SUMMARY NOTES OF THE FEBRUARY 25, 2026, MEETING OF THE TECHNICAL ADVISORY COMMITTEE FOR *A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

INTRODUCTION

The February 25, 2026 meeting of the Technical Advisory Committee (TAC) for *A Chloride Impact Study for the Southeastern Wisconsin Region* was convened online at 10:03 a.m. The meeting was called to order by Committee Secretary Ms. Laura Herrick, Chief Engineer with the Southeastern Wisconsin Regional Planning Commission. Attendance was taken using the online software.

Members Present

Laura K. Herrick, Secretary ..... Chief Environmental Engineer, SEWRPC
Mandy Bonneville..... Deputy Director/County Conservationist, Walworth County Land Use and Resource Management Department
Brian Cater.....Interim Director of Public Works/City Engineer, City of Kenosha
Matthew W. Diebel..... Hydrologist, U.S. Geological Survey
David J. Hart.....Hydrogeologist, Wisconsin Geological and Natural History Survey
Samantha Katt.....Urban Storm Water Specialist, Wisconsin Department of Natural Resources
Kevin J. Kirsch.....Water Resource Engineer, Wisconsin Department of Natural Resources
Matthew T. Magruder .....Environmental Research Manager, Milwaukee Metropolitan Sewerage District
Cheryl Nenn..... Riverkeeper, Milwaukee Riverkeeper
Neal T. O'Reilly.....Director, Department of Conservation and Environmental Science, University of Wisconsin Milwaukee
Charles Paradis..... Assistant Professor, Department of Geosciences, University of Wisconsin Milwaukee
Scott M. Schmidt .....Chief Public Works Officer/County Surveyor, Washington County Highway Department
Kurt Sprangers .....Engineer in Charge, Environmental Engineering Section, Department of Public Works, City of Milwaukee
David Strifling ..... Director, Water Law and Policy Initiative, Marquette University Law School

Guests Present

Mitchell Olds ..... Water Resources Specialist, Milwaukee Metropolitan Sewerage District

Staff Present

Thomas M. Slawski .....Chief Biologist, SEWRPC
Karin M. Hollister..... Principal Engineer, SEWRPC
James M. Mahoney .....Engineer, SEWRPC
Collin A. Klaubauf.....Engineer, SEWRPC
Emily E. Porter.....Planner, SEWRPC

Ms. Herrick welcomed the attendees to the tenth TAC meeting for the *Chloride Impact Study* (Study). She also noted for the TAC that Mr. Tom Grisa has retired and appreciated his dedication to the Study as Chair of the TAC. Ms. Herrick introduced the agenda for the meeting to review Chapters 4 and 5 of SEWRPC Technical Report No. 66, *State of the Art for Chloride Management* and provided an update on the Study's progress thus far.

[Secretary's Note: The agenda for this meeting is attached herein as Exhibit A.]

REVIEW OF THE SUMMARY NOTES FROM THE NOVEMBER 12, 2025, TECHNICAL ADVISORY COMMITTEE MEETING

Ms. Herrick asked the TAC for any comments or edits for the Summary Notes from the November 12, 2025, TAC meeting. The previous meeting reviewed Chapter 5 (Lakes) of SEWRPC Technical Report No. 63, *Chloride Study Conditions and Trends*. TAC members offered no questions or comments on the Summary Notes.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 66 CHAPTER 4, *PRIVATE WATER SOFTENING AND TREATMENT*

Mr. Mahoney introduced the subject of water hardness and the connection between hard groundwater used as drinking water and water softening. He explained that hardness is primarily caused by calcium and magnesium ions in the water and that the Region has hard groundwater. The presence of excess hardness in drinking water does not cause any negative health impacts, however it can cause scale buildup in pipes and appliances, reduce the lathering of soap and cleaners, leave mineral deposit spots on glasses, and cause laundry to feel stiff and not clean.

Mr. Mahoney next explained the process of ion exchange water softening, which is the most common private softening technology in the Region. He described how the hardness-causing ions bind to a resin bead, which removes the hardness from the water and displaces sodium ions from the resin bead into the water. Once the softening capacity of the resin has been exhausted, a regeneration cycle runs that uses a salt brine solution of sodium chloride. The sodium ions bind with the resin, removing the calcium and magnesium ions from the resin and recharging the softener. The displaced calcium, magnesium, and chloride ions get discharged from the softener as wastewater. Mr. Mahoney explained that conventional water softeners can either be timer-based or demand-based systems. Timer-based softeners regenerate after a set period of time and are less efficient, either regenerating too often or not often enough. Demand-based systems regenerate after a specified amount of flow has passed through the system and provide consistent softened water levels and optimized salt use.

Mr. Mahoney next presented alternate private softening technologies. He explained that portable exchange softeners use ion exchange technology, however they are stand alone tanks that get swapped out by a service provider when they need to be regenerated. The regeneration cycle is completed at the facility of the service provider, which can include systems to capture and treat the high chloride waste brine. Mr. Mahoney then discussed reverse osmosis technology and explained that the large amounts of reject water and the membrane replacement costs make it an impractical option for whole house water softening. He then explained that nanofiltration technology operates at a lower pressure than reverse osmosis, which reduces the operating cost and amount of water wasted compared to reverse osmosis. It does require pretreatment to reduce fouling of the membrane. Nanofiltration can be a viable whole house water softening alternative that does not discharge chlorides. He noted that cost data for these alternative technologies were not available to include in the report.

Next Mr. Mahoney discussed four emerging private softening or conditioning technologies that do not produce chlorides. Template assisted crystallization uses media beads to form microcrystals from the hardness ions, which do not cause scale buildup and can remove existing scale in pipes and appliances. Magnetic treatment uses magnetic fields to form soft scale from the hardness ions, which passes though the plumbing system without causing hard scale buildup. He did note that scientific opinion is divided on whether magnetic treatment offers any scale reduction benefit. Electrically induced precipitation uses electrical fields to precipitate out hardness as nucleation seeds, which pass through the plumbing system

and do not cause hard scale buildup. The final emerging technology discussed was capacitive deionization which is a chemical-free water softening technology, using electrodes to capture ions in the water. A backwash cycle, along with reversing the charge of the electrodes, removes the hardness from the water. Mr. Mahoney pointed out that all these emerging technologies do not use salt and as a result do not produce chloride. He also noted that further research and development is needed for each of these technologies to be used at the household scale. He highlighted that adequate cost data was not available for these emerging technologies to include in this Study.

Mr. Mahoney next presented three factors that can influence private water softening performance. He explained that blending valves on softeners can allow a portion of source water to bypass the softener and result in finished water with a certain amount of hardness. This would yield a reduction in salt used and chloride produced. He then explained that calibration is essential for efficient ion exchange softener operation, and he explained the data needed to calibrate a softener. Additionally, Mr. Mahoney described how municipal assistance programs that offer educational information on water softener use and financial assistance for calibration and upgrades can reduce chloride generation from water softeners.

Mr. Mahoney finished the discussion of Chapter 4 by presenting potential impacts of water softening on septic systems. He provided a brief overview of septic system operation and the two main septic system configurations in the Region. He also explained the main areas of potential impact on septic systems. Mr. Mahoney highlighted that scientific opinion is divided on whether water softening has negative impacts on septic system components, however he noted that recent studies indicate efficient water softeners may not harm septic systems and may improve septic system performance.

Ms. Nenn asked that whether the alternate treatment technologies that bind up the hardness ions and pass them through the system would merely pass chloride through and result in a discharge of chloride. Mr. Mahoney clarified that these systems do not generate chloride, so no chloride would be added by the technology.

TAC members offered no other questions or comments for draft Chapter 4.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 66 CHAPTER 5, *OTHER CHLORIDE SOURCES*

Background and Overview

Mr. Klaubauf introduced Chapter 5 of TR-66 as Other Chloride Sources which included select agricultural chloride sources and industrial food processing chloride sources.

Agricultural Sources – Synthetic Fertilizer

Mr. Klaubauf first outlined the following presentation discussion topics for synthetic fertilizers: background information, alternatives to potassium chloride, precision agriculture technologies, traditional conservation practices, controlled release fertilizers, drain tiles and drainage control systems, and conclusions. Mr. Klaubauf discussed that potassium is applied to agricultural fields in the Region to satisfy crop nutrient needs. He noted that 95 percent of the potassium applications in the United States are potash in the form of potassium chloride (KCl). KCl breaks down into its ions in the field, where the potassium ion is a macronutrient for plant growth and the chloride ion is a micronutrient, thus unused (by the plant) chloride will be left on the fields. Mr. Klaubauf noted that one study found that 94% of the chloride applied via KCl to a cornfield was left on the field after harvest. He then listed alternatives to potassium chloride, including potassium sulfate (K_2SO_4), potassium nitrate (KNO_3), potassium thiosulfate ($K_2S_2O_3$), potassium-magnesium sulfate (langbeinite) ($K_2SO_4 \bullet 2MgSO_4$), potassium feldspar ($KAlSi_3O_8$), and soil amendments:

compost, biochar, and glauconite. The main limitations of using alternatives to potassium chloride included higher relative cost to KCl, lack of local supply, lack of producer awareness, lower potassium availability, and slower potassium release.

Mr. Klaubauf discussed that reductions to chloride exports from agricultural fields were best achieved through reducing applications of KCl fertilizer in the first place. This could be accomplished by soil amendments improving soil health year after year, reducing the need to apply fertilizer. Similarly, he discussed precision agriculture techniques which can guide applications of nutrients to specific areas in crop fields, preventing over-application. Controlled release fertilizers could also represent a pathway to reducing chloride exports by minimizing the amount of excess fertilizer leaving the field. Controlled release fertilizers extend the availability of fertilizer to the plant roots. Mr. Klaubauf concluded that alternative fertilizers to potassium chloride have high barriers to use and traditional best management practices such as cover crops and buffer strips are unlikely to reduce chloride exports from fields. Mr. Klaubauf discussed that more research is needed on chloride uptake from traditional crops, cover crops, and buffer strips, as well as alternative methods to remove chloride from fields, runoff, and/or shallow groundwater, and methods of reducing the barriers to use of alternative fertilizers.

No comments or questions on the synthetic fertilizer section of TR-66 Chapter 5 were given by the TAC.

Agricultural Sources – Manure Management

Mr. Klaubauf started this section by discussing how chlorides become part of animal waste, which is predominantly through animal feed. While animal manure represents a small percentage of the total annual chloride loading in the Region, handling of animal waste is heavily regulated, so any improvements in typical manure management would likely result in a reduction in chloride exports to the environment. Mr. Klaubauf explained that there are no direct methods to remove chlorides from manure, thus methods to reduce export are better focused on ways to apply manure in a more efficient manner and reduce manure runoff from fields. Discussed methods to accomplish these goals are Nutrient Management Plans and manure incorporation, as well as the previously discussed precision agriculture technologies, buffer strips, and cover crops. Mr. Klaubauf concluded that more research is needed on quantifying chloride content in animal waste.

No comments or questions on the manure management section of TR-66 Chapter 5 were provided by the TAC.

Industrial Food Processing

Mr. Klaubauf began this section by discussing three food processing industries in the Region with elevated chloride levels in their waste stream: dairy processing, meat and poultry processing, and fruit and vegetable canning. He stated that in dairy processing, chlorides enter the waste stream predominately due to the salt brine used to make cheese, but also from water softening, cooling liquors, and source water used to make dairy products. In meat and poultry processing, chlorides enter the waste stream through hide processing, kosher slaughter, curing, smoking, pickling, and marinating, as well as from water softening and source water. Finally, chlorides are introduced to vegetable and fruit canning in the can filler brine and the source water. He noted that there were no good alternatives to the use of salt in these processes. Mr. Klaubauf noted that typical wastewater treatment technologies in food processing plants, where they are found, are similar to those in municipal wastewater treatment plants. At minimum all food processing plants include screening (preliminary treatment) before discharge to a public wastewater system. If more treatment is done at the food processing facility it can also include primary treatment, biological treatment, phosphorus

removal, disinfection, and solids handling. Mr. Klaubauf made the specific point that these processes are not designed nor do they remove chloride.

Mr. Klaubauf highlighted chloride removal alternatives for food processing waste streams such as reverse osmosis, brine evaporation ponds, mechanical evaporation systems, and deepwell injection. Mr. Klaubauf discussed that brine evaporation ponds and deepwell injection wells are not viable methods in our Region because of incompatible climates for brine evaporation ponds and state law preventing disposal via deepwell injection. He stated that reverse osmosis and mechanical evaporation systems represent a path forward for dedicated chloride removal from food processing wastewater streams but would work best with segregated wastewater streams. This means high chloride wastewater would be separated from the rest of the wastewater stream for treatment.

Mr. O'Reilly asked whether the mechanical evaporation systems would reduce the baseflow to streams because they would release water into the atmosphere rather than as liquid into a stream. Mr. Klaubauf responded that for mechanical evaporation systems, the optimum performance would be if the wastewater introduced to the evaporation system is a segregated chloride laden wastewater stream. This would reduce the liquid load on the evaporation system and minimize the evaporated water volume and impact on receiving waters.

No additional comments or questions about the industrial food processing section of TR-66 Chapter 5 were provided by the TAC.

NEXT STEPS FOR THE PLAN

Ms. Herrick stated that comments will be taken on the TR-66 Chapter 4 and 5 draft text reviewed during this TAC meeting until March 20, 2026. She added that comments can be submitted to her directly via email (lherrick@sewrpc.org).

Ms. Herrick reviewed the next steps for the Study. She stated that the next TAC meeting will be in April 2026 and consist of a review of the remaining chapter of SEWRPC Technical Report No. 66 *State of the Art for Chloride Management* covering public and private deicing. She indicated that the meeting agendas, presentations, and summary notes along with completed reports and preliminary drafts are posted on the SEWRPC project website at www.sewrpc.org/chloride-study.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 11:12 a.m.

Respectfully submitted,

Laura Herrick
Recording Secretary

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CAK, JMM, LKH
2/25/2026, 2/27/26

Exhibit A

Southeastern Wisconsin Regional Planning Commission

Notice of Meeting and Agenda

TECHNICAL ADVISORY COMMITTEE FOR
A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION

DATE: Wednesday, February 25, 2026

TIME: 10:00 am to Noon

TEAMS LINK
Join: https://teams.microsoft.com/meet/29885842272592?p=xmq0TQnPN6xZ6wTp9k
Meeting ID: 298 858 422 725 92
Passcode: az6ZP7kh

AGENDA:

1. Roll call

2. Review of summary notes from the November 12, 2025, TAC meeting

3. Review of a portion of **SEWRPC Technical Report No. 66, State of the Art for Chloride Management**
    a. Chapter 4 – Private Water Softening and Treatment
    b. Chapter 5 – Other Chloride Sources (agriculture, food processing)

4. Next steps

5. Adjourn

Laura K. Herrick
Chief Environmental Engineer