A Connected Waterway | Restored

Forest Park East Waterways

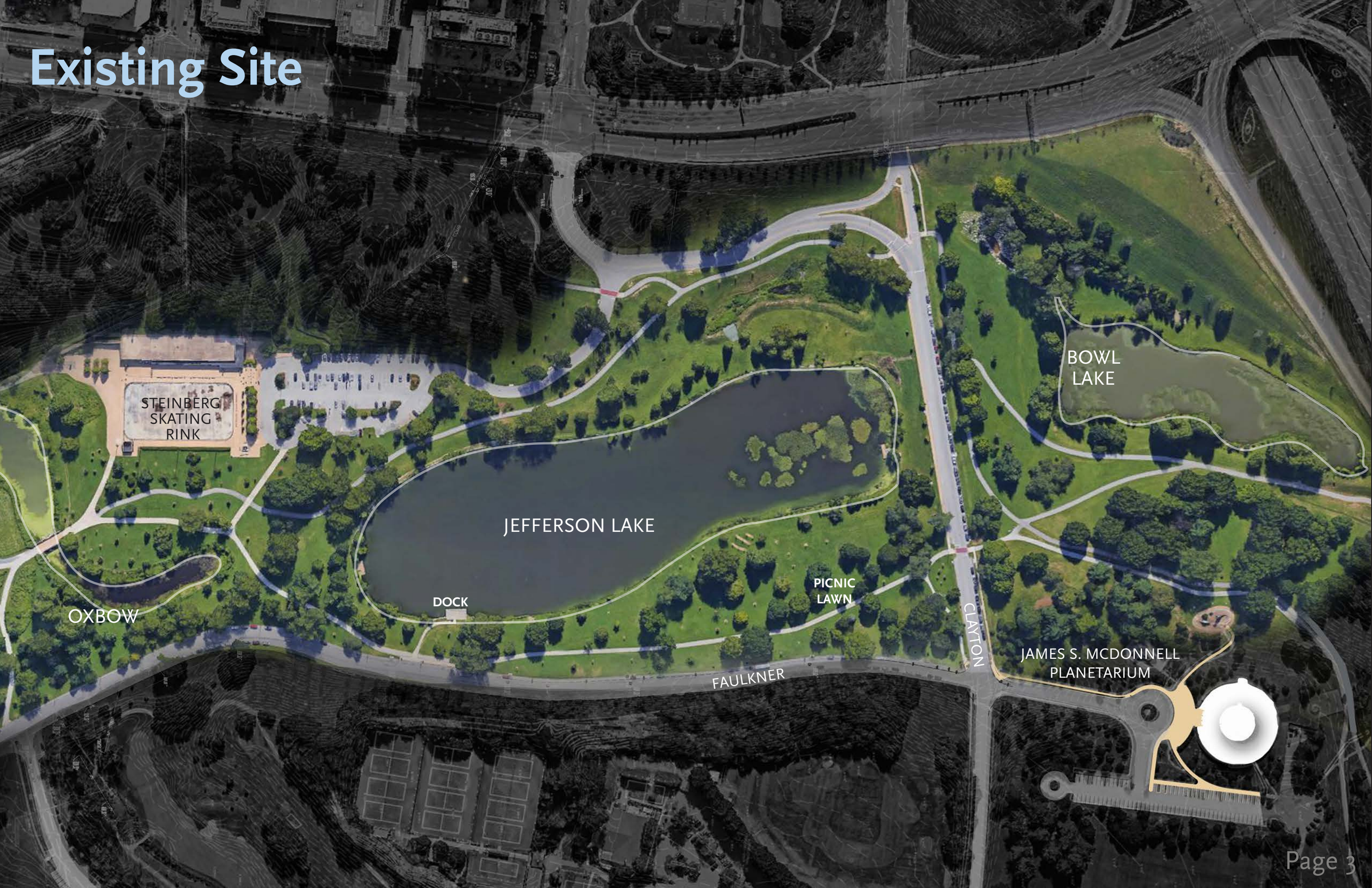
USGBC - Sustainable SITES
Design Process and Documentation
August 9, 2019

Forest Park Forever

SWTDESIGN

Project Context

Existing Site



Bowl Lake Existing Conditions

Jefferson Lake Existing Conditions

Oxbow Existing Conditions

THE Sustainable SITES Initiative®

SITES GOALS

Create Regenerative Systems and Foster Resiliency

- Protect and restore natural resources such as soil, water, and vegetation.
- Encourage biodiversity.
- Enhance landscapes to provide multiple ecosystem services such as cleaning air and water, providing habitat, and storing carbon.
- Mitigate for evolving hazards and natural disasters.
- Plan for monitoring and adaptive management.

Ensure Future Resource Supply and Mitigate Climate Change

- Minimize energy consumption and encourage use of low carbon and renewable energy sources.
- Minimize or eliminate greenhouse gas emissions, heavy metals, chemicals, and other pollutants.
- Reduce, reuse, recycle, and upcycle materials and resources.
- Conserve water.
- Increase the capacity of carbon sinks through re-vegetation.

Transform the Market through Design, Development, and Maintenance Practices

- Foster leadership in industry and professional practice.
- Use a systems-thinking, integrative and collaborative design approach.
- Use lifecycle analyses to inform the design process.
- Support local economies and sustainability policies.

Enhance Human Well-Being and Strengthen Community

- Reconnect humans to nature.
- Improve human health (physical, mental, and spiritual).
- Foster stewardship by providing education that promotes the understanding of natural systems and recognizes the value of landscapes.
- Encourage cultural integrity and promote regional identity.
- Provide opportunities for community involvement and advocacy.

SITES v2 Scorecard Summary

YES	?	NO			
10	0	3	**1: SITE CONTEXT**	**Possible Points:**	**13**
Y			**CONTEXT P1.1**	Limit development on farmland	
Y			**CONTEXT P1.2**	Protect floodplain functions	
Y			**CONTEXT P1.3**	Conserve aquatic ecosystems	
Y			**CONTEXT P1.4**	Conserve habitats for threatened and endangered species	
3		3	**CONTEXT C1.5**	Redevelop degraded sites	3 to 6
4			**CONTEXT C1.6**	Locate projects within existing developed areas	4
3			**CONTEXT C1.7**	Connect to multi-modal transit networks	2 to 3
3	0	0	**2: PRE-DESIGN ASSESSMENT + PLANNING**	**Possible Points:**	**3**
Y			**PRE-DESIGN P2.1**	Use an integrative design process	
Y			**PRE-DESIGN P2.2**	Conduct a pre-design site assessment	
Y			**PRE-DESIGN P2.3**	Designate and communicate VSPZs	
3			**PRE-DESIGN C2.4**	Engage users and stakeholders	3
12	9	2	**3: SITE DESIGN - WATER**	**Possible Points:**	**23**
Y			**WATER P3.1**	Manage precipitation on site	
Y			**WATER P3.2**	Reduce water use for landscape irrigation	
4	2		**WATER C3.3**	Manage precipitation beyond baseline	4 to 6
4		2	**WATER C3.4**	Reduce outdoor water use	4 to 6
4	1		**WATER C3.5**	Design functional stormwater features as amenities	4 to 5
	6		**WATER C3.6**	Restore aquatic ecosystems	4 to 6
11	15	14	**4: SITE DESIGN - SOIL + VEGETATION**	**Possible Points:**	**40**
Y			**SOIL+VEG P4.1**	Create and communicate a soil management plan	
Y			**SOIL+VEG P4.2**	Control and manage invasive plants	
Y			**SOIL+VEG P4.3**	Use appropriate plants	
		6	**SOIL+VEG C4.4**	Conserve healthy soils and appropriate vegetation	4 to 6
	4		**SOIL+VEG C4.5**	Conserve special status vegetation	4
3	3	0	**SOIL+VEG C4.6**	Conserve and use native plants	3 to 6
4	2		**SOIL+VEG C4.7**	Conserve and restore native plant communities	4 to 6
	6		**SOIL+VEG C4.8**	Optimize biomass	1 to 6
4			**SOIL+VEG C4.9**	Reduce urban heat island effects	4
		4	**SOIL+VEG C4.10**	Use vegetation to minimize building energy use	1 to 4
		4	**SOIL+VEG C4.11**	Reduce the risk of catastrophic wildfire	4
5	36	0	**5: SITE DESIGN - MATERIALS SELECTION**	**Possible Points:**	**41**
Y			**MATERIALS P5.1**	Eliminate the use of wood from threatened tree species	
2	2		**MATERIALS C5.2**	Maintain on-site structures and paving	2 to 4
	4		**MATERIALS C5.3**	Design for adaptability and disassembly	3 to 4
	4		**MATERIALS C5.4**	Use salvaged materials and plants	3 to 4
	4		**MATERIALS C5.5**	Use recycled content materials	3 to 4
	5		**MATERIALS C5.6**	Use regional materials	3 to 5
	5		**MATERIALS C5.7**	Support responsible extraction of raw materials	1 to 5
	5		**MATERIALS C5.8**	Support transparency and safer chemistry	1 to 5
	5		**MATERIALS C5.9**	Support sustainability in materials manufacturing	5
3	2		**MATERIALS C5.10**	Support sustainability in plant production	1 to 5

				Possible Points:	**30**
				nd historic places	2 to 3
				lity, safety, and wayfinding	2
					2
					2
					2
				n	3 to 4
					4
				ulti-modal transportation	4
				mental tobacco smoke	1 to 2
					3
				Possible Points:	**17**
				nable construction practices	
				n pollutants	
				construction	
				ious development	3 to 5
				tion materials from disposal	3 to 4
				ks, and soil from disposal	3 to 4
				ruction	2 to 4
				Possible Points:	**22**
				enance	
				ion of recyclables	
					3 to 5
				r use	4 to 5
				mption	2 to 4
				dscape electricity needs	3 to 4
				cape maintenance	2 to 4
				Possible Points:	**11**
				ess and education	3 to 4
				se study	3
	4		**EDUCATION C9.3**	Plan to monitor and report site performance	4
0	0	0	**10. INNOVATION OR EXEMPLARY PERFORMANCE**	**Bonus Points:**	**9**
			INNOVATION C10.1	Innovation or exemplary performance	3 to 9

YES	?	NO		
82	96	23	**TOTAL ESTIMATED POINTS**	**Total Possible Points:** **200**

KEY		SITES Certification levels	Points
YES	Project confident points are achievable	**CERTIFIED**	70
?	Project striving to achieve points, not 100% confident	**SILVER**	85
NO	Project is unable to achieve these credit points	**GOLD**	100
		PLATINUM	135

YES	?	NO
82	96	23

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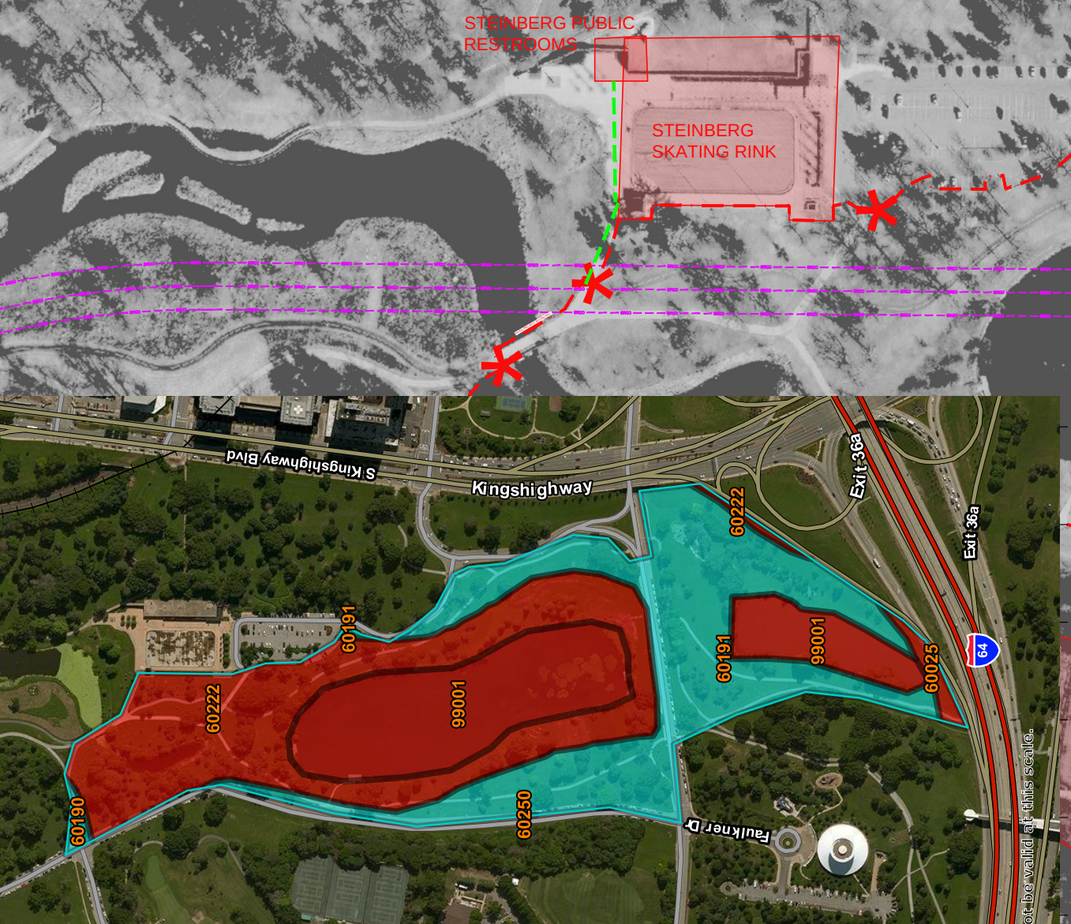

Tree Protection, Site Access, Staging

3	0	0	**2: PRE-DESIGN ASSESSMENT + PLANNING**	**Possible Points:**	**3**
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3			**PRE-DESIGN C2.4**	Engage users and stakeholders	**3**

PROJECT TEAM

Forest Park Forever, St. Louis Parks & Forestry, City of Saint Louis BPS
Client/Owner/Developer

SWT DESIGN

Prime
Project Management
Landscape Architecture
Environmental Design
Engagement
Operations + Maintenance

ABNA

MEP Engineering
Geotechnical
Surveying

AfH Design
PLANNING • DESIGN • CONSULTING

Environmental Art
Educational Graphics
and Interpretives
Signage

cole

Hydraulic/Water Civil
ADA Accessibility
MSD Coordination
Traffic Coordination

APPLIED ECOLOGICAL SERVICES

Environmental Consulting
Hydrology/Aquatics
Ecology and Biology
Wetland Delination

Hydro Dramatics
The Fountain Division of Missouri Machinery and Engineering Company

Water Features
Fountains
Associated MEP

MASTER PLAN RECOMMENDATIONS

The Forest Park Master Plan calls *"for the preservation and maintenance of its natural resources, environment and wildlife habitat to ensure a sustainable, ecologically sound natural system"* **and that** *"Forest Park's natural beauty, scenic value, and historic and cultural institutions should be the basis for the enjoyment of the park, regardless of future changes in types and levels of park activities and park users."* **(page 5)**

"The open space spine is based upon the park's natural and man-made features and follows the old River Des Peres' water course and line of bluffs in the park" **(page 11)**

The creation of "a park-wide, linear connected water system as the connective thread that unifies the diverse qualities of the passive open space system" **(page 158)**

The design recommendations include:

- Water character and spatial features
- Functional requirements
- Water quality controls
- Soil erosion controls
- Shorelines vegetation recommendations confluence areas and filtering marshes
- Check dams and upland water controls structures
- A series of long-term design options and site specific recommendations

Step 3 Completed September 2017

Project Goals

- [ ] Link The Waterway System
- [ ] Enhance Fishing Habitat and Access
- [ ] Improve Water Quality
- [ ] Bank Edge Erosion and Stabilization
- [ ] Reduce Need for Potable Water
- [ ] Increase Biodiversity
- [ ] Increase and Promote Accessibility
- [ ] Improve Overall Aesthetics
- [ ] Provide Opportunities for Passive Recreation
- [ ] Improve/ Update Park Infrastructure
- [ ] Connect Park Institutions
- [ ] Sustainable Maintenance Strategies
- [ ] Environmental Art Opportunities

Overall Plan

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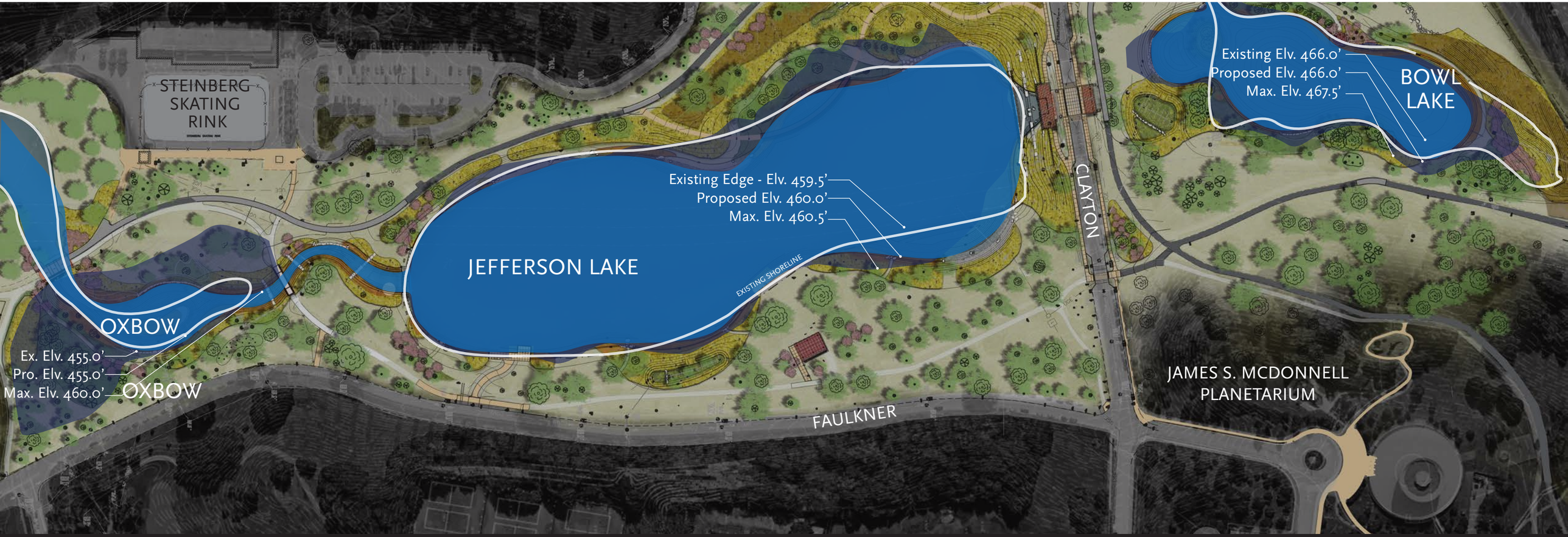


Reduce City Water Input by over **110,000** Gallons Per Day

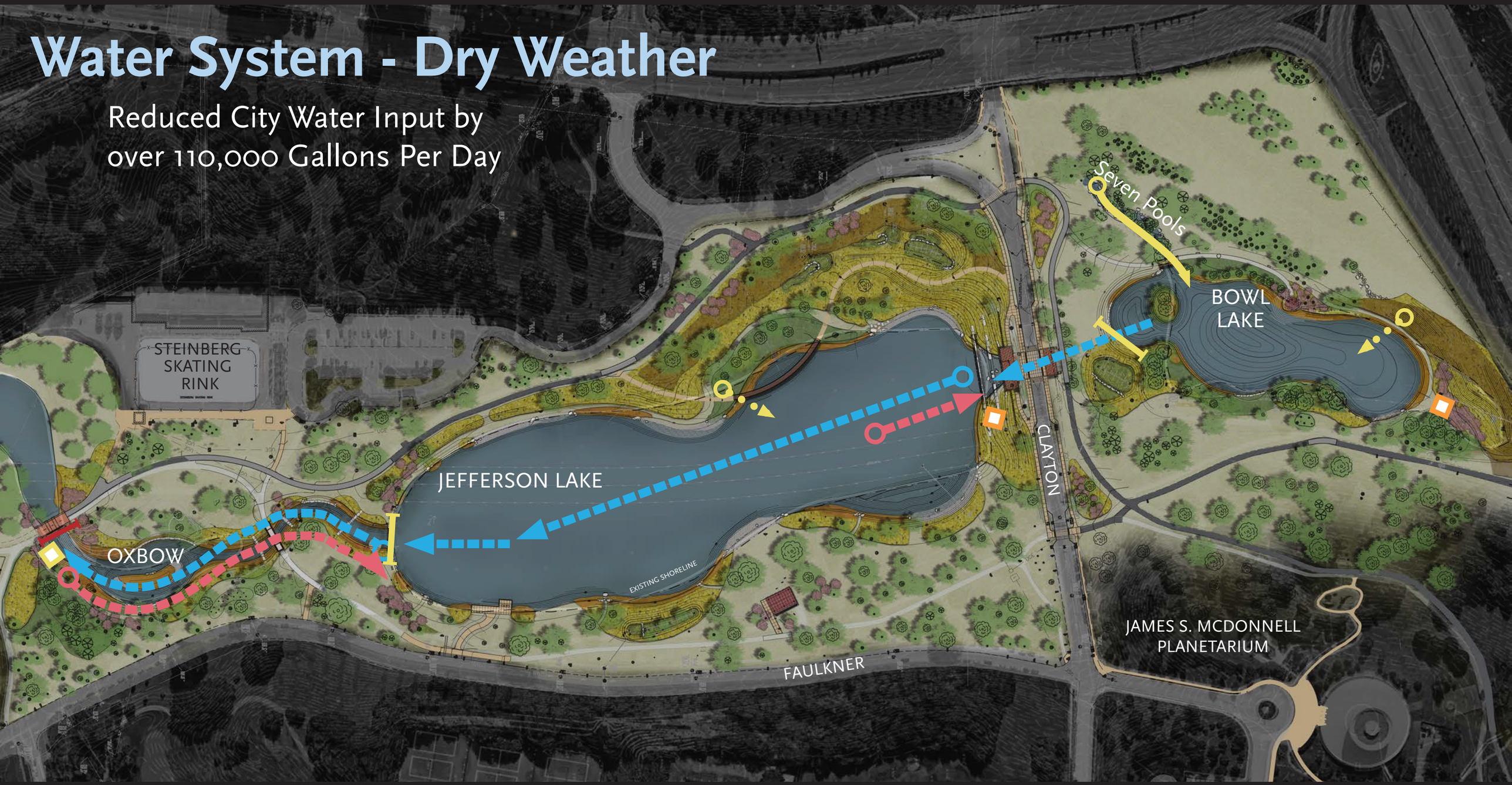
LAKE EDGE AT FLOOD

EXISTING LAKE EDGE

PROPOSED LAKE EDGE

Water System - Dry Weather

Reduced City Water Input by
over 110,000 Gallons Per Day



LAKE RECIRCULATION

100% SEPARATION
FROM LINEAR WATERWAY

WEIR

CITY WATER INPUT

EMERGENCY OVERFLOW

SITE OVERFLOW

Water System - Wet Weather

STORMWATER FLOW

WEIR

100% SEPARATION FROM LINEAR WATERWAY

RAIN GARDEN

EMERGENCY OVERFLOW

SITE OVERFLOW

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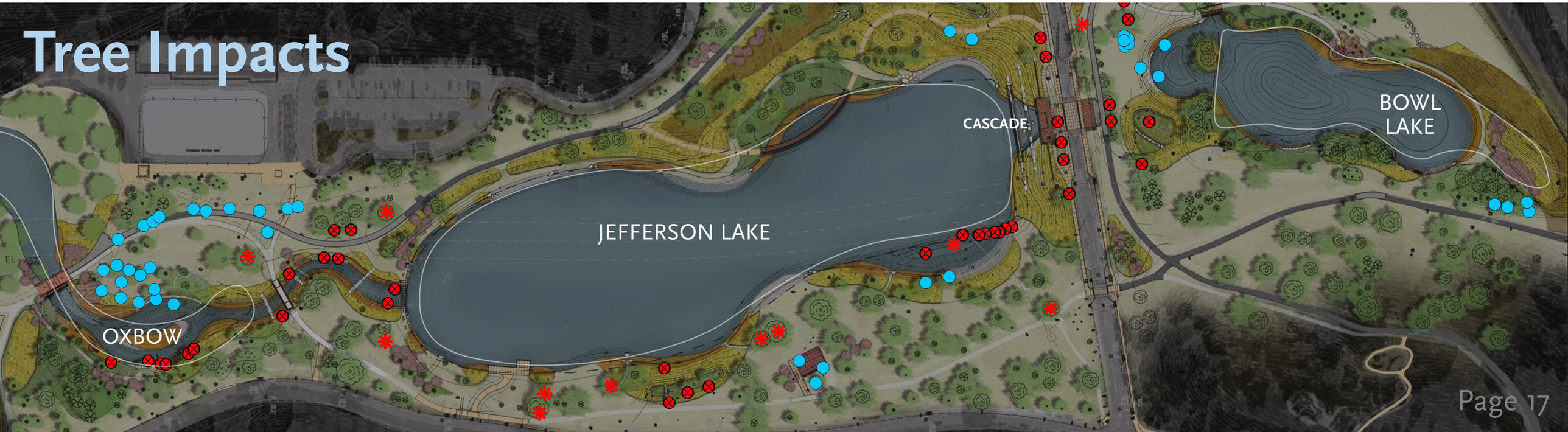
Tree Impacts



Proposed Trees

PROPOSED TREES - *496*

CANOPY TREES - *221*

FLOWERING TREES - *215*

EVERGREEN TREES - *60*

Landscape Typologies

GRAVEL BAR

MEADOW/ WET MEADOW

RAIN GARDEN

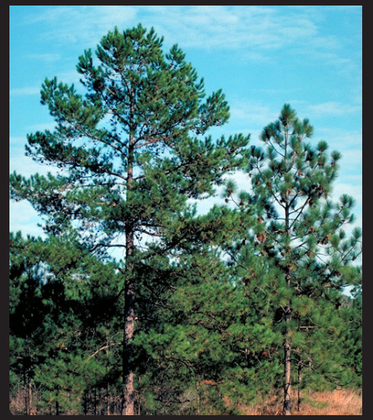
RIPARIAN

LAWN/TREES

SEDGE MEADOW

Proposed Planting - Trees and Shrubs

Bald Cypress
Taxodium distichum



Short Leaf Pine *Pinus echinata*

Sycamore
Platanus occidentalis

Bur Oak *Quercus macrocarpa*

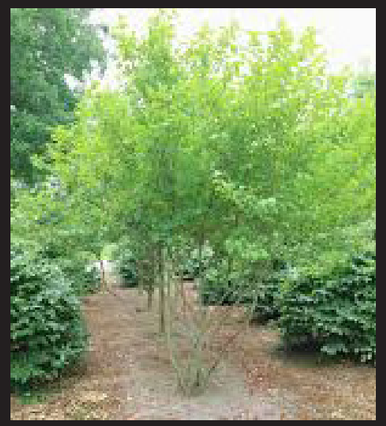
Sugar Maple *Acer saccarum*

Swamp White Oak
Quercus bicolor

Hazelnut *Corylus americana*

Red Bud *Cercis canadensis*
'Appalacian Red'

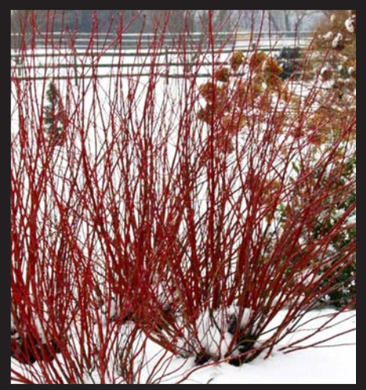
Bladdernut
Staphylea trifolim



Spicebush *Lindera benzoin*

American Beautyberry
Callicarpa dichotoma

Sandbar Willow *Salix exigua*

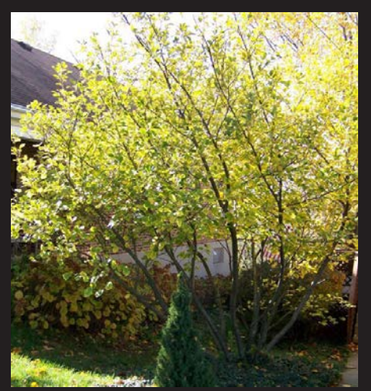


Cardinal Red-twig Dogwood
Cornus sericiea 'Cardinal'

Winterberry
Ilex verticillata 'Red Sprite'

Winterberry
Ilex verticillata 'Jim Dandy'

Gro-Low Sumac
Rhus aromatica 'Gro-Low'



American Beautyberry
Callicarpa dichotoma

Indigo Bush *Amorpha fruticosa*

Grasses and Forbs

Blumt Spike Rush
Eleocharis obtusa

Soft Rush
Juncus effusus

Bristly Sedge
Carex comosa

Slender Sedge
Carex praegracilis

Palm Sedge
Carex muskingumensis

Fox Sedge
Carex vulpinoidea

Panicum virgatum
Panicum virgatum

Little Bluestem
Andropogon scoparius

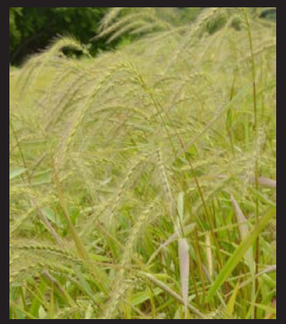
Blue Joint Grass
Calamagrostis canadensis

Fowl Mana Grass
Glyceria striata

Wool Grass
Scirpus cyperinus

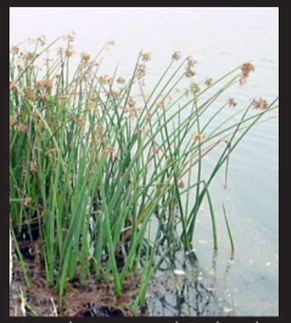
Bottlebrush grass
Elymus hystrix

Indian Grass
Sorgastrum nutans



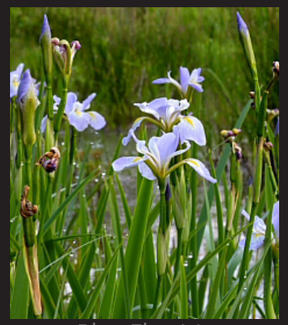
Riverbank Wild Rye
Elymus riparius

Common woodread
Cinna arundinacea



Hard-stemmed Bulrush
Scirpus acutus

Copper Iris
Iris fulva



Blue Flag Iris
Iris virginica

Joe Pye Weed
Eupatorium dudium

Marsh Blazing Star
Liatris spicata

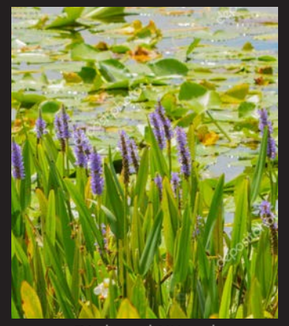
Ozark Blue Star
Amsonia illustris

Black Eyed Susan
Rudbeckia hirta

Water Willow
Justica americana

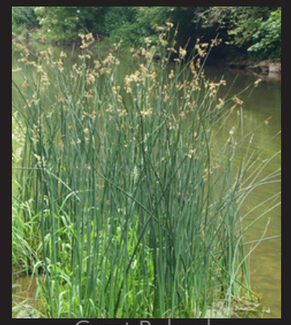
Grass-leaved Goldenrod
Solidago graminifolia

Tall Ironweed
Veronia altissima

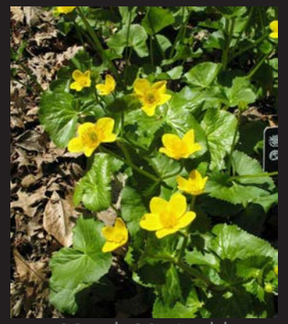


Pickerel Weed
Pontederia cordata

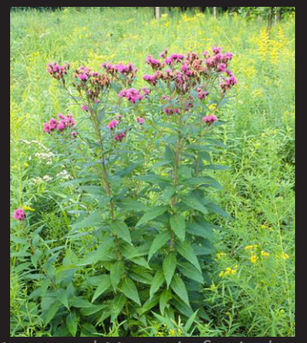
Burreed
Sparganium eurycarpum



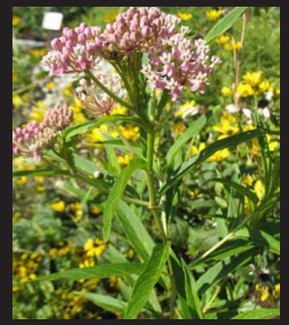
Great Bulrush
Scirpus validus



Marsh Marigold
Caltha palustris



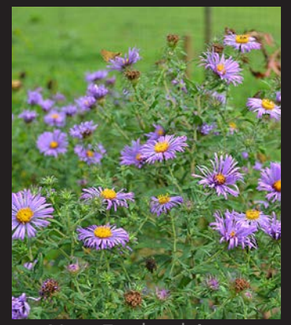
Ironweed *Vernonia fasciculata*



Swamp Milkweed
Asclepias incarnata

Common Milkweed
Asclepias syriaca

Side-flowering Aster
Aster lateriflorus



New England Aster
Aster novae-angliae

Nodding Wild Onion
Allium cernuum

Wild Columbine
Aquilegia canadensis

Butterfly Weed
Asclepias tuberosa

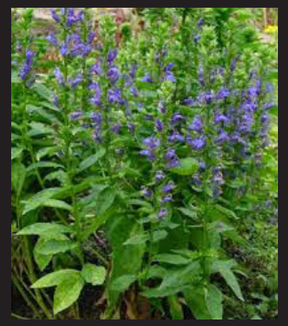
Stiff Coreopsis
Coreopsis palmata

Pale Purple Coneflower
Echinacea pallida

Queen of the Prairie
Filipendula rubra

Marsh Mallow
Hibiscus coccineus

Crimson Rose Mallow
Hibiscus moscheutos



Great Blue Lobelia
Lobelia siphilitica

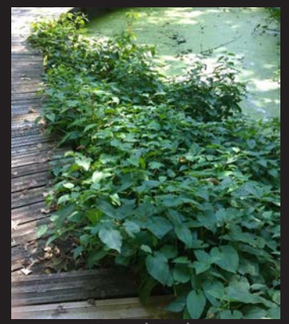
Lavender Musk
Mimulus ringens

Wild Bergamot
Monarda fistulosa

Foxglove Beard Tongue
Penstemon digitalis

Obedient Plant
Physostegia virginiana

Common Mountain Mint
Pycnanthemum virginianum



Lizard Tail
Saururus cernuus

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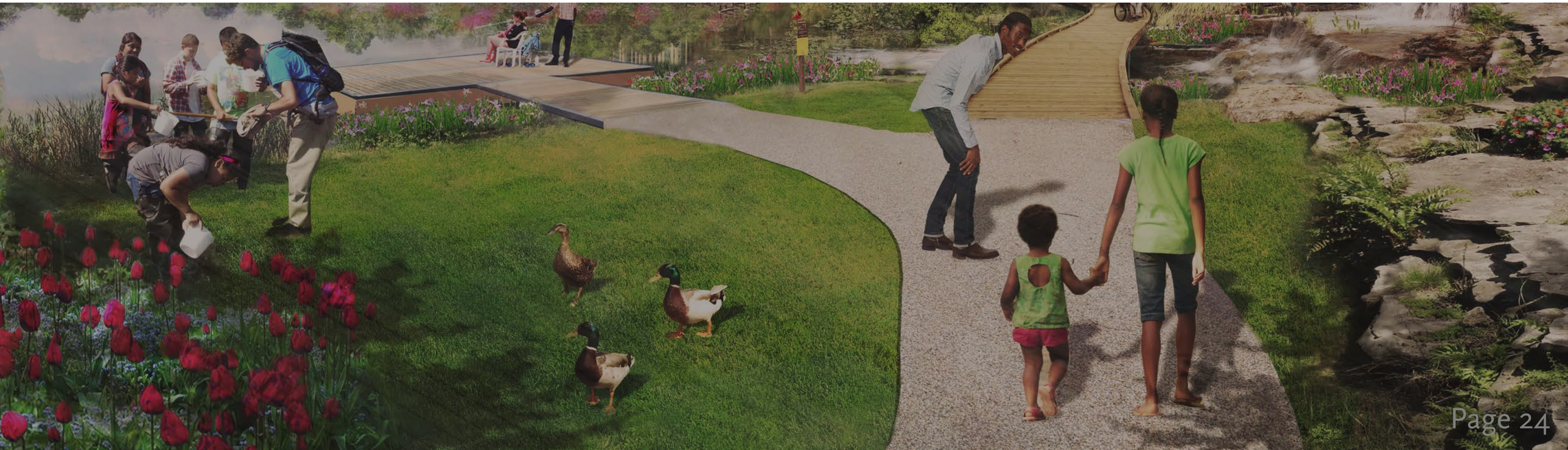
18	8	4	6: SITE DESIGN - HUMAN HEALTH + WELL-BEING		Possible Points:	30
3			**HHWB C6.1**	Protect and maintain cultural and historic places		**2 to 3**
2			**HHWB C6.2**	Provide optimum site accessibility, safety, and wayfinding		**2**
2			**HHWB C6.3**	Promote equitable site use		**2**
2			**HHWB C6.4**	Support mental restoration		**2**
2			**HHWB C6.5**	Support physical activity		**2**
	2		**HHWB C6.6**	Support social connection		**2**
		4	**HHWB C6.7**	Provide on-site food production		**3 to 4**
4			**HHWB C6.8**	Reduce light pollution		**4**
	4		**HHWB C6.9**	Encourage fuel efficient and multi-modal transportation		**4**
	2		**HHWB C6.10**	Minimize exposure to environmental tobacco smoke		**1 to 2**
3			**HHWB C6.11**	Support local economy		**3**



Open Space

Design Phase - Subject to Change

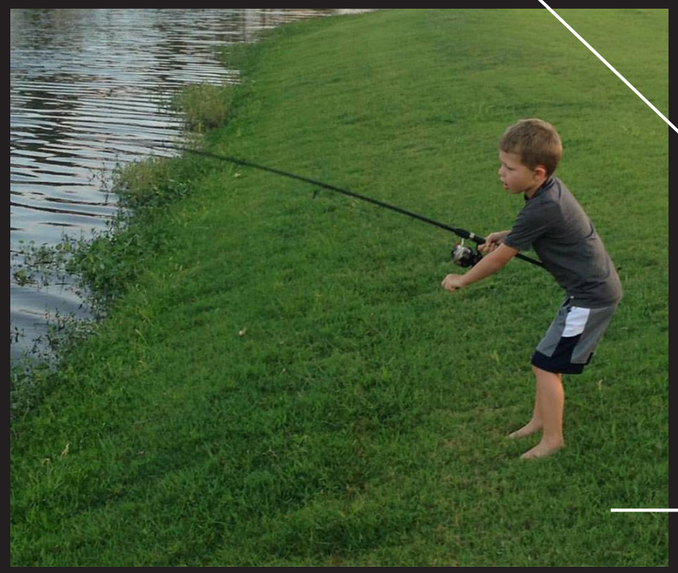
EXISTING IMPERVIOUS AREA: 2.43 Acres
EXISTING OPEN SPACE: 39.67 Acres

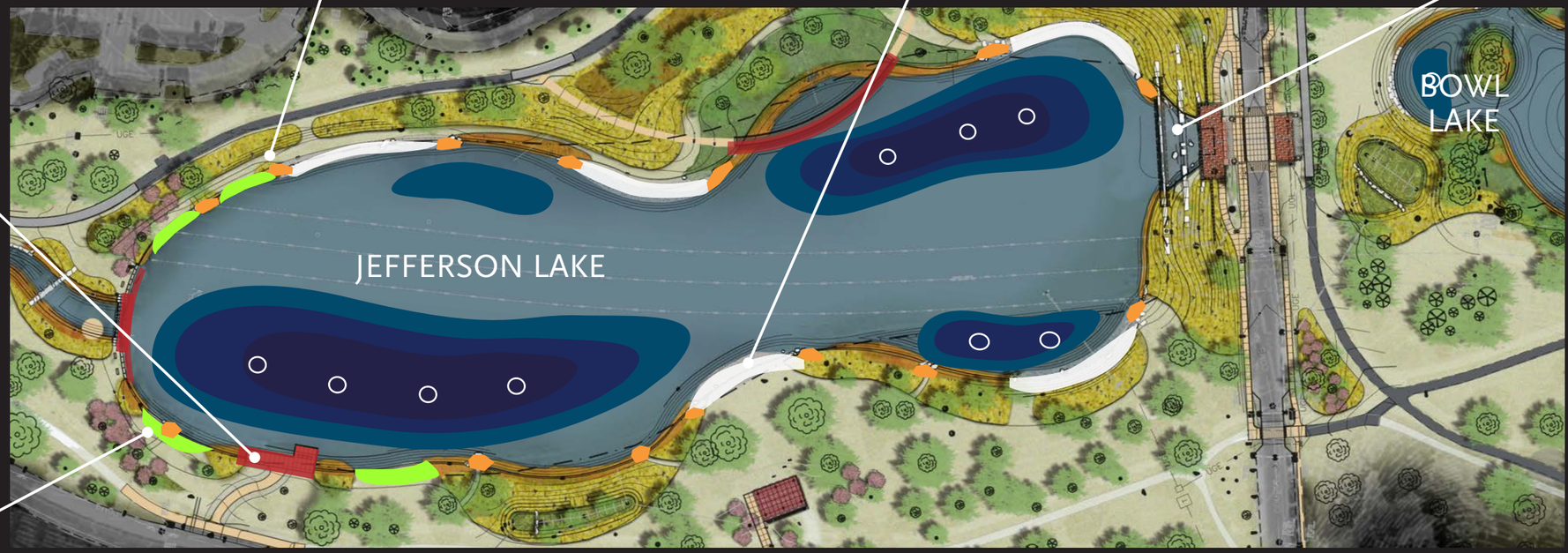
PROPOSED IMPERVIOUS AREA: 2.54 Acres
PROPOSED OPEN SPACE: 39.56 Acres

EXISTING IMPERVIOUS AREA TO REMAIN
PROPOSED IMPERVIOUS AREA
OPEN SPACE

Net Change of Open Space: -0.11 Acres

Jefferson Lake Fishing Opportunities





CITY WATER INPUT
AERATION
GRAVEL BAR
LAWN EDGE
ACCESSIBLE DOCK
ROCK OUTCROP
DEEP POOL
BOARDWALK

Circulation

EXISTING PARKING SPACES: **228**

PROPOSED PARKING SPACES: **225**

PARKING

ACCESSIBLE PARKING

CONNECTOR

WHEELS - ACCESSIBLE

HEELS- ACCESSIBLE

9	9	0	**7: CONSTRUCTION**	**Possible Points:**	**17**
Y			**CONSTRUCTION P7.1**	Communicate and verify sustainable construction practices	
Y			**CONSTRUCTION P7.2**	Control and retain construction pollutants	
Y			**CONSTRUCTION P7.3**	Restore soils disturbed during construction	
	5		**CONSTRUCTION C7.4**	Restore soils disturbed by previous development	**3 to 5**
4	1		**CONSTRUCTION C7.5**	Divert construction and demolition materials from disposal	**3 to 4**
3	1		**CONSTRUCTION C7.6**	Divert reusable vegetation, rocks, and soil from disposal	**3 to 4**
2	2		**CONSTRUCTION C7.7**	Protect air quality during construction	**2 to 4**

7	15	0	**8. OPERATIONS + MAINTENANCE**	**Possible Points:**	**22**
Y			**O+M P8.1**	Plan for sustainable site maintenance	
Y			**O+M P8.2**	Provide for storage and collection of recyclables	
3	2		**O+M C8.3**	Recycle organic matter	**3 to 5**
4	1		**O+M C8.4**	Minimize pesticide and fertilizer use	**4 to 5**
	4		**O+M C8.5**	Reduce outdoor energy consumption	**2 to 4**
	4		**O+M C8.6**	Use renewable sources for landscape electricity needs	**3 to 4**
	4		**O+M C8.7**	Protect air quality during landscape maintenance	**2 to 4**

7	4	0	**9. EDUCATION + PERFORMANCE MONITORING**	**Possible Points:**	**11**
4			**EDUCATION C9.1**	Promote sustainability awareness and education	**3 to 4**
3			**EDUCATION C9.2**	Develop and communicate a case study	**3**
	4		**EDUCATION C9.3**	Plan to monitor and report site performance	**4**

0	0	0	**10. INNOVATION OR EXEMPLARY PERFORMANCE**	**Bonus Points:**	**9**
			INNOVATION C10.1 Innovation or exemplary performance		**3 to 9**

Innovative 9 Step Process

Bowl Lake & Seven Pools

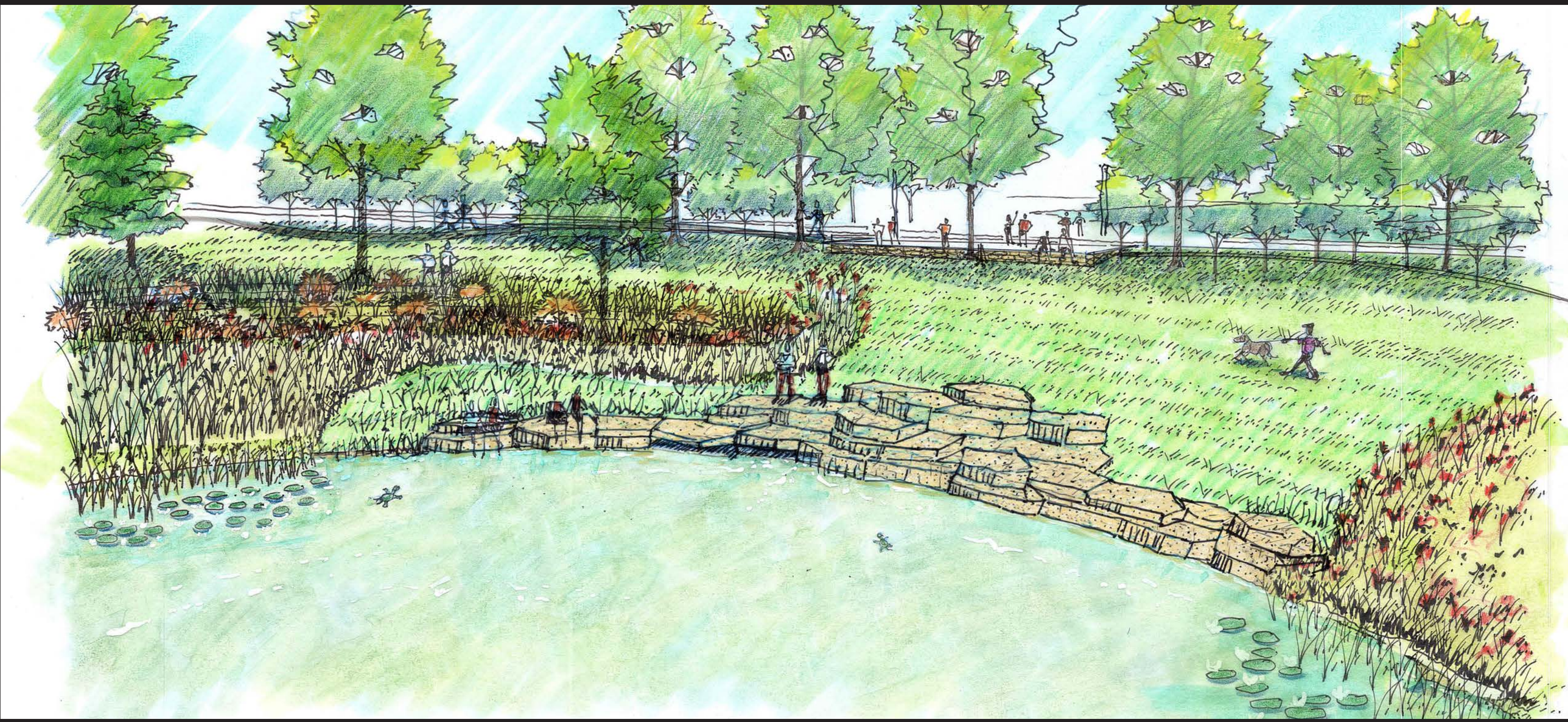
- Accentuate plantings and create an earthen berm near south end of Bowl Lake
- Water outfall at north end of Bowl Lake to be piped into Jefferson Lake
- Restore Stone Bridge
- Provide seating area to enjoy and learn about Bowl Lake
- Provide sediment filtration and shoreline plantings
- Incorporate educational elements in cooperation with the Science Center and Central Institute for the Deaf

Bowl Lake

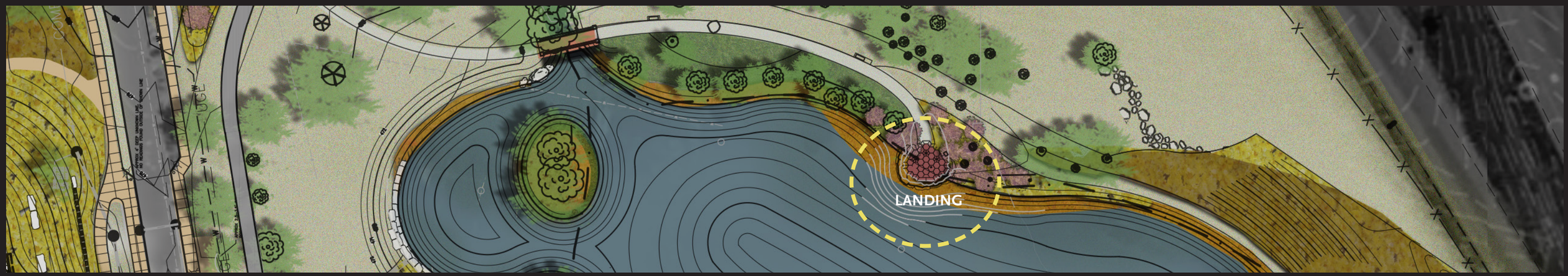
KEY

1. Restored Seven Pools bridge
2. Cypress island
3. Bowl Lake Landing
4. Aquatic Plants
5. Heels trail
6. Wheels trail
7. Overlook
8. Seven Pools restoration
9. Extend berm for highway buffer
10. Seven Pools Parking
- Lighting

Bowl Lake Edge Near Clayton



Bowl Lake Landing



Jefferson Lake

- Extend naturalistic landscape features around Jefferson Lake
- Restore existing paved fishing platforms
- Provide aeration and sediment filtration
- Connect to Bowl Lake and the rest of the water system
- Create a cascading water input at the south end of Jefferson Lake
- Provide aeration and sediment filtration
- Reshape and enlarge Jefferson Lake
- Reduce the amount of City water input
- Provide a connected waterway system

Jefferson Lake

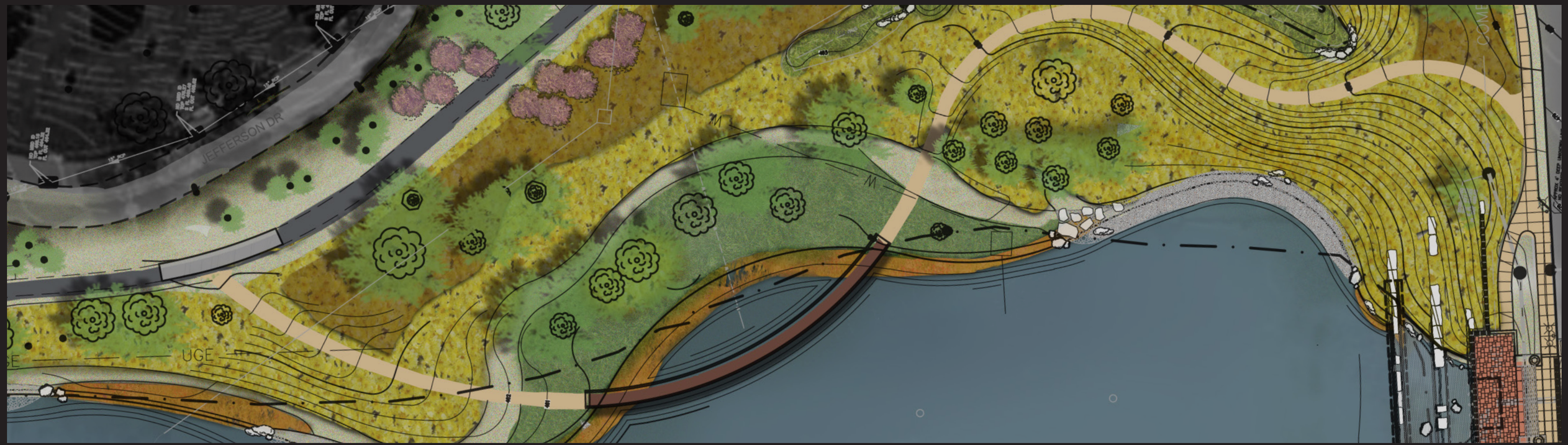
KEY

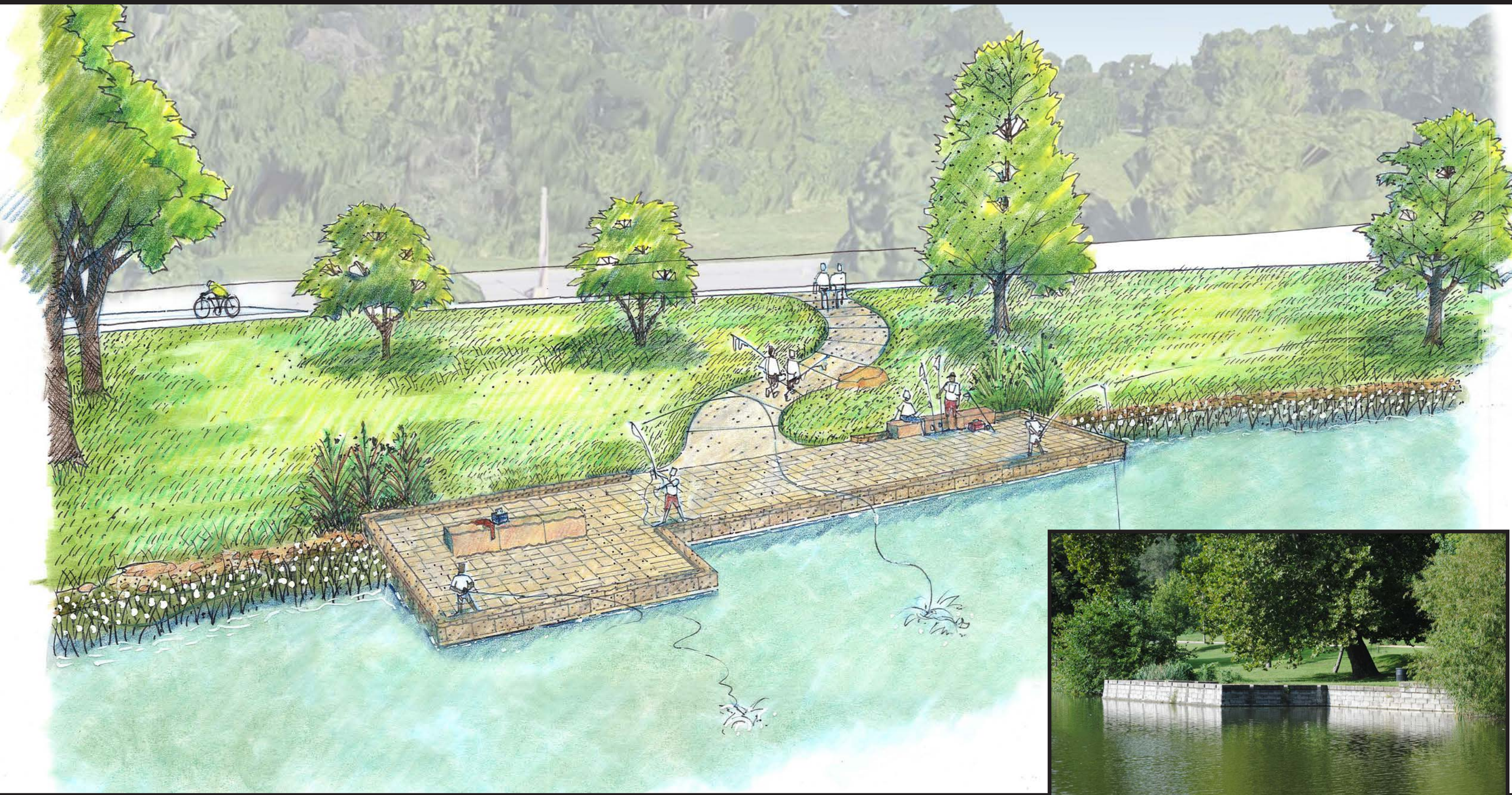
1. Cascades
2. Boardwalk & cypress wetland
3. Picnic pavilion
4. Gravel bar
5. New fishing dock
6. Stormwater BMP
7. Weir
8. Picnic lawn
9. Heels trail
10. Wheels trail
11. Overlook
12. Traffic calming improvements
13. Roadside ADA parking
- Lighting

Clayton Cascade

Clayton Overlook

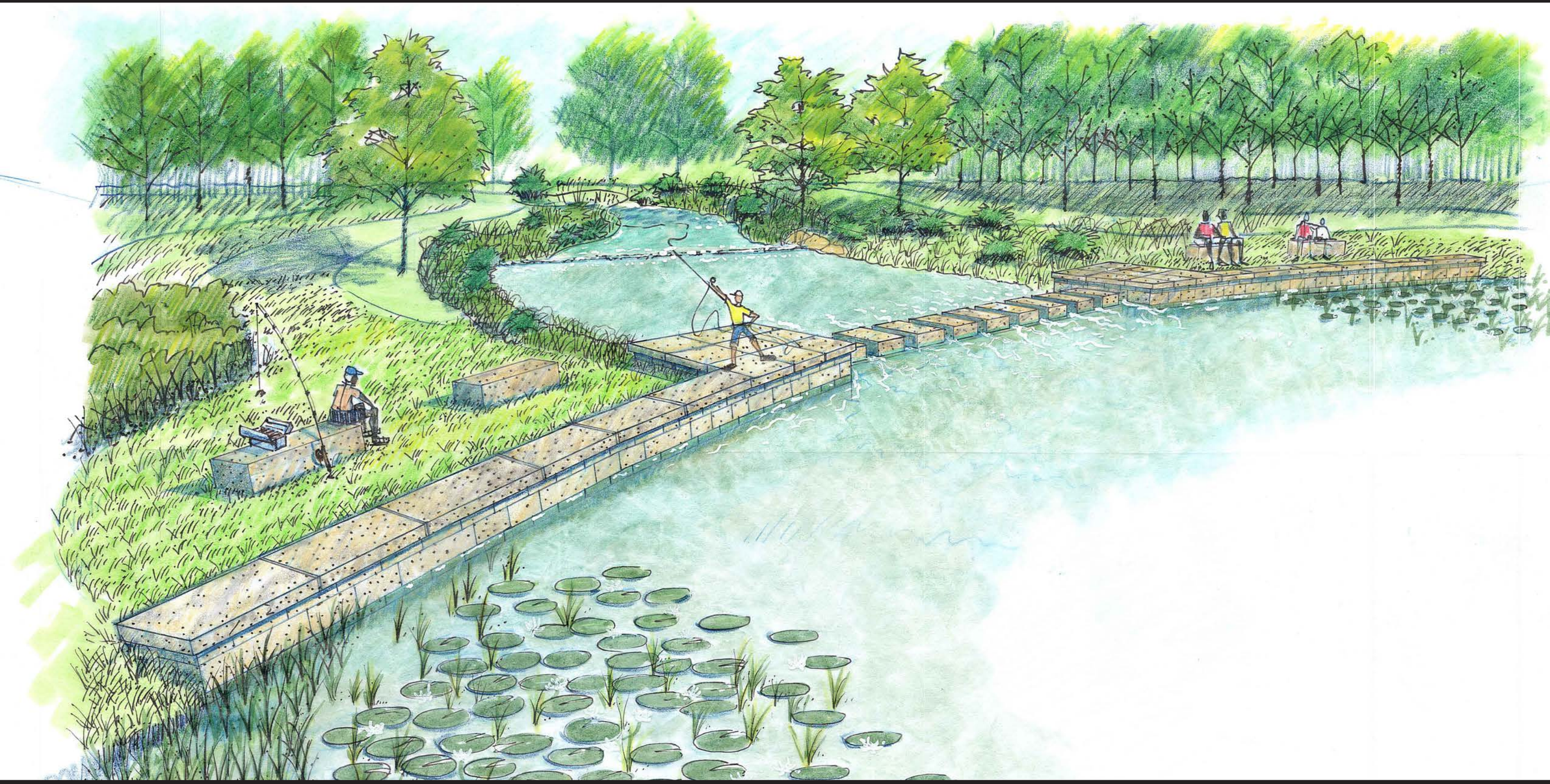
Jefferson Lake Boardwalk





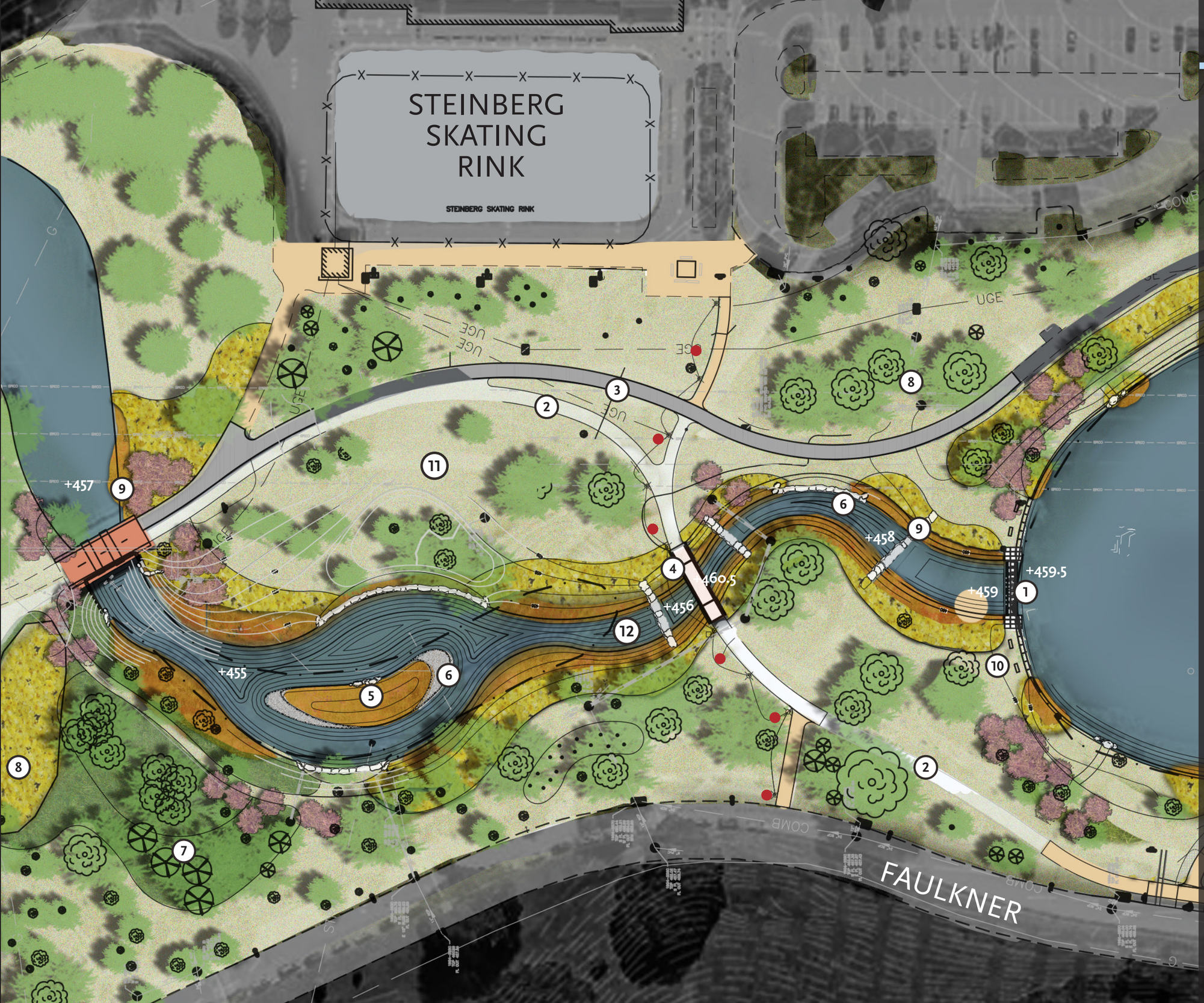
Fishing Dock

Jefferson Lake Pavilion



Jefferson Lake Weir

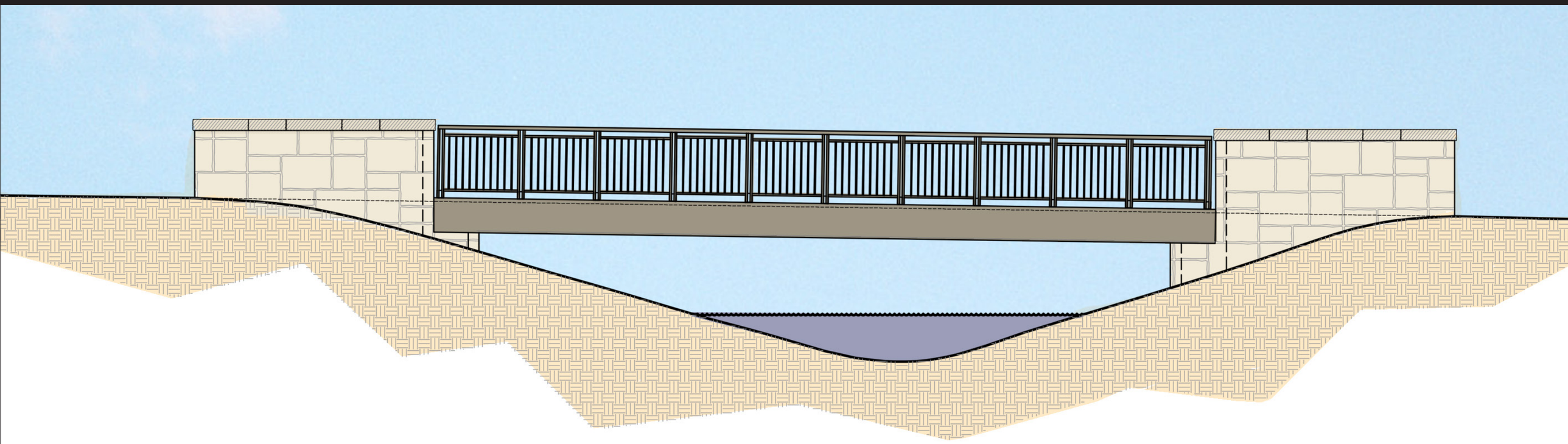
The Oxbow

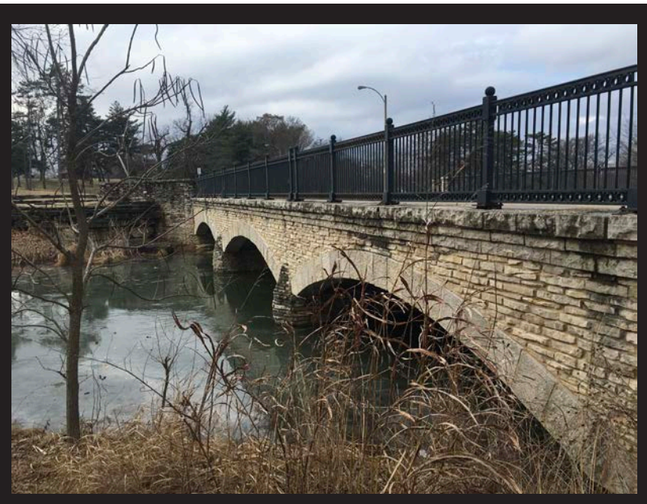


KEY

1. Weir
2. Heels trail
3. Wheels trail
4. Bridge
5. Island
6. Gravel bar
7. Sedge meadow
8. Meadow plantings
9. Cascade
10. Seating node
11. Picnic lawn
12. Water quality improvements
- Lighting

Oxbow Bridge





Proposed Railing Updates

SWTDESIGN

Discussion

Forest Park Forever™