

**ST. LOUIS ICE CENTER PROJECT  
DRAFT ENVIRONMENTAL ASSESSMENT**  
Maryland Heights, St. Louis County, Missouri



**Lead Agency:**  
US DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE  
Omaha, Nebraska

**State LWCF Agency:**  
Missouri Department of Natural Resources – LWCF Management Section  
Jefferson City, Missouri

June 2017

To request further information, contact:  
Janet Wilding  
St. Louis Economic Development Partnership  
7733 Forsyth Blvd.  
Suite 2300  
St. Louis, MO 63105  
Phone: 314-615-7663  
E-mail: [JWilding@stlpartnership.com](mailto:JWilding@stlpartnership.com)

---

**THIS PAGE LEFT BLANK INTENTIONALLY**

---

---

## Table of Contents

---

1.0	Purpose and Need for Action .....	1-1
1.1	Project Overview .....	1-1
1.2	Project Description .....	1-2
1.3	Park History.....	1-3
1.4	Project Purpose.....	1-3
1.5	Project Need .....	1-3
1.6	Scoping and Public Involvement Activities .....	1-4
1.7	Necessary Federal Permits or Licenses .....	1-5
1.8	Issues Addressed.....	1-5
2.0	Project Alternatives .....	2-9
2.1	Introduction .....	2-9
2.2	Background of Alternative Development.....	2-9
2.3	Evaluation of Alternatives .....	2-10
	2.3.1 Alternatives Not Considered for Further Analysis .....	2-10
	2.3.2 Alternatives Retained for Analysis .....	2-12
2.4	Environmentally Preferable Alternative.....	2-13
3.0	Affected Environment.....	3-1
3.1	Socioeconomics .....	3-1
	3.1.1 Affected Environment.....	3-1
3.2	Land Use .....	3-3
3.3	Prime Farmland.....	3-5
3.4	Traffic and Transportation .....	3-6
	3.4.1 Existing Transportation Infrastructure .....	3-6
	3.4.2 Existing Traffic Volumes .....	3-6
	3.4.3 Existing Operating Conditions.....	3-7
3.5	Air Quality.....	3-9
	3.5.1 Air Quality Standards .....	3-9
	3.5.2 Air Quality Conditions .....	3-10
3.6	Noise .....	3-11
	3.6.1 Noise Regulations .....	3-13
	3.6.2 Sources of Noise.....	3-13
	3.6.3 Noise Receptors.....	3-13
3.7	Geology, Groundwater and Soils .....	3-14
3.8	Cultural Resources.....	3-15
	3.8.1 Regulatory Framework for Cultural Resources.....	3-15
	3.8.2 Project Area .....	3-16
	3.8.3 Previous Studies .....	3-16
3.9	Biological Resources (Vegetation, Wildlife, Aquatic Life) .....	3-17
3.10	Threatened and Endangered Species .....	3-18
3.11	Wetlands .....	3-21
3.12	Surface Water .....	3-21
3.13	Floodplain.....	3-22
3.14	Hazardous Waste.....	3-22
3.15	Visual Environment .....	3-23
3.16	Visitor Experience / Recreation Resources .....	3-27

4.0	ENVIRONMENTAL CONSEQUENCES .....	4-1
4.1	Socioeconomics .....	4-1
4.1.1	No Action Alternative .....	4-1
4.1.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-1
4.2	Land Use .....	4-2
4.2.1	No Action Alternative .....	4-2
4.2.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-2
4.3	Prime Farmland.....	4-2
4.3.1	No Action Alternative .....	4-2
4.3.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-3
4.4	Traffic and Transportation.....	4-3
4.4.1	No Action Alternative .....	4-3
4.4.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-3
4.5	Air Quality.....	4-7
4.5.1	No Action Alternative .....	4-7
4.5.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-7
4.6	Noise .....	4-9
4.6.1	No Action Alternative .....	4-9
4.6.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-9
4.7	Geology, Groundwater and Soils .....	4-12
4.7.1	No Action Alternative .....	4-12
4.7.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-12
4.8	Cultural Resources.....	4-13
4.8.1	No Action Alternative .....	4-13
4.8.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-13
4.9	Biological Resources (Vegetation, Wildlife, Aquatic Life) .....	4-13
4.9.1	No Action Alternative .....	4-13
4.9.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-13
4.10	Threatened and Endangered Species .....	4-14
4.10.1	No Action Alternative .....	4-14
4.10.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-14
4.11	Wetlands .....	4-15
4.11.1	No Action Alternative .....	4-15
4.11.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-15
4.12	Surface Water .....	4-15
4.12.1	- No Action Alternative .....	4-15
4.12.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-15
4.13	Floodplains.....	4-16
4.13.1	No Action Alternative .....	4-16

4.13.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-17
4.14	Hazardous Waste.....	4-17
4.14.1	No Action Alternative .....	4-17
4.14.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-18
4.15	Visual Environment .....	4-18
4.15.1	No Action Alternative .....	4-18
4.15.2	Alternative 1 – Construction of the Proposed Ice Center at 13750 Marine Avenue .....	4-19
4.16	Visitor Experience / Recreation Resources .....	4-21
4.16.1	No Action Alternative .....	4-21
4.16.2	Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue .....	4-21
4.17	Cumulative Impacts.....	4-22
4.17.1	Identification of the Significant Cumulative Effects Issues .....	4-22
4.17.2	Geographic Area of Analysis .....	4-23
4.17.3	Past, Present, and Reasonably Foreseeable Future Actions in the Study Area.....	4-23
4.17.4	Cumulative Impacts .....	4-24
5.0	Consultation and Coordination.....	5-1
5.1	Public Coordination .....	5-1
5.2	Agency Coordination.....	5-1
6.0	List of Preparers.....	6-1
7.0	Recipients of this Document .....	7-1
7.1	Federal Agencies .....	7-1
7.2	Federally Recognized Tribes .....	7-1
7.3	State Agencies .....	7-1
7.4	Individuals and Organizations.....	7-1
8.0	References.....	8-1

## List of Tables

Table 2-1. Summary of Impacts – No Action Alternative and Alternative 1.....	2-14
Table 3-1. Demographic and Economic Characteristics .....	3-2
Table 3-2. Land Use/Land Cover.....	3-5
Table 3-3. Average Weekday Traffic Volumes Near the Proposed Project Site .....	3-7
Table 3-4. Level of Service Thresholds at Intersections.....	3-8
Table 3-5. Existing Operating Conditions .....	3-8
Table 3-6. USEPA Criteria Pollutant Emission Standards.....	3-10
Table 3-7. Common Indoor and Outdoor Noise Levels .....	3-12
Table 3-8. Previously Recorded Archaeological Sites within a one-mile buffer of the PA. ....	3-16
Table 3-9. Cultural Resource Surveys Within a one-mile buffer of the PA.....	3-17
Table 3-10. Sensitive Species that May Occur Within or Near the Project Area.....	3-19
Table 4-1. Forecast Operating Conditions, 2017 (Alternative 1) .....	4-5
Table 4-2. Forecast Operating Conditions, 2037 .....	4-6
Table 4-3. Typical Construction Equipment Noise Levels .....	4-10
Table 4-4. Traffic Related Sound Levels as Modeled in TNM 2.5 (dBA).....	4-11
Table 4-5. Reasonably Foreseeable Future Projects Considered as Part of the Cumulative Impacts Analysis .....	4-23

## List of Figures

Figure 1-1. Project Location Map.....	1-6
Figure 1-2. Site Development Plan .....	1-7
Figure 2-1. Initial Study Alternatives .....	2-15
Figure 3-1. Existing Land Use.....	3-30
Figure 3-2. Prime Farmland .....	3-31
Figure 3-3. Transportation Features .....	3-32
Figure 3-4. Noise Receptors .....	3-33
Figure 3-5. Wetlands.....	3-34
Figure 3-6. Floodplains / Flood Insurance Rate Map.....	3-35
Figure 3-7. Existing Recreation.....	3-36

## **List of Appendices (in separate file)**

---

- Appendix A Project Description / Environmental Survey Form (PD/ESF), Dated June 2017
- Appendix B Traffic Impact Study, Dated May 7, 2017
- Appendix C Soils Report
- Appendix D Phase I Cultural Resource Survey, Dated June 8, 2017
- Appendix E Habitat Evaluation Memo, Dated May 8, 2017
- Appendix F Stormwater Management Facilities Report: Detention Volume – Howard Bend Levee District, Dated March 27, 2017.
- Appendix G Form AD-1006 – Farmland Conversion Impact Rating
- Appendix H Marine Avenue – Road Widening Plan
- Appendix I Correspondence

---

## Symbols, Acronyms, and Abbreviations

---

<b>µg/m<sup>3</sup></b>	microgram per cubic meter
<b>BMP</b>	best management practices
<b>CEQ</b>	Council on Environmental Quality
<b>CFR</b>	Code of Federal Regulations
<b>CWA</b>	Clean Water Act
<b>dB</b>	decibel
<b>dba</b>	A-weighted decibel
<b>dbh</b>	diameter at breast height
<b>DOI</b>	Department of the Interior
<b>EA</b>	environmental assessment
<b>EIS</b>	environmental impact statement
<b>EJ</b>	environmental justice
<b>EO</b>	executive order
<b>ESA</b>	Endangered Species Act of 1973
<b>ESF</b>	environmental screening form
<b>FEMA</b>	Federal Emergency Management Agency
<b>FHWA</b>	Federal Highway Administration
<b>FIRM</b>	flood insurance rate map
<b>FONSI</b>	finding of no significant impact
<b>FPPA</b>	Farmland Protection Policy Act
<b>GRG</b>	Great Rivers Greenway District
<b>HUD</b>	Department of Housing and Urban Development
<b>Hz</b>	hertz
<b>Ldn</b>	day-night sound level averaged
<b>Leq</b>	equivalent sound level
<b>LOS</b>	level of service
<b>LWCF</b>	Land and Water Conservation Fund
<b>MDC</b>	Missouri Department of Conservation
<b>MDNR</b>	Missouri Department of Natural Resources
<b>MoDOT</b>	Missouri Department of Transportation
<b>mph</b>	miles per hour
<b>NAAQS</b>	National Ambient Air Quality Standards
<b>NEPA</b>	National Environmental Policy Act
<b>NHPA</b>	National Historic Preservation Act
<b>NPS</b>	National Park Service
<b>NRPA</b>	National Recreation and Park Association
<b>NWI</b>	national wetlands inventory
<b>OEPC</b>	Office of Environmental Policy and Compliance (Department of the Interior)
<b>Park</b>	Creve Coeur Lake Memorial County Park
<b>PD/ESF</b>	proposal description and environmental screening form
<b>ppb</b>	parts per billion
<b>ppm</b>	parts per million
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>SHPO</b>	State Historic Preservation Officer (MDNR)
<b>SLCDPR</b>	St. Louis County Department of Parks and Recreation
<b>SLIC</b>	St. Louis Ice Center
<b>SPCC</b>	spill prevention, control and countermeasure plan
<b>SWPPP</b>	stormwater pollution prevention plan



<b>TNM</b>	traffic noise model
<b>USACE</b>	U.S. Army Corps of Engineers
<b>USC</b>	United States Code
<b>USCB</b>	U.S. Census Bureau
<b>USDA</b>	U.S. Department of Agriculture
<b>USEPA</b>	U.S. Environmental Protection Agency
<b>USFS</b>	U.S. Forest Service
<b>USGS</b>	U.S. Geological Survey
<b>USFWS</b>	U.S. Fish and Wildlife Service
<b>voc</b>	volatile organic compound
<b>WASO</b>	Washington Support Office (National Park Service)
<b>WOUS</b>	waters of the United States

**THIS PAGE LEFT BLANK INTENTIONALLY**

---

## 1.0 PURPOSE AND NEED FOR ACTION

### 1.1 Project Overview

St. Louis County Department of Parks and Recreation (SLCDPR) manages Creve Coeur Lake Memorial County Park (Park) in the municipality of Maryland Heights in St. Louis County, Missouri (Figure 1-1). The Park encompasses 2,113.91 acres and lies on both upland ground and bottomland areas of the Missouri River floodplain.

St. Louis County received a donation of 400 acres of land that became Creve Coeur Lake Memorial Park in 1945. Since then, St. Louis County has received funding through the Land and Water Conservation Fund (LWCF) to further establish new areas of the Park. The LWCF Act of 1965 (16 United States Code [USC] 4601-4 to 4601-11) was enacted to establish a funding source to assist the States and Federal agencies in meeting present and future outdoor recreation demands and needs. Federal assistance (funds) from the Act are authorized to the States for the planning, acquisition, and/or development of needed land and water or utilized, directly, by Federal agencies for the acquisition and development of “certain lands.” Administration of the LWCF Act is by the National Park Service (NPS) which, in turn, delegates many of the roles and responsibilities to a department within the state (NPS, 2017). In Missouri, statewide administration has been delegated to the LWCF Grants Management section of the Missouri Department of Natural Resources (MDNR).

Section 6(f) of the LWCF Act mandates that any site acquired or developed, either partially or wholly, with LWCF assistance must be retained in public outdoor recreation use in perpetuity. Conversion to any other use must receive prior approval of the NPS. Section 6(f)(3) states that those properties acquired or developed with LWCF funds shall not be converted to a use other than public outdoor recreation without the approval of the Secretary of the Department of the Interior, acting through the NPS and at the request of the state delegate/state liaison officer. However, a proposal to construct a public facility, such as an indoor pool building or recreation center, does not constitute a conversion to non-outdoor recreational use in all instances. Public recreational facilities may be approved on Section 6(f) land where the facility results in a net gain in outdoor recreation benefits or enhances the outdoor recreation use of the entire park, and the facility is compatible with and significantly supportive of the outdoor recreation resources and opportunities of the Section 6(f)(3) protected area.

A proposal has been submitted to develop the St. Louis Ice Center (SLIC) on a piece of land designated as Section 6(f) land within the Park. The SLIC will increase public outdoor recreational opportunities throughout the year (including the winter months when Park visitation is generally lower), will attract people from across the state and region and it will increase overall use of the Park. As part of the proposal, the SLCDPR would retain ownership of the land and lease it to a not-for-profit organization, the St. Louis Legacy Ice Foundation (Foundation), which has been formed to oversee construction and the operation of the project. The proposal to construct a public facility on approximately 40 acres of land within the Park, which are protected under Section 6(f), requires the approval of NPS.

A determination has been made that various aspects of the proposed project will have impacts that exceed “minor.” As a result of this determination, MDNR has required an Environmental Assessment (EA) be prepared to further assess the impacts of the proposed project. The EA serves to provide information to MDNR and NPS to evaluate the proposed project with regard to the environmental consequences of the proposed action and potential impacts to the human environment. An LWCF draft “Proposal Description and Environmental Screening Form” (PD/ESF) is also included as part of this document and can be found in Appendix A.

## 1.2 Project Description

The proposed SLIC project is to develop a new outdoor recreation facility in Creve Coeur Lake Memorial Park at 13750 Marine Avenue just southeast of Route 141 (Figure 1-2).

The proposed outdoor recreation project consists of the following:

- three indoor ice sheets under one roof;
- a seasonal outdoor skating sheet;
- an outside athletic field space (120 feet by 225 feet);
- an 880-space surface parking lot adjacent to the proposed SLIC;
- a future potential 257-space overflow parking lot west of Marine Avenue across from the proposed SLIC;
- widening of Marine Avenue from two to three lanes in front of the proposed SLIC (this will be achieved within existing rights of way);
- two striped crosswalks on Marine Avenue;
- onsite stormwater detention; and
- two connections to the Fee Fee Greenway trail.

The three indoor ice sheets have the following spectator seating:

- an event center ice sheet with a 3,400-seat capacity
- one additional sheet of ice for youth hockey development having an approximate 400-seat capacity; and
- a new training center and sheet of ice with a 700-seat capacity.

The SLIC would occupy approximately 250,000 square feet (5.7 acres) of the approximate 40-acre site. Proposed recreational activities available at the SLIC would include (but are not limited to) the following:

- public ice skating
- figure skating
- learn-to-skate sessions
- learn-to-play sessions
- in-line skating
- youth, high school & college hockey
- floor hockey
- indoor field hockey
- athletic strength, conditioning and rehabilitation
- sled hockey

All four ice sheets would accommodate public hockey programs for all ages including elite players, local youth organizations, universities, high schools and adults. Events such as the USA Hockey High School Championship, the Synchronized Figure Skating National Championships, World Sled Hockey Challenge (for disabled hockey players) and the IIHF World Junior (hockey) Championship, could all be hosted at or make use of the proposed recreational facility. Support facilities at SLIC include office space, concessions, strength/conditioning/rehabilitation facilities, a pro-shop, dressing rooms, and restrooms.

All of these elements would be accessible to the public. No memberships would be required for the use of the facility and fees for the use of the facility would be nominal and comparable to other typical outdoor recreation uses. The facility would remain under control and tenure of SLCDPR, which will lease the operation of the facility to a non-profit organization.

Surface parking is proposed immediately adjacent to the SLIC and across Marine Drive to the west. The surface parking will benefit Park users as well as users of the proposed outdoor athletic field and the Fee Fee Greenway Trail, a multipurpose trail (which is being developed by Great

Rivers Greenway). The parking area would also be used as a trailhead for this trail, which will have connectivity to the rest of the multi-purpose trails in the Park.

### **1.3 Park History**

The Park was established on June 3, 1945. The initial Park size was 400 acres and was made available through a donation from a land owner and was the first county park. St. Louis County purchased the land surrounding the lake, including the Creve Coeur Beach subdivision, east of Marine Drive, from funds made available from county bonds issued in 1969. The federal government required that all of the buildings and property in the Creve Coeur Beach subdivision be purchased prior to the receipt of federal money. Included were approximately 150 cottages, some of which were permanent residences requiring government relocation assistance.

For several years in the 1970s, Creve Coeur Lake was dredged, which increased its size from 220 acres to 320 acres. In the course of the dredging, a large unexpected quantity of sand was discovered, which was then used to construct a 1,600-foot beach along Marine Avenue. Between 1974 and 1984, 355 acres of land were purchased for Park expansion with LWCF funds. In 1984, an LWCF grant was awarded to SLCDPR for the development of Sailboat Cove. The lower Park was entirely submerged by the Missouri River in the flood of 1993. Several Park facilities were destroyed or damaged, and since then the facilities in that location have been designed to withstand flooding.

In the early 1990s, the Missouri Department of Transportation (MoDOT) began planning for and designing the extension of Page Avenue (Highway 364) from Interstate 270 (I-270) west from the Park across the south end of Creve Coeur Lake. Section 6(f) of the LWCF required that the environmental impacts associated with this highway project be mitigated. As a result, 1,005.8 acres were added to Creve Coeur Lake Memorial Park in 1999, which included four miles of paved bicycle path. A new lake (Mallard Lake) was developed, which now helps alleviate the recurrence of siltation in Creve Coeur Lake. Of this added acreage, 167 acres have been leased to Crystal Springs Quarry Golf Club for 30 years, until December 2029.

Annual attendance at Creve Coeur Lake Memorial Park has exceeded 1 million visitors, making it the most heavily visited of the St. Louis County parks (SLCDPRa 2017).

### **1.4 Project Purpose**

The primary purpose of the proposed action is to construct a public recreational ice complex (the SLIC) to accommodate current and anticipated future ice-related recreational opportunities in the region. The SLIC would provide greater opportunities for development of youth and adult ice sport programs ranging from learn-to play/skate to summer camps. The proposed project is forecast to be a destination facility with the ability and mission to accommodate regional and national sporting events for both able-bodied and disabled athletes throughout the year. In addition to enhancing recreational opportunities within the Park, the facility would attract visitors from the region which would provide an economic benefit to the St. Louis metropolitan area which includes the Missouri counties of Jefferson, St. Louis and St. Charles, the City of St. Louis, and Illinois counties of Monroe, Madison and St. Clair.

### **1.5 Project Need**

To accommodate the anticipated growth in ice sports (e.g., youth and adult hockey and figure skating) and the need to accommodate public skaters, there is a need for additional ice sheets in the St. Louis metro area. Skating rinks are considered public facilities under the LWCF program

and due to the climate in St. Louis, covered rinks are necessary in order to maintain the ice to support ice-related recreation.

Over the last decade, youth and adult hockey participation, especially among girls and women, in the St. Louis metro area has grown and is expected to continue to grow. According to the Foundation, there are currently 7,000 youth and roughly 3,000 adult hockey participants in St. Louis metro area. Based on levels of youth participation in a similar market, Pittsburgh, Pennsylvania, it is a goal that by 2020 there will be 12,000 youth hockey participants in the St. Louis metropolitan area.

According to recreation standards established by the National Recreation and Park Association (NRPA), there is a need for one indoor ice facility for every 100,000 in population. These standards are guidelines to determine land requirements for various kinds of park and recreation areas and facilities. The standards assist with determining recreational needs for a community or regional area. St. Louis County has a population of slightly less than 1 million. Based on the NRPA standards, there is a need for 10 indoor ice facilities in St. Louis County. If the entire St. Louis Metro area with a population of 2.8 million is considered, there is a need for 28 indoor ice facilities (based on the assumption of one ice sheet per facility).

The St. Louis metro area recently lost three ice sheets with the closing of the Hardee's Iceplex in Chesterfield, Missouri. The Hardee's Iceplex, which was constructed in 1995, was the largest ice skating facility in Missouri, and one of the largest ice facilities in the Midwest with two professional size (85-ft by 200-ft) sheets and a showcase Olympic size (100-ft x 200-ft) sheet with seating for up to 2,200 (Hardee's 2017). These three rinks allowed for large scale events and hockey tournaments. The closing of this facility reduced the number of ice sheets in the St. Louis metro area from 21 to 18. In order to reach the goal of 12,000 youth hockey participants in the St. Louis area by 2020, the area would need a total of 36 to 40 ice sheets to accommodate this level of participation. In comparison, the Pittsburgh metro area has 14,600 participants in youth hockey programs with 44 ice sheets.

## **1.6 Scoping and Public Involvement Activities**

Scoping is the initial process used to identify the affected environment that may be impacted by the proposed project, and to identify alternatives for achieving the proposed action, while minimizing the potential impacts.

The St. Louis County Planning Department held a public meeting on January 25, 2017 to present the proposed project. Notification of the meeting was published on the County's website and emailed to subscribers and open space organizations. In addition, notice of the meeting was mailed to nearby property owners and was posted on signage in the Park.

Representatives from St. Louis County and from the Foundation presented the proposed project to the attendees. After the presentations, 42 individuals spoke on the topic with 25 in favor of the project and 17 opposed to it. The attendees that spoke were unanimous in their agreement of the benefits of ice sports facilities for recreation, health, fitness and family fun. However, there was not unanimous support for the siting of the proposed project in Creve Coeur Lake Memorial Park. The public comments can be summarized into three major areas:

- Ice sports enthusiasts' support for the project in its proposed location.
- Open space advocates and Park users against the use of the proposed location.
- Maryland Heights Officials' support for the project and its proposed location.

## 1.7 Necessary Federal Permits or Licenses

A National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit for storm water runoff from construction activities is anticipated for the proposed SLIC.

## 1.8 Issues Addressed

Based on preliminary analysis and comments received to date, the following resources and issues could potentially be affected by implementing the proposed project:

- Land Use
- Biological Resources (vegetation, wildlife and aquatic life)
- Floodplains and Wetlands
- Surface Water
- Water Resources
- Threatened and Endangered Species
- Geology and Soils
- Transportation
- Noise
- Air Quality
- Aesthetics and Visual Resources
- Cultural Resources
- Socioeconomics and Environmental Justice

The potential direct and indirect impacts of each resource are assessed in the EA. Mitigative measures designed to minimize impacts are also identified. In addition, the EA includes an analysis of the cumulative impacts of the Preferred Alternative. A cumulative impact analysis considers the potential impact to the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations [CFR] § 1508.7). The methodology for performing such analyses is set forth in “Considering Cumulative Effects under NEPA” (CEQ 1997a).

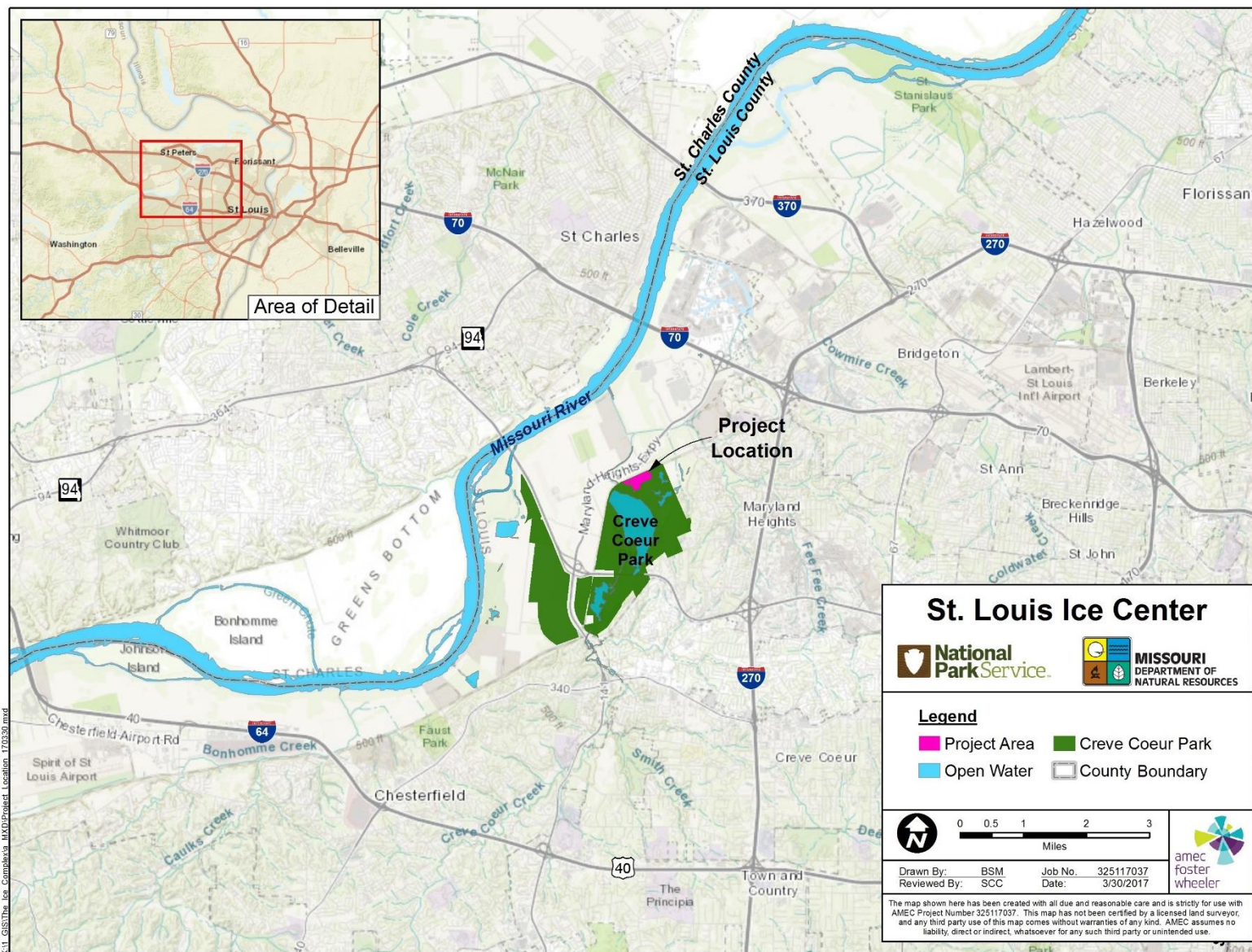


Figure 1-1. Project Location Map





Figure 1-2. Site Development Plan

**THIS PAGE LEFT BLANK INTENTIONALLY**

---

## 2.0 PROJECT ALTERNATIVES

### 2.1 Introduction

The Council on Environmental Quality (CEQ) has provided guidance for the development and analysis of alternatives under the National Environmental Policy Act (NEPA). A full range of alternatives, framed by the purpose and need, must be developed for analysis for any federal action. Alternatives should meet the project purpose and need, and minimize impacts to environmental resources. Alternatives should also be “reasonable,” which CEQ has defined as those that are economically and technically feasible, and show evidence of common sense. Alternatives that could not be implemented if they were chosen (for economic or technical reasons), or do not resolve the need for action and fulfill the stated purpose in taking action to a large degree, are therefore not considered reasonable. The alternatives chapter describes and analyzes alternative pathways for achieving a desired result.

### 2.2 Background of Alternative Development

This EA evaluates a range of alternatives for the proposed SLIC. The study team for this EA developed criteria to bind the development of alternatives for the SLIC to a manageable area in the St. Louis metro area. These criteria consist of the following factors:

- Central Location. The site should be centrally located in St. Louis County such that it is accessible to all primary users.
- Size. The site must meet the minimum acreage requirement of 40 acres.
- Accessibility. The site should have good access to major (four-lane) highways and minimize disruption to existing traffic patterns.
- The project should minimize land costs to make the project financially viable.
- Site Topography. To enhance constructability, the site should be on land that is relatively flat.
- Surrounding Uses. The location should conform to surrounding land uses and encourage public use and should be proximate to other recreational uses (active and passive).

When considering these criteria, two areas in St. Louis County were identified as viable locations for the proposed Ice Center:

1. within or near Creve Coeur Lake Memorial Park in Maryland Heights; and
2. within Queeny Park in unincorporated St. Louis County east of Weidman Road between Manchester Road and Clayton Road.

(The selection of these two county park areas for development of an ice recreation complex is not without precedent. Currently, there are two county parks with a covered ice complex. These are Queeny County Park (Greensfelder Recreation Complex), and Suson County Park (Wayne Kennedy Recreation Complex) on Wells Road off of Highway 21 in south St. Louis County.)

Given the two regional locations listed above, the study team considered five alternative sites for the proposed SLIC. These alternatives were developed from a collaborative analysis based on the interdisciplinary expertise of planning team members. Four of these sites are in the vicinity of

Creve Coeur Lake Memorial Park, and the other is at Queeny Park (Figure 2-1). These are described below:

**Alternative 1:** 13750 Marine Avenue in Creve Coeur Lake Memorial Park;

**Alternative 2:** Land south of Highway 364 and west of Highway 141 in Creve Coeur Lake Memorial Park;

**Alternative 3:** Sportport north of Highway 141 between Marine Avenue and Creve Coeur Mill Road; and

**Alternative 4:** Golfport south of Highway 141 between Marine Avenue and Creve Coeur Mill Road.

**Alternative 5:** Queeny Park near the existing Greensfelder Recreation Complex.

Alternatives 1 and 2 are within the Park on Section 6(f) land that is owned by St. Louis County. Alternatives 3 and 4 are on private property. Alternative 5 is on land owned by St. Louis County but is not a Section 6(f) property.

## 2.3 Evaluation of Alternatives

The alternatives were evaluated at a high-level in order to determine those considered worthy to carry forward for further analysis. Elements considered at this higher level of analysis included: suitability of the site for development; traffic circulation and access; infrastructure and land development costs; and substantive environmental impacts.

### 2.3.1 Alternatives Not Considered for Further Analysis

Four of the alternative sites were considered but not retained for further analysis due to environmental impacts, poor traffic circulation, inadequate setbacks or some other issue. These alternatives are summarized below:

#### 2.3.1.1 Alternative 2

Alternative 2 is a 56-acre parcel located just to the west of Highway 364 and north of River Valley Drive located in the Park and designated as Section 6(f) land. The site is currently undeveloped and consists of a mix of woodland and open field. This site is not recommended for further evaluation for a number of reasons:

- The site is located in close proximity to the Howard Bend Levee and an under-seepage berm which significantly restricts the ability to do subsurface preparation and ground penetrations on site (foundations, utilities, potential ground improvement measures, etc.).
- The Levee District would require a 350-foot setback from the levee, which would make the site unfeasible due to the loss of developable land.
- Sanitary and water connections are not readily available and would be difficult and costly due to the long distances required to make the connection.
- Development of the site would require substantive and costly fill.
- The soils at this location are high in clay content, highly plastic and would require further study to determine the construction quality of the soils. There is a high probability that some form of soil remediation/stabilization would be required.
- Access to this location is poor and would be off of River Valley Drive (a two-lane road) with no immediate direct access to Highway 141. Therefore, a new intersection off

Route 141 and access to the site itself would have to be constructed resulting in additional environmental impacts and cost.

- According to the National Wetland Inventory (NWI), there are wetlands at this location, which would be impacted and wetland delineation and mitigation may be required for the development of this site.

For the reasons listed above, Alternative 2 was not considered viable and was eliminated from consideration.

### **2.3.1.2 Alternative 3**

This 50-acre privately owned site is located at the intersection of Golfport Drive and Highway 141 at 3250 Creve Coeur Mill Road. Currently a portion of the property is used for recreational purposes as a driving range and batting cages. Listed below are some of the features of this alternative.

- A sanitary sewer for this site could be connected to the new pump station installed just north of Maryland Heights Pump Station. A new water line could be connected to the existing 12-inch main adjacent to the south side of Highway 141.
- The site would have good access to Highway 141 with a direct link and with an existing traffic signal.
- The site is located within the 100-year flood zone of Creve Coeur Creek as indicated by the Federal Emergency Management Agency (FEMA). The elevation of the site averages around 445 feet, which would require five to seven feet of fill to elevate the site one foot above the 100-year flood elevation.
- The development of the site would require a significant detention basin or an underground detention system, either of which would be very costly.
- An overhead utility line with a 275-foot wide easement is located on the property, which limits building location and height on the site. Additional special care required throughout the planning and design stages of the development would have to be considered so as not to impact the powerline and this would add to the project cost.
- As with most soils in this area, the soils at this location are highly plastic, and consist of silt and silty clays and would require further study to determine the construction quality of the soils. There is a high probability that some form of soil remediation/stabilization would be required.
- According to the NWI, there are wetlands at this location, which would be impacted and wetland mitigation may be required.
- The site is privately owned. Inquiries were made to the current land owner about a purchase of the property, but the Foundation was unable to agree to terms with the land owner.

As the site is not available for development, and contains a 275-foot wide overhead utility easement on the property, Alternative 3 was eliminated from further consideration.

### **2.3.1.3 Alternative 4**

This site is located at the intersection of Sportport Drive and Highway 141 at 12525 Sportport Road and is currently used as the Sportport International recreational facility with 15 soccer fields. The property, which was constructed 20 years ago, is owned by Maryland Heights and leased to

an individual who controls the site for the next 20 years. Listed below are some of the features of this alternative.

- Good access to utilities as a sanitary sewer for this site could be connected to the new pump station installed just north of Maryland Heights Pump Station. A new water line could be connected to the existing 12-inch main adjacent to the south side of Highway 141.
- The site would have good access to Highway 141 with a direct link and with an existing traffic signal.
- As with most soils in this area, the soils at this location are highly plastic, and consist of silt and silty clays and would require further study to determine the construction quality of the soils. There is a high probability that some form of soil remediation/stabilization would be required.
- The site is privately controlled. The Foundation was unable to agree to terms with the lessee of Sportport after nine months of negotiation.

Because this site is not available, Alternative 4 was eliminated from further consideration.

#### **2.3.1.4 Alternative 5**

This site is located in Queeny Park at 550 Weidman Road (west access) and at 1675 South Mason Road (east access). Both accesses are between Manchester Road and Clayton Road. This site was considered because it already has an ice complex (Greensfelder Recreation Complex) and because it is within a publicly owned park. However, development of an ice complex at this location poses certain infrastructure and environmental challenges including:

- The development of this site would result in poor traffic flow and circulation. The site is served by Weidman Road and Mason Road, both two-lane roads (Weidman does have a center turn lane from Queeny Park to Manchester Road). The nearest four-lane road is Manchester Road, which is 0.65 miles south of Queeny Park.
- The Foundation was not able to locate an area of land large enough to meet the minimum 40-acre size requirement. Queeny Park has rolling topography and suitable land for development is not as abundant as at the previous sites mentioned.
- The internal traffic circulation would be poor and would likely have adverse impacts on the Queeny Park experience for users of Queeny Park. In order to access the existing ice rink area, traffic would need to use ½ mile of an internal park access road.

For the reasons listed above, Alternative 5 was not considered viable for further study and was eliminated from consideration.

### **2.3.2 Alternatives Retained for Analysis**

#### **2.3.2.1 No Action Alternative**

Under the No Action Alternative, an ice recreation complex would not be constructed and there would be a continued demand for ice-related recreation in the region. Consequently, this alternative would not satisfy the project purpose and need and is not considered viable or reasonable. However, it does provide a benchmark for comparing the environmental impacts of implementation of Alternative 1.

### **2.3.2.2 Alternative 1 (Preferred)**

Alternative 1 is located on an approximate 40-acre tract at 13750 Marine Avenue within the Park. It lies just south of the Southern Pacific Railroad line on the east side of Marine Avenue approximately 750 south of Highway 141.

As shown on the detailed site plan in Appendix A and on Figure 1-2, under this alternative, a new 5.7-acre ice recreation complex, the SLIC, would be constructed within the approximate 40-acre tract. The SLIC would include three indoor ice rinks and one outdoor rink that would be ice in the winter months and could be used for concerts, floor hockey or other outdoor recreational activities during the non-winter months. Also, part of the outdoor recreation plan is an outdoor athletic turf field space measuring 120 feet by 225 feet.

An 880-space surface parking lot would be constructed adjacent to the SLIC and a future potential 257-space surface parking overflow lot would be constructed across from the SLIC on the west side of Marine Avenue. Two pedestrian crossings would be implemented on Marine Avenue to allow for safer movement of pedestrians from the parking lot across Marine Avenue to the proposed SLIC.

Access to the SLIC would be developed off Marine Avenue via three entrances, the middle of which being directly across from Sailboat Cove. Marine Avenue would be widened from two to three lanes wide within existing rights of way between the north and the south entrance.

Two connections would be constructed to the Fee Fee Greenway Trail (which is being developed by GRG) in conjunction with the proposed SLIC.

The sanitary system of the proposed SLIC would be connected to a relatively new pump station installed just north of the Maryland Heights Pump Station. Water needs can be met by connecting to the existing 12-inch water main on the south side of Highway 141. The connection would extend along Marine Avenue. Both the sanitary and water lines would have to pass under the existing Southern Pacific Railroad to make the connection to the project site.

Storm water would be routed to a detention basin and lake located along the north and east ends of the planned development. Additionally, bio-swales will be constructed to manage the quantity and quality of storm water produced from the development. Storm water quality will also be addressed by installing numerous rain gardens throughout the parking lots and by utilizing porous pavement. Storm water generated from the proposed development would ultimately outflow to Creve Coeur Creek.

Energy efficiency would be incorporated into the design of the SLIC to meet Leadership in Energy and Environmental Design (LEED) certification. Measures incorporated into the building design optimize energy performance, protect and conserve water, enhance indoor environmental quality and reduce environmental impact.

## **2.4 Environmentally Preferable Alternative**

The environmentally preferable alternative is defined by CEQ as the alternative that would promote the national environmental policy as expressed in NEPA Section 101. This includes:

- Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assuring for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

- Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- Preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
- Achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and
- Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources.

The NPS is required to identify the environmentally preferable alternative in its NEPA documents for public review and comment. The NPS, in accordance with the Department of the Interior policies, defines the environmentally preferable alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in NEPA (Section 101(b)(5)16 DM 4.10). CEQ further clarifies the identification of the environmentally preferable alternative, stating "Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." The environmentally preferable alternative does not need to be the preferred alternative, nor does it need to be the alternative that is ultimately selected for implementation.

The No Action Alternative would cause the least impact to the biological and physical environment and best protect and preserve natural resources. Furthermore, under the No Action Alternative, the proposed project site, a Section 6(f) property, would remain as undeveloped open space.

Impact associated with the Preferred Alternative (Alternative 1) will not affect natural or cultural resources to the level of significance and would be minimized through implementation of Best Management Practices (BMPs) and other mitigation measures as discussed in Chapter 4.

**Table 2-1. Summary of Impacts – No Action Alternative and Alternative 1**

Resource	No Action Alternative	Alternative 1
Prime farmland conversion (acres)	0	39.91
Traffic flow	No change in traffic flow.	Minor changes that can be managed through modified signal timing and phasing.
Air quality impacts	No impact.	Negligible impact.
Noise receptors	No impact.	Negligible impact.
Geology, groundwater, soils	No impact.	Minor impact that can be mitigated with the use of an appropriate Spill Prevention, Control and Countermeasure Plan
Cultural resources	No impact.	No impact.
Biological resources	No impact.	No impact.
Threatened and endangered species	No impact.	No impact.
Jurisdictional wetlands (acres)	0	0
Surface water	No impact.	Negligible. Surface water would be managed through bio-retention basins and detention lakes.
Floodplains (acres)	0	35.5
Hazardous waste	No impact.	No impact.
Visual impacts	No impact.	Permanent impact in the foreground but is not expected to create significant visual discord. No visual discord in the middleground or background.



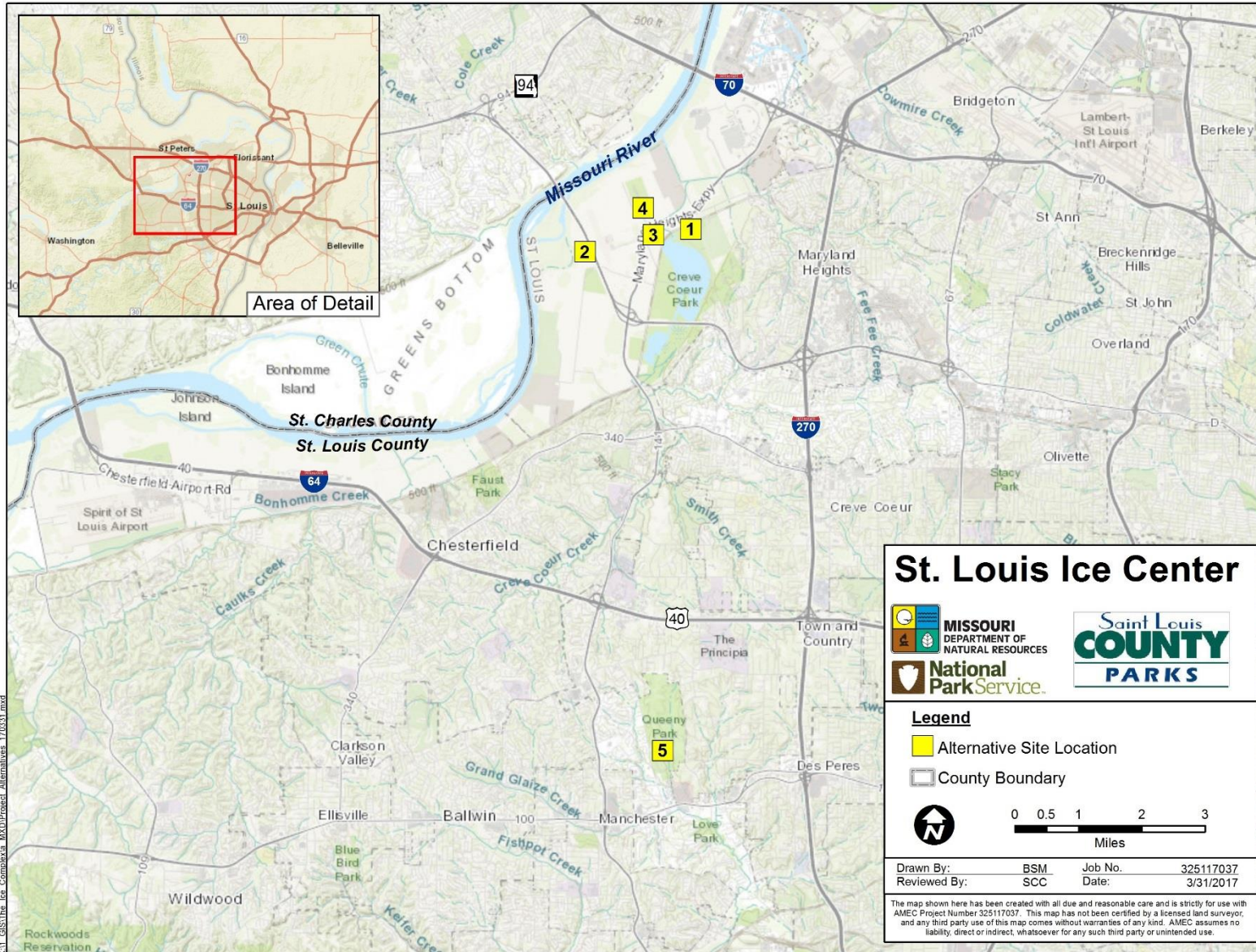


Figure 2-1. Initial Study Alternatives

**THIS PAGE LEFT BLANK INTENTIONALLY**

---

## 3.0 AFFECTED ENVIRONMENT

### 3.1 Socioeconomics

#### 3.1.1 Affected Environment

Socioeconomic characteristics of resident populations are assessed using 2011-2015 American Community Survey (ACS) 5-year estimates provided by the U.S. Census Bureau (USCB 2017a).

For socioeconomic and Environmental Justice (EJ) analyses, data are from a spatial extent and scale that provides the most accurate and up-to-date picture of socioeconomic characteristics in the vicinity of proposed actions. Given the nature of the proposed action, the spatial extent for analysis of socioeconomic impacts is set as a 1-mile radius buffer (project area) around the SLIC project, which encompasses all of the proposed facilities and the immediate community surrounding the Park (Figure 3-1). The spatial scale for analysis of socioeconomic impacts are by block groups (i.e., the second smallest census geography unit). This spatial scale of analysis simultaneously provides fine detail while maintaining the greatest availability of data. Included as secondary geographic areas of reference are St. Louis County and the state of Missouri. Comparisons at multiple spatial scales provides a more detailed picture of populations that may be affected by the proposed actions including EJ populations (e.g., minority and low income).

##### 3.1.1.1 Demographics

Demographic characteristics of the study area (including population and race) are summarized in Table 3-1.

Portions of four St. Louis County municipalities are within the 1-mile project buffer including: Maryland Heights, Chesterfield, Champ, and unincorporated St. Louis County. Overall, there are approximately 11,126 people living in the vicinity of the project area. This represents only 1.1 percent of the population of St. Louis County (1,001,327 people) and 0.2 percent of the population of Missouri (6,045,448 people). These communities are more densely populated (523 people per square mile) than Missouri (87 people per square mile), but less populated than other areas of St. Louis County (1,915 people per square mile) (USCB 2017a).

The population around the project area is slightly more diverse than the State of Missouri and reflects the increased diversity seen in St. Louis County. The white population in the project area makes up 79.8 percent of the total population, which is nearly 10 percent more than St. Louis County (69.6 percent white), but nearly 3 percent less than Missouri (82.6 percent, white). Correspondingly, minority populations in the project area fall between St. Louis County and Missouri levels, with a couple of exceptions. Black, or African Americans, are the largest racial minority group in the project area (7.0 percent), followed by two or more races (6.9 percent), Asian (5.9 percent), and all others (0.4 percent). Of these, Asians and two or more races are higher than the comparative St. Louis County and Missouri populations; however, these populations are not high enough to constitute a potential EJ community (i.e., the difference in the percentages as compared to the other geographies is not more than 20). Similarly, Hispanics and Latinos comprise 5.4 percent of the project area population, a higher population percentage than St. Louis County and Missouri, but not high enough to constitute an EJ community.

**Table 3-1. Demographic and Economic Characteristics**

	SLIC Project Area	St. Louis County	State of Missouri
<b>Population<sup>2</sup></b>			
Population, 2015 estimate	11,126	1,001,327	6,045,448
<b>Racial Characteristics<sup>2</sup></b>			
White alone, 2015 (a)	79.8%	69.6%	82.6%
Black or African American, 2015 (a)	7.0%	23.3%	11.5%
American Indian and Alaska Native, 2015 (a)	0.3%	0.1%	0.4%
Asian, 2015 (a)	5.9%	3.8%	1.8%
Native Hawaiian and Other Pacific Islander, 2015 (a)	0.0%	0.0%	0.1%
Some Other Race, 2015 (a)	0.1%	0.7%	1.1%
Two or More Races, 2015	6.9%	2.5%	2.4%
Hispanic or Latino, 2015d (b)	5.4%	2.7%	3.9%
<b>Income<sup>1</sup></b>			
Median per capita income, 2011-2015	\$36,730	\$35,570	\$26,259
Persons below poverty level, 2011-2015	6.1%	10.9%	15.6%
(a) Includes persons reporting only one race.			
(b) Hispanics may be of any race, so also are included in applicable race categories.			

### 3.1.1.2 Economic Conditions

Economic characteristics (income and poverty rates) are shown in Table 3-1. Income characteristics of the study area are higher than comparison geographies. Median per capita incomes for the defined SLIC project area (\$36,730) are approximately 3 percent higher than St. Louis County (\$35,570) and roughly 40 percent higher than the Missouri average (\$26,259). Additionally, the total persons living below the poverty line around the SLIC project area (6.1 percent) is much lower than St. Louis County (10.9 percent) and Missouri (15.6 percent).

### 3.1.1.3 Environmental Justice

On February 11, 1994, President Clinton signed Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates some federal-executive agencies (including the NPS) to consider EJ as part of the NEPA process. EJ has been defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income (USEPA 2017a) and ensures that minority and low income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities.

Guidance for addressing EJ is provided by the CEQ's Environmental Justice Guidance under NEPA. The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race (not mentioned above); two or more races; or a race

whose ethnicity is Hispanic or Latino (CEQ 1997b). Low income populations are based on annual-statistical poverty thresholds also defined by the USCB.

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997b).

Low-income populations are those with incomes that are less than the poverty level, which varies by the size of family and number of related children under 18 years (CEQ 1997). The 2015 USCB poverty thresholds states the poverty threshold as an annual household income of \$24,257 for a family of four and \$12,082 for an individual (USCB 2017b). A low-income population exists if either of the following two conditions is met:

- The per capita low income population exceeds 50 percent of the total number of households.
- The ratio of low income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic area of analysis.

For this assessment, three geographic areas of analysis (i.e., census block group, county, and state) were used to determine potential EJ populations. Potentially affected communities were defined as any census block group that intersected the 1-mile radius study boundary around SLIC. Demographic data by block group were then compared to county and state-wide data.

There are no EJ minority or low income populations around the SLIC project boundary. Total minority population (i.e., all non-white racial groups and Hispanic or Latino, combined) comprise 21.2 percent of the population of Missouri and 33.1 percent of the population of St. Louis County.

Minorities comprise between 8.3 to 41.2 percent of the population of block groups intersecting the study area around the proposed project (average of 25.6 percent). None of these block groups exceed EJ thresholds when compared to reference geographies. EJ thresholds for St. Louis County and the State of Missouri are well above 20 percent for any given minority population.

The poverty rate in Missouri is 15.6 percent and 10.9 percent for St. Louis County. The average poverty rate of the populations around the proposed project is 6.1 percent and ranges from 1.3 to 13.2 percent between block groups. Therefore, none of these block groups exceed the EJ thresholds for poverty when compared to reference geographies.

### **3.2 Land Use**

The proposed project site is located within the Park in the City of Maryland Heights. The Park encompasses 2,113.91 acres and lies on both upland ground and in the bottomland floodplain. Presently, the majority of the project site is maintained as a mowed field with a

Parks Department storage shed and a gravel drive connecting the shed to Marine Avenue and does not exhibit active recreational use. The open field is mowed seasonally to restrict woody growth. The site is used occasionally for special event parking. The southern portion of the project site is currently used as a disc golf course; however, the disc golf holes are scheduled to be relocated as a result of trail construction in this area.

The Park offers a variety of recreational activities and diversity of land uses. Listed below are some, but not all, of the activities and land uses that can be found in the Park:

- The Quarry at Crystal Springs 18-hole golf course and a driving range;
- Soccer fields and ballfields;
- Biking and pedestrian trails;
- Boat rentals for the lake;
- Bike rentals for the trails;
- Fishing;
- Picnic sites and shelters;
- Go Ape Zip Line and Treetop Adventure;
- Boating, rowing, sailing and windsurfing;
- Passive areas;
- Natural areas;
- Wetlands, woodlands and prairie areas; and
- Creve Coeur Lake, a 320-acre natural lake (an old oxbow of the Missouri River).

Land use and land cover based on the National Land Cover Database (Homer et al. 2011) within the region surrounding the proposed project site are identified in Table 3-2 and shown on Figure 3-1. Land use within a one-mile radius around the proposed project site is a mix of parkland, agriculture (cultivated crops), recreational areas (including trails and a golf course), industrial, commercial and single/multi-family residential. Other common land use types include pasture land, open water associated with Creve Coeur Lake, and single family/multi-family residential developments on the uplands to the east of the project site, and to the west of the project site.

The City of Maryland Heights updated their Comprehensive Plan (Plan) in 2015. The Plan addresses a broad range of topics for the entire city, and covers a long-term time horizon of 20 years. Under the Plan, the project site lies within the Howard Bend Levee District (Maryland Heights, 2015). With the completion of the 500-year Howard Bend levee in 2006, the construction of Route 364 through the planning area, and the extension of the Maryland Heights Expressway (Route 141), the Howard Bend Levee District has significant development potential. According to the 2015 update to the Plan, the City has established a goal to enhance, reinforce, and connect to local and regional open space and recreation facilities.

**Table 3-2. Land Use/Land Cover**

<b>Land Use Type</b>	<b>Acres within 1-mi Radius</b>
Barren Land (Rock/Sand/Clay)	1.07
Cultivated Crops	1,107.2
Deciduous Forest	220.5
Developed High Intensity	75.8
Developed, Low Intensity	356.4
Developed, Medium Intensity	201.6
Developed, Open Space	408.5
Emergent Herbaceous Wetlands	38.4
Grassland/Herbaceous	7.2
Open Water	278.1
Pasture/Hay	3.0
Woody Wetlands	106.4
<b>Total</b>	<b>2,804.17</b>

The project site is zoned as “Mixed Use Development District” or MXD. The intent of the MXD zoning is to permit developments with a mixture of residential, commercial, industrial, cultural and institutional. St. Louis County Parks received approximately 1,100 acres of land as part of the mitigation from the construction of Route 364 (Page Avenue Extension) through the Park. To manage this additional open space, St. Louis County created a master plan and coordinated the rezoning of the Park to MXD. The County’s master plan includes the continuation of existing recreational uses and the expansion of athletic fields. The master plan also calls for more aggressive recreational use.

Furthermore, the project site lies within the City’s Maryland Park Lake District, Creve Coeur Lake Planning Sub-District (Sub-District), which is owned and managed almost in its entirety by the St. Louis County Department of Parks and Recreation. The Sub-District encompasses nearly 20 percent of the Maryland Park Lake District. The long-term vision of the Sub-District is to function as a major regional destination for a variety of active and passive recreational uses, some of which are unique to the region, and all of which are supportive of the City’s hospitality and entertainment industry.

### **3.3 Prime Farmland**

The U.S. Department of Agriculture (USDA) defines prime farmland as land with soils capable of producing high yields of food, feed, forage, fiber, and oilseed crops, and is available for these uses. The 1981 Farmland Protection Policy Act (FPPA) and its implementing regulations (7 CFR Part 658) require all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting land to a use incompatible with agriculture. This type of conversion is not the same as the LWCF conversion described in Section 1.1.

Prime farmland within the proposed project site was quantified using soil types and slopes specified as prime by the USDA Natural Resource Conservation Service (NRCS). Prime farmland occurs over the entire project area, which totals 39.91 acres and consists of Peers silty clay loam, 0 to 2 percent slopes and is occasionally flooded (Figure 3-2).



## **3.4 Traffic and Transportation**

### **3.4.1 Existing Transportation Infrastructure**

The proposed project site is along Marine Avenue, a two-lane road, approximately 785 feet southeast of Route 141 (aka, Maryland Heights Expressway). Route 141 is a north-south divided expressway with two through lanes in each direction plus separate left and right-turn lanes at Marine Avenue. Route 141 forms a major connection with Interstate 64 (I-64) to the south and Interstate 70 (I-70) to the north, both of which are major interstates linking St. Louis and St. Charles counties. In addition, Highway 364 (Page Avenue) provides a crucial link between I-270 and Highway 141 as well as a link between St. Louis and St. Charles counties. These roadways increase the service area of the proposed SLIC and provide improved access. Route 141 has a posted speed limit of 45 miles per hour (mph) within the study area. For the purposes of this study, Route 141 is referenced as a north-south roadway although its orientation at Marine Avenue is more east-west. Regionally, Route 141 is a north-south roadway. Since Route 141 is referenced as a north-south roadway, Marine Avenue is referenced as an east-west roadway at Route 141.

Marine Avenue is a minor arterial serving Creve Coeur Park and residential areas east of the Park with connections to Dorsett Road to the south and Route 141 on the north. The Route 141/Marine Avenue intersection is controlled by traffic signals. Marine Avenue is a two-lane road through the Park with a posted speed limit of 30 mph. It widens to provide a separate right-turn lane at the intersection with Route 141. The west leg of the intersection also has a separate right-turn lane, which serves Schmittel's nursery to the north.

Other roadways in the vicinity of the proposed project site include Creve Coeur Mill Road North, Sportport Drive, Creve Coeur Mill Road South, and Dorsett Road. Interstate 70 lies approximately 2.5 miles north of the Route 141/Marine Avenue intersection. Interstate 270 lies approximately two miles east (measured directly through the air) from the proposed project site.

A rail line operated by Southern Pacific Railroad lies just north of the proposed project site. This line crosses Marine Avenue approximately 690 feet southeast of Route 141. The crossing has flashing lights, but is not gated. Approximately one to five trains use this line per day (SLCDPR 2017b). Rail traffic on this line is not expected to affect the levels of service on Marine Avenue.

### **3.4.2 Existing Traffic Volumes**

Listed below in Table 3-3 are average weekday traffic volumes for 2015 at various locations in and around Creve Coeur Lake Memorial Park as provided by MoDOT and St. Louis County Department of Transportation:



**Table 3-3. Average Weekday Traffic Volumes Near the Proposed Project Site**

<b>Location</b>	<b>Average Weekday Traffic Volume</b>
Marine Avenue. south of Route 141 (at project site)	5,670
Route 141 south of Route 364	28,243
Route 141 between I-70 and Route 364	40,306
Marine Avenue north of Dorsett Road	8,130
Dorsett Road. east of Marine Avenue.	5,440
Marine Avenue south of Dorsett Road	6,100
Creve Coeur Mill Road south of Route 141	5,780

Based on the anticipated peak operating hours of the proposed project, the focus of the traffic analyses was the late afternoon (PM) commuter peak hour of a typical weekday (4:00 to 6:00 pm) as well as the Saturday evening event peak hour (6:00 to 8:00 pm). The full traffic analysis and report can be found in Appendix B.

Manual turning movement counts were collected in March 2017 at the following signalized intersections along Route 141 during the weekday PM (4:00 to 6:00 pm) and Saturday evening event (6:00 to 8:00 pm) peak periods. These intersections are shown on Figure 3-3.

- Route 141 at Creve Coeur Mill Road North;
- Route 141 at Marine Avenue (also includes the entrance to Schmittel’s);
- Route 141 at Golfport/Sportport;
- Route 141 at Creve Coeur Mill Road South/Airport Road; and
- Dorsett Road at Marine Avenue.

Traffic data revealed the peak hours to be from 4:30 to 5:30 pm for the PM commuter peak hour and 6:00 to 7:00 pm for the Saturday evening event peak hour. Specifically on Marine Avenue, the PM commuter peak hour volumes are 320 vehicles northbound and 310 vehicles southbound measured just south of the Southern Pacific Railroad tracks. A comprehensive view of the existing peak hour traffic volumes in the vicinity of the proposed project site are provided on Exhibit 2 in Appendix B.

Given the traffic characteristics in the study area and the anticipated trip generation for the proposed project, the peak periods identified would represent a “worst-case scenario” with regard to the traffic impact on the surrounding road network. If traffic operations are acceptable during these peak hours, it is reasoned that conditions would be acceptable throughout the remainder of the day.

### **3.4.3 Existing Operating Conditions**

Existing operating conditions for the intersections in proximity of the proposed project site were evaluated using SYNCHRO 8 software, which is based on procedures outlined in the Highway Capacity Manual to determine estimates of capacity and operational performance of signalized and unsignalized intersections. The traffic operations analyses include measures of effectiveness generated by the SYNCHRO software.

The operating conditions were graded in accordance with six levels of service (LOS) ranging from an LOS A “free flow” to an LOS F “fully saturated.” The LOS at an intersection is a

measure of the effectiveness of traffic flow and considers such factors as speed, delay, traffic interruptions, safety, driver comfort, and convenience. An LOS C, which is normally used for highway design, represents a roadway with volumes ranging from 70 percent to 80 percent of its capacity. However, an LOS D is generally considered acceptable for peak period conditions in urban and suburban areas. Table 3-4 summarizes the thresholds used in the analysis for signalized and unsignalized intersections.

**Table 3-4. Level of Service Thresholds at Intersections**

Level of Service (LOS)	Control Delay per Vehicle (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 – 20	> 10 - 15
C	> 20 – 35	> 15 - 25
D	> 35 – 55	> 25 - 35
E	> 55 – 80	> 35 - 50
F	> 80	> 50

The existing operating conditions and levels of service at the five intersections identified above are provided below in Table 3-5.

**Table 3-5. Existing Operating Conditions**

Traffic Movement	Weekday PM Peak Hour *	Saturday Evening Event Peak Hour *
<b>Route 141 at Creve Coeur Mill Road North</b>		
Eastbound Approach	B (16.1)	C (21.3)
Westbound Creve Coeur Mill Road Approach	F (197.1)	B (19.7)
Northbound Route 141 Approach	B (15.9)	A (8.2)
Southbound Route 141 Approach	C (27.9)	A (8.6)
<b>Intersection Overall</b>	<b>D (35.8)</b>	<b>A (8.9)</b>
<b>Route 141 at Marine Avenue</b>		
Eastbound Approach	C (35.0)	B (15.5)
Westbound Marine Avenue Approach	D (35.2)	A (6.2)
Northbound Route 141 Approach	A (6.4)	A (8.5)
Southbound Route 141 Approach	C (26.1)	A (8.1)
<b>Intersection Overall</b>	<b>C (20.7)</b>	<b>A (8.3)</b>
<b>Route 141 at Sportport/Golfport</b>		
Eastbound Sportport Road Approach	A (9.7)	A (5.2)
Westbound Golfport Road Approach	B (11.9)	B (8.5)
Northbound Route 141 Approach	A (2.4)	A (8.2)
Southbound Route 141 Approach	B (17.2)	B (14.9)
<b>Intersection Overall</b>	<b>B (11.8)</b>	<b>A (9.5)</b>
<b>Route 141 at Creve Coeur Mill Road South/Airport Road</b>		
Eastbound Airport Road Approach	C (33.7)	B (13.4)
Westbound Creve Coeur Mill Road Approach	D (36.7)	B (15.0)
Northbound Route 141 Approach	A (7.9)	B (12.9)
Southbound Route 141 Approach	A (5.4)	B (10.2)
<b>Intersection Overall</b>	<b>A (7.6)</b>	<b>B (12.1)</b>
<b>Dorsett Road at Marine Avenue</b>		
Westbound Dorsett Road Approach	B (11.4)	B (11.9)
Northbound Marine Avenue Approach	B (10.4)	A (8.1)
Southbound Marine Avenue Approach	A (7.0)	A (5.4)
<b>Intersection Overall</b>	<b>A (9.5)</b>	<b>A (8.5)</b>
* X (XX.X) = Level of Service (Vehicular delay in seconds per vehicle)		

The study intersections were evaluated and are summarized in Table 3-5 above. All of the study intersections currently operate at overall acceptable levels (LOS D or better) during the weekday PM and Saturday evening peak hours except for the westbound approach of Creve Coeur Mill Road North at Route 141, which currently operates at LOS F during the weekday PM peak hour. This approach could be re-striped and some signal timing could be reassigned to accommodate a westbound shared left turn along with the through movement. If this is done, the existing operating conditions for the westbound approach would improve to LOS C during the PM peak hour.

Although the southbound approach at Route 141 and Marine is at an acceptable level of service (LOS C), the southbound left-turn movement from Route 141 to Marine Avenue currently operates at LOS F during the PM peak hour. This is due to the minimal amount of green time provided to serve the 220 left-turns during the PM peak hour because the signal timing is focused on accommodating the through movements on Route 141. However, the southbound left-turn queues are generally short and contained within the storage bay currently provided.

The traffic volumes in the study area are significantly lower during the Saturday evening event peak hour. As such, the intersections operate at highly desirable levels during the Saturday evening event peak hour.

## **3.5 Air Quality**

### **3.5.1 Air Quality Standards**

Air quality is regulated by the U.S. Environmental Protection Agency (USEPA). The USEPA delegates authority to the MDNR for monitoring and enforcing air quality regulations in Missouri. The MDNR then delegates some authority to local municipalities having air quality control agencies. In Maryland Heights, this agency is the St. Louis County Air Pollution Control Program.

The Clean Air Act requires the adoption of air quality standards, quality control regions, and state implementation plans. The federal government established the National Ambient Air Quality Standards (NAAQS), to protect public health, safety and welfare from known or anticipated effects of sulfur dioxide, particulates, carbon monoxide, nitrogen dioxide, ozone, and lead. In addition to these pollutants, the State of Missouri established additional criteria for hydrogen sulfide and sulfuric acid.

Air quality in Missouri is defined with respect to conformity with the NAAQS. These standards were developed and promulgated by the USEPA (Table 3-6). The seven priority air pollutants constituting the NAAQS are ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>, often reported as part of nitrogen oxides, NO), particulate matter less than 10 microns in aerodynamic diameter (PM<sub>10</sub>), fine particulate matter less than 2.5 microns in aerodynamic diameter (PM<sub>2.5</sub>), and lead (Pb).

MDNR has adopted the standards for the criteria pollutants listed in Table 3-6 in its air quality program. On October 1, 2015, the USEPA strengthened the eight-hour ozone standard, setting it at 70 parts per billion (ppb). On December 14, 2012, the USEPA finalized the federal rule revising the annual PM<sub>2.5</sub> standard from 15 ug/m<sup>3</sup> to 12 ug/m<sup>3</sup>. The USEPA and MDNR

classify geographic regions of Missouri as having air quality better or equal to (attainment) or worse than (non-attainment) these standards. The St. Louis area is in attainment for all but two of the listed pollutants: ozone and PM<sub>2.5</sub>.

**Table 3-6. USEPA Criteria Pollutant Emission Standards**

Pollutant	Primary / Secondary	Averaging Period	Level	Form
CO	Primary	8 hour	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Pb	Primary and Secondary	Rolling 3 month average	1.5 µg/m <sup>3</sup>	Not to be exceeded
NO <sub>2</sub>	Primary	1 hour	100 ppb	98 <sup>th</sup> percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb	Annual Mean
O <sub>3</sub>	Primary and Secondary	8 hour	70 ppb	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
SO <sub>2</sub>	Primary	1 hour	75 ppb	99 <sup>th</sup> percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year
PM <sub>10</sub>	Primary and Secondary	24 hour	150 µg/m <sup>3</sup>	Not to be exceeded more than once per year on average over 3 years
PM <sub>2.5</sub>	Primary	1 year	12 µg/m <sup>3</sup>	Annual mean, averaged over 3 years
	Secondary	1 year	15 µg/m <sup>3</sup>	Annual mean, averaged over 3 years
	Primary and Secondary	24 hours	35 µg/m <sup>3</sup>	98 <sup>th</sup> percentile, averaged over 3 years
µg/m <sup>3</sup> = micrograms per cubic meter ppm = parts per million ppb = parts per billion Source: USEPA, 2017				

### 3.5.2 Air Quality Conditions

The proposed project site is located in an area that currently is in a non-attainment area for ground level ozone. There are eight air monitoring stations within the region which are operated by MDNR. Among these, the Maryland Heights monitoring site is representative of the study area and can be used to describe existing air quality of the area. Ozone monitoring data shows that the eight-hour ozone levels did not exceed the NAAQS standard at the Maryland Heights monitoring site in 2014 or 2015. This was when the eight-hour ozone standard was set at 75 ppb by the USEPA. Between April 1, 2016 and October 31, 2016, the

eight-hour ozone levels exceeded the NAAQS standard on six days (EWGCOG 2017) for the lower 70 ppb standard.

Effective April 15, 2015, USEPA found that it could not determine, based on available data, whether the eight-county St. Louis region met the 2012 annual PM<sub>2.5</sub> standard or was contributing to a nearby violation. USEPA has designated the St. Louis area as "unclassifiable."

### 3.6 Noise

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs. For instance, higher sensitivities to noise would be expected during the quieter overnight periods at noise sensitive receptors such as residences. Other receptors might include developed sites where frequent human use occurs such as churches and schools.

Sound is measured in units of decibels (dB) on a logarithmic scale. The "pitch" (high or low) of the sound is a description of frequency, which is measured in Hertz (Hz). Most common environmental sounds are a composite of sound energy at various frequencies. A normal human ear can usually detect sounds that fall within the frequencies from 20 Hz to 20,000 Hz. However, humans are most sensitive to frequencies between 500 Hz to 4,000 Hz.

Sound from a source spreads out as it travels from the source, and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy; atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over large distances from the source. An individual's sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval. A continuous source of noise is rare for long periods and is typically not a characteristic of community noise (i.e. outdoor noise near a community). Typical background day/night noise levels for rural areas range between 35 and 50 dB whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (USEPA 1974). Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio, and sleeping.

Certain frequencies are given more "weight" during noise assessments because human hearing is not equally sensitive to all frequencies of sound. This adjusted unit of measure is known as the A-weighted decibel, or the dBA. The dBA scale corresponds to the sensitivity range for human hearing. A-scale weighting reflects the fact that a human ear hears poorly in the lower octave-bands. It emphasizes the noise levels in the higher frequency bands heard more efficiently by the ear and discounts the lower frequency bands. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. A 10 dBA change is perceived as a doubling or halving of noise loudness; whereas a 20dBA change is considered a "dramatic change" in loudness.

Common indoor and outdoor noise levels are listed in Table 3-7.

**Table 3-7. Common Indoor and Outdoor Noise Levels**

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
Jet Flyover at 300 m (984.3 ft)	110	Rock Band at 5 m (16.4 ft)
Gas Lawn Mower at 1 m (3.3 ft)	100	Inside Subway Train (New York)
Diesel Truck at 15 m (49.2 ft)	90	Food Blender at 1 m (3.3 ft) Garbage Disposal at 1 m (3.3 ft)
Gas Lawn Mower at 30 m (98.4 ft)	80	Shouting at 1 m (3.3 ft)
Commercial Area	70	Vacuum Cleaner at 3 m (9.8 ft)
Quiet Urban Daytime	60	Normal Speech at 1 m (3.3 ft)
Quiet Urban Nighttime Quiet Suburban Nighttime	50	Large Business Office
Quiet Rural Nighttime	40	Dishwasher Next Room
	30	Small Theater, Large Conference Room Library
	20	Bedroom at Night Concert Hall (Background)
	10	Broadcast and Recording Studio
	0	Threshold of Hearing

Source: Arizona DOT, 2008

### 3.6.1 Noise Regulations

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level (Leq). The Leq value, expressed in dBA, is the energy-averaged, A-weighted sound level for the time period of interest. The day-night sound level (Ldn), is the 24-hour Leq, which incorporates a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m., to account for the increased annoyance during this period when most people are more sensitive to noise while they are trying to sleep. The U.S. Environmental Protection Agency (USEPA 1974) guidelines recommend that Ldn not exceed 55 dBA for outdoor residential areas. The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD, 1985). These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (USEPA 1974). For traffic-related noise, the Federal Highway Administration (FHWA) has set a threshold of 67 dBA as the sound level at which noise abatement should be considered.

### 3.6.2 Sources of Noise

Current sources of noise at the proposed project site are primarily a result of existing motor vehicle traffic with occasional noise generated from passing trains. Noise sources common to activities associated with the proposed project include transportation, construction equipment, and noise associated with operations. Three primary factors influence highway noise generation; traffic volume, traffic speed, and vehicle type. Generally, heavier traffic volumes, higher speeds, and greater numbers of trucks increase the sound level of roadway traffic noise. Other factors that affect the sound level of traffic noise include a change in engine speed and power, such as at traffic lights, hills, and intersecting roads, as well as pavement type. Highway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled roadways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic volume would result in approximately a 3 dBA increase in noise levels, which would not normally be a perceptible noise increase. Railway noise depends primarily on the speed of the train but variations are present depending upon the type and condition of engines, wagons, and rails (Berglund & Lindvall 1995).

The level of construction noise is dependent upon the nature and duration of the project. Construction activities would be expected to result in increased noise levels due to operation of construction equipment onsite and the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. Construction noise is temporary and intermittent in nature as it generally occurs on weekdays during daylight hours which minimizes the impact to receptors. The level of operational noise is primarily dependent upon the amount of traffic near the site, and the mechanical equipment used to operate the facility.

### 3.6.3 Noise Receptors

The majority of the proposed project area site is comprised of mowed open fields. The southernmost portion of the site contains some scattered trees. The nearest residential development is approximately 0.6 mile to the east. These residences are far enough from the project site that they are not affected by traffic noise (from construction and operations) near the site.

However, there are three sensitive noise receptors in proximity to the proposed project site (Figure 3-4).

- A residential house at 3404 Creve Coeur Mill Road, approximately 480 feet northwest of the project site that fronts Route 141 near the southeast quadrant of the Route 141 and Marine Avenue intersection.
- A pavilion (Tremayne Shelter) near Creve Coeur Lake on the west side of Marine Avenue approximately 510 feet west of the project site.
- Creve Coeur Disc Golf Course to the south of the project site.

### **3.7 Geology, Groundwater and Soils**

The project site is located in the Missouri River floodplain and is within the 100-year floodplain of Creve Coeur Lake and Creve Coeur Creek. Quaternary alluvial deposits within the project area are at a depth of greater than 100 feet. Alluvial deposits at the project site include silt, clay, silty clay and sand. The predominant natural physiographic features of the project site area is the Missouri River floodplain and the adjacent upland terrace (i.e., bluff line) situated to the southeast. The floodplain along the south bank of the river averages about 2,000 feet in width and generally lies at or above approximately 320 feet above mean sea level. The floodplain is characterized by a natural levee immediately adjacent to the river and a lower, locally swampy area extending south of the levee to the base of the upland terrace. At the southern margin of the floodplain, the topography rises some 20 to 30 feet to a relatively flat upland terrace bench.

The St. Louis region has a substantial seismic risk due to the presence of the New Madrid Seismic Zone in southeastern Missouri and the Wabash Valley Seismic Zone in southeastern Illinois and southwestern Indiana. The alluvial geologic setting of the project site also presents risk due to site amplification of bedrock ground motions by the soil profile. Sands present in the soil profile can be susceptible to liquefaction, which results in loss of foundation support during the design earthquake event. As such, the proposed development will require ground improvement to mitigate seismic risk.

The project site is underlain by more than 100 feet of unconsolidated deposits of silt, clay, silty clay and sand of the Quaternary Period, Holocene Epoch. The ground is relatively flat with a slight decrease in elevation along the eastern and northern portions of the project area. Bedrock at the site consists of limestone of the Salem formation (Mississippian System), which lies approximately 100 to 110 feet below the ground surface in the project site area (based on drilling refusal encountered at the project site by Geotechnology, Inc. in 2016). The bedrock surface likely dips to the west-northwest toward the Missouri River (MDNR GeoSTRAT 2017). According to GeoSTRAT, karst-related features such as springs and sinkholes are not present within one mile of the project site.

Groundwater was encountered between 15 and 22 feet below the ground surface at the project site during a geotechnical subsurface exploration conducted by Geotechnology, Inc. in 2016. Groundwater is generally not used as a potable drinking water source in the project site area since municipally-supplied water is available from Missouri American Water Company. The project site lies within the MDNR Regional Area 1, which requires alluvial wells to be constructed with a minimum of 20 feet of surface casing.



The soils located on the site are identified as Peers, silty clay loam by the NRCS. Additional soils information can be found in Appendix C. This soil is identified as a hydric soil in St. Louis County. As described the soil is located on nearly flat ground and is somewhat poorly drained. Permeability is moderate, and surface runoff is slow.

### **3.8 Cultural Resources**

#### **3.8.1 Regulatory Framework for Cultural Resources**

Cultural resources or historic properties include prehistoric and historic archaeological sites, districts, buildings, structures, and objects as well as locations of important historic events. Federal agencies are required by the National Historic Preservation Act (NHPA) (54 USC 300101 et seq) and by NEPA to consider the possible effects of their undertakings on historic properties. “Undertaking” means any project, activity, or program, and any of its elements, which has the potential to have an effect on a historic property and is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency. An agency may fulfill its statutory obligations under NEPA by following the process outlined in the regulations implementing Section 106 of NHPA at 36 CFR Part 800. Additional cultural resource laws that protect historic resources include the Archaeological and Historic Preservation Act (54 USC 300101 et seq.), Archaeological Resources Protection Act (16 USC 470aa-470mm), and the Native American Graves Protection and Repatriation Act (25 USC 3001-3013).

Section 106 of the NHPA requires that federal agencies consider the potential effects of their actions on historic properties and to allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Section 106 involves four steps: (1) initiate the process, (2) identify historic properties, (3) assess adverse effects, and (4) resolve adverse effects. This process is carried out in consultation with the State Historic Preservation Officer (SHPO) and other interested consulting parties, including federally recognized Indian tribes.

Cultural resources are considered historic properties if they are listed or eligible for listing in the National Register of Historic Places (NRHP). The NRHP eligibility of a resource is based on the Secretary of the Interior’s criteria for evaluation (36 CFR 60.4), which state that significant cultural resources possess integrity of location, design, setting, materials, workmanship, feeling, association and:

- a. Are associated with events that have made a significant contribution to the broad patterns of our history; or
- b. Are associated with the lives of persons significant in our past; or
- c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value; or
- d. Have yielded, or may yield, information (data) important in prehistory or history.

A project may have effects on a historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the NRHP. However, if the agency determines (in consultation) that the undertaking’s effect on a historic property within the project area (PA) would diminish any of the qualities that make the property eligible for the NRHP (based on the criteria for evaluation at 36 CFR Part 60.4 above), the effect is said to be adverse. Examples of adverse effects would be ground

disturbing activity in an archaeological site or erecting structures within the viewshed of a historic building in such a way as to diminish the structure’s integrity of feeling or setting.

Federal agencies are required to consult with SHPOs, tribes, and others throughout the Section 106 process and to document adverse effects to historic properties resulting from agency undertakings.

### 3.8.2 Project Area

The project area (PA) is the geographic area or areas within which an undertaking may directly cause changes in the character or use of historic properties, if such properties exist.

The proposed SLIC includes the elements listed in Section 2.3.2.2. The archaeological PA consists of these two components, on both sides of Marine Drive, totaling about 40 acres. The land use of the smaller area to the west is maintained grass. The eastern portion is mostly fallow with weeds and grass, a smaller wooded area adjacent to an existing two-track, and a maintained grass and timber park area.

### 3.8.3 Previous Studies

Background research involved the examination of archaeological site and architectural resource files, National Register listings, and cultural resource reports on file at the SHPO office in Jefferson City, Missouri, and available through the online SHPO Geographic Information System (GIS) inventory. This research was conducted to identify areas previously surveyed and determine whether previously recorded archaeological sites or architectural resources are located within the project area or within a one-mile radius. Additionally, the background research examined historic maps, historic United States Geologic Survey (USGS) quadrangles, and aerial imagery to identify the locations of historic resources and aid in developing a historic context for the area. No previously recorded archaeological sites or historic architectural resources have been recorded within the PA. Nine previously recorded sites are within the one-mile radius (Table 3-8). Additionally, nine cultural surveys have been conducted within the one-mile radius (Table 3-9), of which, two include the current PA (SC186 and SL500). Both surveys were part of large literature reviews and did not include any field work associated with the current PA. No shipwrecks, sites listed on the NRHP, or NRHP Districts have been recorded within the one-mile radius. Additionally, no architectural surveys have been conducted within the PA.

**Table 3-8. Previously Recorded Archaeological Sites within a one-mile buffer of the PA.**

Site Number	Cultural Affiliation	Site Type	NRHP Recommendation
23SL18	No information available		
23SL14	No information available		
23SL20	Undetermined prehistoric	Habitation	Unevaluated
23SL738	Historic	Habitation	Not reported
23SL739	No information available		
23SL740	Historic	Recreation facility	Not reported
23SL741	Historic	Habitation	Not reported
23SL768	No information available		
23SL776	No information available		

**Table 3-9. Cultural Resource Surveys Within a one-mile buffer of the PA.**

Survey Number	Date	Includes PA?	Investigation Type	Primary Author
SC186	1989	Yes	Literature Search	David Crampton
SL55	1980	No	Phase I	Jonathan Kent
SL166	1993	No	Phase I	Dianna Reinhardt
SL171	1994	No	Phase I	Dennis Naglich
SL205	1996	No	Phase I	David Bowman
SL370	1997	No	Phase I	Mechelle Crisler
SL487	2003	No	Phase I	Sara Hixson
SL500	2004	Yes	Literature Search	Not Reported
SL681	2007	No	Phase I	Cynthia Balek

### 3.9 Biological Resources (Vegetation, Wildlife, Aquatic Life)

The project site is located within the Interior River Valleys and Hills ecoregion (USEPA 2000). This ecoregion is made up of many wide, flat-bottomed, terraced valleys, forested valley slopes, and dissected glacial-till plains. This region contains forested river side-slopes and bluffs, loess-covered hills, and areas with karst features. Deep, sandy and silty, moderately to poorly drained alluvium covers the river valleys. Paleozoic bedrock in this ecoregion is relatively resistant to erosion along the Missouri River, and consequently the Missouri River alluvial valley is relatively narrow in this region. Land cover throughout this region is varied, with row crops, improved pasture, woodland, and mixed hardwood forests.

Most of the project site consists of old field herbaceous growth. The site has been open and used for various agriculture practices since at least 1937. Current management over the past few years has been a seasonal mowing to keep woody growth from invading the site. Some of the old field herbaceous species would include but not be limited to the following species: Johnson grass, Virginia wild rye, goldenrod, fescue, fleabane, blackberry, poison ivy, thistle, vetch, white sweet clover, white woodland aster, chicory, ragweed, and red clover, as well as other species.

The boundary of the project site on the north, east and south is lined with woody vegetation as a combination of trees and shrub species. The woody corridor is made up of a combination of mature and immature species. Some of the woody species found along the project site boundary would include but not be limited to the following species: silver maple, box elder, elderberry, honey locust, hackberry, black walnut, white ash, Kentucky coffee tree and basswood. Other species growing in the corridor include bush honeysuckle, autumn olive and Siberian elm. The wooded corridor provides a travel lane for more mobile wildlife to reach other portions of the Park.

The project site does not offer suitable habitat for rare wildlife species, but is used by many common species. A field survey was conducted by Amec Foster Wheeler staff during a bat habitat assessment on April 27, 2017. During the bat habitat assessment, visual observations of the project site were made with respect to wildlife habitat. Fish and wildlife habitats located in the project area consist primarily of old agricultural fields consisting of herbaceous vegetation and small woodlots and scattered mature trees. The existing habitats may provide food and cover for a variety of wildlife, rabbits, squirrel, red fox, white-tailed deer, songbirds, and snakes. The open fields may provide habitat for grassland nesting bird species adapted to more frequent human disturbance as occurs in the area of the Park including field sparrows and red-winged blackbirds, as well as several species of small rodents, garter snakes, black

rat snakes, and American toads. The small woodlots and scattered trees on the area may provide foraging and nesting habitat for common species of songbirds typical of urban settings including American robins, indigo buntings, Baltimore orioles, tufted titmouse, black-capped chickadee, and Carolina wrens.

The southernmost portion of the project area contains some scattered trees including American elms (*Ulmus americana*), hackberry (*Celtis occidentalis*), and various planted oaks (*Quercus spp.*). This area has an open understory comprising of various grasses and herbaceous vegetation that is mowed regularly. The small fencerow bordering the southeastern portion of the project area is dominated by small hackberry trees, honeysuckle shrubs (*Lonicera maackii*), and grape vines (*Vitis sp.*). This fencerow extends westward toward Marine Road where it transitions into a narrow linear woodlot with larger hackberry trees, honeysuckle shrubs, and grape vines. This small woodlot separates areas of scattered trees to the south from the open grassland/herbaceous area in the main part of the project area to the north. The far eastern edge of the project area borders a stream and the associated wooded riparian area includes larger cottonwood (*Populus deltoides*) and hackberry trees. This woodlot bordering the eastern edge of the site is characterized by overgrown shrubs and vines and a very dense understory. The western portion of the project area, west of Marine Road, is mostly an open mowed field with a few scattered sycamores (*Platanus occidentalis*) and bald cypress (*Taxodium distichum*) near the road. Trees in this area appear to have been planted during Park development.

EO 13112 (Invasive Species) defines an invasive species as one that is not native to the local ecosystem and whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive plants can include trees, shrubs, vines, grasses, ferns, and forbs. Invasive plants near the project area include Bush honeysuckle, Japanese honeysuckle and Bradford pear. These species have the potential to affect the native plant communities adversely because of their ability to spread rapidly and displace native vegetation. Creve Coeur Lake also has populations of the invasive Asian carp; however, water features that support this invasive species do not exist on the project site.

### 3.10 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize federally listed species or their designated critical habitat. The list of federally protected species is developed and maintained by the U.S. Fish and Wildlife Service (USFWS). A list of federally protected species that could be affected by this project was obtained through the USFWS Information, Planning, and Conservation system.

The State of Missouri provides protection for species considered endangered under the Wildlife Code of Missouri. The list of state protected species is developed and maintained by the Missouri Department of Conservation (MDC), Missouri Natural Heritage Program. Project information was submitted to the Missouri Natural Heritage Review Website, and the Natural Heritage Review confirmed that there are no known records for Species or Natural Communities of Conservation Concern within the defined project area.

Based on information obtained from the USFWS and MDC, four species of concern were identified that may be present within or near the project site (Table 3-10).

**Table 3-10. Sensitive Species that May Occur Within or Near the Project Area**

Common Name	Scientific Name	Federal Status	State Status
Gray bat	<i>Myotis grisescens</i>	Endangered	Endangered
Indiana bat	<i>Myotis sodalis</i>	Endangered	Endangered
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Not listed
Decurrent False Aster	<i>Boltonia decurrens</i>	Threatened	Endangered

Gray bats almost exclusively roost in large caves found in Alabama, Arkansas, Kentucky, Missouri, and Tennessee with some smaller populations found in nearby states. They are sometimes found roosting in mines or buildings. Adults and their young require forested areas along banks, streams, or lakes near the entrance to their cave roosts. They typically do not feed in areas along rivers or reservoirs where the forest has been cleared away (NatureServe 2016). Suitable roosting habitat for gray bats is not present within the proposed project areas because of a lack of caves, mines, or suitable buildings. Potential foraging habitat exists nearby over Creve Coeur Lake and the Missouri River. No critical habitat has been designated for the gray bat.

The Indiana bat is found throughout much of the eastern half of the United States and has been listed as a federally endangered species since March 11, 1967. It is also listed in Missouri as endangered. Per the 2016 Range-Wide Indiana Bat Summer Survey Guidelines, “suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags greater than 5 inches diameter at breast height (dbh) that have exfoliating bark, cracks, crevices, and/or hollows) (USFWS 2016). Other summer habitat may include riparian zones, bottomlands, floodplains, wooded wetlands, and adjacent upland forests (USFWS 2007). Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested habitat (USFWS, 2016). Tree species that Indiana bats have been known to roost and establish maternity colonies in include hickory (*Carya* spp.), oak (*Quercus* spp.), elm (*Ulmus* spp.), ash (*Fraxinus* spp.), maple (*Acer* spp.), and poplar (*Populus* spp.) trees. Some tree species, primarily hickories and to a lesser extent oaks, provide adequate bark characteristics in living trees. Space between exfoliating bark and the trunk of the tree appear to be the primary characteristic needed for bats to use a particular tree (USFWS 2007). In winter, Indiana bats hibernate in caves or abandoned mines (USFWS 2006).

Indiana bat critical habitat, designated on September 24, 1976, consists of 11 caves and two mines in six states including Illinois (one mine), Indiana (two caves), Kentucky (two caves), Missouri (five caves and one mine), Tennessee (one cave) and West Virginia (one cave) [41 FR 41914]. The critical habitat locations in Missouri are: Cave 021 (Crawford County), Caves 009 and 017 (Franklin County), Pilot Knob Mine (Iron County), Bat Cave (Shannon County), and Cave 029 (Washington County) [41 FR 41914]. Critical habitat for the Indiana bat is not located within the project site. A detailed habitat evaluation report is provided in Appendix E.

The USFWS listed the northern long-eared bat (*Myotis septentrionalis*) as threatened on April 2, 2015. This species is not listed as endangered by the State of Missouri. In summer months, northern long-eared bats roost singly or in colonies within cavities, underneath bark, crevices, or hollows of both live and dead trees that typically have a DBH greater than or equal to 3 inches. Northern long-eared bats appear to be opportunistic, selecting trees based on the presence of cavities, crevices, or peeling bark. If suitable roost trees are not available, northern long-eared bats have been known, although rarely, to roost in manmade structures such as barns, bridges, and sheds. Northern long-eared bats emerge from their roosts at dusk to forage through the understory of forested hillsides and ridges feeding on insects (USFWS 2015a).

Suitable summer habitat for the northern long-eared bat includes a wide variety of forested lands to roost, forage, and travel. This includes forests containing potential roosts such as woodlots, fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested habitat. Non-forested foraging habitats may include adjacent emergent wetlands and edges of agricultural fields, old fields, and pastures. Northern long-eared bats typically occupy their summer habitat from mid-May through mid-August (USFWS 2016). In winter, the northern long-eared bat hibernates underground in caves or other manmade structures such as mines (USFWS 2015a). No critical habitat has been designated for the northern long-eared bat.

An Indiana bat and northern long-eared bat habitat suitability assessment was conducted within the project area in April 2017. The majority of the project area was comprised of open, grassy/herbaceous fields that appear to be mowed occasionally. The southernmost portion of the project area contained some scattered trees including elms, hackberry, and various planted oaks. This area had an open understory comprising of various grasses and herbaceous vegetation that is mowed regularly. The small fencerow bordering the southeastern portion of the project area was dominated by small hackberry trees, honeysuckle shrubs, and grape vines. This fencerow extended westward toward Marine Avenue where it transitions into a narrow linear woodlot with larger hackberry trees, honeysuckle shrubs, and grape vines. This small woodlot separates area of scattered trees to the south from the open grassland/herbaceous area in the main part of the project area to the north. The far eastern edge of the project area borders a stream and the associated wooded riparian area includes larger cottonwood and hackberry trees. This woodlot bordering the eastern edge of the site was characterized by overgrown shrubs and vines and a very dense understory. The western portion of the project area, west of Marine Avenue, is mostly an open mowed field with a few scattered sycamores and bald cypress near the road. Trees in this area appear to have all been planted during Park development.

One tree within the project area exhibited features that would make it a potentially suitable bat roost tree including exfoliating bark, crevices, and hollow cavities. This tree is a large declining American elm (121.5 centimeters dbh) located in the southern portion of the project area just east of Marine Avenue (AmecFW 2017).

Decurrent false aster is found exclusively in Missouri and Illinois and predominantly occurs in moist, sandy floodplains (USFWS 2015b). In Missouri, decurrent false aster is only known to exist in St. Charles County, and potential habitat includes riverbanks, old fields, roadsides, mudflats, and lake shores. Decurrent false aster is found in areas where succession is

prevented, with high levels of sunlight (MDC 2015). The species is reliant upon periodic flooding, but cannot tolerate prolonged flooding (USFWS 2015b). While the grassy/herbaceous fields within the project area may provide potential habitat for the decurrent false aster, due to the disturbances associated with frequent mowing, it is unlikely that these fields support the decurrent false aster.

### **3.11 Wetlands**

The 2013 McKelvey Woods Trail Wetland Delineation Phase II report identified two wetlands within the eastern portion of the proposed project area. This trail is part of the Fee Fee Greenway, which has been previously described in this document. The delineation was conducted for the US Army Corps of Engineers (USACE), St. Louis District by Burns & McDonnell Engineering Company, Inc. The work was carried out under contract with the City of Maryland Heights and the Great Rivers Greenway. The Fee Fee Greenway Trail traverses a portion of the project area. The wetland delineation was only carried out along the course of the proposed trail and not the entirety of the proposed project site.

In January 2017, Geotechnology completed a Waters of the United States (WOUS) delineation of the proposed development site. WOUS may include lakes, rivers, streams, wetlands, and similar waters that possess a connection to traditional navigable waters. The USFWS National Wetland Inventory (NWI) was reviewed to obtain information pertaining to NWI-mapped wetlands and waterbodies in the project area. NWI-mapped wetlands do not appear in the project area. The closest NWI-mapped wetlands located to the west adjacent to Creve Coeur Lake and Creve Coeur Creek and east adjacent to a tributary of Louisville Creek. During the delineation, Geotechnology identified a 0.13-acre forested wetland on the eastern side of the project area (previously identified during the Phase II wetland delineation), and two recently developed emergent wetlands on the western portion of the site. The eastern forested wetland exists within a depression of a drainage area that discharges to a stream system present on the east adjoining property. Streams were not identified within the project area. Wetlands identified on the proposed project site are shown on Figure 3-5.

### **3.12 Surface Water**

The western portion of the project site is located adjacent to Creve Coeur Creek, and approximately 500 feet from Creve Coeur Lake. Creve Coeur Creek is a tributary to the Missouri River that flows near the western boundary of the project site. The Creve Coeur Creek drainage area is approximately 22 square miles (USGS 2017). According to the USGS National Water Information System, Creve Coeur Creek at the Creve Coeur gaging station had a maximum daily discharge of 46.6 cubic feet per second (cfs) in 2008. Creve Coeur Creek is included on Missouri's 303(d) list of impaired waters for exceedances of *Escherichia coli* bacteria, chloride, and low dissolved oxygen. The MDNR's Water Protection Program issued a draft bacteria Total Maximum Daily Load (TMDL) report for Creve Coeur Creek in 2012. Future TMDLs are anticipated to be developed by the MDNR for chloride and dissolved oxygen.

Creve Coeur Lake, approximately 320 acres in area, is Missouri's largest naturally-formed lake. The oxbow lake supports a variety of flora and fauna, as well as wetland areas on the north, west and southern ends. Creve Coeur Creek passes through the Creve Coeur Lake from south to north. Creve Coeur Lake was included on Missouri's 2001 303(d) list of impaired waters for exceedances of chlordane (a pesticide that was banned by the USEPA

in 1988). The source of chlordane was runoff from nearby urban areas to the east primarily from termite treatment in the 1970s and 1980s.

Runoff generated on the project site currently moves to the north and east of the project area. The runoff then discharges to a wooded wetland that begins on the project area and extends into adjoining properties. Off-site runoff moves into a drainage moving to the east and eventually entering Fee Fee Creek. Surface flowing streams do not exist on the project site.

### **3.13 Floodplain**

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2 percent chance of flooding in any given year is normally called the 500-year floodplain.

The project site is located within the Missouri River floodplain. According to the FEMA flood map (Panel No. 0176K), the project site is located in flood zone “AE” in which base flood elevations have been determined. The Howard Bend 500-year levee protects the area from Missouri River floodwaters. However, the site is within the 100-year flood of Creve Coeur Lake and Creve Coeur Creek. The National Flood Insurance Program Flood Insurance Study and associated Flood Insurance Rate Map are illustrated in Figure 3-6 and is provided in Appendix F.

The area of the project site recently experienced three greater than 100-year floods in July 2015, January 2016 and May 2017. The project site and/or roads leading to the site were inundated in these flood events.

### **3.14 Hazardous Waste**

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated environmental media, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste and other materials (solid, liquid, or contained gaseous substances). Subtitle D of the Resource Conservation and Recovery Act (RCRA) and its implementing regulations establish minimum federal technical standards and guidelines for nonhazardous solid waste management. States are primarily responsible for planning, regulating, implementing, and enforcing solid waste management.

Hazardous materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act, RCRA, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, and Toxic Substances Control Act.

According to the St. Louis County Parks Department, the maintenance shed on the project site was constructed in March 2015, and is used to store equipment and janitorial supplies for the Park. Equipment stored inside the maintenance shed includes a trash truck, a boat/trailer, a golf cart, canopies, trash bags, mops and brooms. Chemicals stored inside the maintenance shed include a 50-gallon drum of diesel fuel, 20 gallons of restroom disinfectant, 20 gallons of bleach, and 24 cans of household cleanser.



### 3.15 Visual Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 4.8 of this document.

The visual landscape of an area is formed by physical, biological and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on several factors that include scenic attractiveness, integrity and visibility.

Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty of landform, water characteristics, vegetation pattern, and cultural land use. It is expressed in the forms, colors, textures and visual composition of each landscape. Scenic attractiveness is divided into three classes: A, distinctive; B, typical or common; and C, indistinctive.

Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The three concern levels for scenery are: 1, high; 2, moderate; and 3, low.

Landscape visibility is composed of two parts: human values as they relate to the relative importance to the public of various scenes; and the relative sensitivity of scenes based on distance from an observer. Human values may be derived from many sources including, but not limited to: independent research; other facets of ecosystem assessment; and local, regional, and national studies. The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent on where and how it is viewed. Scenic visibility of a landscape may be described in terms of three distance contexts: foreground; middleground; and background. In the foreground, an area within 0.5 mile of the observer, individual details of specific objects are important and easily distinguished. In the middleground, from 0.5 mile to 4 miles from the observer, object characteristics are distinguishable but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

Using the data gathered and mapped for scenic attractiveness and landscape visibility, a numerical scenic class rating is assigned to all lands. Scenic classes measure the relative importance, or value, of discrete landscape areas having similar characteristics of scenic attractiveness and landscape visibility. Scenic classes are used to compare the value of scenery with the value of other resources, such as forests, wildlife, surface water, or minerals. The higher the scenic class, the more important it is to maintain higher scenic value.

For this analysis, the affected environment is considered to include the proposed project site, as well as the physical and natural features of the landscape. The proposed project site is characterized by a mowed field. Some scattered trees line the edges of the site. The dominant visual component near the proposed project site is an electric transmission line approximately 190 feet north of the site. Other visual components near the site include:

- a railroad;
- Marine Avenue and an electric traffic signal at Route 141;
- a maintenance shed on the project site;
- the parking lot (and its lighting) for Sailboat Cove in the Park;
- a large maintenance building (the Rowers Building) west of Marine Avenue in the Park;
- a residential structure at 3404 Creve Coeur Mill Road near the southeast quadrant of the Route 141 and Marine Avenue intersection;
- the clubhouse of The Quarry at Crystal Springs golf course; and
- Creve Coeur Lake.

These features can be viewed in photos 1 through 6 below. Creve Coeur Lake provides the only distinctive surface water characteristic in the foreground of the study area. The topography throughout the area is flat.



**Photo 1. View to the northwest from mid project site.**



**Photo 2. View to the west from near north end of site.**



**Photo 3. View to the southeast from Marine Avenue toward house at 3404 Creve Coeur Mill Road**





**Photo 4. View to the southeast from Marine Avenue toward railroad crossing, the project site and the maintenance shed**



**Photo 5. View to the west toward Rowers Building and Sailboat Cove from the project site**



**Photo 6. View to the northwest toward Creve Coeur Lake from Marine Avenue south of the project site**

The composition of vegetation and the patterns of vegetation are the prominent features and consist of a mowed field and a variety of deciduous trees with evidence of human alteration. There are no predominant focal points at the project site. Scenic attractiveness of the area can be classified from Class B-Typical to Class C-Indistinctive and scenic integrity ranges from moderate to low. The rating for scenic attractiveness is due to the ordinary or common visual quality. The forms, colors and textures in the affected environment are normally seen through the characteristic landscape of the area. Therefore, the landscapes are not considered to have distinctive quality. In the foreground, the scenic integrity has been lowered by human alteration such as the mowed field, the electric transmission lines, paved roads, traffic signals, a parking lot and its lighting, electric traffic signals and a railroad.

However, in the middleground and background these alterations are not substantive enough to dominate the view of the landscape. Based on the criteria used for this analysis, the overall scenic value class for the affected environment is considered to be fair to good.

Views of the project site are generally restricted to the foreground and include Park visitors and Park employees. Within the Park, there are multi-use paved paths and a pavilion (Tremayne Shelter) within the foreground (i.e., within 0.5 mile) of the proposed project site. As mentioned previously, there is one residential property at the intersection of Route 141 and Marine Avenue that has a view of the project site. This residence is also within the viewshed of the electric transmission line and Route 141.

### **3.16 Visitor Experience / Recreation Resources**

The proposed project site is located within and at the northern edge of the Park. The Park encompasses 2,113.91 acres and lies on both upland ground and in the bottomland

floodplain as shown on Figure 3-7. The Park serves the St. Louis Metropolitan region and attracts numerous Park users from surrounding municipalities in St. Louis and St. Charles Counties.

A trail connecting the Park to Katy Trail State Park via the Route 364 bridge over the Missouri River has increased regional trail usage within the Park. The Park has over 18 miles of natural, paved and gravel trails. The trails are designed for bicycles, roller sports and hiking. A new 2.2 mile long trail being constructed by the Great Rivers Greenway (GRG) will connect the Park with one of the nearby residential areas. The new GRG trail will also parallel and connect to the proposed project site.

Creve Coeur Lake provides recreation opportunities for sailboaters, wind surfers, rowers, and kayakers. Three boat ramps provide boating access to Creve Coeur Lake. There are four shelters that can be used for public gathering in the bottomland portion of the Park (Tremayne Shelter is the closest to the proposed project site). There two more shelters in the upland portion of the Park.

Construction on the new Creve Coeur Soccer Complex inside the Park began in April 2017 and is scheduled to be completed in early 2018 (SLCDPR 2017c). This Soccer Complex will provide eleven new artificial turf fields, parking, field and parking lot lighting, concessions and restrooms and other amenities. This new complex incorporates the existing Scott Gallagher Soccer Club, which currently has two turf fields, and parking. This new Soccer Complex lies to the west of Creve Coeur Lake. The Lou Fusz Soccer Club lies at the southern end of the park off of Creve Coeur Mill Road. The Lou Fusz Soccer Club has eight turf fields, practice fields, parking, and concessions.

The Park has four playgrounds, three in the upland section and one in the bottomland section. There are numerous picnic areas and tables scattered throughout the Park. There are two baseball/softball fields, two tennis courts, and two sand volleyball courts in the upland section of the Park.

The Park also features Mallard Lake, a smaller lake to the south of Creve Coeur Lake, which was constructed as part of the mitigation of the construction of Route 364 in the early 2000s and provides additional recreation opportunities and is popular for bird and nature viewing. Additional open space bird and nature viewing opportunity exists at the Little Creve Coeur Ecological Area, which is over 500 acres and lies west of Route 141 and south of Route 364 in the far western end of the Park.

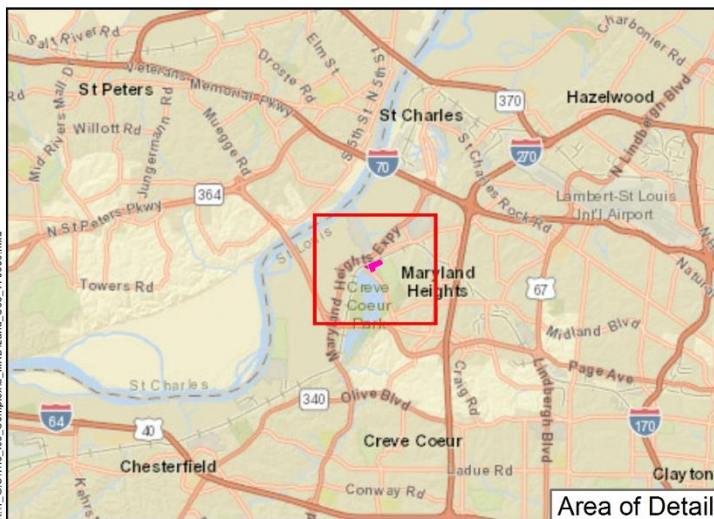
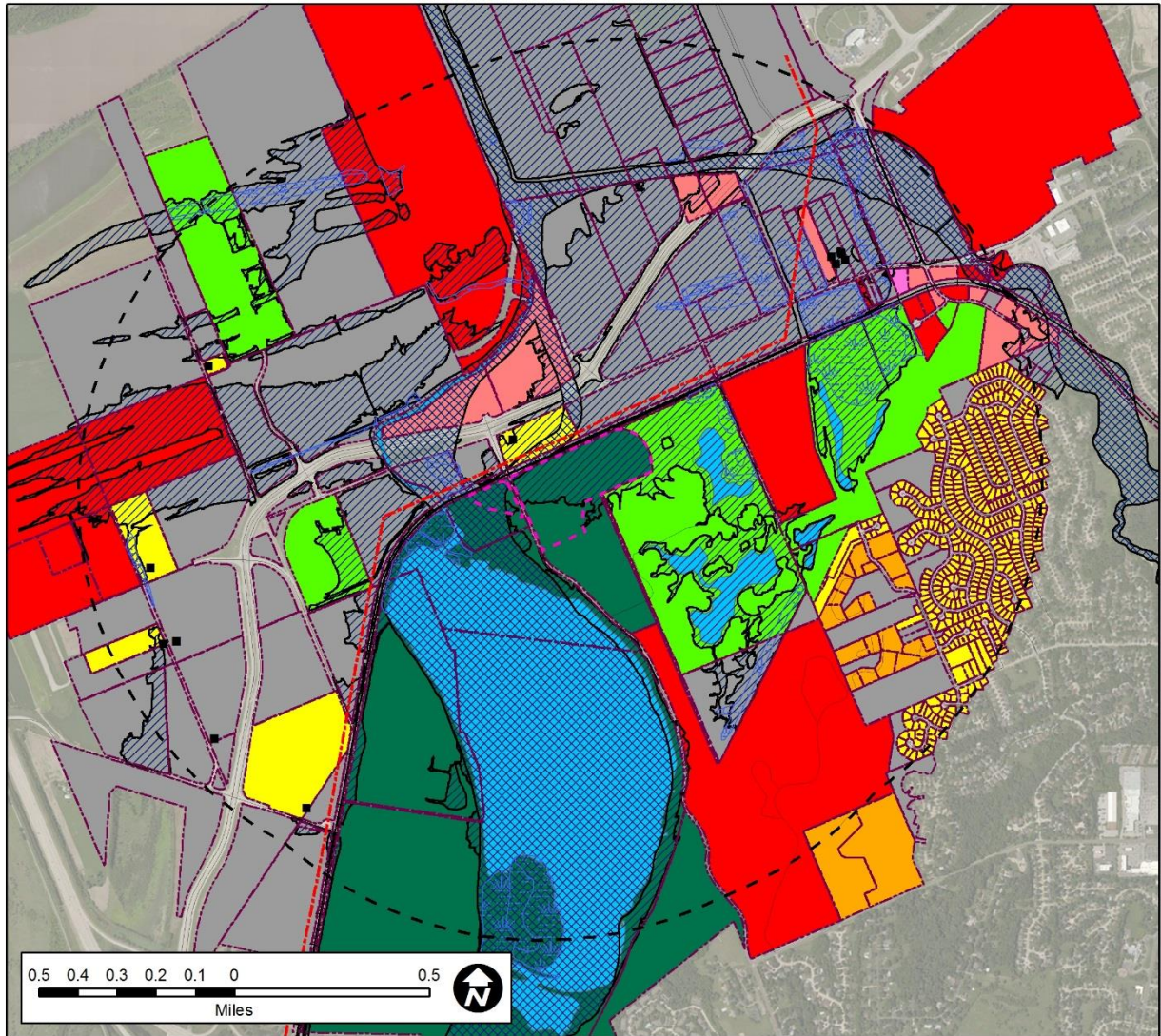
The Creve Coeur Lakehouse Bar & Grill was established in 2006 and lies just west of Mallard Lake off of Creve Coeur Mill Road. This full service restaurant also offers a bar and live music. The Quarry at Crystal Springs Golf Club lies just to the east and south of the proposed project site. This golf course is leased by SLCDPR to the golf club until December 2029 (SLCDPR 2017a).

The Park also features a zip line and tree-top obstacle course and the Creve Coeur Disc Golf Course.

Currently, the project site offers very little opportunity for outdoor recreation. It is primarily a mowed pasture field located just south of an active railroad line. A St. Louis County Parks maintenance shed and a gravel road that connects the shed to Marine Avenue is situated in

the south-central portion of the project site. Signage associated with the maintenance shed drive indicates “*Park Maintenance Vehicles Only*” at Marine Avenue. A small portion of the southern end of the project site is currently used as a disc golf course; however, the disc golf holes affected by the proposed development will be relocated as a result of the Fee Fee Greenway Trail, which is being developed by GRG.





**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

**Saint Louis**  
**COUNTY**  
**PARKS**

**National**  
**ParkService.**

**Legend**

■ House	□ Parcel	■ Industrial/Utility
— Road	⊞ Boundary	■ Institution
⊕ Railroad	⊞ Floodway	■ Multi-Family
⊞ Study Area	⊞ Floodplain	■ Park
⊞ 1-Mile Buffer	⊞ Landuse	■ Recreation
■ Open Water	■ Commercial	■ Single Family
⊞ Wetland		■ Vacant/Agriculture

Drawn By: BSM  
Reviewed By: SCC

Job No. 325117037  
Date: 6/6/2017

The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number 325117037. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

Figure 3-1. Existing Land Use



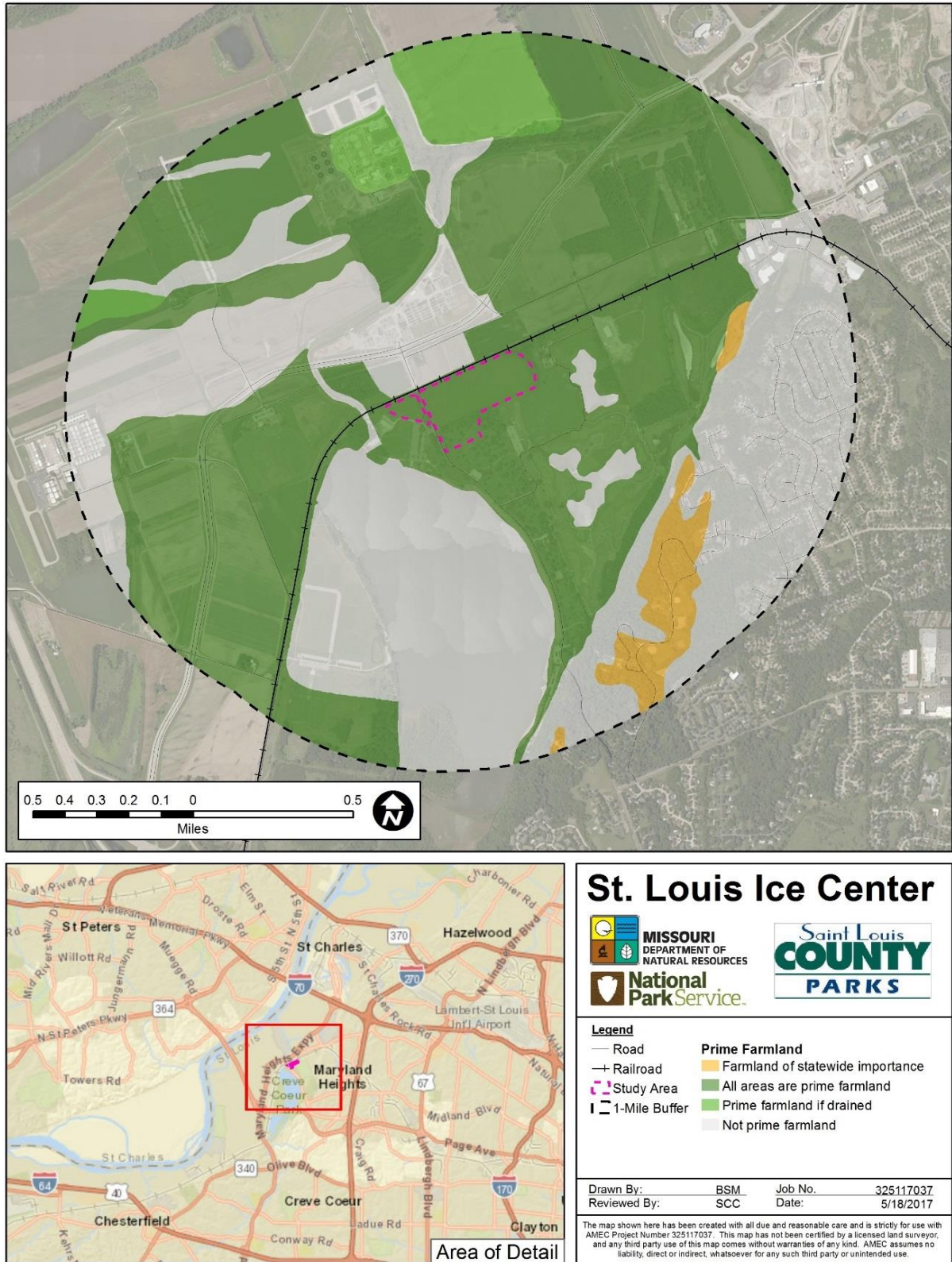


Figure 3-2. Prime Farmland



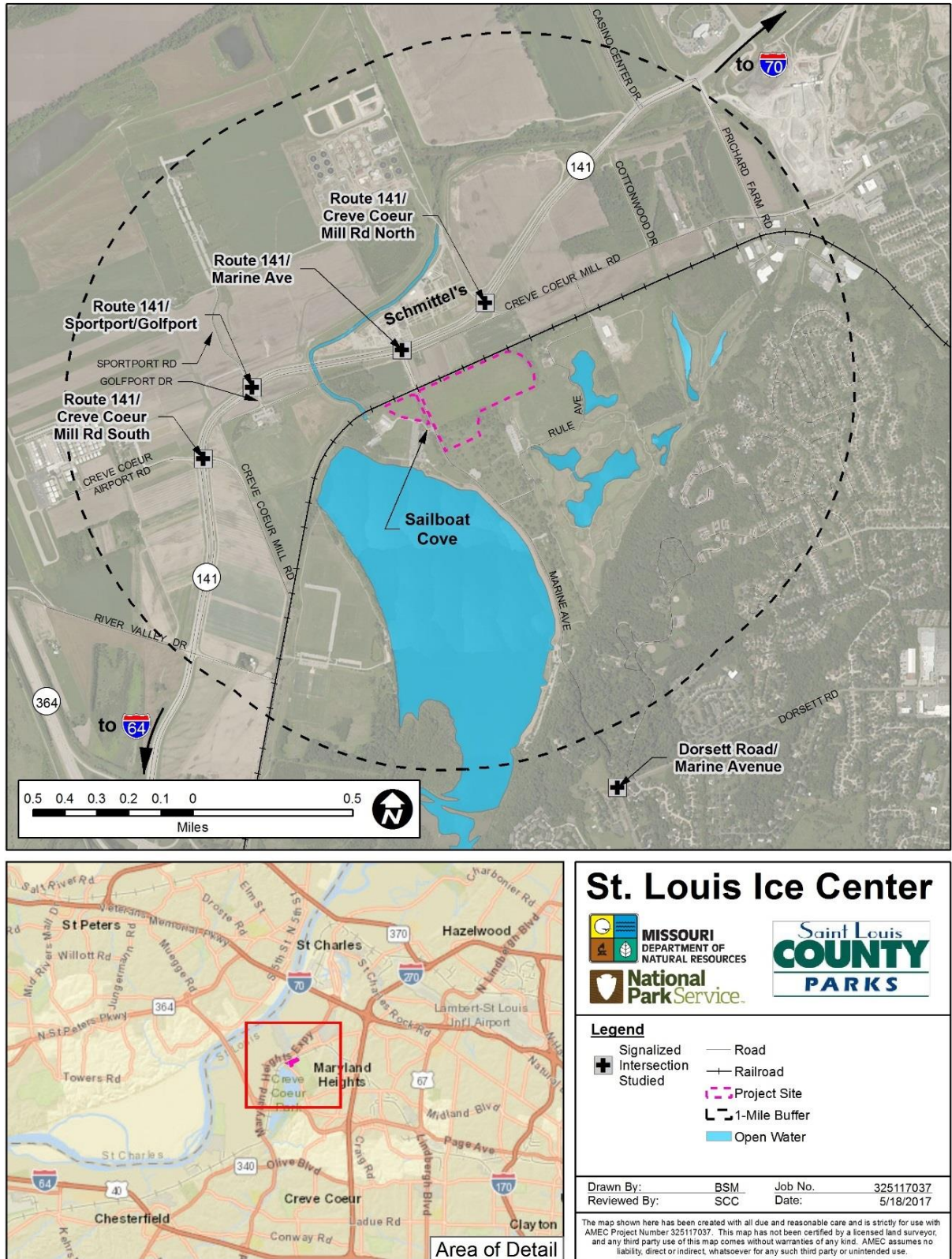


Figure 3-3. Transportation Features





Figure 3-4. Noise Receptors



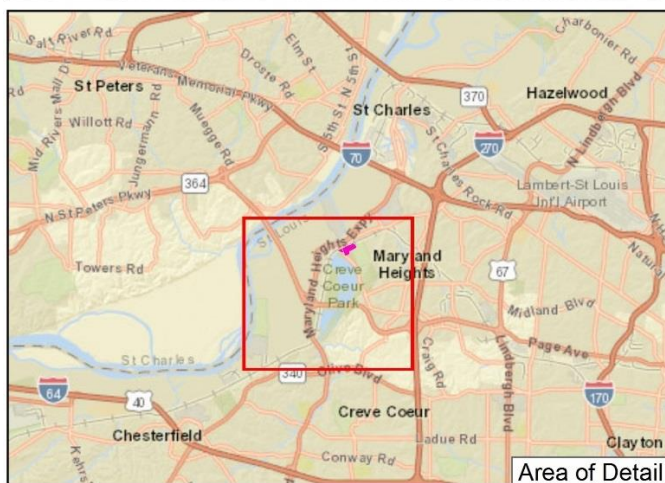
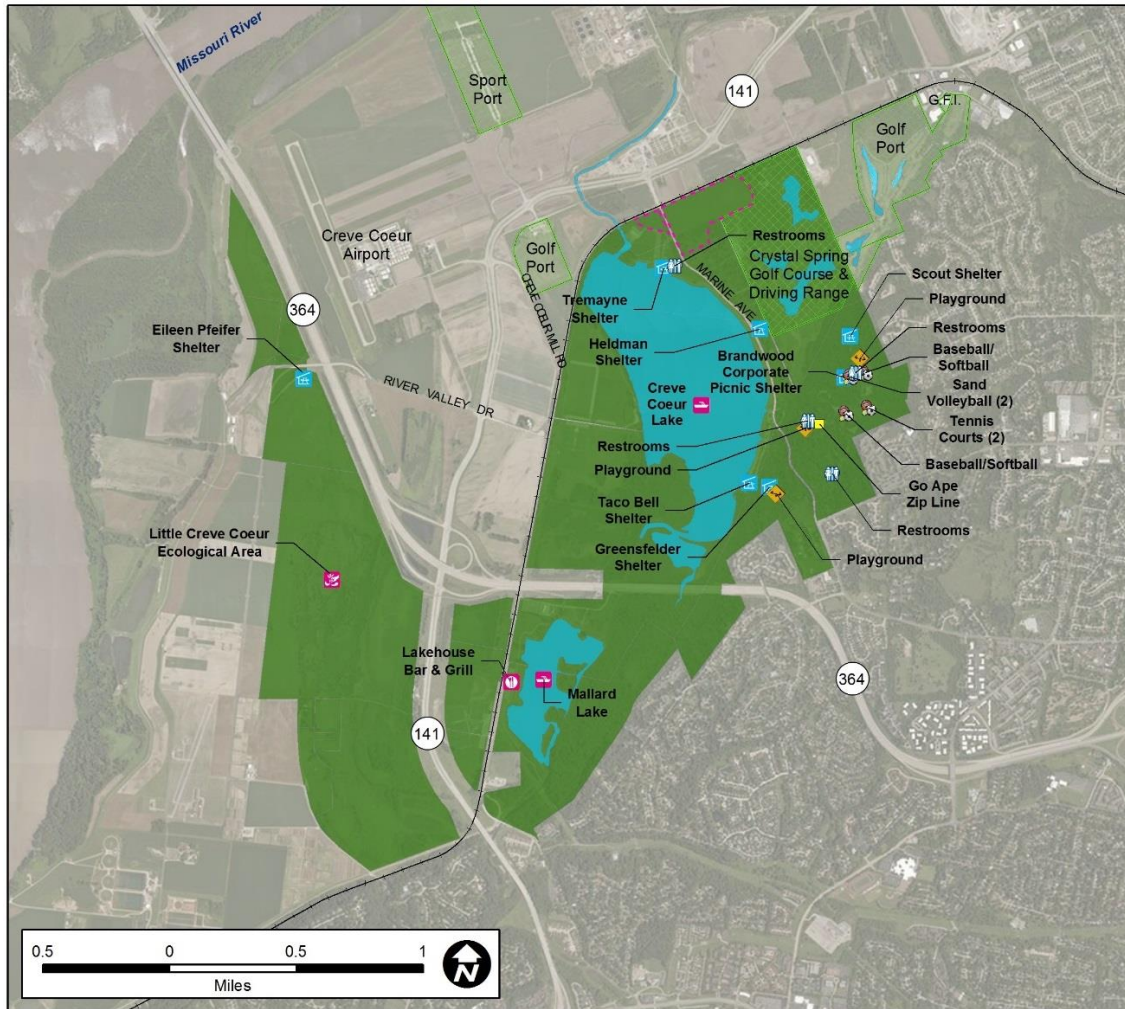


Figure 3-5. Wetlands









**St. Louis Ice Center**

MISSOURI DEPARTMENT OF NATURAL RESOURCES  
National Park Service

Saint Louis COUNTY PARKS

**Legend**

- Baseball/Softball Field
- Shelter
- Lake
- Adventure Activity Park
- Bar & Grill
- Ecological Area
- Playground
- Restroom
- Railroad
- Project Site
- Open Water
- Creve Coeur Park
- Recreation

Drawn By:	BSM	Job No.:	325117037
Reviewed By:	SCC	Date:	5/19/2017

The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number 325117037. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

Figure 3-7. Existing Recreation

## **4.0 ENVIRONMENTAL CONSEQUENCES**

### **4.1 Socioeconomics**

#### **4.1.1 No Action Alternative**

Under the No Action Alternative, there would be no changes to local demographics, economic conditions, or community services.

#### **4.1.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Under Alternative 1, the proposed SLIC would provide local changes to temporary and full-time employment, local business revenues, local tax revenues, and access to facilities outlined in the purpose and need. St. Louis County would retain ownership of the property, would own the proposed SLIC, and would enter into a lease agreement with the St. Louis Legacy Ice Foundation to operate the facility.

##### **4.1.2.1 Demographic and Employment Impacts**

The proposed SLIC would require a temporary construction workforce of 970 workers (Johnson Consulting 2017) and would take an estimated 11 to 18 months. Construction workers would be drawn from the labor force that currently resides in the St. Louis metropolitan area. Following construction, there would be a need for an estimated 156 permanent full-time employees to staff the SLIC (Johnson Consulting 2017). Many of these employees could be drawn from the surrounding study area. New employees that move into the area would be few enough in number to have a negligible effect on local demographics. Consequently, the proposed project is not expected to have impacts to local demographics.

##### **4.1.2.2 Economic Impacts**

Potential economic impacts associated with the proposed project are positive and relate to direct and indirect effects of the construction, long-term employment, and increased visitation to the Park.

Construction activities would temporarily increase employment and associated payrolls and require the purchase of materials and supplies. Capital costs associated with the proposed action would be an estimated \$53 million, of which \$34.3 million would be total spending (i.e., direct and indirect employment costs), raising an additional \$1.6 million in tax revenue (Johnson Consulting 2017). Increased tax revenue due to construction would therefore have direct economic benefit to the local and regional area. Additionally, direct materials purchases and secondary impacts associated with the multiplier effects of construction activities would also benefit the local and regional economy.

There would also be beneficial long-term economic impacts associated with the annual operational costs, long-term employment, and increased visitation to the SLIC. Annual operations of the SLIC would require 156 full-time employees. This number of employees would earn

approximately \$7.0 million per year (Johnson Consulting 2017). Average annual visitation to the SLIC (estimated 272,591 individuals) would increase spending in the local area (e.g., hotel stays, meals, etc.) by an estimated \$21.7 million (Johnson Consulting 2017). Direct fiscal impacts (i.e., increased tax revenues) to the local and regional economy would be roughly \$800,000 per year. Increased visitation and employee wages would have secondary impacts associated with the multiplier effects of spending (e.g., spending on local goods and services) that would further benefit the local economy.

#### **4.1.2.3 Environmental Justice**

No sensitive populations subject to EJ consideration were identified in the SLIC study area, therefore there would be no direct impact on EJ populations as a result of implementation of this alternative.

Modest admission fees would be required to attend select events and to use the ice facilities for open-skate, open-hockey and other such on-ice activities in order to cover the facility's operating costs. Additionally, the proposed SLIC would also provide increased access for the able-bodied and disabled public to a community outdoor recreational facility. Although the SLIC would be built on an approximate 40-acre parcel in the Park, the SLIC would not restrict access to the existing active and passive recreational facilities in the other 2,100 acres of the Park. Therefore, there would be no indirect disproportionate impact to EJ communities.

## **4.2 Land Use**

### **4.2.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. As a result, the existing land use of the project site would not change.

### **4.2.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Construction of the SLIC will change the existing land use at the project site from a mowed/semi-wooded tract of land to a developed outdoor recreational use with a permanent structure, surface parking and detention pond areas.

The proposed SLIC is compliant with permitted developments under the project site's zoning designation of "Mixed Use Development District."

## **4.3 Prime Farmland**

### **4.3.1 No Action Alternative**

Under the No Action Alternative, the SLIC would not be constructed. Consequently, there would be no project-related impacts to prime farmland under this alternative.



### **4.3.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Under this alternative, the 39.91 acres of prime farmland at the project site would be converted to a non-farmable use. This is not to be confused with the conversion of Section 6(f) land, as farmland conversion has to do with soil types.

This prime farmland conversion is considered to be minor and not significant for the following reasons:

- the area being converted has not been farmed in the last 10 years;
- it is not protected by any state or local government;
- it is relatively close (approximately 3,300 feet) from urban built-up area and urban support services (utilities) are all within ½ mile of the project site;
- it is less than half the size of an average farm in St. Louis County;
- there are basically no farm support services nearby; and
- the land cannot be used for agricultural purposes under Section 6(f) of the LWCF Act.

A Form AD-1006 was completed for the proposed action and reviewed by the NRCS. Form AD 1006 provides farmland conversion information and the amount of prime farmland impacted by the proposed SLIC (Appendix G).

## **4.4 Traffic and Transportation**

### **4.4.1 No Action Alternative**

Currently, there are no known traffic improvements planned or proposed for Marine Avenue. Traffic would increase within Creve Coeur Lake Memorial Park as a result of the proposed ice center; however, most of the traffic to and from the public facility is expected to enter and leave the Park at the adjacent entrance at the intersection of Marine Avenue and Highway 141.

### **4.4.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Access to the SLIC is proposed via three entrances along the east side of Marine Avenue. The middle entrance would be opposite the existing Sailboat Cove entrance, another is proposed approximately 360 feet south of the middle entrance and a third entrance is proposed approximately 500 feet north of the middle entrance. In addition, a future potential access on the west side of Marine Avenue may be implemented to serve a future potential 257-space overflow parking lot opposite the north entrance. The future potential overflow lot would also connect to the existing Sailboat Cove parking lot.

There is a need to provide separate left-turn lanes at each of the proposed entrances. Based on the distance between the entrances, a three-lane cross section is recommended along Marine Avenue (one lane in each direction plus a two-way left-turn lane) between the proposed south entrance and the proposed north entrance. This widened roadway section is proposed within the existing right of way of Marine Avenue (Appendix H). MoDOT, SLCDOT and the City of Maryland

Heights have approved the roadway improvement plan for this widened section. Appendix H also contains a memo documenting this approval.

Construction at the site could be expected to generate between 150 and 200 vehicles per day. The peak inbound traffic would occur during the AM peak timeframe and the peak outbound would occur during the PM peak timeframe. Traffic generated by the operation of the facility is expected to be much higher than construction-level traffic; therefore, construction-level traffic is not analyzed separately.

#### **4.4.2.1 2017 Peak Hour Traffic Analyses (assumes build out of the SLIC)**

The 2017 traffic volumes were analyzed, with the proposed SLIC included, using the same methodology applied to the existing traffic volumes to identify the traffic impacts of the proposed SLIC. Results of these evaluations are summarized in Table 4-1.

Traffic during the Saturday evening event peak will have event-based traffic patterns. A majority of patrons will arrive and depart within a relatively short period of time before and after a scheduled event. The intersection of Route 141 and Marine Avenue would be impacted the most by the event traffic. The traffic modeling for peak hour condition for a Saturday evening was adjusted for this.

The operating conditions summarized in Table 4-1 include the modified peak hour condition at the intersection of Route 141 and Marine Avenue during the Saturday evening event peak hour. The operating conditions summarized in Table 4-1 represent the worst 15-minutes of the peak hour. It may be difficult to obtain acceptable levels of service and short queue lengths during these arrival/dismissal peak times since the event style traffic floods the intersection for a short time after which demand is significantly reduced.

Typically, it is not feasible to provide adequate capacity for event traffic to operate at normal levels of service during the peak arrival and dismissal hours. Infrastructure needs for churches, stadiums, auditoriums, and to a lesser extent, schools and universities are more often based on total duration of loading and unloading the site's parking facilities in addition to maintaining safe operating conditions on the public roadway.

As shown in Table 4-1, the 2017 operating conditions for the proposed SLIC at all intersections within the study area are expected to operate at acceptable levels of service (LOS D or better) during both the weekday PM peak hour and the Saturday evening event peak hour, except the westbound approach of Creve Coeur Mill Road North during the weekday PM peak hour. This approach could be improved by lane reassignment re-striping at the intersection, which could improve the level of service to LOS C during the PM peak hour. This westbound approach is an existing condition and the additional traffic from the proposed SLIC is not expected to have an impact on the westbound approach during the PM peak hour.

**Table 4-1. Forecast Operating Conditions, 2017 (Alternative 1)**

<b>Traffic Movement</b>	<b>Weekday PM Peak Hour *</b>	<b>Saturday Evening Event Peak Hour *</b>
<b>Route 141 at Creve Coeur Mill Road North</b>		
Eastbound Approach	D (43.0)	C (26.0)
Westbound Creve Coeur Mill Road Approach	F (194.6)	C (22.4)
Northbound Route 141 Approach	B (15.6)	A (8.4)
Southbound Route 141 Approach	C (28.8)	A (8.9)
<b>Intersection Overall</b>	<b>D (35.8)</b>	<b>A (9.2)</b>
<b>Route 141 at Marine Avenue</b>		
Eastbound Approach	C (35.0)	D (47.5)
Westbound Marine Avenue Approach	D (38.5)	C (40.3)
Northbound Route 141 Approach	A (6.3)	C (32.5)
Southbound Route 141 Approach	D (35.8)	C (33.4)
<b>Intersection Overall</b>	<b>C (26.6)</b>	<b>C (33.4)</b>
<b>Route 141 at Sportport/Golfport</b>		
Eastbound Sportport Road Approach	A (9.7)	A (5.2)
Westbound Golfport Road Approach	B (11.9)	B (8.5)
Northbound Route 141 Approach	A (2.4)	A (8.2)
Southbound Route 141 Approach	B (17.2)	B (14.9)
<b>Intersection Overall</b>	<b>B (11.8)</b>	<b>A (9.5)</b>
<b>Route 141 at Creve Coeur Mill Road South/Airport Road</b>		
Eastbound Airport Road Approach	C (33.7)	B (13.4)
Westbound Creve Coeur Mill Road Approach	D (36.7)	B (15.0)
Northbound Route 141 Approach	A (7.9)	B (12.9)
Southbound Route 141 Approach	A (5.4)	B (10.2)
<b>Intersection Overall</b>	<b>A (7.6)</b>	<b>B (12.1)</b>
<b>Dorsett Road at Marine Avenue</b>		
Westbound Dorsett Road Approach	B (11.4)	B (11.9)
Northbound Marine Avenue Approach	B (10.4)	A (8.1)
Southbound Marine Avenue Approach	A (7.0)	A (5.4)
<b>Intersection Overall</b>	<b>A (9.5)</b>	<b>A (8.5)</b>
* X (XX.X) = Level of Service (Vehicular delay in seconds per vehicle)		

Although the southbound approach at Route 141 and Marine operates at an acceptable LOS, the southbound left-turn movement from Route 141 to Marine Avenue operates at LOS F during the PM peak hour and the additional southbound left-turns resulting from the proposed SLIC would exacerbate those conditions. Minor signal timing adjustments, a reallocation of 6 seconds of green time from the northbound through movement to the southbound left-turn movement during the PM peak hour, would improve the southbound left-turn level of service with negligible impacts to delays, operation and progression for northbound Route 141.

#### 4.4.2.2 2037 Peak Hour Traffic Analyses

The existing 2017 traffic volumes were used as the basis to develop projected 20-year traffic forecasts for 2037. An annual growth rate of 0.5 percent was applied to the roadways within the study area to achieve the 2037 volumes.

The study intersections were reevaluated using the same methodologies described in Section 4.4.2.1. Table 4-2 summarizes the results of the 2037 traffic operating conditions, for both the No Action Alternative and Alternative 1, during the weekday PM peak hour and the Saturday evening event peak hour. This evaluation assumes that left-turn lanes are provided along Marine Avenue from the proposed north driveway to the proposed south driveway, as previously discussed.

**Table 4-2. Forecast Operating Conditions, 2037**

Traffic Movement	Weekday PM Peak Hour *		Saturday Evening Event Peak Hour *	
	2037 No Action	2037 Alt. 1	2037 No Action	2037 Alt. 1
<b>Route 141 at Creve Coeur Mill Road North</b>				
Eastbound Approach	D (43.0)	D (43.0)	C (24.0)	C (27.0)
Westbound Creve Coeur Mill Road Approach	F (247.1)	F (247.1)	B (20.0)	C (23.8)
Northbound Route 141 Approach	B (16.0)	B (15.6)	A (8.3)	A (9.4)
Southbound Route 141 Approach	C (32.7)	C (35.0)	A (8.6)	B (10.0)
<b>Intersection Overall</b>	<b>D (42.5)</b>	<b>D (43.3)</b>	<b>A (9.0)</b>	<b>B (10.2)</b>
<b>Route 141 at Marine Avenue</b>				
Eastbound Approach	C (35.0)	C (35.0)	B (16.5)	D (47.5)
Westbound Marine Avenue Approach	D (35.2)	D (40.3)	A (6.5)	D (40.8)
Northbound Route 141 Approach	A (7.0)	A (7.0)	A (9.3)	C (32.9)
Southbound Route 141 Approach	C (30.0)	C (24.7)	A (8.9)	C (33.7)
<b>Intersection Overall</b>	<b>C (23.2)</b>	<b>C (30.2)</b>	<b>A (9.0)</b>	<b>C (33.7)</b>
<b>Route 141 at Sportport/Golfport</b>				
Eastbound Sportport Road Approach	A (9.1)	A (9.1)	A (5.5)	A (5.9)
Westbound Golfport Road Approach	B (14.1)	B (14.2)	A (9.0)	A (9.5)
Northbound Route 141 Approach	A (2.5)	A (2.5)	A (8.4)	A (9.9)
Southbound Route 141 Approach	D (35.2)	D (40.7)	B (15.3)	B (14.9)
<b>Intersection Overall</b>	<b>C (23.6)</b>	<b>C (26.1)</b>	<b>A (9.8)</b>	<b>B (10.4)</b>
<b>Route 141 at Creve Coeur Mill Road South/Airport Road</b>				
Eastbound Airport Road Approach	C (33.7)	C (33.7)	B (12.9)	B (19.2)
Westbound Creve Coeur Mill Road Approach	D (37.9)	D (37.9)	B (15.6)	C (23.8)
Northbound Route 141 Approach	A (9.2)	A (9.9)	B (13.3)	B (17.3)
Southbound Route 141 Approach	A (7.2)	A (7.7)	A (10.6)	B (10.1)
<b>Intersection Overall</b>	<b>A (9.1)</b>	<b>A (9.7)</b>	<b>B (12.5)</b>	<b>B (15.6)</b>
<b>Dorsett Road at Marine Avenue</b>				
Westbound Dorsett Road Approach	B (12.3)	B (12.2)	B (12.0)	B (11.2)
Northbound Marine Avenue Approach	B (11.3)	B (11.3)	A (8.4)	A (9.2)
Southbound Marine Avenue Approach	A (7.1)	A (7.1)	A (5.5)	A (5.5)
<b>Intersection Overall</b>	<b>B (10.1)</b>	<b>B (10.1)</b>	<b>A (8.7)</b>	<b>A (8.9)</b>
* X (XX.X) = Level of Service (Vehicular delay in seconds per vehicle)				

Under Alternative 1, the 2037 operating conditions at the intersections off of Marine Avenue to the proposed SLIC will operate at overall acceptable levels (LOS D or better) during the weekday PM and Saturday evening event peak hours. The westbound approach of Creve Coeur Mill Road North at Route 141 could be re-striped to allow for two westbound left-turn lanes to improve the operation of that approach.

As with the 2017 conditions, minor signal timing adjustments could also be made for the 2037 conditions to provide additional southbound left-turn green time for Alternative 1 to minimize the southbound left-turn delays and queues, while still providing desirable levels for northbound Route 141.

Table 4-2 summarizes the results of the No Action Alternative and Alternative 1 for the 2037 operating conditions during the weekday PM and Saturday evening event peak hours. These evaluations assume that left-turn lanes are provided along Marine Avenue from the proposed north driveway to the proposed south driveway (center two-way left-turn lane), as previously discussed.

The 2037 operating conditions at the study intersections will continue to operate at overall acceptable levels (LOS D or better) during the weekday PM and Saturday evening event peak hours both during the No Action and Alternative 1 conditions. The westbound approach of Creve Coeur Mill Road North at Route 141 could be re-striped to allow for two westbound left-turn lanes to improve the operation of the westbound approach.

As with the 2017 conditions, minor signal timing adjustments could also be made to provide additional southbound left-turn green time for Alternative 1 in 2037 to minimize the southbound left-turn delays and queues, while still providing desirable levels for northbound Route 141.

## **4.5 Air Quality**

### **4.5.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed Ice Center. Project-related environmental conditions in the project site area with respect to air quality are not expected to change. Thus, continued use of the project site as an open field under the No Action Alternative would not be expected to cause additional direct or indirect effects to air quality; therefore there would be no change in existing conditions.

### **4.5.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

#### **4.5.2.1 Construction**

Under this alternative, transient air pollutant emissions would occur during construction of the proposed Ice Center. Construction-related air quality impacts would be primarily related to operation of internal combustion engines and site preparation activities.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur dioxide (SO<sub>2</sub>) during the site preparation and construction period. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Additionally, it is expected that vehicles would be properly maintained, which would also reduce emissions. Therefore, emissions from internal combustion engines would result in minor short-term local effects on air quality due to the relatively low number of vehicles, adherence to equipment maintenance requirements, and continued improvement of emission control measures and fuel blends.

Site preparation and vehicular traffic over paved and unpaved roads at the construction site can result in short-term increases in fugitive dust in and around the project area. The potential air quality impacts will be short-term, occurring while construction work is in progress and local conditions are appropriate. The potential for fugitive dust emissions typically is associated with ground clearing, site preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of materials. The potential is greatest during dry periods, high wind conditions, and during periods of intense construction activity.

Dust and airborne dirt generated by construction activities will be controlled through dust control procedures or a specific dust control plan, when warranted. The nature and extent of dust-generating activities will be assessed by the contractor and the municipal agency overseeing the land disturbance permit. Specific types of control techniques appropriate to the specific situation will be considered. Techniques that may warrant consideration include measures such as minimizing track-out of soil onto nearby publicly-traveled roads, reducing speed on unpaved roads, covering haul vehicles, and applying chemical dust suppressants or water to exposed surfaces, particularly those on which construction vehicles travel.

With the application of appropriate measures to limit dust emissions during construction, air quality impacts are not expected to be significant and would be minor and short-term.

#### **4.5.2.2 Operation**

Operation of the proposed SLIC is subject to specific state air quality regulations. The proposed Ice Center would be operated in compliance with state regulations. Air quality impacts associated with operation of the proposed SLIC would be minor and is not expected to have an effect on the region's air quality.

The proposed SLIC will attract motor vehicle traffic. The combustion of gasoline in motor vehicles contributes to the formation of volatile organic compounds (VOCs), which can lead to the formation of ground-level ozone during the hotter months of the year when there is more heat and sunlight. Steps to reduce ground-level ozone formation have been implemented in the St. Louis region such as: installation of vapor recovery nozzles at gasoline pumps (these have since been removed); cleaner burning gasoline reformulated to reduce VOCs; and enhanced vehicle inspection programs. The proposed project is not expected to attract a significant amount of motor vehicle traffic so as to have an effect on the region's air quality.

## 4.6 Noise

A calibration run was modeled utilizing Traffic Noise Model (TNM) 2.5 and the existing traffic data (which can be found in Appendix B) and compared to the existing field data collected on May 9, 2017 to ensure the accuracy of the model. FHWA policy requires that the model be accurate to within  $\pm 3$  dBA of actual monitored levels to be considered a valid model. The TNM 2.5 model run for existing conditions falls within the tolerance for this validation.

### 4.6.1 No Action Alternative

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. Project-related environmental conditions in the project site area with respect to noise would not change. Thus, continued use of the project site as an open field under the No Action Alternative would not cause additional noise-related impacts; therefore there would be no change in existing conditions.

### 4.6.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue

#### 4.6.2.1 Construction Impacts

Construction of the SLIC will require excavation, which would result in elevated temporary short-term noise levels. Development of this site would generate noise from compactors, front loaders, backhoes, graders, and trucks. As illustrated in Table 4-3, typical noise levels from construction equipment are expected to be 85 dBA or less at a distance of 50 feet from the equipment. These types of noise levels would diminish with distance from the project site activity at a rate of approximately 6 dBA per each doubling of distance. Therefore, noise would be expected to attenuate to the recommended HUD noise guideline of 65 dBA at approximately 500 feet. Although construction noise would attenuate to meet the HUD guideline of 65 dBA during daytime hours, construction noise could still remain above the USEPA guideline of 55 dBA at 500 feet.

There is one sensitive receptor located within 500 feet of the proposed site, which is the residence 480 feet to the northwest at 3404 Creve Coeur Mill Road. Based on straight line noise attenuation, construction noise from earth moving equipment would attenuate to 65.3 dBA at the receptor. However, objects in the field and topography would cause further noise attenuation. Therefore, it is expected that construction noise at this receptor would not exceed the HUD noise guideline of 65 dBA at approximately 500 feet. Construction noise would still remain above the USEPA guideline of 55 dBA. However, construction-related noise impacts would be intermittent and temporary and would occur during daytime hours. Given the temporary and intermittent nature of this construction noise, and the fact that the house is located within noise effects of Route 141, construction noise impacts are expected to be minor.

The Tremayne Shelter in the Park is 510 feet to the west and based on straight line noise attenuation, construction noise would attenuate to 64.8 dBA at this receptor. This would not exceed HUD noise guidelines, but would exceed the USEPA guideline. However, as stated above, these impacts would be intermittent, temporary and during weekday daytime hours.

The Creve Coeur Disc Golf Course is adjacent to the project site to the south. Several of the holes on the course are being relocated as part of this project and the course would be closed during the grading operations on site; therefore, the disc golf course would not be affected by the construction noise of earth moving equipment.

**Table 4-3. Typical Construction Equipment Noise Levels**

<b>Equipment</b>	<b>Noise Level (dBA) at 50 ft</b>
Dump Truck	84
Bulldozer	85
Scraper	85
Grader	85
Excavator	85
Compactor	80
Concrete Truck	85
Boring-Jack Power Unit	80
Backhoe (trench)	80
Flatbed Truck	84
Crane (mobile)	85
Generator	82
Air Compressor	80
Pneumatic Tools	85
Welder/Torch	73

Source: FHWA 2016

There is a potential for indirect noise impacts associated with an increase in construction related traffic and the transport of construction equipment to site. Noise impacts from construction related traffic are expected to be minor as construction-related traffic would utilize major arterial roadways as much as possible and likely would not have a noticeable increase on traffic volume and consequently traffic noise in the vicinity of those major roadways.

#### **4.6.2.2 Operation Impacts**

The proposed SLIC would operate seven days a week. Primary operational noise associated with the proposed facility would come from motor vehicle traffic entering and exiting the site and from mechanical equipment on the building.

As noted above, there are three receptors within proximity of the project site. The nearest is a residential house approximately 480 feet northwest of the project site. However, the nearest noise-producing mechanical equipment would be a condenser unit component of the dehumidifying unit, which would be mounted on the building roof top on the north side of rink one. The distance to the residential receptor from this unit is approximately 800 feet. This equipment could be expected to create a noise level of approximately 75 dBA at 50 feet. Based on straight-line attenuation, the noise from this equipment would attenuate to approximately 51 dBA at the residence. Therefore, there would be no operational noise impact at the residence.

The Tremayne Shelter is approximately 510 feet west of the project site. However, the nearest noise-producing mechanical equipment would be an outdoor condenser that would be ground



mounted on the west side of the building near the dock area. This distance to the Tremayne Shelter from this unit is approximately 902 feet. This evaporative condenser operating at full fan speed could be expected to create a noise level as high as 87.5 dBA at 50 feet. Based on straight-line attenuation, the noise from this equipment would attenuate to approximately 62.3 dBA at the shelter, which would be below the HUD guideline of 65 dBA, but it would still be above the USEPA suggested guideline of 55 dBA. However, objects in the field and topography would cause further noise attenuation. It is not expected that this condenser would cause disruption of the use of the shelter. This condition could be further mitigated by providing a barrier wall around the condenser unit to provide a break in the noise path to the shelter.

The Creve Coeur Disc Golf Course would not be in the path of noise created by the ground-mounted condenser on the west side of the building. The roof-mounted condenser on the north side of the building is further from the disc golf course than it is from the residence. Therefore, there are no operational noise impacts on the disc golf course.

There is a potential for indirect noise impacts associated with an increase in motor vehicle traffic to and from the site due to operation of the SLIC (permanent).

Noise levels were modeled in TNM 2.5 for the existing (2017) weekday PM peak hour traffic volume and the Saturday peak hour traffic volume. Then, noise levels were modeled with increases in traffic volumes as a result of the SLIC for the same two peak hour conditions in 2017. A 20-year design window was used to determine the 2037 peak hour traffic volumes and these were used to generate noise levels in TNM 2.5.

Noise impacts from traffic related to the operation of the SLIC would not exceed FHWA noise abatement criteria. The existing and forecast noise levels are presented in Table 4-4 below.

**Table 4-4. Traffic Related Sound Levels as Modeled in TNM 2.5 (dBA)**

Receiver	Existing PM Peak Hour	Existing Sat. Peak Hour	Build Condition 2017 PM Peak Hour	Build Condition 2017 Sat. Peak Hour	Build Condition 2037 PM Peak Hour	Build Condition 2037 Sat. Peak Hour
Tremayne Shelter	52.5	47.3	53.6	55.3	53.7	55.5
Creve Coeur Disc Golf Course	53.7	47.9	54.8	56.2	54.9	56.3
Residence at Route 141 and Marine Avenue	61.3	60.8	61.5	61.9	61.5	61.9

Existing PM peak hour traffic noise levels near the project site range from 52.5 dBA to 61.3 dBA. Predicted noise levels as a result of the operation of the SLIC would not increase by more than 3 dBA in any of the modeled scenarios. Therefore, there would be no noise related impact during the weekday PM peak hour condition.

The estimated modeled noise as a result of the SLIC would increase the noise level by 8.0 and 8.3 dBA at the Tremayne Shelter and disc golf course respectively. However this level would only occur for a very brief period before and after a Saturday event in the evenings during the colder months when it would be expected that use of other outdoor facilities would be less frequent. Given this, the noise impacts associated with the operation of the SLIC during Saturday evening peak times are expected to be minor.

## **4.7 Geology, Groundwater and Soils**

### **4.7.1 No Action Alternative**

Under the No Action Alternative, the SLIC would not be constructed. Consequently, there would be no project-related impacts to groundwater, geology or soil resources.

### **4.7.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

#### **4.7.2.1 Construction**

Most of the project site would be filled 2 to 5 feet to raise the elevation to at least one foot above the 100-year flood elevation. An estimated 195,000 cubic yards of fill will be obtained from construction of the on-site stormwater retention basins. The primary retention basin will be constructed north and east of the ice center facility, and will require excavations as deep as 18 feet below the existing ground surface. Groundwater is expected to be encountered as a result of the detention pond excavation activities; however, groundwater quality is not expected to be impacted.

Aggregate piers or a similar ground improvement system would likely be used to increase footing bearing pressure, reduce settlement under structural footings, and to reduce seismic liquefaction potential. Aggregate piers are installed by drilling an approximately 24-inch diameter excavation to approximately 60 feet and backfilling with compacted crushed rock. Aggregate piers would likely be installed beneath the proposed SLIC footprint. The remaining construction-related excavations associated with the proposed SLIC would be shallow (less than about 8 feet deep) and are not expected to encounter groundwater.

Prior to construction, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared and submitted as part of the stormwater permitting process. Components of the SWPPP will contain BMPs, such as silt fencing, for minimizing and controlling erosion and managing sedimentation.

The proposed site grading, excavation and ground improvement activities are not expected to negatively impact soil and groundwater on the project site. Design considerations are expected to mitigate the potential seismic risk of impact to the facility. Therefore, no notable seismic impacts are expected to occur that would impair operation.

#### **4.7.2.2 Operations**

A potential source of groundwater contamination resulting from operations of the proposed ice center facility includes releases of diesel fuel from backup generators. These potential impacts

are typically minor and would be sufficiently mitigated with the use of an appropriate Spill Prevention, Control and Countermeasure Plan.

## **4.8 Cultural Resources**

### **4.8.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed Ice Center. Therefore, there would be no direct or indirect impacts to cultural resources with this alternative.

### **4.8.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

The project area (PA) for the proposed SLIC site underwent a Phase I archaeological survey for the presence of NRHP eligible archaeological sites in May of 2017 (Appendix D). The investigation located three areas with cultural material, of which, two are historic isolated finds and one is a historic site. The two isolated finds were limited to a piece of clear glass, each. The location of these isolated finds correspond to structures identified on historic maps. By their nature, isolated finds are not considered sites; therefore they are not eligible for inclusion in the NRHP. The site that was discovered is part of the former Creve Coeur Beach Subdivision. This portion of the subdivision was likely constructed in the 1930s, and by 1974 the structures were no longer extant on the USGS topographic map. The 1979 USGS topographic map depicts the subdivision roads and on the 1981 aerial image the roads are not shown. The recovered artifacts (including mostly construction debris and a small amount of glass and ceramics) correspond to this timeframe. The artifacts were recovered from soil that was mixed with moderate to heavy amounts of gravel. Additionally, no intact soils were encountered; therefore, the conclusion is this site is not eligible for the NRHP. Furthermore, the project as defined, would not adversely affect NRHP-eligible cultural resources. No further work is recommended. The report detailing these findings can be found in Appendix D. In a letter dated June 20, 2017, the SHPO issued a clearance letter for the project indicating that there would be no historic properties affected; therefore, the SHPO has no objection to the proposed SLIC.

## **4.9 Biological Resources (Vegetation, Wildlife, Aquatic Life)**

### **4.9.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. Therefore, there would be no direct or indirect impacts to vegetation and wildlife species with this alternative.

### **4.9.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Various species of trees, bushes, flowers, grass, mammals, reptiles, birds and amphibians inhabit the project site. Construction of the proposed SLIC will remove approximately 36.5 acres of existing vegetation. Vegetation in the east-southeast portion of the project site will not be impacted due to existing wetland areas. Existing trees that exist in the southern portion of the project site

will be removed. As a result of the existing vegetation removal, existing wildlife habitat will be removed from the project site.

Impacts to existing vegetation and wildlife will be offset by the construction of the detention ponds and bioswales on the project site. Additional proposed creative native landscaping features will re-create natural environments that will provide educational opportunities and improve wildlife habitat. Parking islands with bioswales and native plants will benefit butterflies, honeybees, and other pollinators. Although the proposed SLIC will remove existing habitat for other wildlife, the project site represents only 1.9 percent of the entire Park area with most of this being a mowed field with just a few trees. The existing habitat at the project site is not unique, and there are numerous areas within and adjacent to the Park that will support wildlife offset by the SLIC.

## **4.10 Threatened and Endangered Species**

### **4.10.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed Ice Center. No permanent or temporary construction activities would occur that would potentially impact sensitive species or their dependent habitats. Therefore, there would be no direct or indirect impacts to sensitive species with this alternative.

### **4.10.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Surveys conducted within the project area did not find suitable habitat for the gray bat, and impacts are not anticipated on this species. Therefore, the project would have no effect on the gray bat.

Of the woodlots identified within the surveyed project area, no woodlots were designated as potentially suitable bat habitat based on the presence of potentially suitable roost trees and the forest community composition. The existing woodlots contained too dense of an understory to allow bats to move through the forest for foraging. While there was one potentially suitable bat roost tree located in the area of scattered trees in the southern portion of the project area, the overall community composition in the area did not have suitable tree species and community structure to support suitable summer bat habitat (trees with exfoliating bark, cracks, crevices, and/or hollows). The nearest larger blocks of forest are located approximately 1.6 miles to the southeast of the project area along the hillsides above the Missouri River valley (AmecFW, 2017).

Based on the lack of available potentially suitable bat habitat and less favorable forest community structures, tree clearing for the SLIC would have no effect on roosting or foraging habitat for the Indiana and northern long-eared bats.

Due to frequent mechanical disturbances at the site within the decurrent false aster growing period, it is unlikely that this species is present within the project area. Within Missouri, this species is presently only known to occur in St. Charles County (MDC 2015). In addition, large tracts of available potential habitat are located in the areas surrounding the project site. In

consideration of these factors, the project would have no effect on habitat for the decurrent false aster.

## **4.11 Wetlands**

### **4.11.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed Ice Center. Project-related environmental conditions in the project site area with respect to wetlands would not change. Thus, continued use of the project site as an open field and disc golf course under the No Action Alternative would not cause additional direct or indirect effects to on-site wetland areas; therefore, there would be no change in existing conditions.

### **4.11.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Site grading and construction of the SLIC project site will not impact the 0.13-acre forested wetland or the 0.11-acre emergent wetland on the eastern portion of the proposed project site. The proposed main stormwater detention basin on the eastern end of the site will provide new water-based ecological habitat that does not currently exist on the project site.

Although two emergent wetlands identified on the western portion of the site will be impacted by the proposed grading and construction, the USACE has verified that the two western emergent wetlands are not considered jurisdictional wetlands because they lack connectivity to a WOUS. Therefore, a Section 404 permit will not be required. As a result, the USACE has issued a “No Permit Required” letter to facilitate other necessary construction permits. A copy of the “No Permit Required” letter from the USACE is included in Appendix I.

## **4.12 Surface Water**

### **4.12.1 - No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed Ice Center. Project-related environmental conditions in the project site area with respect to surface water would not change. Thus, continued use of the project site as an open field and disc golf course under the No Action Alternative would not cause additional direct or indirect effects to the existing surface water runoff; therefore, there would be no change in existing conditions.

### **4.12.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Under Alternative 1, the St. Louis Legacy Ice Foundation would construct a new outdoor recreation facility that is protected from the 500-year flood of the Missouri River by the Howard Bend levee.

Based on information provided by the USGS, a 1-inch rain storm will generate 27,154 gallons of runoff on one acre of impermeable surface. Considering the size of the proposed development, a one-inch rain event would generate approximately 651,696 gallons of runoff (or, roughly the volume of an Olympic-sized pool). Retention basins located in low permeable soils with a high water table will hold water for a considerable amount of time. Bio-retention is a depressed landscape feature which stores, filters, and infiltrates stormwater runoff. Bio-retention is an attractive BMP on many developments because it can be tucked into greenspace such as curb islands, landscaping and planter boxes.

The project site currently slopes to the north and east. To counter the occurrence of the project site being within the 100-year flood zone, the site would be raised with 2 to 5 feet of fill. This action would bring the project site one foot above the 100-year flood elevation of Creve Coeur Creek. The proposed SLIC would be divided into multiple sub-basin watersheds: each tributary to a bio-retention basin, and then to retention lakes. To manage runoff, three constructed retention basins would provide compensatory water storage to offset the volume of water displaced by filling. The main retention lake would have an average water depth of 10 feet and would be interconnected to a secondary “finger lake” immediately west of Marine Avenue. From the second retention lake, an enclosed storm sewer discharge pipe would convey runoff to Creve Coeur Creek. Upstream of the on-site retention lake, bio-retention basins would be utilized to provide water quality treatment and volume reduction for proposed impervious surfaces. The site would be designed such that parking lots would sheet flow into bio-retention basins along their perimeter, and roof drains will “bubble up” into bio-retention basins. Private sewers would then convey stormwater from the bio-retention basins to the on-site retention lakes for storage. The Howard Bend Levee District has granted approval of the project hydraulics. The proposed filling activities to raise the elevation of the site, coupled with the creation of the stormwater detention ponds (with subsequent discharge to Creve Coeur Creek) will help control flooding and ponding that has been experienced on the project site. The proposed SLIC is not expected to negatively impact surface waters.

### 4.13 Floodplains

It is necessary to evaluate development in the 100-year floodplain to verify that the project is consistent with the requirements of Presidential EO 11988 (Floodplain Management). The objective of EO 11988 is “...**to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative**” (United States Water Resources Council 1978). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. For certain “Critical Actions,” the minimum floodplain of concern is the 500-year floodplain.

#### 4.13.1 No Action Alternative

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. Project-related environmental conditions in the project site area with respect to floodplains would not change. Thus, continued use of the project site as an open field

under the No Action Alternative would not cause additional direct or indirect effects to the existing 100-year floodplain environment; therefore, there would be no change in existing conditions.

#### **4.13.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

Under Alternative 1, the St. Louis Legacy Ice Foundation would construct a new outdoor recreation facility that is protected from the 500-year flood of the Missouri River by the Howard Bend levee. However, the project site is still subject to interior flooding within the Howard Bend Levee District. This flooding is associated with Creve Coeur Creek, of which flood control management is carried out by the Howard Bend Levee District. The proposed development will require fill material that will raise the elevation of the current project site above the 100-year floodplain of Creve Coeur Creek. To counter the occurrence of the project site being within the 100-year flood zone, the site will be raised with two to five feet of fill. This action will bring the project site one foot above the 100-year flood elevation of Creve Coeur Creek. Roadways leading to the development could be inundated and impassible during a 100-year flood event. As presented in the stormwater report in Appendix F, the proposed project results in the direct impact to approximately 35.5 acres of floodplain. No actions have been recommended to raise the elevations of roadways serving the immediate project area. As a result of the proposed fill activities on the project site, flooding of the SLIC from the Missouri River or Creve Coeur Creek is not expected to occur under either the 100-year or 500-year flood events of Creve Coeur Creek or the Missouri River, respectively.

The City of Maryland Heights is an approved municipality to administer the Federal Flood Insurance Program per FEMA. As such, Maryland Heights has ordinances in place under which to review and administer any proposed development within the regulatory floodplain as defined by FEMA Flood Insurance Rate Maps. Specifically, floodplain permits and flood studies are required for any changes via the removal or filling of earth within the designated floodplain. Development within the floodplain must demonstrate a no “net rise” to the stream or river floodway conveyance area, if applicable. A stormwater management study was conducted by Stock & Associates Consulting Engineers, Inc. in March 2017 for the proposed SLIC development. In a letter dated March 28, 2017 from Horner & Shifrin, the Howard Bend Levee District has granted approval of the project hydraulics as it relates to compensatory storage and compliance with the stormwater master plan. Information regarding the proposed stormwater management features of the project site is included in Appendix F.

The proposed filling activities to raise the site elevation out of the 100-year floodplain, coupled with the creation of the stormwater detention ponds (with subsequent discharge to Creve Coeur Creek) will help control flooding and ponding that has occurred on the project site. The proposed SLIC is not expected to negatively impact existing floodplains in the vicinity of the project site.

### **4.14 Hazardous Waste**

#### **4.14.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. Project-related hazardous materials and solid waste will not be used

or generated during construction and operation of the proposed SLIC. Existing hazardous materials and solid waste generated at the St. Louis County Parks maintenance shed would continue. Thus, continued use of the project site as an open field and disc golf course with a maintenance shed under the No Action Alternative would not cause additional direct or indirect effects to the generation of hazardous and solid waste, and there would be no change in existing conditions.

#### **4.14.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue**

##### **4.14.2.1 Construction Impacts**

During the construction phase of the proposed SLIC and site development, there will be typical generation of non-hazardous solid waste such as non-recyclable construction material scrap. To the extent possible, contractors and subcontractors will recycle acceptable materials. Hazardous waste will not be generated during construction activities. Diesel fuel will be used for jobsite equipment such as earth-moving equipment, lulls, and lifts. Various paints, solvents and adhesives will be used in relatively small quantities during construction, and per the manufacturer's intended uses. Non-hazardous solid waste generation will be temporary and will only last during construction.

##### **4.14.2.2 Operational Impacts**

The proposed SLIC is expected to generate typical amounts of non-hazardous solid waste such as paper, plastic and glass. To the extent possible, recycling will be encouraged. Hazardous wastes will not be generated during the operation of the SLIC, which may utilize a diesel-powered generator for backup power. These generators are typically self-contained and contain an internal aboveground storage tank. Additionally, typical cleaning solvents and solutions are expected to be used during the operation of the SLIC. Operation of the proposed SLIC is not expected to generate hazardous waste, or above-average amounts of non-hazardous solid waste.

#### **4.15 Visual Environment**

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity and visibility. Sensitivity of viewing points available to the public, their viewing distances and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed facility were evaluated based on the process and criteria outlined in the USFS scenic management system (USFS 1995).

##### **4.15.1 No Action Alternative**

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. Project-related environmental conditions in the project site area with respect to visual receptors would not change. Thus, continued use of the project site as an open



field and disc golf course under the No Action Alternative would not cause additional direct or indirect effects to the visual environment and there would be no change in existing conditions.

#### **4.15.2 Alternative 1 – Construction of the Proposed Ice Center at 13750 Marine Avenue**

##### **4.15.2.1 Construction Impacts**

During the construction phase of the proposed projects there would be slight visual discord from the existing conditions due to an increase in personnel and equipment in the area. Impacts from additional vehicular traffic are expected to be insignificant as the access to there is already traffic on the adjacent roads (Marine Avenue and Route 141). This small increase in visual discord would be temporary and only last during construction.

##### **4.15.2.2 Operational Impacts**

The proposed SLIC would contrast somewhat with the color and juxtaposition of the existing landscape. The current landscape at the proposed site is predominantly green and brown as a result of the existing grass landcover and scattered trees on the site. The dominant shapes in the landscape include the grass field, the existing electric transmission line to the northwest, the roads and railroad, and some trees scattered around the site.

The proposed SLIC would be constructed on fill approximately two to five feet above the existing ground at the site. Approximately 25 percent of the building would be 53 feet high, which would be approximately 55 to 60 feet above the existing ground level. The remaining 75 percent of the building would be 36.5 feet high, or approximately 38 to 41 feet above the existing ground. The color and shape contrast of the SLIC to Park users would be greatest in the foreground primarily west of Marine Avenue. These contrasts would be less noticeable in the middleground and indistinguishable in the background. In the foreground, the proposed SLIC would contrast with the natural landscape color and landform; however, the site would be landscaped with trees up against the proposed building and in the proposed parking lot. As those trees mature, the visual discord would decrease. Other nearby buildings in the foreground include the clubhouse to the Quarry at Crystal Springs golf course approximately 555 feet south, and the Rowers Building in the Park approximately 640 feet west. By comparison, the Rowers Building is approximately 28 feet high. As mentioned previously, there is also an electrical transmission line and railroad immediately northwest of the project site. While the SLIC would be a permanent impact in the foreground as presented in the project rendering below, it is not expected to create significant visual discord as there are other elements of human activity in the foreground, which lessen the scenic integrity of the area.



**Project Rendering – view to the southwest**

The proposed site would also be lit at night, which would be in contrast to the existing conditions at the site, which receives no artificial lighting. However, the lighting proposed at the site would be limited to minimize the amount of light “spill” off of the site. Additionally, the existing parking lot across the street at Sailboat Cove is lit so the lighting at the proposed SLIC would not have significant visual discord to the existing light patterns in the foreground.

While the proposed SLIC would be visible in the foreground to motorists on Marine Avenue and to Park users in the Park, it is not anticipated to create visual discord at the middleground and background distances as the topography and vegetation within the surrounding area provide some screening and allow the landscape to absorb the minor visual changes.

Based on the criteria used for this analysis, the scenic value class for the affected environment after the proposed SLIC is constructed is considered to remain at fair to good.

## 4.16 Visitor Experience / Recreation Resources

### 4.16.1 No Action Alternative

Under the No Action Alternative, the St. Louis Legacy Ice Foundation would not construct and operate the proposed SLIC. The visitor experience and existing recreation resources of the project site would not change. The existing site does not effectively promote outdoor recreation. It is primarily a mowed pasture field located just south of an active railroad line. An SLCDPR maintenance shed and a gravel road connecting the shed to Marine Avenue is situated in the south-central portion of the existing project site. Signage associated with the maintenance shed drive indicates “*Park Maintenance Vehicles Only*” at Marine Avenue, which gives the appearance that the area is off limits. Thus, continued use of the project site as an open field would not cause additional direct or indirect effects to the visitor experience and existing recreation resources.

### 4.16.2 Alternative 1 – Construction and Operation of the Proposed SLIC at 13750 Marine Avenue

#### 4.16.2.1 Construction Impacts

During the approximately 12 month construction phase of the proposed SLIC, there would be an increase in personnel and equipment in the area of the project site, which would not be open for recreational activities. Additionally, construction-related traffic will increase in the area of the project site. Impacts from additional vehicular traffic are expected to be minor as there is already traffic on the adjacent roads (Marine Avenue and Route 141).

#### 4.16.2.2 Operational Impacts

The proposed SLIC would attract additional visitors to the Park, and would be significantly supportive of other outdoor recreation uses and resources in the Park. The primary function of the proposed SLIC is recreation. The proposed SLIC would provide outdoor recreational activities such as ice hockey, public skating, figure skating, in-line skating, sled hockey, floor hockey and athletic strengthening/conditioning, all of which do not currently exist on the project site or elsewhere in the Park. These activities would be conducted, in part, on the proposed outdoor ice rink. To further encourage outdoor recreation, the SLIC would also feature an outdoor turf field in the southwest corner of the development as shown on Figure 1-2. The turf field will be used for the following activities:

- Warm-up, stretching and preparation area;
- Athletic rehabilitation and general strength training;
- Outdoor game and activity area for summer/athletic camps; and
- A general area for children, teens and adults that are accompanying ice sport athletes to run and play outdoors (i.e., frisbee, throwing footballs, kicking soccer balls).

The proposed SLIC would benefit and support the Park’s other outdoor recreational activities and uses. The SLIC would bring to the Park new visitors who may not visit otherwise. Youth-based sports such as ice hockey commonly draw additional friends and family members to a facility to observe practices and games. The presence of the SLIC in the Park would provide numerous outdoor recreational opportunities for family members of athletes that are visiting the SLIC

(particularly during practice and down-time between games). These outdoor recreation opportunities include: walking, hiking, biking, and nature viewing. A new 2.2 mile long trail being constructed by GRG will connect the Park to a larger trail network within and around the Park. The SLIC will serve as a convenient trailhead with public parking capacity and public restroom facilities for future trail users. This added benefit does not presently exist. The proposed SLIC would not result in lost recreation opportunities at the existing site. Some of the holes on the existing disc golf course are being relocated due to the construction of the trail but the recreation opportunity remains intact. Therefore, all outdoor recreation opportunities that are part of the SLIC would benefit the use of the existing site and would benefit the Park's recreation overall by providing new opportunities and trail linkages.

## **4.17 Cumulative Impacts**

This section discusses cumulative impacts to the region's environment that could result from construction of the proposed SLIC. Cumulative effects, as defined by the CEQ, result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts could result from individually minor, but collectively significant actions taking place over a period of time. For example, degradation of a stream's water quality by several developments that taken individually, would have minimal effects but collectively would cause a measurable negative impact is considered a cumulative effect.

### **4.17.1 Identification of the Significant Cumulative Effects Issues**

Reasonably foreseeable future actions within the study area addressed in this cumulative impacts assessment are identified below. For a project to have a cumulative impact, it must have some incremental impact in the category being studied. For example, if the cumulative projects will have impacts on air quality, but the proposed project will not have any incremental impact on air quality, the project has no cumulative impact on air quality. Conversely, if the project will have a large enough significant impact, such that it may affect an entire watershed or air basin, it may be considered to have significant cumulative impacts even if no other projects will contribute impacts.

For the proposed SLIC, there are certain environmental resources that would have no impacts, or very minimal impacts, to cumulatively add or assess in comparison to the past, the present, or the reasonably foreseeable future. Environmental resources that could have potential cumulative impacts associated with past, present and reasonably foreseeable future projects include the following specific resource categories, which are analyzed in this section.

- Social and Economic Resources
- Agriculture Land
- Transportation
- Land Use
- Noise
- Floodplains

In general, the potential for the proposed project to influence those resources, either through induced development or by affecting the same resources as other past, present, or reasonably foreseeable projects or actions in the area, was considered based on the best available information prior to initiating the study.

#### 4.17.2 Geographic Area of Analysis

A cumulative impact analysis must consider the geographic extent of cumulative effects as well as the timeframe of potential effects. The geographic focus of the cumulative impact analysis is defined by an area roughly bounded by: I-70 on the north; I-270 on the east; Fee Fee/Olive/Waterworks Roads on the south; and the Missouri River on the west. This boundary incorporates an area where cumulative effects could be expected.

#### 4.17.3 Past, Present, and Reasonably Foreseeable Future Actions in the Study Area

A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and either explicitly or implicitly already have considered the impacts of past and present actions with those of the proposed action.

Reasonably foreseeable future actions that have been considered for the cumulative impact analysis are listed in Table 4-5. The listing includes relevant foreseeable future actions within and adjacent to the study area including other federal, state and local agencies, as well as private and commercial entities where information was known.

**Table 4-5. Reasonably Foreseeable Future Projects Considered as Part of the Cumulative Impacts Analysis**

Timeframe	Description of Action	Remarks
Past	Route 364 (Page Avenue) Extension	Included a bridge over the Missouri River linking St. Louis and St. Charles Counties.
	Sportport	90-acre multi-purpose outdoor athletic facility <sup>1</sup>
	Howard Bend 500+3 feet Levee	7.6 mile long levee completed in 2004 <sup>2</sup>
	Expansion of MSD Wastewater Treatment Plant	Missouri River Wastewater Treatment Plant.
	Route 141 extension from Route 340 to I-70	Included expansion of capacity at the Route 364 interchange.
	Missouri American Water lines and MSD sanitary sewer lines <sup>2</sup>	To serve existing and future land uses.
Present	Fee Fee Greenway Trail	Being developed by Great Rivers Greenway and Maryland Heights.

Timeframe	Description of Action	Remarks
Reasonably Foreseeable Future	Build-out of Maryland Heights Draft Land Use Plan for the Howard Bend Floodplain	Much of this area is zoned MXD (Mixed Use) with a recreational land use designation. Exact build-out unknown at this time.
	Maryland Oaks <sup>3</sup>	A planned residential development at the northwest quadrant of I-270 and Route 364 with 77 single family homes, 25 townhomes and 240 apartment units.
	New soccer complex at 2350 Creve Coeur Mill Road <sup>4</sup>	Within Creve Coeur County Memorial Park.
<p>1 Source: <a href="http://www.sportportintl.com">www.sportportintl.com</a></p> <p>2 Source: <a href="http://www.howardbend.com/our-history">www.howardbend.com/our-history</a></p> <p>3 Source: <a href="http://www.marylandheights.com/Home/ShowDocument?id=12608">http://www.marylandheights.com/Home/ShowDocument?id=12608</a></p> <p>4 Source: <a href="http://www.stlouisco.com/Community/News/Article/1470/Soccer-Complex-at-Creve-Coeur-Park-Project-Information-Meeting">http://www.stlouisco.com/Community/News/Article/1470/Soccer-Complex-at-Creve-Coeur-Park-Project-Information-Meeting</a></p>		

#### 4.17.4 Cumulative Impacts

##### 4.17.4.1 Social/Economic Resources

The proposed project is being developed within an environment where recreational land uses and a significant road network has been established. Much of the geographic area of analysis is in the Howard Bend Flood District, which has been determined to not be in floodplain and may be developed for commercial, industrial or residential uses subject to land use regulations of the cities of Maryland Heights and Chesterfield (Howard Bend 2017). Consequently, many of the foreseeable future projects could entail private development in planned growth areas. It is not possible to quantify the cumulative effects associated with private development projects, until specific project plans are known. However, the proposed Ice Center falls into an acceptable development category within Maryland Heights' land use development plan. Other planned development may result in the vicinity of this project site, which could improve business potential, positively affect employment opportunities and associated personal income in the region. The combination of all of the past, present, and future actions, could result in economic growth in the region.

##### 4.17.4.2 Farmland

The proposed SLIC would lead to a direct conversion of 39.91 acres of prime farmland. Prime farmland exists throughout the Missouri River floodplain within the Howard Bend Levee District. Future projects within the Howard Bend Levee District that have a connection to a federal action could result in additional farmland conversions. The conversion ratings of these projects would need to be reviewed by the responsible federal agency. Cumulative impacts to farmland are not considered to be substantial.

##### 4.17.4.3 Transportation

The potential for cumulative effects to transportation from other reasonably foreseeable future actions could occur. Traffic generated by the reasonably foreseeable future actions would consist

of shorter-term construction traffic and longer-term operational traffic associated with the action. Construction-related traffic is expected to be temporary, intermittent and is not expected to create long-term adverse cumulative effects to the transportation system in the vicinity of the proposed project.

#### **4.17.4.4 Land Use**

Cumulative effects to land use from other reasonably foreseeable future actions could occur. As described in Section 4.2, construction and long-term operation of the SLIC will result in a change in land use at the project site. Similar developments as described in Table 3-2 may result in similar land use changes in the geographic area of analysis. It is anticipated that proposed land use changes in the vicinity of the project site will be consistent with the permitted developments under specific zoning designations, and the City of Maryland Heights' Comprehensive Plan.

#### **4.17.4.5 Water Resources and Floodplains**

Culverting, stream channelization and modifications, sediment impacts, and the addition of impervious surfaces are all factors that tend to degrade overall quality of aquatic habitats and water quality. As described in Section 4.12, short-term construction and long-term operation and maintenance associated with the proposed project will result in minor impacts to streams in the study area. These impacts, together with the impacts associated with reasonably foreseeable future development in the study area could result in an adverse cumulative impact to water quality to streams such as Creve Coeur Creek. This project and all foreseeable future actions will require a SWPPP, which describes erosion control practices that will be implemented. Use of appropriate BMPs and continued coordination with regulatory agencies during project design and permitting would be implemented to help reduce the overall cumulative impacts to aquatic resources caused by implementation of the proposed project and reasonably foreseeable future actions. Regulatory agencies would be responsible for regulation of water resource impacts from private developments in the study area to help minimize water quality impacts. However, since adverse impacts associated with new construction projects are often temporary, substantial long-term cumulative water quality impacts are not anticipated.

The proposed project would impact approximately 35.5 acres of floodplain. The Howard Bend Levee District has granted approval of the hydraulics of the project as it relates to compensatory storage and compliance with their overall stormwater master plan. Foreseeable future actions within the Howard Bend Levee District would need to meet these same requirements, and all other regulatory requirements, for development within the district. Provided that all regulatory requirements are met, substantial long-term cumulative floodplain impacts are not anticipated.

**THIS PAGE LEFT BLANK INTENTIONALLY**

---



## 5.0 CONSULTATION AND COORDINATION

### 5.1 Public Coordination

A public meeting was held on January 25, 2017 for the proposed project. The meeting was hosted by the City of Maryland Heights and St. Louis County Department of Planning. The meeting was held to satisfy zoning requirements in the City of Maryland Heights. Representatives from St. Louis County and from the Foundation made presentations to the attendees. After the presentations, 42 individuals spoke on the topic with 25 in favor of the project and 17 opposed to it. The attendees that spoke were unanimous in their agreement of the benefits of ice sports facilities for recreation, health, fitness and family fun. However, there was not unanimous support for the siting of the proposed project in Creve Coeur Lake Memorial Park. The public comments can be summarized into three major areas:

- Ice sports enthusiasts' support for the project in its proposed location.
- Open space advocates and Park users against the use of the proposed location.
- Maryland Heights Officials' support for the project and its proposed location.

### 5.2 Agency Coordination

Consultation with MDNR was initiated on April 5, 2017 via conference call. The purpose of the call was to introduce MDNR to this new NEPA phase of the project. MDNR already had familiarity with the project through previous consultation from St. Louis County Recreation and Parks Department in 2016 and early 2017. The conference call discussion included:

- Introductions of the project team;
- A project status update, which included: project goals, a description of the project; project status; and a project schedule
- Discussion about the classification of the project, whether it is exempt from conversion process, and whether the grading activities are subject to NPS approval under LWCF. Discussion points included the following:
  - The proposed project is compatible with Missouri's State Comprehensive Outdoor Recreation Plan (SCORP).
  - Location alternatives have been adequately considered, documented and rejected on a sound basis; this is covered in the EA
  - The proposed project is compatible with outdoor resources on site.
  - Outdoor uses on the site continue to be greater than expected indoor uses.
  - The project is expected to create a net gain in outdoor recreational benefit in the Park.
  - Land to remain under the ownership of St. Louis County and the proposed facility will be publicly owned.
  - The proposed project is not a professional sports facility, but rather it will provide: a year-round recreational opportunity to the public; reasonable fees will be charged to ensure the facility is accessible to everyone; memberships will not be required; limited office space will support the operation of the facility
- Under certain circumstances NPS will approve funding of enclosed ice rinks

- Ice skating is considered an outdoor recreation activity under the LWCF program
- Discussion on whether the project meets criteria for a public facility
- NPS will approve sheltered public facility, including enclosed ice rinks
- The study team requested a meeting with NPS representatives to introduce the project

A scoping packet and draft PD/ESF were sent to the National Park Service in April 2017 for their review.

## 6.0 LIST OF PREPARERS

### ST. LOUIS ECONOMIC DEVELOPMENT PARTNERSHIP

Name: **Janet Wilding**  
Education: B.A., Economics and English  
Project Role: VP Major Projects, St. Louis Economic Development Partnership  
Experience: 25 years of professional experience in urban and greenway design, and economic development.

Name: **Sheila Sweeney**  
Education: MBA, Business and Finance; B.A., Political Science  
Project Role: CEO, St. Louis Economic Development Partnership  
Experience: 30 years of professional experience in real estate and economic development.

### GEOTECHNOLOGY, INC.

Name: **Michael Roark, RG**  
Education: M.S. and B.S., Geology and Applied Geophysics  
Project Role: Project Manager and Senior Reviewer; Land Use, Floodplains, Recreation  
Experience: 18 years of environmental consulting experience including NEPA assessments, environmental assessments and natural systems consulting.

Name: **Robin Ledford**  
Education: M.S. and B.S., Biological Sciences  
Project Role: Wetlands and Natural Systems  
Experience: 13 years of experience in conducting wetlands assessments and delineations, and biological assessments.

Name: **Ed Alizadeh, PE**  
Education: B.S., Petroleum Engineering; J.D., Law  
Project Role: Project Principal, QA Reviewer  
Experience: 33 years engineering experience including 28 years as an environmental professional.

### AMEC FOSTER WHEELER

Name: **Karen Boulware**  
Education: M.S., Resource Planning and B.S., Geology  
Project Role: Socioeconomics and Environmental Justice, Natural Areas, Parks and Recreation, Noise  
Experience: 25 years of professional experience in NEPA.

Name: **Joel Budnik**  
Education: M.S. and B.S., Wildlife and Fisheries Sciences  
Project Role: Threatened and Endangered Species, Wildlife and Vegetation  
Experience: Mr. Budnik has 19 years of experience in environmental planning, NEPA analysis and documentation, ecological studies, and preparation of technical documents including Integrated Natural Resource Management Plans (INRMP).

Name: **Steve Coates, PE**  
Education: B.S., Civil Engineering  
Project Role: Document Manager; Prime Farmland, Transportation; Air Quality; Visual Impacts  
Experience: 30 years of experience in conceptual design of urban and rural highway projects, environmental compliance and stormwater management and civil site design, and NEPA reports.

Name: **Linda Hart**  
Education: B.S., Business/Biology  
Project Role: Technical Editing  
Experience: 30 years of experience in production of large environmental documents including technical editing, formatting, and assembling.

Name: **Richard Hart**  
Education: A.S. of Applied Science  
Project Role: Noise Analysis  
Experience: 20 years of experience in Computer-Aided Design Technology, baseline noise measurements and noise modeling using the Traffic Noise Model

Name: **Stephanie Miller**  
Education: M.S., Biology and B.S., Marine Biology  
Project Role: Wetlands, Threatened and Endangered Species  
Experience: 8 years of experience in visual assessment, land use, aquatic and terrestrial ecology

Name: **Chris Musselman**  
Education: M.S., Fisheries and Aquatic Ecology  
Project Role: Socioeconomics and Environmental Justice  
Experience: 3 years of experience in NEPA assessments

Name: **Kathy Warner**  
Education: M.A. Anthropology  
Project Role: Cultural resources document review  
Experience: 18 years of experience in cultural resource management

Name	<b>Vince Warner</b>
Education	M.A. and B.A. Anthropology
Project Role	Cultural resources lead investigator
Experience	26 years of experience in cultural resource management

**THIS PAGE LEFT BLANK INTENTIONALLY**

---

## **7.0 RECIPIENTS OF THIS DOCUMENT**

### **7.1 Federal Agencies**

U.S. Army Corps of Engineers, St. Louis District  
U.S. Fish and Wildlife Service  
National Parks Service – Omaha Support Center

### **7.2 Federally Recognized Tribes**

Delaware Nation  
Delaware Tribe of Indians  
Eastern Shawnee Tribe of Oklahoma  
Iowa Tribe of Oklahoma  
Iowa Tribe of Kansas and Nebraska  
Kaw Nation  
Kickapoo Tribe of Kansas  
Kickapoo Tribe of Oklahoma  
Miami Nation of Oklahoma  
Osage Nation  
Peoria Tribe of Oklahoma  
Ponca Tribe of Oklahoma  
Ponca Tribe of Nebraska  
Quapaw Tribe of Oklahoma  
Sac and Fox Nation of Missouri in Kansas and Nebraska  
Sac and Fox Tribe of the Mississippi in Iowa  
Sac and Fox Nation of Oklahoma  
Shawnee Tribe

### **7.3 State Agencies**

Missouri Department of Natural Resources – Division of State Parks, Land & Water Conservation  
Fund Grants Program  
Missouri Department of Natural Resources – State Historic Preservation Officer  
Missouri Department of Transportation

### **7.4 Individuals and Organizations**

St. Louis County Department of Parks and Recreation  
St. Louis County Department of Planning  
City of Maryland Heights

**THIS PAGE LEFT BLANK INTENTIONALLY**

---



## 8.0 REFERENCES

- AmecFW (Amec Foster Wheeler), 2017. Project Technical Memorandum, Evaluation of Project Area for Potentially Suitable Bat Habitat. (Also found in Appendix E).
- Arizona DOT (Arizona Department of Transportation), 2008. Common Indoor and Outdoor Noise levels. Retrieved from: [http://azdot.gov/docs/default-source/planning/noise\\_common\\_indoor\\_and\\_outdoor\\_noise\\_levels.pdf?sfvrsn=4](http://azdot.gov/docs/default-source/planning/noise_common_indoor_and_outdoor_noise_levels.pdf?sfvrsn=4). (Accessed May 2017).
- Berglund, B., & Lindvall, T. (Eds.), 1995. Community noise. Archives of the Center for Sensory Research 2(1), pg. 20. Retrieved from: <http://www.nonoise.org/library/whonoise/whonoise.htm>. (Accessed May 9, 2017).
- CEQ (Council on Environmental Quality), 1997a. Considering Cumulative Effects Under the National Environmental Policy Act. Retrieved from: [https://ceq.doe.gov/publications/cumulative\\_effects.html](https://ceq.doe.gov/publications/cumulative_effects.html). (Accessed May 31, 2017).
- CEQ, 1997b. Environmental Justice Guidance Under the National Environmental Policy Act, Executive Office of the President, Washington, DC, page 25. Retrieved from: [https://www.epa.gov/sites/production/files/2015-02/documents/ej\\_guidance\\_nepa\\_ceq1297.pdf](https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf). (Accessed May 2017).
- EWGCOG (East West Gateway Council of Governments), 2017. Ozone Data Tracking Report, Maximum 8-Hour Average By Monitor, for 2014, 2015 and 2016. Retrieved from the following websites: <http://www.ewgateway.org/environment/air/ozonedatasharing/8hrozone-2014.pdf>, <http://www.ewgateway.org/environment/air/ozonedatasharing/8hrozone-2015.pdf>, <http://www.ewgateway.org/environment/air/ozonedatasharing/8hrozone-2016.pdf>. (Accessed May 8 and 31, 2017).
- FHWA (Federal Highway Administration), 2011. Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. December 2011. Page 11.
- FHWA, 2016. Construction Noise Handbook. Retrieved from: [http://www.fhwa.dot.gov/environment/noise/construction\\_noise/handbook/handbook09.cfm](http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm). (Accessed May 9, 2017).
- Hardee's, 2017. Hardee's Iceplex, Facility Information, website. Retrieved from: <http://hardeesiceplex.com/facilityinformation.html>. (Accessed March 30, 2017).
- Homer et. al., 2011. Completion of the 2011 National Land Cover Database for the Conterminous United States – Representing a Decade of Land Cover Change Information. Retrieved from: [https://cfpub.epa.gov/si/si\\_public\\_record\\_report.cfm?dirEntryId=309950](https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=309950). (Accessed May 2017).

- Howard Bend, 2017. Howard Bend Levee District, website. Retrieved from: <http://www.howardbend.com/our-history>. (Accessed May 11, 2017).
- HUD (U.S. Department of Housing and Urban Development), 1985. The Noise Guidebook, HUD-953-CPD Washington, D.C., Superintendent of Documents, U.S. Government Printing Office.
- Johnson Consulting, 2017. St. Louis Ice Center Economic Impact Analysis. Johnson Consulting, Chicago, Illinois. Pp: 1-8.
- Maryland Heights, 2015. Comprehensive Plan Update, 2015. Retrieved from: <http://www.marylandheights.com/home/showdocument?id=2334>. (Accessed May 15 and 31, 2017).
- MDC (Missouri Department of Conservation), 2015. Best Management Practices for Construction and Development Projects, Decurrent False Aster. Retrieved from: <https://mdc.mo.gov/sites/default/files/downloads/Decurrent%20False%20Aster.pdf>. (Accessed May 15, 2017).
- MDNR (Missouri Department of Natural Resources), 2017. GeoSTRAT website. Retrieved from: <https://dnr.mo.gov/geology/geostrat.htm>. (Accessed May 2017).
- NatureServe, 2016. NatureServe Web Service. Arlington, Virginia. USA. Available: <http://services.natureserve.org>. (Accessed May 2017).
- NPS (Department of the Interior, National Park Service), 2017. Land and Water Conservation Fund, State Assistance Program, Federal Financial Assistance Manual, Volume 69, Effective Date: October 1, 2008, Chapter 1-1.
- SLCDPR (St. Louis County, Department of Parks and Recreation), 2017a. “History of Creve Coeur” website. Retrieved from: <http://www.stlouisco.com/Portals/8/docs/Document%20Library/parks/PDFs/ParkHistory/CreveCoeurHistory.pdf>. (Accessed March 30, 2017).
- SLCDPR, 2017b. St. Louis County Department of Parks and Recreation, Environmental Assessment (Draft) St. Louis Ice Center, Creve Coeur Lake Memorial Park, January 2017, Section 2.1.
- SLCDPR, 2017c. St. Louis County Department of Parks and Recreation, Creve Coeur Soccer Complex, website. Retrieved from: <http://www.stlouisco.com/ParksandRecreation/Sports/CreveCoeurSoccerComplex>. (Accessed May 16, 2017).
- USCB (U.S. Census Bureau), 2017a. American Community Survey 2011-2015. Detailed Tables. Retrieved using American FactFinder: <http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>. (Accessed May 2017).

- USCB, 2017b. Poverty Thresholds for 2015. Detailed Table. Retrieved from: <http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html>. (Accessed February 2017).
- USEPA (US Environmental Protection Agency), 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA-550/9-74-004, Washington, DC. Retrieved from: <http://nepis.epa.gov/Exe/ZyNET.exe/2000L3LN.TXT?ZyActionD=ZyDocument&Client=EPA&Index=Prior+to+1976&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C70thru75%5CTxt%5C00000001%5C2000L3LN.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75q8/r75q8/x150y150q16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL#area>. (Accessed January 2016).
- USEPA, 2000. Ecoregions of Iowa and Missouri. Retrieved from: [ftp://newftp.epa.gov/EPADDataCommons/ORD/Ecoregions/mo/moia\\_front.pdf](ftp://newftp.epa.gov/EPADDataCommons/ORD/Ecoregions/mo/moia_front.pdf). (Accessed May 2017).
- USEPA, 2017a. Environmental Justice. Retrieved from: <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>. (Accessed May 2017).
- USEPA, 2017b. National Ambient Air Quality Standards (NAAQS) Table. Retrieved from: <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. (Accessed May 8, 2017).
- USFS (US Department of Agriculture, Forest Service) 1995. Landscape Aesthetics, A Handbook for Scenery Management.
- USFWS (US Fish and Wildlife Service), 2006. Indiana Bat (*Myotis sodalis*) Fact Sheet. Retrieved from: <https://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbafactsht.pdf>. (Accessed May 15, 2017).
- USFWS, 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan, First Revision. Great Lakes Big Rivers Region, Region 3 Fort Snelling, Minnesota. 260 pages. Retrieved from: [http://www.fws.gov/midwest/endangered/mammals/inba/inba\\_drftrecpln16ap07.html](http://www.fws.gov/midwest/endangered/mammals/inba/inba_drftrecpln16ap07.html). (Accessed May 15, 2017).
- USFWS, 2015a. Northern long-eared bat (*Myotis septentrionalis*) Factsheet. Retrieved from: <https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/NLEBFactSheet01April2015.pdf>. (Accessed May 15, 2017).

- USFWS, 2015b. Decurrent False Aster Fact Sheet. Retrieved from:  
<https://www.fws.gov/midwest/endangered/plants/pdf/d-f-aster.pdf>. (Accessed May 15, 2017).
- USFWS, 2016. Range-Wide Indiana Bat Summer Survey Guidelines. Retrieved from:  
<https://www.fws.gov/arkansas-es/docs/2016IndianaBatSummerSurveyGuidelines11April2016.pdf>. (Accessed May 15, 2017).
- USGS (US Geological Survey), 2017. United States Geological Survey Surface-Water Annual Statistics. Retrieved from:  
[https://waterdata.usgs.gov/nwis/annual/?referred\\_module=sw&site\\_no=06935890&por\\_06935890\\_75944=834573,00060,75944,1997,2017&year\\_type=W&format=html\\_table&date\\_format=YYYY-MM-DD&rdb\\_compression=file&submitted\\_form=parameter\\_selection\\_list](https://waterdata.usgs.gov/nwis/annual/?referred_module=sw&site_no=06935890&por_06935890_75944=834573,00060,75944,1997,2017&year_type=W&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list). (Accessed May 2017).

