

## USGS Framingham-Lake Cochituate Groundwater- Surface Water Interaction Study

### Progress Report, April 1 – June 30, 2011

**Project Title:** Groundwater and surface-water interaction in a complex glacial-fill hydrogeologic setting—balancing community water supply and natural resources needs

**Project Personnel:** J. Eggleston, P. Zarriello, C. Carlson, USGS VA and MA-RI Water Science Centers

**Project Begin Date:** October 1, 2010

**Project End Date:** September 30, 2014

### PROGRESS DURING THE QUARTER:

#### ***Task 1: Formed the project's Stakeholder Interest Group (SIG) and Technical Working Group (TWG).***

The goal of the SIG is to ensure that the project gives the opportunity for public input from all parties with an interest in the outcome of the project and the proposed reactivation of Framingham's Birch Road well field.

- Established SIG, and held first meeting with representatives from the U.S. EPA, National Park Service, U.S. Fish & Wildlife Service, Town of Framingham, Mass DCR, Mass DEP, Mass Water Resources Authority, Mass Executive Office of Environmental Affairs, Organization for the Assabet, Sudbury, and Concord Rivers, and the USGS. An overview of the project and of progress to date was presented and various stakeholder interests were discussed. Subsequent communications were held with officials from the Town of Wayland, who will attend the next SIG meeting.

The goal of the TWG is to provide technical and scientific guidance and to ensure that the project uses the best available methods, tools, and science.

- Established the TWG, and held first meeting. The group consists of members from the following institutions and organizations.

Prof. David Ahlfeld	-	University of Massachusetts, Amherst
Prof. Grant Garven	-	Tufts University
Paul M Barlow	-	US Geological Survey, Office of Groundwater
Thomas J Mack	-	US Geological Survey, New Hampshire
Daniel Nvule	-	Massachusetts Water Resources Authority

The technical scope and modeling methods of the project were presented and discussions of scientific approach were held that provided direction for subsequent modeling efforts.

***Task 2: Problem Definition***

Extensive data have been compiled describing the history, geology, hydrology, and physical characteristics of the study area. The study area has more than a century of history of as a water supply source. A compilation of numerous earlier studies describe the site as a shallow aquifer composed of glacial drift sediments in close hydraulic connection with surface water features including streams, ponds, and wetlands. Data compiled for the study include: land surface elevations, stream network geography, and pond bathymetry; borehole logs, sediment logs, ground penetrating radar, and seismic profiling; stream stages, pond stages, streamflows, groundwater levels, and groundwater pumping test data; climatic data; and previous output from groundwater and surface water models.

***Task 3: Preliminary Model Development and Sensitivity Analyses***

The preliminary groundwater model, based on the MODFLOW software package, is up and running and is 70% complete. Initial output from the model looks good and calibration of the steady-state version of the model is nearly complete.

In the course of developing the model, several important data needs became evident. Although the current phase of the project (Phase I) was not intended to include data collection, several short-term data collection opportunities were undertaken to meet immediate and pressing data needs of the preliminary model. Field activities completed as of June 30, 2011 include passive seismic data collection to determine depth to bedrock and periodic streamflow measurements at Dudley Pond and 'Kidney Pond' outlets. These additional data improved our understanding of the bedrock surface configuration and groundwater contribution to the ponds. Further data needs have been identified and further data will be collected in the next quarter.

**PLANS FOR NEXT QUARTER:*****Task 3: Preliminary Model Development and Sensitivity Analyses***

In the next quarter, model development tasks will include upgrading to a transient version of the model, performing sensitivity analysis, and running scenarios to answer questions about effects of pumping wells on surface water.

***Data Collection***

Data collection efforts will be continued as data needs are identified and appropriate collection opportunities present themselves. The Town of Framingham intends to fund the installation and logging of several wells to the north of the proposed pumping wells. These wells should be completed by end of September, 2011. Plans are being made for USGS funded ground penetrating radar (GPR) data collection efforts. The GPR data collection, if it proves feasible, will likely occur by the end of September, 2011.

**STATUS OF REPORT(S):**

Portions of the Preliminary Report have been completed, including the Introduction, and Sections on the geology, hydrography, and hydrogeology of the study area. Modeling Sections are presently 50% written. Our goal is to have an initial draft report ready by the end of September, 2011.