Feasibility Study of Sustainable Development and Conservation Options for the Maryland Park Lake District

July 2015

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The following organizations are proud to endorse this report:

- Eastern Missouri Chapter of the Sierra Club
- Forest ReLeaf of Missouri
- Gateway Greening
- Maryland Heights Residents for Responsible Growth
- Missouri Coalition for the Environment
- Ozark Regional Land Trust
- The Open Space Council (*)
- St. Louis Audubon Society
- U.S. Green Building Council – Missouri Gateway Chapter

Acknowledgments

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- Maryland Heights Residents for Responsible Growth
- Eastern Missouri Chapter of the Sierra Club
- And Individual Contributions

This report was prepared by The i5Group.

Additional partners and participating organizations in a future green infrastructure and ecosystem services valuation plan:

- BiodiverseCity St. Louis
- Missouri American Water

For more information or to download a copy of this report, visit:
www.marylandheightsresidents.com

Executive Summary

Overview

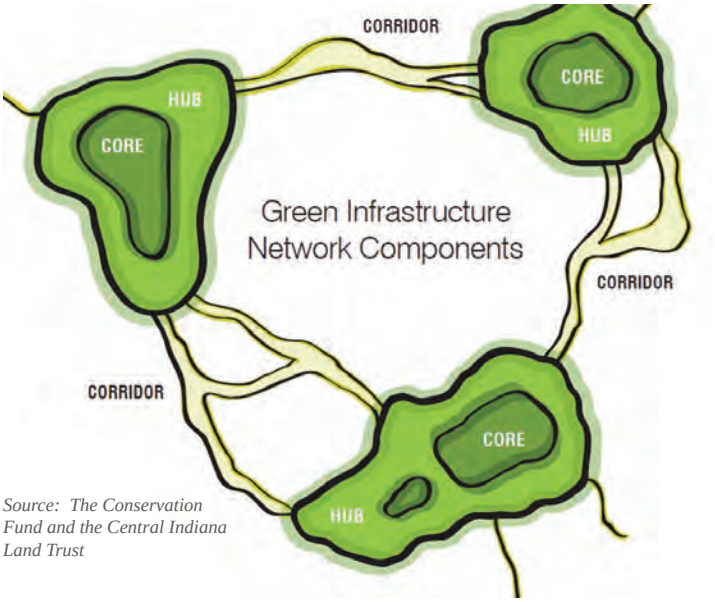
As the City of Maryland Heights updates the City's Comprehensive Plan, there is an opportunity to examine in greater detail strategies to promote sustainable development and conservation in the Maryland Park Lake District (Howard Bend Planning Area).

This feasibility study acknowledges that development will occur in the Maryland Park Lake District. However, it is hoped that this feasibility study and future analysis and planning can lead to development that follows sustainable principles, invests in green infrastructure, and promotes and encourages conservation.

As one of the largest undeveloped areas in the St. Louis metropolitan region, this is a once in a lifetime opportunity to promote sustainable development that will create value for landowners, the city, the region, habitat, wildlife, visitors, and residents.

This feasibility study is a concise, high level document that outlines opportunities and a process for future sustainable development and conservation in the Maryland Park Lake District. While this report does not make specific recommendations for the type of sustainable development or where conservation should occur, this report does recommend that a full green infrastructure plan and ecosystem evaluation take place.

Stakeholder meeting on April 20, 2015 for the Feasibility Study.



Source: The Conservation Fund and the Central Indiana Land Trust

A connected system of green infrastructure (natural resources) have multiple benefits compared to fragmented areas.

What We Heard

In talking with stakeholders, reviewing current and past planning documents, and reviewing the results of the public forum in February 2015, there are many existing shared values for the Maryland Park Lake District. While this list may not be inclusive of all stakeholders, it provides a general context.

Shared values include:

Build Community
Value Open Space
Respect Agricultural Heritage
Promote Community Identity
Create Economic Value

Report Recommendation

The primary recommendation of this feasibility study is that a full green infrastructure plan and ecosystem services valuation study be done for the Maryland Park Lake District.

Opportunities

A green infrastructure plan and ecosystem services valuation will guide and inform several opportunities for sustainable development including:

- Ensuring a Connected Green Infrastructure Network
- Restoring the Tree Canopy
- Promote Community Identity Through Architecture and Site Design
- Create and Support "High Quality" Open Space

Benefits for Maryland Heights

The benefits for the City by following the report recommendations and opportunities include: long term increased value through ecosystem services, creating a competitive advantage for the City, and continued stewardship of Creve Coeur Lake Memorial Park.

Background

Maryland Park Lake District

Approximately 2,000 undeveloped acres exist in the Maryland Park Lake District (Howard Bend Planning Area). The area is protected by a 500-year levee which was financed and constructed by the Howard Bend Levee District. A brief history of planning in the Maryland Park Lake District includes:

1987: City Comprehensive Plan – Levee status was uncertain.
1993: The Great Flood
2001: Construction started on levee.
2006: 500 year levee was certified.
2006: Howard Bend Land Use Implementation Plan
2006: Multiple Conceptual Development Plans Approved
Dec. 2014: Public Hearing to Begin Process of Updating Comprehensive Plan
Feb. 2015: Community Forum for Comprehensive Plan

Feasibility Report Process

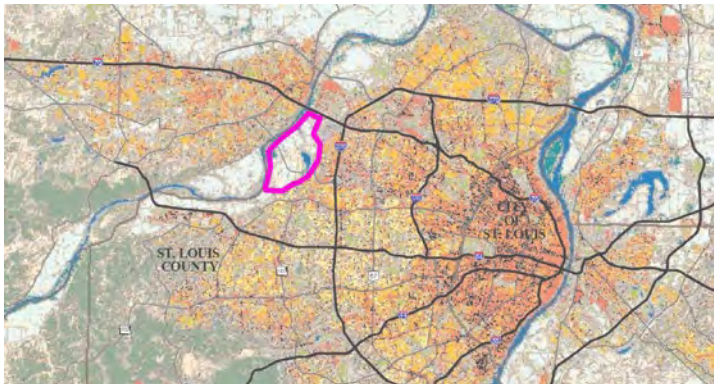
The process of this study has included:

- Review of Existing and Current Plans
- Group Stakeholder Meeting
- Individual Stakeholder Meetings
  - Great Rivers Greenway District
  - MSD
  - Howard Bend Levee District
  - McBride and Son Homes

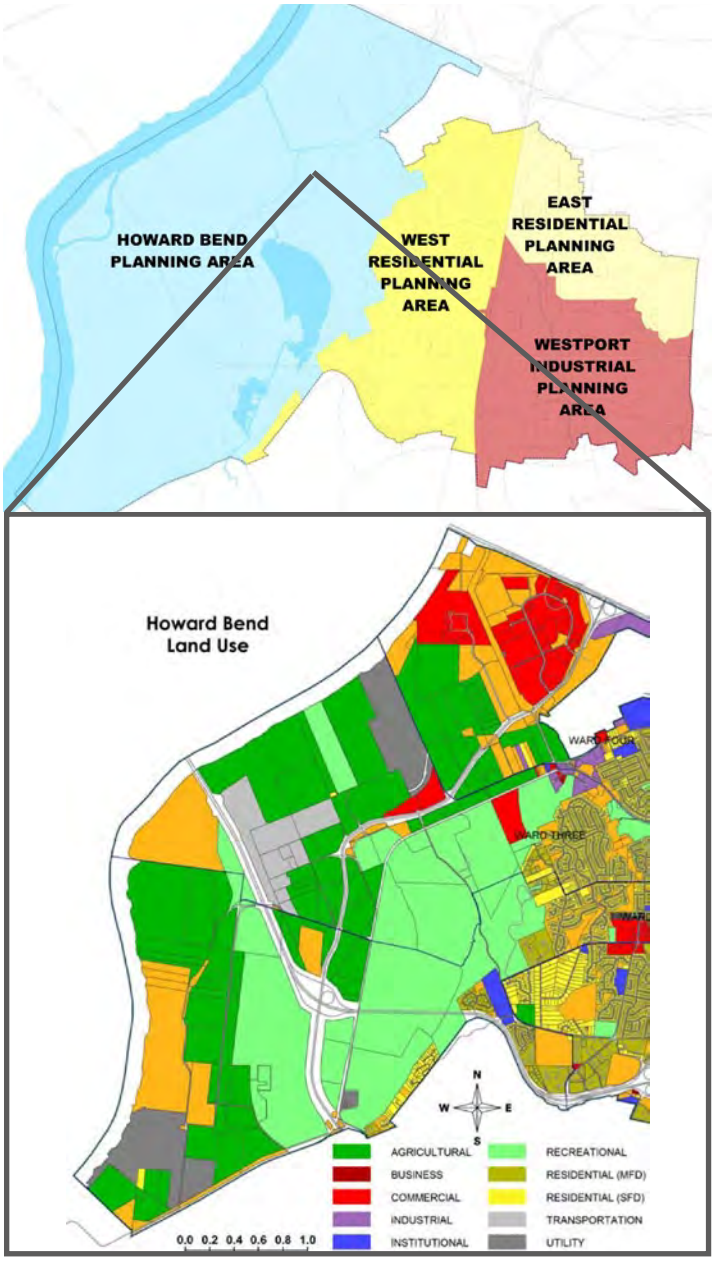
The purpose of the feasibility study was to identify opportunities to promote sustainable development and conservation in the Maryland Park Lake District. The goals of the study included: 1.) Demonstrate the economic value of sustainable development. 2.) Develop a framework and scope for a future green infrastructure and ecosystem evaluation plan. 3.) Techniques to promote future sustainable development in the Maryland Park Lake District such as LEED for Neighborhood Development, Conservation Subdivisions, SITES (Sustainable Sites Initiative), and Envision. 4.) A starting point for continued discussion.

Feasibility Study Schedule

This feasibility study has been a very concise process, conducted over a 6-8 week period in April and May 2015.
April 3 - Meeting with City Planning Staff
April 20 - Group Stakeholder Meeting
April - Individual Stakeholder Meetings
May 6 - Meeting with City Planning Staff
May 12 - Presentation of Draft Feasibility Report to City Planning Commission



Map of land cover in the St. Louis Region The Maryland Park Lake District (in purple) is one of the largest undeveloped areas in the St. Louis metropolitan region.
Map source: East-West Gateway Council of Governments



Location and existing land use of the Howard Bend Planning Area (Maryland Park Lake District)

Map source: City of Maryland Heights

What is Green Infrastructure

Our green infrastructure is all around us.

Sometimes green infrastructure is defined as dealing with storm water in a way that mimics natural systems. While that is part of the definition, the definition for this report is broader, referring to all our natural resources such as parks, open space, forests, wetlands, lakes, rivers, prairies, trees, gardens, etc.

Whether we call it green infrastructure or natural resources or ecosystems or nature, a key aspect is having a *connected* system of green infrastructure. A connected system of large, unfragmented areas of green infrastructure have tremendous benefits for habitat, wildlife, water quality, flood reduction, air quality, and quality of life.

Another aspect of thinking of our natural resources as 'green infrastructure' is to think of our natural resources as an investment in much the same way we realize that other infrastructure are "investments" such as roads and utilities. We also realize that there is an economic benefit of that infrastructure investment.

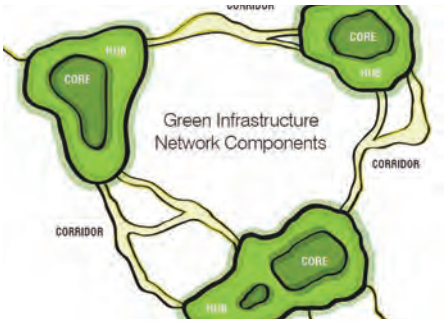
The principle of a connected system of green infrastructure works at multiple scales including regional, community, and site scales. The key principles to achieve a connected system of green infrastructure include:

- Protect existing public and private open space and natural areas.
- Conserve additional lands to assemble high quality natural areas of sufficient scale.
- Connect large blocks of natural areas with corridors.
- Stewardship of protected lands and natural areas.
- Mimic natural processes where development does occur.

Photo: SWT Design

The term 'green infrastructure' is a way to think of our natural resources as an "investment" in that it provides significant economic, social, and environmental benefits.

The principles of a connected system of green infrastructure is scalable including site, community and regional scales.



Source: Conservation Design Forum

Site Scale **Community Scale** **Regional Scale**

What are Ecosystem Services

Ecosystem services are the benefits that our natural resources (green infrastructure) provides.

The most common ecosystem services include:

- Reduced Stormwater Costs
- Water Benefits
  - Reduced Stormwater Costs
  - Improved Water quality
  - Reduced Flooding
- Energy Related Benefits
- Air Quality Benefits
- Climate Change Benefits
- Reduced Heat Island Effect
- Community Livability
- Habitat Benefits
- Increased Property Values
- Health Value
- Tourism

Ecosystem services valuation is a way to define the **economic** value of the various ecosystem services. Many of these economic benefits are very intuitive such as the economic value of pollinators for our agricultural products.

Increased property values is one of the easiest ecosystem services values to understand. Proximity to a park or greenspace means increased property values.

While ecosystem services valuation is a relatively new field, more communities are investing in determining the value of their existing and proposed green infrastructure. Knowing the value of their green infrastructure helps to inform their other decisions related to capital budgets, land use, and other infrastructure investments.

Ecosystem services may also be treated like economic assets that provide a stream of benefits over time like bridges, roads, and other built capital infrastructure. As such, economic valuation methods such as market pricing, hedonic pricing, replacement costs, and avoidance costs are used to determine an overall economic value.

Case Study

Central Iowa Realizes the Economic Value of Ecosystem Services in the Cedar River Watershed

After a devastating flood along the Cedar River in central Iowa in 2008, multiple stakeholders came together to analyze the value of ecosystem services within the Middle Cedar Watershed. The resulting report in 2012, performed by Earth Economics, looked at the economic value of various ecosystem services including:
Food production
Biological control
Water regulation and supply
Aesthetic and recreation

The report found an annual economic value of $548 million to $1.9 billion in ecosystem services in the Middle Cedar Watershed.

Case Study

Lancaster Saves on Gray Infrastructure Costs, Plus Gains Millions of Dollars in Energy, Air Quality, and Climate Benefits

A 2011 report analyzing the economic impact of Lancaster, Pennsylvania's green infrastructure plan found that the city saved over $120 million in gray infrastructure costs by using green infrastructure. The implementation cost of the green infrastructure was $77 million if the projects were integrated with other work.

In addition, the city gained $4.2 million in annual economic value from energy, air quality, and climate benefits by utilizing green infrastructure.

The report was funded by the EPA with technical work by the Center for Neighborhood Technologies, American Rivers, Tetra Tech, and CH2MHill.

Recommendation:

Invest in a full Green Infrastructure Plan and Ecosystem Services Valuation for the Maryland Park Lake District

The primary recommendation of this feasibility study is that a green infrastructure plan and ecosystem services valuation study be done for the Maryland Park Lake District. It is important that this recommendation moves forward now, prior to substantial development occurring in the district.

The green infrastructure plan will identify existing and future green infrastructure assets in the Maryland Park Lake District. Creve Coeur Lake and the area along the Missouri River are existing green infrastructure core areas. One aspect of the study will be to identify the best opportunities to link these areas through green infrastructure corridors.

The second aspect will be to conduct an ecosystem services valuation. This will place an economic dollar value on the many ecosystem services in the Maryland Park Lake District. The economic valuation should examine both the existing ecosystem services benefits and proposed conditions based on different development scenarios.

A green infrastructure plan and ecosystem services valuation will bring into focus several opportunities including:

- Ensure a connected green infrastructure network.
- Restore the tree canopy.
- Promote community identity through architecture and site design.
- Create and support "high quality" open space.

The proposed scope outline for a green infrastructure plan and ecosystem services valuation study:

Task A - Green Infrastructure Network and Prioritization

Base Mapping and Desktop Green Infrastructure: ID Habitat Patches and Connectivity

Verify Natural Areas, Water Resource and Water Management

Develop Ranking and Prioritization of Green Infrastructure Network

Ecosystem Service maps

- Flood Control, Water Purification, Groundwater Recharge, Carbon Storage, Biodiversity, Recreation/ Ecotourism
- Ecosystem Service Valuation Maps
- Parcel Prioritization

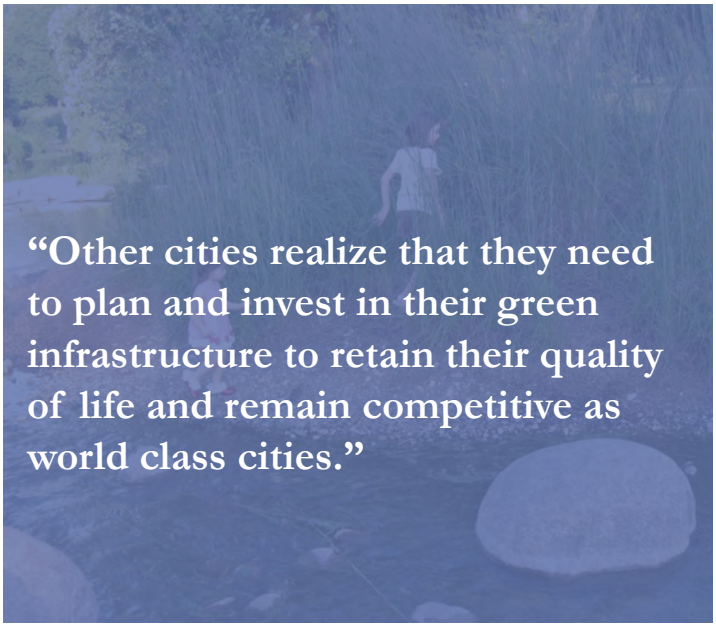
Task B - Community and Stakeholder Engagement

Task C - Ecosystem Services Valuation
Framework of Applicable Ecosystem Services
Economic Valuation Models
Annual and Life Cycle Valuations

Case Study

Keeping Houston Competitive

As Houston, Texas continued to grow, regional leaders realized that to remain competitive and attractive, better planning for green infrastructure needed to take place to preserve the best natural assets, direct development away from flood-prone areas, and ensure that residents have safe and easy access to local parks and trails.
The resulting green infrastructure plan, by The Conservation Fund, provided short, intermediate, and long term recommendations to better invest in the region's green infrastructure.



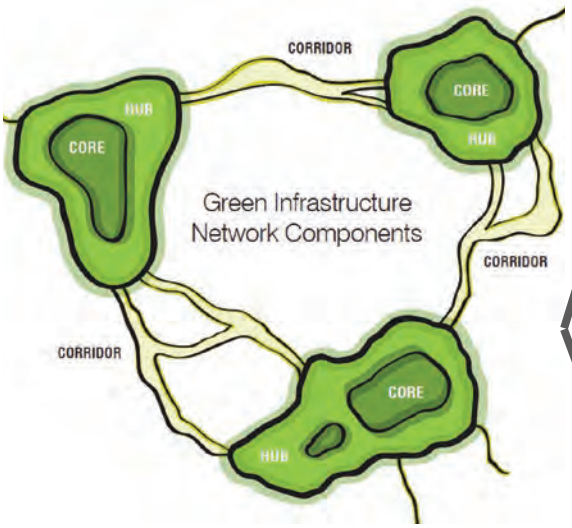
Opportunity #1
Ensuring a Connected Green Infrastructure Network

The first opportunity from the green infrastructure plan for the Maryland Park Lake District will be to ensure a connected green infrastructure network in the district.

There are several opportunities to expand on existing efforts to ensure a connected green infrastructure network.

Stormwater Management
Within the district, stormwater will be conveyed via a flood storage and discharge system (see diagram lower right). This connected system of stormwater conveyance has the opportunity to provide more than just the functional movement of stormwater, but also green infrastructure corridors whether it is recreation or habitat corridors.

MSD's water quality requirement will also be another opportunity to connect green infrastructure.

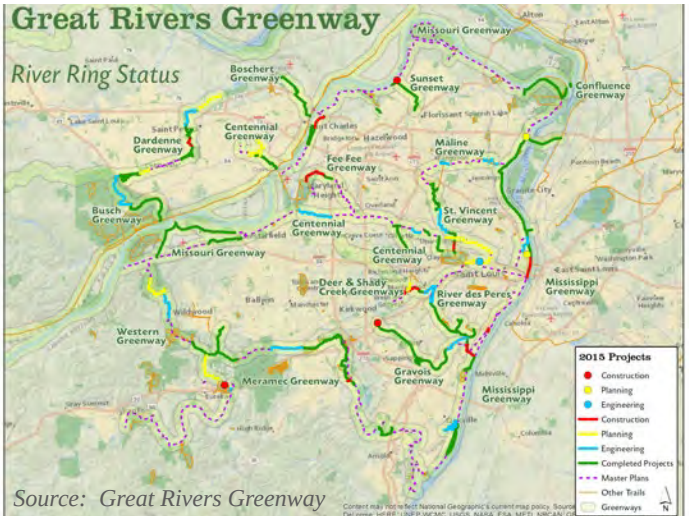


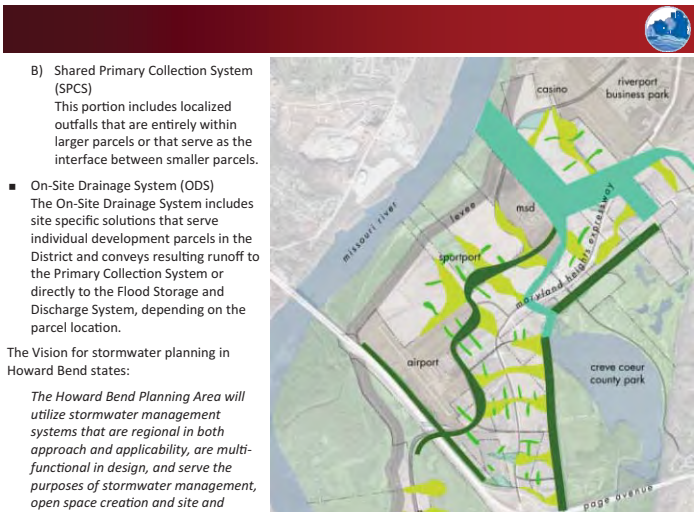
Existing plans such as Great Rivers Greenway's River Ring plan (top right) and the Maryland Park Lake District plan for stormwater conveyance (bottom right) are opportunities to develop a connected green infrastructure network.

Greenways
In many ways, Maryland Heights is the "Greenway City" with multiple greenways, trailheads, and destinations located within the city.

Existing and proposed greenways are perfect corridors to act as green infrastructure networks.

Community Open Space
The current Comprehensive Plan and Zoning Code require that 30% of each development within the Maryland Park Lake District consists of open space. How this open space is arranged and configured will be another opportunity for a connected green infrastructure network.





B) Shared Primary Collection System (SPCS)
This portion includes localized outfalls that are entirely within larger parcels or that serve as the interface between smaller parcels.

- On-Site Drainage System (ODS)
The On-Site Drainage System includes site specific solutions that serve individual development parcels in the District and conveys resulting runoff to the Primary Collection System or directly to the Flood Storage and Discharge System, depending on the parcel location.

The Vision for stormwater planning in Howard Bend states:

The Howard Bend Planning Area will utilize stormwater management systems that are regional in both approach and applicability, are multi-functional in design, and serve the purposes of stormwater management, open space creation and site and

Case Study

Menomonee Valley in Milwaukee: A Hub for Jobs, While Being Named a Top 10 Development Example by the Sierra Club

The redevelopment of the 1,200 acre Menomonee Valley has been a model of economic and sustainable development. Since 1999, the Menomonee Valley has attracted 35 companies and over 5,000 jobs.

Early in the redevelopment process, a sustainable design guide was developed. The design guide was influenced by the U.S. Green Building Council & the LEED Green Building Rating System. The guide included categories for:

- Site Design
- Building Design and Energy Use
- Materials and Resources
- Construction and Demolition
- Indoor Environmental Air Quality
- Operations and Maintenance

Examples of detailed requirements included:
Using native plants and trees for 80% of all planted areas.
New tree plantings (or other shade systems) to provide 30% shade over non-roof impervious areas with 5 years.
Designing parking facilities and open spaces to work together to manage stormwater, create connections to the river and trail system.

A key component of the Menomonee Valley was an integrated and shared stormwater management system. This system not only provided highly functional benefits in terms of stormwater quality and volume requirements, but created a connected green infrastructure network that was a benefit for habitat, wildlife, and recreation.

The Valley has been so successful that it has developed a reputation for sustainable development. It has used this sustainable "brand" to help lure additional companies that want to locate and be associated with sustainable development.

All photos this page: Menomonee Valley Partners

Opportunity #2
Restore the Tree Canopy

There is an opportunity to restore the tree canopy in the Maryland Park Lake District.

There is a historical precedent for an extensive tree canopy as the area would have been bottomland forest prior to agricultural production.

Restoring the tree canopy would have multiple benefits, including increased community identity, stormwater infiltration, habitat, and energy saving.

Community Identity
Tree lined streets and sites with trees have a tremendous positive impact on the character of the community. Trees enhance community property values and are one of the most sought after amenities in overall community character by home and business owners.

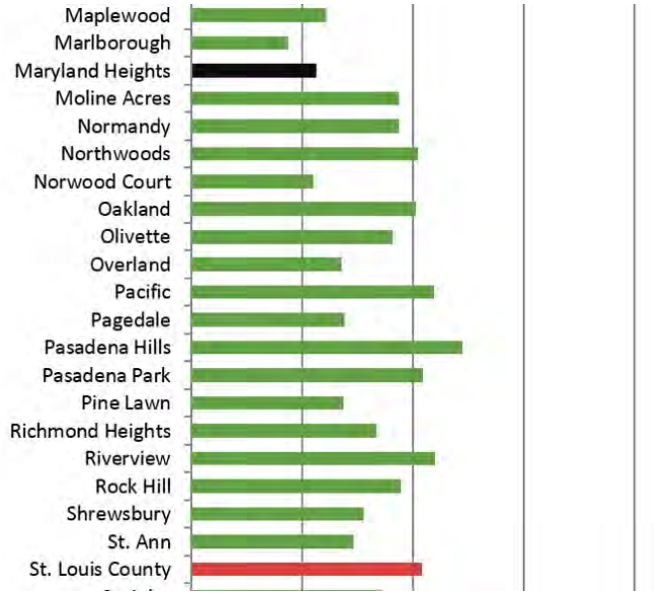
Stormwater Infiltration
Trees are extremely valuable for their role in stormwater management. American Forests has estimated that for every five percent of tree cover added to a community, stormwater runoff is reduced by approximately two percent.

Habitat
Trees are an essential part of wildlife habitat contributing shelter and food.

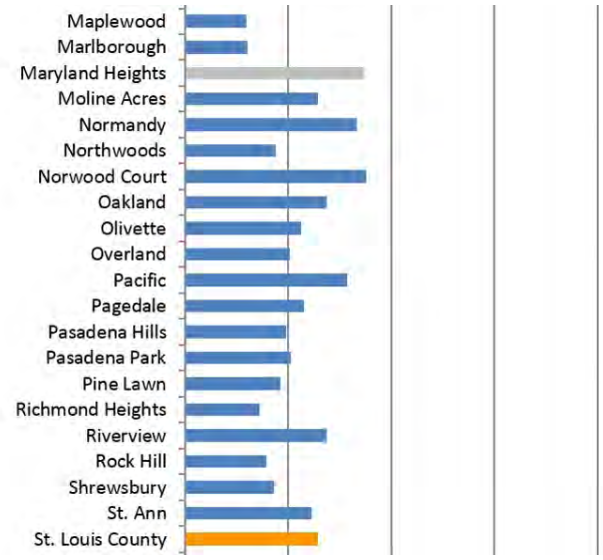
Energy Savings
Trees are important toward energy savings for individual buildings and homes, and for overall reduction in a community's heat island effect. According to the USDA Forest Service, trees properly placed around buildings can reduce air conditioning needs by 30 percent and save 20-50 percent in energy used for heating.

The Wall Street Journal reported in a November 2014 article about the value of trees for residential development, that a study by the U.S. Forest Service found that the presence of a single "street tree" in front of the home added over $7,000 to its sale price.

Existing Urban Tree Canopy



Potential Planting Areas



The top chart shows existing urban tree canopy in Maryland Heights compared to other municipalities and the overall St. Louis County average. Maryland Heights has a urban tree canopy coverage of 23% compared to a county wide average of 40%. However, over 35% of land in Maryland Heights has the potential as tree planting areas (bottom chart). Most of this available area is in the Maryland Park Lake District.

Source: Forest ReLeaf of Missouri

Opportunity #3

Promote Community Identity Through Architecture and Site Design

The Maryland Park Lake District has a rich context to draw from for architecture and site design including its agricultural heritage, recreation assets, Creve Coeur Lake Memorial Park, natural areas, and the Missouri River.

As development does occur in the district, there is an opportunity to use the rich context to inspire the architecture and community character to create a unique identify for the city.

This page highlights some of the existing character of the Maryland Park Lake District that could be incorporated in future architecture, community character, and site design.

Existing Character of the Maryland Park Lake District

- **Agricultural Heritage**
- **Recreation**
- **Creve Coeur Lake Park**
- **River and Natural Areas**

Photo: Richard Spener

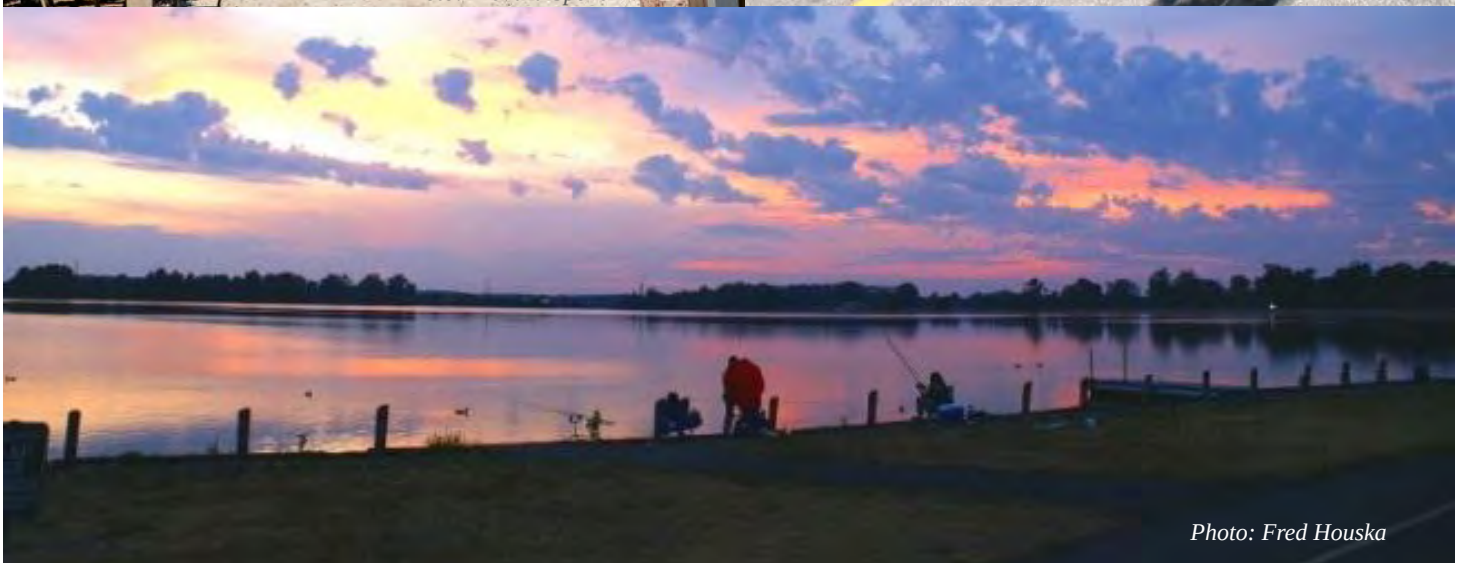


Photo: Fred Houska

Opportunity #4
Create and Support "High Quality" Open Space

The current Maryland Heights Comprehensive Plan and Zoning Code require that 30% of each development within the Maryland Park Lake District consists of open space.

There is an opportunity to ensure that this open space is "high quality" in terms of social and environmental aspects.

Community and Neighborhood Gathering Areas

Open space has the opportunity to be a community and neighborhood gathering area, such as open space where families and residents can enjoy nature, play sports, or interact with neighbors. Open space can be an amenity for employees to gather or explore during lunch or breaks.

High Functioning Landscapes

Open space has the opportunity to contribute to a "high functioning" landscape. Examples of this include:

Stormwater Requirements

MSD's water quality requirement requires native landscaping and other green infrastructure strategies. The benefits of this approach is not only increased water quality, but increased biodiversity and habitats.

Support Creve Coeur Lake Habitats

Creve Coeur Lake is a recreation and habitat asset for both the city and the region. There is an opportunity to support habitats around the lake, especially in the wetland mitigation areas to the south and southwest of the lake.

Support Biodiversity

Biodiversity is the variety of different types of plant and animal life. It is a measure of the variety of organisms present in different ecosystems.

Part of the Connected System

As open space is preserved or created, it should be connected whenever possible, especially between sites and developments. A connected system of open space and green infrastructure increases its benefits and value.

Photo: St. Louis Metropolitan Sewer District

Photo: Menomonee Valley Partners

Examples of High Quality Open Space
Top: Existing habitats around Creve Coeur Lake.
Middle Top: Meeting stormwater requirements while also providing aesthetics, habitat, and gathering areas.
Middle Bottom: Community open space as a trail in a native vegetation corridor.
Bottom: Supporting biodiversity with monarch and pollinator habitats.

Methods and Strategies

How are the opportunities for the Maryland Park Lake District achieved and realized?

First, the resources and information that a green infrastructure plan and ecosystem services valuation will provide will help inform and better shape the opportunities. Additional opportunities will likely be identified through a full green infrastructure plan and ecosystem valuation.

In addition, there are multiple methods and strategies that will help achieve the opportunities. Many of the these methods and strategies are already taking place in the Maryland Lake Park District. Methods and strategies include:

Stormwater Management
MSD's water quality requirements and the Howard Bend Levee District stormwater plan are existing requirements that can be used to achieve a connected green infrastructure network and create high quality open space.

Conservation Easements
Conservation easements are a voluntary program where landowners "set aside" their land for conservation use. It allows landowners to continue to own and use their land, and they can also sell it or pass it on to heirs. For example, farmers can continue to farm their land. The conservation easement is usually donated to a land trust which typically qualifies the landowner for tax savings including a charitable tax deduction and property and estate tax savings.

Zoning and Development Standards
As zoning and development standards are updated for the Maryland Park Lake District there is an opportunity to draw from existing sustainable guidelines and metrics such as:

- LEED ND (Neighborhood Development)
- LEED NC (New Construction)
- Sustainable Sites Initiative
- Envision
- National Association of Home Builders (NAHB) Green Building Guidelines
- Conservation Subdivisions

Public / Private Partnerships
Promote existing and potential partnerships where landowners, organizations, developers, and the city can partner. Programs like the Audubon Society's *Bring Conservation Home* is an example of a partnership with homeowners.

Example of an existing partnership between Missouri American Water and the Missouri Department of Conservation of a prairie restoration in the Maryland Park Lake District.

Sustainable Rating System

LEED ND (Neighborhood Development)

Developed by the U.S. Green Building Council, LEED ND looks beyond individual buildings at whole communities and neighborhoods.

Similar to other LEED (Leadership in Energy and Environmental Design) rating systems, there are prerequisites and credits for sustainable metrics. Categories for LEED ND include:

- Smart Location and Linkage
- Neighborhood Pattern and Design
- Green Infrastructure and Buildings
- Innovation
- Regional Priority

Some of the most applicable aspects of LEED ND based on the recommendations and opportunities listed in this report include:

Restoration of Habitat
Restore predevelopment native ecological communities in an area equal or greater to 10% of the development footprint.

Long-Term Conservation Management
Commit to 10-Year management plan for existing or recently restored on site native habitats.

Walkable Streets
Compact Development
Reduced Parking Footprint
Connected and Open Community
Access to Civic and Public Space
Access to Recreation Facilities
Local Food Production
Tree-Lined and Shaded Streets
Minimized Site Disturbance
Rainwater Management
Heat Island Reduction
Light Pollution Reduction

Sustainable Rating System

Sustainable SITES

Developed by the American Society of Landscape Architects (ASLA), Lady Bird Johnson Wildflower Center of The University of Texas at Austin, and the U.S. Botanic Garden, SITES is modeled after and aligned with the Leadership in Energy and Environmental Design (LEED) and is intended for land design and development.

Categories of SITES include:

- Site Context
- Pre-Design Assessment and Planning
- Site Design - Water
- Site Design - Soil and Vegetation
- Site Design - Material Selection
- Site Design - Human Health and Well Being
- Construction
- Operations and Maintenance
- Education and Performance Monitoring

Some of the most applicable aspects of Sustainable Sites based on the recommendations and opportunities listed in this report include:

Design Functional Stormwater Features as Amenities
Create and Communicate a Soil Management Plan
Conserve Healthy Soils and Appropriate Vegetation
Conserve and Restore Native Plants
Optimize Biomass
Reduce Urban Heat Island Effect
Use Vegetation to Minimize Building Energy Loss
Support Mental Restoration
Support Physical Activity
Support Social Connection
Provide On-site Food Production
Reduce Light Pollution
Plan for Sustainable Site Maintenance

Benefits for Maryland Heights

The benefits for Maryland Heights to have a green infrastructure plan and ecosystem services valuation for the Maryland Park Lake District include:

Long Term Increased Value Through Ecosystem Services

Unique Identity for the City

- Competitive Advantage
- Regional and National Branding

Continued Stewardship of Creve Coeur Lake Memorial Park

- A City and Regional Asset
- Enhance Visibility and Connections

Next Steps

1. Conduct a Green Infrastructure Plan and Ecosystem Services Valuation

As recommended, a green infrastructure plan and ecosystem services valuation will better inform the opportunities to promote sustainable development and conservation options in the Maryland Park Lake District.

2. Alignment with Recommendation and Opportunities

- Comprehensive Plan Goals and Strategies
- Zoning and Development Standards

The results of this feasibility study as well as the future green infrastructure plan and ecosystem services valuation should inform the updates to the comprehensive plan goals and strategies, zoning, and development standards.

Photo: Richard Spener

Front Cover
Top Photo: Overlooking existing agricultural fields in the Maryland Park Lake District *(Photo by Richard Spener)*
Middle Photo: Bicyclists enjoying a trail near Creve Coeur Lake Memorial Park
Bottom Photo: View of Creve Coeur Lake

Back Cover: View of wildflowers and grassland near the restored wetlands of Creve Coeur Lake Memorial Park.

Photo / Graphic Credits
All photos by the i5Group except as noted. Green infrastructure diagram by the Conservation Fund and the Central Indiana Land Trust. All other credits as noted.