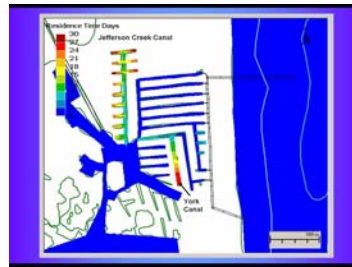


South Bethany Canals Flushing Study

Town of South Bethany, Little Assawoman Bay, Delaware



Situation

The purpose of this study was to evaluate an engineering design to enhance flushing in the South Bethany Beach. The town has a series of interconnected canals in a residential neighborhood. Due to insufficient exchange with the adjacent waterbody, Little Assawoman Bay, these canals suffer from poor water quality conditions. A network of pipes was proposed to connect the canals to the Atlantic Ocean. It was expected that flushing flows caused by the elevation differences between the canals and the ocean would increase flushing and improve water quality. Modeling was requested to corroborate this expectation.

Approach

A combined 3-D and 1-D hydrodynamic model, GEMSS® (Generalized Environmental Modeling System for Surfacewaters) was used to model the proposed system. The model grid included not only the adjacent waterbodies but also the canal and pipe network. The adjacent waterbodies (a portion Atlantic Ocean and Little Assawoman Bay) were included in the model domain to compute and feedback the tidal elevations to the 1-D canal and pipe network. The complete model was run first to test the pipe network and confirm the functionality of the system. Once the system was found to be functional and performing as anticipated, a numerical dye study was done to estimate the changes in the residence times to quantify the current degree of stagnation and the overall effectiveness of the proposed system.

Results

The study indicated a strong likelihood that the proposed design will improve the flushing rate in the canals. The

average residence time decreased from over 120 days to less than 3 days. The study was presented to the technical advisory committee, and will be used for future feasibility studies.



Figure 1 Canal and pipe network

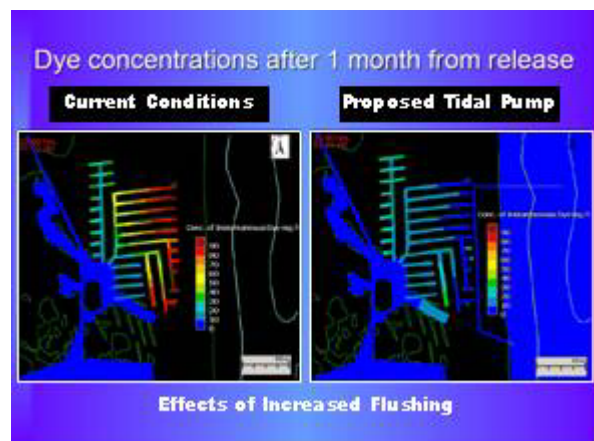


Figure 2 Flushing estimates with and without tidal pumps