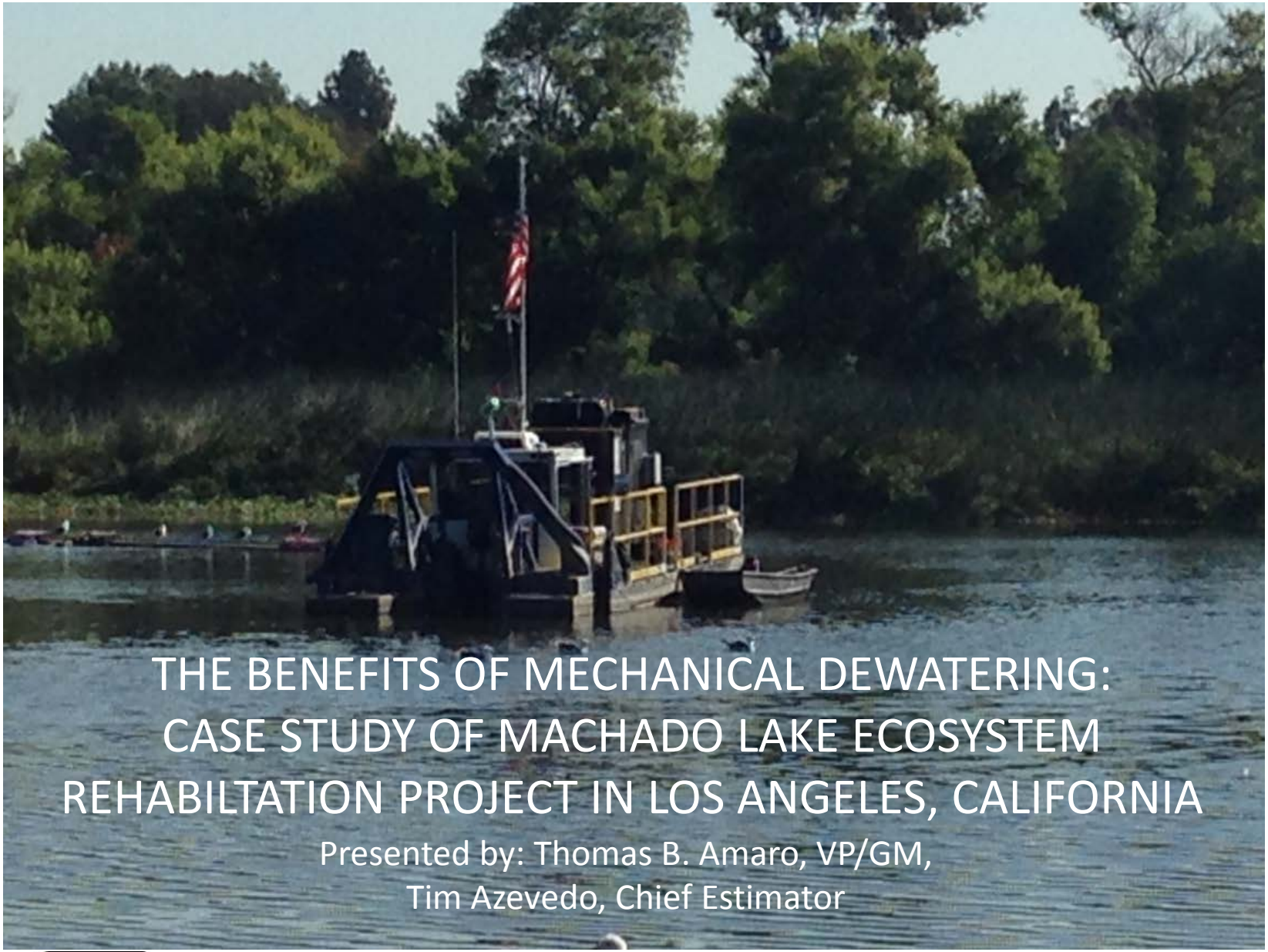

THE BENEFITS OF MECHANICAL DEWATERING: CASE STUDY OF MACHADO LAKE ECOSYSTEM REHABILTATION PROJECT IN LOS ANGELES, CALIFORNIA

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Tim Azevedo, Chief Estimator

JND Thomas Co., Inc.

2014 Annual Meeting Pacific Chapter
WEDA, Seattle, WA

Pacific Chapter WEDA

Machado Lake Ecosystem Rehabilitation Project
Location and Funding

- Proposition O - In 2004, the Los Angeles, CA, bond referendum called Proposition O raised $500 million, an unprecedented sum for any US municipality for stormwater quality improvements

- Altogether, the city of L.A. approved 36 stormwater and water-quality projects through the proposition - 20 projects received funding and 19 of those have been completed.

- In August 2013, the 20th and largest major Proposition O project; the Wilmington Drain and Machado Lake rehabilitation was approved. This $120 million project is intended to remove contaminated sediment, restore habitat, and create a parkside destination.

- The project was awarded to OHL USA, Inc. as Prime and JND Thomas Company, Inc. as 1st Tier Sub on 1/29/14 for $74,841,795 beginning March 2014 thru April 2017.

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LOS ANGELES PROJECT OBJECTIVES


Wilmington Drain looking upstream (north) from Pacific Coast Highway


Stormwater flow to lower basin

- Improve water quality conditions and help the City to meet the existing and future TMDL requirements mandated by the Los Angeles Regional Water Quality Control Board.
- Improve the flood control capacity of the Wilmington Drain to convey the flow from a 50-year storm event.
- Improve the biological diversity of the Machado Lake ecosystem by restoring and enhancing native habitat for threatened and sensitive species and by removing invasive plant species.
- Improve visual aesthetics of the Wilmington Drain, **Machado Lake**, and Harbor Regional Park in the context of a reduced water supply.
- Enhance the provision of open green space, public-use facilities, and recreational and educational amenities.
- Meet the requirements of available funding sources;
  Proposition O – a $500-million bond measure. Proposition 50 – Chapter 8, of the State of California's Integrated Regional Water Management Plan Implementation Grant Program.

PROPOSED PROJECT COMPRISED OF THREE ELEMENTS

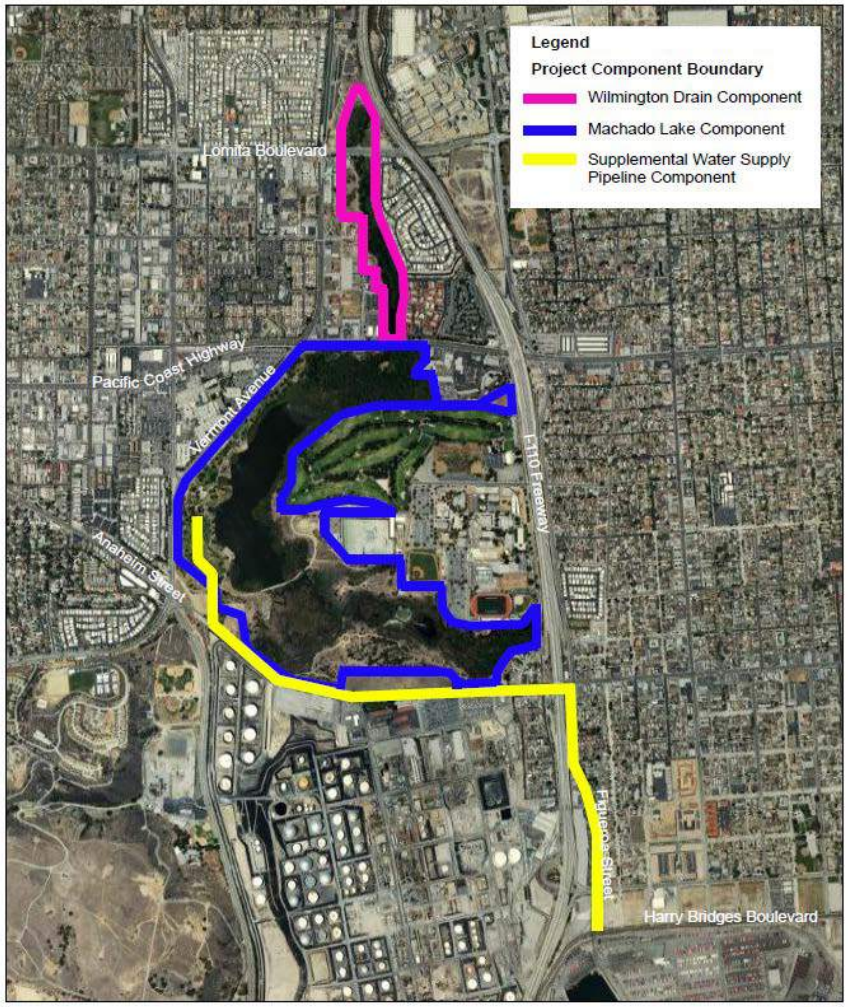


Figure 1
Project Component Boundaries

CDM

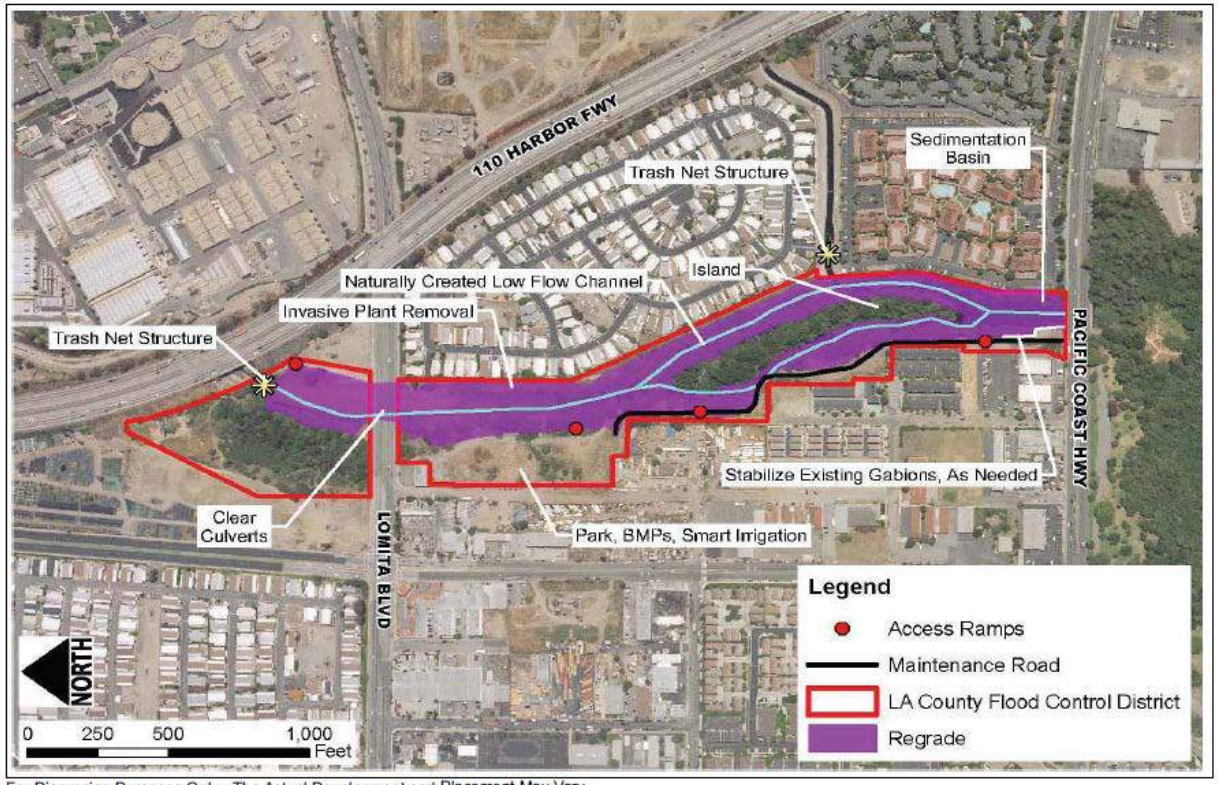
City of Los Angeles Bureau of Engineering
Wilmington Drain Multi-use and Machado Lake Ecosystem Rehabilitation Project

- **Wilmington Drain Multi-use.**
- **Machado Lake Ecosystem Rehabilitation.**
- Supplemental Water Supply Pipeline to deliver to Machado Lake during dry-weather.

Machado Lake and the Wilmington Drain form an interconnected open space near Wilmington and Harbor City;

- The Wilmington Drain is a channelized stream that conveys urban runoff and stormwater flows to Machado Lake and ultimately to the Los Angeles Harbor.
- The lake and drain have both been identified as impaired water bodies as a result of pollution in stormwater and urban runoff flowing from its 15,553-acre watershed.
- The Wilmington Drain feeds more than half of the water that flows into Machado Lake, so its water quality is of great importance.

WILMINGTON DRAIN COMPONENT



For Discussion Purposes Only - The Actual Development and Placement May Vary

Figure 1-3
Wilmington Drain Component

CDM

City of Los Angeles Bureau of Engineering
Wilmington Drain Multi-use and Machado Lake Ecosystem Rehabilitation Project

- The Wilmington Drain is characterized by a soft bottom vegetated channel, southern willow scrub plant communities, non-native plants, urban litter, and rip-rap support/abutments.
- THREE KEY ELEMENTS:
  - Habitat & Park Design
  - Channel Improvements & Bank Stabilization
  - Best Management Practices

MACHADO LAKE COMPONENT

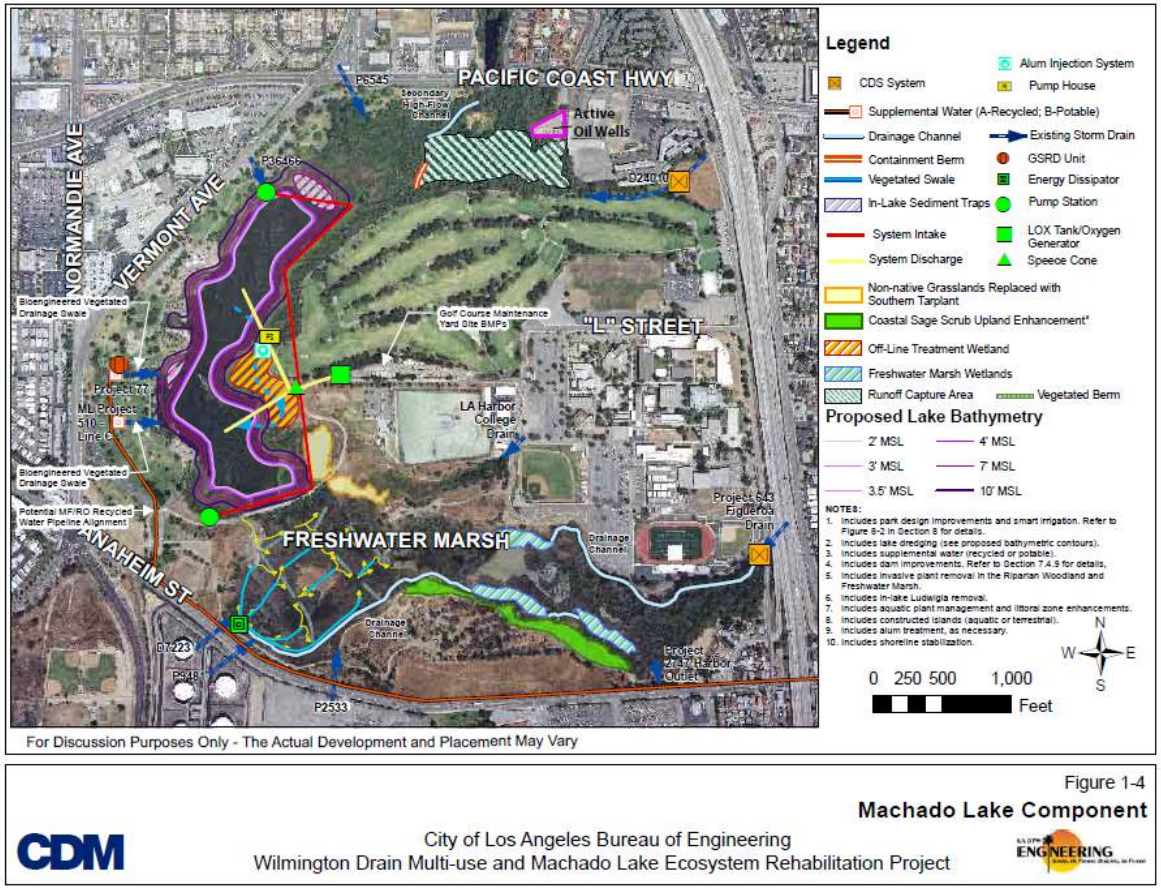


Figure 1-4
Machado Lake Component

CDM

City of Los Angeles Bureau of Engineering
Wilmington Drain Multi-use and Machado Lake Ecosystem Rehabilitation Project

- Machado Lake is comprised of an upper 40-acre lake and lower 63-acre marsh, separated by a low earthen dam.
- Machado Lake is primarily fed by stormwater runoff from the local watershed, including flows from the Wilmington Drain and ultimately discharged to the West Channel of the Los Angeles Harbor.
- As a result of low inflow during the dry season, nutrient levels in the lake tend to increase and water depth tends to decrease, contributing to the overall water quality problems in the lake.
- FIVE KEY ELEMENTS:
  - Habitat & Park Design
  - Best Management Practices
  - Wetlands Improvements
  - Recreational Improvements
  - **Lake Improvements**

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Machado Lake Improvements

JND SCOPE

- **Hydraulic dredging** of the lake bed to remove approximately 239,000 cy of accumulated sediment.
- **Mechanically dewater** and staging of dewatered sediment.
- **Removal of an obsolete aeration/oxygenation system used** to increase dissolved oxygen at the sediment-water interface, which would help to address the TMDL for eutrophication and odor.
- **Stabilization of the shoreline** to limit nutrients and sediment from entering the lake and to enhance aquatic and riparian habitats.
- **Construction of Two in-lake sediment basins** in the northern portion of the lake to promote localized sediment deposition.
- **Alum injection** (or alternative phosphorus inactivation method) to remove elevated nutrient levels in the water column and immobilize phosphorus, as needed.
- **Capping of Lake Bottom** with application of sand/Aqua Blok layers to prevent contamination from underlying contaminated lake bed.

NON JND SCOPE TASKS

- **Construction of off-line treatment wetland**s that recirculate lake water to further reduce nutrients within the lake and improve water quality.
- **Biomanipulation to directly enhance aquatic ecosystem**, which is best used in concert with carp and small fish reductions, managed submerged macrophyte beds and modest nutrient reductions (as by artificial circulation and dredging).
- **Establishment of an aquatic plant management program**, including macrophyte management and littoral zone modifications/enhancements that would improve overall water quality and reduce conditions favorable to mosquito breeding.
- **Establishment of a Lake Water Quality Management Plan**, required as part of implementation of the Nutrient TMDL; and Modifications to the Machado Lake dam to improve pedestrian access, to provide better public safety during overflow conditions by improving flood control, and to facilitate draw-down, as needed.

Environmental Considerations

- Biological Resources - Direct and indirect effects on a sensitive plant species and sensitive animal species, including an endangered species.
- Paleontological Resources - Could be encountered during construction.
- Archaeological Resources - Could be encountered during construction.

- Hazards and Hazardous Materials - Potential to create conditions favorable to mosquitoes, which in turn could potentially result in increased vector-related health hazards and public nuisance.

  Encounter hazardous or contaminated soils, which may require appropriate disposal, or development of treatment options.

- Transportation/Traffic - Potential for truck trips associated with off-site soil disposal to be an inconvenience to local residents during AM and PM peak hours.

- Air Quality - Peak day construction would generate approximately 727 pounds per day of NOx, thus exceeding the threshold of 100 pounds per day. The implementation of feasible mitigation measures would result in a minimum reduction of approximately 20 percent in NOx (145 pound reduction, and 582 pounds generated). NOx emissions would still exceed the significance threshold of 100 pounds per day.

- Noise - Noise generated during construction cannot be mitigated to a level below significance (5 decibels [dBA] increase over ambient conditions) at nearby sensitive receptor (residences, school, residences, and recreational uses) during daytime construction activities.

- Cumulative - Significant project-level impacts from NOx emissions, thus making a cumulatively considerable contribution to air quality impacts (NOx emissions) after implementation of mitigation measures.

  Elevated noise levels in conjunction with other projects could result in cumulative noise levels that are greater than 5 dBA over ambient conditions at nearby locations.

JND Thomas Company Project Objectives/Restrictions

Objectives

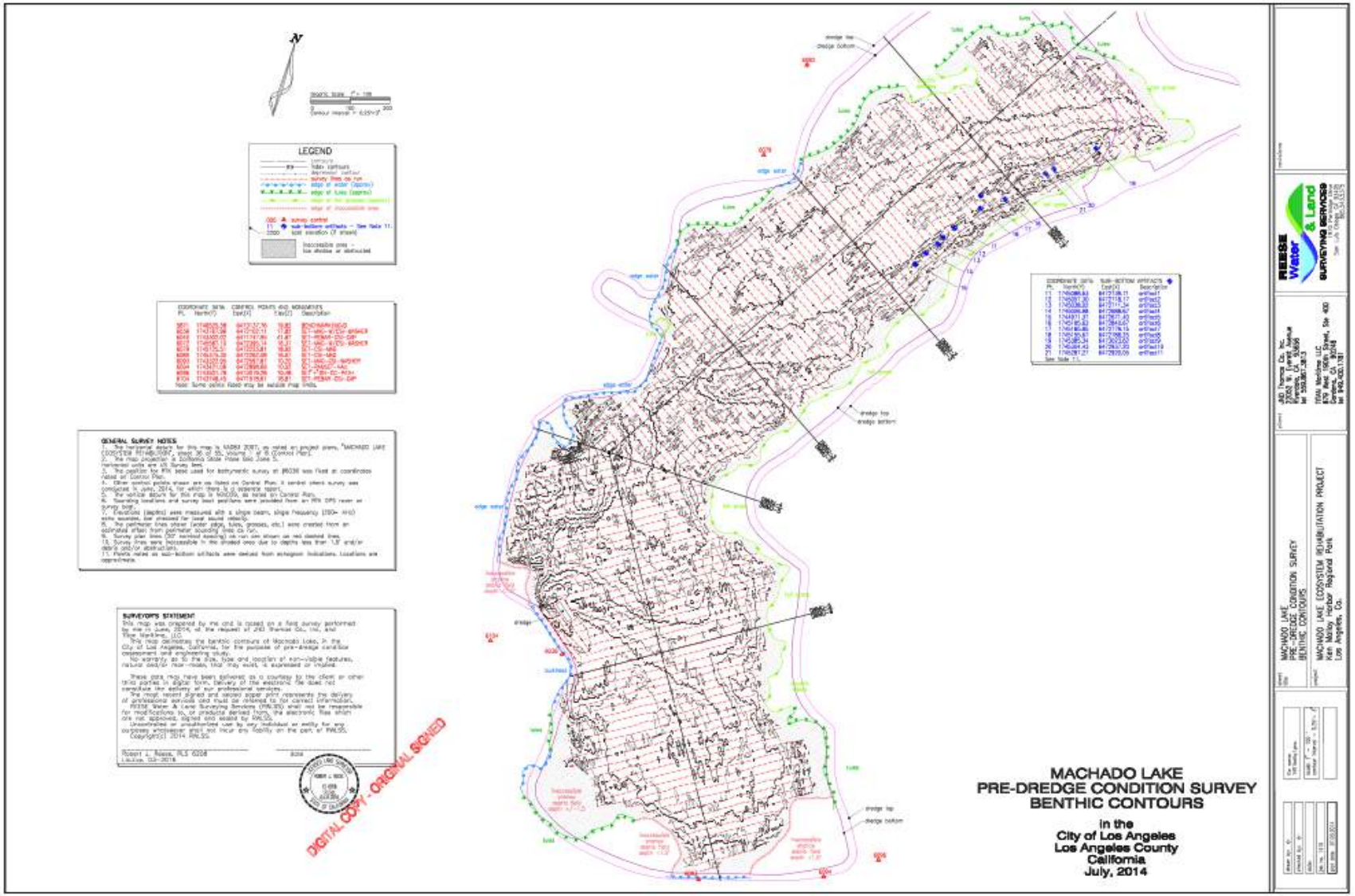
- Deepen the lake to an average of 3 ½ feet overall by removing approximately 239,000 cubic yards of sediment. (Dredged materials consist of a mixture of sand (8%), silt (23%), clay (60%), organics (9%) and trash (?)
- Turbity control utilizing multiple turbidity curtains located throughout the lake.
- Mechanically dewater and stock pile sediment within less than (¾) acre of usable space within Park boundaries:
  - Separation of large debris & course solids from fine sediments and water to facilitate sediment processing.
  - Dewatering of fine sediments to generate a solid waste disposal.
  - Treatment of water recovered from size separation and dewatering processes to meet project discharge specifications.
- Daily staging of dewatered sediments for testing and transportation.

Environmental Restrictions

- Establish approved laydown areas within the park, adhering to a minimal footprint and maintaining designated distances from all trees.
  - No materials, spoils, debris shall be located in a manner which may result in a discharge…… MEANING only on asphalt or geosynthetic barrier.
  - Return water from dredged sediment will be treated and tested prior to being discharged back to lake for pH, temp, dissolved oxygen, turbidity, total suspended solids, PCB's, DDT, DDE, DDD, Chlordane, Dieldrin.
- Schedule and coordinate all activities in such a way as to avoid impacts on:
  - Foraging California least Tern nesting colony between May & September,
  - No significant impact to mosquitofish requiring no more than 50% of the lake with a 100-meter buffer from the 50% division between June 7 and August 15.
  - Sensitive bird species breeding between Feb 1 through August 31
- All work to be performed from dawn to dusk and in accordance with noise restrictions.

Dredging Approach

Dredging Approach



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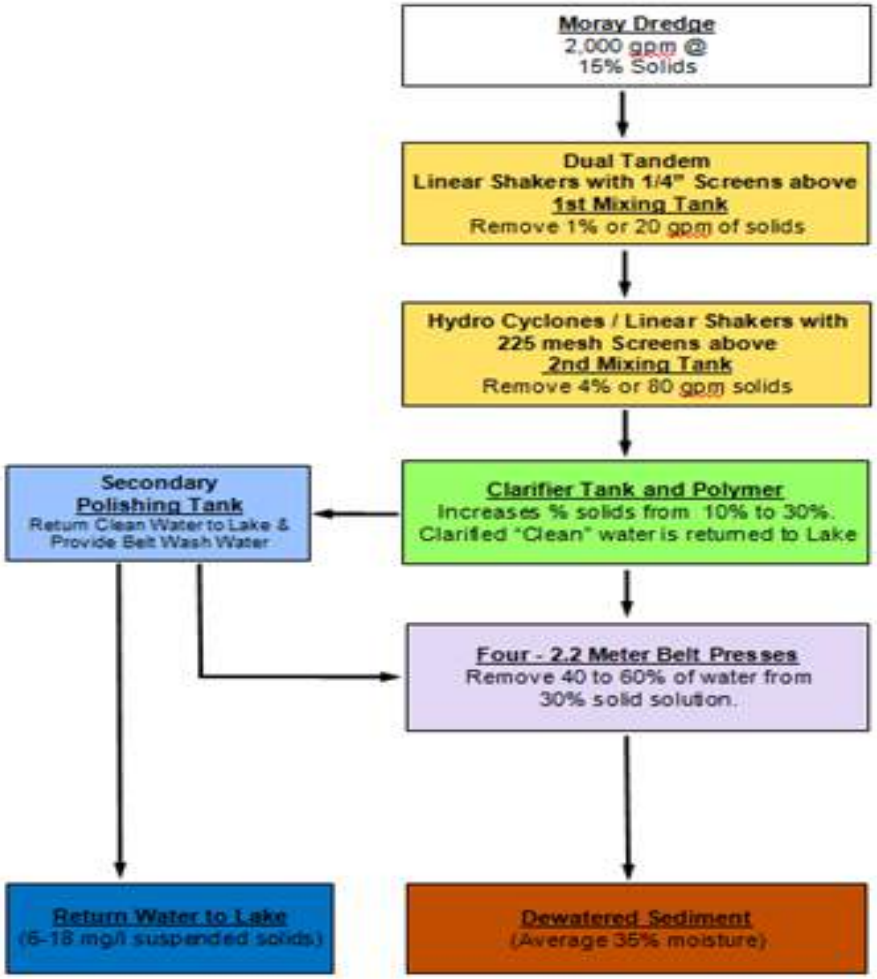
Mechanical Dewatering Flow Chart



Mobilization

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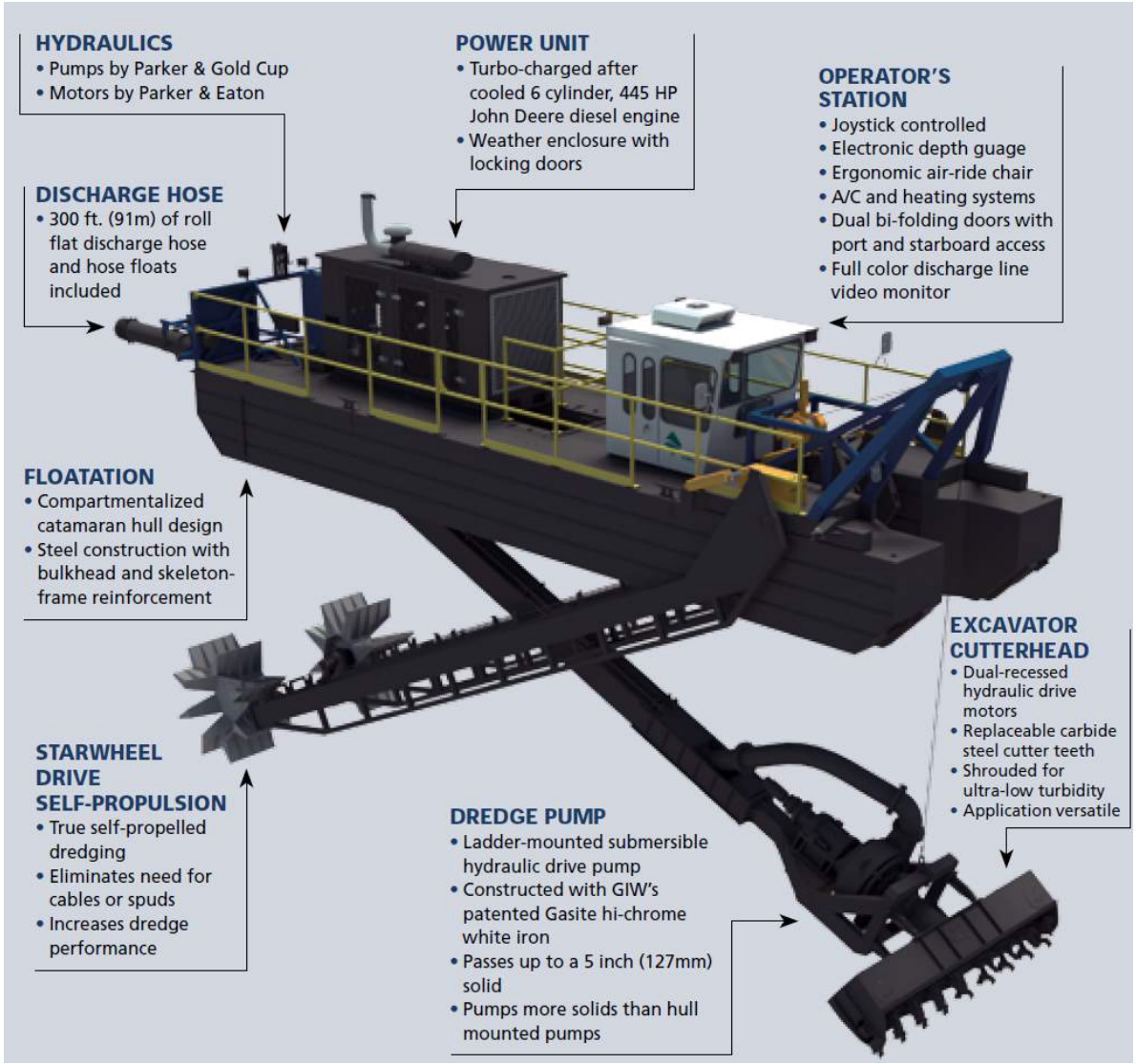
Dredge – IMS 7012



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Excavator/Barge for Trash Removal

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Dual Tandem Shakers / Primary Mix Tank

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Hydro Cyclone / Linear Motion Shakers

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Clarifier Tanks

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Belt Presses

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Clean Water from Clarifier

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Loading Trucks

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Dewatering Site

Plant Water Originally Sent to Purification System

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After Testing, Cleaned Water Returned to Lake

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Benefits of Mechanical Dewatering

- ***Environmental Considerations do not preclude the use of Dredging & Mechanical Dewatering as a viable option.***
- ***Clearly defined objectives, restrictions and scheduled completion dates enhanced and solidified the utilization of mechanical dewatering.***
- ***Portable mobilization minimized excessive pre construction costs and time.***
- ***Correct "coupling" of the Dredge selection and Dewatering system capacity insured efficient economies of scale, resulting in the correct balance of thru put averaging 1,000 cubic yards per day.***
- ***An advantage of mechanical dewatering with "high flow clarification" is the ability to return lake water used during the process back to its original source, cleaner than before.***
- ***Due to all dewatering activities occurring on less than ¾ acre with portable above ground components, Site Restoration costs are expected to be minimal.***

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Benefits of Mechanical Dewatering

QUESTIONS ?

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