

Compiling Key Aquifer Properties for use in the Water Withdrawal Assessment Tool

Synopsis

Transmissivity is an important aquifer characteristic to determine a well's drawdown and potential impacts on nearby streams. In 2005, the Groundwater Inventory and Map Project used 282,802 records in the State of Michigan's Wellogic database to estimate transmissivity for both the glacial and bedrock aquifers throughout Michigan. These estimates were built into the WWAT. Today, there are over 575,000 records in the Wellogic-2 database and many of these contain automatically derived estimates of the effective transmissivity of both unconfined and confined aquifers. The doubling of the number of Wellogic records, combined with the standardized estimation of aquifer properties in the Wellogic-2 database, will allow the statewide estimates of transmissivity for both the glacial and bedrock aquifers, key components of the WWAT, to be significantly improved. On an ongoing basis, Sec. 32706a (6) requires EGLE to add verified data about the geologic and water resources to the WWAT database. Currently, scores of aquifer tests associated with irrigation wells have been conducted by private consultants (e.g., 50 aquifer tests were conducted in the Cass County Pilot Project). The EGLE, Water Use Program should collect, compile and combine these data with Wellogic data to develop new statewide estimates for transmissivity. This will improve predictions made in the WWAT.

The current storage coefficient used in the WWAT for glacial aquifers is 0.01. This value was based on a 2004 database of aquifer tests from public water supplies (PWS). The most recent aquifer test data for PWS at DWEHD, EGLE (October 2015) contains more than twice the number of test results and these conclusively show that a storage coefficient of 0.10 is much more appropriate for unconfined glacial aquifers. A GIS method to identify all Water Management Areas (WMAs) used in the WWAT that are dominated by unconfined, glacial aquifer conditions was recently developed. WMAs selected by this method should have their storage coefficients increased to 0.10 in the WWAT. Applying a higher storage coefficient will better reflect the local aquifer characteristics, and provide better estimates of streamflow depletion.

Recommended Actions

The WUAC strongly recommends that the legislature allocates \$100,000 to the EGLE, Water Use Program to be expended across two fiscal years for

- (1) an external contractor (\$12,000) who will (a) compile and derive statewide estimates of transmissivity for both the glacial and bedrock aquifers according to the protocol already approved by the Council and incorporating all transmissivity values from irrigation aquifer tests that EGLE compiled; and (b) identify all WMAs statewide that are dominated by unconfined, glacial aquifer conditions using the GIS method already approved by the Council; and
- (2) DTMB (\$88,000) to incorporate the new estimates of transmissivity into the WWAT and to alter the WWAT to utilize a storage coefficient of 0.10 in all WMAs that the contractor determined are dominated by unconfined, glacial aquifer conditions.

Implementing Organization

The EGLE, Water Use Program (WUP) will work through the DTMB to solicit bids from qualified contractors to (1) compile and derive statewide estimates of transmissivity for both the glacial and bedrock aquifers and (2) identify all WMAs statewide that are dominated by unconfined, glacial aquifer conditions. The EGLE, WUP will be the point of contact for the State of Michigan to manage the subsequent contract. The EGLE, WUP will develop a work order with DTMB Center For Shared Solutions (CSS) to have CSS incorporate the new estimates of transmissivity into the WWAT and to alter the WWAT to utilize a storage coefficient of 0.10 in all WMAs that the contractor determined are dominated by unconfined, glacial aquifer conditions.

Timeframe

This recommendation envisions a 12-month contract for the successful contractor to complete (1) the compilation and derivation of statewide estimates of transmissivity for both the glacial and bedrock aquifers in Michigan and (2) the mapping of all WMAs statewide that are dominated by unconfined, glacial aquifer conditions. EGLE, WUP will develop a work order with DTMB CSS within a 6-month period and CSS will (1) incorporate the new estimates of transmissivity into the WWAT and (2) alter the WWAT to utilize a storage coefficient of 0.10 in all WMAs that the contractor determined are dominated by unconfined, glacial aquifer conditions over a 12-month period.