

DYNAMIC WELL FIELD OPERATION PLAN

WATER
OUR FOCUS
OUR BUSINESS
OUR PASSION

Optimizing Your Well Field Design and Operation

Simple as they are, groundwater well fields are often sited, designed, and operated without proactive or optimized strategies. Well field optimization is a service that Carollo Engineers offers to help our clients assess alternative design and operation strategies for their well fields to meet near and long term demand and water quality goals while lowering capital and O&M costs.

Benefits

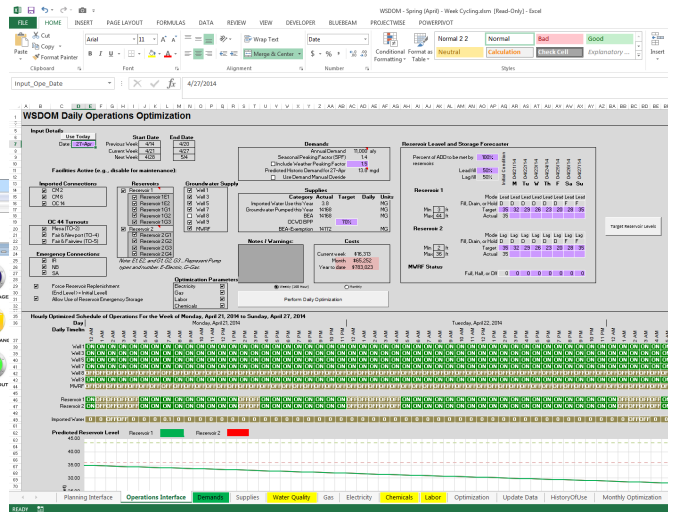
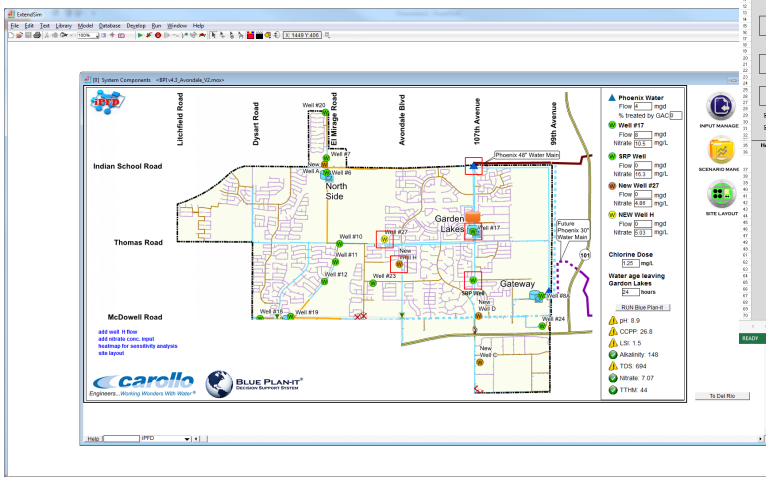
- Construction and O&M savings.
- Improves water quality while minimizing treatment costs.
- Reduces media replacement and regeneration frequency for GAC, ion exchange and other wellhead treatment processes.
- Lowers energy and chemical uses.
- Lowers analytical costs.
- Provides daily/weekly/monthly operational guidance and annual or long term water resource and quality summary.
- Extends well and pump service life.
- Improves preventive maintenance or asset management practice.

Our Approach

Using Carollo Engineers' Blue Plan-it® Decision Support System, with built-in features such as scenario manager, genetic algorithm optimizer, linear and non-linear solvers, full factorial solver, and Monte Carlo simulation, linked with customizable data visualization and business intelligence dashboards, our team is ready to assist you with your well field design and operational optimization.

The Daily Optimizer gives the user information on an hourly basis. It provides the operator with a daily and weekly operating guide to assist in making decisions on which wells to be used to meet the demand, while reducing overall operating costs (e.g., energy, treatment, chemical, analytical, labor, etc.).

The Monthly Optimizer gives the user an annual summary and overview. It provides managers and operators the big picture in a dynamic setting, and generates customized reports for regulatory needs. This function helps users assess historical operation data for business intelligence, and virtually experiment with new strategies and improvements before implementation.



Screen shots from two well field studies completed by Carollo Engineers. In one case, the Daily Optimizer provided the tool to make daily decisions on which well to pump, and for how long, in order to maintain the reservoir levels or pressure setting in various zones. Operators can focus on O&M activities knowing their decisions will lower operating costs. The monthly optimization tool helped the utilities manage their water rights/pumping constraints from multiple groundwater basins.

Integrated Water Quality Modeling

One strength of our approach using Blue Plan-it® has the unique capability to model distribution system water quality. From corrosion and stability assessment associated with blending multiple surface and groundwater sources in a system, to water age analysis and simulation of chlorine residuals and DBP formation, to salinity and inorganic and organic contaminants [e.g., nitrate, arsenic, fluoride, selenium, TCE, TCP, 1,4-dioxin, Per- and Polyfluoroalkyl Substances (PFAS)], Blue Plan-it® does it all in one platform. The built-in database and algorithms allow the users to evaluate the impacts of chemical additions and treatment processes on water quality.

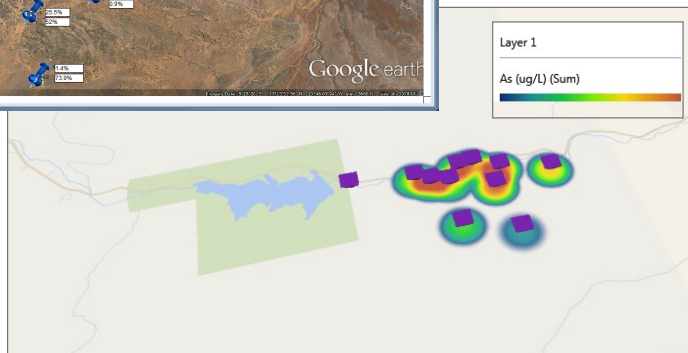
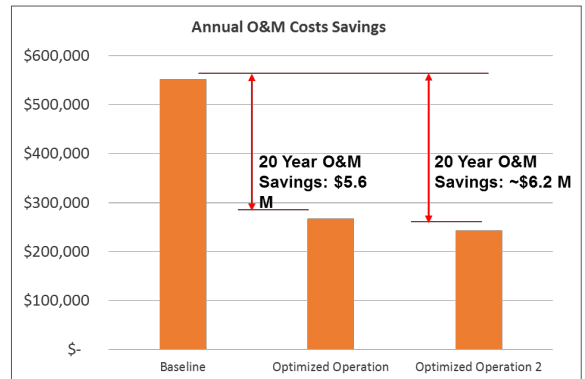
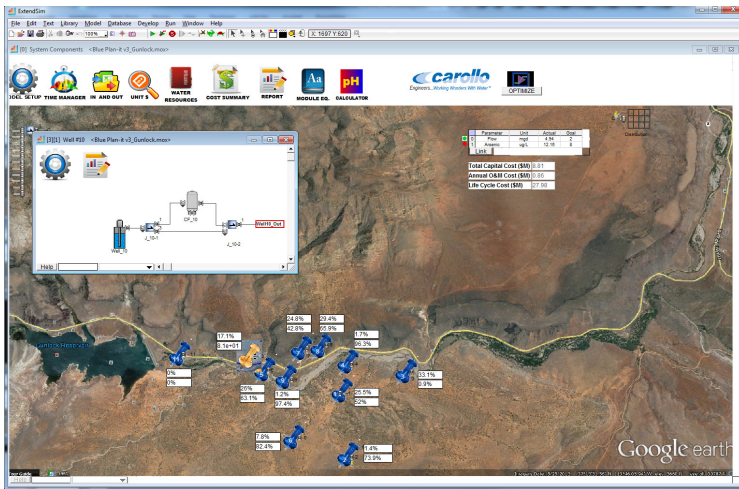
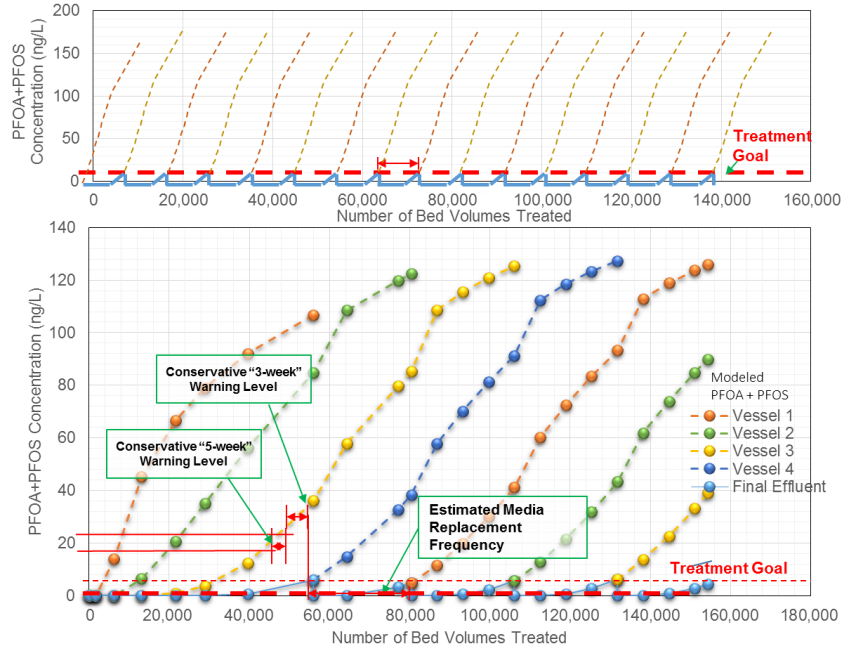
The screen shots on the right show a study completed for an Arizona well field with PFAS contamination where our optimization approach demonstrated significant capital and O&M savings. With data from RSSCT and full scale testing, we optimized the configuration of the treatment system (e.g., well head versus centralized, lead/lag with two or more in series or in parallel). It provided an operational guide for the GAC system, which considered the turnaround time for analytical service and the lead time for ordering replacement media.

Outage Analysis Feature

Our dynamic operation planning tool can be used to conduct “outage analysis” for a well field. It utilizes genetic algorithm optimizer or full factorial solver to promptly balance supply to meet the demand, assisting engineers, operators and managers to respond timely to an outage situation when one or more wells goes out of service.

Customizable and Flexible Deliverables

Connecting with Power BI, Tableau, Excel, GIS, and the Blue Plan-it® decision support system and its web portal, our approach can be delivered in a customized manner to meet specific needs.



Geographical information integrated into the dashboards for a well field study in St. George, Utah.