In the world of data analytics there's a phrase that says we are data rich and knowledge poor. The rise of real-time data has put more information than ever at our fngertips, but without proper analysis and context, this data boom does not deliver much value.

The Stantec team is working to address this challenge in our approach to water infrastructure design and engineering to make our data work smarter and harder to deliver real value to clients. By using advanced hydraulic models, our team is focused on translating extensive data into a holistic story of the overall outcomes of a project.

The goal? To increase understanding and confdence, drive effciency, and achieve real cost savings.

Setting a plan, and checking it twice

Our ongoing work on one of the largest CSO projects in the Northeastern U.S. serves as a prime example of the great potential for advanced data analysis when applied to hydraulic modeling in optimizing project solutions. In this case, our team developed a detailed ft-for-purpose hydraulic model to help optimize CSO control facilities for the Narragansett Bay Commission (NBC) Phase III CSO Abatement Program in Rhode Island.

Over the past 20 years, NBC, which operates wastewater collection and treatment facilities for 10 member communities, has been leading a three-phase program to address CSO volumes and resulting environmental impacts. Program goals include a reduction of annual CSO volumes by 98 percent with no more than four overfows per year, an 80 percent decrease in shellfsh bed closures, and a 98 percent reduction in fecal coliform loading. The main component in Phase I (under construction from 2001 2

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By taking a TOTEX approach, we focused on analyzing the overall outcome for our client, rather than a single output of a project being successfully delivered on time and on budget. In this vein, we looked to examine standard operating procedures such as the long-term legacies, the costs, the impact on future maintenance, and ownership.

This strategy informed our approach in building the hydraulic model, where we mapped all water discharge infrastructure within the terrain and layered in rainfall data to establish flow data. We then used stochastically generated rainfall events to evaluate system exceedance rather than the traditional approach focused on retention. Combined, this data helped us better understand the system to determine flow trends into sewers, available capacity, and general water movement within the system.

Using a hydraulic model to understand both the magnitude of flows and the timing is critical. Individually, these data points represent simple flow conditions, but collectively they represent a complex matrix of interactions that must be understood and managed to create a successful outcome.

By continuously running the model, collecting NBC's SCADA data, and, in some cases, adding additional flow meters over the course of our five years on this project, the model has become increasingly informed. In seeing this data year over year, our team is looking for trends and changes, making sure that the designed system is standing up to the rigors of this increased implementation via real-time control