SUMMARY NOTES OF THE NOVEMBER 12, 2025, MEETING OF THE TECHNICAL ADVISORY COMMITTEE FOR *A CHLORIDE IMPACT STUDY FOR THE SOUTHEASTERN WISCONSIN REGION*

INTRODUCTION

The November 12, 2025 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 and Resource Management Department
Cody Churchill.....Winter Maintenance Engineer, WisDOT
Richard Hough ..... Director of Public Works, Walworth County
Kevin J. Kirsch ..... Water Resources Engineer, Wisconsin Department of Natural Resources
Matthew T. Magruder .....Environmental Research Manager, Milwaukee Metropolitan Sewerage District
Max Marechal.....City Engineer, Engineering Department, City of West Bend
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
Mike Wieser.....Director, Engineering and Public Works, City of Cedarburg

Guests Present

Elexis Montes.....Stormwater Specialist, Wisconsin Department of Natural Resources
Mitchell Olds ..... Water Resources Specialist, Milwaukee Metropolitan Sewerage District

Staff Present

Thomas M. Slawski .....Chief Biologist, SEWRPC
Aaron W. Owens.....Principal Planner, SEWRPC
Justin P. Poinsatte ..... Principal Specialist, SEWRPC
Emily E. Porter.....Planner, SEWRPC

Ms. Herrick welcomed the attendees to the eleventh TAC meeting for the *Chloride Impact Study* (Study). Ms. Herrick introduced the agenda for the meeting to review Chapter 5 of SEWRPC Technical Report No. 63, *Chloride Study Conditions and Trends: Lakes* 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 OCTOBER 8, 2025, TECHNICAL ADVISORY COMMITTEE MEETING

Ms. Herrick asked the TAC for any comments or edits for the Summary Notes from the October 8, 2025, TAC meeting. The previous meeting reviewed SEWRPC Technical Report No. 65, *Mass Balance Analysis for Chloride in Southeastern Wisconsin.* TAC members offered no questions or comments on the Summary Notes.

REVIEW OF SEWRPC TECHNICAL REPORT NO. 63 CHAPTER 5, *CHLORIDE STUDY CONDITIONS AND TRENDS: LAKES.*

Background and Overview

Mr. Slawski began the main presentation by providing a brief overview of the chapters of Technical Report No. 63 (TR-63) and explained that Chapter 7 "*Drivers and Interactions*" will no longer be included in the Report, as this content is discussed throughout the other chapters. Mr. Slawski introduced TR-63 subchapters 5.4, 5.5, and 5.6 as the focus of his presentation. He provided background information on how lakes were defined for the analyses carried out in these subchapters, stating that there are 492 total lakes in the Region greater than 2 acres in size. He noted that the lakes range from two to 5,404 acres and from one to 135 feet in depth and that lake watershed sizes also vary from 0.04 square miles to 282.3 square miles. The study area lakes also differed in type, residence time, and natural communities. Mr. Slawski explained that lake chloride and specific conductance data came from numerous sources when available but added that many study area lakes did not have chloride data. Summaries of available time series chloride and specific conductance data for the lakes in the Study can be found on the Chloride Study website page in Appendices I and J.

Mr. Slawski next described the scope of data aggregation and formatting used in the Chapter 5 analyses. He explained that the full period of record used in the Study was 1960-2022 and that long term trends were examined during this full record as well as during recent conditions (2013-2022). He stated that there were 116 lakes with chloride data and 157 lakes with specific conductance data for 1960-2022. Mr. Slawski then discussed climate conditions during the full period of study, indicating an overall annual warming trend for the Region. He explained that, while temperatures are warming and winters appear to be becoming milder, this was not reflected in the chloride and specific conductance levels observed in the lakes. Conversely, the Study found that annual mean specific conductance and chloride across lakes during the full study period has increased, which may be more a reflection of increased urban land use.

Chloride Conditions and Trends in Lakes

Mr. Slawski next showed a figure that displayed the percentage of lake chloride samples within various water quality thresholds during the full study period. He showed that nearly 80 percent of all lake samples exceeded the 10 mg/l threshold, around 30 percent exceeded the 35 mg/l threshold, and one percent exceeded the 120 mg/l threshold. He next shared a graph that illustrated the distribution of specific conductance across time periods (< 1975, 1975-2005, > 2005) and explained that the specific conductance dataset for lakes was more comprehensive than the chloride dataset. Mr. Slawski compared this figure with a graph of paired mean chloride and specific conductance data by time period for 15 select lakes with paired datasets and described the positive linear relationship between chloride concentrations and specific conductance. He noted that this relationship likely means that chloride is comprising greater amounts of the overall specific conductance within lakes over time. Mr. Slawski then showed a graph with percent urban land and roads and parking lots from 1970-2020 for the 15 lakes, explaining that there were significant increases in both the percentage of urban land and percentage of parking lots during that time period.

Mr. Slawski next showed two study area maps, one showing trends in chloride concentrations for the full study period, with increasing trends in 62 lakes and no decreasing trends, and the other showing increasing

trends for specific conductance for 58 lakes and decreasing trends in 11 lakes. Overall, Mr. Slawski cited good correspondence between chloride and specific conductance trends in lakes.

Mr. Slawski next described how lake sampling period start and end chloride concentrations related to percentages of surrounding urban lands and parking lots. He explained that chloride concentrations at the start or sampling did not have a statistically significant relationship with land use while ending concentrations and land use were strongly correlated with chloride levels, increasing at a rate of about 3.9 mg/l compared to the starting lake chloride concentrations. He then discussed individual trends in annual mean chloride concentrations for 51 lakes with strong datasets over the study period, breaking the lake graphs into lakes with less than 50 mg/l, between 50 and 100 mg/l, and greater than 100 mg/l chloride concentrations. While 24 lakes did not exceed 50 mg/l, seven exceeded 35 mg/l concentrations, the conservative lower impact limit, consistently since the 1990s.

Mr. Slawski next highlighted the Muskego Chain of Lakes, showing a graph of annual average chloride concentrations in the chain over time. He noted that Bass Bay Lake and Little Muskego Lake had some of the highest observed chloride concentrations for the Study. He showed a table with urban land use and road and parking lot percentages for the lakes in the chain as well as water residence time, explaining how each is likely affecting chloride concentrations. Similarly, Mr. Slawski next discussed annual mean chloride concentrations and influencing factors in the Oconomowoc Chain of Lakes between 1973 and 2022. Mr. Slawski noted that this graph (Figure 5.16), will need to be revised for colors and symbols to help distinguish between the different lakes on the graph, as it is currently difficult to interpret. He then showed a daily mean specific conductance graph for the Oconomowoc Chain of Lakes and explained how data intervals and availability impacted the lake trends in the figure.

Mr. Slawski next discussed potential future chloride concentrations in lakes, showing a figure with the percentage of lakes forecasted to exceed various thresholds between 2025-2075. To note, these trends assumed the study area lakes would continue to rise in chloride concentration at the same rate as observed in the full period dataset. He warned that the Region's waterbodies are currently at sustained chronic chloride toxicity thresholds and have been getting worse over time. Since most documented research has looked at shorter exposure periods rather than sustained exposure to toxicity levels, it is unknown what these levels mean for biological communities.

Mr. Slawski shifted to examine seasonal trends and monthly mean chloride levels by year in selected lakes. The six lakes included in the Study monitoring plan all showed slightly elevated chloride levels in winter, but none appear to have had substantial accumulation at depth that inhibited mixing. He added that there is less variability in specific conductance and chloride levels seasonally and over time in lakes when compared to streams and suggested that this is likely due to the influence of residence time dilution effects as well as increasing chloride concentrations in shallow groundwater. He noted that it appeared that the "the floor of chloride concentrations is rising" due to this groundwater influence.

Mr. Slawski summarized conditions during the most recent period of the Study (2013-2022). He shared results from the statistical models and analyses used to determine if the relationships between recent lake chloride concentrations and various factors were significant. He noted that land use characteristics were the only significant factor correlated with changing chloride levels in lakes in the Study. Lakes in watersheds with greater proportions of urban land use had higher mean, minimum, median, and maximum chloride and specific conductance levels compared to lakes in less urban watersheds. Since both chloride and specific

conductance were examined in this Study, Mr. Slawski noted that paired specific conductance and chloride data were limited in the Region. He added that while 15 lakes did have this paired data and there was a significant relationship observed between chloride and specific conductance levels, no lake data covered a wide range of concentrations, thus this relationship would need to be verified and refined to substantiate using this regression equation as a general regional equation for lakes.

Chloride Conditions for Lake Michigan

Mr. Slawski briefly shifted focus from inland lakes in the Study area to Lake Michigan. He explained that Lake Michigan was not the primary focus of the Study but added that outer Lake Michigan's chloride concentrations have been increasing for over 100 years, despite its massive volume of water. Mr. Slawski highlighted the fact that Lake Michigan chloride concentrations are still less than 20 mg/l but are consistently increasing and stated that this trend is worth noting.

Chapter Conclusions

Mr. Slawski ended the presentation by summarizing the annual mean chloride concentrations among Study area lakes compared to biological thresholds from 1960-2022. He explained that, while not at the same rates and scale, chloride concentrations are increasing and are on track to continue this trend. Lakes in the Study area are approaching the Canadian Chronic Toxicity threshold (120 mg/l) and assuming the increases continue, many lakes will surpass this threshold in the future. Chloride concentrations in a few study area lakes are nearing the USEPA Chronic Toxicity threshold (230 mg/l). Mr. Slawski summarized lake vulnerability to chloride toxicity, explaining that lakes can have a diluting effect on the seasonal oscillations in chloride concentrations in downstream rivers and subsequently downstream lakes. Mr. Slawski also added that the Study did not detect any pattens for chloride levels by lake type, but that seepage lakes and spring lakes that lack an outlet are more susceptible than other lake types. He also mentioned that lakes with shorter residence times are more vulnerable to chloride toxicity concentrations than lakes with longer residence times.

Mr. Slawski concluded the presentation by asking for any questions from the TAC. Mr. Kirsch offered a summarizing comment, stating that the presentation was very thorough and that he was struck by Mr. Slawski's quote that the "chloride concentration floor was increasing." He said that it sounds like some individual lakes had decreasing concentrations but that overall, chloride concentrations in lakes are increasing. He added that everything came down to land use and percent roads and parking lots.

Mr. Hough added a written question to the comments section of the meeting, stating that many counties and communities have shifted from rock salt to brine operations in recent years. He asked if there was any indication in the lake data of these changing winter maintenance strategies. Ms. Herrick responded by noting that we are really early in this transition to brine, and we will likely start to see this change reflected in stream levels in the future. Mr. Slawski also added that we don't have good data, but that it would be nice to incorporate this type of data in and around Little Muskego Lake.

No additional comments or questions on the TR-63 Chapter 5 results or conclusions were given by the TAC.

NEXT STEPS FOR THE PLAN

Ms. Herrick stated that comments will be taken on the TR-63 Chapter 5 draft reviewed during this TAC meeting until November 28, 2025. 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 early 2026 and consist of a review of the remaining chapters of SEWRPC Technical Report No. 66 *State of the Art for Chloride Management* covering public and private deicing, private water softening, and agricultural and food processing sources. 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 11:28 a.m.

Respectfully submitted,

Laura Herrick
Recording Secretary

COMMENTS RECEIVED AFTER THE MEETING - WDNR

Ms. Herrick received an email shortly after the meeting from Ms. Montes that provided additional comments related to Mr. Hough's brine application question. She explained that permitted municipalities in the southeast region must comply with the MS4 permit. The MS4 permit requires implementation of smart salting strategies and for permittees to keep track of deicer usage. She added that implementing smart salting best management practices (BMPs) is still relatively new and that it will take a while to see if chloride trends in river/stream systems change. Ms. Montes noted that they hope to improve annual report submittals in future years to ensure that they are getting the most accurate deicing data. She noted that smart salting practices being implemented include: calibration of equipment on annual or bi-annual basis (prior to season and once again during mid-season), temperature probes to track real-time pavement temperature, establishing resident expectation that there is no 'clear pavement' policy, and smart salting training events. She concluded her email with specific examples from the City of Glendale and the City of Oak Creek, illustrating how both cities have decreased their salt usage significantly and highlighting the various best management practices implemented.

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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, November 12, 2025

TIME: 10:00 am to Noon

TEAMS LINK
Join the meeting now
Meeting ID: 258 920 554 299 7
Passcode: ay6MZ3Ra

AGENDA:

1. Roll call

2. Review of summary notes from the October 8, 2025, TAC meeting

3. Review of a portion of **SEWRPC Technical Report No. 63, Chloride Conditions and Trends in SE Wisconsin**
    a. Chapter 5 – Chloride Conditions and Trends: Lakes

4. Next steps

5. Adjourn

Laura K. Herrick
Chief Environmental Engineer