



# WELL TECH SOLUTIONS



## Client Case Study: Lake Elsinore

### Lake Metrics:

- Surface Area: 3311 acres
- Average Depth: 20 ft
- Size: 30,000 acre-feet
- Lake volume: 9.8 billion gallons
- Normally receives 6.5 million gallons of treated wastewater effluent

### Barge Nanobubble Titan System:

- 44 lbs/hr (20kg/hr) oxygen concentrator
- 2400 (545 m3/hr) GPM pump

### Results:

- 12 ft (3.7 m) water clarity, >280% deeper clarity
- 50% average blue-green algae reduction
- >300 mV ORP, 100% increase

### Lake Closures Prompt Quick Response from the City

Urban lakes, nestled within the bustling landscapes of cities and towns, serve as vital green spaces, providing recreational opportunities and ecological benefits. However, these urban oases often face a myriad of challenges that stem from human activities and urbanization.

The largest natural freshwater lake in Southern California, Lake Elsinore, managed by the City of Lake Elsinore, has grappled for decades with recurring issues related to algae, particularly harmful algal blooms (HABs). The lake received danger advisory levels or lake closures 4 out of the last 7 years and the presence of harmful algal blooms in Lake Elsinore prompted an 8-month closure in summer of 2022. Shortly after, the City of Lake Elsinore implemented a roadmap to a renewed and restored Lake Elsinore to manage and mitigate algae issues maintain the ecological health of the lake for both wildlife and the surrounding communities.

### An Urban Lake that Needs a Viable Solution

Lake Elsinore is a popular destination for various recreational activities, including boating, fishing, and water sports. The lake's proximity to major population centers, such as Los Angeles and San Diego, contributes to its popularity.

It's situated in an endorheic basin, meaning it is a closed drainage basin with no outflow to the ocean. The water level in Lake Elsinore can fluctuate due to precipitation, evaporation, and human water management practices.

The lake's warm climate and nutrient-rich source water and runoff create an environment conducive to rapid algae growth. Excessive nutrients, often stemming from agricultural runoff and urban activities, fuel the proliferation of harmful algae, such as cyanobacteria (blue-green algae), and increased lake eutrophication. These blooms often lead to the production of toxins that pose risks to the lake's water quality and the health of aquatic organisms.

In the past, the city tried whole lake aeration with no success in reducing algae or improving water quality, however, in 2023, the city selected Moleaer to treat the lake with nanobubble technology.

### Moleaer Deploys Nanobubble Barge off Elm Grove Beach

Moleaer's Lake Elsinore project includes a floating barge deployed off the shore of Elm Grove Beach with 5 monitoring buoys that offer extensive water quality testing. The barge holds a nanobubble generation system housed in two containers that continuously pump millions of gallons of water each day (turning over the volume of the lake every 7.8 years) to increase dissolved oxygen (DO) levels and promote healthy lake processes.



### Monitoring buoys track:

- ✓ Temperature
- ✓ pH
- ✓ DO concentrations
- ✓ DO saturation %
- ✓ ORP (Oxidation-Reduction Potential)
- ✓ Blue Green Algae-Phycocyanin
- ✓ Chlorophyll-A
- ✓ Specific Conductivity
- ✓ Actual Conductivity

After only 30 days of nanobubble treatment, the lake had notable improvements in water clarity.

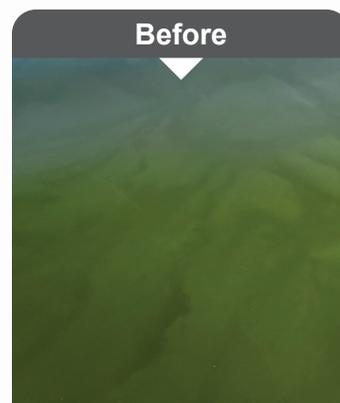


Photo credit: Local Community Member.

## LAKE ELSINORE: URBAN LAKE RESOLVES ALGAE & LAKE CLOSURE PROBLEMS WITH SUSTAINABLE NANOBUBBLE TECHNOLOGY



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Significant improvements in lake conditions are also reviewed at 60 days, with the following results:

- ✓ 50-99% reduced blue-green algae
- ✓ Increased ORP to over 300 mV (healthy ORP is around 300-500 in lakes)

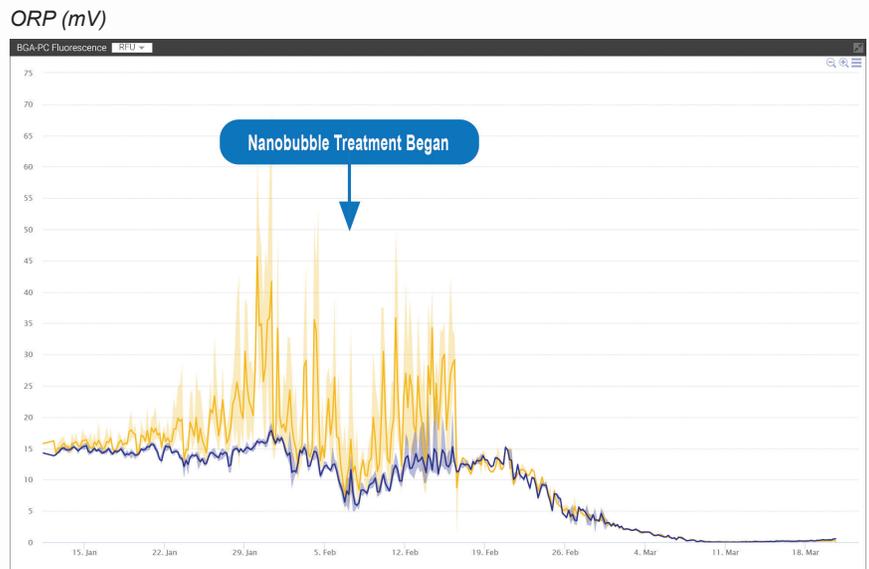
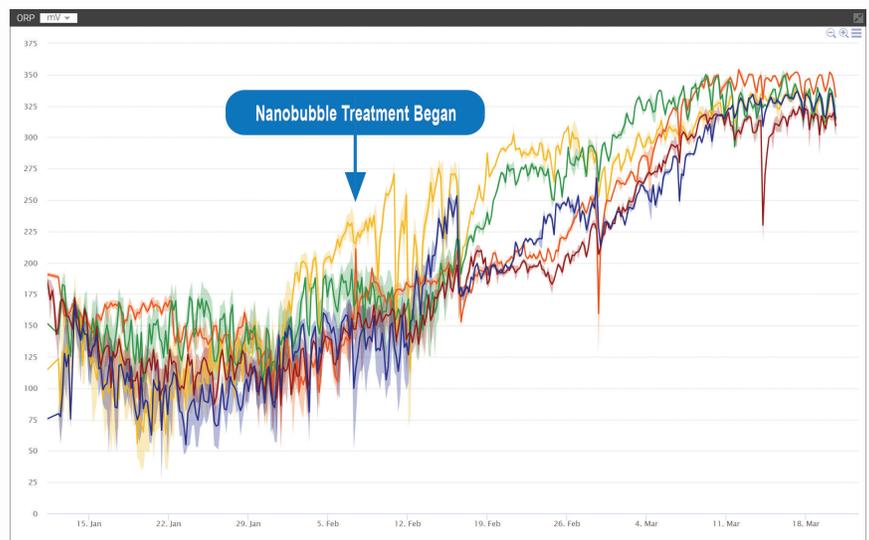
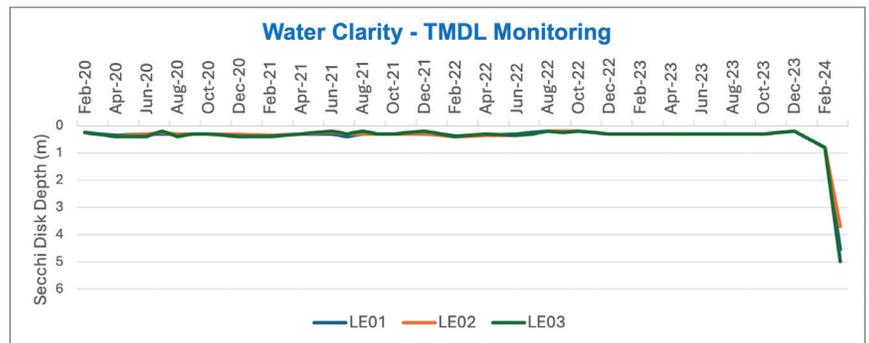
In addition to the measurements taken by Moleaer's buoys, the city's engineering company also took measurements. This included a 12 feet (3.7 meters) depth improvement in water clarity from Secchi disk readings, a 287% increase, and the presence of what they believe to be Daphnia in water samples. Daphnia are small planktonic crustacean organisms that are a keystone species in lakes and ponds, providing filter-feeding on suspending particles like algae. This was the first time the company has sighted these beneficial organisms in Lake Elsinore.

Measurements will continue to be analyzed; however, these 60-day results are an indicator that Moleaer's technology is improving natural lake processes to combat Lake Elsinore's problems.

### Improving Lake Resiliency with Oxygen Nanobubbles

Nanobubble technology from Moleaer helps deliver oxygen throughout the water column and to the sediment layer by producing and delivering nano-sized bubbles of oxygen into and throughout the water column. These bubbles are so small that they are neutrally buoyant and remain suspended in the water column for an extended period of time, allowing the oxygen to diffuse into the lakebed.

By getting more oxygen to the sediment layer using nanobubble technology, the lake's natural microbial communities can thrive, promoting the breakdown of organic matter and reducing nutrient cycling. This can help improve water quality and clarity by reducing muck and promoting a healthy lake ecosystem. Additionally, enhancing lakebed oxygen levels can help reduce the effects of eutrophication and harmful algal blooms as well as improve the habitat for aquatic life.



BGA-PC Fluorescence (RFU)



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