

## CASE STUDY

# CITY OF THOUSAND OAKS

The introduction of the PAX Water Mixer allowed a 1 MG tank in Thousand Oaks to achieve fully-mixed conditions after only three hours of operating time

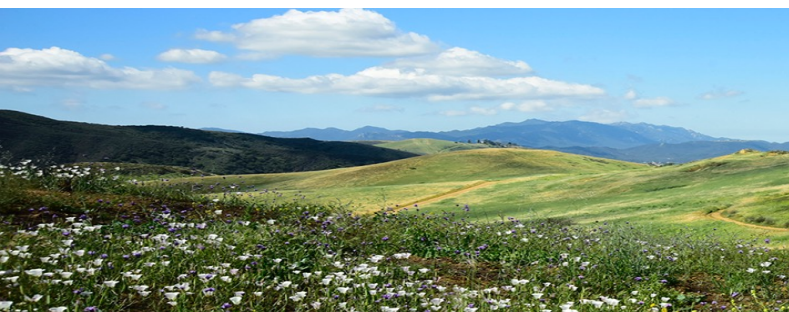


## OVERVIEW

Over the years, the City of Thousand Oaks in Ventura County, California, has evolved from a rural settlement into a desirable, comfortable city in Southern California. Thousand Oaks is nestled against the Santa Monica Mountains and contains over 15,000 acres of natural, publicly-owned open space located within the City's boundaries. Offering a beautiful blend between industrial, residential, commercial, and recreational space in an attractive location, it's no surprise that it holds an ever-growing population of over 125,000 residents.

Due to the typical warm, dry climate, Thousand Oaks often faces drinking water quality issues common in chloraminated systems. Thousand Oaks is one of the many municipalities that purchases finished drinking water. They purchase it from the Metropolitan Water District through a wholesaler in the Calleguas Municipal Water District. Thousand Oaks distributes this purchased water to roughly 16,000 residences and businesses.

View of the Santa Monica mountains as seen from one of many trails located in Thousand Oaks.



*"Thousand Oaks is a 'Tree City', and has been named one of the county's greenest cities"*

## SITUATION

With 16 storage tanks ranging in size from 0.5 to 5 MG, and large seasonal swings in demand, maintaining desired disinfectant residual levels, especially in reservoirs with low turnover, has been a challenge.

Historically, Thousand Oaks would encounter a period of low demand in the winter, which would result in high water age, reduced residual levels and elevated levels of nitrite (a warning sign of nitrification). Operators would lower reservoir levels and refill tanks with water directly from the wholesale supplier, but residual levels would not improve for long.

With the recent adoption of water conservation measures in the summer, which extended the period of low demand, Thousand Oaks was finding its period of "challenging water quality" expanding to as much as four to six months out of the year.

The City determined that passive mixing systems (which only mix during the fill cycle) were not the right choice because water quality problems were most problematic when tank turnover was lowest. The City sought an active mixing technology that would operate 24/7/365.

# APPROACH

The City performed a test to determine whether a PAX Mixer or a draft-tube mixer would perform best. They began with the draft-tube mixer test. They took residual measurements at the bottom, middle and top of the tank while the mixer was in operation.

The results showed that the tank became well-mixed after continuous operation of the mixer for 30 days, however, residual levels did not show much improvement. Water quality managers were concerned that they would need to manually boost disinfectant residual levels to achieve their water quality goals. Because these initial measurements indicated a slow mixing rate, they were also concerned about whether the draft-tube mixers would have sufficient mixing power to rapidly blend a manually-added dose of disinfectant. After testing the effectiveness of draft-tube testing and realizing the potential downfalls, the operators decided to try the PAX Impeller Mixer PWM400.

The PWM400 was lowered through an opening at the top of the tank, without the use of a diver nor needing to be fastened to the bottom of the tank. The operators took samples from the top, middle, and bottom of the tank again. Siemens and Hach total chlorine analyzers were used, installed at the return valve, to measure chlorine levels.

The PAX Submersible Impeller Mixer PWM400



*"There was a BIG difference in mixing performance between these two systems...controlling residual levels would only be possible with the mixing power provided by the PAX system."*

*Water Quality Superintendent,  
City of Thousand Oaks*

# RESULTS

86%

Decrease  
In Mixing/Blending  
Time

24/7

Operating  
Time

- After three hours of operating time, the PAX Impeller Mixer was able to achieve stable chlorine levels. The draft-tube mixing took 23 hours to achieve similar results.
- The PAX Impeller Mixer greatly improved the total chlorine levels in the tank from 1.0 ppm to 2.0 ppm, with samples registering the same total chlorine levels to within .2 ppm (compared to .25 ppm from standard draft-tube mixing).
- The PAX Impeller Mixer was able to fully mix the entirety of the tank, while draft-tube mixing failed to reach certain areas of the tank. The draft-tube mixer resulted in high variances in residual levels throughout the tank.
- Without the PAX Mixer, the staff needed to manually monitor and boost disinfectant residual levels to achieve their quality goals and standards.

# CONCLUSION

The PAX Impeller Mixer was able to completely mix the water tank at a rate fast enough to blend a dose uniformly into the water. This is critical for manual dosing to be safe and effective. City operators and managers at Thousand Oaks reviewed the results and concluded that the draft-tube mixer was unable to mix the tank after continuous operation over several days, while the PAX Impeller Mixer was able to achieve stable, completely mixed conditions in just three hours and greatly improve residual levels. This truly powerful mixer featuring a quick blend time was the clear winner.

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