Antidegradation Evaluation for the City of Waukesha Application for a Lake Michigan Water Diversion with Return Flow

PREPARED FOR:	Wisconsin Department of Natural Resources (WDNR)
PREPARED BY:	CH2M HILL on behalf of the City of Waukesha
DATE:	December 20, 2014 (updated on May 26, 2015 to provide cross references in Part C.7 to Application)
ATTACHMENTS:	Great Lakes Diversion Application July 25, 2014 Letter Response to WDNR

This memorandum is an evaluation of the City of Waukesha Application for Lake Michigan Water Diversion with Return Flow (Application) as it relates to antidegradation requirements included in Wisconsin Administrative Code Chapter NR 207.

Background

The Wisconsin Department of Natural Resources (WDNR) is reviewing the Application (October 2013) prior to a Great Lakes basin regional review. This includes reviewing the Application for its ability to meet Wisconsin permitting requirements. The WDNR is determining if the Application would be permittable following approval from the Great Lakes-St. Lawrence Water Resources Regional Body. Consequently the WDNR is not issuing a permit at this time but has requested an antidegradation evaluation be completed.

The City of Waukesha is requesting a Lake Michigan water diversion with return flow through the Root River. The Great Lakes – St. Lawrence River Basin Water Resources Compact (Compact) requires that the City return the withdrawn water after use. Antidegradation requirements of NR 207 are imposed on the return flow because the return flow is a discharge to a different surface water from where the City of Waukesha's wastewater treatment plant (WWTP) currently discharges. However, because the Compact requires return of the diverted water and the return flow would not occur without the Lake Michigan water supply, antidegradation is evaluated as a system. This is consistent with the approach taken in the Application and its proposals for meeting other Compact and Wisconsin permitting requirements.

As part of the WDNR's review of the Application, an antidegradation worksheet was provided to the City of Waukesha to serve as a template for providing the evaluation. The worksheet is used by the WDNR as part of their internal review of antidegradation evaluations. For ease of review, this memorandum follows the general outline of the worksheet.

General Information (Worksheet Part A)

The City of Waukesha has an existing wastewater treatment plant that discharges to the Fox River (WPDES Permit Number 0029971-08-0). The WWTP and its outfall to the Fox River is located at 600 Sentry Drive, Waukesha, WI. The return flow outfall is proposed in Franklin near the southeast corner of 60th Street and Oakwood Road, downstream of the 60th Street bridge (Latitude: 42.855411, Longitude: -87.989370). The Application includes providing continuous return flow to the Root River. When the WWTP effluent flow exceeds the maximum return flow rate, such as during rain events, a portion of the flow would continue to discharge to the Fox River following the return flow management plan summarized in Section 2 in Volume 4 of the Application and as amended by WDNR[1].

[1] Email correspondence from Nicki Clayton (WDNR) to Dan Duchniak (Waukesha Water Utility) on November 3, 2014. Subject: Waukesha Return Flow Volume.

The antidegradation requirements of NR 207 require classification of the discharge as either a new or increased discharge, but it could be argued that the return flow does not meet either NR 207 definition. However, for the purposes of this evaluation, documentation is provided for a new discharge as requested by the WDNR.

Indicator Parameters (Worksheet Part B)

The WWTP monitors bioaccumulative chemicals of concerns (BCCs) such as monthly sampling for mercury as part of their existing permitting requirements. As summarized in Section 6.4 of Appendix A in Volume 4 of the Application, the City implemented a Mercury Pollutant Minimization Program in 2007. Since then the mercury concentration in the WWTP effluent has dropped to levels below the wildlife criterion and Lake Michigan criterion of 1.3 ng/L. Consequently, mercury is not a BCC parameter of concern for the return flow.

The City of Waukesha does not have detectable PCBs in their wastewater collection system and therefore sampling for PCBs as a BCC is not required as part of their existing permit. Instead sampling is completed during the permit application to demonstrate that PCBs are not present in WWTP flow. As part of the City's last permit application (June 2012), seven PCB samples were completed. All test results were below limits of detection. Consequently, PCBs are not a BCC parameter of concern for the return flow.

The Root River is a tributary to Lake Michigan but the return flow does not have BCCs. As a result, NR 207 directs the antidegradation evaluation to follow procedures for Fish and Aquatic Life Waters, including listing indicator parameters. In an October 27, 2014 meeting, indicator parameters were proposed by WDNR to include mercury, ammonia, chloride, copper, temperature, and total suspended solids (TSS). The WDNR has proposed draft effluent limits for return flow where several effluent limits are listed at the water quality criterion (see Section 3.1.5, Appendix A, and Attachment A-3 in Volume 4 of the Application). As summarized in the Application, there are no exceptions requested of the proposed effluent limits. Therefore because the return flow will meet all proposed effluent limits and there are no BCCs, the return flow water quality will be fully protective of fish and aquatic life.

Antidegradation Evaluation (Worksheet Part C)

As noted above, the return flow is classified as a new discharge for the antidegradation evaluation and there are no BCCs. As a result, the antidegradation evaluation skips items one through six of the worksheet because those items relate to existing dischargers and dischargers of BCCs, and proceeds to item seven, *Assessment of Important Economic and Social Development*.

Economic and Social Development (Worksheet Part C.7)

Item seven of the worksheet requests information on the economic and social development of the Application proposal. Although NR 207 requires a demonstration of at least one improvement to economic or social development, the Lake Michigan water supply and resulting return flow proposal will provide several economic and social developments, including, but not limited to, the following:

- Corrects a public health problem by providing clean, safe and sustainable water that meets all state and federal drinking water standards to the Waukesha Water Supply Service Area in a manner that protects environmental, economic, and social health. This is further summarized in Section 11.4 in Volume 2 of the Application.
- Corrects an environmental problem by reducing continued use of depleted aquifers included in the Groundwater Management Areas and reduces adverse impacts to wetlands, streams, and environmentally sensitive areas. This is further summarized in Section 11.4 in Volume 2, and Section 6.4.4 for groundwater, Section 6.4.3 for wetlands, and Section 6.4.2 for inland waterways in Volume 5 of the Application.
- Protects public health by avoiding use of groundwater sources with radium levels above regulations for potable water. This is further summarized in Section 11.4 in Volume 2 of the Application. Also is

protective of public health by avoiding use of groundwater sources that have documented emerging groundwater contaminants, such as arsenic, strontium and molybdenum.

- Provides adequate water to support economic activity and development in the Waukesha Water Supply Service Area and southeastern Wisconsin as forecasted by local and regional planning commissions in the *City of Waukesha Comprehensive Plan* (September 2009) and the Southeastern Wisconsin Planning Commission's *The Economy of Southeastern Wisconsin* (July 2004). In 2000, about 14 percent, or 37,800, of the jobs in Waukesha County were located in the City of Waukesha. To support the regional employment projections of about 146,000 new jobs in the region by year 2035, with 76,000 of those jobs in Waukesha County a safe and reliable public water supply is needed. These data and projections are further described in the above cited documents. Water supply projections to meet the forecasted economic growth is summarized in Section 6 in Volume 2 of the Application.
- Invests in a water supply that is cost-effective and resource efficient over its life cycle. This includes cost savings from avoided maintenance and emergency repairs of underperforming old infrastructure, avoided fines and financial penalties for not meeting Safe Drinking Water Act regulatory requirements, and avoided implementation of a water supply solution that is not sustainable for the long term. This is further summarized in Section 10 in Volume 2 of the Application.
- Provides employment through the construction of water supply and return flow infrastructure, estimated to total $207 million. A summary of the water supply infrastructure for the proposal is included in Section 11.4 in Volume 2 of the Application. A summary of the return flow infrastructure is included in Section 3.2 and Appendixes A and I in Volume 4 of the Application.
- Provides a water supply that is protective of public health and the environment because the source water and return flow are high quality and the return flow will provide a water balance to Lake Michigan. The water supply water quality is summarized in Section 11.4.2.4 in Volume 2 of the Application. The return flow water volume is discussed in Section 2 in Volume 4 of the Application, as amended by WDNR through a November 3, 2014 email. The return flow water quality is summarized in Sections 3.1.5 and 3.2.6 of the Application.
- Protects public health and supports correcting an environmental problem by providing water quality and environmental benefits to the Root River and Root River fisheries, including improving river water quality and increasing Great Lakes angling opportunities through increases of egg collection and fishery stocking through the operation of the Root River Steelhead Facility. This is further summarized in Section 3.2 and Appendixes L and M in Volume 4 of the Application.
- Provides an opportunity for the City of Waukesha to maintain employment for operation and maintenance of infrastructure improvements with the water supply and return flow pipelines and pump stations, and potential return flow monitoring requirements at the Root River outfall and along the Root River.
- Provides for efficient use of resources by implementing an aggressive water conservation plan. This is further summarized in the Water Conservation Plan in Volume 3 of the Application.

Assessment of Significantly Lowering of Water Quality (Worksheet Part C.8)

The Application provides detailed evaluation of the water quality impacts of the return flow to the Root River (Section 3.2 in Volume 4 of the Application), including water quality modeling of the Root River (Appendix M in Volume 4) and a WDNR summary of environmental benefits that the return flow would have on Root River fisheries (Appendix L in Volume 4). Waukesha has completed water quality modeling of the Root River using a regionally accepted and DNR-approved water quality model. The modeling specific for the Application has been peer reviewed by a third party consultant who developed the original model for the Southeastern Wisconsin Regional Planning Commission to verify that the analysis and results meet the intent of the model.

Return flow will meet all of the limits proposed by the WDNR, some of which are at the water quality criterion. For some parameters such as phosphorus, the return flow to the Root River will improve water quality in the river because the return flow water quality will be better than that of the river. Because of the exceptional return flow water quality, and because return flow would provide a source of additional flow in the river, the modeling shows that the Root River would have the same or better water quality with return flow than without. Consequently, the Application concluded that return flow would maintain or improve Root River water quality. Additional return flow water quality information was also included in a July 25, 2014 letter from the City of Waukesha in response to WDNR questions related to return flow water quality (see Attachment A in this memorandum).

Regardless of the antidegradation interpretation of water quality change, the process for antidegradation review allows for an evaluation of economic and social benefits of the Application proposal. Therefore, for the purpose of completing this antidegradation evaluation, the City of Waukesha chooses the waiver option for additional technical analyses for assessing Root River water quality and elects to proceed with the economic and social evaluation. As part of the final approval process following the regional review (as opposed to the current "approvability review" process), additional technical, social, and economic analyses will be provided, if needed, to support the WDNR's actual detailed permitting process.

Pollution Control Alternatives (Worksheet Part C.9 and Attachment E)

Throughout Volumes 1, 2, 4 and 5 of the Application, water supply and return flow alternatives were evaluated. The Application proposes the alternative that would be implementable, the most protective of public health and safety, and that provides an environmental benefit to the Root River and Lake Michigan system. The City of Waukesha WWTP has a long history of providing exceptional effluent water quality. The WDNR has proposed effluent limits for return flow, some of which are set at the water quality criterion, which by definition would not allow the return flow to cause water quality exceedances in the Root River.

Through current treatment capabilities and improvements planned at the WWTP through the City's WDNR-approved Facility Plan, all of the proposed limits can be met without exception. Detailed evaluation of return flow alternatives is provided in Volume 4 of the Application, and detailed evaluation of treatment processes and effluent water quality at the WWTP are included in Sections 3.1.5, 3.2, Appendix A (Attachments A-3 to A-5), and Appendix M in Volume 4 of the Application. These demonstrate compliance with effluent limits proposed by the WDNR for parameters including phosphorus, thermal, biological oxygen demand, chlorides, TSS, ammonia, and mercury.

Final Determination and Effluent Limitations (Worksheet Part C.10)

The WDNR has provided proposed effluent limitations in two prior correspondences. The most recent is included in Appendix A, Attachment A-3 in Volume 4 of the Application. Analyses for meeting chloride and thermal limits are included in Appendix A, Attachments A-4 and A-5 in Volume 4 of the Application. Additional analyses for other parameters, such as phosphorus, ammonia, BOD, TSS, and mercury limits, are included in Sections 3.1.5, 3.2, Appendix A (Attachments A-3 to A-5), and Appendix M in Volume 4 of the Application.

Summary

The City of Waukesha is proposing to divert Lake Michigan water with return flow to the Root River after use and treatment. The return flow will meet all of the effluent water quality limits proposed by the WDNR, some of which are set at the water quality criterion. Detailed water quality modeling was completed as part of the Application and showed that water quality in the Root River would be maintained or improved with the addition of return flow.

The antidegradation review also allows for an evaluation of economic and social benefits of the proposal. Because the Compact requires return of diverted water and the return flow would not occur without the Lake Michigan water supply, antidegradation is evaluated as a system. The Application proposal meets the economic, social and environmental basis for antidegradation because the proposal supports the increase in

employment and economic production levels forecasted by regional planning authorities, it invests in a water supply that is cost-effective and resource efficient over its life cycle, and it corrects a public health problem by avoiding use of groundwater sources with radium levels above regulations for potable water and by providing clean, safe and sustainable water that meets all state and federal drinking water standards in a manner that protects environmental, economic, and social health. The proposal also supports correcting an environmental problem by improving Root River water quality while providing environmental benefits to the Root River and Lake Michigan fisheries.

Attachment A
Great Lakes Diversion Application July 25, 2014 Letter Response to WDNR

City of Waukesha

OFFICE OF THE MAYOR

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Shawn N. Reilly
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July 25, 2014

Mr. Russ Rasmussen
Water Division Administrator
State of Wisconsin
Department of Natural Resources
101 S. Webster Street
Box 7921
Madison, WI 53707-7921

Re: Great Lakes Diversion Application

Dear Mr. Rasmussen:

Thank you for providing the opportunity to meet with the Department of Natural Resources on May 15th, and also for your follow-up letters dated May 23, 2014 and July 17, 2014. We appreciate your time and attention as the City of Waukesha works through the Great Lakes Water Diversion Application process.

As part of our Application, we thoroughly analyzed four alternatives for the return flow discharge location. Each of the return flow alternatives meets the requirements of the Great Lakes Compact. Providing return flow through the Root River is not the least-cost alternative, but it provides additional environmental benefits, including augmenting low flow during periods that are critical for salmon and trout spawning, increasing aquatic habitat and angling opportunities, improving phosphorus water quality, and increasing egg collection from the DNR's Root River Steelhead Facility. Please see the attached memorandum dated August 16, 2012. In consultation with the DNR, the Application states that the Root River is the preferred return flow location. Lacking any additional specific information to change this selection, the preferred discharge location remains the Root River.

We also analyzed alternatives for managing the return flow and volume. Our goal was to exceed the Compact requirement to return the volume withdrawn, minus an allowance for consumptive use. We also sought to balance the Compact's requirements to minimize out-of-basin water and to maximize Great Lakes water returned to the Great Lakes basin. Our proposed return-flow management plan meets the Compact requirements while also providing at least 100 percent return flow, with no net loss of water to the Great Lakes basin. The City's proposed return flow management plan remains as outlined in the Application. However, if the DNR or regional reviewers decide upon a different alternative, the City will accommodate that modification.

The City understands the need to comply with NR 217 for the Root River return flow. Like hundreds of other water bodies in the state, the Root River is listed as an impaired river due to in-stream phosphorus levels greater than the water quality standard. Because of the phosphorus impairment, the return flow will provide a new source of water that has phosphorus concentrations less than current concentrations in the river and less than the river standard. Return flow to the Root River will improve water quality in the Root River for phosphorus; it will meet the requirements of NR 217.13(8)(b); and it is consistent with the EPA position that the discharge should result in a decrease in phosphorus concentration in the receiving water, which was stated in an enclosure to a July 25, 2012 EPA letter to Cathy Stepp approving NR 217. The City is also evaluating treatment performance options to meet its June 2015 permit deadline. Waukesha's return flow water quality will meet all state and federal permit limits and the City is committed to providing return flow that improves the Root River water quality.

We thank the DNR for its dedicated and in-depth review of our proposal to provide safe and sustainable drinking water to our customers and for ensuring the terms of the Compact are met. We look forward to continuing our discussions as the DNR finalizes the Application's technical review.

If you would like to discuss this item or any other aspects of the application, feel free to contact Daniel Duchniak at 262-521-5272 (ext. 518).

Sincerely,

Shawn N. Reilly
Mayor

Enclosure

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: August 16, 2012 FILE REF: 3600

TO: Eric Ebersberger

FROM: Brad Eggold

SUBJECT: Water return to Root River from Waukesha

The Root River does provide a significant fishing opportunity for thousands of anglers in the densely populated area of southeast Wisconsin. In the spring there are spawning runs of steelhead (Chambers Creek and Ganaraska strain rainbow trout) from Lake Michigan and in the fall there are spawning runs of coho salmon, Chinook salmon, steelhead (Skamania strain rainbow trout) and brown trout. Because of these strong spawning runs observed in the Root River, the department, in 1994, constructed a facility to collect eggs for our hatcheries named the Root River Steelhead Facility. Eggs are collected from these spawning fish so that we can rear the correct number for stocking in subsequent years. These young fish are subsequently stocked back into Wisconsin's Lake Michigan Harbors and tributaries. In addition, this facility was constructed to enable us to regularly monitor the salmon and trout entering the Root River and collected in the facility. In peak years, we have experienced runs of over 10,000 salmonids providing angling opportunities which at times exceeded 100,000 angling hours. In addition, movements of these fish in the lake provide many thousands of angling hours for both sport and charter boats fishing off-shore near Racine.

Because the upper reaches of the Root River lie in heavily urbanized areas, the upstream hydrology has been significantly altered by development and stormwater sewer construction. This has had an impact on the total stream flow to the extent that in dry years, particularly during the fall, the average stream flows in Racine can drop below 10 cubic feet per second. These low flows have a very negative impact on the fishery. Understandably, this also results in a significant decrease in the department's ability to collect adequate supplies of eggs for our hatcheries. Further, the angling opportunities are greatly diminished downstream of the Horlick Dam. In short, no water means few fish, inadequate or hard to obtain egg collection and a decreased number of anglers. As a result we believe that increasing the total stream flow by about 15 cfs (the average return flow from Waukesha) would be beneficial to our fisheries program goals for the Root River and for Lake Michigan. Not only would increased flows have a positive impact on the number of fish entering the river and thus into our facility, it is also likely that the angling experiences would be expanded because with more water, there could be more places to fish below the Horlick Dam. Further, with higher flows, fish may enter the river earlier and stay in the river for longer periods thereby extending the angling "season" for these anadromous fish.

At our Strawberry Creek Weir facility in Door County, we have constructed a water pipeline to take water from the Sturgeon Bay ship canal and pump it to the water right above that weir. This has increased the water flow into Strawberry Creek and has allowed us to collect sufficient Chinook salmon eggs for our production needs. We have considered this method to augment flow in the Root River, however the department would incur significant construction and ongoing energy costs to pump water from the Lake to augment the total stream flow in the river. The future discharge of the highly treated wastewater from Waukesha could provide a flow augmentation solution without any new investments needed at our facility.