally listed species have been documented within Lone Lake Park, a review of the Minnesota Department of Natural Resources (MNDNR) Natural Resources Information Systems (NHIS) database was completed. This database identifies the known locations of listed species, critical habitats, and other unique resources that have been positively identified. Because some species are mobile, a one-mile buffer was used to identify any species that has been documented within or adjacent to the park, to ensure that a sufficient area was included. The database review failed to identify any species of concern within or adjacent to the park. While this doesn’t mean that a state listed species couldn’t be present it is generally considered sufficient for meeting state requirements for sensitive species reviews.

Federally, Lone Lake Park is within the range of two listed species, the northern long-eared bat, and the more recently listed rusty patched bumble bee.

The northern long-eared bat utilizes wooded habitats during the summer, where it roosts under the bark of large trees, singly or in small colonies. Bat pups are also raised in these wooded habitats. During the winter, the bats congregate in hibernaculum, which usually consists of caves, structures, and sometimes large trees or wooded snags. The wooded habitat present within the park would generally be suitable to this species during the roosting and pupping period, and potentially could offer some areas of hibernaculum. Current guidelines by the U.S Fish and Wildlife Service discuss tree removal, and limiting activities during the roosting period. These resources also identify the townships in which roosting trees and hibernaculum have been positively identified. While one hibernaculum has been positively identified within Hennepin County, it is not within the area of the park. Under federal guidelines, there would be no restrictions on park amenities based on the known distribution of the bats, even though the habitat may be present.

The rusty patched bumble bee is a recently listed species, and was added following an alarming trend of declining populations of pollinator species. Like other bee species, the rusty patched bumble bee relies on pollen from flowering plants for sustenance, and has been harmed by a loss of prairies, grasslands, and other critical habitats; and potentially overuse of herbicides and insecticides. The bees nest underground, often using rodent burrows, but require relatively undisturbed conditions to flourish. The rusty patched bumble bee has been positively identified within Lone Lake Park, as reported to bee-tracking websites, utilizing the flowering plants in the rain gardens for nectar. Other have been positively confirmed in the area, and because they are mobile, are presumed to be present, although positive nesting is harder to document than foraging individuals.

### 3.6 Soils

Soils within Lone Lake Park include the loamy soils associated with the lake, South Fork of Ninemile Creek and the associated wetlands and the sandy loam soils that dominate the adjacent
The dominant soil within the park is the Kingsley-Gotham Complex. The Kingsley component consists of very deep, well drained soils that formed in loamy glacial till on glacial moraines. These soils have moderate to moderately slow permeability, and slopes that range from 2 to 40 percent. The Gotham component consists of very deep, somewhat excessively drained soils formed in sandy glaciofluvial deposits on moraines, outwash plains, stream terraces, and glacial lake basins. Permeability is rapid, and slopes range from 0 to 35 percent.

The majority of the soils are stable, and provided there is not a sustained gradient, are relatively less prone to erosion than finer textured soils may be. Where sand content is high, trails are more prone to erosion from use, and may require the placement of a cap to prevent unintentional widening. Overall, however, the soils are suitable to support a trail, and there would be limited need to import any material.

3.7 Slopes and Topography

One of the unique features of Lone Lake Park are the frequent hills and steep slopes. Elevations within the park are highly variable, and range from approximately 900 feet at Lone Lake and along the South Fork of Ninemile Creek, to a high elevation of 1,060 feet in the southeast portion of the park. These hills are glacial features, and are composed of till material dominated by sand and sandy loam. The hills can be separated into the tallest peak in the southeast corner, the northern slope and ravines in the southeast portion north of the water tower, the central north-south aligned ridge west of the lake, and the isolated peak located west of the creek.

The City of Minnetonka has a bluff ordinance, which establishes criteria for steep slopes and setback requirements in relation to proximity to aquatic features. Large portions of the park are considered to be bluffs under the city definition, and would have limitations on land use.

Using LiDAR data, all slopes greater than 20% and 30% have been identified in Figure 6. A 20% slope averages a one foot change in elevation for every five foot change horizontally. The majority of the hillsides are 20% slope, and except for areas of wetland, flatter areas would require crossing steep slopes to reach them. Smaller areas are 30% slopes, which is very steep and would be difficult areas to traverse.

3.8 Unique Features

Within Lone Lake Park are several areas that have merit in discussion as separate features. These include areas of vegetation, features, or amenities that add value to the park, and make it unique.

- **Basswood stand**: Located in the southwest portion of the park, near the top of the highest point is a small stand of basswood trees within the dominant red oak slopes. These basswood trees are relatively young, and are not remnant old-growth specimens, but do provide for a diverse tree assemblage and are appropriate native species for this setting.

- **Water tower ravine**: North of the water tower is a small ravine that drains to the north. This ravine is the outlet for the water tower, and has been graded to include drain tile, tile inlet structures, and rock checks, which minimize the ability for surface water runoff to accumulate and therefore reduce erosion. The tile system was installed to minimize erosion, and it is not readily apparent that it is present without observing the inlet structures. The tile outlets into a constructed rain garden located south of the playground parking lot, before discharge into Lone Lake.
• Parking lot rain gardens have been installed in the playground parking lot. These have been designed to allow collection and treatment of parking lot runoff, and have been planted with a variety of native species. These, and the created rain garden south of the lot, provide for pollinator species while also protecting lake water quality.

• Revegetation has occurred within the park, and are noted as areas where active management is being completed. Most recent revegetation has occurred at the southern end of the wetland in the center of the site, along the western bluff where some prairie has developed, and along the southern shoreline of Lone Lake where aquatic plants have been planted to stabilize and diversify the vegetation present.

• There are several deer exclosures within the park, which were set up to observe differences in vegetation when deer are prevented from accessing areas and browse is prevented.

4 Mountain Bike Trail Impact Considerations

4.1 Potential Impacts

The inclusion of mountain bike trails within Lone Lake Park will have some impact on the park’s resources. The exact impacts will depend on the trail design, route, and length, which will be identified as the process is finalized, and plans are prepared. Rather than quantifying the impacts, this assessment will discuss the types of impacts that can be anticipated, and a discussion of how they should be evaluated. The intent is not to quantify the impact, nor establish a level where the impact would be considered to be acceptable or unacceptable. Rather, it is to ensure consideration of all topics to ensure informed decision making.

4.2 Trees, Shrubs, and Vegetation

Routing a trail through a wooded area typically requires the removal of some trees to maintain a consistent corridor width, and to create a consistent surface. The number of trees removed is often dependent upon tree density, which is a consideration based on the age of the stand, and the composition of tree species present.

The wooded areas within Lone Lake Park are dominated by moderately dispersed mature species, which have a lower overall tree density, and more spacing between individual trees than would be present in a younger stand. The full canopy limits new trees from being established, and the understory shrub layer is present, but is similarly less dense than would be present in full sunlight.

Under a sustainable or low impact design, the alignment of the trail incorporates existing topography, and is intentionally variable in the lateral flow of movement. Depending on the technical difficulty, this may include very gradual shifts in alignment, or may be abrupt and more challenging. Under a moderate design, there may be a need to remove a limited number of trees to maintain the trail path. A more difficult alignment can incorporate the tight turns to potentially reduce the need for tree removal.

For this proposed project, tree removal is anticipated to a small quantity, but is unlikely to be completely avoidable. It is estimated that tree removal would be minimal, and would be limited to smaller trees. Removal of trees of sufficient size to alter the existing closed canopy would not be anticipated.
Although the direct removal of trees may be minimal, secondary impacts may occur from compaction of the soils, erosion which may expose and damage roots, and damage to trees from contact resulting in injury to trunk or branches. It is possible that these secondary impacts are a bigger consideration than the direct loss, although it is more difficult to quantify.

Shrubs would generally not be affected, provided dense stands are avoided. This is an achievable goal, as there are few areas of concentrated shrub coverage. Shrubs would be removed along trail alignments, but would not be a significant reduction as the entire understory has some shrub coverage, but is well dispersed and is not dense.

Herbaceous vegetation will also be affected where it is directly removed for the trails. Within the wooded areas, the herbaceous cover is sparse due to light limitation, but does include patchy Pennsylvania sedge, and other woodland species that thrive in shady environments. Impacts to herbaceous vegetation, like shrubs, would be expected to be direct, but limited to the width of the disturbed corridor itself. Prairie areas are elevated, and depressed, and would be impacted with trails passing through them for direct vegetation loss.

4.3 Invasive Species

Invasive plants thrive in disturbed conditions, where they can take advantage of opportunities to get established and outcompete native species. Inclusion of mountain bike trails will disturb the soils, and create corridors by which invasive species may spread. This may be limited by a lack of source material from within the park, but direct transport of seeds and reproductive material can also occur from dirt trapped in tire treads, which can be transported from off-site locations.

It is likely that increasing the amount of soil disturbance will promote the spread and establishment of invasive species, as it will create conditions more favorable to them than native species. Transport from other locations is also a serious concern, as it may introduce species not currently a concern.

The concern with mountain bike trails is lessened when you consider the total area disturbed, which is a small percentage of the park area. If the trails in total will disturb less than a half-acre, it is not a large quantity of space for invasive species to establish. The concern however, is that the small area of disturbance is not isolated to one area, but is dispersed throughout a third to a half of the park. The ability to transport invasive species seeds and biological material throughout the park may exacerbate the problem, as you may see establishment wherever the trails may be located.

4.4 Wetlands and Aquatic Resources

The primary aquatic features in the park (Lone Lake and South Fork of Ninemile Creek) are not appropriate for mountain biking, and would likely not be directly affected by the inclusion of trails within the park. Should the South Fork of Ninemile Creek need to be crossed, it would require the use of an existing crossing, or a permit for a new crossing, as an in-water crossing would not be permitted.

The large wetland located south of Lone Lake may need to be crossed to provide the desired length of bike trail, but that should be able to be achieved by routing the alignment far enough south to be outside of the wetland, utilize the existing crossing, or construct a new elevated crossing which eliminates any disturbance to the wetland.
4.5 Wildlife

Lone Lake Park has a diverse assemblage of native, mammal, bird, and reptile species. Most of these have persisted within the development of the area, and have accommodated to the presence of humans. While there are large areas of open space, there are existing trails and active areas that bisect the habitat. Few areas within the park exceed more than 500 feet from a trail, parking lot, or adjacent residence, and presumably the wildlife are accustomed to frequent encounters due to this proximity.

In consideration of wildlife impacts, you must determine the type of interaction, and the frequency of occurrence. Currently, the interaction of wildlife with walkers or joggers over a 2-mile trail route is infrequent, and likely predictable to the animal. With active bike trails, you have an increase in the frequency of interaction, as there would be a greater length of trails, and they would be more concentrated. It is expected that the trail users would be more likely to encounter a greater number of animals than a pedestrian, due to the greater distance traveled over a period of time.

Because of the speed of travel, the length of the trails, and concentration of the trails within desired areas, there is a greater opportunity for bike riders to be disruptive to wildlife. The full extent of this disruption is dependent on the number of riders, and how many participants are present on an average daily basis. For species that are highly adaptable and have thrived in the presence of humans, this is likely not a concern. For other animals, the frequent interaction may be sufficient for them to seek solitude in other areas.

It is challenging to determine when wildlife impacts from a park being “too busy” can be verified and quantified, but for some species the inclusion of bike trails may be sufficient for them to be displaced. This is most likely to occur with some of the nesting birds that prefer large intact tracts of woods, and prefer solitude.

Direct habitat loss is also a consideration, as bike trails physically remove vegetation, and could be considered a change in available habitat at the surface. Given the overall size of the park, the potential habitat loss is a relatively small fraction, but a five mile long trail, that is five feet in width would disturb approximately three acres. Because this is diffuse, and not in one area, it is probably negligible habitat loss, but it can be quantified. Fragmentation is also present, although the trail width is likely not sufficient to interrupt the complete canopy, and edge effects are likely not generated.

4.6 Threatened and Endangered Species

As previously discussed, there are no known state listed species within the park, however there are two federally listed species which warrant discussion.

Habitat for the northern long-eared bat is present, as these bats prefer wooded areas for roosting and pup rearing in the summertime. There are no confirmed occurrences, however, and the nearest hibernaculum, is located miles away. While it cannot be confirmed that the northern long-eared bat is not utilizing Lone Lake Park, the biggest concern for this species is tree removal, loss of hibernaculum, and spreading of the white nosed fungus. The inclusion of bike trails is not expected to remove a large number of trees, and would not impact hibernaculum or influence the spread of the white nosed fungus.
A United States Fish and Wildlife Service (USFWS) fact sheet on the long eared bat is presented in Appendix B.

The rusty patched bumble bee has been observed within the park, where it was utilizing flowering plants as a source of nectar. Nectar producing vegetation is generally absent from the wooded areas, as it is too shady for the primary nectar species to be present. Fringe areas may support more nectar species, as would some open areas, but overall the amount of nectar species is generally low within the park. It is unlikely that the inclusion of bike trails would decrease the availability of nectar plants. Direct habitat loss is possible, but given the limited direct area of disturbance, it is unlikely that a bumble bee nest would coincide with a trail.

While it cannot be definitively proven, it is unlikely that the inclusion of mountain bike trails within Lone Lake Park would have an effect on the northern long-eared bat or the rusty patched bumble bee.

A USFWS fact sheet on the rusty patched bumble bee is presented in Appendix C.

4.7 Erosion

Trails will disrupt the soil surface, and create areas devoid of vegetation. Bare soil is prone to erosion, but requires concentrated water movement and a gradient for it to be aggravated. Trails constructed on the contours, where slope is reduced, can be stable and control erosion. Trails that contain a slope or cross contours can encourage the channelization of water, which can form rills and exacerbate runoff until it is damaging and self-perpetuating. Once started, erosion can be very hard to control, and so it is important that it is prevented.

Currently, erosion does not seem to a significant issue within the park, although it is noted that some of the pedestrian trails that are present have some concentrated flows where slopes are present and water can accumulate. Particularly downslope from the water tower to the park, where pedestrians have aggravated the conditions through frequent use. This is also be a concern for mountain bike trails, which will similarly have bare earth base, and more potential to rut and compact the soils. Where trails will go with contours, and there is no sustained gradient, erosion potential is greatly reduced.

4.8 Water Quality

Water quality, in consideration of Lone Lake and the South Fork of Ninemile Creek, is not expected to be affected by the inclusion of mountain bike trails within Lone Lake Park. Water quality is a function of nutrient inputs, rates and volume of storm water, sediment discharge, and internal factors such as temperate, vegetation, and existing water quality conditions.

While there is a small risk of elevating erosion potential, it is not anticipated that water quality will be affected. Eroded material would likely be captured by the vegetation between the hills and the lake/creek, and not enter the waterbodies. This will also limit the introduction of nutrients, which are associated with sediment, or deposition of organic material such as leaf litter. While compaction of soils could occur on the trails, it would not be sufficient to be an impervious surface. Therefore, storm water volume and rates of discharge into Lone Lake or South Fork of Ninemile Creek would be unchanged.
4.9 Noise, Dust, and Visual Impacts

Mountain biking is louder than walking, but generally produces little noise other than the sounds of peddling, clicking of gears, and the wheels in contact with the trail. While this may introduce noises to areas of the park that are normally quiet, it is at low decibels, and limited to the area immediately adjacent to the rider. It is unlikely that noise will be perceived by other park patrons unless they are immediately adjacent to the rider, and will likely not exceed the noises currently present by park patrons during sporting events, playing at the park, or having a conversation while walking the existing trails. Noise is likely not necessarily a biological issue, although it may be disturbing to some wildlife.

Dust will be generated by bicycle tires on earthen trails, however it is expected to be limited to a very small area along the route. It is not anticipated that any park patron would be aware of dust generation by bicycles. In wet conditions mud will form, which can aggravate trail conditions, particularly if cyclists reroute and expand trails to avoid ponded or muddy locations. This is more of an erosion control issue than a biological condition, however.

Visually, the occurrence of a bike rider on the hills may alter their enjoyment of the park, as it may affect the perception of isolation that is currently enjoyed by many park users. In summer when the shrubs and understory are leaved out, this may be less of a factor than in spring or fall when the entire hillside is visible and anyone of the slope is readily apparent. Visual effects are an important consideration, but are more of a social concern than biological.

5 Assessment of Probable Impacts at Lone Lake Park

Based on the anticipated layout of the trail route, there is an opportunity to discuss with greater specificity the type and extent of impacts that are most probable within Lone Lake Park. It is assumed that a “sustainable” or “low impact” design will be selected, and that the trail route will have a distance of approximately 4.5 miles.

A sustainable design may require 5-6 feet of space during construction, which allows for access for construction equipment needed to grade the trail. This will have an initial disturbance of approximately 2.7 acres within the park. The perimeter of this disturbance is allowed to restore to natural conditions, however, and leave a central path that is typically 2.5 in width. After this disturbed area has been restored, the permanent impacts are estimated to be 1.4 acres, which will remain as bare soil for the mountain bike trail. This is approximately 1% of the park’s area.

The current tree density allows for a complete canopy, but has sufficient spacing that a trail system can navigate the slopes without the needs for extensive tree removal. Because the trail design should use areas with low slopes, there may be a need to remove individual trees, but this is a tradeoff with the risk of erosion if steeper slopes are allowed. Overall, the loss of trees, provided they are not concentrated in one area, is likely minimal and will not affect the overall health of the forest. Shrub loss is also expected to be minimal, and the herbaceous layer is already sparse and not likely to be affected significantly.

Invasive species will likely find opportunity in the newly disturbed areas, particularly garlic mustard, which thrives in wooded areas. Invasive species management will need to continue, and may require accelerated demand in the initial years following construction, as it will be much
easier to manage before it can get established in new areas. Buckthorn will probably be less likely to be spread specifically through a new trail, but overall continuation of the current management program will be helpful to ensure that current populations remain under control, and that the corridors do not become pathways for expansion.

Impacts to aquatic resources are not anticipated, provided they are avoided from direct impacts. Secondary impacts from erosion or water quality seem to be limited in risk, and probably cannot be quantified as existing stressors likely exceed any negative changes from the introduction of mountain bike trails into the watershed.

It is anticipated that the existing wildlife have likely accommodated to life in an urban setting. While there is habitat and relative isolation, there are adjacent residents, open spaces, and existing trails that prevent large areas from truly being intact and undisturbed. The primary risk to wildlife is displacement, if the frequency of disturbance exceeds an individual animal's tolerance threshold. For most species, this tolerance is high, as it is already a natural environment, but within a much larger developed area. It is plausible that some species will seek other areas for nesting that may provide less disturbance, but that is difficult to verify or quantify. Overall habitat loss is relatively small, but some fragmentation could occur in areas with dense trails. The habitat loss is probably negligible, and is less of a consideration than disturbance, which is already a stressor to some degree, but will be amplified with additional users.

Like wildlife overall, the two listed species that may be present are likely at low risk of direct loss, but have an increased risk in being disturbed and potentially displaced. Overall, the habitat for long-eared bats will remain, and is not expected to be significant. No impacts to the long earned bat are anticipated. The rusty patched bumble bee is harder to quantify, as there is less known about the species, and what is driving the decline. Much of the consensus is that habitat loss is a primary factor. The bee’s ideal habitat is not present in great quantity, and the proposed trail will not impact any areas that support an abundance of nectar species. Nesting habitat could be affected, but the likelihood of a trail and a nest occurring in the same area is small. While it is impossible to say that no impacts will occur, the chances of occurrence are small enough that it would likely not have an impact on the rusty patched bumble bee.

Provided the design follows the lowest impact guidelines, there should be a crown or slope that will allow water to shed, and avoid pooling on the trail. This is typically along the entire trail, and avoids concentrated areas were flows can aggravate erosion. While erosion is always a concern, it can be limited, and repaired if it is detected quickly. Steep slopes will need to be avoided, and while the overall slopes within the wooded hills is steeper than 20%, a route with a lesser gradient can be located if it goes with the contours, and flat areas are used for turn arounds. From a design standpoint, the trail can be laid out to minimize erosion, and have very little impact.

While the park has many areas with unique features, and areas of active management, the alignment can avoid these, and not disrupt current efforts to improve the park’s biota. There should be no impacts to the ongoing efforts to manage the park’s resources.
Although not recognized as part of the park’s trail system, there are currently an abundance of trails within the wooded slopes. These originate from within and outside of the park, and are extensive. City staff have mapped the informal trails, and have measured more than three miles of trail, ranging from cleared corridors, to more modest footpaths. Most of these informal trails are subtle, and not readily apparent to casual observation. However in traversing the hillsides, it is readily apparent that there are miles of informal trails that have developed over the years. While some of these may be older, many are still used, as during the field assessment, SEH staff encountered one child and one person walking their dog on these wooded paths. A recent wooden fort was observed where children had congregated. Footprints in the snow and discarded trash indicate that trail use is continuing and is perhaps more frequent than realized.

The majority of trails are small, and would be a foot or two in width with little disturbance, while others are several feet in width and are practically established paths. Almost all of them follow the contours, as there are few areas where the paths directly go up or down the hillside. A mountain bike path would likely be similar in many regards to these existing trails, in terms of width, extent, and how they traverse the hillsides along the contours; including incorporation of relatively shallow sloped turning areas to ease climbing up or down the hillside.

It is not possible to quantify the impacts from these existing trails, but they do provide a preview of what a mountain bike trail may look like, and may serve as preliminary routes to consider where there is already an alignment that can be utilized. Unfortunately, many of the informal trails are wider and steeper than the mountain bike trails that are proposed, and not all areas can be utilized for the proposed alignment.

Numerous studies have compared the impacts resulting from hiking and mountain bike trails, and have concluded that many of the concerns are shared, regarding erosion, compaction, disturbance to wildlife, and spread of invasive species123. The risks from mountain biking are slightly higher, but a well-traveled hiking trail is as likely to have as much, or even greater, environmental impacts as a well-designed bicycle route.

While the current discussion is based on the consideration of adding mountain biking trails within the park, some consideration may also be warranted to either promote or discourage unapproved hiking paths as well. Although not perceived, the damage from the existing trail system may exceed the damage from a proposed mountain bike trail, if properly designed and limited in extent.


3 Quinn, Michael and Chernoff, Greg. 2010. Mountain Biking: A Review of the Ecological Effects
Photo 7: An existing informal trail in the woods, which is well-used and residents keep the corridor maintained.

Photo 8: A steep sloped existing informal trail with significant erosion control concerns
Mitigation Opportunities and Challenges

Overall, impacts from the inclusion of mountain bike trails are anticipated, but quantification is dependent upon determining a route, selection of trail dimensions, and determining where it may be allowed or excluded. Under an aggressive approach, with extensive wide trails, impacts could be significant; with tree removal required, erosion likely, invasive species transport assured, and wildlife disturbance expected.

Using a sustainable or low impact approach, where trails widths are limited (such as single file, one-way routes), trees are more likely to be preserved, erosion is negligible, and transport of invasive species is discouraged, impacts are likely not significantly greater than what has already occurred with the informal hiking paths that have developed.

In consideration of potential impacts, the following have been identified as potential approaches to limit or mitigate for impacts:

- Establish a trail design that has the smallest footprint while achieving the desired goals
  - Consider low-impact designs, such as one-way and single file routes.
  - Establish routes that allow multiple distances, which can allow the options to spread the route out, or concentrate to a limited area

- Limit vegetation loss and damage
  - Select an alignment that avoids tree removal. If unavoidable, select for removal of trees that are less mature, or of lower quality species. For example, remove a smaller aspen tree and avoid encroachment on a mature oak tree.
  - Limit damage to tree limbs by pruning rather than breaking limbs
  - Consider transplanting herbaceous spring ephemerals if they are located along a trail route

- Avoid accessing areas with unique habitats or sensitive species
  - Buffer areas that are intended to be avoided

- Control erosion
  - Limit distances where trails cross contours and prevent the buildup of concentrated runoff. Vary routing so there are series of small hills and valleys, and slope trails so water can runoff and discourage formation of mud holes. Avoid flat ground where compaction and rutting can promote water collection and lead to mud holes, trail widening, bypass trail formation, and perpetuate erosion
  - Consider boardwalks over gullies and depressions, or elevate the trail to discourage accelerated runoff downslope.
  - Restrict seasonal use to avoid spring snowmelt and periods where muddy conditions are prevalent.

- Maintain invasive species control programs
• Concentrate efforts of maintaining areas cleared of invasive species, and monitor for signs of spreading due to trails.

• Install bike wash stations to reduce import of soils and weed seeds from off-site.

• Promote wildlife use
  o Increase plantings of native species, nectar species, and establish additional areas of prairie
  o Provide educational material on what individuals can do to promote bee habitat, plant and maintain nectar species, and support protection of pollinator species
  o Restrict or limit access to critical habitats for sensitive species

• Establish and enforce mountain bike user etiquette
  o Promote mountain bike users to be engaged in supporting volunteer programs to maintain the parks resources

• Locate, repair, and prevent future use of the highly eroded existing informal trails.
Figures

Figure 1 – Site Location and Topographic Map
Figure 2 – Aerial Photograph
Figure 3 – Aquatic Resources
Figure 4 – Hennepin County Soil Survey
Figure 5 – LiDAR and topography
Figure 6 – Steep Slopes
Figure 7 – MLCCS Land Cover
Figure 8 – Land Coverage and Notable Features within Potential Trail Areas
This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.
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LONE LAKE PARK STUDY
Minnetonka, Minnesota

Legend
National Wetlands Inventory (2014)
1 - Seasonally Flooded Basin or Flat
3 - Shallow Marsh
4 - Deep Marsh
5 - Shallow Open Water
6 - Shrub Swamp
7 - Wooded Swamp

MNDNR Public Waters
PWI Watercourses
PWI Basins

Aquatic Resources

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Legend

Soil Hydric Rating

Hydric
Predominantly Hydric
Partial Hydric
Predominantly Non-Hydric
Non-Hydric

Soil Survey Map (SSURGO)

Minnetonka, Minnesota
This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.
### Minnesota Land Cover Classification System (MLCCS) Map

#### LONE LAKE PARK STUDY
Minnetonka, Minnesota

**Legend**

- MLCCS Classifications (Outside Site)

#### MLCCS Classifications

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- Map by: B. Tolcser
- Projection: NAD83 UTM 15N
- Source: MNDNR, SEHINC, City of Minnetonka
- Background: 2016 MNDNR
- Project: MINNE 145810
- Print Date: 4/30/2018

Path: S:\KO\M\Minne\145810\3-env-stdy-regs\GIS\fig07_MLCCS.mxd
Trailhead of informal trail near the tennis court

Oak-dominated woods on east side of park
Oak-dominated woods on east side of park
Exposed rock and cobble at top of hill indicate glacial till soils

Informal trail through oak trees on east side of park
Planted white pine and sumac shrubs on east side of park

View west across ravine near water tower
Drain tile inlet and rock check in water tower ravine

Well worn footpath on water tower ridge
Common garter snake emerging hibernation in spring

Steep slopes on water tower ridge, view north towards playground
Informal trail through south side of the main north-south ridge west of Lone Lake

Deer exclosure on west side of park
Wet meadow associated with Ninemile Creek

Emerging marsh marigold in wet meadow
Oak-dominated woods on western shore of Lone Lake

West Branch of Ninemile Creek
Crushed limestone trail along western bank of Lone Lake

View of western shore of Lone Lake
Lone Lake, view from parking lot

Shoreland plantings on south shore of Lone Lake
Rain garden in playground parking lot

Vertical trail from water tower to playground, with severe erosion.
Wood anemone in bloom on eastern side of the park in spring-ephemeral rich area

Interrupted fern fiddleheads emerging in spring throughout the park
Appendix B

Long Eared Bat Fact Sheet
The northern long-eared bat is federally listed as a threatened species under the Endangered Species Act. **Endangered** species are animals and plants that are in danger of becoming extinct. **Threatened** species are animals and plants that are likely to become endangered in the foreseeable future. Identifying, protecting and restoring endangered and threatened species is the primary objective of the U.S. Fish and Wildlife Service’s Endangered Species Program.

**What is the northern long-eared bat?**

**Appearance:** The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, Myotis.

**Winter Habitat:** Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

**Summer Habitat:** During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. They rarely roost in human structures like barns and sheds.

**Reproduction:** Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, females emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization.

After fertilization, pregnant bats migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies of females and young generally have 30 to 60 bats at the beginning of the summer, although larger maternity colonies have also been observed. Numbers of bats in roosts typically decrease from the time of pregnancy to post-lactation. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species’ range. Young bats start flying by 18 to 21 days after birth. Maximum lifespan for the northern long-eared bat is estimated to be up to 18.5 years.

**Feeding Habits:** Like most bats, northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

**Range:** The northern long-eared bat’s range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species’ range includes 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

**Why is the northern long-eared bat in trouble?**

**White-nose Syndrome:** No other threat is as severe and immediate as...
northern long-eared bats, although a windmill has been documented for in very large numbers. Mortality from kill bats, and, depending on the species, lead to bats not surviving through winter. Arousal during hibernation causes bats to human disturbance while hibernating. Also, cave-dwelling bats are vulnerable a cave unsuitable for hibernating bats. A change of even a few degrees can make also change airflow and microclimates. A restrict bat flight and movement, but people from caves and mines not only other structures intended to exclude bats. Also, cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their energy stores, which may lead to bats not surviving through winter.

Loss or Degradation of Summer Habitat: Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat’s range. Many forest management activities benefit bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, some forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.

Wind Farm Operation: Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality from windmills has been documented for northern long-eared bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat’s range and many more are planned.

What Is Being Done to Help the Northern Long-Eared Bat? Disease Management: Actions have been taken to try to reduce or slow the spread of white-nose syndrome through human transmission of the fungus into caves (e.g. cave and mine closures and advisories; national decontamination protocols). A national plan was prepared by the Service and other state and federal agencies that details actions needed to investigate and manage white-nose syndrome. Many state and federal agencies, universities and non-governmental organizations are researching this disease to try to control its spread and address its affect. See www.whitenosesyndrome.org/ for more.

Addressing Wind Turbine Mortality: The Service and others are working to minimize bat mortality from wind turbines on several fronts. We fund and conduct research to determine why bats are susceptible to turbines, how to operate turbines to minimize mortality and where important bird and bat migration routes are located. The Service, state natural resource agencies, and the wind energy industry are developing a Midwest Wind Energy Habitat Conservation Plan, which will provide wind farms a mechanism to continue operating legally while minimizing and mitigating listed bat mortality.

Listing: The northern long-eared bat is listed as a threatened species under the federal Endangered Species Act. Listing a species affords it the protections of the Act and also increases the priority of the species for funds, grants, and recovery opportunities.

Hibernacula Protection: Many federal and state natural resource agencies and conservation organizations have protected caves and mines that are important hibernacula for cave-dwelling bats. What Can I Do? Do Not Disturb Hibernating Bats: To protect bats and their habitats, comply with all cave and mine closures, advisories, and regulations. In areas without a cave and mine closure policy, follow approved decontamination protocols (see http://whitenosesyndrome.org/topics/decontamination). Under no circumstances should clothing, footwear, or equipment that was used in a white-nose syndrome affected state or region be used in unaffected states or regions.

Leave Dead and Dying Trees Standing: Like most eastern bats, the northern long-eared bat roosts in trees during summer. Where possible and not a safety hazard, leave dead or dying trees on your property. Northern long-eared bats and many other animals use these trees.

Install a Bat Box: Dead and dying trees are usually not left standing, so trees suitable for roosting may be in short supply and bat boxes may provide additional roost sites. Bat boxes are especially needed from April to August when females look for safe and quiet places to give birth and raise their pups.

Support Sustainability: Support efforts in your community, county and state to ensure that sustainability is a development goal. Only through sustainable living will we provide rare and declining species, like the northern long-eared bat, the habitat and resources they need to survive alongside us.

Spread the Word: Understanding the important ecological role that bats play is a key to conserving the northern long-eared and other bats. Helping people learn more about the northern long-eared bat and other endangered species can lead to more effective recovery efforts. For more information, visit www.fws.gov/midwest/nleb and www.whitenosesyndrome.org

Join and Volunteer: Join a conservation group; many have local chapters. Volunteer at a local nature center, zoo, or national wildlife refuge. Many state natural resource agencies benefit greatly from citizen involvement in monitoring wildlife. Check your state agency websites and get involved in citizen science efforts in your area.
The U.S. Fish and Wildlife Service listed the rusty patched bumble bee as endangered under the Endangered Species Act. Endangered species are animals and plants that are in danger of becoming extinct. Identifying, protecting and recovering endangered species is a primary objective of the U.S. Fish and Wildlife Service’s endangered species program.

What is a rusty patched bumble bee?
Appearance: Rusty patched bumble bees live in colonies that include a single queen and female workers. The colony produces males and new queens in late summer. Queens are the largest bees in the colony, and workers are the smallest. All rusty patched bumble bees have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the back.

Habitat: Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast, but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil).

Reproduction: Rusty patched bumble bee colonies have an annual cycle. In spring, solitary queens emerge and find nest sites, collect nectar and pollen from flowers and begin laying eggs, which are fertilized by sperm stored since mating the previous fall. Workers hatch from these first eggs and colonies grow as workers collect food, defend the colony, and care for young. Queens remain within the nests and continue laying eggs. In late summer, new queens and males also hatch from eggs. Males disperse to mate with new queens from other colonies. In fall, founding queens, workers and males die. Only new queens go into diapause (a form of hibernation) over winter - and the cycle begins again in spring.

Feeding Habits: Bumble bees gather pollen and nectar from a variety of flowering plants. The rusty patched emerges early in spring and is one of the last species to go into hibernation.

Why conserve rusty patched bumble bees?
As pollinators, rusty patched bumble bees contribute to our food security and the healthy functioning of our ecosystems. Bumble bees are keystone species in most ecosystems, necessary not only for native wildflower reproduction, but also for creating seeds and fruits that feed wildlife as diverse as songbirds and grizzly bears.

Bumble bees are among the most important pollinators of crops such as blueberries, cranberries, and clover and almost the only insect pollinators of tomatoes. Bumble bees are more effective pollinators than honey bees for some crops because of their ability to “buzz pollinate.” The economic value of pollination services provided by native insects (mostly bees) is estimated at $3 billion per year in the United States.
It needs a constant supply and diversity of flowers blooming throughout the colony’s long life, April through September.

**Range:** Historically, the rusty patched bumble bee was broadly distributed across the eastern United States and Upper Midwest, from Maine in the U.S. and southern Quebec and Ontario in Canada, south to the northeast corner of Georgia, reaching west to the eastern edges of North and South Dakota. Its range included 28 states, the District of Columbia and 2 provinces in Canada. Since 2000, this bumble bee has been reported from only 13 states and 1 province: Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin – and Ontario, Canada.

**Why is the rusty patched bumble bee declining?**

**Habitat loss and degradation:** Most prairies and grasslands of the Upper Midwest and Northeast have been converted to monoculture farms or developed areas, such as cities and roads. Grasslands that remain tend to be small and isolated.

**Intensive farming:** Increases in farm size and technology advances improved the operating efficiency of farms but have led to practices that harm bumble bees: increased use of pesticides, loss of crop diversity resulting in flowering crops being available for only a short time, loss of hedgerows with flowering plants, and loss of legume pastures.

**Disease:** Pathogens and parasites may pose a threat, although their prevalence and effects in North American bumble bees are not well understood.

**Pesticides:** The rusty patched bumble bee may be vulnerable to pesticides. Pesticides are used widely on farms and in cities and have both lethal and sublethal toxic effects.

Bumble bees can absorb toxins directly through their exoskeleton and through contaminated nectar and pollen. Rusty patched bumble bees nest in the ground and may be susceptible to pesticides that persist in agricultural soils, lawns and turf.

**Global climate change:** Climate changes that may harm bumble bees include increased temperature and precipitation extremes, increased drought, early snow melt and late frost events. These changes may lead to more exposure to or susceptibility to disease, fewer flowering plants, fewer places for queens to hibernate and nest, less time for foraging due to high temperatures, and asynchronous flowering plant and bumble bee spring emergence.

**What is being done to conserve rusty patched bumble bees?**

**U.S. Fish and Wildlife Service:** Several Service programs work to assess, protect, and restore pollinators and their habitats. Also, the Service works with partners to recover endangered and threatened pollinators and pollinator-dependent plants. Concern about pollinator declines prompted formation of the North American Pollinator Protection Campaign, a collaboration of people dedicated to pollinator conservation and education. The Service has a Memorandum of Understanding with the Pollinator Partnership to work together on those goals. The Service is a natural collaborator because our mission is to work with others to conserve, fish, wildlife, and plants and their habitats.

**Research:** Researchers are studying and monitoring the impacts of GMO crops and certain pesticides on pollinators. Efforts by citizen scientists and researchers to determine the status of declining bee species are underway throughout the United States.

**What can I do to help conserve the rusty patched bumble bee?**

**Garden:** Grow a garden or add a flowering tree or shrub to your yard. Even small areas or containers on patios can provide nectar and pollen for native bees.

**Native plants:** Use native plants in your yard such as lupines, asters, bee balm, native prairie plants and spring ephemerals. Don’t forget spring blooming shrubs like ninebark and pussy willow! Avoid invasive non-native plants and remove them if they invade your yard. For more information on attracting native pollinators, visit www.fws.gov/pollinators/pdfs/PollinatorBookletFinalrevWeb.pdf.

**Natural landscapes:** Provide natural areas - many bumble bees build nests in undisturbed soil, abandoned rodent burrows or grass clumps. Keep some unmowed, brushy areas and tolerate bumble bee nests if you find them. Reduce tilling soil and mowing where bumble bees might nest. Support natural areas in your community, county and state.

**Minimize:** Limit the use of pesticides and chemical fertilizer whenever possible or avoid them entirely. Pesticides cause lethal and sublethal effects to bees and other pollinators.
Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a companywide commitment to act in the best interests of our clients and the world around us.

We’re confident in our ability to balance these requirements.
Summary: 99 species of birds recorded at Lone Lake Park including 10 climate-endangered and 43 climate-threatened species, 48 species recorded nesting in the park and 41 of those species nest in the woodland, and 23 of the 41 species that nest in the woodland construct nests between the ground and 25' above ground.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Breeding Habitat/Nesting Site</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branta canadensis</td>
<td>Y tundra, fresh marshes, salt marshes, lakes</td>
<td>Stable, increasing population</td>
</tr>
<tr>
<td>Anser albifrons</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Cygnus columbianus</td>
<td>Climate Endangered</td>
<td></td>
</tr>
<tr>
<td>Anas platyrhynchos</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Mareca americana</td>
<td>Climate Endangered</td>
<td></td>
</tr>
<tr>
<td>Lophodytes cucullatus</td>
<td>Climate Endangered</td>
<td></td>
</tr>
<tr>
<td>Dryocopus pileatus</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Phalaenorrhoa auritus</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Antigone canadensis</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Ardea herodias</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Ardea alba</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Butorides virescens</td>
<td>Y In shrub or tree 5-30' above ground, sometimes on ground; often very close to water but can be quite distant. Stable, common</td>
<td></td>
</tr>
<tr>
<td>Charadrius vociferus</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Actitis macularius</td>
<td>Y Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Sitta carolinensis</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Troglodytes aedon</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Empidonax sp.</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Myiarchus crinitus</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Contopus cooperi</td>
<td>Declining population</td>
<td></td>
</tr>
<tr>
<td>Contopus virens</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Pileated Woodpecker</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Red-bellied Woodpecker</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Downy Woodpecker</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Black-backed Woodpecker</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>northern flicker</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Sayornis phoebe</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Empidonax sp.</td>
<td>Declining population</td>
<td></td>
</tr>
<tr>
<td>Myiarchus saxicola</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Contopus virens</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Contopus minimus</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Contopus cooperi</td>
<td>Declining population</td>
<td></td>
</tr>
<tr>
<td>Contopus parvus</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Vireo albigularis</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Vireo albigularis</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Cyanocitta cristata</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Cyanocitta cristata</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Cyanocitta cristata</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Steigdopitys semipennis</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Tachycineta bicolor</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Hirundo rustica</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Chaetura pelagica</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Pooecile atricapillus</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Troglytes aedon</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Polioptila caerulea</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Regulus satrapa</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Regulus calendula</td>
<td>Stable, common</td>
<td></td>
</tr>
<tr>
<td>Certhia americana</td>
<td>Climate Endangered</td>
<td></td>
</tr>
<tr>
<td>Sitta carolinensis</td>
<td>Climate Threatened</td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Scientific Name</td>
<td>Nest Type</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Eastern Bluebird</td>
<td>Sialia sialis</td>
<td>Natural hollow in tree, in old woodpecker hole, or in birdhouse. Usually nests fairly low (2-20' above the ground).</td>
</tr>
<tr>
<td>Swainson's Thrush</td>
<td>Catharus ustulatus</td>
<td></td>
</tr>
<tr>
<td>Gray-cheeked Thrush</td>
<td>Catharus minimus</td>
<td></td>
</tr>
<tr>
<td>Veery</td>
<td>Catharus fuscensens</td>
<td></td>
</tr>
<tr>
<td><strong>UNIDENTIFIED THRUSH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Robin</td>
<td>Turdus migratorius</td>
<td>Horizontal branch of tree or shrub, usually 5-25' above ground</td>
</tr>
<tr>
<td>Gray Catbird</td>
<td>Dumetella carolinensis</td>
<td>Dense shrubs, thickets, briar tangles, or low trees, usually 3-10' above the ground.</td>
</tr>
<tr>
<td>Brown Thrasher</td>
<td>Toxostoma rutum</td>
<td></td>
</tr>
<tr>
<td>Tennessee Warbler</td>
<td>Oreothlypis perigrina</td>
<td></td>
</tr>
<tr>
<td>Orange-crowned Warbler</td>
<td>Oreothlypis celata</td>
<td></td>
</tr>
<tr>
<td>Nashville Warbler</td>
<td>Oreothlypis ruficapilla</td>
<td></td>
</tr>
<tr>
<td>Yellow warbler</td>
<td>Setophaga petechia</td>
<td>Upright fork of branches in shrubs, small trees, and briars from 2-60' above ground.</td>
</tr>
<tr>
<td>chestnut-sided warbler</td>
<td>Setophaga pensylvanica</td>
<td></td>
</tr>
<tr>
<td>Magnolia Warbler</td>
<td>Setophaga magnolia</td>
<td></td>
</tr>
<tr>
<td>Yellow-rumped warbler</td>
<td>Setophaga coronata</td>
<td></td>
</tr>
<tr>
<td>Palm Warbler</td>
<td>Setophaga paimarum</td>
<td></td>
</tr>
<tr>
<td>Bay-breasted Warbler</td>
<td>Setophaga castanea</td>
<td></td>
</tr>
<tr>
<td>Blackpoll Warbler</td>
<td>Setophaga strata</td>
<td></td>
</tr>
<tr>
<td>Black-and-white Warbler</td>
<td>Mniotilta varia</td>
<td></td>
</tr>
<tr>
<td>American Redstart</td>
<td>Setophaga ruticilla</td>
<td>In fork of tree, 4-70' above the ground.</td>
</tr>
<tr>
<td>Ovenbird</td>
<td>Seiurus aurocapilla</td>
<td></td>
</tr>
<tr>
<td>Common Yellowthroat</td>
<td>Geothlypis trichas</td>
<td>(less than 3' up) on tussocks of weeds, grasses, or shrubs, and among cattails, bulrushes, sedges in marshes.</td>
</tr>
<tr>
<td>Wilson's Warbler</td>
<td>Cardellina pusilla</td>
<td></td>
</tr>
<tr>
<td>Swamp Sparrow</td>
<td>Melospiza georgiana</td>
<td>In marsh vegetation such as cattails, sedge tussocks, or bushes, often directly above the water, up to 5' high</td>
</tr>
<tr>
<td>White-throated Sparrow</td>
<td>Zonotrichia albicollis</td>
<td></td>
</tr>
<tr>
<td>Chipping Sparrow</td>
<td>Spizella passerina</td>
<td>Usually in a conifer, (or deciduous tree) or sometimes on the ground; usually lower than 15' above the ground</td>
</tr>
<tr>
<td>Song Sparrow</td>
<td>Melospiza melodia</td>
<td>Usually on ground under clump of grass or shrub, or less than 4' above the ground, sometimes up to 10' or higher.</td>
</tr>
<tr>
<td>Dark-eyed Junco</td>
<td>Junco hyemalis</td>
<td></td>
</tr>
<tr>
<td>House Finch</td>
<td>Haemorhous mexicanus</td>
<td>In conifers, ivy on buildings, holes in manmade structures, averaging about 12-15' above the ground.</td>
</tr>
<tr>
<td>Cedar Waxwing</td>
<td>Bombycilla cedrorum</td>
<td></td>
</tr>
<tr>
<td>Scarlet Tanager</td>
<td>Piranga olivacea</td>
<td>In tree (usually deciduous), typically 20-30' above ground, sometimes lower or much higher.</td>
</tr>
<tr>
<td>Northern Cardinal</td>
<td>Cardinalis cardinalis</td>
<td>Usually well hidden in dense shrubs, vines, or low trees, placed 3-10' above ground, sometimes higher.</td>
</tr>
<tr>
<td>Rose-breasted Grosbeak</td>
<td>Pheucticus ludovicianus</td>
<td></td>
</tr>
<tr>
<td>Indigo Bunting</td>
<td>Passerina cyanea</td>
<td>Nest site is usually 1-3' above ground, rarely up to 30' or more, in dense shrub or low tree.</td>
</tr>
<tr>
<td>Baltimore Oriole</td>
<td>Icterus galbula</td>
<td>Nest site is in tall deciduous tree, placed near end of drooping branch, usually 20-30' up, can be higher.</td>
</tr>
<tr>
<td>Red-winged Blackbird</td>
<td>Agelaius phoeniceus</td>
<td>Marsh growth such as cattails or bulrushes, in bushes or saplings close to water, or in dense grass in fields.</td>
</tr>
<tr>
<td>Brown-headed Cowbird</td>
<td>Molothrus ater</td>
<td></td>
</tr>
<tr>
<td>Common Grackle</td>
<td>Quiscalus quiscula</td>
<td></td>
</tr>
<tr>
<td>American Goldfinch</td>
<td>Spinus tristis</td>
<td>In deciduous shrubs or trees, sometimes in conifers or in dense weeds, less than 30' above the ground.</td>
</tr>
<tr>
<td>American Woodcock</td>
<td>Scelopax minor</td>
<td>On ground, usually in open woods or overgrown field, in area with many dead leaves.</td>
</tr>
</tbody>
</table>