



PUBLIC NOTICE

DATE: January 17, 2020

The Missouri Department of Natural Resources has received a request to modify the Water Quality Management 208 Plan for the Lower Meramec Basin. This amendment would modify the East-West Gateway Water Quality Management 208 Plan, specifically the section related to the Lower Meramec Watershed Basin in south St. Louis County and northern Jefferson County. The area is served by the St. Louis Metropolitan Sewer District (MSD), the Northeast Public Sewer District (NPSD), and the Rock Creek Public Sewer District (RCPSD).

The Department is providing a public notice of the Proposed Amendment to the Water Quality Management 208 Plan for the Lower Meramec. This is the second public comment period for the proposed amendments. The only revision is on page 5, which states that the proposed amendment only supersedes the existing Lower Meramec Watershed Basin portion of the 1978-208 Plan. The Clean Water Commission previously held a hearing and approved the amendment at the July 22, 2019 meeting.

The public comment period is to gather any public concerns and support on the proposed amendments. The public comment period will be held from January 17, 2020 to February 18, 2020.

The public notice announcement and supporting information are placed on the Department's webpage: <http://dnr.mo.gov/env/wpp/wpcp-pn.htm>. Copies of all supporting documentation including copies of applicable regulations are available for inspection and copying at Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102, between the hours of 8a.m. and 5p.m., Monday through Friday. The deadline for comments is February 18, 2020.

Comments may be submitted electronically or in writing to Ms. Leasue Meyers, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102, or by email at leasue.meyers@dnr.mo.gov. **Please include the Lower Meramec Watershed Amendment in all comment letters.**

Amendment to the 1978 St. Louis, Missouri Water Quality Management 208 Plan

Lower Meramec River Basin

January xx, 2020

Prepared by

Metropolitan St. Louis Sewer District
Northeast Public Sewer District
Rock Creek Public Sewer District



Executive Summary

In 1978, pursuant to Section 208 of the Clean Water Act, East-West Gateway Council of Governments (EWGCOG) completed the St. Louis, Missouri Regional Water Quality Management Plan (hereinafter referred to as the 208 Plan). The goal of the 208 Plan was to meet State water quality standards throughout entirety of St. Louis City and County, St. Charles County, Franklin County, and Jefferson County. The 208 Plan also identified the Meramec River as the region's number one priority river, deserving protection as a drinking water source and because it is biologically diverse and contains important habitat.

The 208 Plan recommended controls to address point and nonpoint sources of pollution and residual waste management throughout the four-county planning area. Within the Lower Meramec Basin, the plan called for a regional secondary treatment system in St. Louis County near the confluence of the Meramec and Mississippi River. This regional facility was to be managed by the Metropolitan St. Louis Sewer District (MSD) and provide services for the Lower Meramec System, which consists of the Lower Meramec Basin (southern St. Louis County and northern Jefferson County) and the entire Rock Creek Basin in Jefferson County. The 208 Plan also recommended designating this facility a regional sludge processing center.

These recommendations were based on an evaluation of cost-effectiveness, water quality effectiveness, management and institutional constraints, and environmental considerations. Since 1978 however, the technical, economic, and environmental conditions have changed and some of the original recommendations are no longer appropriate. The 208 Plan recognizes that updates to the plan may be necessary noting that it "is not a static list of recommendations but represents a dynamic and progressive policy for guiding future wastewater construction activities." Federal regulations (40 CFR 130.6) also allow plans to be updated to reflect changing water quality conditions, results of implementation actions, new requirements, or to remove conditions in prior conditional or partially-approved plans.

This report provides support for amending the 208 Plan to bring it into alignment with the current situation in the Lower Meramec Basin. The analyses justify the following amendments:

- It is more cost-effective to maintain existing facilities (\$147 million) within the Lower Meramec System than to construct a single regional WWTF (\$400 million). Further, a single regional WWTF is not necessary to meet state water quality standards in the Lower Meramec River. Therefore, the Lower Meramec System should instead be served by four WWTFs: Lower Meramec WWTF, Grand Glaize WWTF, Saline Creek Regional WWTF, and Kimmswick WWTF.
- Due to environmental and management considerations, it is not feasible for the Lower Meramec WWTF to serve as a regional sludge processing center. The plan should be revised to recognize that sludge processing for MSD facilities in the Lower Meramec System will be addressed at the Bissell Point WWTF or Lemay WWTF; the Northeast Public Sewer District and Rock Creek Public Sewer District will continue their current management activities.

Contents

Executive Summary	i
1. Introduction.....	1
1.1. Lower Meramec System.....	2
1.2. MSD's 201 Facility Plan for the Lower Meramec River Basin.....	3
1.3. Report Objectives.....	5
2. System Updates in the Lower Meramec System	6
2.1. Metropolitan St. Louis Sewer District (MSD).....	6
2.1.1. Lower Meramec WWTF	6
2.1.2. Grand Glaize WWTF	7
2.1.3. Fenton WWTF	7
2.1.4. Future Plans for MSD WWTFs in the Lower Meramec Basin.....	8
2.1.5. Collection System Improvements.....	8
2.2. Northeast Public Sewer District (NPSD)	9
2.2.1. 2010 Facility Planning Efforts.....	9
2.2.2. Saline Creek Regional WWTF Construction and Upgrade History.....	10
2.2.3. Future Improvements	11
2.3. Rock Creek Public Sewer District (RCPSD)	11
2.3.1. Historical Facility Planning Efforts and Improvements.....	12
2.3.2. Identified Future Improvements	13
3. Meramec River Water Quality Evaluation	14
3.1. 208 Plan Water Quality Goals	14
3.2. Existing Water Quality Conditions	14
3.2.1. Lead.....	15
3.2.2. Bacteria	15
3.2.3. Ammonia	16
3.3. WWTF Performance for Major Facilities Discharging into the Lower Meramec River.....	18
3.3.1. Grand Glaize WWTF Performance	18
3.3.2. Fenton WWTF Performance	18
3.3.3. Saline Creek Regional WWTF Performance	19
4. Proposed 208 Plan Amendments	20
4.1. Lower Meramec System Point Source Amendments	20
4.2. Lower Meramec Regional Center Sludge Management Amendments.....	23
4.2.1. MSD Sludge Management	23
4.2.2. NPSD Sludge Management	24
4.2.3. RCPSD Sludge Management	24
4.3. Summary of Public Information Process	25
4.4. Summary of Proposed Amendments	25

Tables

Table 1. Proposed Permanent WWTFs in the Lower Meramec System.	20
Table 2. Comparison between Costs to Implement Original 208 Point Source Recommendations and Costs to Maintain Existing Facilities in the Lower Meramec System.....	22

Figures

Figure 1. 208 Planning Area for the St. Louis Region.	1
Figure 2. Lower Meramec System as Identified in the 208 Plan and Interim WWTF Outfalls and Tunnel Identified in 201 Plan.	4
Figure 3. Average (Geometric Mean) Recreational Season (April – October) <i>E. coli</i> Levels in the Meramec River at Paulina Hills (1997-2016).	15
Figure 4. Distribution of Average (Geometric Mean) Recreational Season (April – October) <i>E. coli</i> Levels by Flow Regime in the Meramec River at Paulina Hills (2005 – 2018).	16
Figure 5. Average Annual Ammonia in the Meramec River at Paulina Hills (1968 – 2018).	17
Figure 6. Average Annual Ammonia Levels in the Meramec River at Eureka (Upstream of the 201 Planning Area) and Paulina Hills (Downstream of Major WWTFs in the 201 Planning Area).....	17
Figure 7. Proposed 208 Plan Amendment for the Lower Meramec System.	21

Attachments

Attachment A. Process and Proposed Schedule for Updating the 208 Plan.

Attachment B. Summary of Water Quality Management Plan Elements Required by 40 CFR 130.6(c).

1. Introduction

Section 208 of the Clean Water Act (CWA) requires that Regional Water Quality Management Plans be developed to control water pollution from point and nonpoint sources in a defined geographic area. In 1975, the Governor of Missouri designated the East-West Gateway Council of Governments (EWGCOG) as the agency responsible for preparing the Water Quality Management Plan for the St. Louis area, including the City of St. Louis and the counties of Franklin, Jefferson, St. Charles and St. Louis (Figure 1).

The St. Louis, Missouri Regional Water Quality Management Plan¹ (hereinafter referred to as the 208 Plan) was subsequently completed in 1978. The objective of the 208 Plan was to ensure that the water quality of rivers and streams of the St. Louis area meets state standards and that the negative effects of growth on water quality be kept to a minimum. The 208 Plan also identified the Meramec River as the region's number one priority river and watershed area, deserving protection as a drinking water source and because it is biologically diverse and contains important habitat.

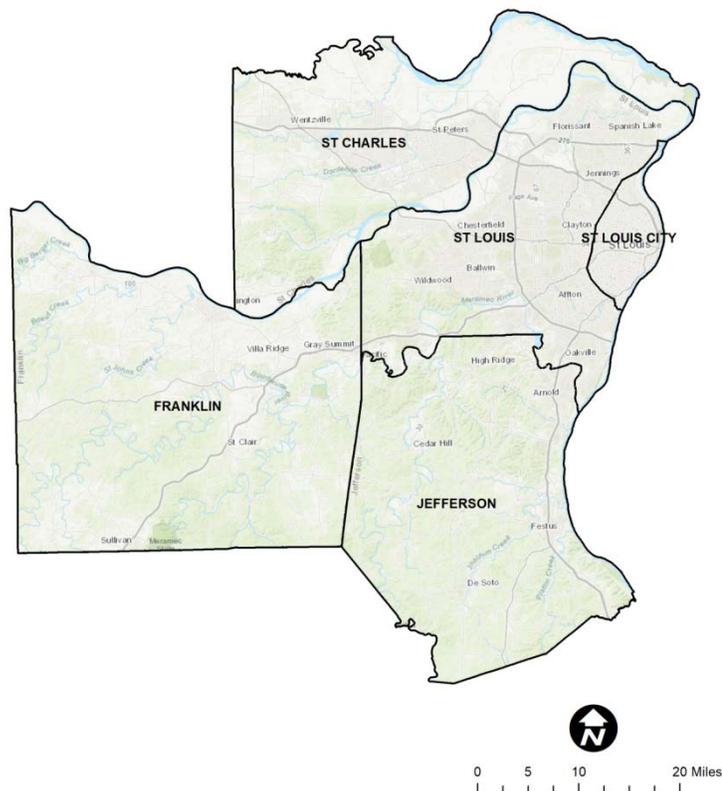


Figure 1. 208 Planning Area for the St. Louis Region.

The 208 Plan proposed multiple control alternatives, with each alternative evaluated using four major criteria: 1) cost-effectiveness, 2) water quality effectiveness, 3) management/institutional constraints, and 4) environmental considerations. After evaluation against these criteria, the best of the alternatives at the time was chosen as a goal for the region. The 208 Plan included a mixture of structural and non-structural control alternatives to address point sources, nonpoint sources, and residual waste (sludge) throughout the four county region, which are summarized as follows:

- *Point sources* – The 208 Plan delineated 40 service area recommendations across the four county planning area and identified a number of secondary wastewater treatment

¹ East-West Gateway Coordinating Council (EWGCOG). 1978. St. Louis, Missouri Water Quality Management Plan: Areawide Waste Treatment Management Study (208). St. Louis, Missouri. <https://www.ewgateway.org/wp-content/uploads/2017/07/208Rpt-Part1.pdf>

facilities (WWTF) to serve as regional treatment facilities within each of the service areas.

- *Nonpoint sources* – The 208 Plan recommended nonpoint source control measures for each of the four counties in the planning area. Controls addressed both individual home treatment systems (septic systems) and urban stormwater runoff. Recommendations for septic systems included design and operational guidelines and implementation measures. Recommendations for urban stormwater runoff were divided into three categories of control designed to address the quantity and quality aspects of urban runoff. These include control of stormwater runoff, onsite detention, and urban cleanliness programs.
- *Sludge management* – The 208 Plan delineated 14 regional sludge processing centers across the four county planning area.

Since the 208 Plan was completed in 1978, the technical, economic, and environmental conditions have changed and some of the original recommendations are no longer appropriate. This report and the proposed amendment address updates to the original point source and sludge management recommendations within the Lower Meramec System, which is one of 40 areas defined by the 208 Plan. Information regarding the Lower Meramec System, MSD's 201 planning efforts, and objectives of the current report are discussed in the remainder of this section.

1.1. Lower Meramec System

The Lower Meramec System is one of 40 service areas delineated within the St. Louis 208 planning region. The Lower Meramec System of the 208 Plan included the Lower Meramec Basin (southern St. Louis County and northern Jefferson County) and the entire Rock Creek Basin in Jefferson County (Figure 2). Plan recommendations within the Lower Meramec System were intended to address pressing water quality issues of the time in the Meramec River.

The main recommendation of the 208 Plan for the Lower Meramec System was the construction of a regional secondary treatment system in St. Louis County near the confluence of the Meramec and Mississippi River (see pages 62 and 91 of the 208 Plan). The proposed Lower Meramec facility was to be managed by the Metropolitan St. Louis Sewer District (MSD) and provide sewer services via major interceptors for the entire Lower Meramec System. The 208 Plan also recommended that the facility serve as the regional sludge processing center for St. Louis and Jefferson counties (see pages 148-149 and 151 of the 208 Plan). Sludge processing would include the use of dissolved air flotation, anaerobic digestion, and final disposal in twenty year storage lagoons. The plan alternatively considered pumping and hauling residuals from the regional treatment facility to MSD's Lemay WWTF to be incinerated. However, this alternative was ultimately rejected based on the preliminary economic analysis conducted at that time.

Recommendations for a single regional facility within the Lower Meramec System to be serviced and managed by MSD never came to fruition. In 1977, MSD annexed the entirety of the St.

Louis County portion of the Lower Meramec River Basin into its service area. By charter, MSD could not annex the Jefferson County portions of the Lower Meramec River Basin, so in 1979 it was proposed that the northern Jefferson County's newly-formed Northeast Public Sewer District (NPSD) contract with MSD for treatment at the proposed regional treatment facility. A similar suggestion was made for the newly-formed Rock Creek Public Sewer District (RCPSD) and the City of Arnold. MSD currently accepts and treats flow from the Arnold Pump Station, but not from NPSD. Nearly all of RCPSD's flow is treated at the Kimmswick WWTF, with a small amount of area ultimately being served (via the Arnold Pump Station) by the Lower Meramec WWTF.

1.2. MSD's 201 Facility Plan for the Lower Meramec River Basin

In conjunction with the 208 Plan, MSD developed the 201 Facility Plan (hereinafter referred to as the 201 Plan) for the Lower Meramec River Basin in September 1979² and updated the plan in 1985³. Consistent with the 208 Plan, the 201 Plan concluded that the most cost-effective solution to improve water quality in the Lower Meramec Basin was through the consolidation of wastewater treatment to one regional WWTF discharging to the Mississippi River with a major interceptor serving the entire basin. However, for unexpressed reasons, the 201 area was limited to the Lower Meramec Basin and did not include Rock Creek as called for in the 208 Plan.

Additionally, the 201 Plan acknowledged that MSD has no legal or jurisdictional authority for operation within Jefferson County. By charter, MSD's service area boundaries are limited to St. Louis City and St. Louis County. The effect of this is to limit the sewer collection system that MSD is responsible for operating and maintaining to these areas. MSD and Missouri-American Water (the agency that operates Arnold's sewer collection system) have an interagency agreement whereby MSD treats wastewater from the City of Arnold. RCPSD has a similar agreement with Missouri American Water to allow flow through to MSD. NPSD currently maintains authority over most of the Lower Meramec Basin in Jefferson County.

In 1985 when the 201 Plan was updated, MSD recognized that construction of the regional treatment facility and its associated collection system could take significantly longer than anticipated because of decreases in federal funding, and therefore proposed interim solutions. These interim solutions included the construction of three secondary treatment facilities, Grand Glaize, Fenton, and Lower Meramec, within the St. Louis County area of the Lower Meramec River Basin. The intent of the 201 Facility Plan was to phase out the interim treatment facilities upon the construction of the regional facility and the Lower Meramec Tunnel (LMT), which was to be completed in three distinct phases (Figure 2). MSD has since been implementing the 201 Facility Plan recommendations in the Lower Meramec Basin. Details regarding specific actions and progress are discussed further in Section 2.1.

² Metropolitan St. Louis Sewer District (MSD). 1979. Final 201 Facility Plan: Lower Meramec River Basin. St. Louis, MO. 462 pp.

³ Havens and Emerson, Inc. 1985. 201 Facility Plan Update: Lower Meramec River Basin. St. Louis, MO. 193 pp.

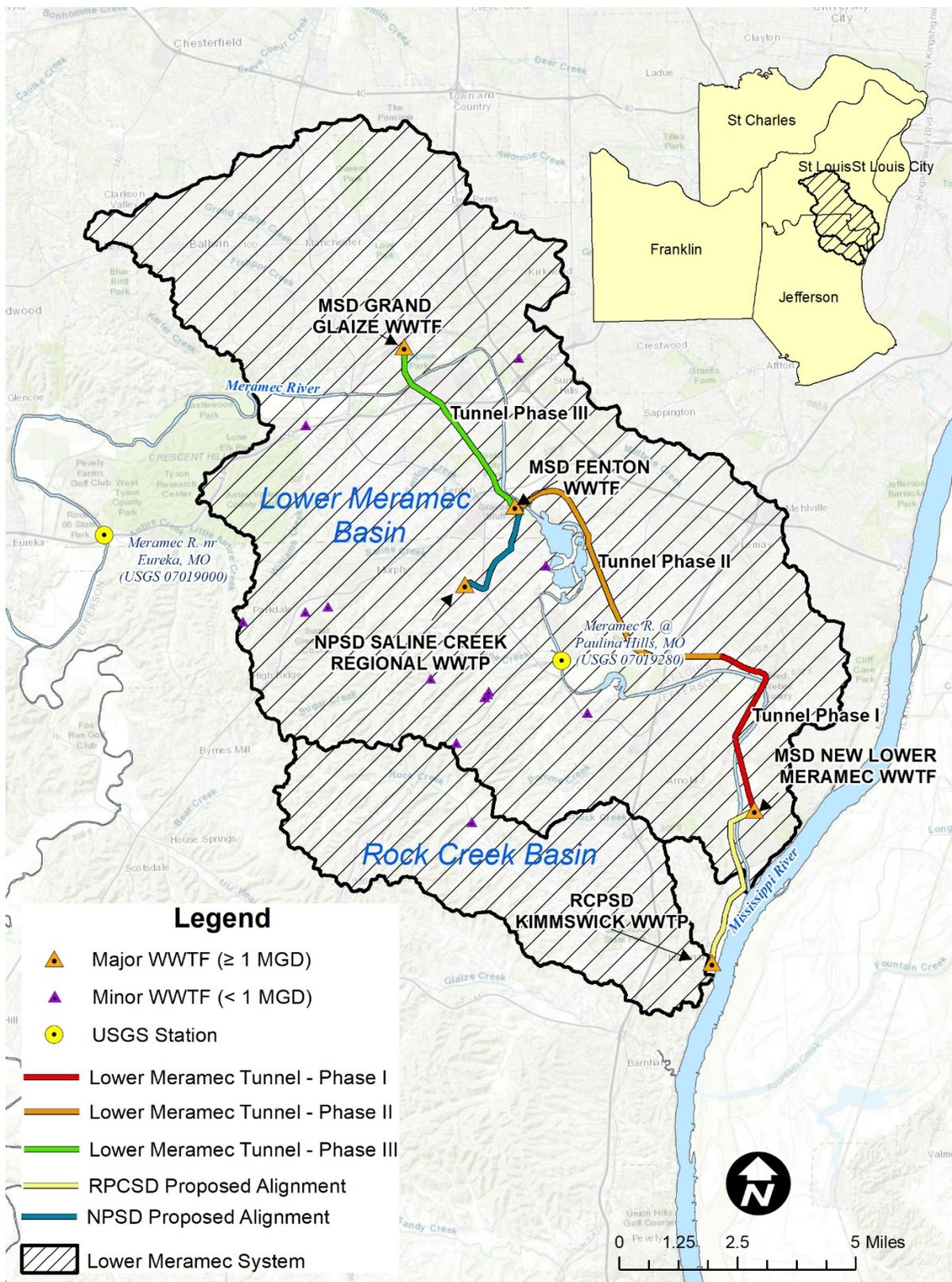


Figure 2. Lower Meramec System as Identified in the 208 Plan and Interim WWTF Outfalls and Tunnel Identified in 201 Plan.

1.3. Report Objectives

As discussed above, the objective of the 208 Plan was to ensure that the water quality of rivers and streams of the St. Louis area meets state standards and mitigate the negative effects of population growth on water quality. Circumstances have changed since 1978 and construction of a single regional treatment facility in the Lower Meramec Basin is no longer necessary to achieve these objectives. Water quality in the Meramec River itself has generally improved and point sources in the Basin currently meet all applicable discharge permit requirements. Remaining water quality challenges in the Basin are primarily related to nonpoint source control issues and cannot be remedied through further point source consolidation.

The original 208 Plan recognizes that updates to the plan may be necessary, noting that it “is not a static list of recommendations but represents a dynamic and progressive policy for guiding future wastewater construction activities.” Further, federal regulations (40 CFR 130.6(e)) allow water quality management plans to be updated to reflect changing water quality conditions, results of implementation actions, new requirements, or to remove conditions in prior conditional or partially-approved plans. The process for amending the 208 Plan is included in Attachment A. A summary of necessary plan elements required by 40 CFR 130.6(c), and their relationship to the modifications proposed in this report is included in Attachment B.

The purpose of this report is to amend the 208 Plan recommendation for the Lower Meramec Basin and bring it into alignment with the current situation. The decision criteria used to evaluate alternatives and develop recommendations in the original 208 Plan were

- Cost-effectiveness,
- Water quality effectiveness,
- Management and institutional constraints, and
- Environmental considerations.

These same criteria are applicable in the context of the current situation and support the need to amend some of the original 208 Plan recommendations for the Lower Meramec Basin. It is important to note that the proposed amendments in this report only address one point source service area (identified as the Lower Meramec System in the 208 Plan) and one regional sludge processing center (identified as the Lower Meramec Regional Center in the 208 Plan). The proposed amendments do not impact point source, nonpoint source, or sludge management recommendations for the remainder of the four-county planning area. The amended 208 Plan only supersedes the original 208 Plan with regard to the Lower Meramec Basin. In the event of any conflicts or inconsistencies between these two documents, the amended 208 Plan is the controlling document.

2. System Updates in the Lower Meramec System

Wastewater treatment and planning efforts of the three regional control authorities responsible for the Lower Meramec System are discussed below. These include MSD, NPSD, and RCPD.

2.1. Metropolitan St. Louis Sewer District (MSD)

MSD incorporated the entirety of the St. Louis County portion of the Lower Meramec River Basin in 1977, inheriting hundreds of miles of sewers and over sixty treatment plants, most of which were small, overburdened, and failing due to construction under limited to no regulation. Much of the inherited collection system was old and inadequately sized for future development. MSD shaped its goals for the Lower Meramec River Basin around rehabilitating, maintaining, and improving this inherited collection system and eliminating numerous treatment plants.

Through the use of its sewer use ordinance, MSD has been able to regulate dischargers within its service area in order to protect the sewer system, treatment processes, residuals management processes, and receiving waters. MSD has a variety of regulatory abilities including requiring connection to the MSD system, connection permitting, pretreatment limits, effluent monitoring, and reporting requirements. These regulatory abilities have given MSD the opportunity to eliminate nearly all of the inherited treatment plants and replace them with three well operated treatment facilities, as well as to rehabilitate much of its collection system.

In 2012, MSD entered into a Consent Decree with the United States EPA (EPA), the state of Missouri, and the Missouri Coalition for the Environment Foundation. In this Consent Decree, MSD committed to spending \$4.7 billion in order to make infrastructure improvements to the sanitary and combined collection systems.⁴ The major improvements to MSD's collection system that the Consent Decree includes are inflow and infiltration (I/I) reduction remediation projects, elimination of all constructed sanitary sewer overflows (SSOs), elimination of all known SSOs, and elimination of building backups. These efforts have and will continue to make a significant impact in ensuring that the Lower Meramec River Basin achieves Clean Water Act goals.

Since the 1985 201 Plan update, MSD has constructed the three recommended WWTFs and made significant progress with respect to maintaining and improving their sanitary sewer collection systems. These activities, as well as planned future WWTF modifications, are described below.

2.1.1. Lower Meramec WWTF

The Lower Meramec WWTF was constructed in 2007 with a design flow of 15 million gallons per day (MGD) and a peak hour design capacity of 40 MGD. Currently, the facility has an average dry weather daily flow of 11 MGD, which includes wastewater flows from the City of Arnold, and discharges to the Mississippi River (Figure 2). MSD intends to expand the Lower

⁴ *United States of America and the State of Missouri, and Missouri Coalition for the Environment Foundation v. Metropolitan St. Louis Sewer District*, No. 4:07-CV-1120-CEJ, The original Consent Decree required improvements over a twenty-three year period. In 2018, the parties agreed to modify the duration of improvements to twenty-eight years.

Meramec WWTF to accommodate additional flows from the Fenton WWTF when it is eliminated. The Lower Meramec WWTF is currently served by a 31 square mile sanitary sewer collection, consisting of approximately 1.75 million feet of public sewers and 34 active pump stations owned and maintained by MSD.

The Lower Meramec WWTF uses sludge grit removal, gravity sludge thickeners, sludge belt filter presses, and cake storage hoppers for sludge management, and produces approximately 2,000 dry tons of sludge annually. MSD currently hauls its sludge from the Lower Meramec WWTF to MSD's Bissell Point WWTF for incineration or to the IESI Champ Landfill to be landfilled.

2.1.2. Grand Glaize WWTF

In an effort to improve wastewater treatment in the Lower Meramec River Basin, MSD constructed the Grand Glaize WWTF in 1986 and expanded the facility in 2006. This expansion resulted in an average design flow of 21 MGD and peak hour design capacity of 40 MGD. In addition to the treatment capacity directly available, the facility can store influent flows above 40 MGD in its 49.7 million gallon wet weather storage lagoon. The Grand Glaize WWTF discharges to the Meramec River (Figure 2). The Grand Glaize WWTF serves a 45 square mile sanitary collection system consisting of approximately 3 million feet of public sewers, with pipe diameters ranging from 6 to 54 inches. The collection system also includes 20 active pump stations owned and maintained by MSD.

The Grand Glaize WWTF uses gravity sludge thickeners and belt filter presses for residuals management and produces approximately 3,000 dry tons of sludge annually. MSD hauls its residuals from Grand Glaize to MSD's Bissell Point WWTF for incineration or to the IESI Champ Landfill to be landfilled.

2.1.3. Fenton WWTF

The Fenton WWTF was constructed in 1987. This facility has a design flow of 6.75 MGD and currently has an average dry weather daily flow of 4.85 MGD that discharges to the Meramec River. The Fenton WWTF currently discharges to the Meramec River but MSD anticipates taking it offline and sending flows to the Lower Meramec WWTF once Phase II of the LMT is complete (Figure 2). The Fenton WWTF has a 19 square mile sanitary collection system consisting of approximately 850,000 feet of public sewers. The Fenton collection system also includes 21 active pump stations owned and maintained by MSD.

The Fenton WWTF uses a gravity sludge thickener and a sludge belt filter press for residuals management and produces approximately 1,000 dry tons of sludge annually. MSD hauls its residuals from the Fenton treatment facility to MSD's Bissell Point treatment facility for incineration or to the IESI Champ Landfill to be landfilled.

2.1.4. Future Plans for MSD WWTFs in the Lower Meramec Basin

MSD plans to expand the Lower Meramec WWTF to accommodate future flows from the offline Fenton WWTF. This expansion is scheduled to be completed in 2023. The Fenton WWTF facility is currently scheduled to be taken offline in 2025 once the Phase II LMT extension is complete.

The Grand Glaize WWTF will continue to operate, as the treatment facility has more than enough capacity to accommodate future flows and has demonstrated continual high-quality treatment. MSD is also planning to spend \$2.75 million for additional flood protection infrastructure, including earthen berms and a floodwall. This work is important for making the Grand Glaize maintenance yard and treatment facilities more resilient to regional flooding created by the Meramec River.

As described further herein (see Section 3.1.1), MSD is planning major improvements to its sewer sludge incineration facilities at the Lemay WWTF and Bissell Point WWTF. MSD estimates \$340 million is needed to replace its sewer sludge incinerators with fluidized bed incinerator technology that substantially reduces emissions. MSD estimates an additional \$50 million is needed for pumping stations and piping needed to transport sludge from the Meramec basin facilities to the Lemay WWTF.

2.1.5. Collection System Improvements

MSD has taken significant steps to study and characterize its collection system in order to identify the best strategy to maintain and rehabilitate the collection system. In 2013, MSD produced sewer system evaluation surveys (SSES) for the following watersheds: Fenton Creek, Lower Meramec Sub Areas, Mattesse Creek, Fishpot Creek, Kiefer Creek, and Grand Glaize Creek. These watersheds make up the entirety of the MSD service area portion of the Lower Meramec River Basin. SSES reports were produced discussing the various aspects of the collection system, including constructed SSO outfalls, known SSOs, building backups, gravity sewers, pump stations, force mains, CCTV inspections, I/I evaluations, and flow and rainfall monitoring,

MSD has made substantial efforts towards maintaining and rehabilitating its collection system. The Capacity, Management, Operations and Maintenance (CMOM) Program Plan is a Consent Decree requirement that allows MSD to better understand how its sewer system works under various conditions, and identifies maintenance and improvements needed to achieve established goals. The CMOM program has been in place since 2012. The goal of the CMOM program is to preserve capital investment while minimizing building backups and non-capacity SSOs. The CMOM program includes the following control measures: scheduled cleaning and inspection of gravity sewers, especially for sewer lines with historic Fats, Oils, and Grease (FOG) blockages; sewer lining to minimize root intrusion and I/I and to prevent structural damage, SSOs, and building backups; manhole inspection, repair, rehabilitation, and replacement; utilization of a computerized maintenance management system; recording, investigating, and resolving customer complaints to correct system problems; CCTV of sewer

lines and manholes to rate the condition; pump station inspections, maintenance, repair, and testing; scheduled force main visual and non-destructive testing; and proactive inspection of FOG generating facilities and source investigation of excessive FOG in sewer lines. These CMOM control measures have target service levels for MSD to maintain, all of which have been consistently met since the program was implemented.

2.2. Northeast Public Sewer District (NPSD)

NPSD was established in 1979 under the provisions of Chapter 204 of the Missouri Revised Statutes and is governed by a five member Board of Trustees appointed by the Jefferson County, Missouri government. The day-to-day operations of NPSD are managed by the Executive Director. As a Chapter 204 Sewer District, NPSD does not levy taxes and receives income from user fees and connection fees. NPSD covers 42.8 square miles of northern Jefferson County, serving over 12,000 customers. NPSD operates and maintains a collection system consisting of 161.5 miles of gravity sanitary sewer, 49 pump stations, 29.78 miles of force mains, 4,948 manholes, and 298 lampholes.

In 1980, the service area of NPSD contained five privately owned sewer companies and 80 permitted wastewater disposal systems. In 1980, and reaffirmed in 1991, NPSD signed a management agreement designating NPSD as a Management Agency for the Northeast Facility Planning Area (FPA) with the boundaries of the FPA conterminous with the boundaries of NPSD. This designation made NPSD responsible for the planning, design, construction, acquisition, operation and maintenance of any public wastewater system with the NPSD service area. In 2015, NPSD was granted Level 2 Continuing Authority classification by the Missouri Clean Water Commission, which permits NPSD to provide sewage collection and service on a regional basis within the NPSD service area. NPSD is currently the only Level 2 Continuing Authority in the Lower Meramec Basin.

Today, there is one privately owned sewer company (Missouri American Water Company), and 14 permitted wastewater disposal systems in the NPSD service area. Four (4) of these permitted systems are NPSD facilities, and NPSD also has a no-discharge pump and haul site.

2.2.1. 2010 Facility Planning Efforts

NPSD completed a comprehensive Facility Plan for the entire collection and treatment system in 2010, with an amendment in 2013. The Facility Plan identified NPSD's future wastewater needs and identified improvements that will support growth within the service boundaries. The Facility Plan recommended the Saline Creek WWTF become a regional facility for NPSD. The plant was designed for an average daily flow of 4 MGD and a peak daily flow of 10 MGD. Provisions were made in the plant design to accommodate expanding capacity to an average daily flow of 8 MGD and a peak daily flow of 20 MGD by adding additional process equipment.

The Facility Plan also recommended to re-rate the Saline Creek Regional WWTF as follows:

1. Design Average Daily Flow = 6.56 MGD
2. Design Maximum Flow = 17.97 MGD
3. Organic Loading BOD5 = 11,341 lb/d
4. Total Suspended Solids Loading TSS = 12,203 lb/d

2.2.2. Saline Creek Regional WWTF Construction and Upgrade History

The Saline Creek Regional WWTF was constructed in two phases with the headworks and overflow basin completed in 2004, and the remainder of the existing facility including lab building, oxidation ditch, clarifiers and UV disinfection system completed in 2009. The WWTF was constructed adjacent to the old Ron Rog plant, which itself was converted to a temporary aerobic digester for the Saline Creek Regional WWTF. In 2017 construction was completed on a new blower building, electrical improvements to the headworks facility to comply with NEC (NFPA 70) Class I, Division 1 requirements, and a new perforated plate screen. The Saline Creek WWTF discharges to the Meramec River (Figure 2).

Biosolids from NPSD's satellite WWTFs are transported to the Saline Creek Regional WWTF for processing and final disposal. The Saline Creek Regional WWTF has an aerobic digester which is a recycled plant from the old Ron Rog WWTF adjacent to Saline Creek Regional WWTF and two (2) biosolids holding ponds. Biosolids are land applied annually by a contractor on fields near Byrnes Mill, MO. The aerobic digester was intended to be a temporary facility until a more in-depth study for improvements to NPSD's biosolids process could be completed.

The Biosolids Facility Plan was completed in February 2014 and NPSD conducted pilot studies on several different types of equipment as part of the development of the plan. The recommendation of the Biosolids Facility Plan was to construct a new aerobic digester with a membrane thickener and continue land application. NPSD applied for a SRF loan (\$5 million) to fund most of the cost of the Biosolids project with the remainder to be funded by NPSD's capital improvement fund. NPSD's biosolids project was included in the FY 2019 Intended Use Plan approved by the Missouri Clean Water Commission on October 18, 2018 as a \$5 million loan. The project is in final design with anticipated bidding in Spring 2019. The total capital cost of the biosolids project will be approximately \$6.4 million.

Between May 2012 and May 2015 NPSD completed \$9.75 million in work to eliminate known sources of I/I and regionalize the service area by eliminating eight of NPSD's wastewater treatment facilities. The flow from seven of these eliminated facilities was redirected to the Saline Creek Regional WWTF, and the flow from the remaining facility was redirected to the collection and treatment system of the RPCSD. Approximately \$9.3 million of this expenditure was funded by a loan from the State Revolving Fund (SRF) program, with the remainder funded by NPSD revenue.

Some of the work completed during this time period also provided improved access to the public sewer system for unsewered areas of NPSD's service area. Four years ago, NPSD eliminated eight facilities. Of the three satellite facilities remaining, two are in the Antire Valley. Sewering of the Antire Valley will be completed in phases. NPSD staff is currently working on design of Phases 1A and 1B. While Phases 1A and 1B will not consolidate treatment or make sewers accessible to additional properties, it must be completed prior to other phases of the work. Phase 2 will eliminate one WWTF (Walnut Ridge WWTF, MO-0095281), remove two pump stations and make public sewers accessible to a private treatment facility (Pembroke Apartments, MO-0091359) and numerous homes with onsite systems. Phase 3 will eliminate one WWTF (Antire Springs WWTF, MO-0099252) and makes sewers accessible to the lower Antire Valley because the major infrastructure will be in place. Sewer main extensions may be required by property owners with onsite systems and they would bear the cost for the sewer main to serve their property. The use of sanitary sewer improvement area financing could aid property owners with financing the cost of sewer main extensions.

2.2.3. Future Improvements

In addition to the planned biosolids project and reduction of unsewered areas, NPSD has begun efforts to evaluate and improve their collection system to eliminate sources of I/I, eliminate sanitary sewer overflows and enhance customer service reliability. While the 2010 Facility Plan improved parts of the collection system and removed I/I, this work concentrated on the interceptors of NPSD's collection system. With that work completed, NPSD can concentrate on the collection sewer mains. As NPSD inspects the system, needed improvements will be added to NPSD's capital improvement planning. At this time, it is anticipated that the work identified by NPSD's systemic inspection program will be completed on a pay-as-you-go basis as funding is available.

In addition to NPSD's planning for its existing assets, NPSD is working to improve management of wastewater on a watershed basis. Many areas of NPSD's territory are not served by public sewers. They are either served by on-site (septic) systems or private treatment facilities. NPSD works with MDNR, Jefferson County and residents to facilitate extending public sewer service to these areas. The introduction of the use of SSIA's is one step that aids in the process of extending public sewers to areas with on-site systems by providing a financing mechanism for the construction. NPSD believes that their current efforts and future planning are the best way to regionally manage wastewater collection and treatment in its service area and improve water quality.

2.3. Rock Creek Public Sewer District (RCPSD)

RCPSD was established on August 7, 1979 under the provisions of Chapter 204 of the Missouri Revised Statutes and is governed by a five member board of trustees appointed by the Jefferson County, Missouri government. The day-to-day operations of RCPSD are managed by the RCPSD Administrator. As a Chapter 204 Sewer District, RCPSD does not levy taxes and receives income from user fees and connection fees. RCPSD was designated the management

agency for the Rock Creek drainage area as a result of the 208 Plan. RCPSD had accepted this responsibility by an agreement signed in March 1980.

RCPSD currently owns and operates the Kimmswick WWTF which services the Rock Creek Basins and includes the cities of Arnold, High Ridge, House Springs, Kimmswick and Imperial. RCPSD area contains approximately 32 square miles or approximately 20,750 acres. The RCPSD area is divided into four service areas: Imperial/Kimmswick, New Towne, Seckman Valley, and West Elm Place. RCPSD operates and maintains a collection system consisting of 150 miles of gravity sewer lines, six pump stations, five miles of force main, 5,000 manholes, and 65 grease traps for commercial customers.

RCPSD also owns and operates the Kimmswick WWTF. The facility is a four basin sequencing batch reactor system with UV disinfection and three aerobic sludge digesters. It has a design flow of 4.8 MGD and discharges directly to the Mississippi River. Under an intergovernmental agreement between RCPSD and MSD, RCPSD also collects sewer flows from the Pomme Creek watershed in Arnold and sends them to MSD's Lower Meramec WWTF.

2.3.1. Historical Facility Planning Efforts and Improvements

Since being established in 1979, RCPSD has worked to improve wastewater treatment and eliminate and regionalize small treatment facilities throughout the Rock Creek Basin. Historical facility planning efforts in 1983, 1985, 1993, 2000, and 2009 have focused on cost-effectively consolidating existing facilities while meeting discharge permit requirements.

The Kimmswick WWTF was constructed in 2003 to facilitate regionalization in the watershed. At the time, RCPSD evaluated the cost to build the new treatment facility against the cost to construct sewers and pump to MSD, as outlined in the original 208 Plan. RCPSD found that the new facility was the most cost effective alternative (Table 1). Construction of the new facility led to the elimination of nine smaller WWTFs in the basin.

Table 1. Estimated RCPSD Treatment Alternative Construction Costs Developed during Previous Facility Planning Efforts (in 2000 Dollars).

Project	RCPSD Cost
Original 208 Plan Recommendation - Connect to MSD	
Original 208 Plan Recommendation – Connect to MSD	\$26.2 million
Construct Kimmswick WWTF	\$16.7 million

Source: Don Daniel, RCPSD District Administrator

In 2009, new permit requirements for disinfection, potential future treatment and collection system improvements, and significant inflow and infiltration reduction challenges necessitated phased upgrades to the Kimmswick WWTF. Upgrades included the addition of a UV disinfection system and the addition of mixers within the existing sequencing batch reactor to achieve partial

nutrient removal in Phase 1. Phase 1 also included improvements to the collection system including elimination of two pump stations, several creek bank stabilizations, sewer relocations, the closure of the Seckman School Lagoon, a significant inflow and infiltration investigation, and manhole lining and rehabilitation. Future Phase 2 improvements may include two additional sequencing batch reactors and the addition of a deep bed sand filter to achieve high effluent quality.

2.3.2. Identified Future Improvements

RCPSD is currently working through a Facility Plan Amendment in the FY 2019 and have identified approximately \$5.7 million in necessary capital improvements at the existing WWTF. Projects include a new influent screen, influent pump replacement, new high efficiency blowers, and a new maintenance garage. These projects will continue to be refined as the Facility Plan Amendment is developed.

3. Meramec River Water Quality Evaluation

Since 1978, water quality impacts caused by WWTFs have been eliminated in the Lower Meramec Basin. However, the Meramec River remains a high priority area in need of improvement from other pollutant sources. A summary of the original 208 Plan water quality goals, existing water quality conditions, and WWTF performance is provided below.

3.1. 208 Plan Water Quality Goals

Three different approaches to water pollution control were defined and evaluated for the original 208 Plan. Each approach or level of pollution control was predicted to produce different water quality in the study area at a different cost. The three levels of water quality used in the 208 Plan in ascending order of stringency are summarized below:

- Level 1 – Provided for the secondary treatment of point sources and a continuation of existing practices and controls for nonpoint sources;
- Level 2 – Required the control of point and nonpoint sources necessary to meet the State of Missouri's water quality standards; and
- Level 3 – Called for more stringent control of point and nonpoint sources of pollution in order to meet the water quality goals developed during the 208 study. This included establishing a new criterion of 0.05 mg/L for phosphate and new, more stringent criteria for fecal coliform and ammonia than were proposed by the State at the time the plan was developed.

As part of the 208 planning process, control strategies and their costs were developed for each water quality level. Results of this analysis were presented to the public at workshops held in 1977. Workshop participants overwhelmingly chose Level 2 water quality, which was subsequently selected as the target for the 208 Plan. In essence, the goal of the 208 Plan was to implement a combination of point and nonpoint source controls such that the rivers and streams of the St. Louis area meet Missouri's water quality standards. Water quality standards consist of three basic elements: 1) designated uses (e.g., recreation, aquatic life, public water supply), 2) numeric and narrative water quality criteria to protect designated uses by limiting chemical constituents that may be present in the water body, and 3) an antidegradation policy to maintain and protect existing uses and high quality waters.

3.2. Existing Water Quality Conditions

Section 303(d) and 305(b) of the CWA require each state to report to EPA on the status of their waters every two years. Waters that do not meet water quality standards and for which adequate water pollution controls have not been required are included on the state's 303(d) List. Missouri's 2018 303(d) List of impaired waters identifies the Lower Meramec River as impaired for both lead in sediment and bacteria (*Escherichia coli* or *E. coli*). There are currently no other identified 303(d) impairments in the Meramec River. Additional information regarding existing lead and *E. coli* levels in the Meramec River is included below. Because total ammonia nitrogen (ammonia) is a common pollutant discharged by WWTFs and Missouri's water quality criteria for ammonia will likely become more stringent in the near future, an analysis of historic and current

ammonia levels in the Meramec River is also included. Data used for this analysis were obtained from United States Geological Survey (USGS) monitoring stations at Paulina Hills (07019280) and Eureka (07019000). Paulina Hills is downstream of all major point discharges. Eureka is located upstream of the Lower Meramec basin system.

3.2.1. Lead

The most likely source of lead impairments to the Meramec River is old lead belt tailings. The Meramec River region is a former lead producing area with over 200 years of lead mining pollution. EPA and the U.S. Army Corps of Engineers (USACE) currently serve on a task force to facilitate the cleanup, restoration, and remediation efforts on the Meramec River⁵. DNR concluded that the Fenton WWTF, Grand Glaize WWTF, and Saline Creek WWTF were not a source of lead or the impairment.⁶

3.2.2. Bacteria

E. coli data collected in the Meramec River at Paulina Hills (USGS station 07019280) since 1997 supports MDNR's findings that the Meramec River is impaired for bacteria. The *E. coli* criterion on the Meramec River is 126 cfu/100 mL, which is expressed as a recreational season (April – October) geometric mean. Since 1997, the *E. coli* criterion has been exceeded at this location six times (Figure 3).

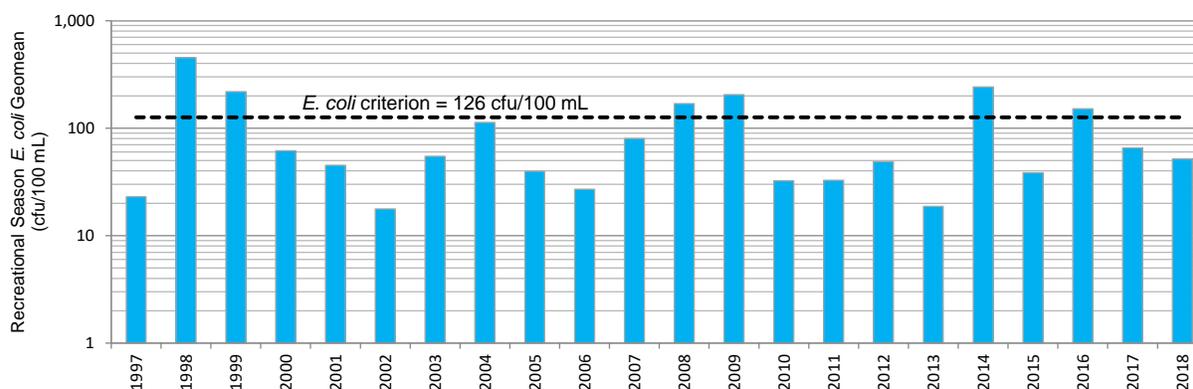


Figure 3. Average (Geometric Mean) Recreational Season (April – October) *E. coli* Levels in the Meramec River at Paulina Hills (1997-2016).

At the time the 208 Plan was developed, WWTFs were considered a significant source of bacteria. However, since then most treatment facilities in the Lower Meramec Basin have been either been eliminated or are required to disinfect. This suggests that high bacteria levels in the Meramec River are primarily a result of nonpoint sources in the watershed. This finding is supported by data from Paulina. Recent *E. coli* data (collected since 2005) from the Paulina Hills station were grouped and summarized by the following flow regimes:

⁵ <https://www.epa.gov/urbanwaterspartners/urban-waters-and-meramec-and-big-rivers-missouri>

⁶ See fact sheets for Missouri State Operating Permits MO-0086126, MO-0101362, and MO-0128490.

- High Flows: 0 to 10% flow exceedance
- Moist Conditions: >10 to 40% flow exceedance
- Mid-Range Flows: >40 to 60% flow exceedance
- Dry Conditions: >60 to 90% flow exceedance
- Low Flows: >90% flow exceedance

The data show that bacteria levels and the flow regime are positively correlated (Figure 4). This relationship is most apparent during high flow conditions, which has an *E. coli* recreational season geometric mean of 398 cfu/100 mL during these wet weather conditions. *E. coli* levels in all other flow regimes range from 40 to 83 cfu/100 mL, which are below the criterion of 126 cfu/100 mL. Because the high flow regime is dominated by stormwater runoff, nonpoint sources are likely the primary source of bacteria during this condition.

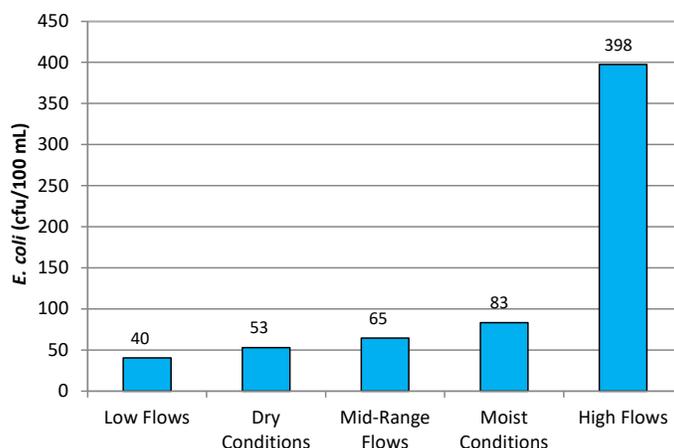


Figure 4. Distribution of Average (Geometric Mean) Recreational Season (April – October) *E. coli* Levels by Flow Regime in the Meramec River at Paulina Hills (2005 – 2018).

3.2.3. Ammonia

Since 1968, average ammonia levels in the Meramec River at the Paulina Hills station have consistently remained below EPA’s new recommendations⁷ for summer (April – September) and winter (October – March) water quality criteria of 0.7 and 2.3 milligrams per liter (mg/L), respectively, which are based on a pH of 7.8 and assume a summer temperature of 26°C and a winter temperature of 6°C (Figure 5). During this period, average summer ammonia levels have been below 0.1 mg/L and average winter levels have been below 0.2 mg/L. There is no clear, long-term trend in ammonia levels at the Paulina Hills station.

⁷ EPA’s 2013 ammonia criteria recommendations are based on new toxicity data which demonstrate that some organisms, particularly some species of gill-breathing snails and freshwater mussels, are more sensitive to ammonia than other organisms in the national toxicity dataset used in previous criteria recommendations (EPA 2013). Depending on pH and temperature assumptions, the revised recommendations represent a decrease of 50% or more for existing ammonia criteria.

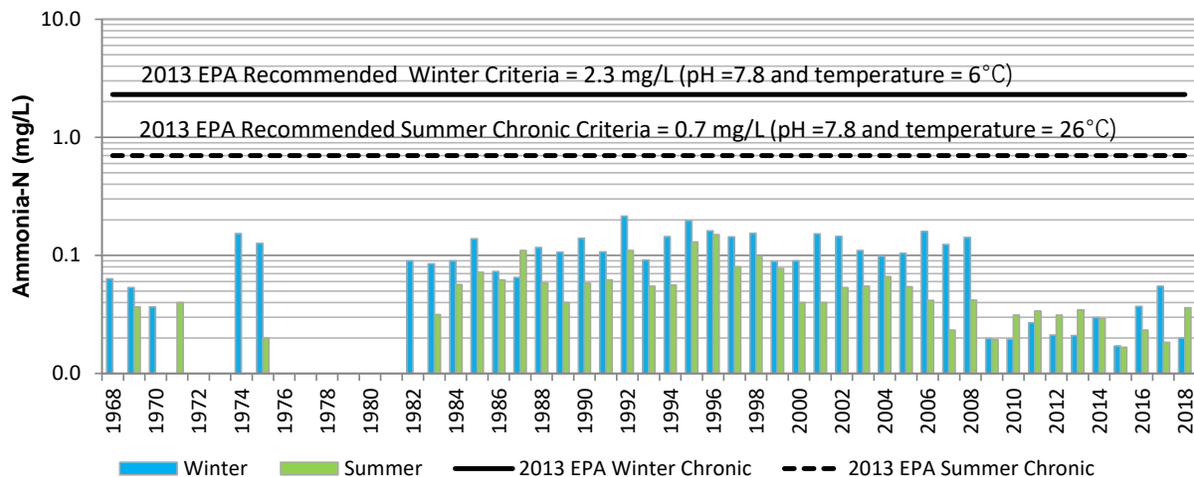


Figure 5. Average Annual Ammonia in the Meramec River at Paulina Hills (1968 – 2018).

Since 2009, average ammonia levels at the Paulina Hills station dropped by approximately 50% and 75% during the summer and winter seasons, respectively. The net result of these changes was that ammonia returned to background levels measured at the upstream Eureka station (Figure 6). This reduction is likely attributable to upgrades made at the Grand Glaize WWTF during the period. However, reduced ammonia levels may also be partly attributable to improvements at the NPSD Saline Creek Regional WWTF, which completed its second phase of construction in 2009.

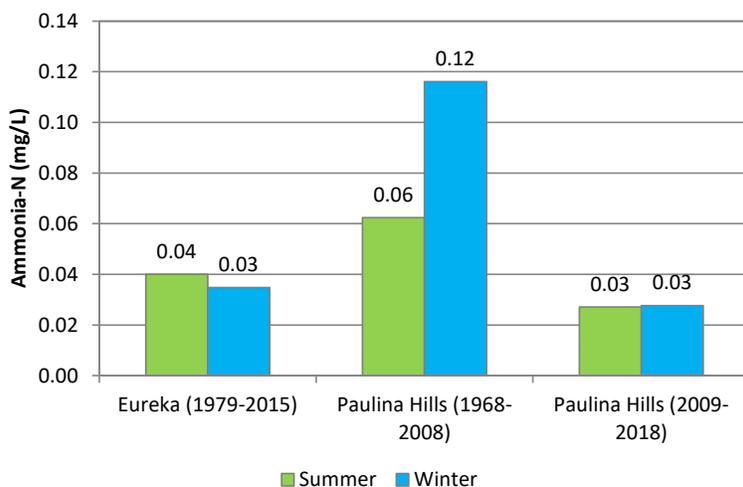


Figure 6. Average Annual Ammonia Levels in the Meramec River at Eureka (Upstream of the 201 Planning Area) and Paulina Hills (Downstream of Major WWTFs in the 201 Planning Area).

3.3. WWTF Performance for Major Facilities Discharging into the Lower Meramec River

In the 1970s, discharges from point sources were directly attributed to elevated levels of phosphorus and fecal coliform in the Meramec River. At that time, the Lower Meramec Basin was serviced by numerous lagoons and septic systems, which did not meet secondary treatment standards or require disinfection. Effluent quality was generally insufficient to meet water quality standards. Since this time, most of these facilities and septic tanks have been consolidated into a small number of major secondary treatment facilities with disinfection. Major facilities that discharge to the lower Meramec River include MSD's Grand Glaize WWTF, and Fenton WWTF, and NPSD's Saline Creek Regional WWTF. All three of these facilities typically meet their National Pollutant Discharge Elimination System (NPDES) permit requirements, which were designed to protect water quality standards.

3.3.1. Grand Glaize WWTF Performance

The Grand Glaize WWTF (MO-0101362) uses a treatment process that includes equalization, coarse screening, influent pumping, fine screening, grit removal, primary clarification, aeration, secondary clarification, and disinfection during the recreation season. This treatment process has been well operated since the facility's expansion in 2007. Over the past decade, both BOD and TSS effluent concentrations have consistently achieved minimum average monthly removal requirement. High wet weather flows significantly affect BOD and TSS removal, so continual achievement of the average monthly removal indicates the Grand Glaize WWTF's ongoing exceptional performance.

Since final ammonia effluent limits came into effect in 2010, the Grand Glaize WWTF has never exceeded daily maximum or monthly average ammonia effluent limits. *E. coli* effluent limits were consistently achieved. In 2018, the National Association of Clean Water Agencies gave the Grand Glaize WWTF a Gold Peak Performance Award.

3.3.2. Fenton WWTF Performance

The Fenton WWTF (MO-0086126) uses a treatment process of fine screening, influent pumping, grit removal, primary clarification, aeration, secondary clarification, and disinfection during the recreation season. In the past five years, there has been one exceedance of *E. coli* limits in May 2017, which occurred during a period of historic flooding and flows into the plant that exceeded the rated capacity of the disinfection equipment. There was one exceedance of lead effluent limits in December 2013. It is anticipated that the Fenton WWTF will be taken offline in 2025 and the Fenton influent flow will be sent to the Lower Meramec WWTF. In 2018, the National Association of Clean Water Agencies gave the Fenton WWTF a Platinum Peak Performance Award.

3.3.3. Saline Creek Regional WWTF Performance

The Saline Creek Regional WWTF (MO-0128490) currently features a multi-channel oxidation ditch with biological nutrient reduction capabilities, two secondary clarifiers, and UV disinfection. The facility used to consist of two separate treatment plants with a separate outfall – the Ron Rog site and the Highway 141 site. The Highway 141 plant was eliminated in 2013 and replaced with a lift station sending all effluent to the Ron Rog site now referred to as the Saline Creek Regional WWTF. Since 2013, there have been no permit limit exceedances. Although nutrient removal is not currently required at the facility, it can be operated to remove nitrogen and phosphorus biologically.

4. Proposed 208 Plan Amendments

As discussed in Section 1, the original 208 Plan made recommendations regarding point source, nonpoint source, and sludge management alternatives across the four-county planning area. These recommendations were based on an evaluation of cost-effectiveness, water quality effectiveness, management and institutional constraints, and environmental considerations.

Technical and economic considerations have changed since the 1978 analysis and the original 208 Plan point source and sludge management alternatives for the Lower Meramec Basin are not necessary for meeting the overall planning objectives. The 208 Plan recognizes that updates to the plan may be necessary noting that it “is not a static list of recommendations but represents a dynamic and progressive policy for guiding future wastewater construction activities.”

The purpose of this section is to identify changes necessary to amend the 208 Plan recommendations and bring it into alignment with the current situation in the Lower Meramec Basin. The proposed changes in this report only address one point source service area (identified as the Lower Meramec System in the 208 Plan) and one regional sludge processing center (identified as the Lower Meramec Regional Center in the 208 Plan), but do not impact point source, nonpoint source, or sludge management recommendations for the remainder of the four-county planning area.

4.1. Lower Meramec System Point Source Amendments

The existing 208 Plan calls for MSD to serve as the designated management agency of a regional treatment facility to provide sewer services via major interceptors for the Lower Meramec area (southern St. Louis County and northern Jefferson County) and the entire Rock Creek Basin in Jefferson County. At the time the 208 Plan was developed, the construction of separate facilities within this area was considered impractical from both a technical and economic standpoint. Technical and economic considerations have evolved since 1978 and it is currently more practical to make the existing major facilities permanent. Also, only NPSD is a Level 2 Continuing Authority whereas MSD and RCPSD are Level 3 Continuing Authorities. Therefore, the 208 Plan recommendations should be amended to state that the Lower Meramec System will be served by four WWTFs and their designated management agencies (Table 1, Figure 7).

Table 1. Proposed Permanent WWTFs in the Lower Meramec System.

Treatment Facility	Service Area	Management Agency
Lower Meramec WWTF	Lower Meramec (St. Louis County)*	MSD
Grand Glaize WWTF	Grand Glaize (St. Louis County)	MSD
Saline Creek Regional WWTF	Lower Meramec (Jefferson County)	NPSD
Kimmswick WWTF	Rock Creek (Jefferson County)	RCPSD

*Includes serving portions of the City of Arnold and RCPSD (Pomme Creek Watershed) in Jefferson County.

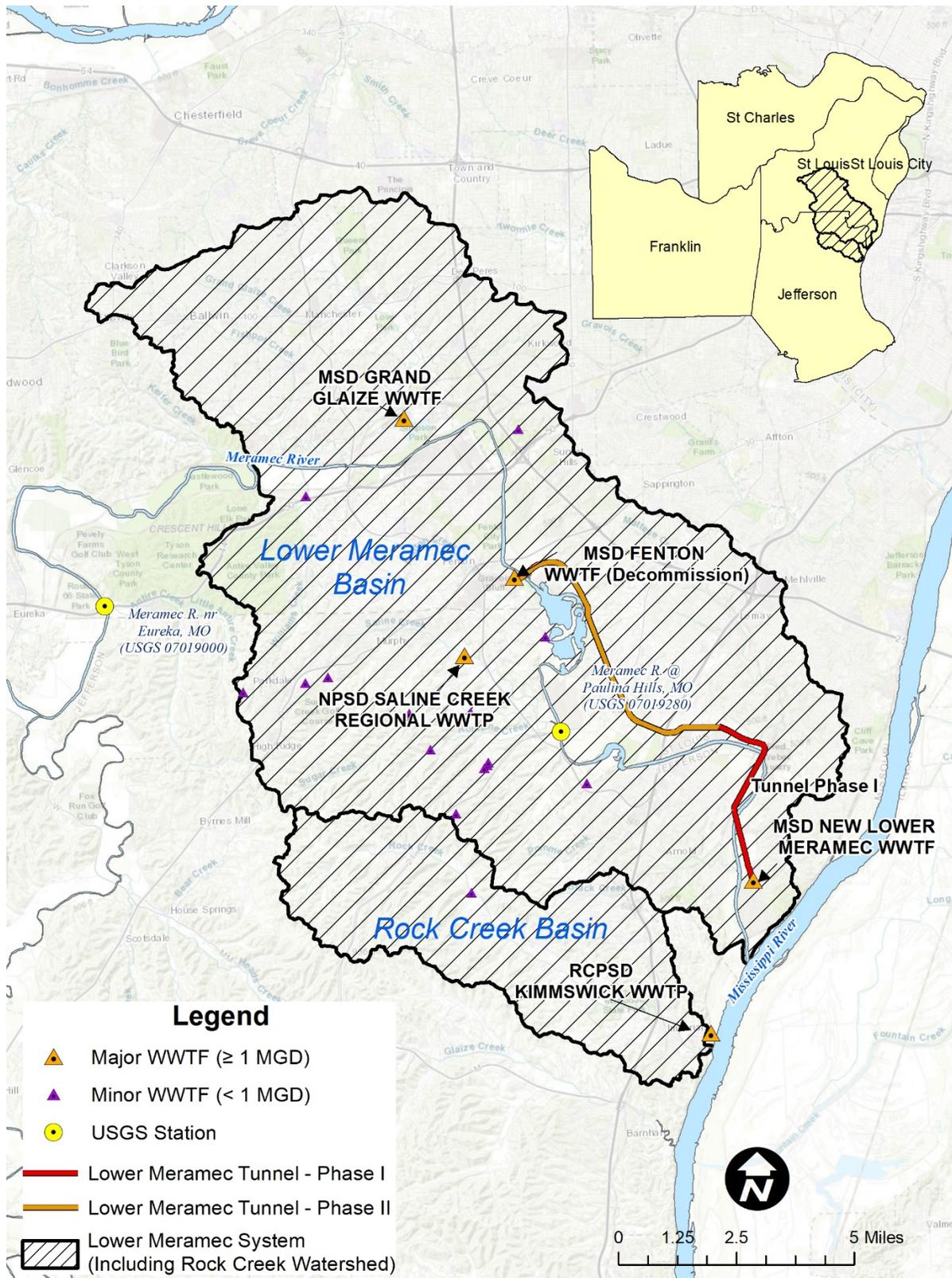


Figure 7. Proposed 208 Plan Amendment for the Lower Meramec System.

Amending the 208 Plan to maintain the four major WWTFs within the Lower Meramec System will not impact water quality standards attainment. Unlike in 1978, there are currently no impairments in Meramec River that are attributable to WWTF discharges, and the existing WWTFs are producing high quality effluent that meets NPDES permit conditions. Additionally, both the Lower Meramec and the Kimmswick WWTF discharge directly to the Mississippi River with no impact to the Meramec River. Therefore, from a water quality perspective, there is little difference between the original 208 Plan and this proposed amendment.

In addition to the Continuing Authority and jurisdictional issues, the overriding consideration for maintaining separate WWTFs in the Lower Meramec System is cost-effectiveness. The 20-year present worth costs for implementing the original 208 recommendations (connecting to the Lower Meramec WWTF) greatly exceed the cost to maintain current facilities for each of the three agencies. Implementing the original 208 recommendations would include annual operation and maintenance, constructing the Phase III Lower Meramec Tunnel, expanding the Lower Meramec WWTF, and decommissioning parts or all of the Grand Glaize, Saline Creek, and Kimmswick WWTFs. The combined estimated cost to implement these projects is approximately \$400 million (Table 2).

Table 2. Comparison between Costs to Implement Original 208 Point Source Recommendations and Costs to Maintain Existing Facilities in the Lower Meramec System.

Estimated 20-Year Present Worth Cost to Implement Original 208 Recommendations (in 2018 dollars)¹				
Cost Component	MSD	NPSD	RCPSD	Total
Phase III Lower Meramec Tunnel	\$134,900,000	--	--	\$134,900,000
Phase III Lower Meramec WWTF Expansion	\$82,200,000	--	--	\$82,900,000
Grand Glaize WWTF Decommissioning	\$2,000,000	--	--	\$2,000,000
O&M Present Worth	\$73,300,000	--	--	\$73,300,000
Cost of Tunnels to Connect to Lower Meramec System	--	\$57,500,000	\$14,300,000	\$71,800,000
Cost of Lower Meramec WWTF Upgrades ²	--	\$15,800,000	\$19,000,000	\$34,800,000
Total Cost to Implement 208 Recommendations	\$293,100,000	\$73,300,000	\$33,300,000	\$399,700,000
Estimated 20-Year Present Worth Cost to Maintain Existing Facilities (in 2018 dollars)¹				
Cost Component	MSD Grand Glaize WWTF³	NPSD Saline Creek Regional WWTF	RCPSD Kimmswick WWTF	Total
Capital Improvements	\$24,700,000	\$6,400,000	\$5,650,000	\$31,550,000
O&M Present Worth	\$88,500,000	\$10,700,000	\$11,200,000	\$95,200,000
Total Cost to Maintain Existing Facilities	\$113,200,000	\$17,100,000	\$16,850,000	\$147,150,000
Final Cost Savings	\$179,900,000	\$56,200,000	\$16,450,000	\$252,550,000

¹ 20-year present worth based on an inflation rate of 2.5%.
² Does not include annual O&M, as these costs would be defined through future intergovernmental agreements.
³ Includes costs (\$5.1 million capital, \$15.3 OM) for future nitrogen and phosphorus removal.

By comparison, costs to maintain the existing facilities would include annual operation and maintenance and capital costs to replace aging equipment at the Grand Glaize WWTF, improve biosolids facilities at the Saline Creek Regional WWTF, and implement preliminary improvements identified for the Kimmswick WWTF. The combined estimated cost to implement these projects is approximately \$147 million (Table 2). Overall, maintaining the existing facilities results in a cost savings of nearly \$253 million.

Existing user rates at each of the three sewer districts do not account for the increased costs necessary to implement the original 208 Plan projects. For MSD, existing (FY 2020) residential user rates include a base charge of \$26.53 and a volume charge that varies depending on whether a home is metered or unmetered. At the current rates, a typical residential bill would be \$55.57 per month. MSD is requesting a 1.9% rate increase in FY 2021, and a 3.8% rate increase in each of FY 2022, FY 2023, and FY 2024. NPSD customers pay a \$31.73 per month base charge and \$3.17 per thousand gallons of water usage. At the current rates, an average NPSD customer would pay \$47.58 per month. NPSD has no planned rate increases at this time. RCPD just completed a district wide rate increase. RCPD charges a base fee of \$24.43 per month or \$73.29 per quarter and a volumetric fee of \$2.57 per thousand gallons. A typical RCPD customer would pay approximately \$88.79 per quarter or \$29.60 per month, depending on the billing structure.

4.2. Lower Meramec Regional Center Sludge Management Amendments

The existing 208 Plan recommended designating the Lower Meramec WWTF as a regional sludge processing center. Alternatives, including transporting the sludge to the Lemay WWTF for incineration, were determined to be more expensive and ultimately ruled out of consideration for this reason. However, more recent analyses and activities in the watershed indicate that the original recommendation is no longer applicable. The 208 Plan recommendations should be amended to state that MSD, NPSD, and RCPD will be responsible for sludge management at their respective facilities, as discussed below.

4.2.1 MSD Sludge Management

In the Lower Meramec Basin, sludge from the Grand Glaize WWTF and Lower Meramec WWTF is currently thickened and hauled off-site for incineration and/or landfill disposal. Sludge from MSD facilities outside of the Lower Meramec Basin are currently incinerated at the Bissell Point WWTF or Lemay WWTF. In 2018, MSD evaluated four potential future sludge management alternatives⁸.

⁸ Metropolitan St. Louis Sewer District (MSD). 2018. Solids Handling Technical Memorandum, Fluidized Bed Incinerators. Project 12565. St. Louis, MO. 24 pp.

Sludge management alternatives included the following:

- 1) Locating all incineration activities at the Bissell Point WWTF,
- 2) Retaining incineration facilities at the Bissell Point WWTF and constructing new facilities at the Lower Meramec WWTF to handle sludge from the Lower Meramec and Grand Glaize WWTFs,
- 3) Retaining incineration facilities at the Bissell Point WWTF and constructing new facilities at the Lower Meramec WWTF and Grand Glaize WWTFs to handle sludge from MSD's facilities in the Lower Meramec Basin, and
- 4) Retaining incineration facilities at the Bissell Point and Lemay WWTFs. The Lemay WWTF would accept sludge from the Grand Glaize and Lower Meramec WWTFs. Incinerators at Bissell Point would provide redundancy for sludge produced at the Grand Glaize and Lower Meramec WWTFs.

MSD concluded that Alternative 4 was the most environmentally sustainable and socially feasible future course of action. This cost between the alternatives was not statistically different, but Alternative 4 provided MSD with the most certainty with respect to unexpected increases in future capital or operational costs. Per the Second Material Amendment to the Consent Decree, the incinerators at both Bissell Point and Lemay WWTFs will be upgraded from multiple hearth incinerators to fluidized bed incinerators by 2026, which will result in a yearly reduction of 2,109 tons of air emissions.

Alternative 4 assumes that sludge from the Grand Glaize and Lower Meramec WWTFs may initially be hauled, but eventually will be transported to the Lemay WWTF via force main. Transportation of raw sludge via hauling will be phased out of use because hauling has potential for both spills and odor complaints. Landfilling of raw sludge will only be used minimally.

The 208 Plan should be amended to state that MSD will manage sludge generated at the Grand Glaize and Lower Meramec WWTFs at the Lemay WWTF, as described above in alternative 4.

4.2.2 NPSD Sludge Management

Biosolids from NPSD's satellite WWTFs are transported to the Saline Creek Regional WWTF for processing and final disposal. The Saline Creek Regional WWTF has an aerobic digester which is a recycled plant from the old Ron Rog WWTF adjacent to Saline Creek Regional WWTF and two (2) biosolids holding ponds. Biosolids are land applied annually by a contractor on fields near Byrnes Mill, Missouri. As described in Section 2.2.2, NPSD is in the process of construction a new aerobic digester with a membrane thickener and will continue land application. The 208 Plan should be amended to state that NPSD will continue the current activities.

4.2.3 RCPSD Sludge Management

In previous facility planning efforts, RCPSD evaluated the cost to haul sludge to MSD's facilities against the cost to retain a contract hauler and land apply them. RCPSD found that the cost to

land apply was approximately half the cost to dispose of them at MSD (\$0.07 per gallon versus \$0.17 per gallon). RCPSD selected the most cost effective alternative and currently land applies residual sludge in accordance with their NPDES permit and MDNR-approved biosolids management plan. The 208 Plan should be amended to state that RCPSD will continue the current activities.

4.3. Summary of Public Information Process

As of the date of this report, the three management agencies proposing to amend the 208 Plan have conducted significant public information and outreach activities. These include:

- January 8, 2019 – Coordination meeting with MDNR staff.
- January 16, 2019 – Informational meeting with Senator Weiland, Representative Shaul, and Representative Ruth.
- February 4, 2019 – Initiated 30-day public comment period for interested parties to review and comment on the draft report and provided update to MSD board at the Program Manager Committee Meeting.
- February 8, 2019 – Informational meeting with Dennis Gannon, Jefferson County Executive.
- February 11, 2019 – Provided update at Jefferson County Council meeting.
- February 12, 2019 – Hosted public hearing.
- March 8, 2019 – Coordination meeting with EPA Region 7 staff.

Additional outreach and public review will occur as the proposed amendment when the proposed amendment is finalized and presented to the Clean Water Commission for review and approval. The planned schedule of remaining outreach activities is included in Attachment A.

4.4. Summary of Proposed Amendments

This report provides support for amending the 208 Plan to bring it into alignment with the current situation in the Lower Meramec Basin. The analyses support the following amendments:

- It is more cost-effective to maintain existing facilities (\$147 million) within the Lower Meramec System than to construct a single regional WWTF (\$400 million). Further, a single regional WWTF is not necessary to meet state water quality standards in the Lower Meramec River. Therefore, the Lower Meramec System should instead be served by four WWTFs: Lower Meramec WWTF, Grand Glaize WWTF, Saline Creek Regional WWTF, and Kimmswick WWTF.
- Due to environmental and management considerations, it is not feasible for the Lower Meramec WWTF to serve as a regional sludge processing center. The plan should be revised to recognize that sludge processing for MSD facilities in the Lower Meramec System will be addressed at the Bissell Point WWTF or Lemay WWTF; the Northeast Public Sewer District and Rock Creek Public Sewer District will continue their current management activities.

ATTACHMENT A

Process and Proposed Schedule for Amending the 208 Plan

State regulations do not currently specify a process or requirements for amending existing 208 plans. According to federal regulations (40 CFR 130.6(f)), updated water quality management plan sections must be consistent with all other parts of the plan. The updates must also be certified by the Governor (or Governor's designee before being sent to EPA for approval.

In the fall of 2015, the EWGCOG met with MDNR, EPA Region 7, and NPSD to identify a process for amending the plan in accordance with the federal regulations. From these discussions, EWGCOG prepared a detailed Process to Amend 208 Water Quality Management Plan. In general, the process stipulates that the requesting agencies (MSD, NPSD, RCPSD) will prepare a documentation report (this document) and amendment request and, with EWGCOG's support, submit it to the Missouri Clean Water Commission (CWC) for their approval following a public notice period. The CWC shall consider recommendations on the proposal from MDNR and hold a public hearing before submitting final recommendations to the Governor or appropriate designee. The detailed process identified by the EWGCOG is outlined below. The proposed schedule for amending the 208 Plan recommendations, through the vote by the CWC to take action on the plan, is included in Figure A-1.

EWGCOG Process for Amending 2018 Plan Recommendations

1. Applicant(s) notify EWGCOG of their interest in an amendment to the 1978 208 Water Quality Management Plan.
2. Applicant(s) communicate with interested parties including and MDNR and receives feedback concerning proposed amendment.
3. Applicant(s) prepare **documentation report** supporting proposed amendment.
4. While Applicant(s) are preparing their **documentation report**, EWGCOG considers request and can prepare a **background report** (if needed) with recommendation and letter.
5. Applicant(s) sends draft **documentation report** to MDNR Engineering Section, Water Pollution Control Branch of Water Protection Program for feedback. Applicant(s) receives feedback and makes adjustments, if necessary.
6. Applicant(s) hold public meeting
Schedule meeting.
Post meeting announcement and request/documentation on Applicant(s) website.
Comment period should begin at time of announcement and end 7 days after public meeting.
Publicize meeting announcement.
Public meeting held and feedback on proposed amendment is solicited.
Meeting documentation is assembled – announcement, where publicized, meeting sign-in sheet and notes and comments received.

7. Applicant(s) prepare packet including: letter requesting amendment to plan; **documentation report**; and public meeting information.
8. Applicant(s) send packet to EWGCOG and to Clean Water Commission.
9. EWGCOG sends letter of recommendation to Clean Water Commission. EWG's **background report** (if needed) will be attached.

MISSOURI CLEAN WATER COMMISSION ACTIONS

1. MDNR receives request letter and packet from Applicant(s).
2. MDNR receives EWG recommendation letter with **background report** (if needed).
3. MDNR/Clean Water Commission places request on Clean Water Commission meeting schedule and identify public hearing/comment period.
4. Clean Water Commission meeting with request on Agenda, as information item.
5. Clean Water Commission holds public hearing about request from MSD.
6. Clean Water Commission meeting with request as action item on Agenda.
7. At this meeting, MDNR will make recommendation to Clean Water Commission on request.
8. Clean Water Commission will take action on request to amend 208 Plan.
9. MDNR staff drafts document to record Commission's recommendation and asks them to sign.
10. MDNR staff prepares memo to Governor requesting action to amend 208 Plan and attaches Commission's recommendation.

GOVERNOR ACTIONS

1. Governor reviews recommendations from Clean Water Commission/MDNR and issues 208 Plan certification and sends to EPA Region 7 for review and approval.

EPA ACTIONS

1. EPA reviews certification and takes action.
2. EPA communicates with MDNR on their action.
3. MDNR informs MSD.

ATTACHMENT B

Summary of Water Quality Management Plan Elements Required by 40 CFR 130.6(c)

Federal regulations (40 CFR 130.6(c)) outline the planning elements that must be included in a water quality management (WQM) plan, or referenced as part of the WQM plan if contained in separate documents when they are needed to address water quality problems. A summary of the regulatory planning elements and their relationship to the information and changes requested in this report is included below.

1) Identify relevant total maximum daily loads (TMDLs) and associated requirements.

There are five TMDLs within the Lower Meramec System. These include biochemical oxygen demand (BOD) and ammonia TMDLs for Rock Creek and Saline Creek, a chlordane and PCB TMDL for the Mississippi River, a lead and zinc TMDL for the Missouri River, and a bacteria TMDL for Fishpot Creek. The issues leading to the Rock Creek and Saline Creek TMDLs have been addressed through regionalization by the Northeast Public Sewer District and Rock Creek Public Sewer District. None of the remaining TMDLs directly address water quality in the Meramec River or impact any recommendations or changes suggested in this report.

Existing TMDLs in the Lower Meramec System				
Stream	Year	Pollutant	Source	Document Link
Rock Creek	1999	BOD and Ammonia	WWTPs	https://dnr.mo.gov/env/wpp/tmdl/docs/1714-rock-ck-tmdl.pdf
Saline Creek	2001	BOD and Ammonia	WWTPs	https://dnr.mo.gov/env/wpp/tmdl/docs/2190-saline-ron-roq-tmdl.pdf
Mississippi River	2006	Chlordane and PCBs	Many point and nonpoint sources	https://dnr.mo.gov/env/wpp/tmdl/docs/0001-1707-3152-mississippi-r-tmdl.pdf
Mississippi River	2010	Lead and Zinc	Herculaneum Smelter	https://dnr.mo.gov/env/wpp/tmdl/docs/1707-miss-r-tmdl.pdf
Fishpot Creek	2016	Bacteria	Urban runoff	https://dnr.mo.gov/env/wpp/tmdl/docs/tmdl-bacteria-fishpot-cr-final.pdf

2) Identify effluent limitations and schedules of compliance. According to MDNR’s most recent (2015) NPDES permit shapefiles, there are 26 permitted facilities (excluding general permits) in the Lower Meramec System. These include major and minor municipal and non-municipal facilities, one state facility, and one industrial stormwater facility. MDNR generally applies new permit limits, compliance schedules, and other requirements for every facility on a five year cycle. A list of facilities in the Lower Meramec Basin and links to their permits (if available) is included in the table below.

As the recommendations included in this report are implemented, MDNR will update permit requirements for the Grand Glaize WWTP, Lower Meramec WWTP, Saline Creek Regional WWTP, and Kimmswick WWTP to reflect the plan amendment and meet water quality standards in the Meramec River.

Existing NPDES Discharges in the Lower Meramec System (Excludes General Permits)			
Category	Permit ID	Facility Name	Link to Permit
Major Municipal	MO0101362	MSD Grand Glaize WWTP	https://dnr.mo.gov/env/wpp/permits/issued/docs/0101362.pdf
Major Municipal	MO0086126	MSD, Fenton WWTP	https://dnr.mo.gov/env/wpp/permits/issued/docs/0086126.pdf
Major Municipal	MO0127949	MSD, Lower Meramec WWTF	https://dnr.mo.gov/env/wpp/permits/issued/docs/0127949.pdf
Major Municipal	MO0128490	NPSD, Interim Saline Creek Regional WWTF	https://dnr.mo.gov/env/wpp/permits/issued/docs/0128490.pdf
Major Non-Municipal	MO0000361	Ameren Missouri- Meramec Power Plant	https://dnr.mo.gov/env/wpp/permits/issued/docs/0000361.pdf
Minor Municipal	MO0092649	NPSD, Terry Jean Acres WWTF	https://dnr.mo.gov/env/wpp/permits/issued/docs/0092649.pdf
Minor Non-Municipal	MO0090484	Big Valley Mobile Home Court	Permit not available online
Minor Non-Municipal	MO0001627	Bohn and Dawson, Inc.	https://dnr.mo.gov/env/wpp/permits/issued/docs/0001627.pdf
Minor Non-Municipal	MO0107981	Brennens Point Apartments	https://dnr.mo.gov/env/wpp/permits/issued/docs/0107981.pdf
Minor Non-Municipal	MO0088846	BROOKSHIRE COURT APTS	https://dnr.mo.gov/env/wpp/permits/issued/docs/0088846.pdf
Minor Non-Municipal	MO0123358	KOLLER CRAFT PLASTIC PROD	https://dnr.mo.gov/env/wpp/permits/issued/docs/0123358.pdf
Minor Non-Municipal	MO0127515	LIVING WELL VILLAGE	Permit not available online
Minor Non-Municipal	MO0091162	MAWC, Meramec Sewer	https://dnr.mo.gov/env/wpp/permits/issued/docs/0091162.pdf
Minor Non-Municipal	MO0094374	McArthy Homesites #2 WWT	https://dnr.mo.gov/env/wpp/permits/issued/docs/0094374.pdf
Minor Non-Municipal	MO0106569	Meramec Heights Shopping Center	https://dnr.mo.gov/env/wpp/permits/issued/docs/0106569.pdf
Minor Non-Municipal	MO0120910	Motomart	https://dnr.mo.gov/env/wpp/permits/issued/docs/0120910.pdf
Minor Non-Municipal	MO0090956	Murphy Ann Apartments WWTP	Permit not available online
Minor Non-Municipal	MO0110779	PEERLESS DEMOLITION LF	https://dnr.mo.gov/env/wpp/permits/issued/docs/0110779.pdf
Minor Non-Municipal	MO0001341	Reichhold, LLC 2	https://dnr.mo.gov/env/wpp/permits/issued/docs/0001341.pdf
Minor Non-Municipal	MO0088897	SIR THOMAS MANOR APTS	Permit not available online
Minor Non-Municipal	MO0114413	Tesson Hills Apartments	https://dnr.mo.gov/env/wpp/permits/issued/docs/0114413.pdf
Minor Non-Municipal	MO0123021	Valley Park TCE Site - Wainwright	https://dnr.mo.gov/env/wpp/permits/issued/docs/0123021.pdf
Minor Non-Municipal	MO0084930	Woodglen Apartments WWTP	Permit not available online
Minor Non-Municipal	MO0040347	Woodridge Apartments	https://dnr.mo.gov/env/wpp/permits/issued/docs/0040347.pdf
Minor State	MO0109975	MDC, Powder Valley Cons. Nature Center	https://dnr.mo.gov/env/wpp/permits/issued/docs/0109975.pdf
Site-Specific Industrial SW	MO0113000	Advanced Disposal Oak Ridge Landfill	Permit not available online

3) Identify anticipated municipal and industrial waste treatment works, construction priorities, and schedules. The relevant information for this planning element is addressed in Section 2 of this report.

4) Describe the regulatory and non-regulatory programs, activities and Best Management Practices (BMPs) which the agency has selected as the means to control nonpoint source pollution where necessary to protect or achieve approved water uses. Identify BMPs for the following nonpoint sources:

- **Residual waste.** Proposed residual management amendments for the Lower Meramec System are outlined in Section 4.2 of this report.
- **Land disposal.** Proposed residual management amendments for the Lower Meramec System are outlined in Section 4.2 of this report.
- **Agricultural and silvicultural.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing plan requirements.
- **Mines.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing plan requirements.
- **Construction.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing plan requirements.
- **Saltwater intrusion.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing plan requirements.
- **Urban stormwater.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing plan requirements.

5) Identify management agencies necessary to carry out the plan. As discussed throughout the report, the management agencies responsible for implementing the 208 Plan and associated amendments described include the East-West Gateway Council of Governments, Metropolitan St. Louis Sewer District, Northeast Public Sewer District, and Rock Creek Public Sewer District.

6) Identify implementation measures necessary to carry out the plan, including financing, the time needed to carry out the plan, and the economic, social and environmental impact of carrying out the plan.

- **Financing** – Although the proposed amendment will save the agencies and their customers \$253 million, the cost to implement the plan is still extensive. The agencies will work with their financial advisors and boards of directors to develop and pursue long-term financing strategies and tools that facilitate successful implementation of the amended plan, as proposed. Financing will likely include a combination of municipal bonds, loans, and pay as you go rates.
- **Point Source Amendment Timelines** – Implementation timelines are included in the attached report for each agency as follows:
 - MSD – Section 2.1.4 describes planned Lower Meramec Tunnel and WWTP project timelines
 - NPSD – Section 2.2.2 describes planned biosolids improvement timelines. Section 2.2.3 describes future improvements that may be pursued as needs are identified.
 - RCPD – Section 2.3.2 describes potential future improvements. RCPD is still working to develop the facility plan amendment that will inform future implementation schedules.
- **Sludge Management Amendment Implementation Timelines** – Implementation timelines are included in the attached report for each agency as follows:

- MSD – Section 4.2.1 describes planned Bissel Point and Lemay WWTF project timelines.
 - NPSD and RCPSD – These agencies will continue their current sludge management activities.
 - Economic and Social Impacts – The economic impacts are addressed in Section 4.2.1. The proposed amendment will result in a cost savings of \$253 million.
 - Environmental Impacts – The water quality impacts are addressed in Section 3. The analysis shows that the point sources meet their discharge limits and do not contribute to water quality impairments in the Meramec River.
- 7) Identify and develop programs for the control of dredge or fill material.** This is not applicable, as the proposed amendments included in this report do not impact or suggest changes to existing dredge or fill requirements.
- 8) Identify any relationship to applicable basin plans developed under section 209 of the Clean Water Act.** Section 209 of the Clean Water Act encourages basin-wide planning through coordination of area-wide plans developed under Section 208, facility plans developed under Section 201, or water quality standards implementation plans developed under Section 303. The relationship of the proposed amendment to the existing 201 Facility Plan for the Lower Meramec System is described in Section 1.2 of this report. Recent facility planning efforts for the individual sewer districts are also described in Sections 2.1, 2.2.1, and 2.3.1. Once approved, the 201 Facility Plan for the Lower Meramec System will be updated to reflect the amended 208 Plan. MDNR's approach to 209
- 9) Identify and develop programs for control of ground-water pollution.** This is not applicable, as the proposed amendments included in this report do not impact groundwater or suggest changes to any existing groundwater requirements.