



**AQUATIC ECOSYSTEM RESTORATION
WOLF LAKE
HAMMOND, INDIANA**



Overview

- ❖ Authority and Purpose
- ❖ Historical and Existing Conditions
- ❖ Project Objectives
- ❖ Plan Formulation and Evaluation
- ❖ Selected Restoration Plan
- ❖ Potential Public Concerns
- ❖ Next Steps

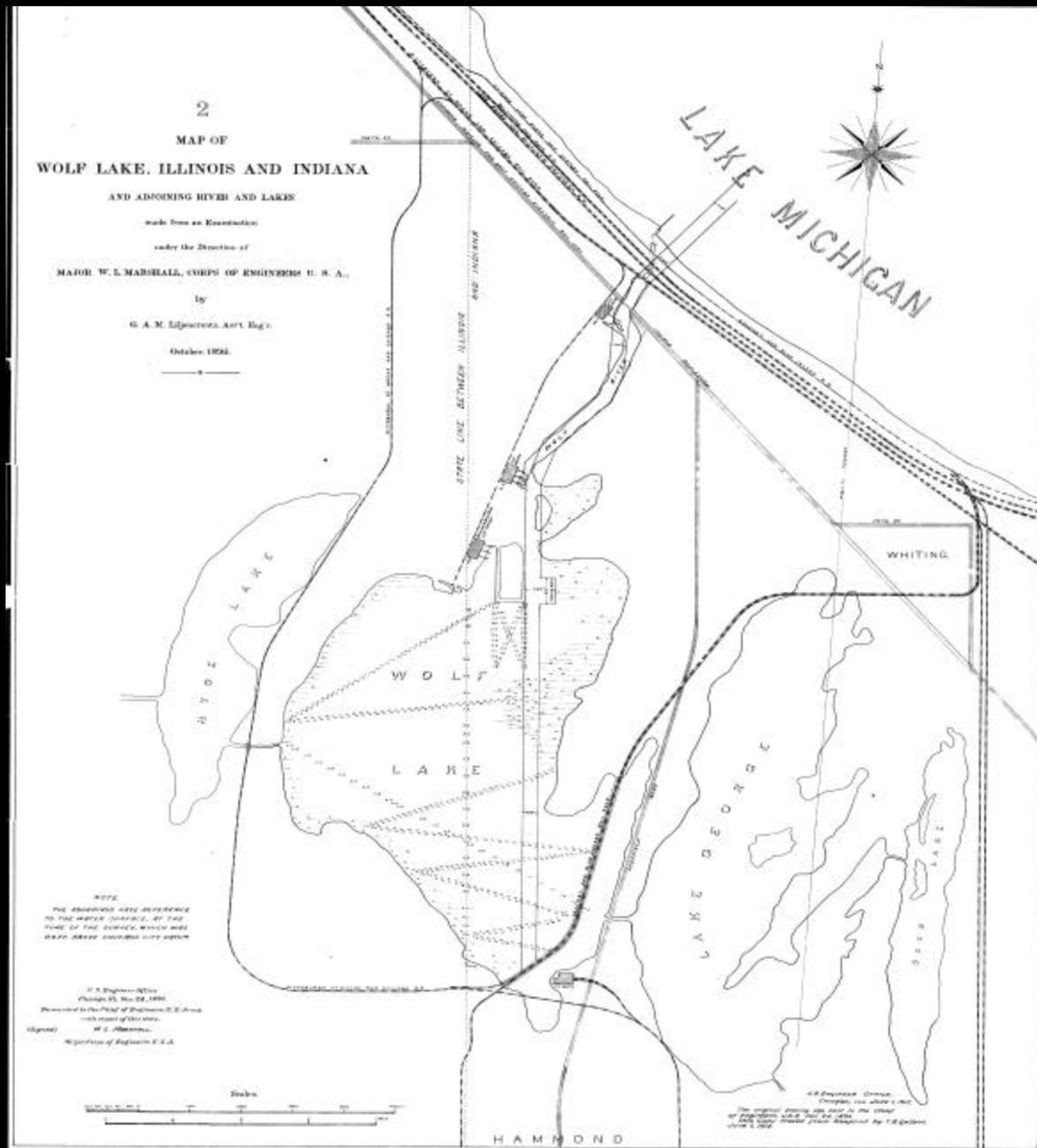
Authority and Purpose

- ❖ Section 206, Water Resource Development Act of 1996
- ❖ Evaluate alternatives and recommend a course of action for ecologically restoring an aquatic ecosystem
- ❖ Project must
 - Improve the quality of the environment in the public interest
 - Be cost-effective
- ❖ Nonfederal sponsor: City of Hammond

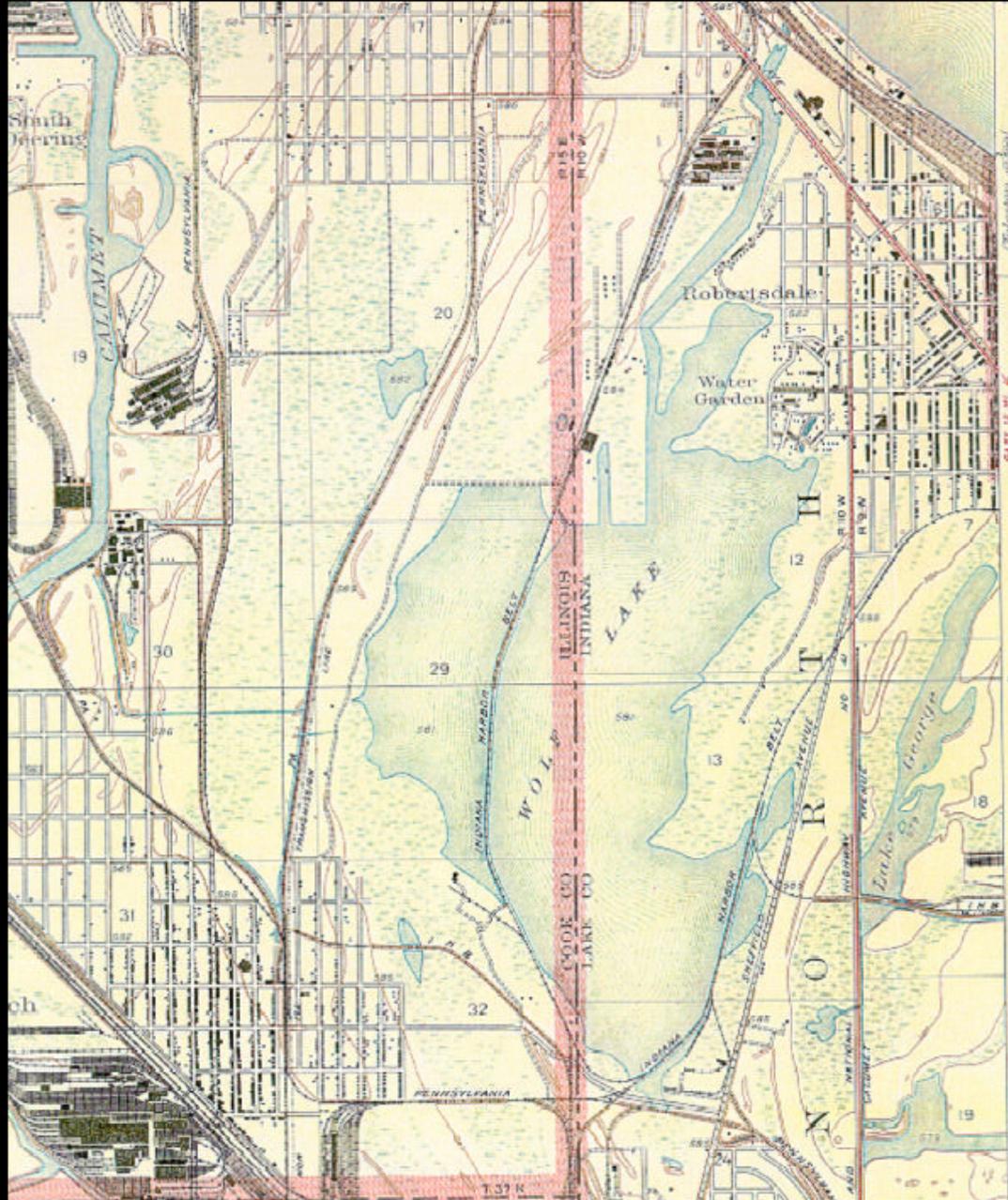
Historical Conditions

- ❖ Shallow (less than 4 feet deep) lake and wetland complex
- ❖ Directly connected to Lake Michigan and Lake George
- ❖ No dikes separating Wolf Lake into pools
- ❖ Sediment composed of beach and lake-related deposits

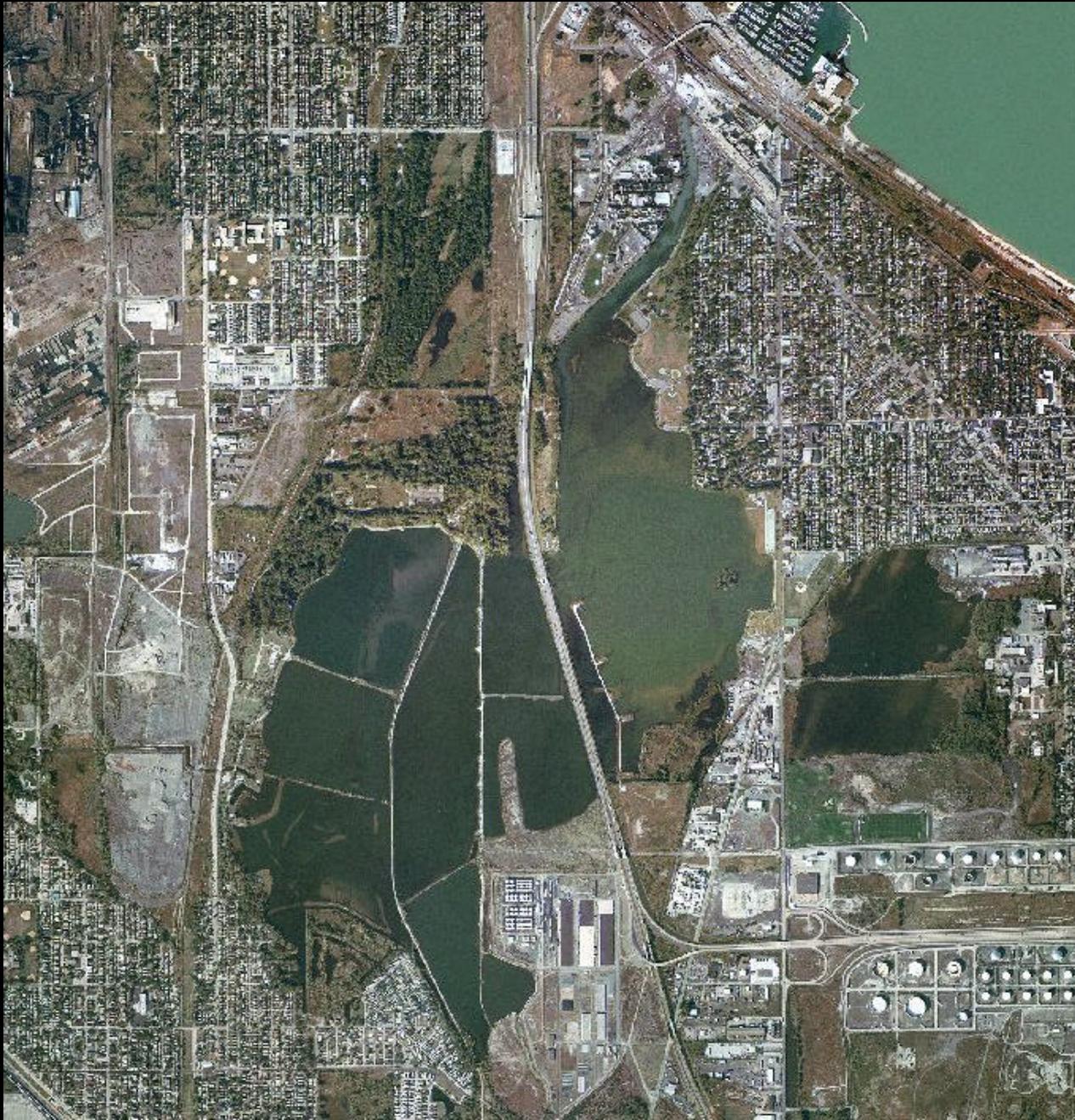
Historical Conditions (1896)



Historical Conditions (1926)



Existing Conditions



Existing Conditions

- ❖ Dikes and causeways separate the lake into pools and cause varying water levels
- ❖ Shoreline erosion occurs due to wave action
- ❖ Previously deposited slag is exposed along the shoreline
- ❖ Water quality is relatively good but is impacted by runoff and discharges
- ❖ Poor sediment quality in certain areas (especially Wolf Lake Channel)
- ❖ Remnants of wetlands remain
- ❖ Some native species are present, but exotic/invasive species are generally dominant

















Expected Conditions Without Restoration

- ❖ Water level fluctuations will continue as channels between pools become increasingly blocked
- ❖ Shoreline erosion will continue, leading to increased siltation and more exposed slag
- ❖ Water and sediment quality will degrade
- ❖ Wetlands will continue to decrease in size
- ❖ Exotic/invasive species will continue to displace native species
- ❖ Aquatic wildlife communities will become less diverse

Project Objectives

U.S. Army Corps of Engineers – Chicago District Objectives

- ❖ Restore wetlands
- ❖ Improve water quality
- ❖ Control exotic species
- ❖ Improve fish and plant habitats
- ❖ Increase biodiversity

Local Objectives

- ❖ Restore wetlands historically present in the north area of Pool 8 near Forsythe Park or in the area south of Scout Island
- ❖ Improve the hydrology of the lake and the channels connecting various pools
- ❖ Improve fish habitat and lake ecology through selected deepening of pools and wetland restoration

Other Considerations

- ❖ Coordinated with Wolf Lake Task Force representatives
- ❖ Participated in the Wolf Lake Recreation Area Development Study
- ❖ Considered the Wolf Lake Vision and Calumet Ecological Management Strategy (EMS)

Plan Formulation and Evaluation

Opportunities

- ❖ Restore and create aquatic habitats, wetlands, and islands
- ❖ Remove dikes to improve hydrology
- ❖ Deepen pools for habitat diversity
- ❖ Control aquatic and shoreline weeds
- ❖ Improve public access and recreation that will complement ecological restoration
- ❖ Implement best management practices for urban storm water management

Constraints and Issues

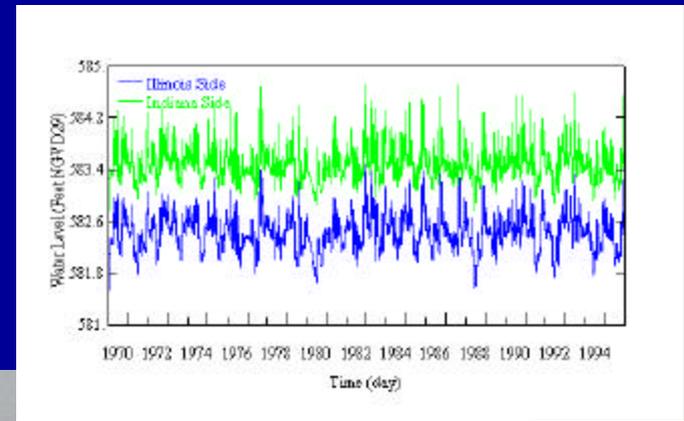
- ❖ Areas not included in project scope:
 - Illinois portion of Wolf Lake
 - Indiana Toll Road causeway
 - Ongoing wetland restoration project area
 - Youth camp area at north end of Pool 7
 - Bicycle path construction and bank stabilization project area

Constraints and Issues (Continued)

- ❖ Funding limit
- ❖ Habitat restoration for non-game species
- ❖ Maintaining fishing access in certain areas, particularly along Wolf Lake Channel

Supplemental Studies to Support Restoration Study

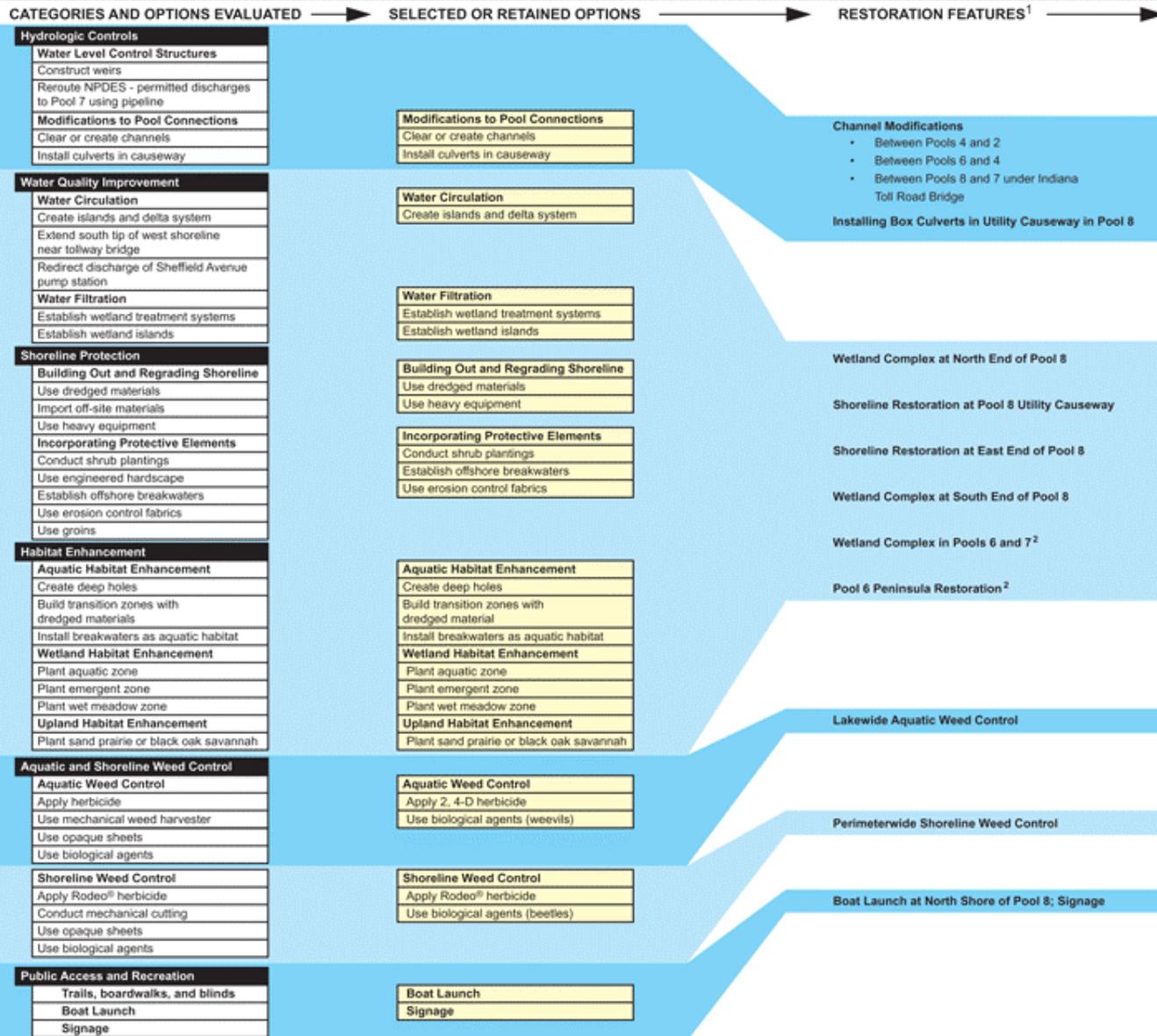
- ❖ Bathymetric survey
- ❖ Hydrologic and hydraulic analysis
- ❖ Hazardous, toxic, and radioactive waste investigation and sediment sampling
- ❖ Geotechnical investigation



Preliminary Restoration Alternatives and Options

- ❖ Hydrologic controls
- ❖ Water quality improvement
- ❖ Shoreline stabilization
- ❖ Habitat improvement
- ❖ Aquatic and shoreline weed control
- ❖ Public access and protective measures

Plan Formulation Process



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WOLF LAKE, INDIANA

FIGURE 3-1
SUMMARY OF PLAN
FORMULATION PROCESS

Notes:

¹ = Restoration features consist of combinations of selected or retained options.

² = Restoration feature also includes creation of channel.

Restoration Features

- ❖ **Channel modifications between**
 - Pools 4 and 2
 - Pools 6 and 4
 - Pools 8 and 7
- ❖ **Lakewide aquatic weed control**
- ❖ **Perimeter-wide shoreline weed control**
- ❖ **Boat launch and signage**
- ❖ **Installation of box culverts in utility causeway in Pool 8 (UCW Culverts)**
- ❖ **Wetland complexes**
 - North end of Pool 8 (WC – 8 – N)
 - South end of Pool 8 (WC – 8 – S)
 - Between Pools 6 and 7 (WC – 6/7)
- ❖ **Shoreline restoration**
 - Pool 8 utility causeway (SR – 8 – UCW)
 - East end of Pool 8 (SR – 8 – E)
- ❖ **Pool 6 peninsula restoration**

Restoration Plan Alternatives

Feature	Alternative									
	1	2	3	4	5	6	7	8	9	10
WC – 8 – N		X	X	X	X	X	X	X	X	X
WC – 6/7			X	X					X	X
Pool 6 Peninsula				X						X
WC – 8 – S					X	X	X	X	X	X
SR – 8 – E						X	X		X	X
SR – 8 – UCW							X	X	X	X
UCW Culverts					X	X	X	X	X	X

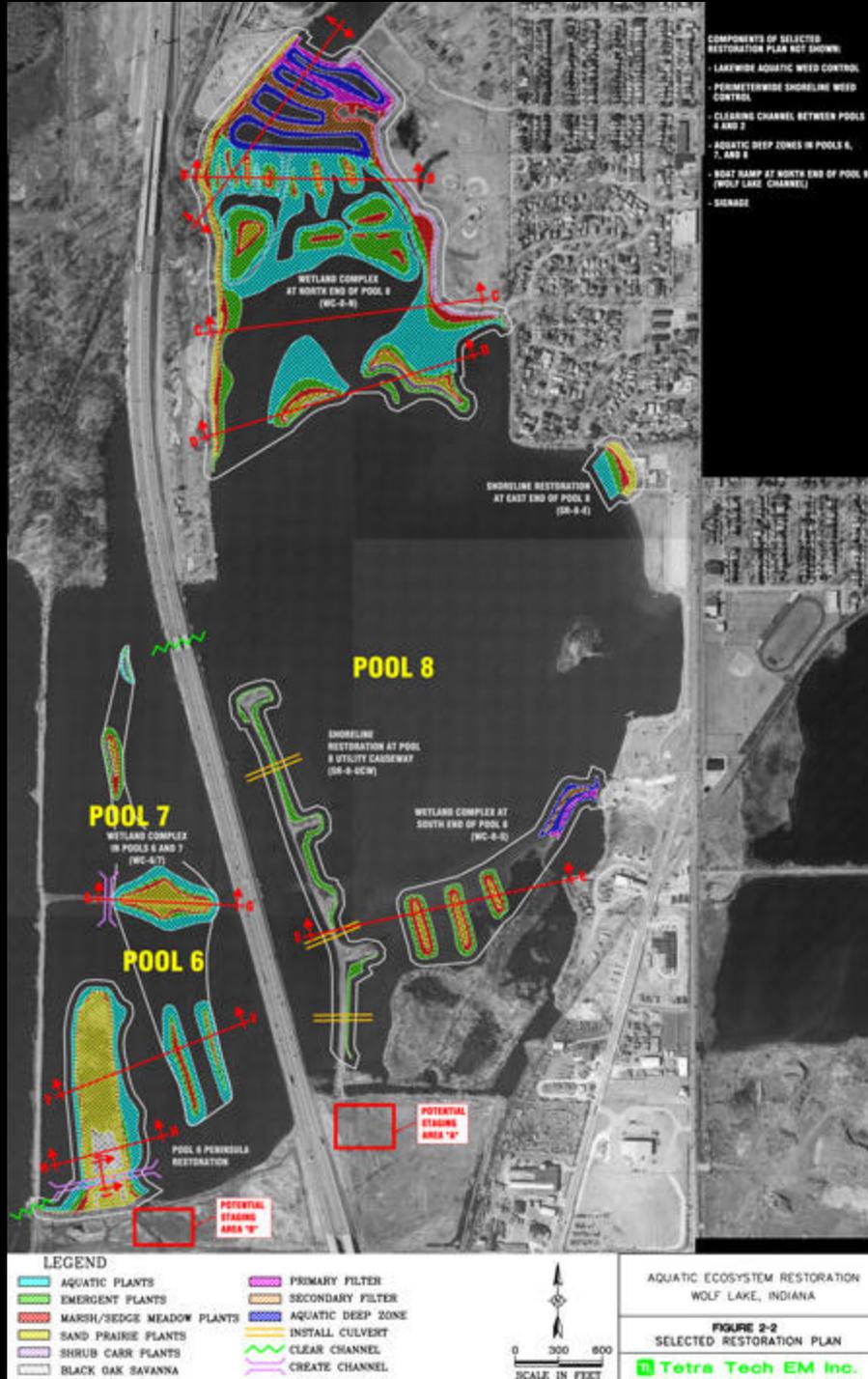
Evaluation of Restoration Plan Alternatives

- ❖ Implementation costs
- ❖ Real estate acquisition
- ❖ Estimated benefits based on environmental quality index that considers
 - Abiotic component
 - Biotic component
 - Ecological diversity component
- ❖ Incremental costs

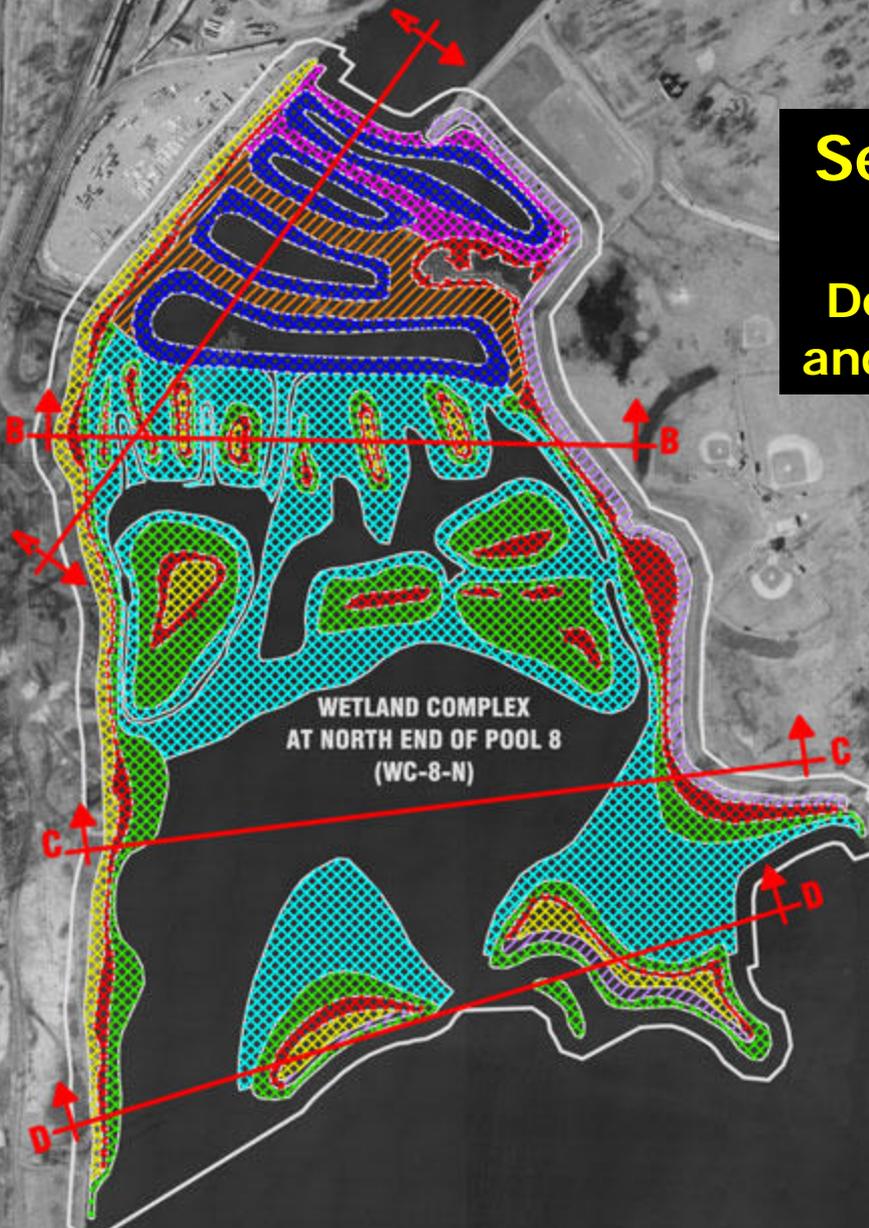
Selected Restoration Plan

Selected Restoration Plan - Alternative 10

- ❖ Improvement of existing and creation of new habitats, including
 - 37 acres of aquatic habitat
 - 20 acres of wetland
 - 9 acres of marsh/sedge meadow
 - 20 acres of sand prairie
 - 3 acres of shrub carr
 - 1 acre of black oak savannah
- ❖ Restoration of 14,550 linear feet of shoreline
- ❖ Creation of deep holes
- ❖ Creation of 2 acres of primary and 3 acres of secondary filtration wetland areas



**Selected Restoration Plan
- Alternative 10
Detail Showing Wetland Complex
and Shoreline Restoration at Pool 8**

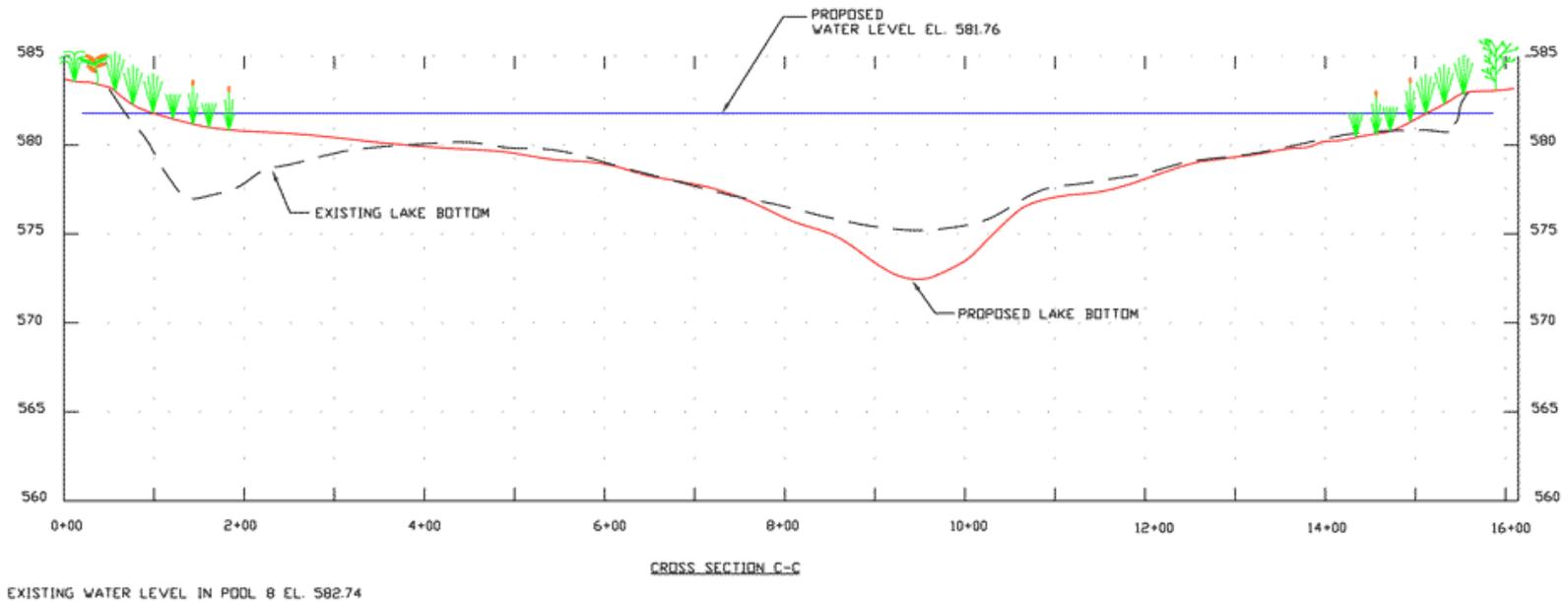


**WETLAND COMPLEX
AT NORTH END OF POOL 8
(WC-8-N)**

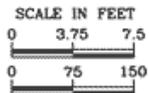
**SHORELINE RESTORATION
AT EAST END OF POOL 8
(SR-8-E)**



Typical Shoreline Profile



SCALE:
 VERTICAL - 1"=7.5'
 HORIZONTAL - 1"=150'



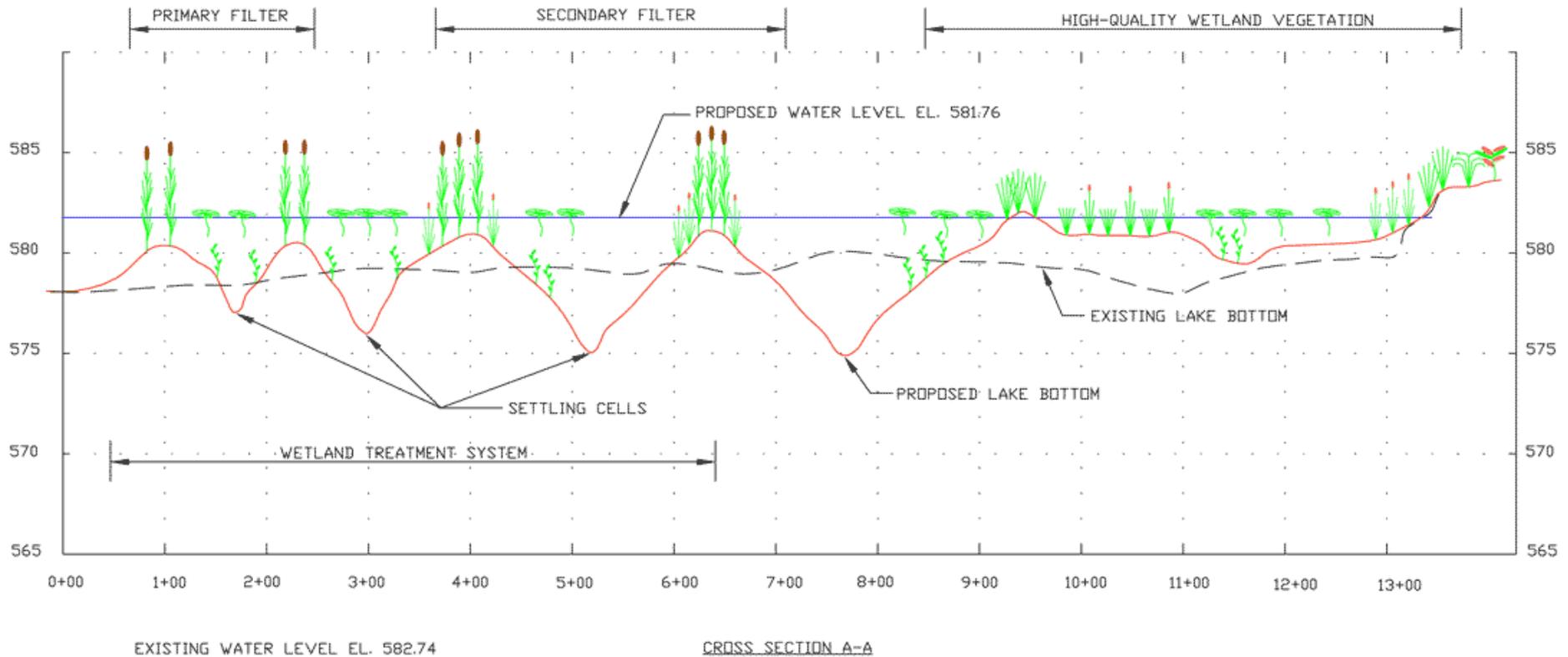
NOTE: ELEVATIONS ARE PRESENTED IN FEET ABOVE MSL.



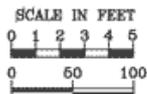
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FIGURE 3-6
 POOL 8 CROSS SECTION (C-C)
 SHORELINE RESTORATION

Typical Wetland Profile



SCALE:
 VERTICAL - 1"=5'-0"
 HORIZONTAL - 1"=100'-0"



NOTE: ELEVATIONS ARE PRESENTED IN FEET ABOVE MSL.

MARSH/SEDGE MEADOW

AQUATIC PLANTS

PRIMARY AND SECONDARY FILTERS (EMERGENT)

EMERGENTS

SAND PRAIRIE

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FIGURE 2-3
 POOL 8 NORTH CROSS SECTION (A-A)
 OF WETLAND TREATMENT AREA

Tetra Tech EM Inc.

Selected Restoration Plan - Alternative 10 Detail Showing Pools 6, 7, and 8

POOL 8

SHORELINE RESTORATION AT POOL 8 UTILITY CAUSEWAY (SR-8-UCW)

WETLAND COMPLEX AT SOUTH END OF POOL 8 (WC-8-S)

POOL 7

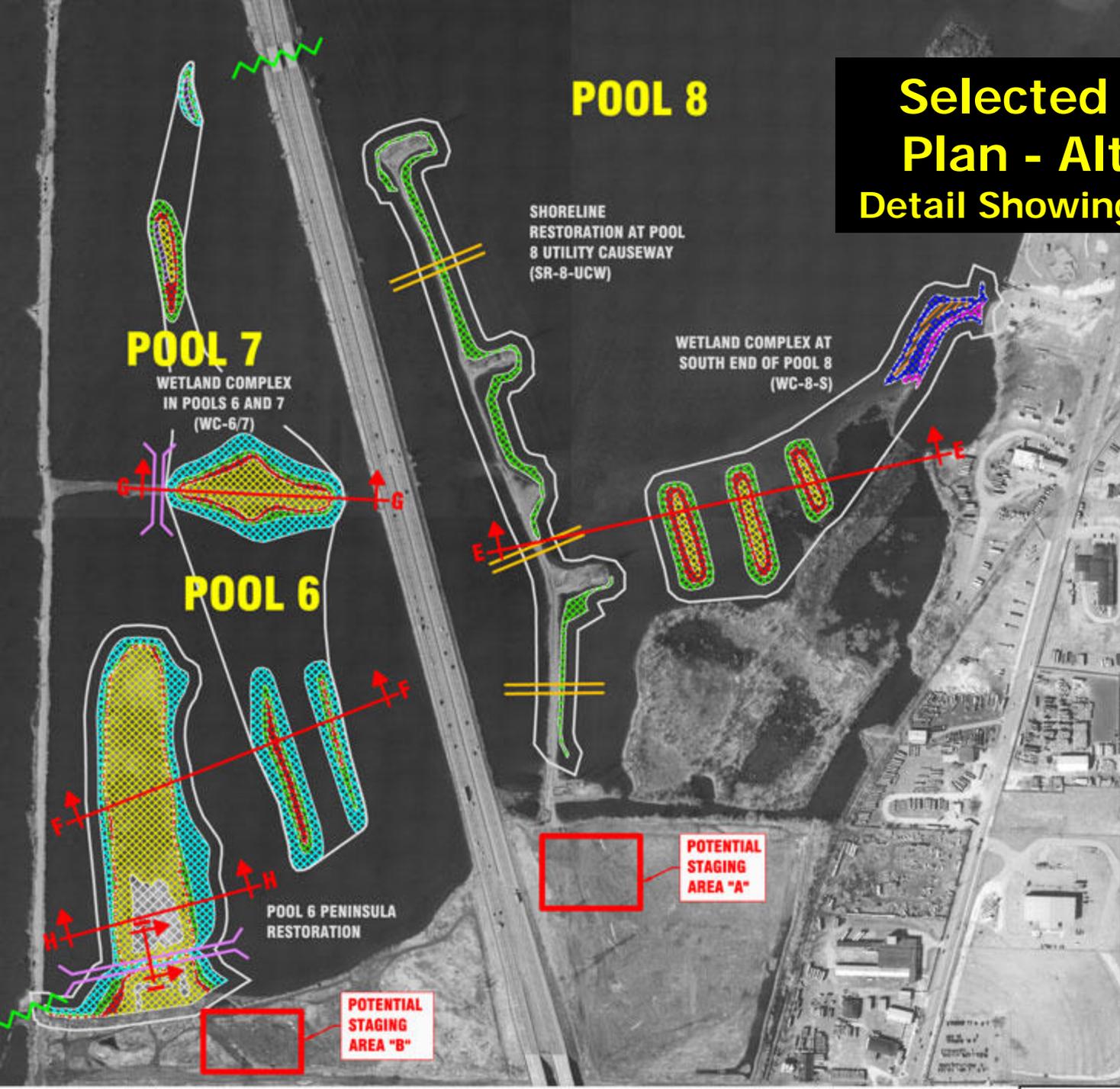
WETLAND COMPLEX IN POOLS 6 AND 7 (WC-6/7)

POOL 6

POOL 6 PENINSULA RESTORATION

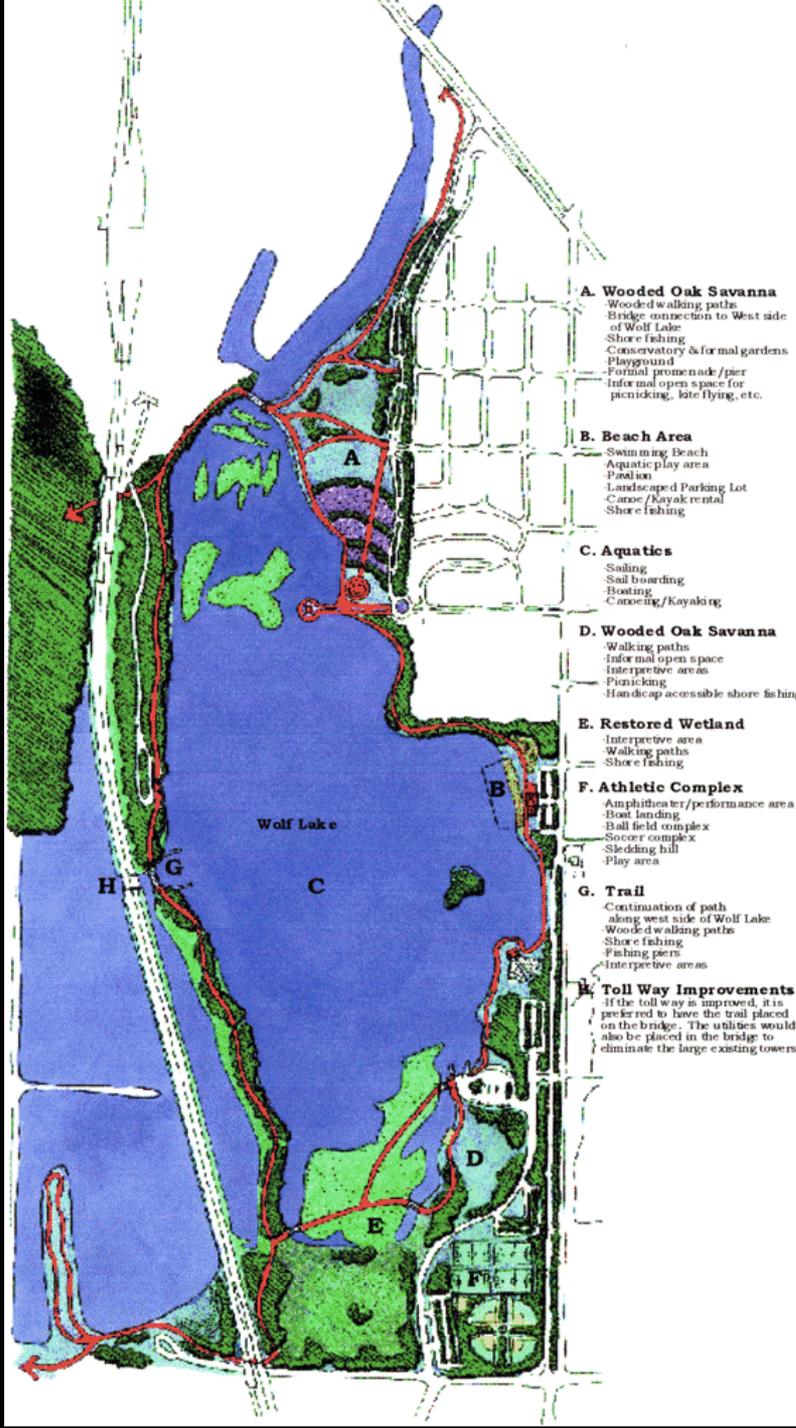
POTENTIAL STAGING AREA "A"

POTENTIAL STAGING AREA "B"



Benefits of the Selected Restoration Plan

- ❖ Provides the best value and greatest habitat diversity
 - Includes all the restoration features considered
 - Improves existing and creates new aquatic, wetland, and upland habitat features
- ❖ Meets all project objectives
- ❖ Has ecosystem benefits beyond the project area
- ❖ Contributes to the Wolf Lake Vision and Calumet EMS
- ❖ Complements findings of the Wolf Lake Recreation Area Development Study



Wolf Lake Recreation Area Development Study Selected Plan

Potential Public Concerns

- ❖ Will lowering the lake's water level limit boat access to portions of the lake or worsen the aquatic weed problem?
 - Some areas will be shallower, but others will be deeper
 - Long-term weed control methods will be implemented
 - Redistribution of sediment will create deep holes where weeds cannot grow, and the sandy bottom will favor native species

Potential Public Concerns (Continued)

- ❖ Will wetland and aquatic plantings restrict access to areas of the lake and reduce the area of open water?
 - Restrictions are temporary
 - Quality of remaining open water will be improved
 - Benefits include aesthetics, spawning habitat for fish, and feeding habitat for birds

Potential Public Concerns (Continued)

- ❖ Will wetland islands restrict boat travel between Pools 8 and 9?
 - Access will be temporarily restricted while vegetation is established
 - Improvements to boat launch in Wolf Lake Channel will allow access
 - Meandering channel through wetland will provide long-term access
 - Benefits of wetlands will include spawning habitat for fish, shelter and feeding habitat for birds, reduced wave action, and introduction of native species

Potential Public Concerns (Continued)

- ❖ Will shoreline fishing be restricted?
 - No restrictions along Wolf Lake Channel
 - The Wolf Lake Recreation Area Development Study includes designated areas for shore fishing, fishing piers, and a walking trail around the lake

Potential Public Concerns (Continued)

- ❖ Will dredging activities impact water quality and wildlife?
 - Dredging will occur in segregated work zones
 - Silt fences will be used
 - No significant impacts; long-term benefits

Potential Public Concerns (Continued)

- ❖ Will dredging, construction, and herbicide application restrict use of the lake?
 - Dredging and construction will occur in fall or winter in segregated work areas
 - Use of herbicides chosen will not result in swimming or boating restrictions

Next Steps

- ❖ Final plans and specifications
- ❖ Contracting
- ❖ Construction
- ❖ Operation, maintenance, and monitoring



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