

DYNAMIC WATER BALANCE FOR INTEGRATED SYSTEM

WATER
OUR FOCUS
OUR BUSINESS
OUR PASSION

A Dynamic Decision Support Tool for Integrated Systems

The Blue Plan-it® One Water Suite is a fully customizable water resources planning and management tool developed by Carollo Engineers, Inc. It takes a holistic approach to manage all water resources including surface water, groundwater, potable water, gray water, wastewater, recycled water, agricultural drainage, and stormwater as "One Water" in one integrated platform.

From surface and groundwater extraction, conveyance, water treatment, storage and banking, to distribution, collection, wastewater treatment, water reuse, advanced treatment, disposal, and stormwater management, the Blue Plan-it® One Water Suite can model all water infrastructure components in one interconnected platform. The system-specific operational rules, water commitments and other environmental/regulatory requirements can be incorporated into the model to accurately simulate system functionality and performance. Multiple views, schematic or geographical, can be developed to meet specific needs for different audiences. Once a process flow diagram is completed, the tool automatically tracks water and mass for the whole system. Beyond basic water and mass balance, cost estimates, and data visualization, this decision support tool empowers users to perform what-if analysis, sensitivity analysis, Monte Carlo simulation, and multi objective optimization in one platform.

Typical Applications

The One Water Suite is designed for planners, engineers, water utilities and agencies to perform a wide range of water resources management studies. Below are some examples of how the tool can be used:

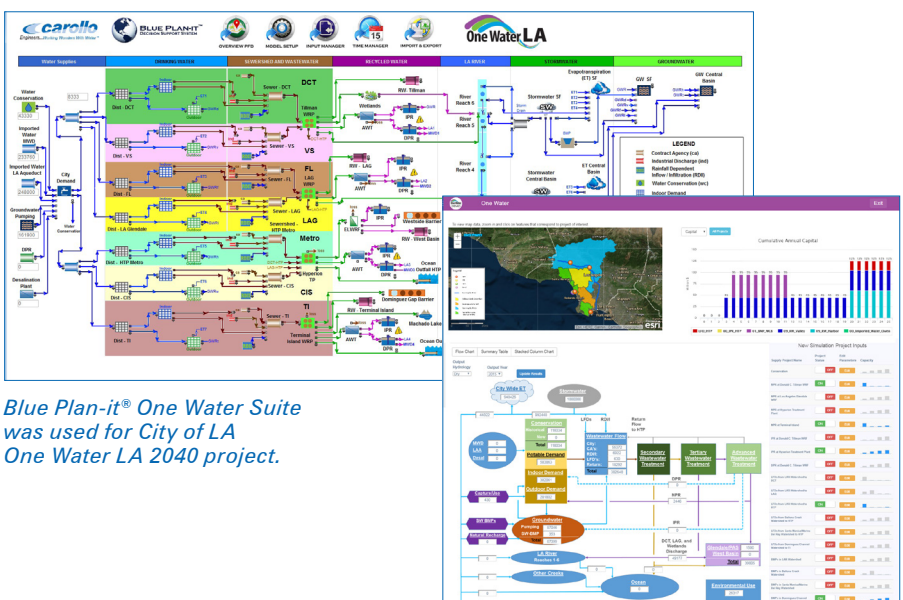
- Establish **whole system water balance** to quantify the availability of each source and connectivity of these water sources within the system.
- Evaluate **alternative planning scenarios** for various conditions (e.g., drought or wet weather) that account for precipitation, supply availability, usage, surface storage, groundwater recharge/storage operations, water quality variability, and discharge compliance.
- Identify the most cost effective and beneficial approaches for **use of available flow streams** based on a dynamic simulation (monthly/daily) to meet current and future demands.
- Assessing distribution **system water quality** based on evaluation of corrosion and stability, blending of sources, water age, chlorine residuals and disinfection byproducts

formation, salinity and inorganic and organic contaminants (e.g., nitrate, arsenic, fluoride, selenium, PFAS).

- Provide **water portfolio summaries** (e.g., fresh water intake, groundwater pumping, water conservation, non-portable, direct and indirect potable reuse, waste disposal, etc.).
- Determine the **sizing of future water facilities**, pipelines, pump stations,

reservoirs, etc., and associated costs for proposed capital improvement plan (CIP) projects.

- Prioritize proposed projects using the **"Dynamic CIP"** planner to meet multiple planning objectives (e.g., demands, sustainability or water conservation goals, fiscal constraints, etc.)



Blue Plan-it® One Water Suite was used for City of LA One Water LA 2040 project.



BLUE PLAN-IT®
DECISION SUPPORT SYSTEM

Tailoring Blue Plan-it® to Your System

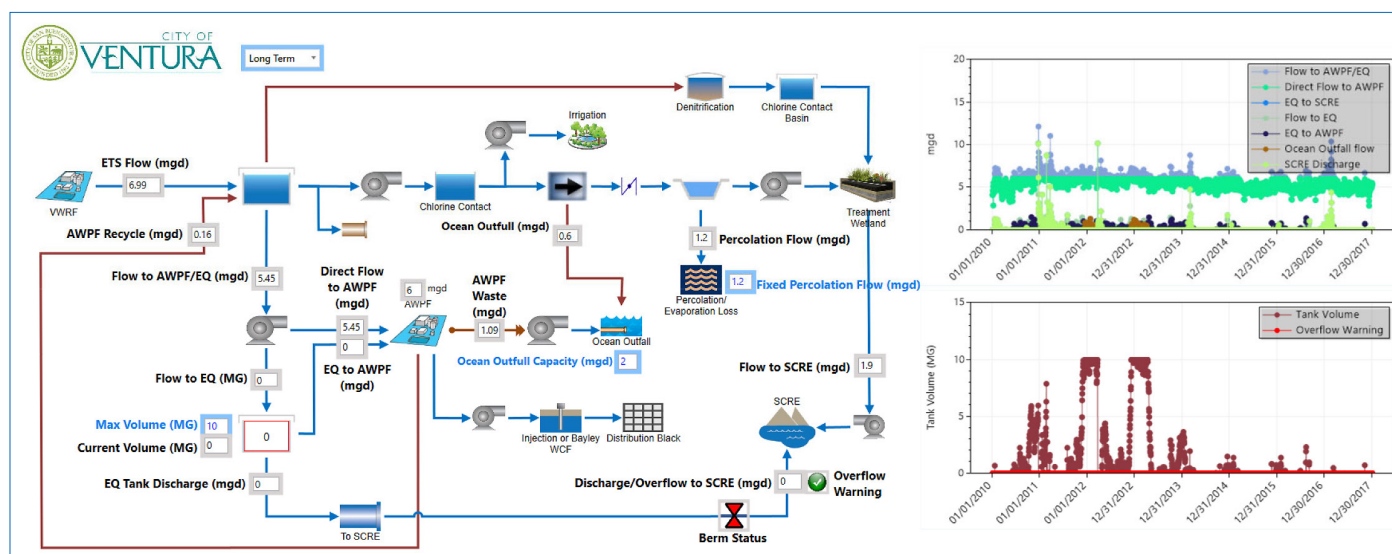
The flexibility of Blue Plan-it® allows us efficiently tailor the application to meet your needs with respect to platform, customizable dashboards, and integration with other models:

Flexible Delivery - Blue Plan-it® can be delivered in a web portal, with options for connecting with Power BI, Tableau, Excel, and GIS, to meet specific needs.

Customizable Dashboards - The Blue Plan-it® dashboard is the interface for the user. Model inputs/parameters and visualization of model results can be customized to meet individual preferences.

Integration with Hydraulic Models -

Blue Plan-it® can be used in conjunction or integrated seamlessly with hydraulic models such as EPA Net, Infowater, CityWater web app, Optimatics, Storm Water Management Model (SWMM), etc. Alternatively, it can be used to provide guidance on scenarios to be further evaluated in depth using hydraulic models.



The Blue Plan-it® dynamic water balance model was used to identify storage and discharge capacities under a range of conditions and regulatory constraints.

Case Study – Using Blue Plan-it® to Optimize Potable Reuse Production and Meet Discharge Limitations

For the City of Ventura's potable reuse project, Carollo developed a customized water balance model using Blue Plan-it® (BPI) to evaluate equalization needs and outfall capacities. Ventura must meet strict requirements of effluent diversions from the Santa Clara River Estuary to satisfy special status species and consent decree requirements. Recognizing the variability caused by climatological changes, Carollo ran 10 years of daily data through the model and created new hydrology data sets to test the system under different conditions. We developed scenarios

that included additional storage and outfall capacity to assess the best approach to maximizing purified water production and minimizing prohibited discharges. Output of daily time-series and annual summaries provided the City with a clear picture of the "end uses" of their effluent. As opposed to a spreadsheet model that may have taken weeks to develop and run scenarios, the Blue Plan-it® model facilitated rapid analysis of multiple scenarios and optimization routines, to establish operational rules and priorities under different conditions.