

Kitsap County Uses Hydraulic Modeling to Meet the Challenges of Optimizing a \$150M Wastewater Facility Plan

Kitsap County, WA occupies the majority of the western shore of Puget Sound and is home to a fast-growing population of more than 250,000 residents. Given the ecological importance of Puget Sound, planning the 20 year wastewater infrastructure needs of this region presented some difficult challenges including handling increasing flows from a growing service area, meeting strict regulatory requirements, protecting aquatic resources, and minimizing the required capital investment.



Main Objectives

One of the basic objectives of the Central Kitsap Facility Plan was to evaluate the collection system for existing deficiencies and to identify improvements needed to serve population growth over the 20-year planning period. Maximum utilization of existing facilities was considered as the baseline condition for planning improvements. This required characterization and evaluation of the conditions and performance of the existing wastewater infrastructure to identify deficiencies and to evaluate upgrade and expansion programs that would provide the best return on investment. In order to accomplish this [BHC Consultants](#) (BHC) developed a comprehensive hydraulic model of the Central Kitsap and Silverdale collection systems for Kitsap County.

Challenges and Solutions

The existing collection systems include over 114 miles of gravity sewers and force mains, with two double-barrel siphons and 44 lift stations. Both constant and variable speed lift stations pump to a range of individual and common force main configurations, discharging to gravity piping with widely varying slopes and experiencing a variety of surcharge conditions. Due to the hydraulic complexity of the County's wastewater collection system, BHC selected DHI's [MIKE URBAN](#) software to handle the development and calibration of the hydraulic model using the MOUSE computational engine.

"I had some experience using MOUSE before, so I was confident it would be able to handle this problem." says Dave Harms of BHC "We challenged the software with some pretty complicated hydraulic conditions, but with MIKE URBAN we were able to push through it and get the results we needed."

The modeling was conducted to help identify existing system deficiencies and evaluate the required improvements, including upgrades to gravity and force main piping and lift stations. A future build-out scenario including 153 miles of conveyance system piping was also developed and analyzed to identify improvements required to serve new areas and associated impacts on existing conveyance capacity. The model utilized parcel-based existing and future build-out loading from a GIS database.

"The ability of MIKE URBAN to seamlessly incorporate the build-out loading from the County's GIS database made our job a lot easier, and the overall GIS integration of MIKE URBAN made it pretty easy to learn as well. " adds Dave Harms.

Benefits Delivered

One of the key features of the collection system is the double barreled siphon in Royal Valley Road, conveying flow from the system to the treatment plant, from the south. Model results indicate that the siphon currently has a capacity of approximately 8000 gpm. The initial future conditions (2025) scenario included conservative assumptions on future growth and connection of all parcels in the service area currently served by septic systems. The 2025

scenario resulted in identification of significant improvements throughout the existing collection systems. Improvements included siphon upgrades required to convey over 15,000 gpm in this scenario. Numerous model runs were performed to identify improvements that would convey the increase in flows under this scenario, while avoiding replacement of a key section of the siphon under an existing stream. The model verified this goal was attainable, and furthermore, it helped to establish the feasibility of avoiding a very large pumping station that had previously been proposed.

For more information on how MIKE URBAN can help you to meet your collection system modeling needs, please visit www.dhigroup.com, send an email to dhi-us@dhigroup.com, or call our Toll Free North American number at 1-888-344-9233.

For more information on this modeling project please contact Dave Harms of [BHC Consultants](http://BHCConsultants.com) at David.Harms@bhconsultants.com.