

CASE STUDY: Water Network Master Planning Henderson, NV, USA

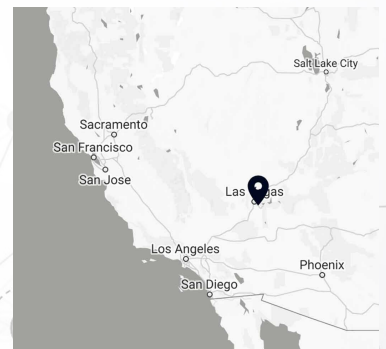
The City of Henderson engaged Stantec and Optimatics to develop a new master plan for their water distribution system, in preparation for the expected population growth and demand increase in the coming years.

KEY POINTS

- Analysis considered regular peak conditions as well as fire flow and resilience scenarios.
- Optimized solution achieved \$120M cost savings compared to solution developed using traditional design methods.

BACKGROUND

The City of Henderson (the City), located in the suburbs of Las Vegas, currently has an approximate population of 300,000, with an average water consumption of 45 MGD. Most of the the City's drinking water is sourced from the Colorado River. Over the last two decades, the population of the City has doubled, and this growth rate is expected to continue in the future. While the population has been increasing, severe drought has reduced the security of supply from the Colorado River. These two factors have motivated the City to take action to safeguard water supply for its residents into the future.



PURPOSE

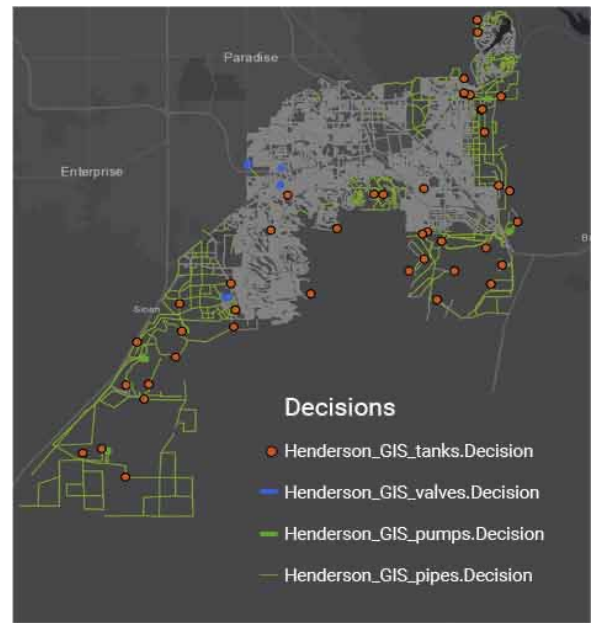
This optimization effort aimed to determine the lowest cost master plan strategy that satisfied the City's hydraulic design standards, based on forecast 2050 demands. Prior to optimization, the City and Stantec had identified a range of possible project sites, so the optimization was largely focused on determining which of these projects to complete, as well as how to size them.

PROJECT SCOPE

The project utilized the EPANET-integrated version of the Optimizer™ Decision Support Tool for Water Distribution Systems. An options hydraulic model was produced that contained existing infrastructure (shown in grey in the adjacent figure), and proposed infrastructure (shown in green in the figure).

A stitched scenario was developed for use in the optimization, involving the following sections:

- Average Demand Day (2050 conditions)
- Peak Demand Day (2050 conditions)
- Critical Fire Flow Events
- Outage Scenarios



The stitched scenario allowed the performance of potential solutions to be tested under a variety of different critical conditions, ensuring that Optimizer™ would produce a robust and balanced solution capable of providing a high level of service under all operating conditions.

A large variety of decision and design criteria types were included in the formulation, giving Optimizer™ opportunity to balance conveyance upgrades, operational control changes, and storage upgrades.



RESULTS

The optimization effort produced a solution that cost approximately \$120M less than a previous solution that had been prepared for the master plan using traditional design methods. After some manual refinement of the optimized solution to account for construction considerations, the cost difference decreased marginally, but still came in significantly under the original plan cost. Based on the success of the project, the City intends to utilize Optimizer™ for future applications.