

POSITIVE IMPACTS OF STORM WATER



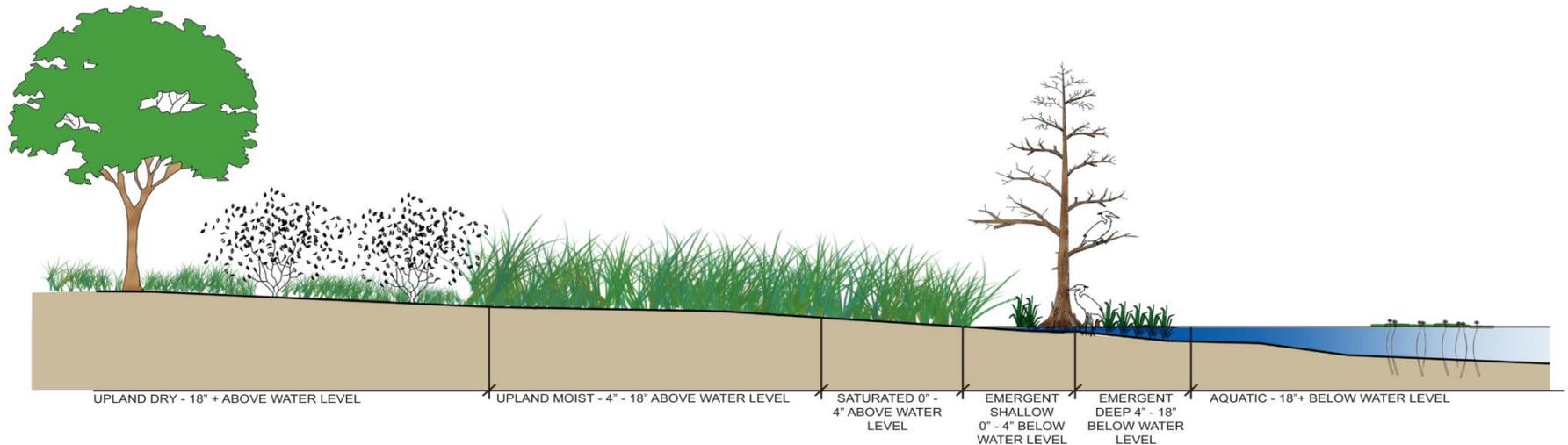
SWT DESIGN

TED H. SPAID, ASLA

WWW.SWTDESIGN.COM

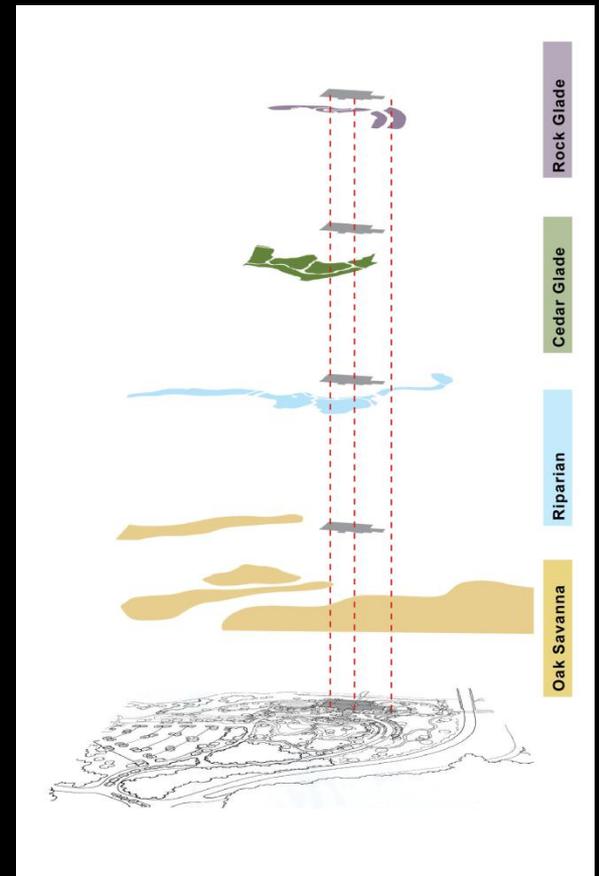
Rain Garden Benefits and Functions:

- add beauty
- create habitat
- replicates natural processes
- improve water quality
- reduce runoff, flooding, and stream-bank erosion
- nutrients are utilized by plants
- treat runoff
- allow 30% more water to infiltrate the ground



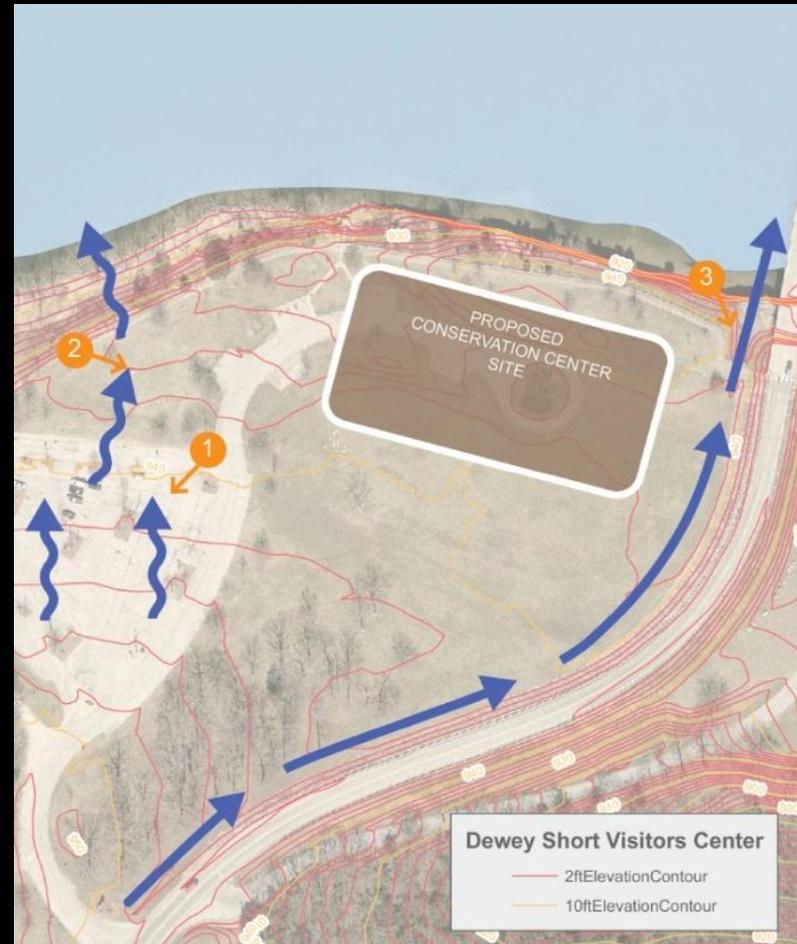
DESIGN PROCESS

- Site Selection / Goal
- Analyze Site Conditions
- Determine Bioretention Needs and Methods
- Develop Design Solution(s) Based on Goals
- Refine Design
- Confirm That Design Meets Desired Goals
- Determine Maintenance Needs



SITE SELECTION / GOAL

- How Does Site Selection Impact Plant Choice?
- Low Impact Development
- Regenerative Opportunities
- Site Performance / Multi-Use
- Partnership Opportunities
- Impact on Adjacent Land





SITE SELECTION / GOALS



ANALYZE SITE CONDITIONS

- “Boots on Ground”
- Tree Preservation
- Existing Soils
- Watershed Analysis
- Site Character
- Micro Climates

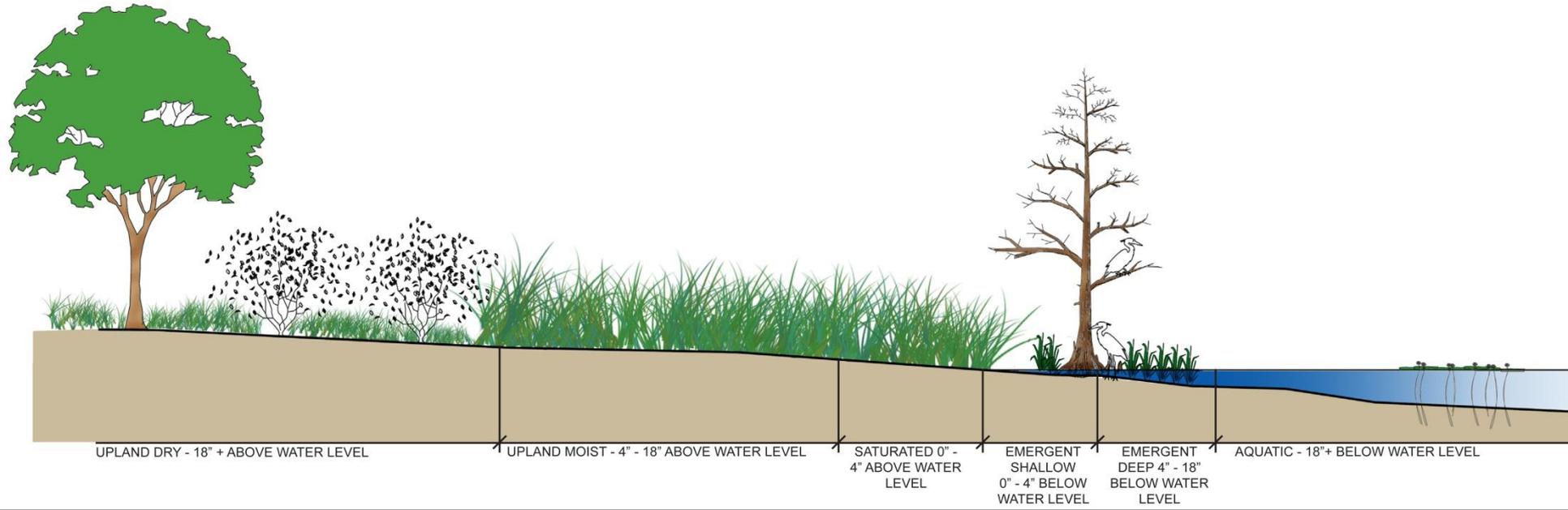


DETERMINE BIORETENTION NEEDS / METHODS

- Sediment Control / Pretreatment
- Environmental Protection
- Use of Dry Swales “Bio Swales”
- Filtration Basin “Rain Gardens”
- Fore Bay
- Detention / Retention Basin
- Wet Pond



UNDERSTAND LANDSCAPE ZONES AND SOIL PROFILE



Button Bush
Cephalanthus occidentalis



Swamp Milkweed
Asclepias incarnata



Cardinal Flower
Labelia cardinalis



Broadleaf Arrowhead
Sagittaria latifolia



Pickerel Weed
Pontederia cordata



Marsh Marigold
Caltha palustris



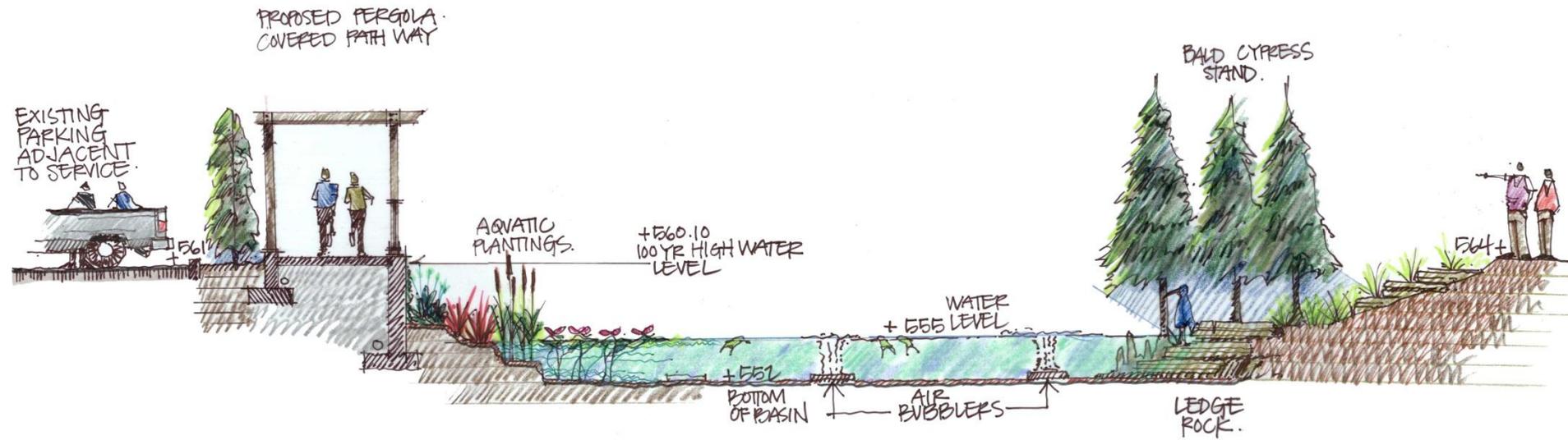
Water Lily
Nymphaea pygmaea helvola

UNDERSTAND LANDSCAPE ZONES AND SOIL PROFILE



DEVELOP DESIGN SOLUTION(S)

- Study in Plan and Section
- Create Plant Palette
- Understand Water Flow
- Determine Normal vs. High Water Line
- Design Criteria Formal vs. Informal
- Visual Impact on Adjacent Land Users





BEFORE

AFTER

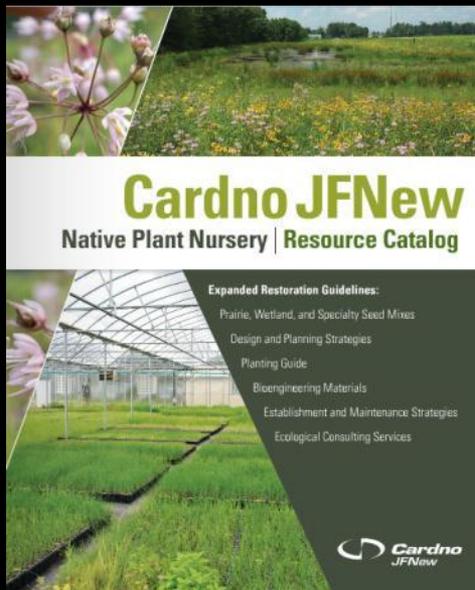


PLANT PALETTE

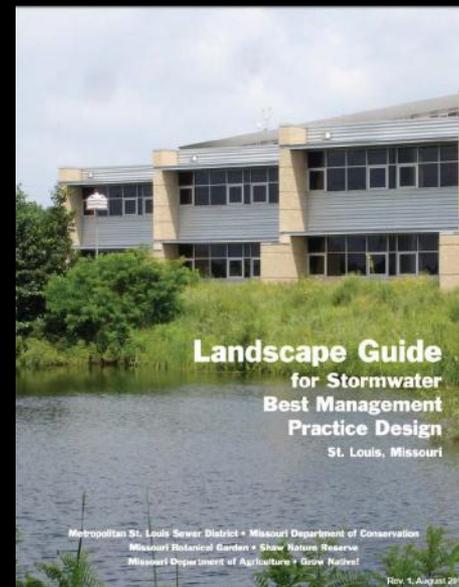
- Provide Seasonal Interest
- Understand Mature Height / Character
- Know Cultural Requirements / Communities
- Diversity of Selections
- Maintenance Requirements
- Long Term vs. Short Term
- Plant Availability







<http://www.cardnojfnew.com/>

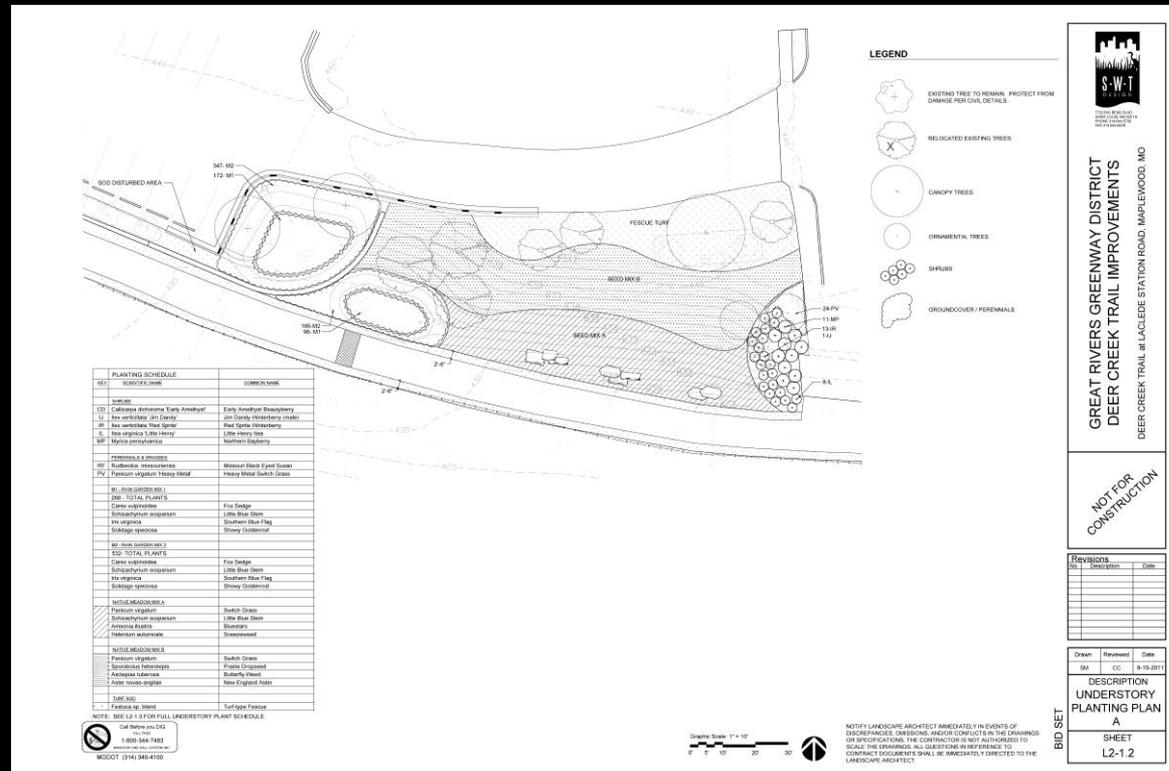


<http://www.stlmsd.com/home>

- Missouri Botanical Garden:
<http://www.missouribotanicalgarden.org/>
- Bohn's Farm:
<http://www.bohnsfarm.com/>
- Forrest Keeling Nursery
<http://www.fknursery.com/>
- Pea Ridge Forest Tree Farm:
<http://www.pearidgeforest.com/>

REFINE DESIGN

- Location of Plants / Layout
- Understand Both Horizontal and Vertical Relationship of Plants
- Ensure Limits of Plants to be Preserved
- Determining Grow-In Requirements
- Cost Analysis Impact of Plant Sizes



S-W-T
SOUTHWEST TERRACE DESIGN

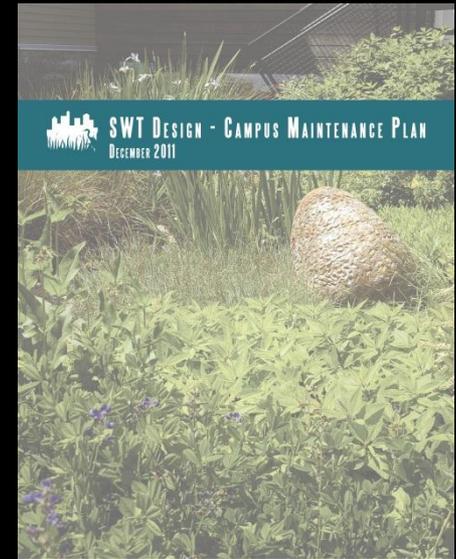
**GREAT RIVERS GREENWAY DISTRICT
DEER CREEK TRAIL IMPROVEMENTS**
DEER CREEK TRAIL @ LACLEDE STATION ROAD, MAPLEWOOD, MO

NOT FOR CONSTRUCTION

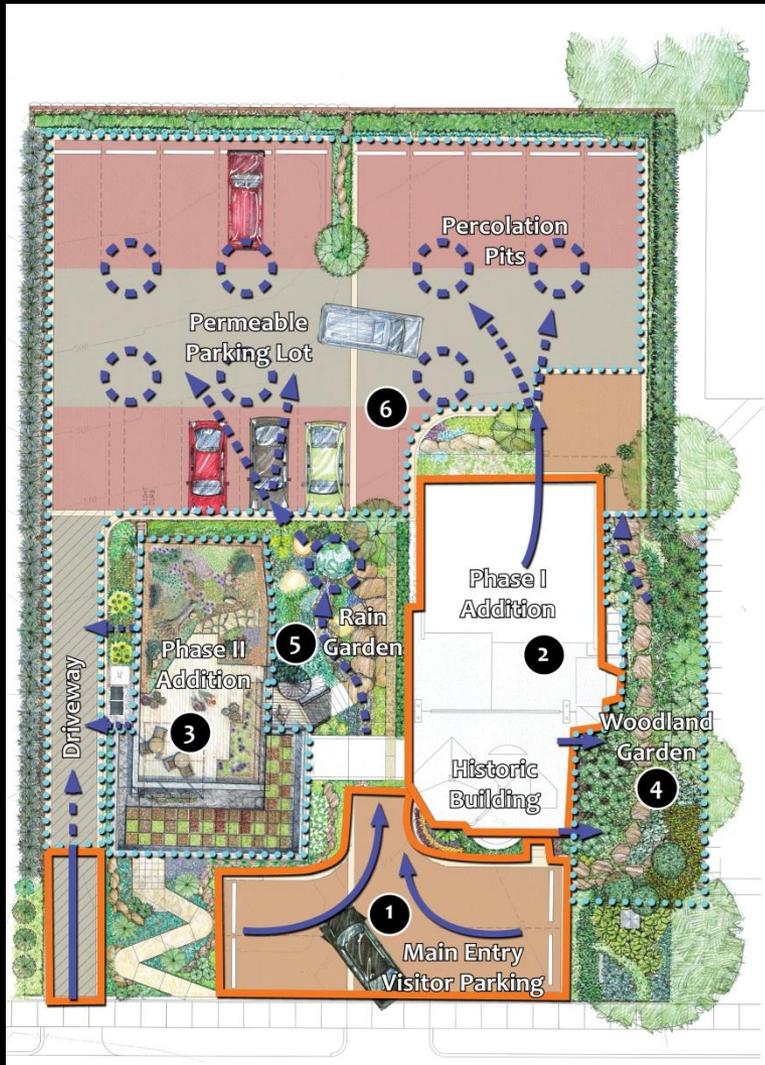
Revisions table and drawing metadata as described above.

MAINTENANCE NEEDS

- Short Term vs. Long Term
- Develop Maintenance Plan
- Sustainable Practices
- High Visibility vs. Low
- Understand the Evolution of Design



CASE STUDIES







Manfreda virginica



Talinum calycinum











Rain Garden

A rain garden is a planted depression that allows rainwater runoff from impervious surfaces, such as roofs, driveways, and walkways, to be absorbed. This reduces rain runoff by allowing stormwater to soak into the ground. Rain gardens can cut down on the amount of pollution reaching creeks and streams by up to 30%. The SWT Design rain garden collects water from the



front parking area, funneling it through a rock stream bed under the building bridge to the garden's water feature. During storm events, water will flow into the garden permeate the ground. Excess water overflows through an underground pipe into the granular base of the adjacent permeable paving system.



Time 00h:00m



Time 00h:03m

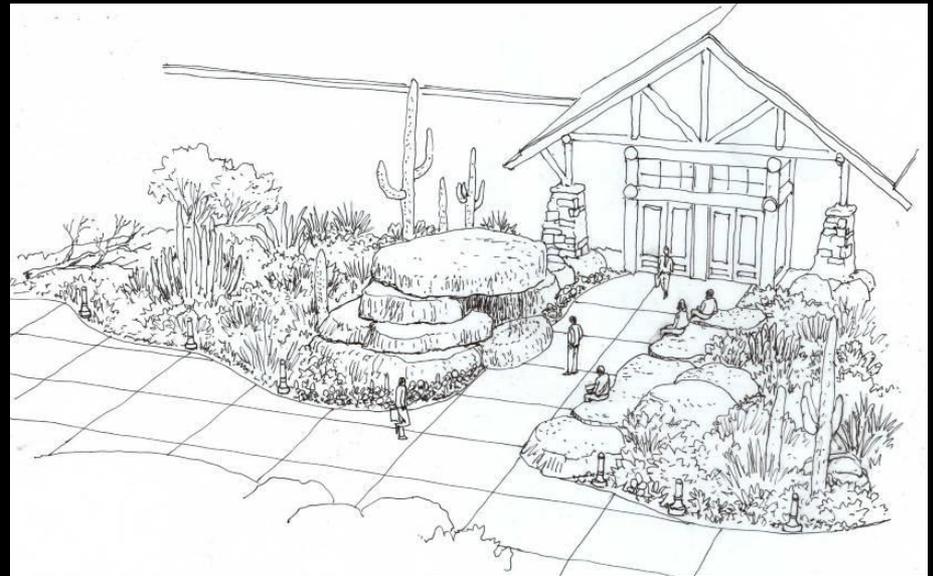


Time 00h:08m



Time 00h:15m









BASS PRO SHOPS OUTDOOR WORLD | MESA, AZ





BASS PRO SHOPS OUTDOOR WORLD | MESA, AZ





INDIAN CREEK LODGE | BRANSON, MO





INDIAN CREEK LODGE | BRANSON, MO





INDIAN CREEK LODGE | BRANSON, MO





RANKEN JORDAN PEDIATRIC SPECIALTY HOSPITAL | MARYLAND HEIGHTS, MO





RANKEN JORDAN PEDIATRIC SPECIALTY HOSPITAL | MARYLAND HEIGHTS, MO







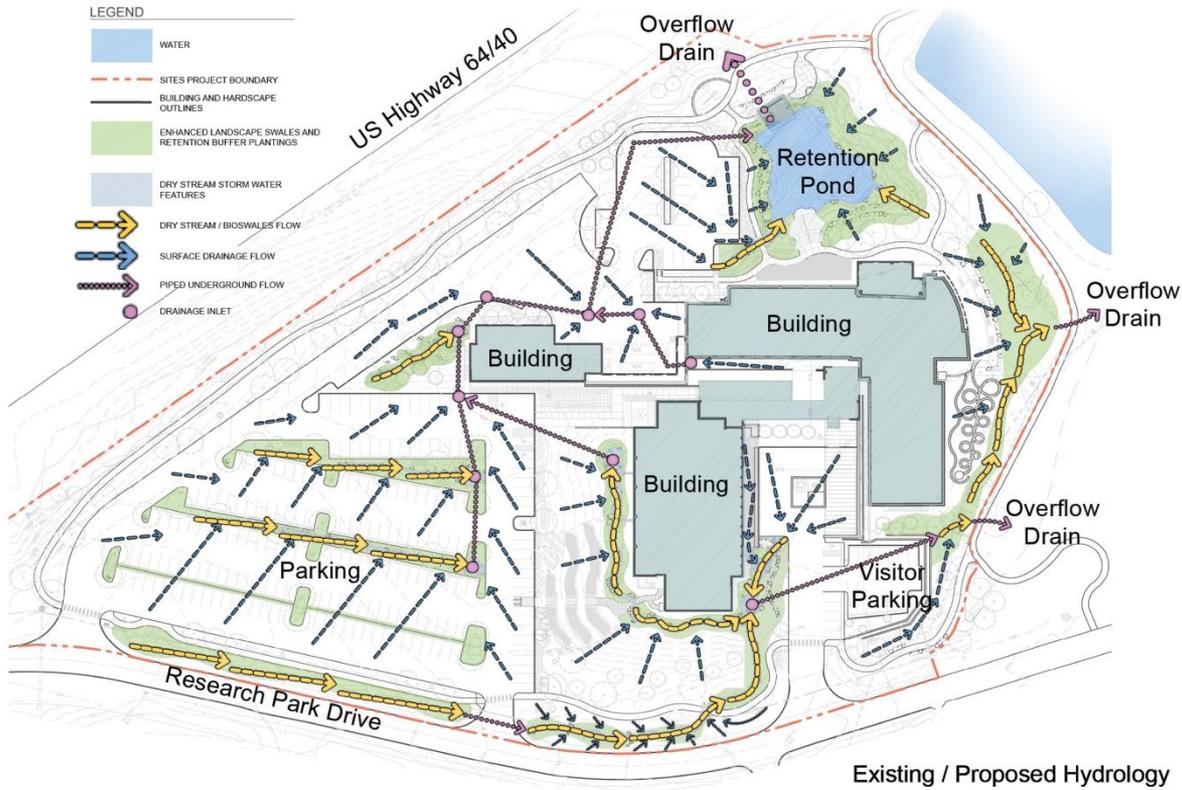
RANKEN JORDAN PEDIATRIC SPECIALTY HOSPITAL | MARYLAND HEIGHTS, MO





NOVUS INTERNATIONAL HEADQUARTERS | ST. CHARLES, MO







NOVUS INTERNATIONAL HEADQUARTERS | ST. CHARLES, MO





NOVUS INTERNATIONAL HEADQUARTERS | ST. CHARLES, MO







NOVUS INTERNATIONAL HEADQUARTERS | ST. CHARLES, MO





NOVUS INTERNATIONAL HEADQUARTERS | ST. CHARLES, MO





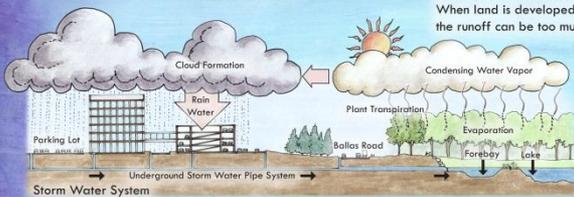
DES PERES LAKESIDE IMPROVEMENTS | DES PERES, MO



STORM WATER

Why storm water matters...

Buildings, streets and parking lots have a profound influence on the environment. When land is developed rainfall is no longer absorbed by trees and grasses; the runoff can be too much for the natural drainage system to handle.



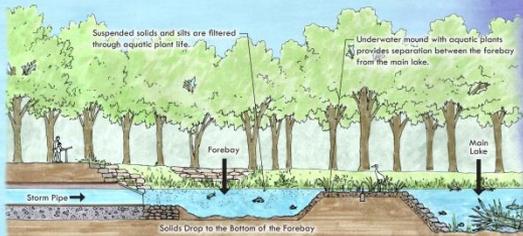
Des Peres Lake is a storm water detention basin; its design incorporates a forebay and aquatic plants which provide a biological filter. This filter reduces pollutants from the atmosphere, streets and automobiles. These pollutants are captured in the forebay of the lake and in the aquatic plants which surround the lake protecting the water quality, fish and aquatic habitat.

What is a forebay?

A forebay uses aquatic plants as a filter against the suspended silts and solids to keep them from getting into the main body of the lake.



Snails are the "cleanup crew" that feed on algae in the pond.

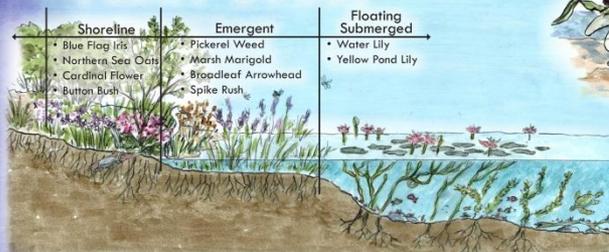


As part of the Federal Clean Water Act, the Metropolitan St. Louis Sewer District is providing oversight for implementation of storm water control systems to promote water quality.

AQUATIC PLANTS

Can you identify the different aquatic plants?

PLANT ZONES



Aquatic plants provide habitat for many aquatic insects and animals. Insects such as dragonflies feed on mosquitoes while serving as a food source for fish.

What value do aquatic plants provide?

- biologically filters polluted water
- nesting and breeding habitat for birds, amphibians, and fish
- controls erosion and protects shores
- food source for wildlife
- produces oxygen aiding fish survival

Missouri's rich diversity of aquatic habitats includes ponds, streams, swamps, rivers, springs and wetlands that can be found throughout the state. Similar to each of these various habitats, the Des Peres Lake water edge plays an essential role in filtering water.

FISH HABITAT

What is under the water?

The illustration shows a cross-section of a fish habitat. It includes a shallow gravel bed, rootwads and dead, fallen tree structures, and various aquatic life forms. Labels include: Shallow gravel bed provides protection for small fish and other creatures, Rootwads and dead, fallen tree structures serve as fish habitat, Tadpoles and frogs feed on small insects. They in turn are a favorite food for largemouth bass, Look For..., Channel Catfish, Bluegill, Largemouth Bass, Embryo, Tadpole with Legs, Frog, Snails, Crayfish, and Painted Turtle. Text at the bottom left: Man made fish attractions using salvaged sewer pipes and dead trees were placed throughout the lake renovation to allow for protection and spawning. Text at the bottom right: Painted Turtle Three species of turtles can be commonly found in Missouri ponds, the red-eared sliders, painted turtles and snapping turtles. They are beneficial scavengers and primarily eat vegetation.





DES PERES LAKESIDE IMPROVEMENTS | DES PERES, MO





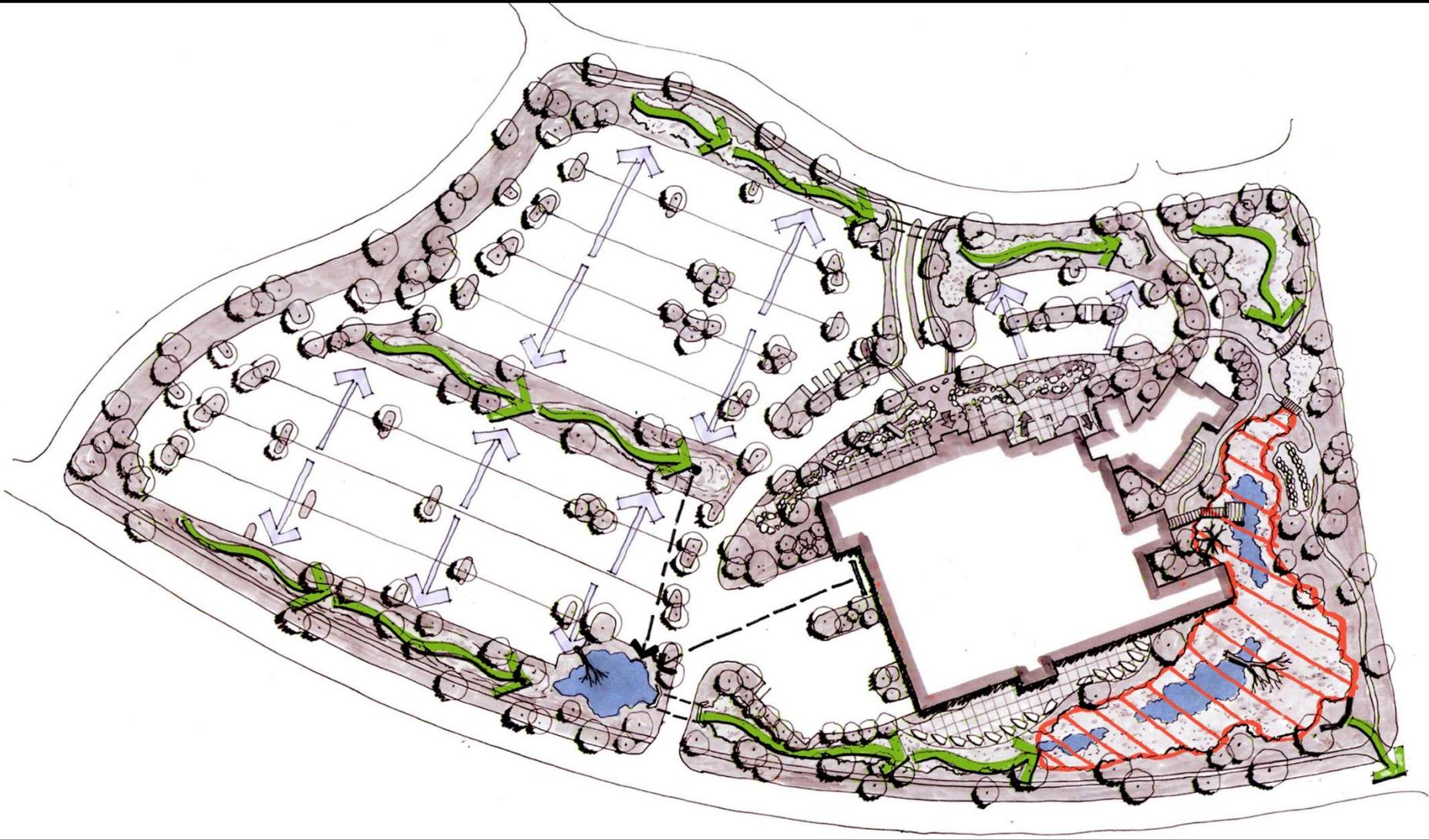
DES PERES LAKESIDE IMPROVEMENTS | DES PERES, MO





DES PERES LAKESIDE IMPROVEMENTS | DES PERES, MO









BASS PRO SHOPS OUTDOOR WORLD | COUNCIL BLUFFS, IA

POSITIVE IMPACTS OF STORM WATER



SWT DESIGN

TED H. SPAID, ASLA

WWW.SWTDESIGN.COM