



Waukesha Water Utility

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July 29, 2011

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DRINKING WATER & GW

Mr. Eric Ebersberger
Wisconsin Department of Natural Resources
101 Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Subject: June 17, 2011 letter from Douglas Cherkauer to the Wisconsin Department of Natural Resources (WDNR) regarding additional commentary on aspects of groundwater modeling of the shallow aquifer system around Waukesha wells 11, 12, 13

Dear Mr. Ebersberger:

Thank you for forwarding for our review the subject letter offering additional considerations related to the United States Geologic Survey/University of Wisconsin-Milwaukee (USGS/UWM) Upper Fox River analysis of riverbank inducement (RBI) as a source of drinking water supply. This potential source of water supply has been evaluated as part of the City of Waukesha's (City's) long-term water supply planning process over a decade ago, and further evaluated and presented in its draft *Application for a Lake Michigan Water Supply (Application)*. The following is the City of Waukesha's (City's) response.

Regarding the take away points from the April 1, 2011 presentation on RBI, we find both analyses - that conducted using the USGS/UWM Upper Fox River model and that conducted using the Troy Bedrock Valley (extracted from the Regional Aquifer Model for Southeastern Wisconsin) - establish the following:

1. The shallow aquifer near the Fox River and in the Troy Bedrock Valley can yield water to meet a portion of the City's long-term water supply.
2. Wells located close to the Fox River cause less aquifer drawdown than wells further from the river because river water flows toward wells along with groundwater.

We disagree with the statement "Thus the induced portion of any pumpage from wells along the Fox will be completely recycled." When the City's treated wastewater effluent is discharged to the Fox River upstream of riverbank infiltration wells, *a portion of* the river induced water is recycled. There is some loss to consumptive use. However, we agree that a result of this recycling of wastewater is that baseflow reduction in that portion of the Fox River will be less than if it was not recycled. This was stated in the *Application*.

In the City's water supply planning process, the availability of an adequate quantity of water over the long term is an important consideration, but other criteria – including public health protection, impact on the environment, implementability, and cost – are equally important.

Public Health

Water captured in riverbank wells includes wastewater treatment plant effluent. During dry weather conditions, like those in years 1988, 2003, and 2005, municipal wastewater effluent comprised approximately 30 – 70 percent of the Fox River flow in Waukesha.

River water induced toward water supply wells is less protective of public health because reused water has more contaminants. While some contaminants can be removed by conventional surface water treatment, others cannot. For example, many pharmaceuticals, personal care products, disease causing microorganisms and salts (i.e., chlorides from home water softeners) pass through the City's wastewater treatment processes and contaminate the Fox River. Storm water also drains into the river. Chemical and oil spills are potential sources of contamination in the river. To remove these compounds, advanced treatment processes like reverse osmosis, activated carbon adsorption, or advance oxidation may be required. In addition to being expensive, these processes can be energy intensive and result in a greater carbon footprint. Given the quality of Fox River water and the need to provide water that is protective of public health, the processes to treat river water must be robust and reliable.

There are also aesthetic issues associated with implementing water reuse strategies. Public acceptance of treated wastewater as a portion of its water supply has proven challenging for other water utilities in the country faced with limited sources of supply.

Impact on the Environment

Model simulations of shallow aquifer and riverbank pumping predict declining groundwater level and reduction of groundwater baseflows that feed surface water features like rivers, creeks, and wetlands. When the quantity of baseflows is reduced, aquatic habitat in the surface water bodies can be degraded. While recycling treated wastewater will restore a portion of the flow in the Fox River, a significant amount of the groundwater discharge that would have fed other surface water sources will be diverted toward wells. Surface water bodies, as well as the aquatic biota that they support, rely heavily on groundwater discharge for temperature and chemical stability.

The areas that appear most productive for shallow well development are located in and near environmentally sensitive features like the Vernon March, Pebble Brook, and Pebble Creek. It is not consistent with the long-term regional land use plan to adversely impact these rare water-dependent natural resources.

To clarify the June 17, 2011 letter reference to a "possible glitch with respect to [model] input" as pertains to simulated aquifer drawdown, WDNR questioned drawdown at one well during its technical review. Through discussions with WDNR, it was then determined that one well was incorrectly simulated in a single model layer. When that input was subsequently corrected, the model simulated appropriate drawdown for the model layers. Overall groundwater drawdown from the water supply alternative incorporating riverbank wells still indicated significant drawdown and environmental impact. The model used for the simulation of the riverbank inducement (RBI) wells was constructed specifically for the purpose of evaluating potential groundwater withdrawal scenarios for municipal water supplies. Additionally, the model was peer-reviewed by Dr. Ken Bradbury of the Wisconsin Geological and Natural History Survey. Consequently, it should be considered an acceptable tool in the evaluation of impacts from high capacity groundwater pumping.

Implementability and Cost

The implementation issues associated with developing new high-capacity wells located outside the City's municipal jurisdiction and within a state-designated groundwater management area are significant. In addition to a technical evaluation of simulated groundwater pumping, recharge, and drawdown, new wells will be subject to rigorous regulatory and policy review given evolving state laws, recent court rulings, and the Public Trust Doctrine. Given current litigation associated with test well exploration in the shallow aquifer near Waukesha, it is highly likely wellfield development in this area will be subject to other costly, and time-intensive legal actions.

All of the long-term water supply solutions for the City require significant investment. Planning-level cost estimates for developing riverbank induction wells, along with other sources of supply, to meet the City's needs were developed. The solution involving riverbank infiltration wells is not lowest in cost.

As stated in the June 17, 2011 letter, both models are defensible and useful despite variation in construction, assumptions, boundary conditions, and scaling factors. The discussion of differences in modeling approaches and uncertainties can continue, but do not significantly change the overall results related to long-term sustainability, environmental impact, protection of public health and cost. Most critical during this screening stage of alternatives

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are the findings that groundwater pumping and aquifer recharge conditions simulated by both models indicate that the shallow aquifer can yield water to meet a portion of the City's long-term needs and, that as a result of pumping, groundwater level and baseflow contributions to surface water resources will decline resulting in adverse impacts greater than those with the Great Lakes alternative. Costs are also greater than the Lake Michigan alternative and the water supply alternative including riverbank wells is less protective of public health.

We appreciate your careful consideration of the *Application* and supporting documentation. Please contact us again if further information or clarification is needed to support your work.

Sincerely,

Waukesha Water Utility

A handwritten signature in blue ink, appearing to read 'D. Duchniak', is written over the printed name.

Daniel S. Duchniak, P.E.
General Manager

cc: Water Commission
Cathy Stepp, WDNR Secretary
Eric Ebersberger, DG/5
Jill Jonas, DG/5