BUILDING A WORLD OF DIFFERENCE

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SUSTAINABLE BENEFITS FOR THE CITY OF LOS ANGELES:
THE REHABILITATION OF ECHO PARK LAKE

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LA DPW ENGINEERING TRANSFORMING LOS ANGELES

EXCELLENCE IN ENVIRONMENTAL ENGINEERING & SCIENCE CONFERENCE
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BLACK & VEATCH
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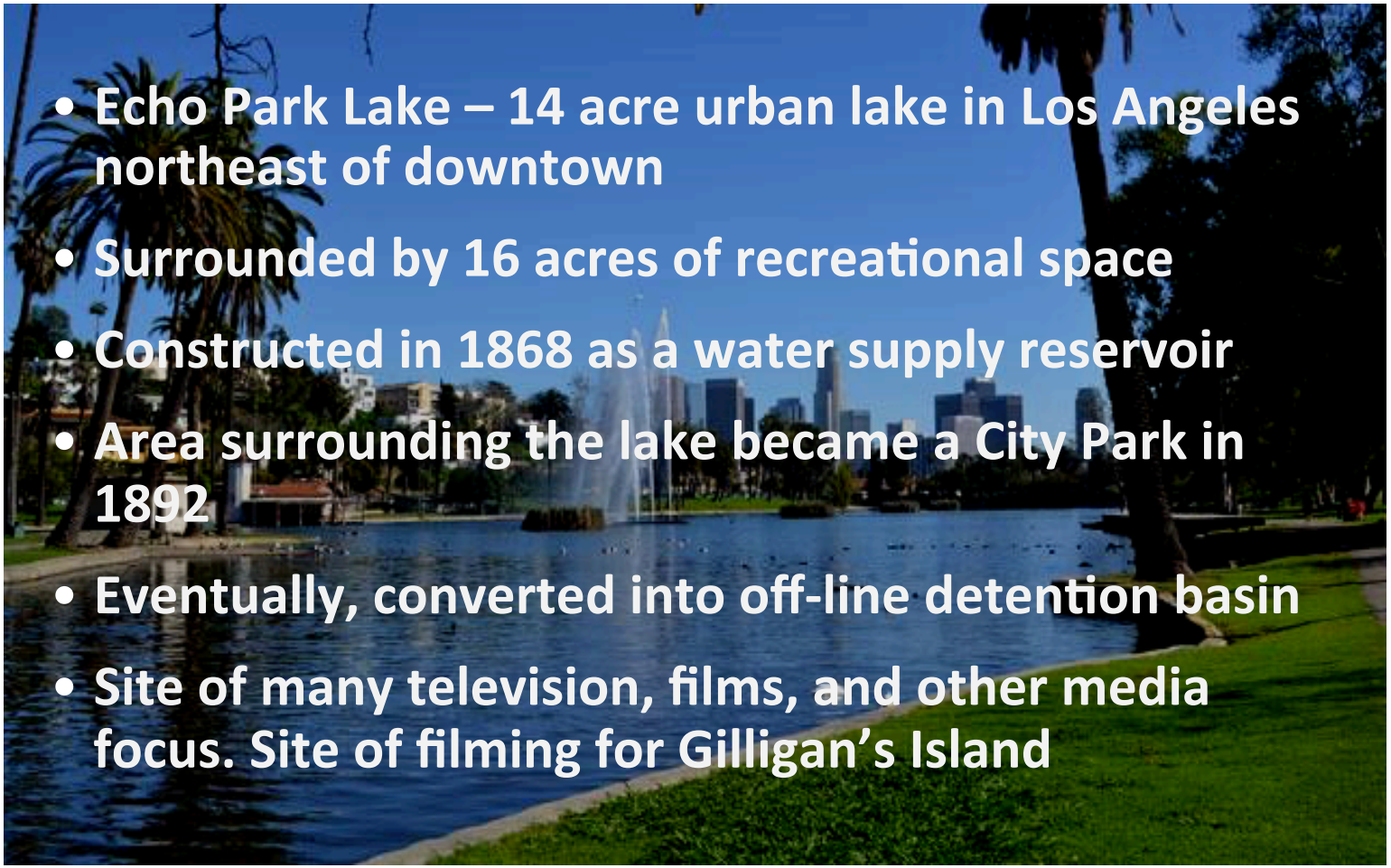
PRESENTATION OUTLINE

- **History and Background**
- **Key evaluation and design efforts**
- **Key sustainability features:**
  - balancing flood control needs with water quality
  - water harvesting
  - stakeholder input on the Project
  - liner system
  - submerged berm for dam safety compliance
  - provisions for drying, draining, and odor control
  - educational signage
- **Conclusions**
- **Questions**

ECHO PARK: A PART OF LOS ANGELES HISTORY

ECHO PARK LAKE - BACKGROUND

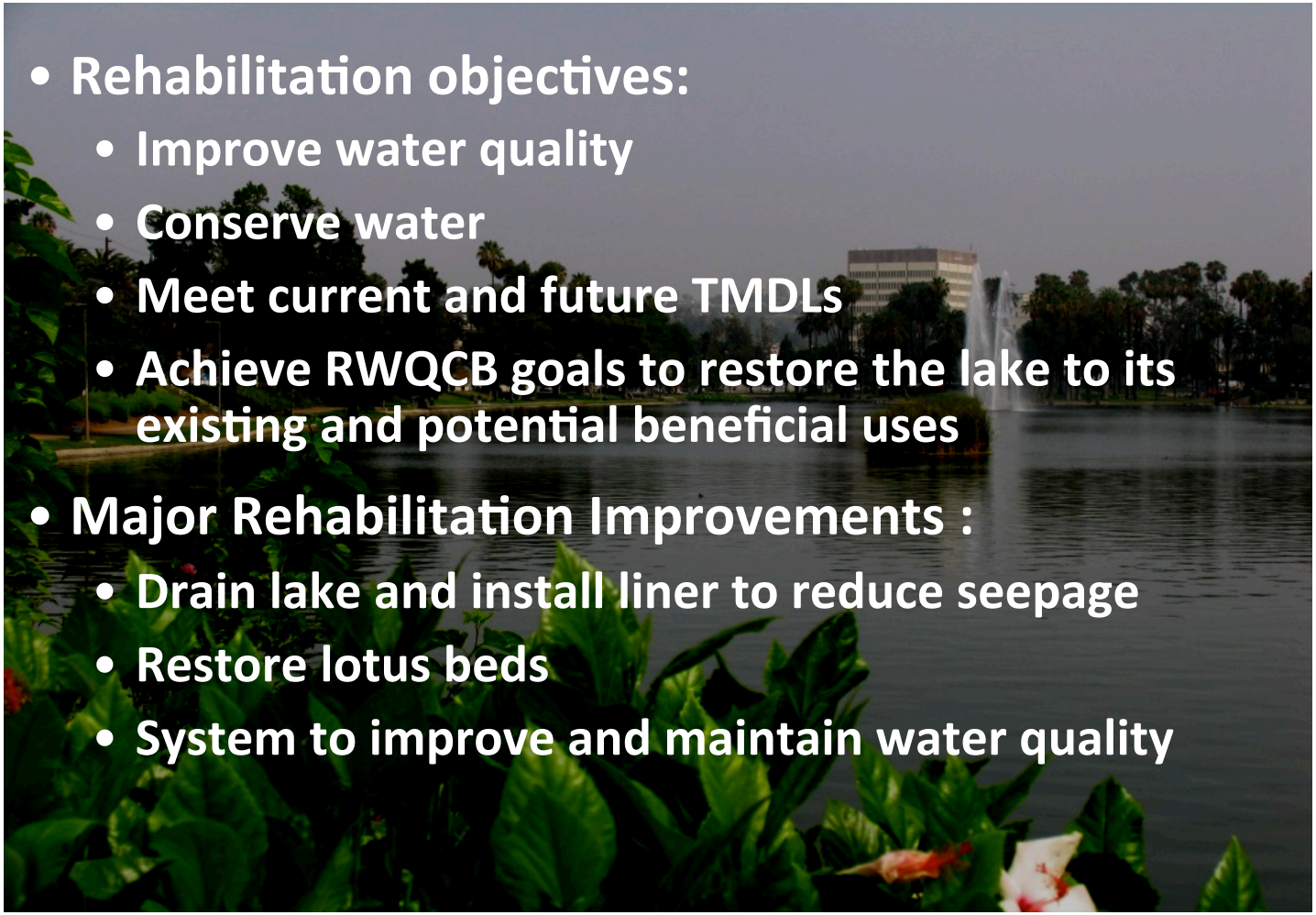


- Echo Park Lake – 14 acre urban lake in Los Angeles northeast of downtown
- Surrounded by 16 acres of recreational space
- Constructed in 1868 as a water supply reservoir
- Area surrounding the lake became a City Park in 1892
- Eventually, converted into off-line detention basin
- Site of many television, films, and other media focus. Site of filming for Gilligan's Island

ECHO PARK LAKE - BACKGROUND

- 2004 LA passed Proposition O
- 2007 $84M total budget approved for rehabilitation
- Prop O objectives:
  - Improve water quality
  - Reduce seepage
  - Protect and enhance public use
- 2006 lake put on 303(d) list for impaired water quality for algae, DO, ammonia, copper, trash

ECHO PARK LAKE - BACKGROUND



- Rehabilitation objectives:
  - Improve water quality
  - Conserve water
  - Meet current and future TMDLs
  - Achieve RWQCB goals to restore the lake to its existing and potential beneficial uses
- Major Rehabilitation Improvements :
  - Drain lake and install liner to reduce seepage
  - Restore lotus beds
  - System to improve and maintain water quality

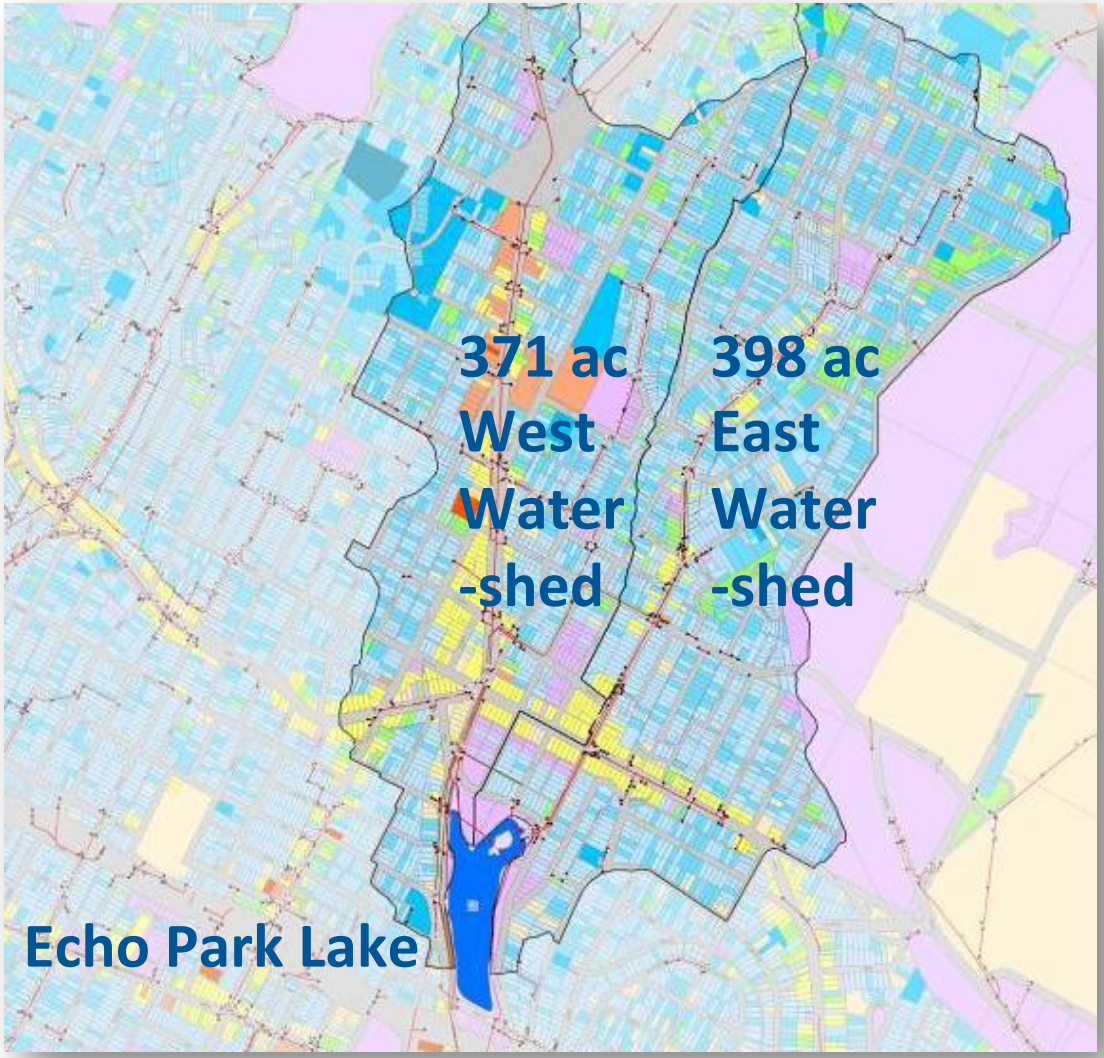
DEGRADATION OF ECHO PARK LAKE

Los Angeles Times

Where have Echo Park's lotuses gone?

LA Times Article, June 2008

ECHO PARK LAKE WATERSHED



ECHO PARK LAKE WATER QUALITY OBJECTIVES

- Total nitrogen = 1 mg/L
- Ammonia = 2.1 mg/L
- Total phosphorus = 0.1 mg/L
- Chlorophyll a = 20 ug/L
- Total copper = 22 ug/L
- Total lead = 11 ug/L
- Total Coliform = 1000 MPN/100mL (monthly geometric mean)
- Enterococci = 35 MPN/100 mL (monthly geometric mean)
- E.Coli = 126 MPN/100 mL (monthly geometric mean)

SUMMARY OF MONITORING RESULTS FROM DRY WEATHER FLOWS IN ECHO PARK LAKE WATERSHED (PRIOR TO REHABILITATION)

- TP = 0.9 mg/L
- TN = 9 mg/L
- Total Copper = 4 ug/L
- Total Lead = 4 ug/L
- Total Coliform = 1,500 MPN/100 mL

SUMMARY OF EXISTING DRY WEATHER WATER BUDGET FOR ECHO PARK LAKE WATERSHED (PRIOR TO REHABILITATION)

- Incoming dry weather flow - 110,000 gpd
- Loss to seepage (piping/exfiltration) - 30,000 gpd
- Loss due to evaporation - 60,000 gpd
- Decision to mine dry weather flows to make up for future evaporative losses

SUMMARY OF PUBLIC FEEDBACK THAT SHAPED WATER QUALITY FEATURES AT ECHO PARK LAKE

- Birds are embraced at the lake and the Park, so nutrient loadings will be accommodated
- Restoration of the Lotus Beds are is an important feature of the Project
- Constructed wetlands within the lake are desirable to achieve water quality goals
- MBR or High Rate Ballasted Flocculation considered as a small footprint/low-profile mechanical treatment option

ALTERNATIVES EVALUATION W/STAKEHOLDERS

Benefit/Impact	Weighting Factor	Option 1 – 14.4 Ac.	Option 2 – 2.7 Ac.	Option 3 – 4.4 Ac.	Option 4 – Mechanical System
Water Quality	**1**				
Water Quality Event		4	0	2	3
Dry Weather Flow		4	3	3	3
Cost	**0.5**				
Construction cost		2	3	3	0
Maintenance cost		1	3	2	0
Cultural value	**0.5**				
Visual quality / aesthetics		0	3	1	3
Historic compatibility		0	2	1	2
Recreational value	**0.4**				
Fishing		1	2	3	2
Boating		0	2	1	2
Walking / jogging		2	2	2	2
Open space		2	2	2	2
Educational value	**0.3**				
Signage opportunity		4	3	3	3
Visual access		4	3	4	1
Habitat value	**0.3**				
Terrestrial		2	2	2	2
Aquatic		1	3	3	3
Public safety	**0.2**				
Safety of park user		0	2	2	2
Other impacts	**0.2**				
Noise		2	2	2	2
Odor		2	2	2	2
Air quality		2	2	2	2
TOTAL		**7.3**	**7.5**	**7.7**	**7.2**

Key for Scoring (Benefits/Impacts)

4 Best/Significantly positive

3 Good/Moderately positive

2 Mid/Neutral

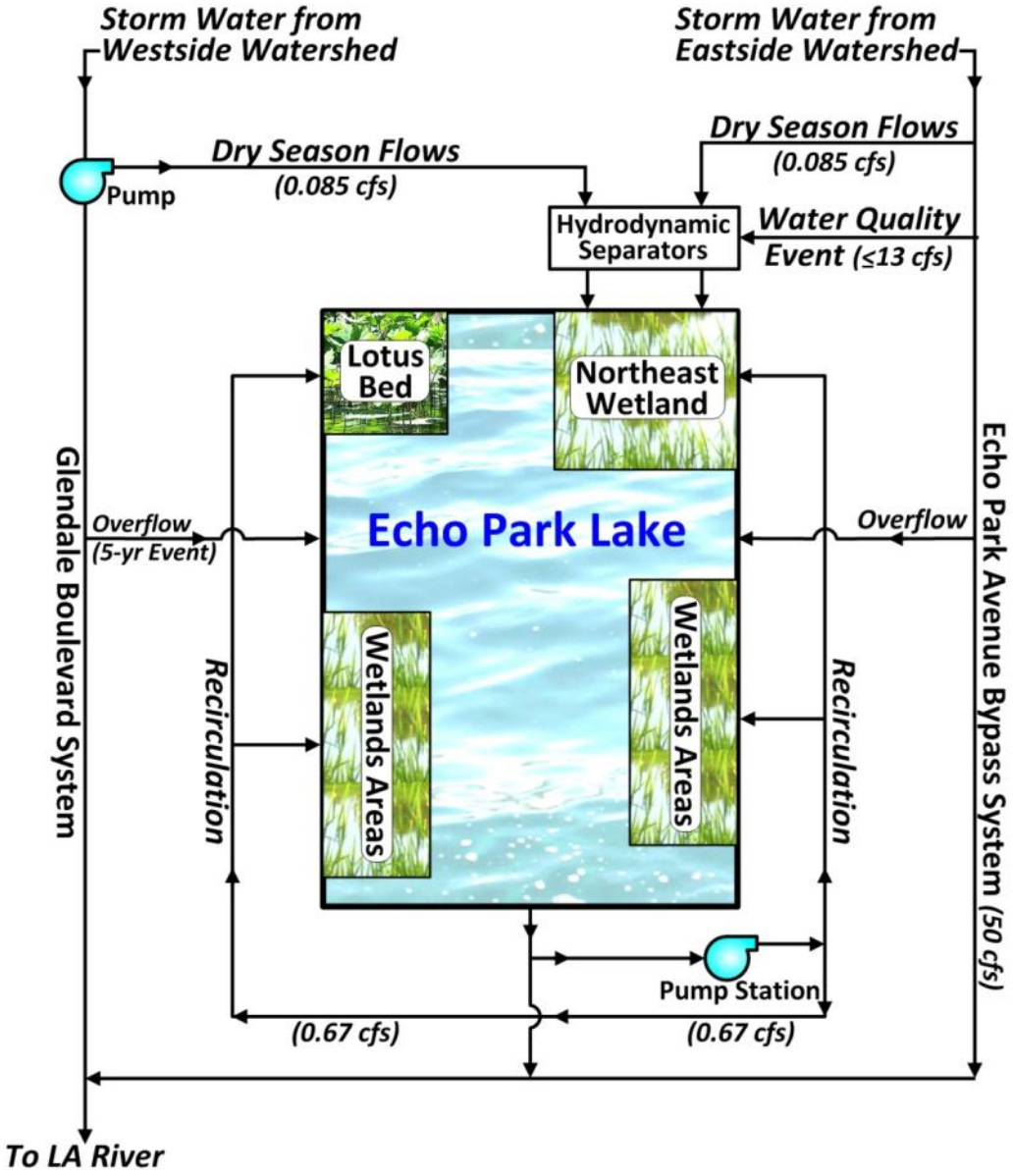
1 Low/Moderately negative

0 Poor/Significantly negative

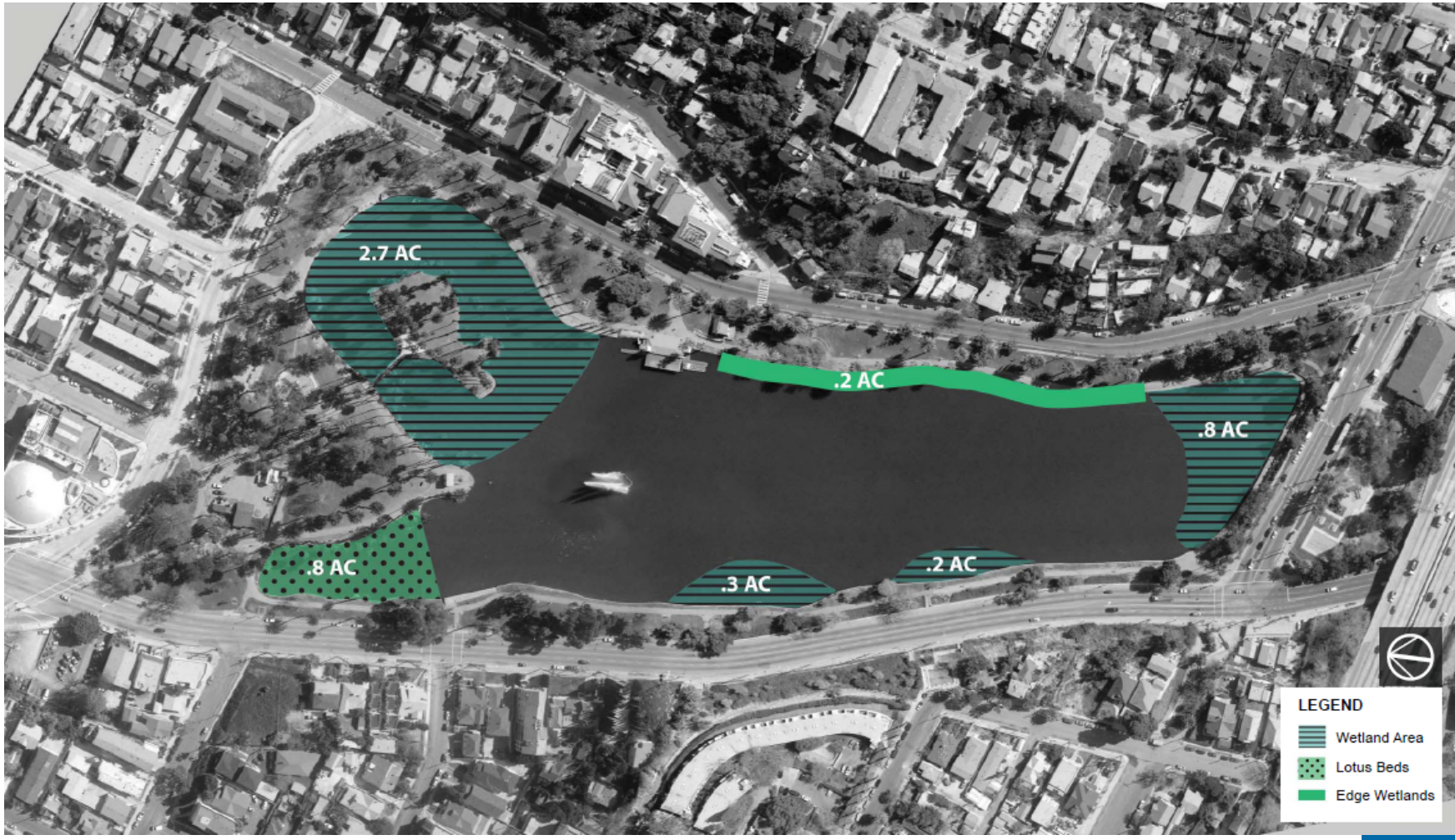
SUMMARY OF INCREMENTAL COSTS

	Option 1 – 14.4 Ac. Wetlands	Option 2 – 2.7 Ac. Wetlands	Option 3 – 4.4 Ac. Wetlands	Option 4 – Mechanical System
Capital Cost	$3,750,000	$2,490,000	$2,445,000	$8,010,000
Annual O&M Costs	$42,500	$13,500	$20,750	$400,000

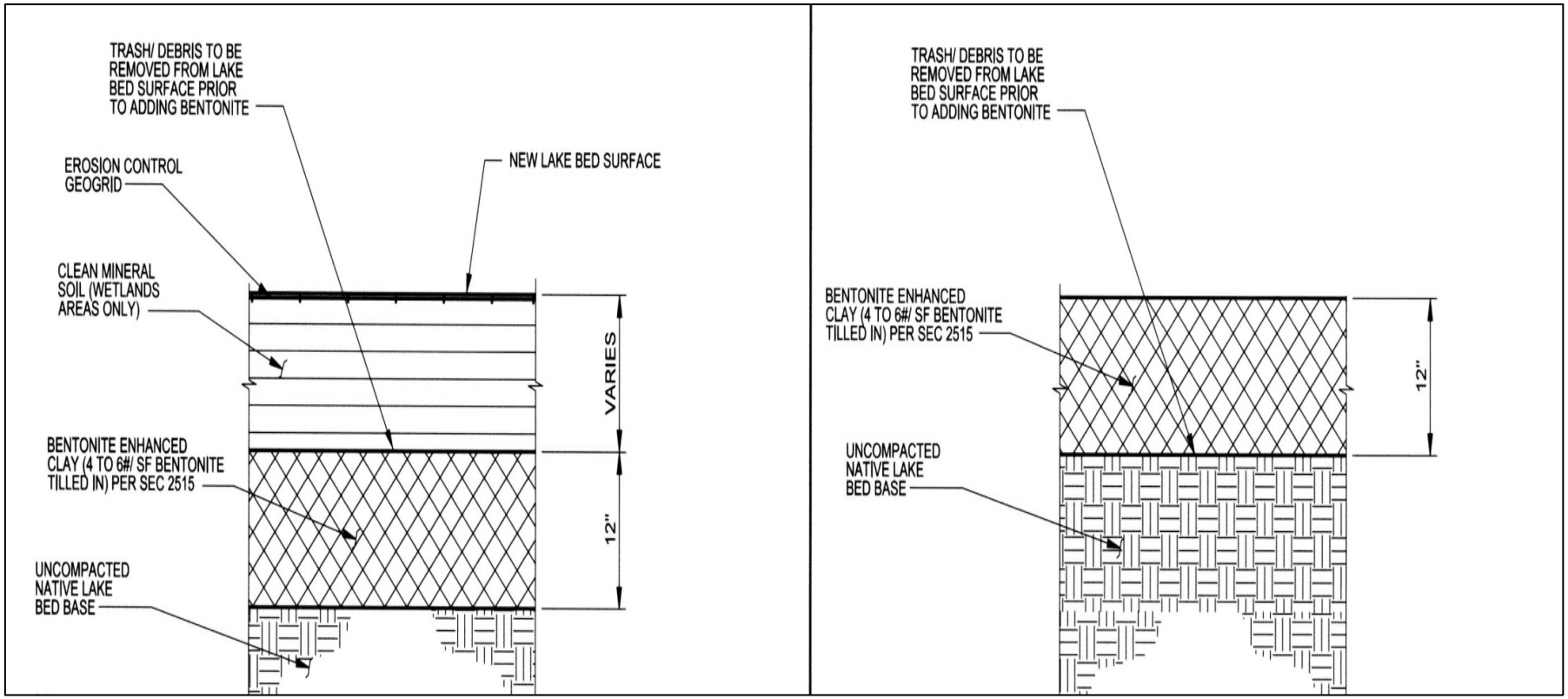
ECHO PARK LAKE FLOW SCHEMATIC



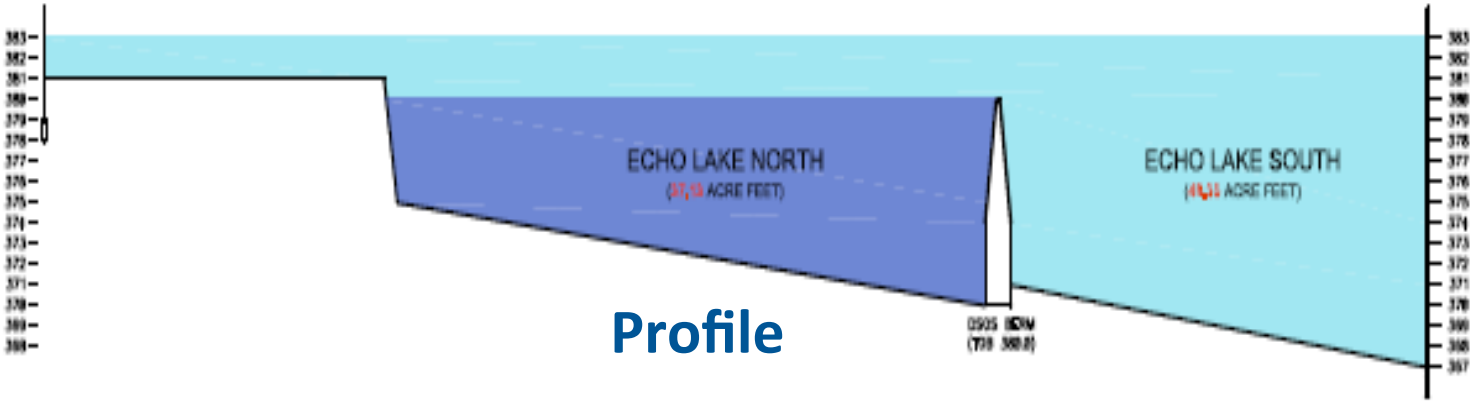
RECOMMENDED OPTION - 3 WITH 4.4 ACRES OF CONSTRUCTED WETLANDS



SUSTAINABLE LINER SYSTEM



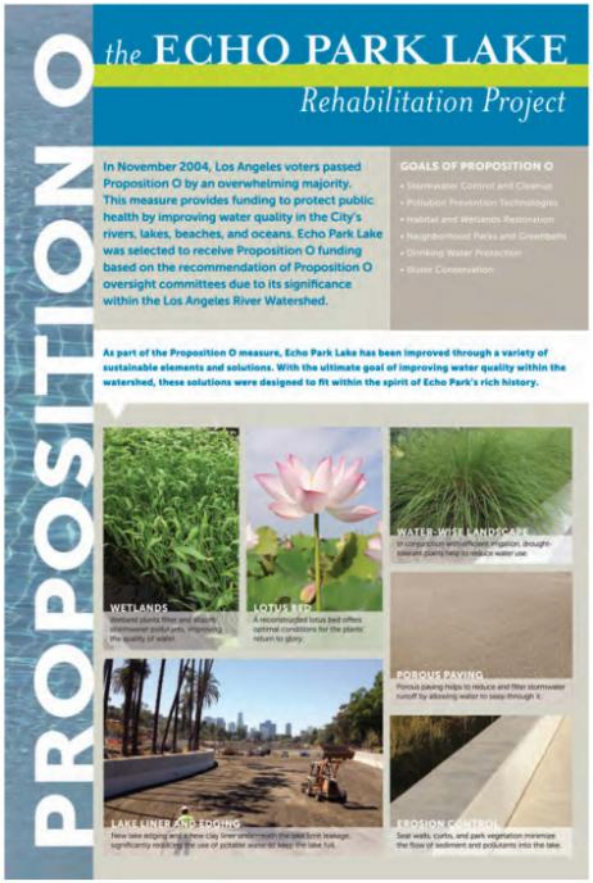
SUBMERGED BERM FOR DAM SAFETY COMPLIANCE

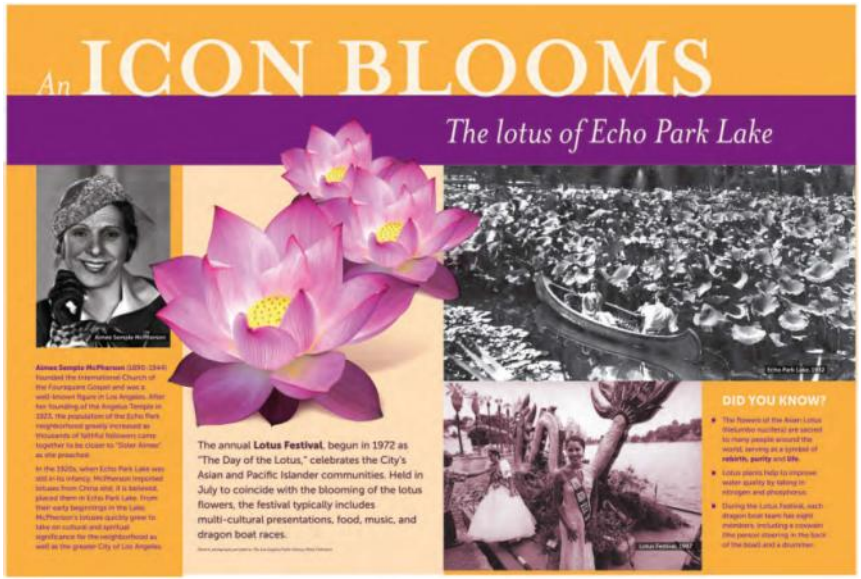


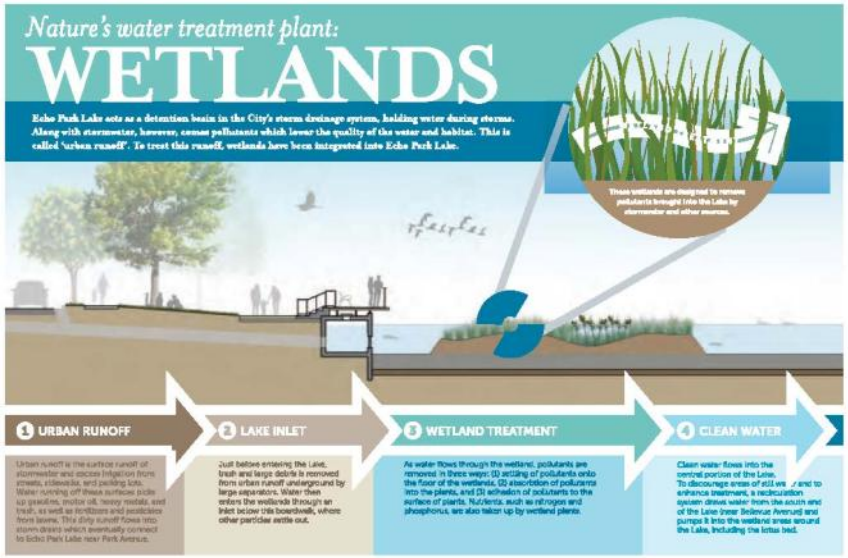
Profile

DRAINING, DRYING AND ODOR CONTROL

EDUCATIONAL SIGNAGE – LEVERAGES THE CITY'S INVESTMENT IN WATER QUALITY







Examples of Actual Educational Signage

MULTIPLE BENEFITS FOR THE COMMUNITY

MULTIPLE BENEFITS FOR THE COMMUNITY

Before

After

RESULTS


TMDLs
Flood Control
Recreation
O&M
Conservation
Community

CONCLUSIONS

- **Stakeholder outreach efforts balanced:**
  - Water quality objectives
  - Recreation
  - Conservation
  - Community Interests
  - Maintenance requirements
  - Flood control
  - Others
- **While providing the City with a sustainable, multi-benefit solution to storm water challenges**
- **These measures saved the City over $20M**
- **Construction completed on schedule -- Spring 2013**

CONTACTS/TEAM

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QUESTIONS?

SUMMARY OF KEY HYDROLOGIC AND HYDRAULIC FEATURES FOR ECHO PARK LAKE

Watershed	Area (Ac.)	Q for WQE (cfs)	Q at Spill (cfs)*	Frequency to Spill (yr.)*
East	398	53	60	5
West	371	51	360	5

*Estimated based on records and simulations of 2, 5, 10, 25, 50, and 100-year events.

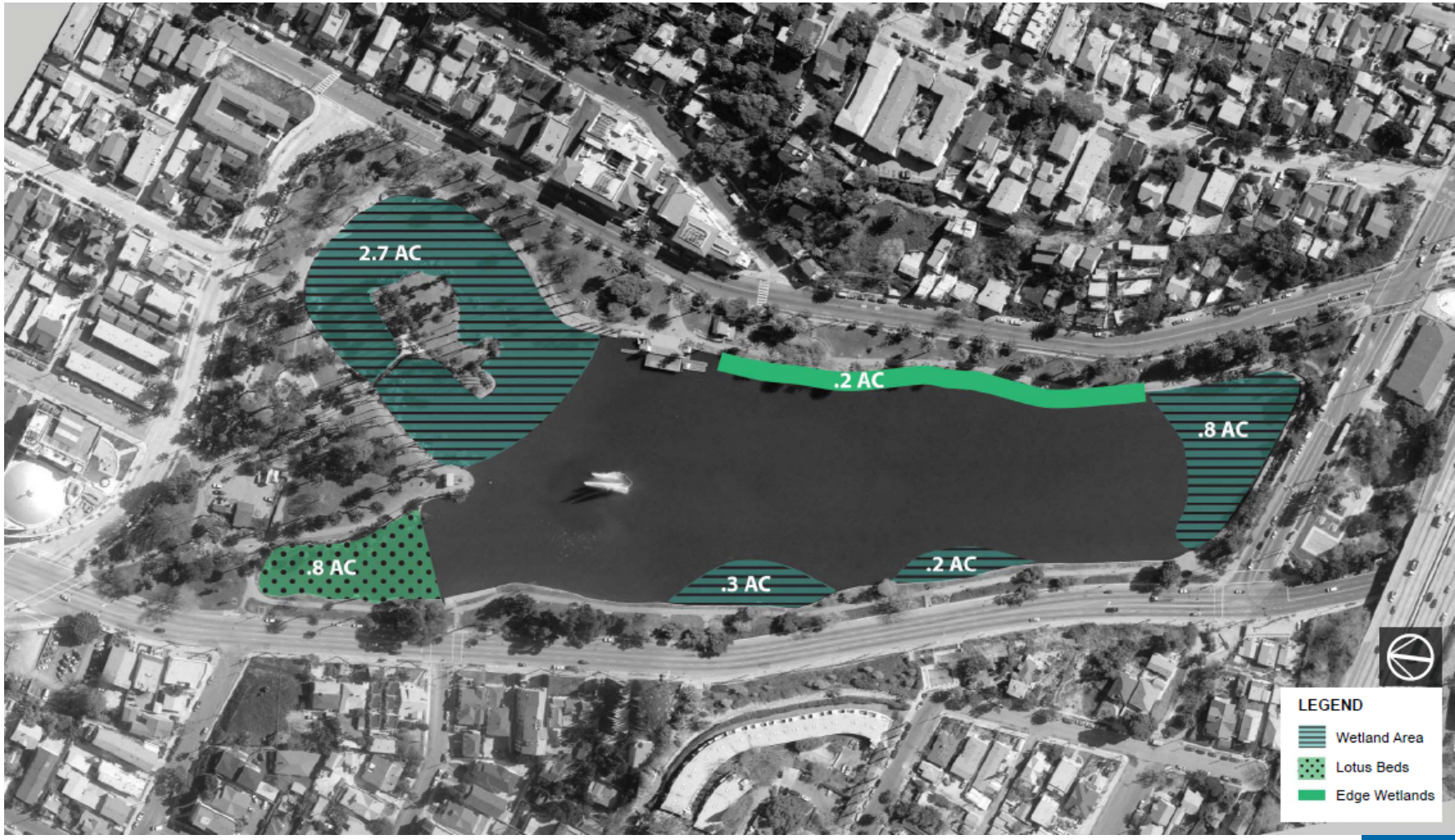
SUMMARY OF WATER QUALITY OPTIONS EVALUATED FOR ECHO PARK LAKE

1. Constructed wetlands to treat the mean daily dry weather flow and WQE → 14.4 Acre Wetlands
2. Constructed wetlands to treat 50 percent of the mean daily dry weather flow → 2.7 Acre Wetlands
3. Constructed wetlands to treat 50 percent of both the dry weather flow and the WQE → 4.4 Acre Wetlands
4. A mechanical treatment system to treat the mean dry weather flows and the WQE → Buried MBR or High Rate Ballasted Flocculation

OPTION 1 – 14.4 ACRES OF CONSTRUCTED WETLANDS

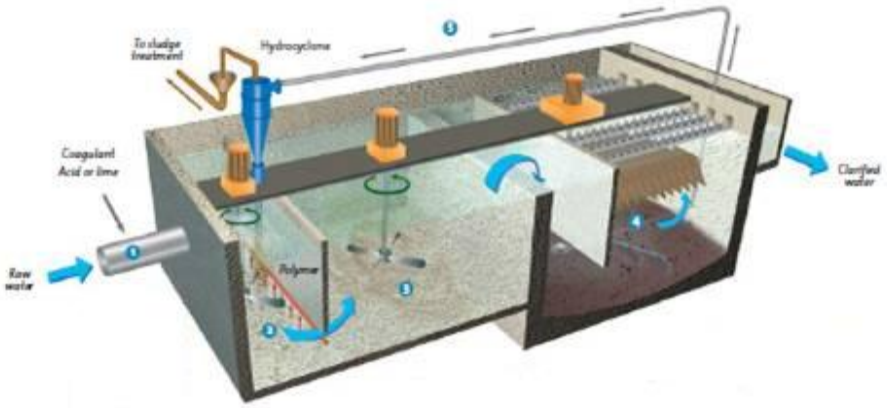
OPTION 2 - 2.7 ACRES OF CONSTRUCTED WETLANDS

OPTION 3 - 4.4 ACRES OF CONSTRUCTED WETLANDS



OPTION 4 - MECHANICAL TREATMENT

- Buried MBR or High-rate ballasted flocculation favored due to compact foot-print
- Favored by by those who prefer open water views
- Mechanical systems are not aligned with the goals of Proposition O
- Also, highest capital and O&M costs



PROPOSED PROJECT DESIGN ELEMENTS

NOTES

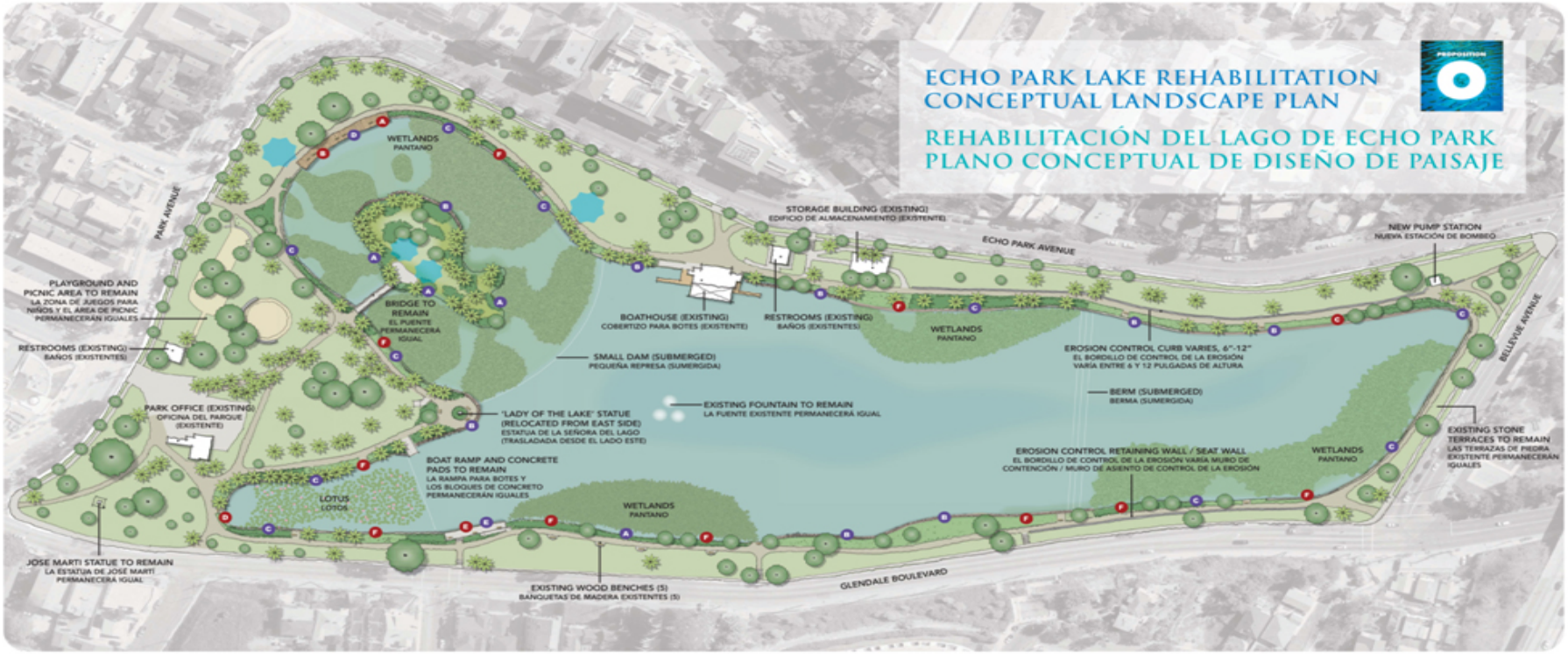
1. Proposed stormwater inlet wetlands
2. Proposed edge wetlands
3. Existing bridge to remain
4. Pump building replaced by "Lady of the Lake" statue
5. Floating islands to be removed (Typ. of 4)
6. Rehabilitated Lotus beds
7. Stormwater overflow converted to proposed overlook
8. Existing stone terraces/walls to remain
9. Existing fountain to remain
10. Proposed submerged partition
11. Hydrodynamic separators
12. Diversion structure
13. Recirculation pump station & valve vault
14. Existing outlet vault
15. Outlet structure
16. Dredging and sediment removal

LEGEND OF IMPROVEMENTS

- Edge condition - Type 1 (vegetated)
- Edge condition - Type 2 (wall)
- Edge condition - Type 3 (rip rap)
- Edge condition - Type 4 (boardwalk)
- Edge condition - Type 5 (overlook)
- Path - porous pavement
- Interpretive signage location
- Planting buffer - lawn
- Planting buffer - shrubs
- Recirculation piping
- Wetland area
- Lotus bed area
- Understory shrubs

ECHO PARK LAKE

PROPOSED CONCEPTUAL LANDSCAPE PLAN



LEGEND

Interpretive Signage
- A Wetland
- B Habitat
- C Sustainability
- D Lotus
- E History
- F 'Do Not Disturb Habitat'

Lake Edge
- A Planted slope
- B Grouted rock
- C Vertical wall
- D Wood walkway
- E Concrete overlook (using existing structure)

Planting
- Palm tree*
- Canopy tree*
- Shrubs / ornamental grasses
- Lawn
- Wetland vegetation
- Lotus beds

Hardscape / Other
- Concrete / asphalt paving
- Porous paving
- Bench (mounted)
- Low retaining wall - proposed
- Existing landscaping to remain
- Temporary pond

* Tree locations are representational

A Proposition O water quality improvement project by the City of Los Angeles Department of Public Works and Department of Recreation and Parks

Un proyecto de mejora de la calidad del agua que recibe fondos de la Proposición O realizado por el Departamento de Obras Públicas de la Ciudad de Los Ángeles y el Departamento de Recreación y Parques

LOVE OUR LAKE DON'T LITTER ECHO PARK

CUIDEMOS NUESTRO LAGO NO ARROJE BASURA ECHO PARK

LEYENDA

Carteles interpretativos
- A Pantano
- B Hábitat
- C Sostenibilidad
- D Lotos
- E Historia
- F No alterar el hábitat

Borde del lago
- A Ladera con vegetación plantada
- B Rocas enlechadas
- C Muro vertical
- D Sendero de madera
- E Vista de concreto (usando la estructura existente)

Vegetación plantada
- Palmera*
- Árbol de sombra*
- Arbustos / pastos ornamentales
- Césped
- Vegetación de pantano
- Lechos de loto

Elementos sólidos del paisaje / otros
- Concreto / pavimento de asfalto
- Pavimento poroso
- Banqueta (montada)
- Muro de retención de baja altura - propuesto
- El diseño de paisaje actual permanecerá igual
- Temporary pond

* Las ubicaciones de los árboles son representativas

AERIAL VIEW WHEN REHABILITATION WAS NEARING COMPLETION