

# Cedar Lake/Lake of the Isles Master Plan

## GOALS TO PREFERRED CONCEPT



July 12, 2022

PAT CONRAD – WATER QUALITY SPECIALIST

## Background

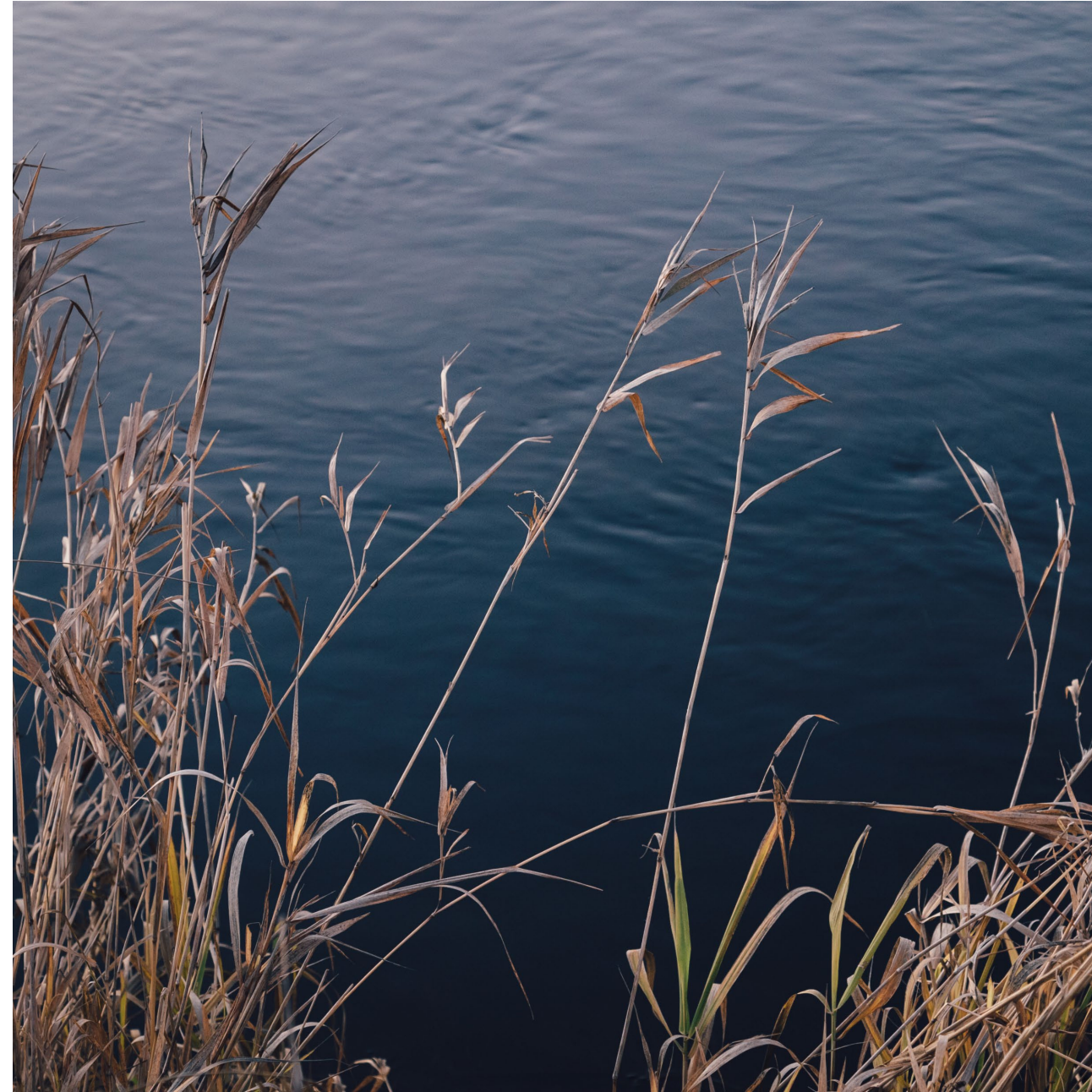
- Three Planning Levels
- Watershed Loading vs In-lake Cycling

## Master Plan Level Goals

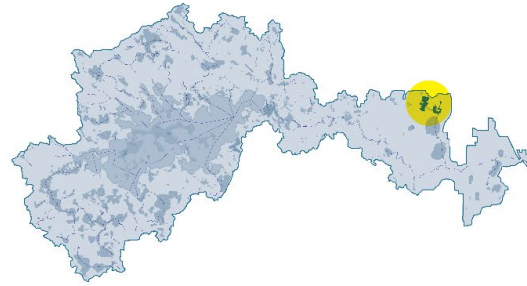
- Master Plan

## Water Quality Treatment

- Goal
- Strategy
- Preferred Plan Design



## WATERSHED LEVEL PLANNING



CO-PLANNING WITH MINNEHAHA CREEK  
WATERSHED DISTRICT AND ST. LOUIS PARK

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## CEDAR LAKE/LAKE OF THE ISLES MASTER PLAN



DEVELOPING MEASURABLE WATER QUALITY  
RECOMMENDATIONS WITHIN THE PROJECT  
AREA

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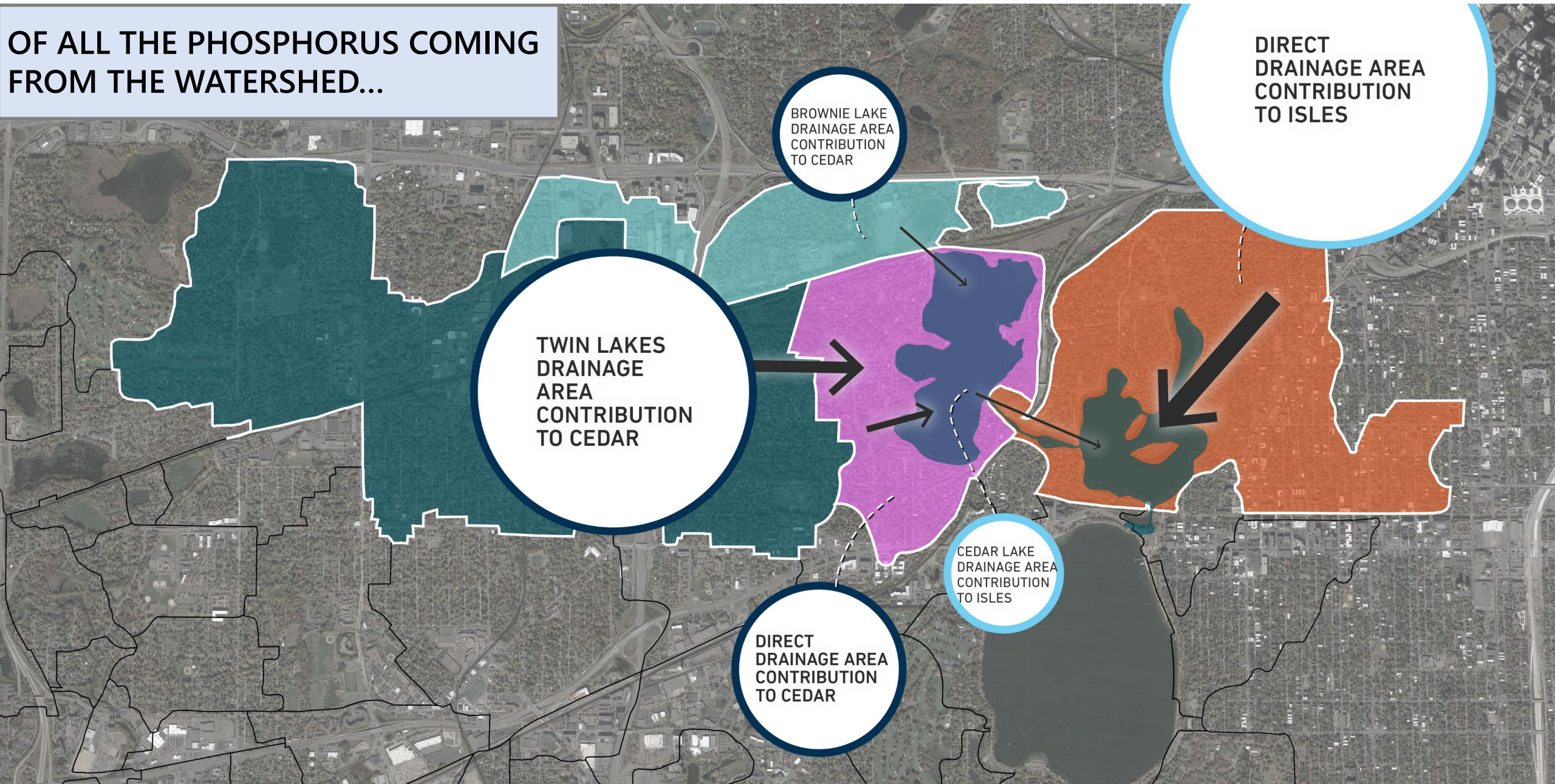
## LAKE MANAGEMENT PLAN



DETAILED MODELING AND GUIDANCE FOR  
INDIVIDUAL LAKES

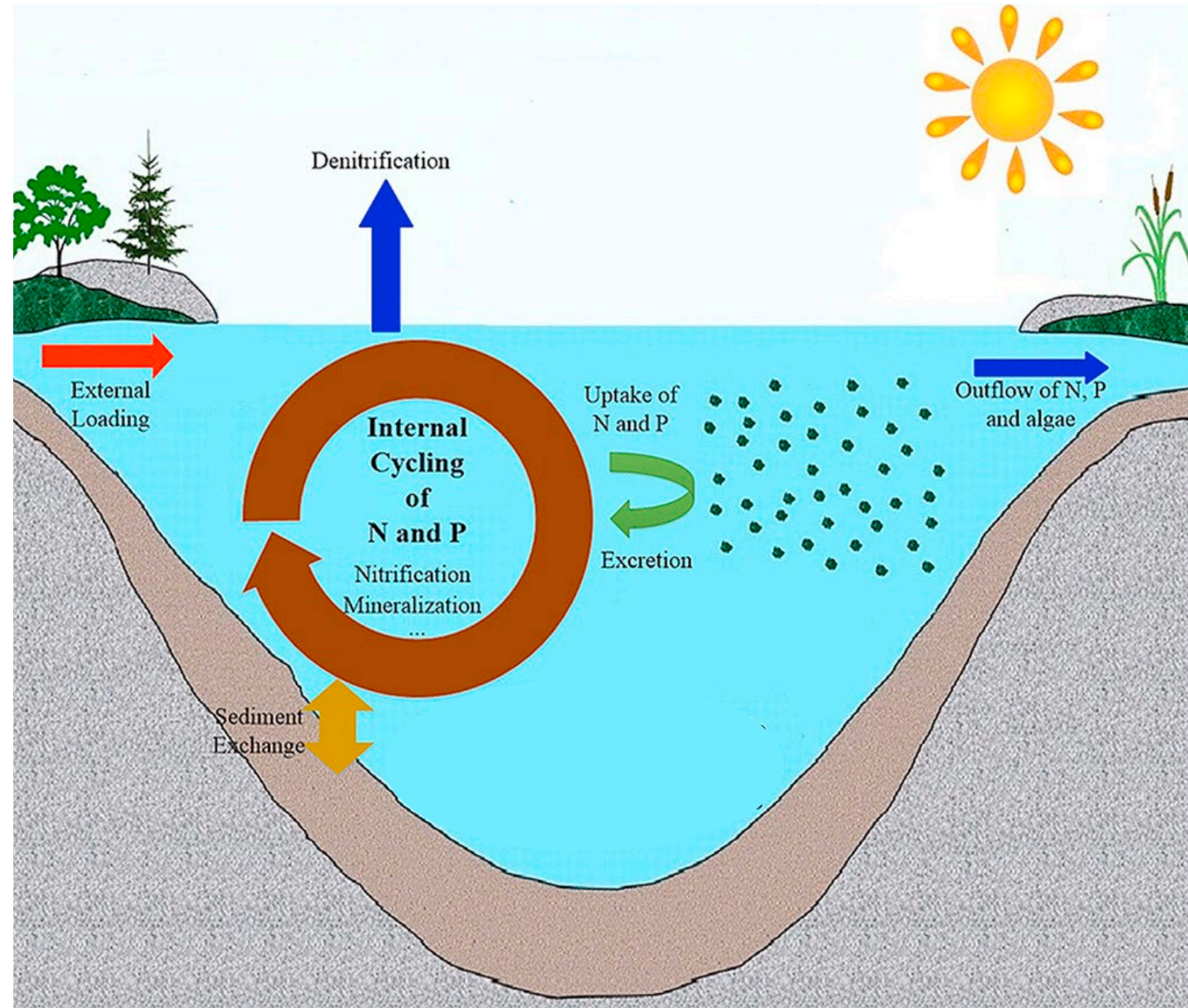
# WATERSHED INFLUENCE

OF ALL THE PHOSPHORUS COMING FROM THE WATERSHED...

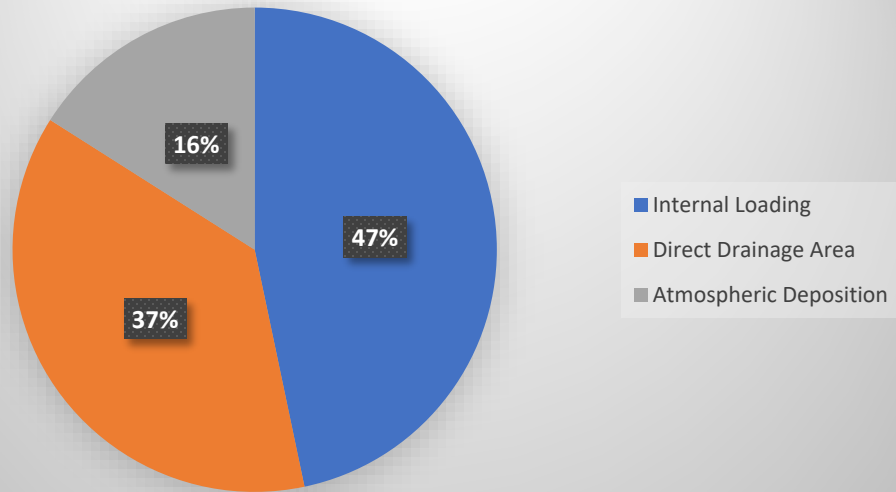


## NUTRIENT FATE

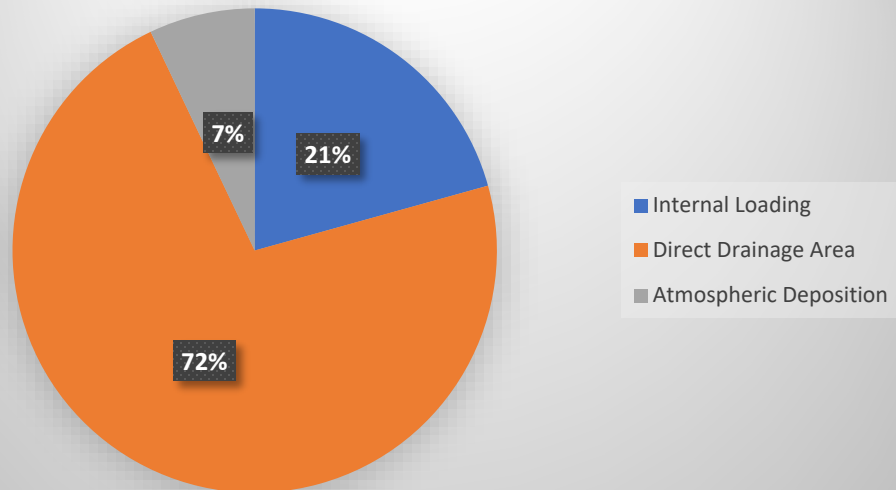
- Outflow
- Algal growth
- Plant uptake
- Nitrification (gas)
- Mineralization (sediment)



## Dry Year (2021) Phosphorus Loading



## Wet Year (2019) Phosphorus Loading



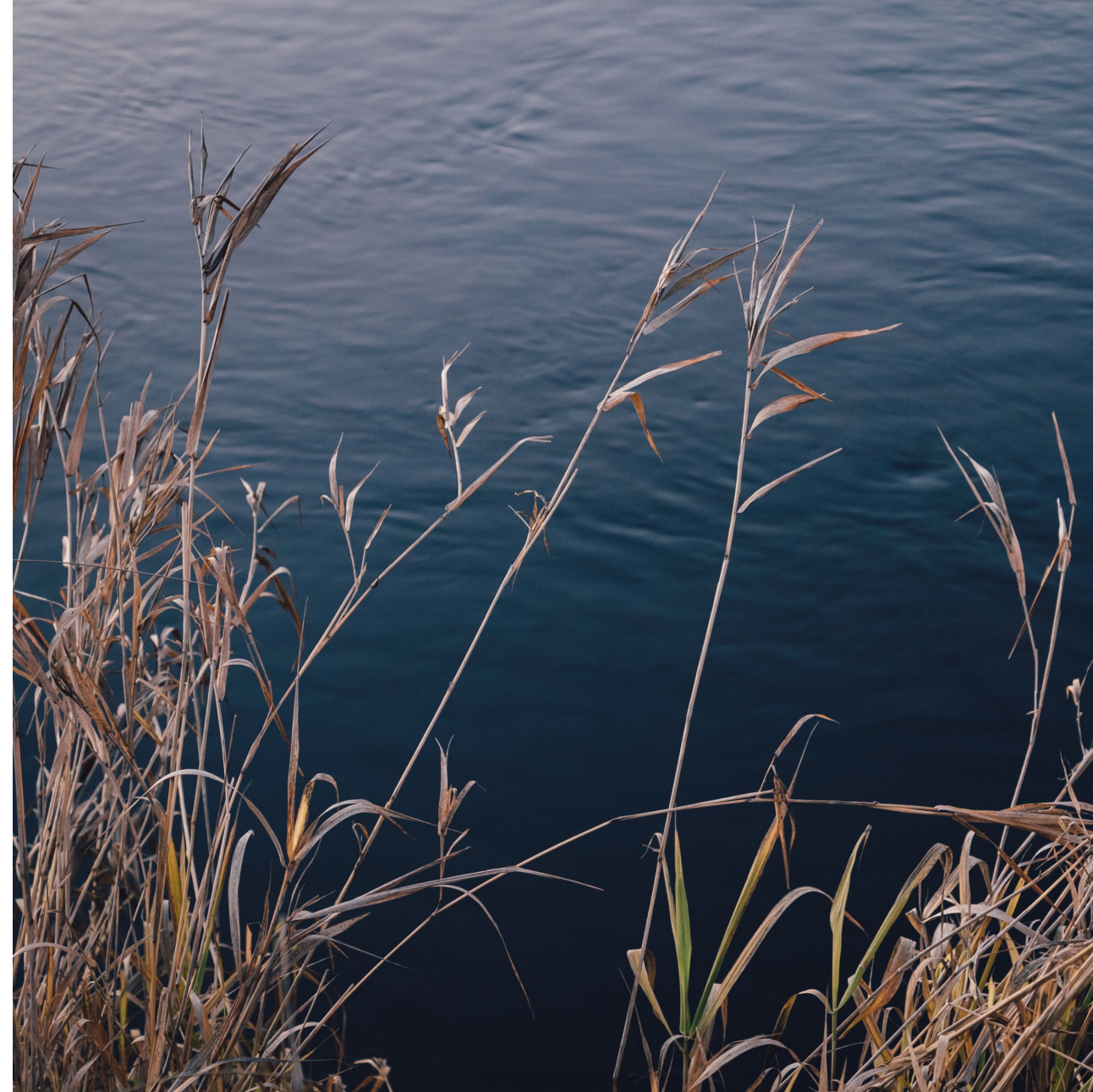
# MASTER PLAN LEVEL GOALS

**Address runoff from all hard surfaces on parkland**

**Reduce chloride, trash, and sediment from entering the lake**

**Maintain and stabilize shoreline with native vegetation in all areas except for formal access points and historic viewsheds**

**Maximize and restore habitat (terrestrial and aquatic) to improve health of the lake and have spaces for wildlife**



## Address runoff from all hard surfaces on parkland

- Treat water runoff from paved surfaces on parkland before it runs into the lake, including parkways and parking lots
- Limit paved surfaces and, where appropriate, make it pervious
- Perform enhanced sweeping of all paved surfaces on park property that drain to lake
- Restore soil health, including restoring compacted soil that currently provides limited infiltration
- Eliminate exposed soil on park land except established beaches and turtle nesting areas



## Treatment of Paved Surfaces

### Parkway & Parking Lots

Delivery to 'traditional' WQ best management practices

- Raingardens
- Tree trenches
- Underground treatment

### Watershed Runoff

- Cedar Lake Meadows retrofit
- East Cedar wetland restoration
- Neighborhood pipe-sheds

### Pedestrian & Bike Trails

Treatment via overland flow across restored areas

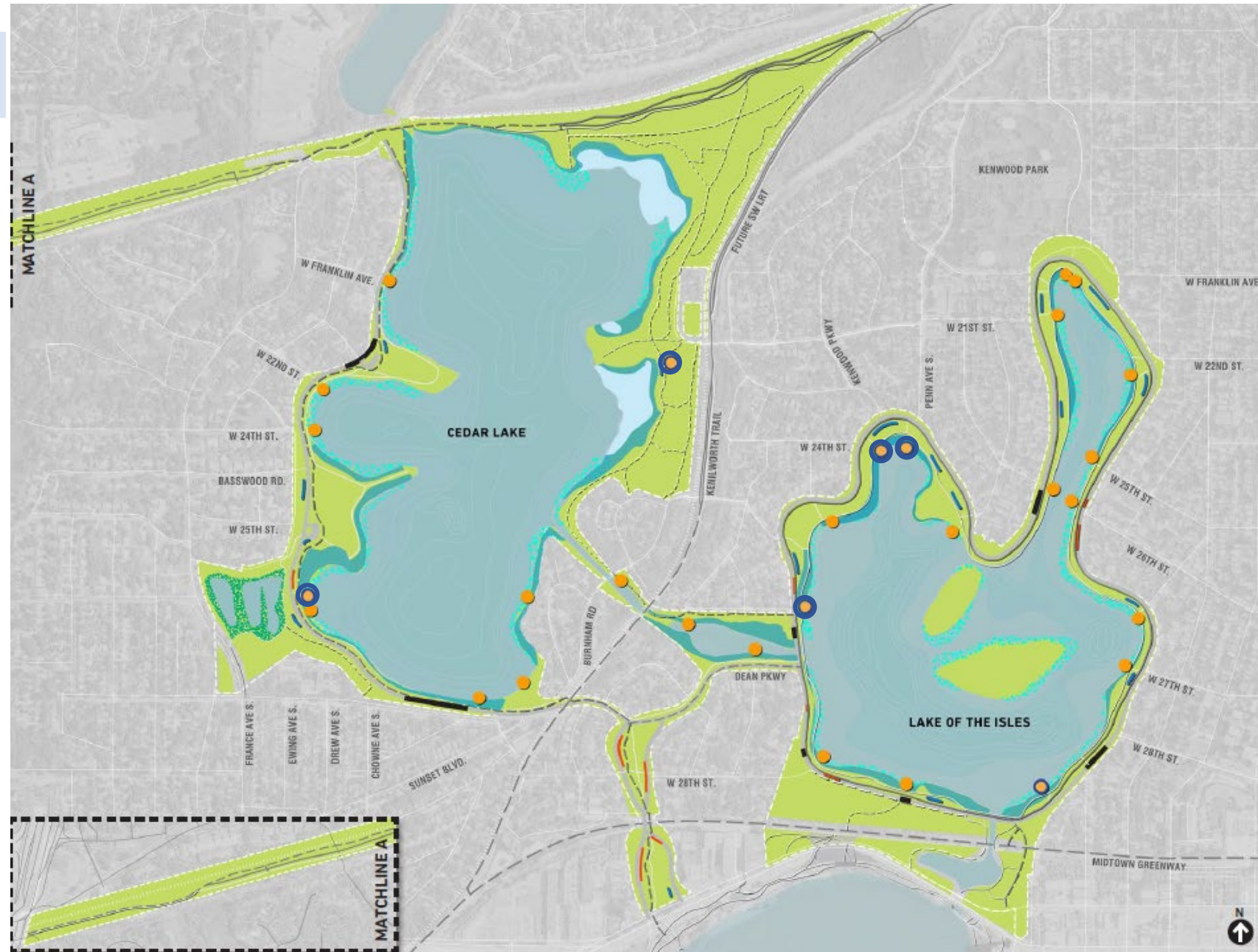
- Prairie/pollinator planting
- Littoral edge expansion
- Improved shoreline buffer



## Stormwater Runoff

### LEGEND

- Existing Outfall Locations
- Existing Outfalls identified for Stormwater Treatment within Park Boundary
- Existing Constructed Wetland
- Proposed Improved Shoreline Buffer
- Proposed Littoral Edge
- Proposed Marsh Restoration
- Proposed Rain Garden
- Proposed Tree Trenches Adjacent to Pkwy
- Proposed Underground Pkwy Treatment






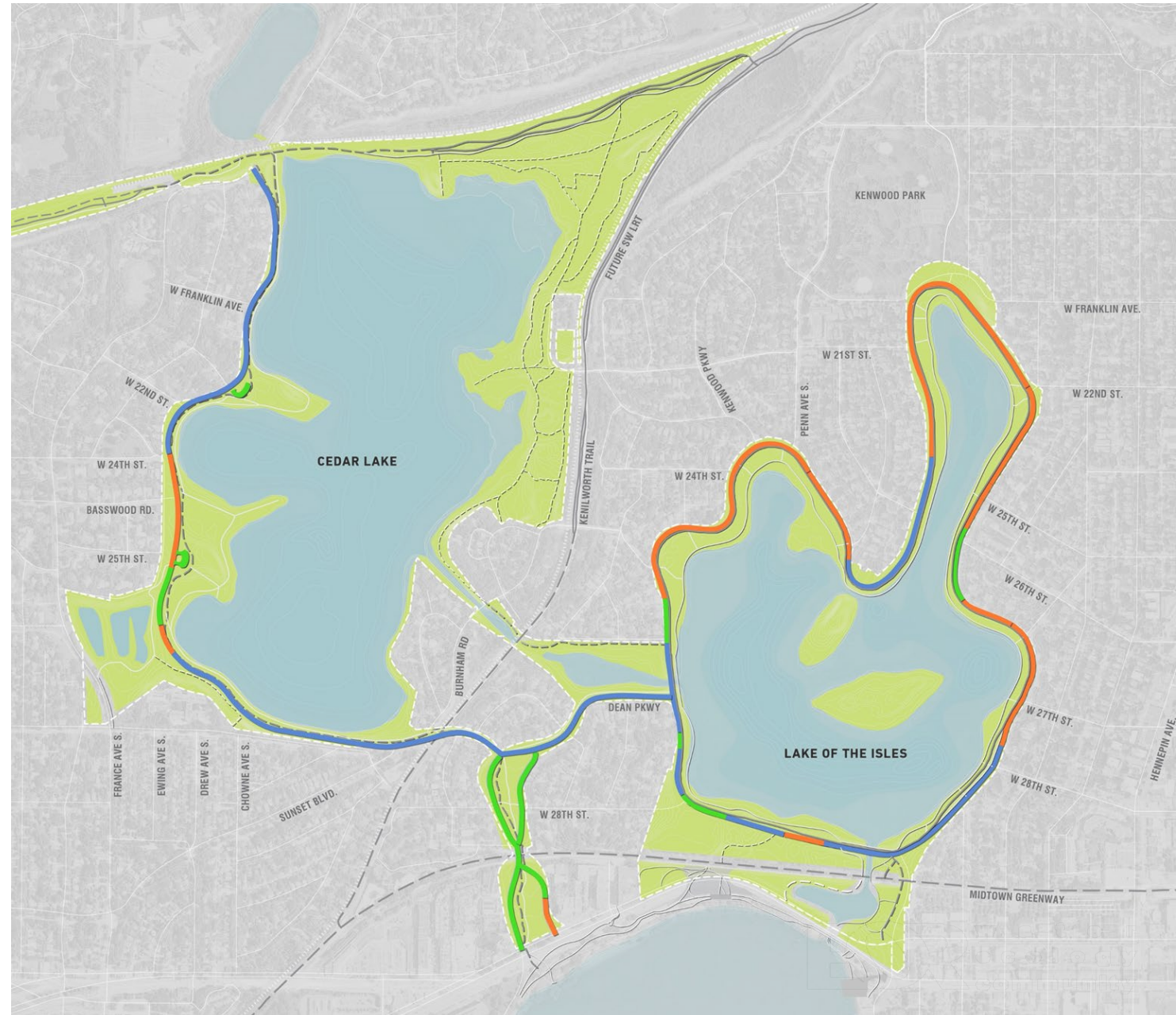
## Delivery to “BMPs”

The parkways and parking lots are the largest impervious surface areas within the park boundary. The land areas around the parkways and lots are highly variable, and different strategies are needed to treat different areas depending on available space and existing topography. Three primary stormwater treatment strategies to improve the quality of run-off from these areas are proposed and outlined below.

This diagram identifies what improvement strategies will be used for different segments of the parkway and parking lots.

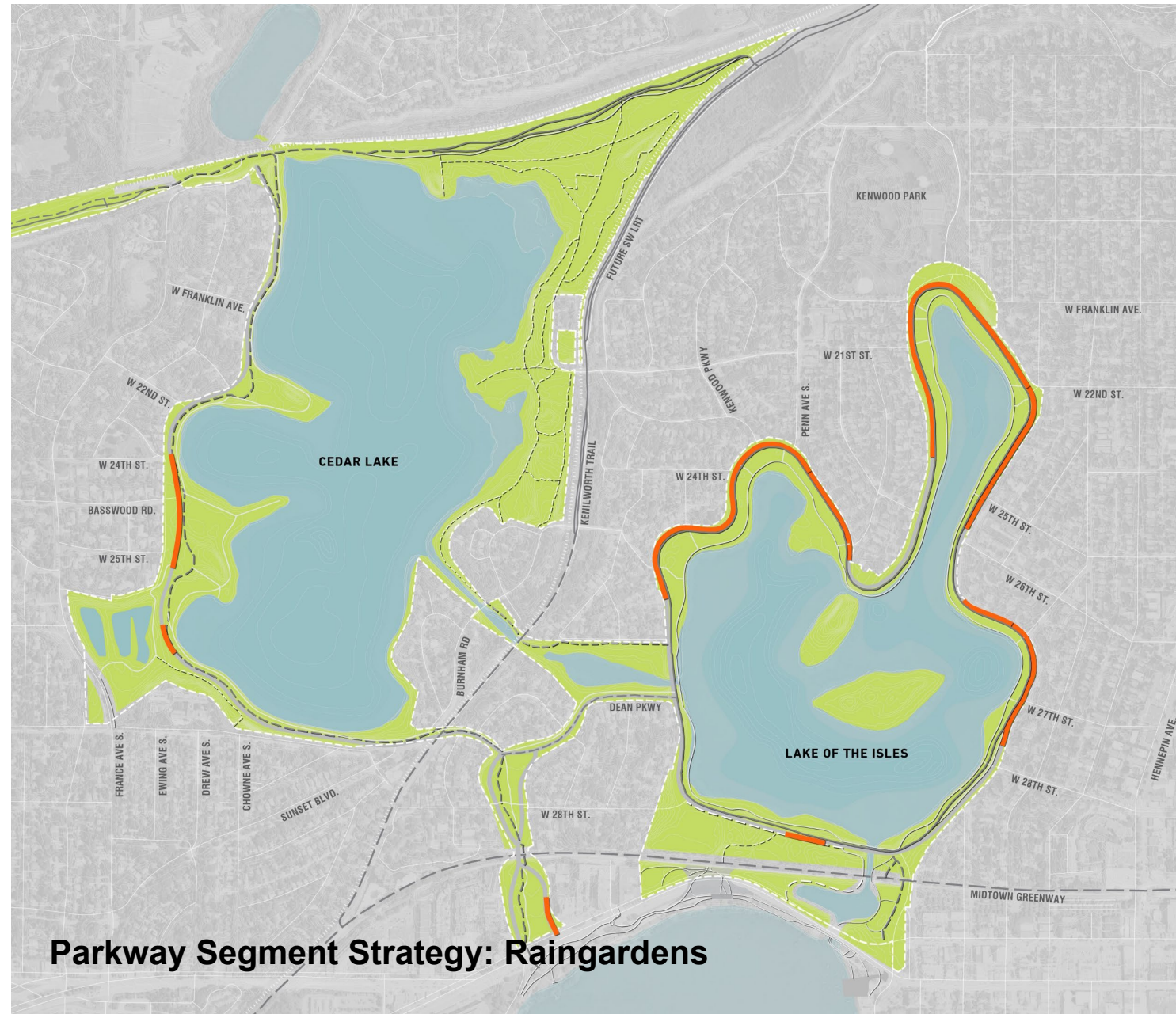
### Parkway Segment Strategy

-  Raingarden
-  Tree Trench Adjacent to Parkway
-  Underground Treatment in Road



## Rain Gardens/Basins

These are areas of the Parkway that are best suited to be treated by raingardens adjacent to the roadway using either existing or new depressions



# RAIN GARDENS: EXAMPLE PARKWAY SEGMENT

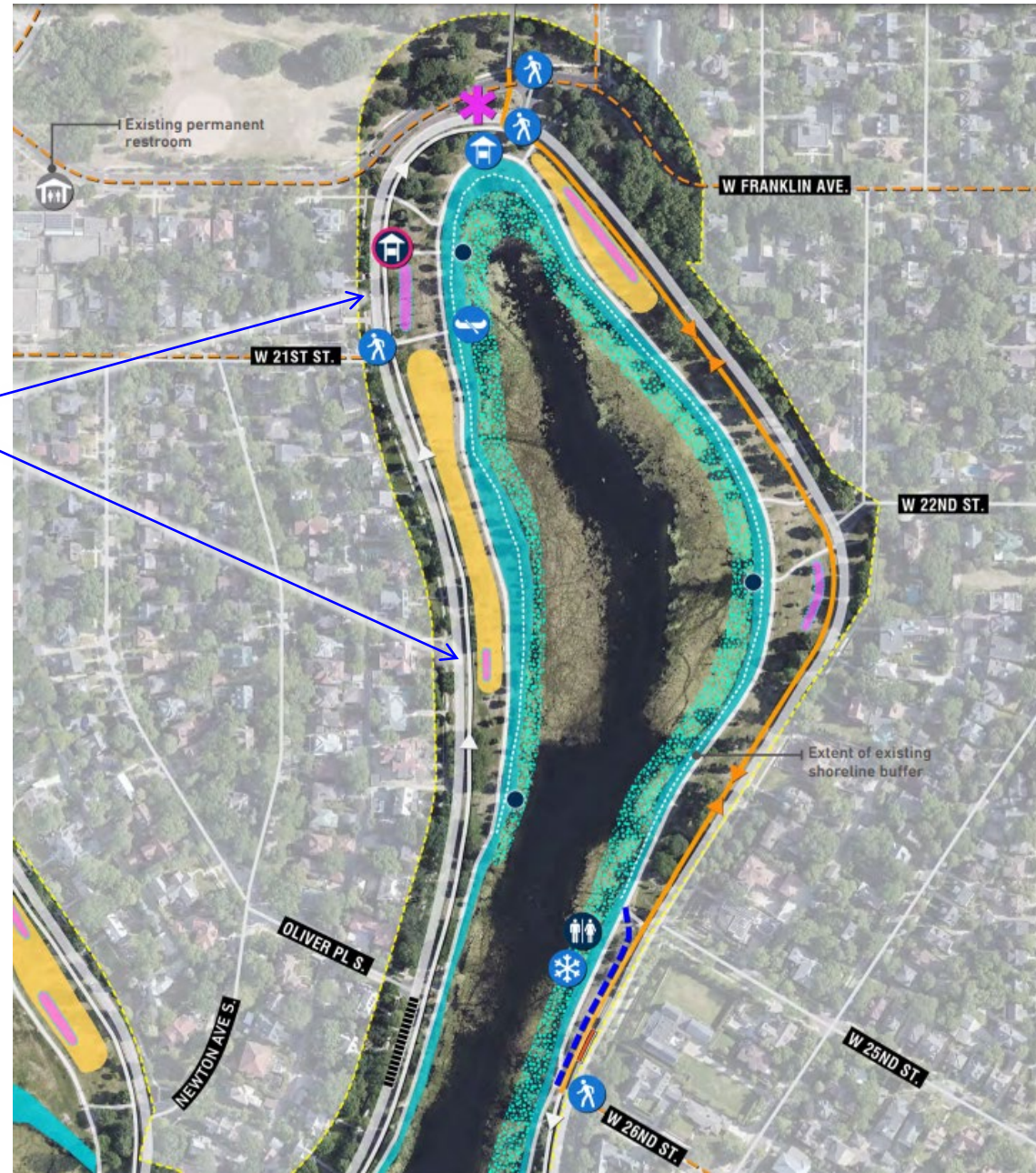


# RAIN GARDENS: PREFERRED CONCEPT EXAMPLE



## Rain Gardens

Form of bioretention consisting of a constructed or altered depression where soils have been amended and native and adaptive vegetation established to support groundwater recharge, pollutant removal and runoff detention.

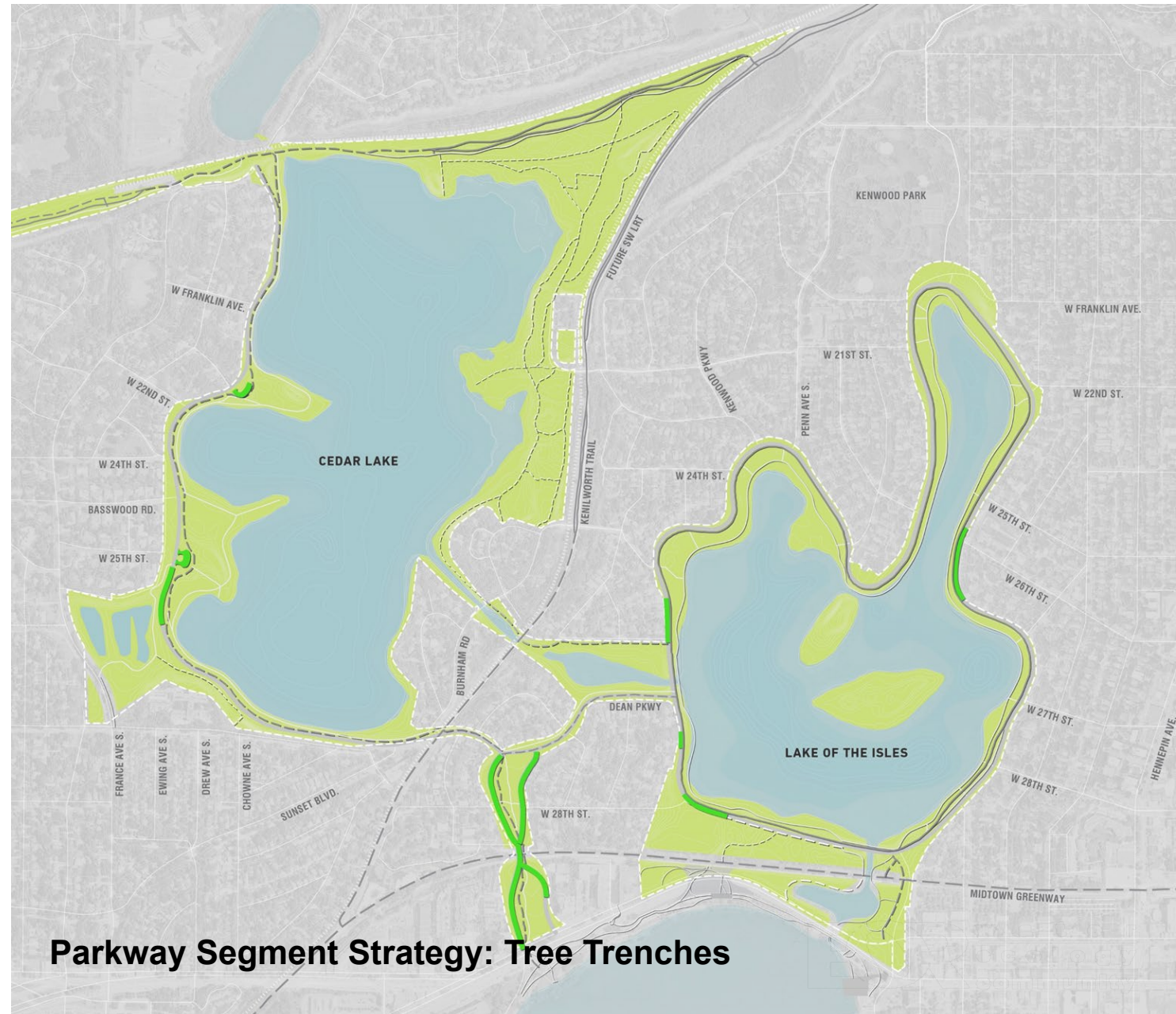


### LEGEND

- Enhanced Welcome Entry Point
- Existing Water Access: Stone Steps
- Existing Temporary Portable Restroom
- Existing Kiosk to Relocate
- Proposed Kiosk (relocated)
- Proposed Upgraded Temporary Warming House
- Proposed Formalized Water Access
- Proposed Intersection Improvements
- Existing Ice Skating Rink Location
- Existing Parkway
- Existing One-Way Bike Trail
- Existing Pedestrian Trail
- Planned Bikeway (City)
- Proposed Pedestrian Trail Realignment
- Proposed Two-Way Bike Trail
- Proposed Paved Pedestrian Trail
- Proposed Tree Trench Adjacent to Parkway
- Proposed Underground Pkwy Stormwater Treatment
- Proposed Prairie/Pollinator Planting
- Proposed Improved Shoreline Buffer
- Proposed Littoral Edge Expansion
- Proposed Rain Garden

## Tree Trenches

These are areas of the Parkway and Parking Lots that are best suited to be treated by tree trenches adjacent to the roadway, making use of the narrow areas between the curb and trails.



# TREE TRENCHES: EXAMPLE PARKWAY SEGMENT



# TREE TRENCHES: PREFERRED CONCEPT EXAMPLE



## Tree Trenches

Engineered landscape practice often adjacent to roads, consisting of a linear system designed to improve water quality, promote infiltration, manage incoming runoff, and support an urban tree canopy.

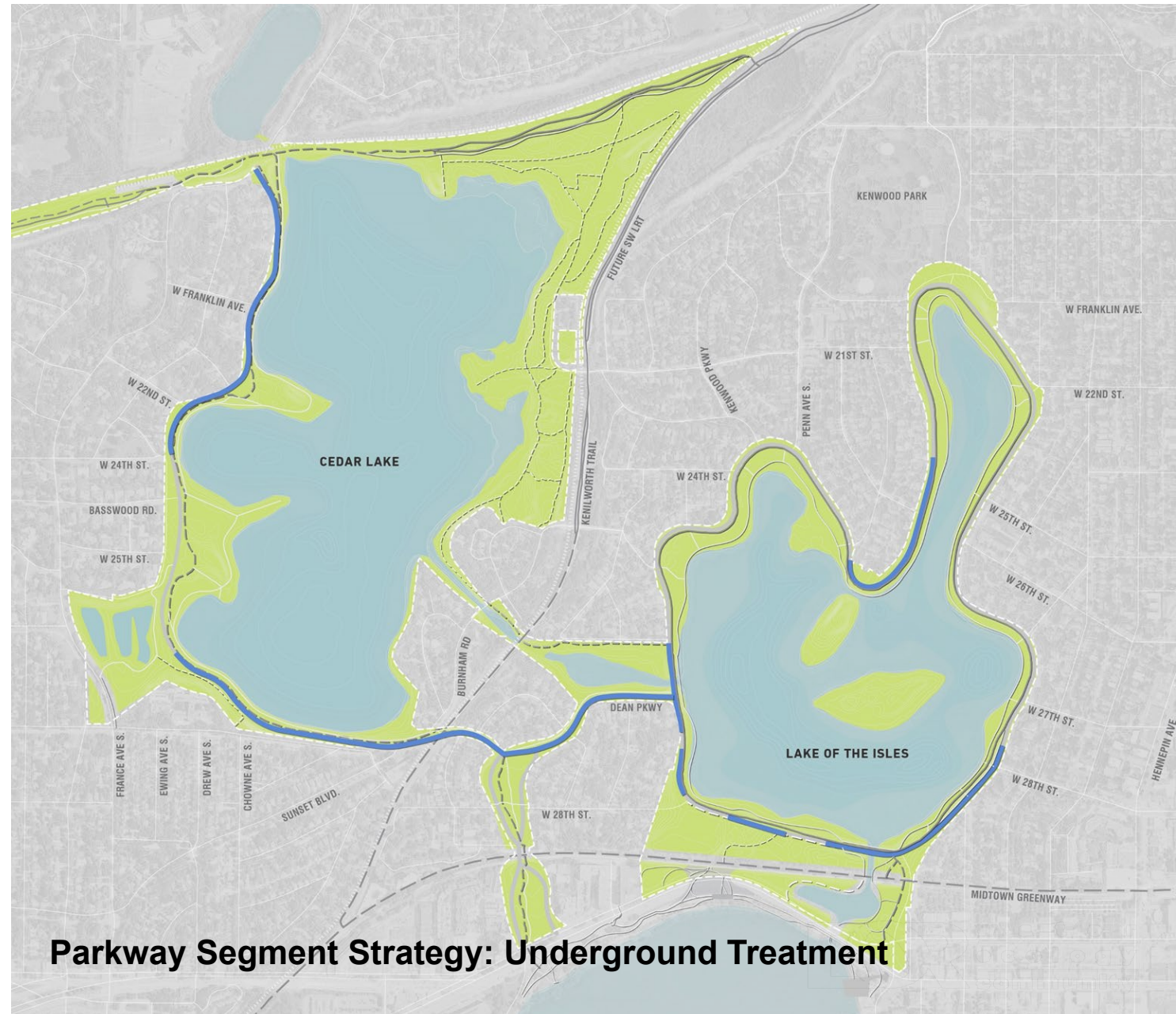


### LEGEND

- |  |  |  |  |
|--|--|--|--|
| ● Existing Water Access: Stone Steps   | — Proposed Formalized Soft Surface Trail | 🏖️ Proposed Picnic Area                  | 🌊 Proposed Marsh Restoration                           |
| ⚓ Existing Dock                        | — Proposed Paved Pedestrian Trail        | 🚰 Proposed Formalized Water Access       | 🌧️ Proposed Rain Garden                                |
| 🚣 Existing Canoe Rack                  | 🌱 Proposed Prairie/Pollinator Planting   | 🚻 Proposed Temporary Portable Restroom   | 🚦 Proposed Tree Trench Adjacent to Parkway             |
| 🏠 Existing Kiosk                       | 🌳 Proposed Mesic Oak Forest Restoration  | 🚶 Proposed Intersection Improvements     | 🏗️ Proposed Underground Pkwy Stormwater Treatment      |
| 🚻 Existing Temporary Portable Restroom | 🌿 Proposed Improved Shoreline Buffer     | 🚲 Existing One-Way Bike Trail            | 🌸 Enhanced Welcome Entry Point                         |
| 🐕 Existing Dog Park                    | 🌊 Proposed Littoral Edge Expansion       | 🚲 Existing Pedestrian Trail              | 🟡 Existing Outfall Identified for Stormwater Treatment |
|  |  | 🚲 Existing Two-Way Bike Trail            | 🌳 Proposed Land Acquisition                            |
|  |  | 🚲 Proposed Two-Way Bike Trail            |  |
|  |  | — Proposed Soft Surface Pedestrian Trail |  |

## Underground Treatment

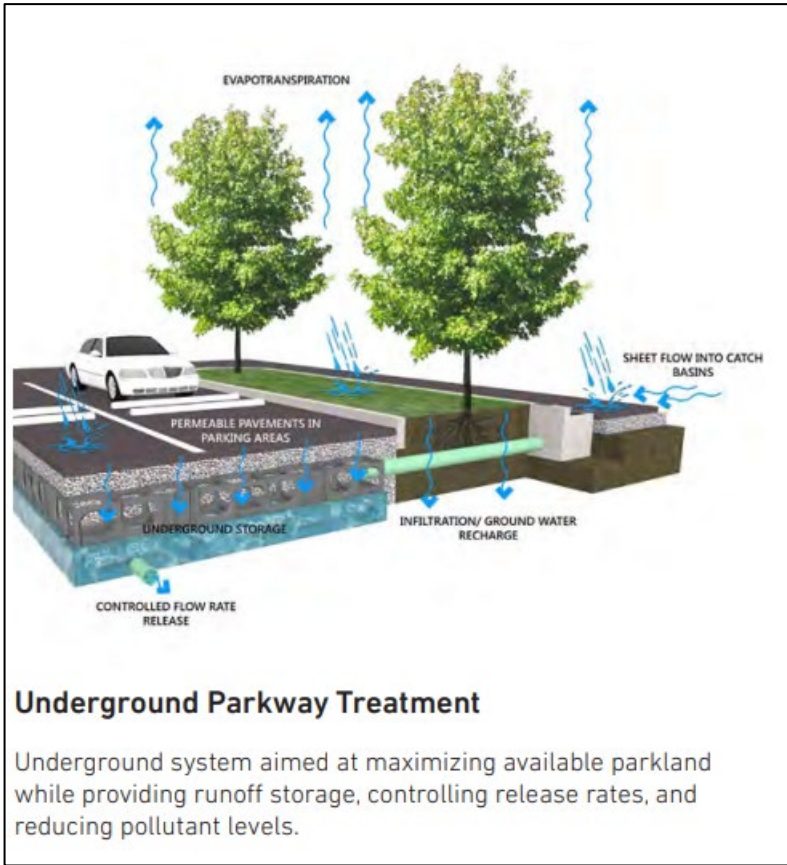
These are areas of the Parkway that are best suited to be treated by underground strategies within the road due to limited/unsuitable adjacent park land.



# UNDERGROUND TREATMENT: EXAMPLE PKWY SEGMENT



# UNDERGROUND TREATMENT: PREFERRED CONCEPT EX.



- LEGEND**
- Existing Canoe Rack
  - Existing Portable Restroom
  - Existing Dock
  - Existing Picnic Area
  - Proposed Intersection Improvements
  - Proposed Formalized Water Access
  - Proposed Viewing Spot
  - Proposed Two-Way Bikeway
  - Existing Expanded Two-Way Bike Trail
  - Proposed Narrowed Parkway
  - Existing Two-Way Bike Trail
  - Proposed Pedestrian Trail
  - Existing Sand Beach
  - Proposed Enhanced Prairie
  - Proposed Improved Shoreline Buffer
  - Proposed Expanded Littoral Edge
  - Enhanced Welcome Entry Point
  - Rain Garden
  - Proposed Underground Pkwy Stormwater Treatment

## Retrofit + Restoration

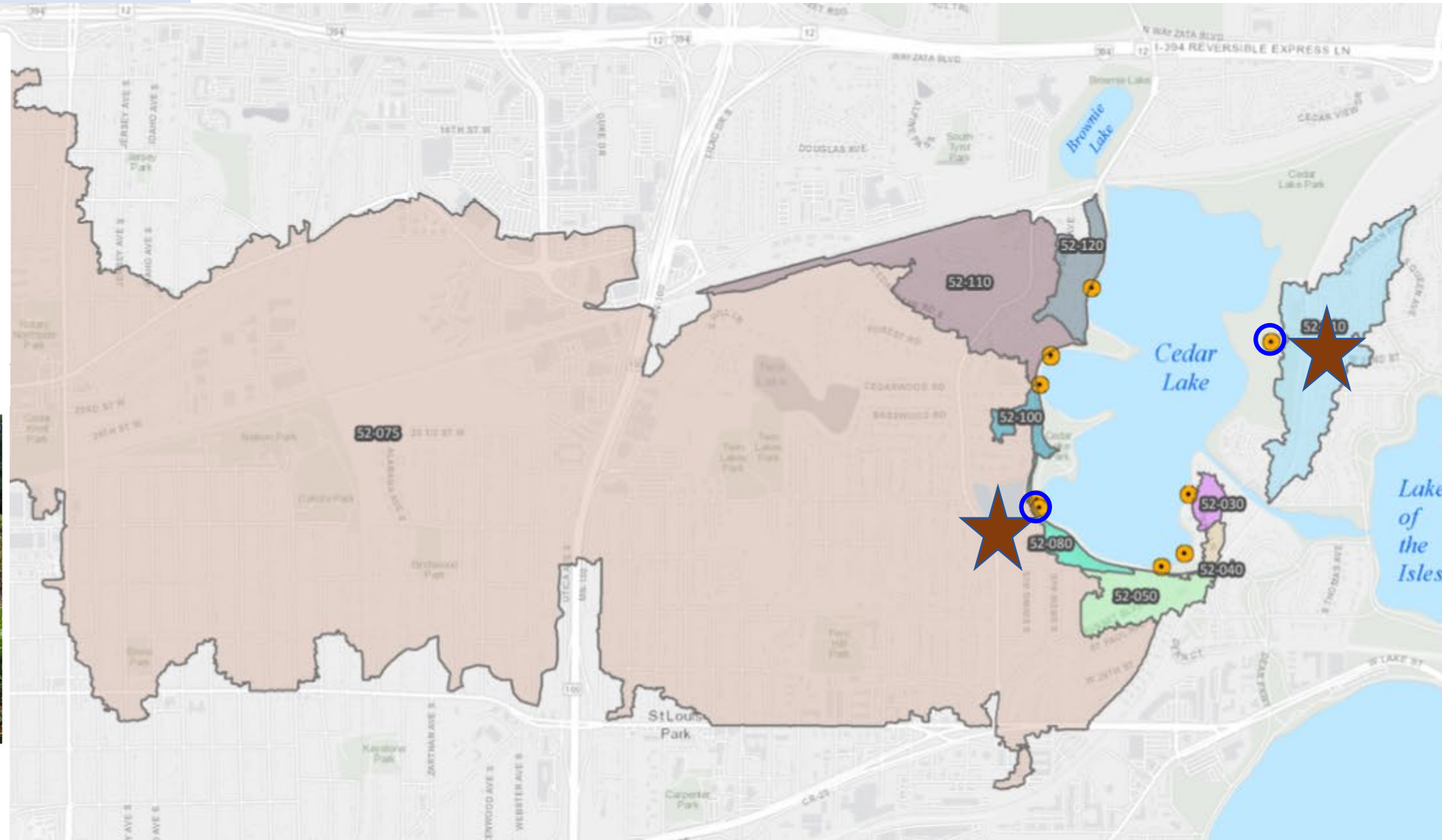


Cedar Lake Meadows retrofit



Marsh Restoration



Reestablished areas of historic marshes with native vegetation and invasive species removal. These restored ecosystems provide enhanced wildlife habitats, flood risk reduction, and soil health improvements.

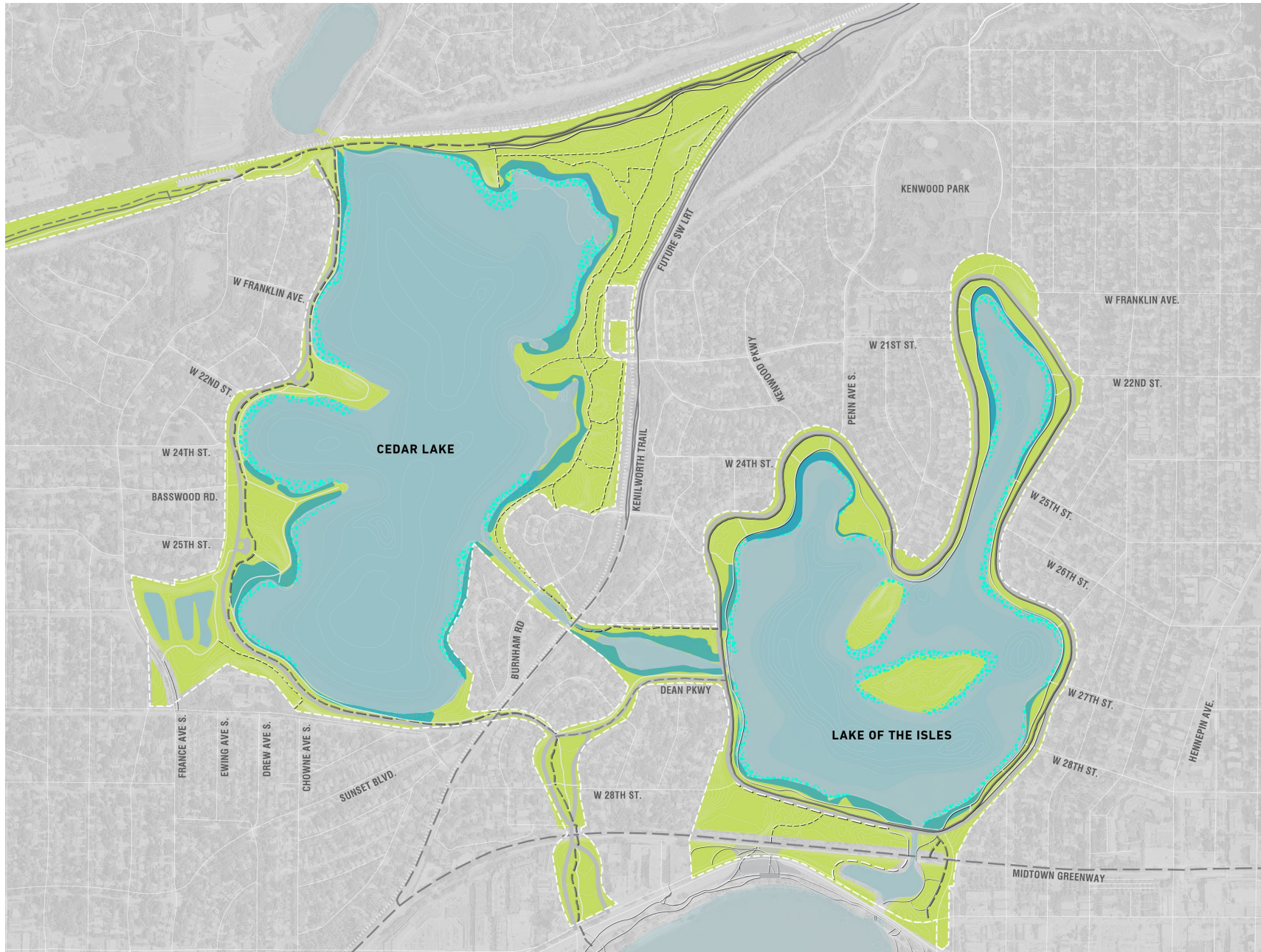




## Overland Flow to Natural Areas

### LEGEND

-  Proposed Improved Shoreline Buffer
-  Proposed Littoral Edge Expansion



## Overland Flow to Natural Areas



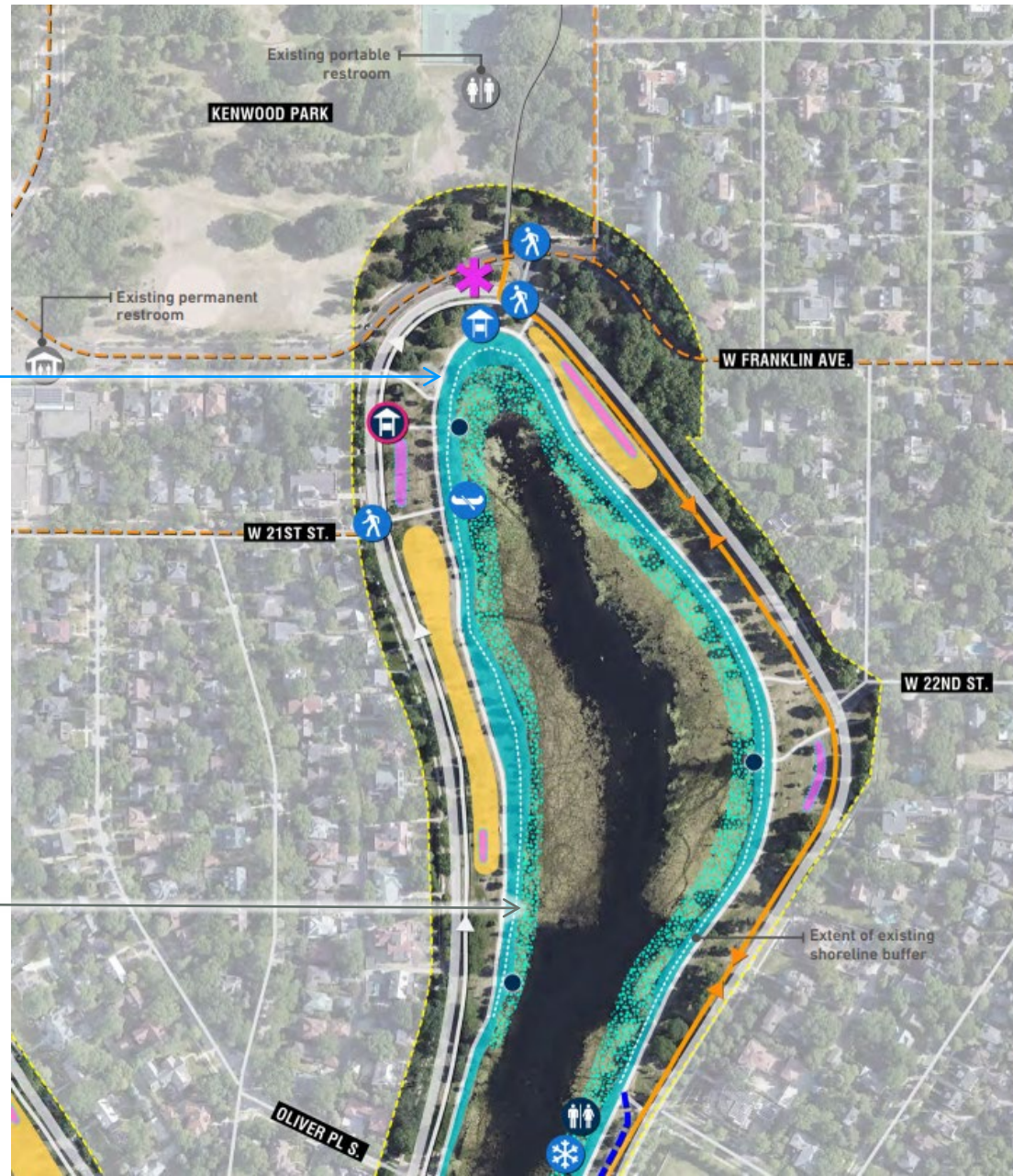
### Improved Shoreline Buffer

Enhanced vegetative strip of varying character along the shoreland edge. This practice can stabilize shorelines, minimize the impact of heavy rain events and act as a filter, capturing sediment and pollutants.



### Expanded Littoral Edge

An improved vegetative edge beginning from the ordinary high water mark and extending into permanently submerged shoreline. This feature reduces impacts of rain events, protects the shoreline and filters pollutants from stormwater runoff.



### LEGEND

- Enhanced Welcome Entry Point
- Existing Water Access: Stone Steps
- Existing Temporary Portable Restroom
- Existing Kiosk to Relocate
- Proposed Kiosk (relocated)
- Proposed Upgraded Temporary Warming House
- Proposed Formalized Water Access
- Proposed Intersection Improvements
- Existing Ice Skating Rink Location
- Existing Parkway
- Existing One-Way Bike Trail
- Existing Pedestrian Trail
- Planned Bikeway (City)
- Proposed Pedestrian Trail Realignment
- Proposed Two-Way Bike Trail
- Proposed Paved Pedestrian Trail
- Proposed Tree Trench Adjacent to Parkway
- Proposed Underground Pkwy Stormwater Treatment
- Proposed Prairie/Pollinator Planting
- Proposed Improved Shoreline Buffer
- Proposed Littoral Edge Expansion
- Proposed Rain Garden

## Maintain and stabilize shoreline with native vegetation in all areas except for formal access points and identified viewsheds

- Establish a naturalized lake buffer in all areas where water and land access is not needed. (above shoreline)
- Naturalize the littoral edge with emergent vegetation in all areas where lake access is not needed (below shore)
- Reduce sedimentation into the lake through adjacent erosion and runoff by ensuring park soils and slopes remain vegetated
- Formalize the location of water access points and ensure they are clearly identified



# STABILIZE SHORELINE: FORMALIZED LAKE ACCESS

Formalizing the location of water access points reduces sedimentation into the lake through adjacent erosion and runoff by ensuring park soils and slopes remain vegetated

## LEGEND

- Existing Erosion Caused by Informal Water Access: Remove and Restore
- Existing Water Access: Stone Steps
- Existing Boat Launch
- Existing Beach Water Access
- Existing Dock/Boat Launch
- Proposed Dock
- Proposed Formalized Water Access



## Maximize and restore habitat (terrestrial and aquatic) to improve health of the lake and have spaces for wildlife

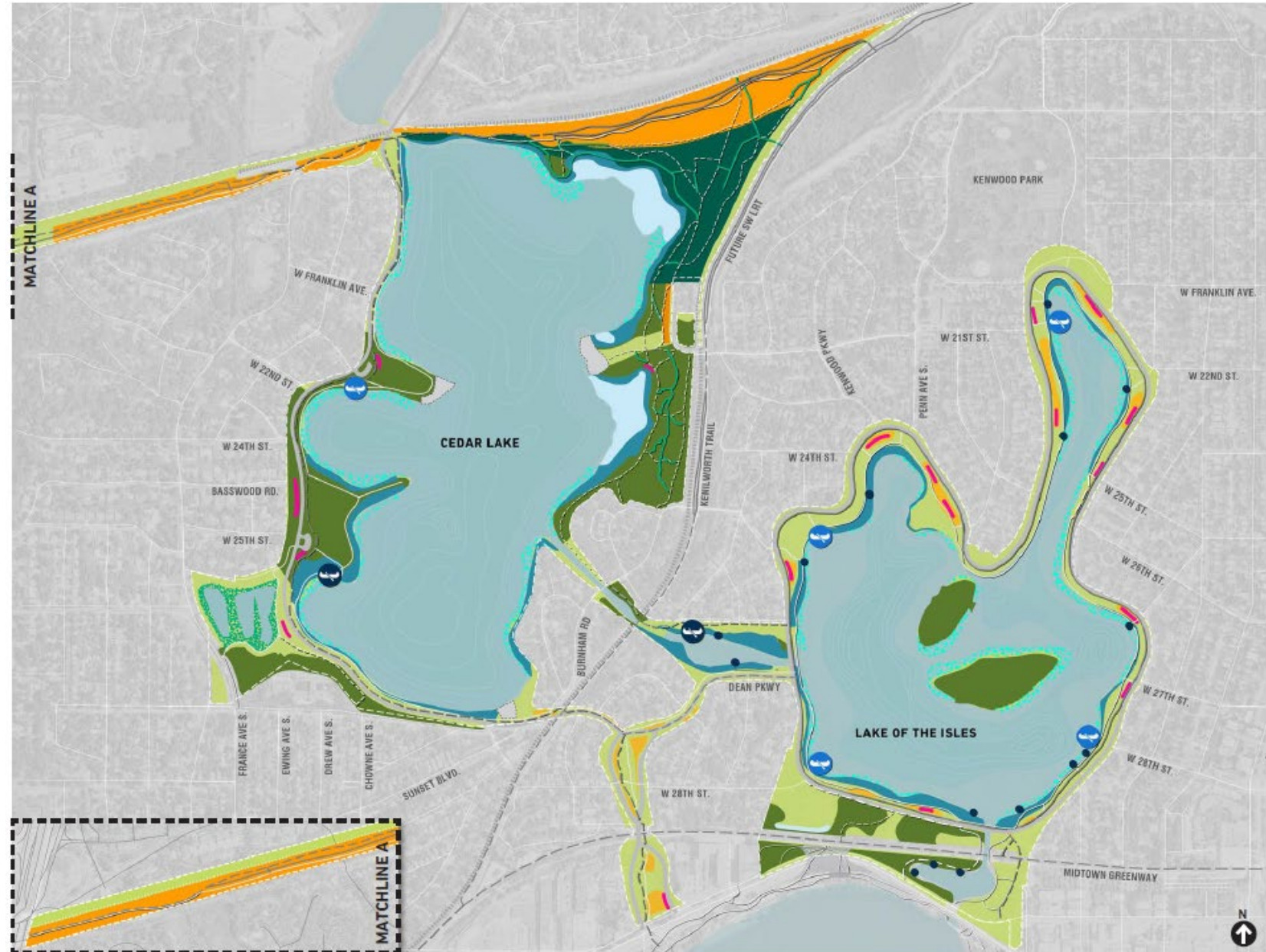
- Restore and improve natural areas that have no interaction with park visitors (ie islands at LOI) to higher ecological quality
- Restore and improve natural areas that interact with park visitors (ie NE forest at Cedar Lake) to higher functioning plant communities



# MAXIMIZE AND RESTORE HABITAT: NATURAL AREAS

## LEGEND

- Existing Water Access: Stone Steps
- Existing Boat Launch
- Existing Constructed Wetland
- Existing Land Cover, No Change
- Existing Sand Beach
- Proposed Formalized Water Access
- Proposed Enhanced Prairie
- Proposed Prairie/Pollinator Planting
- Proposed Oak Savanna Restoration
- Proposed Mesic Oak Forest Restoration
- Proposed Improved Shoreline Buffer
- Proposed Littoral Edge Expansion
- Proposed Marsh Restoration
- Proposed Rain Garden
- Existing Soft Surface Trails to Restore to Woodland



# NATURAL RESOURCE RESTORATION



Enhanced Prairie



Formalized Water Access



Improved Shoreline Buffer



Improved Shoreline Buffer



Littoral Edge Expansion



Marsh Restoration



Mesic Oak Forest Restoration



Oak Savanna Restoration



Prairie Planting



Pollinator Planting



Prairie Planting



Rain Garden

# ZONE 1: NORTH WEST CEDAR LAKE

## ZONE 1: NORTH WEST CEDAR

## PREFERRED PARK CONCEPT



### LEGEND

- Existing Canoe Rack
- Existing Portable Restroom
- Existing Dock
- Existing Picnic Area
- Proposed Intersection Improvements
- Proposed Formalized Water Access
- Proposed Viewing Spot
- Proposed Two-Way Bikeway
- Existing Expanded Two-Way Bike Trail
- Proposed Narrowed Parkway
- Existing Two-Way Bike Trail
- Proposed Paved Pedestrian Trail
- Existing Sand Beach
- Proposed Mesic Oak Forest Restoration
- Proposed Enhanced Prairie
- Proposed Improved Shoreline Buffer
- Proposed Expanded Littoral Edge
- Enhanced Welcome Entry Point
- Rain Garden
- Proposed Underground Pkwy Stormwater Treatment

### SECTION B: EXISTING



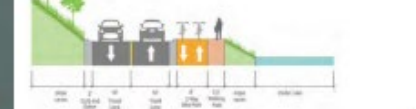
### SECTION B: PROPOSED



### SECTION C: EXISTING



### SECTION C: PROPOSED



# ZONE 2: NORTH EAST CEDAR LAKE

## ZONE 2: NORTHEAST CEDAR LAKE

## PREFERRED PARK CONCEPT



### LEGEND

- Enhanced Welcome Entry Point
- Existing Community Feature
- Existing Water Access: Stone Steps
- Existing Picnic Area (O indicates ADA)
- Existing Temporary Portable Restroom
- Existing Canoe Rack to Relocate
- Proposed Canoe Rack Relocation
- Proposed Cottonwood Protection Area
- Proposed Formalized Event Area
- Proposed Formalized Concert Area
- Proposed Programming Storage
- Existing Two-Way Bike Trail
- Existing One-Way Bike Trail
- Proposed Soft Surface Formalization of Existing Pedestrian Trail
- Existing Soft Surface Trails to Restore to Woodland
- Planned Bikeway (City)
- Proposed Enhanced Prairie
- Proposed Mesic Oak Forest Restoration
- Proposed Oak Savanna Restoration
- Proposed Improved Shoreline Buffer
- Proposed Littoral Edge Expansion
- Proposed Marsh Restoration
- Existing Sand Beach
- Existing Outfall Identified for Stormwater Treatment
- Proposed Rain Garden
- Proposed Land Acquisition



Formalized Soft Surface Trails    Improved Shoreline Buffer    Littoral Edge Expansion



Mesic Oak Restoration    Prairie Enhancement    Oak Savanna Restoration



Enhanced Welcome Entry Point    Enhanced Welcome Entry Point



# ZONE 3: KENILWORTH CHANNEL & LAKE OF THE ISLES

## ZONE 3: KENILWORTH CHANNEL AND SE LAKE OF THE ISLES PREFERRED PARK CONCEPT



### LEGEND

- |  |  |
|--|--|
| ● Existing Water Access: Stone Steps       | — Proposed Paved Pedestrian Trail                      |
| ⊕ Existing Dock                            | --- Proposed Pedestrian Trail to be Removed            |
| ⊕ Existing Canoe Rack                      | ● Proposed Prairie/Pollinator Planting                 |
| ⊕ Existing Kiosk                           | ● Proposed Mesic Oak Forest Restoration                |
| ⊕ Existing Temporary Portable Restroom     | ● Proposed Improved Shoreline Buffer                   |
| ⊕ Existing Dog Park                        | ● Proposed Littoral Edge Expansion                     |
| ⊕ Proposed Picnic Area                     | ● Proposed Marsh Restoration                           |
| ⊕ Proposed Formalized Water Access         | ● Proposed Rain Garden                                 |
| ⊕ Proposed Temporary Portable Restroom     | ● Proposed Tree Trench Adjacent to Parkway             |
| ⊕ Proposed Intersection Improvements       | Proposed Underground Pkwy Stormwater Treatment         |
| → Existing One-Way Bike Trail              | ⊕ Enhanced Welcome Entry Point                         |
| ← Existing Pedestrian Trail                | ● Existing Outfall Identified for Stormwater Treatment |
| ← Existing Two-Way Bike Trail              | ● Proposed Land Acquisition                            |
| ↔ Proposed Two-Way Bike Trail              |  |
| --- Proposed Soft Surface Pedestrian Trail |  |



# ZONE 4: NORTH LAKE OF THE ISLES

## ZONE 4: NORTH LAKE OF THE ISLES

## PREFERRED PARK CONCEPT



- LEGEND**
- Enhanced Welcome Entry Point
  - Existing Water Access: Stone Steps
  - Existing Temporary Portable Restroom
  - Existing Kiosk to Relocate
  - Proposed Kiosk (relocated)
  - Proposed Upgraded Temporary Warming House
  - Proposed Formalized Water Access
  - Proposed Intersection Improvements
  - Existing Parkway
  - Existing One-Way Bike Trail
  - Existing Pedestrian Trail
  - Planned Bikeway (City)
  - Proposed Pedestrian Trail Realignment
  - Proposed Two-Way Bike Trail
  - Proposed Paved Pedestrian Trail
  - Proposed Tree Trench Adjacent to Parkway
  - Proposed Underground Pkwy Stormwater Treatment
  - Proposed Prairie/Pollinator Planting
  - Proposed Improved Shoreline Buffer
  - Proposed Littoral Edge Expansion
  - Proposed Rain Garden

