

Water Supply - Watershed Management



Monitoring station at Aaron River culvert at Doane Street



Monitoring station at Bound Brook below the control structure

Stream Flow Monitoring & Hydrological Assessment Services - Cohasset, Massachusetts

As watershed consultant for the Cohasset Board of Water Commissioners, Norfolk Ram Group, LLC (Norfolk) recommended and implemented a hydrologic monitoring program for the Town's water supply watershed. The program started in 2003 and involved the design and installation of six (6) stream gauging stations at key points throughout the watershed, followed by on-going data collection and assessment. The goal of this hydrological assessment project is to evaluate the inflow/outflow characteristics of the watershed for Lily Pond and the Aaron River Reservoir (which connects to Lily Pond), which serve as the primary sources of drinking water for the Town of Cohasset. A better understanding of the watershed's hydrology and flow is essential to the successful protection of the surface water supply, and management of the associated watershed. Through this effort, the relationship between the stream flows, water releases from the Aaron River Reservoir and water withdrawals from Lily Pond are being quantified, so that the quantity and quality of the surface water supply, as well as the riparian habitats within the system can be better understood and protected.

The information is being used to refine the hydrologic budget for the water supply. Improved understanding of the watershed water balance improves the Commission's ability to manage seasonal fluctuations in surface water levels (by controlling the outflows from key reservoir and watershed control structures); and improves the Town's ability to manage wetlands and wildlife resources in the watershed and areas impacted by control structure outflows. In addition, the watershed nutrient loadings (such as nitrogen and phosphorous, which are also monitored by Norfolk under a related program) are dynamic, and hydrology plays an important role in assessing in-lake nutrient concentrations and their biotic influence on treatment plant performance and drinking water quality. Variability in this ecosystem is higher than most, and a complete hydrologic model improves the ability to predict impacts to the water supply from changes that may occur within the watershed.

Scope of Services

The hydrologic assessment involves the following four major components:

- (1) The installation of monitoring stations - electronic water level meters, that measure and store data on hydraulic pressure that is converted into water stage height. [Norfolk prepared a successful grant application to the Massachusetts Riverways Program (Fish & Wildlife Dept.) for the Town to purchase the stream gauging equipment.] The electronic level meter at each location is encased in a 4" PVC 0.020 slot-screen pipe. A traditional staff gauge is also set at each station (used to check accuracy of the electronic readings).
- (2) Detailed field survey of the stream bottom cross-sections and elevations at each gauge station. This information is critical for later determining stream flow rating curves for each location.
- (3) Periodic visits to the monitoring stations to download the elevation data that is recorded on an hourly basis. Also during each visit Norfolk records stream-velocities (using a USGS approved stream velocity meter) throughout the cross-sectional area of the stream.
- (4) The stream elevation/stream velocity data is then used by Norfolk to develop stage-discharge rating curves for each of the streams flowing into or out of the water supply. The stream velocity and stage height data are processed by a computer model developed by Norfolk utilizing a non-linear regression algorithm for the streams, to determine stream flow rates at different stream flow stages.

The stream flow rating curve data, generated from the analysis, is combined with other relevant data from the Water Department (*i.e.*, water use, precipitation and temperature), to develop a hydrologic water balance for the watershed. If you would like to know more about Norfolk's stream flow monitoring and hydrologic assessment, please contact Mark S. Bartlett, P.E., at (508) 747-7900, extension 131, or via email at mbartlett@norfolkram.com. Norfolk can also be visited on the internet at www.norfolkram.com.

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