

# Comments on the GZA GeoEnvironmental, Inc. Letter on a Non-Diversion Water Supply Alternative for Waukesha

PRESENTED TO: Wisconsin Department of Natural Resources  
PREPARED BY: CH2M and the Waukesha Water Utility  
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During the public comment period for the Wisconsin Department of Natural Resources (WDNR) Draft Technical Review and draft Environmental Impact Statement (EIS) for the City of Waukesha Application for a Lake Michigan Diversion with Return Flow (Waukesha Application), the Compact Implementation Coalition proposed a non-diversion water supply alternative. A summary of the proposal is contained in a July 9, 2015 technical memorandum to Clean Wisconsin and Milwaukee Riverkeeper. Further information supporting the summary technical memorandum was requested of the Compact Implementation Coalition but not provided. The following comments address the July 9, 2015 summary memo (GZA memo).

## Overview

Waukesha has applied to WDNR to withdraw Lake Michigan water and return it to the lake via a tributary (Root River), after use and treatment.

The GZA memo describes a proposed water supply alternative in which Waukesha continues to use its existing water supply sources (deep and shallow aquifers) and adds reverse osmosis (RO) treatment systems for removal of radium and other groundwater contaminants. This alternative is not new. It was previously and extensively evaluated by the Waukesha Water Utility and WDNR. Following thorough investigation, the alternative was rejected for a number of reasons. Most notably, the alternative has greater adverse environmental impacts than a Lake Michigan water supply.

Some of the defects in the alternative, with additional details, include the following:

- **Environmental Protection**—Compared to a Lake Michigan supply with return flow, the non-diversion alternative has greater adverse environmental impacts: harm to wetlands, lakes, and streams from shallow aquifer pumping and harm to aquifers and hydraulically connected surface waters from deep aquifer pumping. The non-diversion alternative contributes to excessive groundwater drawdown in Waukesha County, which is a regulated Groundwater Management Area under state law.
- **Water Quantity**—The non-diversion alternative provides inadequate water supply for the citizens of Waukesha and does not adequately plan for the future. It fails to meet the needs of their own low water demand projections. Their proposal assumes a smaller water supply service area and low water usage. This does not comply with state water supply planning laws and fails to meet Great Lakes Compact requirements.
- **Water Quality**—The alternative does not meet the radium regulations under all flow conditions.
- **Water Supply Infrastructure**—The non-diversion alternative provides insufficient facilities for a reliable water system. Not only is the water quantity too low, the water supply and treatment facilities do not provide safe, reliable, consistent water quality to customers. Important issues, such as the environmental impacts and waste disposal costs from RO treatment, are ignored. There are

no provisions for future treatment requirements or replacing aging existing groundwater supply infrastructure.

- **Cost**—The non-diversion alternative will actually cost much more in over time than a Lake Michigan water supply. The alternative is unsustainable and will have to be replaced in the future, making water customers pay twice for a water supply.

## Environmental Protection

The GZA memo states "no additional impact to the surface water and wetlands are expected." In fact, there are significant impacts.

Extracting shallow groundwater and discharging it to the Fox River has adverse environmental impacts to wetlands, streams, springs, and lakes. The impacts are detailed in the WDNR Draft Technical Report and EIS, Waukesha Application, and Southeastern Wisconsin Regional Planning Commission (SEWRPC) reports. A Lake Michigan alternative, on the other hand, does not extract any groundwater and therefore has no adverse environmental impact on the water resources.

By saying "no additional impact to the surface water and wetlands are expected", the GZA memo ignores the current adverse environmental impact of pumping shallow and deep aquifer water. Clearly, the impact cannot be ignored.

In addition, continued and increased deep aquifer pumping, as proposed, continues the adverse environmental impacts on the deep aquifer. The fact that the deep aquifer is stressed is a conclusion shared by multiple technical reports that span decades, and is reflected in the state groundwater management law. Continued and increased deep aquifer pumping, as proposed in the GZA memo, continues the withdrawal of groundwater away from Lake Michigan instead of restoring the natural flow path towards Lake Michigan.

Unlike Waukesha's Lake Michigan proposal, the non-diversion alternative does not provide any reuse or return flow to water resources. Instead, water is extracted from freshwater aquifers and discharged to the Fox River and eventually to the Gulf of Mexico. This depletes local water resources. The Lake Michigan alternative practices sustainable water reuse and improves the habitat of a tributary river to Lake Michigan, providing an environmental benefit.

The GZA memo claims that the deep aquifer is "sustainable." This assertion is based on select recent data on groundwater levels and ignores the history of groundwater levels in the deep aquifer. Even at recent groundwater levels, the deep aquifer has been drawn down hundreds of feet and is hundreds of feet below the threshold of the 150-foot drawdown designation of a Groundwater Management Area. Many peer reviewed reports from United States Geologic Survey, International Joint Commission, WDNR, SEWRPC, and others all draw attention to the significant drawdown of the deep aquifer and the problems it presents. Consequently, many communities that previously relied on the deep aquifer have abandoned the depleted source of supply for a sustainable Lake Michigan supply.

The GZA memo assumes no additional deep aquifer use by other communities currently using the deep aquifer and uses a recent snapshot to predict future groundwater conditions. Failure to consider future and cumulative impacts results in unrealistic and poor water supply planning. Historical evidence reveals that the deep aquifer temporarily rebounds in response to reduced pumping and that groundwater levels drop again in response to future increased pumping. This has already happened in Brown County, Wisconsin and in northeastern Illinois. Recent history in Waukesha shows deep aquifer water levels rising when the large-capacity (3.5 million gallons per day [mgd]) Waukesha Well #10 was out of service, only to drop again when Well #10 returned to service. The SEWRPC Regional Water Supply Plan performed extensive groundwater modeling with various scenarios of communities on and off the deep aquifer. Under scenarios when Waukesha remained on the deep aquifer, water levels did not recover.

Waukesha County is one of only two areas in Wisconsin designated by WDNR as a Groundwater Management Area due to excessive groundwater drawdown in the deep aquifer (Brown County is the other area). This designation is inconsistent with the GZA memo's claim that the deep aquifer is sustainable.

## Water Quantity

### Service Area

The state water supply planning law that prescribes the process and requirements of water supply service area delineation complies with the Great Lakes Compact. Limiting the water supply service area to the City municipal boundary, as suggested in the GZA memo, fails to meet state planning laws and Compact requirements.

Waukesha already provides water and wastewater services to portions of other communities within its delineated service area, as requested and needed by customers lacking safe water or sanitary service. The GZA memo asserts that the areas within the service area have not demonstrated a need for a Lake Michigan water supply with return flow. In fact, elected officials representing the communities within the Waukesha service area have demonstrated a need to have a sustainable, long-term supply of water through adoption of resolutions supporting their inclusion in the Waukesha Water Supply Service Area Plan.

### Conservation

The GZA memo claims that Waukesha does not meet conservation requirements of the Compact. All Waukesha water service customers, including those located outside Waukesha city limits, are required to pay conservation water rates and are subject to conservation operating rules enforced by the Public Service Commission of Wisconsin. All water service customers are eligible for water conservation financial incentives and provided access to water conservation educational materials. WDNR has thoroughly evaluated Waukesha's conservation program and determined that Waukesha and its water customers meet the water conservation requirements of the Compact and Wisconsin's Compact implementing law.

### Water Demand Projections

The water demand projections in the GZA memo are based on a service area that does not meet state planning laws; therefore, the demand forecasts are invalid.

The GZA memo based water demand projections on a small number of years (2002 to 2014) and a period when demands decreased across the nation. This approach underestimates long-term water needs. Effective long-term water supply plans are based on reliable water demand projections that consider a range of possible future economic and community conditions, not just the lowest possible numbers.

In Waukesha, water use intensity by each customer class is relatively low compared to other communities in Wisconsin, as detailed in the Waukesha Application and the WDNR Draft Technical report. The GZA memo not only assumes continuation of the lowest potential forecasted water use, but also zero change in water use across customer classes for perpetuity. Without contingency for change in water use across customer classes, demand projections are unreliable and an inappropriate basis for the development of a new water supply infrastructure.

## Water Quality

The non-diversion alternative does not meet radium regulations. The GZA memo uses average annual water production and radium concentrations from each well to determine radium compliance and ignores maximum day water production. In addition, firm capacity requirements are ignored (WDNR required capacity with the largest well out of service). Under conditions of maximum day demand and

the largest well out of service, the radium regulations are violated. If radium concentrations increased in the future, the situation would worsen.

## Water Supply Infrastructure

The GZA memo incorrectly projects a maximum day demand of 11.1 mgd, as noted previously in the water supply service area section. Even at that low projection, Waukesha cannot produce 11.1 mgd firm capacity with their existing wells, as claimed in the GZA memo. Firm capacity today is only 10.5 mgd. The GZA memo assumes that shallow wells can produce a firm capacity of 1.5 mgd. The reality, based on actual operational data from the Waukesha Water Utility, is that the wells can only reliably produce 1 mgd. Due to groundwater drawdown and poor water quality when the wells are pumped, the shallow well capacity is limited. In the future, or during a drought, the situation may be much worse. The real operating constraints would require new shallow wells to be drilled and pumped, further increasing environmental harm and costs.

The GZA memo assumes the wells will continue producing water at the same rate, no wells will need to be replaced, and no new wells will be needed. Based on Waukesha's actual experience, wells lose capacity over time, water quality degrades, and equipment wears out. Some deep wells are already 80 years old. For example, Waukesha has had deep wells collapse, pump motors break off and fall to the bottom of the well, and salt and radium increased in Well #9, causing the capacity to be decreased over 30 percent. Other Waukesha wells were taken out of service because of groundwater contamination (Wells #1 and #2). The deep aquifer is not a reliable or sustainable water source. The Waukesha Application assumed decreasing capacity in the deep wells and more shallow wells to make up the difference in their deep/shallow groundwater supply alternative. The GZA memo ignores the cost and reliability of this important aspect of water supply planning.

RO treatment creates a large volume of salty waste brine. The GZA memo ignores this important issue. Many Midwest water utilities have evaluated RO waste disposal and determined it could not be simply discharged to the sewer, as the GZA memo apparently assumes, due to environmental impacts and permitting issues. If RO waste sewer disposal was not possible now or in the future, the cost of this alternative would be more than double. The Waukesha Application discussed the issues and costs of RO waste handling in Volume 2, page 11-14.

The GZA memo assumes shallow groundwater uses existing treatment for iron and manganese only. There are no provisions or costs for future treatment requirements. Shallow groundwater is susceptible to many contaminants, and wells could pull in surface water, requiring expensive surface water treatment. The WDNR Draft Technical Report and the Waukesha Application quantify potential contamination sources for the shallow aquifer. The Waukesha Application further includes a substantial cost for additional shallow groundwater treatment. The GZA memo ignores the important public health and cost issues.

It appears that the GZA memo assumes that only the deep well water is blended, leaving the shallow wells to go directly to customers. This would create unequal water quality to customers in various areas of the distribution system. Some customers would get hard, shallow groundwater and some would get softer water from treated deep groundwater. The unequal water quality also creates operational and water quality issues in the water distribution system pipes. The Waukesha Application includes the cost of pipes for the blending of all water so all customers get consistent water quality.

## Cost

As previously noted, the GZA non-diversion alternative is under-sized and underpriced, and is based on a service area that does not meet regulatory requirements. Therefore, the alternative and the costs are not valid.

Even with proposed lowered demand and use, the GZA non-diversion alternative is not sustainable for the long term due to significant drawdown of the deep aquifer, inadequate supply capacity, exceedance of radium regulations, no provisions for future treatment or waste disposal, and environmental impacts. Any one of the issues would make the non-diversion alternative inadequate and more costly. When the existing supplies and components of the groundwater supply water system become inadequate, another water supply system would be needed at much greater cost, a waste of water customers' money.

The GZA memo ignores the huge cost of RO waste treatment if disposal to the sewer is not permissible at any point. Our cost estimate to treat the RO waste is over \$200 million present worth (50 years). This one issue more than doubles the cost of the non-diversion supply alternative.

The GZA memo does not include any cost for additional treatment of shallow wells. Arsenic and molybdenum have been detected in nearby shallow groundwater and there are numerous sources of contamination in the shallow aquifer. The shallow wells are also close to the Fox River and could draw surface water in the future if pumped hard. Any one of these issues would require additional treatment of the shallow groundwater and significantly increase costs. In the Waukesha Application, examination of groundwater alternatives included costs and infrastructure for further treatment of the shallow groundwater.

Although details were not released, it appears that the cost of the GZA alternative does not include piping to blend all the water sources. This will result in unequal water quality being distributed to some customers, and an increase in the cost of home water softening. In the Waukesha Application, examination of groundwater alternatives included costs for piping to blend all water so customers get consistent water quality. The Waukesha Application includes the cost of home water softening under groundwater alternatives, which is a real cost to customers. The GZA memo does not include these costs.

## Long-term Water Supply Planning

The costs of water supply infrastructure are so significant that defensible decisions can only be made by comprehensively considering long-term needs. Making assumptions based on snapshots of data, ignoring historical trends, and impractically constraining potential future conditions is not prudent planning. If a water supply is not sustainable for 100 years or more, the community and its water customers will pay repeatedly for short-term infrastructure that is ultimately abandoned for a long-term water supply system. Spending money on short-term water supply systems ultimately wastes money. Investing in a long-term, reliable water systems costs less over time.

Environmental and social responsibilities include avoiding "last resort" situations where natural resources are depleted or mined out and community public health is at risk. The Compact requires that Lake Michigan water be the only reasonable alternative, not that it be the last resort.

The water supply alternatives evaluation in the Waukesha Application considered all the long-term water supply planning principles to protect public health, protect the environment, and provide a reliable, safe water supply. The GZA non-diversion alternative fails to do this.