

AquaBlok® Installation Profile



Site Location: *US EPA Region 9*
Machado Lake – Harbor City, CA

Project Status: Completed Fall/Winter of 2015

Setting / Purpose: Machado Lake is located in the Ken Malloy Harbor Regional Park in Harbor City, CA. The park is approximately 290 acres and contains the 40-acre Machado Lake. The primary goal of the project was to improve the water quality in Machado Lake, while enhancing the surrounding natural habitat and the recreational features of the park. The project included a wide range of in-lake improvements, but the primary goal was to dredge approximately 239,000 cubic yards of lake sediment and cap the remaining contaminated lake bottom with AquaBlok.



Legend

	CDS* System		In-Lake Sediment Traps
	Land-Based Compressor		Non-Native Grasslands Replaced with Southern Tarplant in Select Areas (approximate boundary)
	Supplemental Water		Coastal Sage Scrub Upland Enhancement
	Drainage Channel		Off-Line Treatment Wetland (approximate boundary)
	Containment Berm		Freshwater Marsh Wetlands
	Vegetated Swale		Runoff Capture Area
	Alum Injection System	Proposed Lake Bathymetry	
	Aeration System		2' MSL
	Existing Storm Drain		3' MSL
	GSRD Unit		4' MSL
	Pump House		7' MSL
	Energy Dissipator		10' MSL
	Vegetated Berm		

Notes:

1. Includes park design improvements and smart irrigation.
2. Includes lake dredging
3. Includes supplemental water (recycled or potable).
4. Includes dam improvements.
5. Includes invasive plant removal in the riparian woodland and freshwater marsh.
6. Includes in-lake Ludwigia removal.
7. Includes aquatic plant management and littoral zone enhancements.
8. Includes constructed islands (aquatic or terrestrial).
9. Includes alum treatment, as necessary.
10. Includes shoreline stabilization.

The Dredge & Cap approach was selected by the project engineer as a means to focus dredging activity only on the highest levels of contaminant concentrations within the site. Removal was minimized as remaining contaminants in the sediment could be effectively sequestered or isolated with a low-permeability cap (AquaBlok).

Key advantages:

1. **Minimize removal volumes (with all associated costs).**
2. **Provides 100% clean surface for restoration – Eliminates risks associated with low-level residual contamination.**
3. **Reduces risk of recontamination from other sources, such as upland seep zones.**

The City of Los Angeles Department of Public Works project team managed the project, OHL, Inc. was the prime contractor.

Contaminant(s) of Concern: Nutrients, DNAPL - PAHs (polynuclear aromatic hydrocarbons) and metals.

AquaBlok Cap Design / Site Area: As noted above, the cap area comprised a nearly 40 acre area that included a number of different lake features, such as bench shoreline for wetland establishment and a sedimentation basin and the inlet from the Wilmington Drain to capture incoming sediment. The AquaBlok (low-permeability) layer was based on an application rate of 39 lb/SF to achieve a 6-inch hydrated thickness for the as-placed cap. This resulted in a production volume of 33,250 tons, which included a 3% factor for storage and handling losses.

Production Overview:

Since the primary weight and volume of AquaBlok is stone, the manufacturing facility for AquaBlok materials in Southern California is located at a stone quarry south of Corona, CA (see photo to the **right**). Production is carried out in conventional ready mix concrete mixers. Material is off-loaded into bins and material is transferred to bulk dump trucks for transport to the Machado Lake site, which was an approximate one-hour drive from the production facility. Early in the project, it was expected that AquaBlok would be produced on-site at Machado, but it was determined to be more cost effective to deliver the finished material rather than stone to the project site.



To the **right** is a photo of the AquaBlok stockpiled at the project site. After off-loading from the trucks, stacking conveyors were used to create large piles that could be covered with a high density plastic cover to protect the material from rain. It was estimated that from 1%-3% handling losses would take place due to material handling and storage losses.



Installation / Quality Control:

Installation was performed with a hopper/barge system that was able to place a thin-uniform layer in a 20-foot wide 'lane' across the lake bottom. The placement barge was served by a separate supply barge, which was loaded with AquaBlok from the lake shore and shuttled to the continuously operating placement barge. The photo to **right** shows the placement barge and hopper during application of AquaBlok.



The photo on the **right** shows the material stockpile on the placement barge and the mini-excavator that was used to load the hopper.



Quality control was performed on AquaBlok material in advance of shipment, after shipment and after placement. Testing prior to placement consisted of hydraulic conductivity tests in both columns and by independent geotechnical laboratories (see photo below **right**). Meeting the project specification was demonstrated using both methods.

Post-placement confirmation consisted of core samples (photo **below**) to verify the minimum placement thickness of 6-inches (hydrated). To accomplish this, the contractor placed two lifts of approximately 20lb/SF (2.5-3 inch dry thickness) and allowed for hydration between lifts.



Current Status / Summary:

The project demonstrates that it is possible to both improve water quality, while enhancing the surrounding natural habitat and the recreational features of the area. The in-lake improvements included dredging approximately 239,000 cubic yards of lake sediment and capping the lake bottom with AquaBlok to address residual contaminants in the underlying sediments. The habitat and improvements include measures to help maintain water quality after completion of the project and to minimize impacts of ongoing nutrient additions. Invasive plant removal and replanting of native species, and other improvements such as fishing piers, fencing, and walkways also provide important features which improve the ability for the public to enjoy the restored waterbody.