



COMMISSION FILE NO: 18-012-1 **DATE INTRODUCED:** January 8, 2018

INTRODUCED BY: Executive Director (Signature on File in the Office of the Commission)

REFERRED BY COMMISSION CHAIRPERSON TO: Policy, Finance, and Personnel Committee

RELATING TO: Authorization to Execute a Research Contract between the University of Wisconsin-Milwaukee School of Freshwater Sciences and the Milwaukee Metropolitan Sewerage District for Determining Sediment and Bacterial Sources and Linkages to Inform and Evaluate Total Maximum Daily Load Implementation

SUMMARY:

The Commission is requested to authorize and to direct the Executive Director to execute a two-year research contract with the University of Wisconsin-Milwaukee School of Freshwater Sciences (SFS) for determining sediment and bacterial sources and linkages to inform and evaluate total maximum daily load (TMDL) implementation, Contract P-2738, in an amount not to exceed \$295,341. The agreement would become effective on February 1, 2018 and expire on February 29, 2020. This project was selected as a result of a competitive request for proposal, M03091P04 Open Request for Research Proposals, by a District review team.

The results of this research will allow the District to understand sources of total suspended solids and dissolved organic matter in sediment plumes following rain events while empirically characterizing the composition of the plumes. The District can examine the association of bacterial communities and individual taxa with the composition and source of material in sediment plumes in the estuary and lower Milwaukee River. Furthermore, the District will have an assessment of upstream sources of total suspended solids (TSS) and bacteria and be able to compare it with downstream sources. Finally, the District will understand the persistence of the plume components in the nearshore and at beaches.

This work is well aligned with needs identified by technical experts of the Southeastern Wisconsin Watersheds Trust's Science Committee and the Wisconsin Department of Natural Resources Area of Concern Technical Team that is working towards restoring designated uses of area waterbodies.

ATTACHMENTS: **BACKGROUND** **KEY ISSUES** **RESOLUTION**
FISCAL NOTE **S/W/MBE** **OTHER** _____

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COMMITTEE ACTION: _____ **DATE:** _____

COMMISSION ACTION: _____ **DATE:** _____

BACKGROUND

Authorization to Execute a Research Contract between the University of Wisconsin-Milwaukee School of Freshwater Sciences and the Milwaukee Metropolitan Sewerage District for Determining Sediment and Bacterial Sources and Linkages to Inform and Evaluate Total Maximum Daily Load Implementation

Prior work in the McLellan lab at SFS has demonstrated that bacteria are on fine particles (<10 µm) or are free floating in the Milwaukee estuary and may be uncoupled from sediment once they enter Lake Michigan. The District and other stakeholders need more information on how sources of TSS and pathogens are connected in upstream sources, so water managers can implement practices with dual benefits and tailor mitigation strategies that address both pollutants that are of concern in the Milwaukee Basin. More information is needed on how transport and fate of TSS and pathogens differ, what water quality indicators are the most effective in tracking microorganisms (bacteria, viruses, and protozoa), and to what extent microorganisms are delivered to beaches and persist in swimming areas. SFS's McLellan lab will build off its prior work to conduct this research.

There are a number of purposes this research can serve. This research is critical to TMDL efforts for prioritizing implementation strategies. In urban areas, TSS and pathogens may be derived from different sources (i.e. terrestrial runoff for TSS, leaking laterals for pathogens), but upstream in the watershed TSS and pathogens may be common to a source such as agricultural runoff. This research agreement will offer empirical data to compare with modeled data (quantitative fecal coliform loads, TSS loads under specific conditions), and provide baseline pre-TMDL implementation conditions that can be compared with post-implementation time periods. This work also could improve impact assessments from extreme rain events; results from this study could be coupled to a hydrodynamic model to create a tool for determining when beaches are safe again for swimming and the reach of pollution sources into Lake Michigan. By using cutting-edge genomic and source tracking techniques to assess pollutant loads and water quality in the Great Lakes, this work keeps this region on the forefront of water quality science.

KEY ISSUES

Authorization to Execute a Research Contract between the University of Wisconsin-Milwaukee School of Freshwater Sciences and the Milwaukee Metropolitan Sewerage District for Determining Sediment and Bacterial Sources and Linkages to Inform and Evaluate Total Maximum Daily Load Implementation

Large rain events introduce pollution into Milwaukee's waterways from upstream agricultural runoff, stormwater runoff, leaking or illicitly connected sanitary sewage infrastructure, and under extreme rain events, combined sewage overflows. The most visible sign of this pollution is the plume of suspended solids. These solids cause a murky water appearance in the city's rivers and are clearly visible as they disperse into Lake Michigan. While pathogens (i.e. harmful bacteria, viruses, and protozoa) may constitute a public health threat, they are not necessarily correlated to the visible portion of the plume.

The lowermost river reaches, estuary, and harbor are a Great Lakes Area of Concern (AOC) due to high levels of sediment (measured as TSS) and fecal coliforms, a proxy for pathogens. AOC's are designated areas under the Great Lakes Water Quality Agreement that show severe environmental degradation and have Remedial Action Plans (RAP) to address degradation. This research agreement will systematically collect high resolution data at sites in the Milwaukee River, estuary, and Lake Michigan to determine the sources, coupling, and timing of sediment and fecal coliform loads as they are released into the harbor and Lake Michigan. This work is relevant to the TMDL effort in the Milwaukee AOC to improve water quality and is recommended under the existing RAP. Understanding sources and potential cobenefits for different mitigation strategies within the TMDL process is critical for ultimately delisting the Milwaukee AOC.

The overall goals of this project are to 1) understand the sources of suspended solids (including dissolved organic matter), microbial communities, and pathogens in turbid water plumes entering Lake Michigan through the Milwaukee estuary; 2) understand how bacterial signals and suspended solids are coupled in upstream and downstream sources; and 3) examine how the organic matter and microorganisms originating in the plumes impact beaches and the nearshore in the short-term.

RESOLUTION

Authorization to Execute a Research Contract between the University of Wisconsin-Milwaukee School of Freshwater Sciences and the Milwaukee Metropolitan Sewerage District for Determining Sediment and Bacterial Sources and Linkages to Inform and Evaluate Total Maximum Daily Load Implementation

RESOLVED, by the Milwaukee Metropolitan Sewerage Commission, that the Executive Director is authorized and directed to execute a two-year research agreement between the University of Wisconsin-Milwaukee School of Freshwater Sciences and the Milwaukee Metropolitan Sewerage District for determining sediment and bacterial sources and linkages to inform and evaluate total maximum daily load implementation, Contract P-2738, in an amount not to exceed \$295,341.