APPENDIX 9E: SEWRPC/WDNR Review Documentation -

Appendix 9E-1: SEWRPC Review Letter -

Appendix 9E-2: January 8, 2021 Response Letter to WDNR Review Comments -

Appendix 9E-3: Updated Responses to WDNR Comments -

APPENDIX 9E-1: SEWRPC Review Letter -

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION
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December 10, 2020

Karen L. Sands, AICP
Milwaukee Metropolitan Sewerage District
260 W. Seeboth Street
Milwaukee, WI 53204

Dear Ms. Sands:

We are writing in response to your electronic mail of July 29, 2020, to the Wisconsin Department of Natural Resources requesting that the Commission staff review and comment on the document entitled *2050 Facilities Plan,* dated July 2020 (Plan). That document, which was prepared by the Milwaukee Metropolitan Sewerage District (MMSD), uses an asset management approach to provide recommendations for improvements to meet baseline, future, and buildout wastewater flow and effluent quality needs. The improvements will include conveyance and storage projects to increase capacity and reduce infiltration and inflow in the collection system, water reclamation facility (WRF) and biosolids projects to increase capacity and upgrade treatment processes, system wide improvements to reduce and eliminate overflows, and green infrastructure and watercourse projects.

Pursuant to your request, the Commission staff has reviewed the Plan and offer the following comments for your consideration:

1. The population forecast in the Plan indicates that the population of the MMSD planned sanitary sewer service area would approximate 1,390,181 persons in 2050 (buildout conditions). This population projection for the MMSD service area was completed by SEWRPC. A year 2035 (future conditions) population of 1,264,749 persons was projected by SEWRPC and in the report was assumed to be equal to year 2040 conditions due to regional growth projections historically being more optimistic than actual growth. These populations were appropriately applied to estimate future and buildout wastewater flows and loads to the plants.

2. The sanitary sewer service area (SSSA) and planning area for MMSD are shown in Figure 1-1 of the Plan. The sanitary sewer service area map matches the adopted SSSA identified in the following documents. Any SSSA changes to expand within the MMSD planning area are handled as needed through coordination with MMSD staff and by creating or amending the SSSA document for the appropriate community.

    a. September 2019 SEWRPC *Amendment to the Regional Water Quality Management Plan – City of Mequon.*

    b. September 2018 SEWRPC *Amendment to the Regional Water Quality Management Plan – Village of Germantown.*

    c. September 2014 SEWRPC *Amendment to the Regional Water Quality Management Plan – Village of Menomonee Falls.*

d. June 2008 SEWRPC *Amendment to the Regional Water Quality Management Plan – Brookfield-Elm Grove Sanitary Sewer Service Area.*

e. March 2019 SEWRPC *Amendment to the Regional Water Quality Management Plan – City of New Berlin.*

f. March 2013 SEWRPC *Amendment to the Regional Water Quality Management Plan – City of Muskego.*

g. June 2011 SEWRPC *Community Assistance Planning Report No. 176 (2nd Edition), Sanitary Sewer Service Area for the City of Franklin, Milwaukee County, Wisconsin.*

h. September 2007 SEWRPC *Amendment to the Regional Water Quality Management Plan – City of Oak Creek.*

i. June 2009 SEWRPC *Amendment to the Regional Water Quality Management Plan – Village of Caledonia.*

3. For the Jones Island WRF (JIWRF), the estimated future conditions year 2040 average day and maximum daily wastewater flows are 101 million gallons per day (mgd) and 425 mgd, respectively. The current facility average daily design flow and peak flow design capacity is 123 mgd and 390 mgd, respectively. The existing JIWRF currently has sufficient capacity for future year 2040 average daily flows only.

   For the South Shore WRF (SSWRF), the estimated future conditions year 2040 average day and maximum daily wastewater flows are 120 mgd and 375 mgd, respectively. The current facility average daily design flow and peak flow design capacity is 113 mgd and 300 mgd, respectively. The existing SSWRF currently does not have sufficient capacity for future year 2040 average or maximum daily flows.

4. Alternatives were presented in the Plan for projects and programs to address risks under baseline, future, and buildout conditions for the different asset systems. Projects for baseline conditions are recommended regardless of growth in the MMSD planning area.

   New project recommendations under future and buildout conditions are recommended to only be implemented if the projected flows and wasteloads for the planning area are realized for years 2026 to 2050. For future conditions, new project recommendations to meet flow capacity issues at the two facilities include the following:

   - WRF FG8: JIWRF Wet Weather Capacity – this project would expand the blending capacity at JIWRF from 60 mgd to 95 mgd, which would raise the peak maximum daily flow capacity to 425 mgd.
   - WRF FG9: SSWRF Wet Weather Capacity – this project would implement blending at SSWRF to the maximum available capacity of 75 mgd, which would raise the peak maximum daily flow capacity to 375 mgd.
   - WRF R3: SSWRF Primary Clarification, Secondary Treatment Capacity – this project would expand the full treatment capacity at SSWRF for average daily flows to 120 mgd.

5. Green infrastructure (GI) targets in the *2050 Facilities Plan* are aimed at stormwater storage and reduction in overflows. The target for GI storage under baseline conditions is 50 million gallons (mg), which is increased to 200 mg for future (year 2040) conditions. To encourage more use of GI, the 2020 update to the MMSD Chapter 13 Surface Water and Stormwater Rule now includes GI components to address stormwater requirements for development and redevelopment projects in the SSSA. The ultimate GI storage goal of 740 mg proposed by MMSD will require significant cooperation from regional partners including municipalities, businesses, and private homeowners.

6. The Plan evaluated the watercourses (streams) in MMSD's jurisdiction for projected land use changes and climate change impacts. Expected industrial land use change is an increase of about 40% from baseline to future conditions. Expected commercial land use change between baseline and future conditions is an increase of about 50%. It is anticipated than an increase in GI and recent changes to the MMSD Chapter 13 stormwater rules will reduce peak flows to the watercourses, while changes to land use and climate change impacts will increase peak flows. Climate change impacts may also reduce average and low flows in the watercourses in MMSD's jurisdiction. There are a significant number of watercourse projects already identified (40) under baseline conditions in the Plan, and future conditions will necessitate regular evaluation of watercourse impacts.

Blending has been used at the JIWRF to prevent basement backups, raw sewage overflows, and damage to the plant. Blending is the diversion of a portion of sanitary peak flows around secondary treatment and then recombining it with flows receiving secondary treatment before disinfection and discharge to Lake Michigan. As the MMSD system is integrated so both plants can treat sanitary flows from the combined sewer area, the use of blending to treat peak flows was recommended at both JIWRF and SSWRF in SEWRPC's *A Regional Water Quality Management Plan Update for the Greater Milwaukee Watersheds, Planning Report No. 50, December 2007, amended May 2013.* Based on this and the foregoing discussion, the Commission staff finds that the recommendations of the *2050 Facilities Plan,* dated July 2020, are in conformance with, and would serve to implement, the adopted regional water quality management plan.

We trust the foregoing comments and recommendations will be helpful to you. If we may be of further assistance to you in this matter, please do not hesitate to contact Ms. Laura K. Herrick, Chief Environmental Engineer, at (262) 953-3224, or *lherrick@sewrpc.org*.

Sincerely,

Kevin J. Muhs, PE, AICP
Executive Director

KJM/LKH/JED/JMM/cp
00255915-2.docx

cc: Mr. Kevin Shafer, Executive Director, MMSD
Ms. Lisa Helmuth, Water Resources Management Specialist, Wisconsin Department of Natural Resources
Mr. Andrew Dutcher, Wastewater Engineer, Wisconsin Department of Natural Resources

APPENDIX 9E-2: January 8, 2021 Response Letter to WDNR Review Comments -

January 8, 2021

Andrew Dutcher
Wastewater Engineer
Department of Natural Resources
Division of Environmental Management, Water Quality, Wastewater Section
PO Box 7921
Madison, WI 53707-7921

Project Name: 2050 Facilities Plan – Ultimate Build-Out
HNTB Project No. 61129
MMSD Project No. M03037P01
MMSD File Code: P3100

Subject: Responses to DNR review questions during review of 2050 Facilities Plan

Dear Mr. Dutcher:

Thank you for your thorough review of the 2050 Facilities Plan (2050 FP) for the Milwaukee Metropolitan Sewerage District. We appreciated the opportunities to meet and discuss your questions throughout the writing of the 2050 FP and agency review processes, and know we have a better document because of long-term communications. This letter serves as the comprehensive response to all of your agency review process questions, including previous informal response documents. As confirmed in a December 22, 2020 meeting, the MMSD does not anticipate any additional review questions.

Background:

During the DNR/SEWRPC review of the 2050 FP, the 2050 FP team met with you along with Laura Herrick and James Mahoney from SEWRPC to facilitate and coordinate the review process. As part of the review, your questions prompted follow-up response documentation. In addition, as part of our review of documents to provide responses, updates to the 2050 FP and responses were identified as necessary. This letter consolidates updates and responses that have been identified throughout the review period that ran from August 6, 2020 through December 22, 2020.

Document Outline:

Item 1: Responses to Final Review Questions received in a December 17, 2020 email from Andrew Dutcher and were posed during a December 22, 2020 meeting

Item 2: Summary of Previous Responses to Review Questions Documents

Item 3: Plan of Action to Finalize 2050 FP

Attachments to this document:

- Attachment 1: October 13, 2020 Response to Questions
- Attachment 2: October 30, 2020 Response to Questions
- Attachment 3: November 23, 2020 Response to Questions
- Attachment 4: December 10, 2020 Response to Questions

Responses provided by:

Kate Ziino (HNTB), 2050 FP Consultant Technical Lead, with review by Jay Kemp (Black & Veatch) and Dennis Dineen (Donohue) as well as Kevin Jankowski, Cari Roper, and Karen Sands (MMSD)

Item 1: Responses to Final Review Questions received in a December 17, 2020 email from Andrew Dutcher and were posed during a December 22, 2020 meeting

The responses to the final review questions are presented in Table 1. The responses are less detailed than the responses to previous questions that are documented in Item 2 and in the attachments. The intent is to document the proposed edits to confirm the approach is acceptable to the DNR prior to finalizing the 2050 FP. An updated version of this letter documenting additional edits identified while finalizing the 2050 FP will be included with the final 2050 FP.

Table 1: Responses to DNR FINAL (December 17, 2020 email) Comments

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response
1. General Comments				
1.1	Ch 6/Sec 6.2	6-12	Environmental considerations were clearly a part of selection of each alternative. However, information on existing environment was not incorporated. See NR 110.09(3)(a). The plan should be updated to provide that information.	Agree, text changes needed. A short discussion will be added to Section 5.9, Systemwide Assessments, in Chapter 5, acknowledging that the existing environment was not explicitly called out following a standard EA approach/format (physical environment, demographic, and cultural environment); however, the EA completed for 2020 FP was a good foundation for the project-specific EAs that have been completed since 2007. Changes to existing conditions since the 2007 EA include impacts due to climate change, including precipitation patterns, which are documented in the 2050 FP, and more detailed information on environment included in the urban diversity report. The added discussion will include a reference to the 2020 draft EA and the 2019 final draft Urban Diversity report. In addition, the statement in Section 6.2 in Ch 6 regarding environment assessment will be expanded to reference the updated text in Ch 5 and to note that the recommendation to consider EAs on specific projects is standard practice at MMSD.
1.2	Ch 4, Sec 4.3 App 4B, Sec 4.2 App 4B, Sec 4.3 App 4B-1, Sec 6 App 4B-1, Attachment B	4-24 4B-4 4B-29 31 1, 7-10	Parallel cost percentage evaluation breakdowns probably do not reflect the values that are most appropriate for a parallel cost ratio.	Agree, text changes needed. User flow and BOD/TSS breakdowns will be reorganized, expanded, and pulled into a separate appendix to Appendix 4B for easy access by MMSD staff using typical breakdowns for specific project types. Text will be modified in referenced Ch 4 discussions to correctly reference new appendix. See comment responses 1.2.1 and 1.2.2 in this table for more specifics.

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response
1.2.1	See 1.2	See 1.2	Are the flows at design average or peak flow rates? No unit process design is controlled by average daily flow rate. Basically, all hydraulically controlled units are based on peak day to peak instantaneous flow rate	Agree, text changes needed. Additional edits to user flow information will be made to add peak flow breakdown to new appendix to Appendix 4B.
1.2.2	See 1.2	See 1.2	Is there an evaluation for BOD? Processes are based on anywhere from average daily load (aeration basin volumes) to peak day (aeration).	Agree, text changes needed. Additional edits to user BOD/TSS information will be made to add maximum breakdown to new appendix to Appendix 4B. Prior to edits, 2050 FP will test max week versus max month BOD - if industrial % doesn't change much, will just use max month with explanation added to discussion.
2. Jones Island Comments				
2.1	Ch 5, Sec 5.6 App 5B, Sec 5.5 Ch 6, Sec 6.1 App 6B, Sec 6.4	5-25 5B-13 6-5 6B-181	My understanding is that Jones Island operates as pseudo-contact stabilization, though the operation merges toward conventional plug flow activated sludge as the high flow conditions persist. Is there more capacity for secondary treatment during sustained high flow events if JI implements step feed or provides piping so that it can run by design as contact stabilization? Are there implications with respect to filtration needs as a result? Blending is not an either/or: the expectation under NR 210.12(2)(c) is that blending is minimized ("no feasible alternatives"), so additional evaluation is required. To be clear, the regulations and DNR are clearly in favor of blending over overflows.	Agree, text changes needed. As background, your understanding is correct - due to the long mixed liquor (ML) feed channels, JIWRF secondary treatment could be considered contact stabilization during average day conditions. The JIWRF and SSWRF overview information in Appendix 5B, Section 5.2 on page 5B-2 will be expanded to discuss blending and secondary treatment operations at both WRFs as of June 2019 to provide more context for the reader. For JIWRF secondary treatment, the following information will be added: Contact stabilization is defined as 0.5 to 1 hour contact time followed by 2 to 4 hour stabilization time. The contact times at JIWRF under average day and peak hydraulic conditions are as follows:

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response

		Qa = 101 mgd	Qm = 330 mgd
	Volume (MG)	Detention Time (Hrs)	Detention Time (Hrs)
East ML Feed Channel	3.7	0.9	0.3
West ML Feed Channel	1.8	0.4	0.1
East Aeration Basins	32	7.6	2.3
West Aeration Basins	12	2.8	0.9

Currently, the primary effluent and RAS are mixed in the flow control structure before flow is split into the long east and west ML feed channels to the aeration basins. The ML channel appears to act as an anoxic selector, which is believed to maximize treatment capacity, as presented in the 2015 JIWRF aeration project PER study.

In Appendix 6B, Section 6.4, WRF FG8 purpose subsection, a discussion will be added to note that before a utility blends, the utility needs to consider maximizing full treatment first. Note that HRT is not considered “full” treatment from a regulatory perspective. A reference to the JIWRF 2011 capacity report will be added, noting that recommendations were implemented but could only achieve 330 peak treatment because hydraulic capacity is limiting. A discussion regarding step feed of primary effluent will also be included, noting that this secondary treatment method was not considered as it would require major infrastructure modifications to intercept primary effluent (PE) flow at the flow control structure (FCS) and run new PE piping to the heads of the 32 west and east aeration basins, which are each a significant distance away from the FCS and would require penetrating the existing channels in multiple locations. The design analysis would need to include whether pumping would be required to achieve these modifications and whether step feed would improve capacity since the existing arrangement that

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response
				utilizes the ML channel as an anoxic zone is believed to already maximize treatment capacity. Therefore, the 2050 FP project team did not consider additional traditional full treatment modifications to be a reasonable option for the WRF FG 8 analysis. However, the SW FG1, JIWRF and SSWRF reutilization analysis in Appendix 6E did look at wet weather treatment of flow at JIWRF utilizing primary filtration and biological facilities technology. This technology will be considered in Alternative 2. Note that a new Alternative 2 will be added to the WRF FG8 analysis, including costs and scoring in the evaluation section and the recommendation section updated accordingly. The recommendation will remain to proceed with blending channel upgrades with the need to review filtration in Alternative 1 against full treatment in Alternative 2 if operational management alone cannot meet TSS mass limits.
2.2	App 6E, Sec 6.4	6E-44	Wording update request: Table 6E-14, please adjust wording to reflect that TMDL limitations and allocations for TSS will need to be addressed to implement alternatives that utilized HRT. It is unclear how the TMDL TSS limits at JI will be addressed with respect to HRT, but an exemption from TMDL limits is unlikely unless the TMDL is updated.	Agree, text changes needed. Table 6E-14 will be updated along with the discussion on p 6E-32 to acknowledge the uncertainty inherent in the assumption that HRT at JIWRF will be allowed an exception to TMDL limits and that an exception is unlikely unless the TMDL is updated; therefore, the assumption will need to be revisited with DNR prior to design and implementation of HRT systems at JIWRF.
3. South Shore Comments				
3.1	App 6B, Sec 6.4	6B-185-6B-190	Bypass of preliminary and primary treatment is not allowed under blending unless alternative primary treatment (such as that provided by the ISS at Jones Island) is provided. It appears that this is considered on 6B-186, though the preliminary treatment bullet indicates that headworks alterations may be necessary	No text changes related to this response. MMSD does intend to run 375 through headworks. There is a bullet included in the discussion on p 6B-186 that notes that this capacity needs to be confirmed, with potential modifications identified that may be needed if capacity

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response
			to allow 375 MGD to pass. Please confirm that MMSD intends to pass all 375 MGD through headworks.	cannot be achieve. The modifications are operational in nature, which is why costs were not included.
3.2	App 6B, Sec 6.4	6B-186	Disinfection: Project S03003C03 was reviewed and approved by DNR in July. Some of the conclusions of the engineering report do not align with the facility plan (off-hand, the chlorine and bisulfite doses). Given that the more specific evaluation already occurred, I am reluctant to approve the plan without updating the facility plan to reflect the design under S03003C03, unless the facility plan is clearly intended to supersede the engineering report evaluation. The facility plan seems to be unaware of this project moving forward (see 6B-186).	Agree, text changes needed. An additional reference to S03003C03 will be added in WRF R4 and in WRF FG9 analyses noting differences in disinfection dose assumptions in the S03003C03 project. Discussion will note that although the S03003C03 project assumed a higher chlorine dose is needed than the dose assumed in the 2050 FP, both projects assumed more than 1.0 mg/L of additional chlorine is needed to achieve E. coli limits. Additional discussion will be added to tie back to the operation project included in the WRF R4 recommendation to confirm what dose is needed.

Comment Number	Chap/App/ Section Number	Page No.	Andrew Dutcher Comment	2050 FP Team Response
4. Non-regulatory comments				
4.1	Ch 4, Sec 4.2 App 4B, Sec 4.2	4-6 4B-5-4B-7	Total nitrogen limitations are likely on the horizon. Development of nitrogen water quality standards has been highly ranked for the triennial standards review for several cycles, though it has not progressed. Was this considered when evaluating the DnD recommendation to stay at Jones Island?	Agree, text changes needed. Text will be added to Ch 4 under changes to permit discussion regarding TN to acknowledge the Oct 2019 guidance letter from WDNR on this topic indicating that monitoring is now needed but limits not set until gather enough data. The discussion will note that the 2019 permit does not require monitoring due to timing but MMSD can anticipate it being added in the 2024 permit. The discussion will note that MMSD currently does not test for TN but accommodating quarterly samples is not anticipated to be an issue. Discussion will also note no information is available regarding any anticipated specific TN limits. Text in Appendix 6B will be added to reference this discussion in the WRF R2, R3, and FG2, biosolids, analyses. Will note in the discussion the uncertainty about assumption and potential to change in future. The WRF FG2 discussion will also note that the recommendation commits the D&D land space for biosolids, which means that this area will not be available for treatment expansion to meet TN or other more restrictive effluent requirements. Text will be added in Chapter 8 and 9 to tie back to these added discussions.
5. Additional comment made during 12/22 meeting				
5	9	9-38	What is the Milorganite % solids?	No text changes related to this response. Table 9-10 on page 9-38 of Chapter 9 states dryer thickened sludge % of 93%.

Item 2: Summary of Previous Response to Review Questions Documents

During the 2050 FP review process, the DNR provided preliminary questions and comments. The 2050 FP project team provided the DNR with responses to these questions and comments in a series of response documents that are included as attachments to this letter as follows:

Attachment 1: October 13, 2020 Response to Questions

Attachment 2: October 30, 2020 Response to Questions

Attachment 3: November 23, 2020 Response to Questions

Attachment 4: December 10, 2020 Response to Questions

The November 23, 2020 and December 19, 2020 Response to Questions documents included attachments that represented updates to be made to several 2050 FP documents. These attachments are not included in this letter because they will be included in the final 2050 FP itself, but are listed below for reference:

- Appendix 4A-2, Attachment A, Sewershed Population, Land Use, and Flow Tables
- Appendix 4B-1, Attachment A, Recent Data Summary - JIWRF and SSWRF
- Appendix 4B-1, Attachment B, Future Demand Flows and Wasteloads *
- Appendix 4B-2, WRF Future Conditions Flows and Wasteloads Trends
- Appendix 5B-5, WRF Capacity Assessment
- Appendix 6B-4, WRF R3 SSWRF Primary, Secondary Capacity Mass Balance Analysis
- Appendix 9B, Updated WRF Future Condition Mass Balances Incorporating Implementation of Recommended Projects

*Appendix 4B-1, Attachment B will be updated further based on the updates noted in the response to comment 1.2 regarding parallel costs in Item 1 in this letter.

Item 3: Plan of Action to Finalize 2050 FP

We understand by being less specific in the responses to final review questions documented in Item 1 that MMSD will not receive the DNR's approval letter until after the final 2050 FP is submitted instead of receiving a conditional approval letter prior to 2050 FP submittal. However, this decision will allow the 2050 FP team to proceed with edits immediately while allowing that there may be additional edits needed to fully respond to your comments separate from the document.

The intent of this preliminary response letter is to confirm that responses to these comments and previous comments are in general acceptable and there are no concerns on your end as we finalized the 2050 FP. Assuming there are no concerns, the final 2050 FP is scheduled to be submitted to the DNR on March 18, 2021.

Sincerely,

Karen L. Sands, AICP

MMSD Director of Planning, Research and Sustainability

Cc: Kevin L. Shafer, PE, MMSD Executive Director
Katherine Lazarski, MMSD Legal Services
Cari Roper, MMSD 2050 FP Conveyance and Storage Lead
Kevin Jankowski, MMSD 2050 FP WRFs and Biosolids Lead
Susan Coyle, MMSD 2050 FP Watercourse and Flood Management Lead
Bre Plier, MMSD 2050 FP Green Infrastructure Lead

Attachments:

Attachment 1: October 13, 2020 Response to Questions

Attachment 2: October 30, 2020 Response to Questions

Attachment 3: November 23, 2020 Response to Questions

Attachment 4: December 10, 2020 Response to Questions

RESPONSES TO DNR/SEWRPC REVIEW QUESTIONS

Date: October 13, 2020

Project Name: 2050 Facilities Plan – Ultimate Build-Out
HNTB Project No. 61129
MMSD Project No. M03037P01
MMSD File Code: P3100

Background:

Review Questions received from: Laura Herrick, SEWRPC (to Karen Sands via email on 10/12/20)

Responses provided by: Kate Ziino (HNTB), 2050 FP Consultant Technical Lead with review by Kevin Jankowski, Micki Klappa-Sullivan and Karen Sands (MMSD)

Responses:

1. SEWRPC requested confirmation of projected future flows to evaluate capacities at each WRF and submitted Table Q1-1:

Table Q1-1: Projected future flows

	Jones Island	South Shore
Current Capacity – Ave Daily Q	123 MGD	113 MGD
Current Capacity – Peak Q	390 MGD	300 MGD
2050 Ave Daily Q	101 MGD	148 MGD
2050 Peak Q	490 MGD	300 MGD

   a. The flows compiled in Table Q1-1 are reflective of Buildout Conditions. The flows reflective of projected future conditions for the planning period of 2020-2040 are presented in Table 4-11 on page 4-20 in Chapter 4, Section 4.3, and Table Q1-2 has been provided for convenience. It is recommended that the Future Conditions values be used to evaluate capacities at each WRF. The values presented as peak flow (Q) conditions are reflective of a system which provides an equivalent baseline CSO frequency over time, discussed in more detail in Appendix 4B and Appendix 4A-3.

Table Q1-2: Projected future flows - Revised

	Jones Island	South Shore
Current Capacity – Ave Daily Q	123 MGD	113 MGD
Current Capacity – Peak Q	390 MGD	300 MGD
Future Conditions Ave Daily Q	**101 MGD**	**120 MGD**
Future Conditions Peak Q	**425 MGD**	**300 MGD***
2050 Ave Daily Q	101 MGD	148 MGD
2050 Peak Q	490 MGD	300 MGD*

*Future demand in Ch 4 determined SSWRF peak Q limited to 300 MGD but level of service risks in Ch 5 determined blending should be added to SSWRF to address CSOs at BS0405 and DC0103. Therefore Ch 9 design summary in Table 9-11 assumes SSWRF peak flow capacity is 375 MGD. See item 2 below for more details.

2. SEWRPC requested a list of projects that add flow capacity to each plant to meet the 2050 requirements. SEWRPC especially had trouble finding the flow improvements for the South Shore plant.
    a. The following list of projects add flow capacity to meet Future Conditions, not 2050 requirements, based on the response to question 1:
        i. WRF FG8, JIWRF Wet Weather Capacity, would expand the blending capacity at JIWRF to maximum available system capacity, which is estimated to be 180 MGD. Once this project is implemented, blending capacity will be increased from 60 MGD to 95 MGD such that JIWRF peak capacity is increased from 390 MGD to 425 MGD to meet future condition projections.
        ii. WRF FG9, SSWRF Wet Weather Capacity, would expand the blending capacity at SSWRF to maximum available system capacity, which is estimated to be 75 MGD. Once this project is implemented, SSWRF peak capacity is increased from 300 MGD to 375 MGD to address level of service risks of CSOs at BS0405 and DC0103.
        iii. WRF R3, SSWRF Primary Clarification, Secondary Treatment Capacity, would expand the full treatment average day capacity at SSWRF from 113 MGD to 120 MGD to meet future condition projections.

    These projects are based on recommendations presented in Appendix 6B, and are included in the recommended plans presented in Chapter 7 (WRF R3) and Chapter 8 (WRF FG8), and are incorporated into the proposed updates to the design criteria presented in Section 9.7 in Chapter 9.
3. SEWRPC requested a discussion on how the analysis was done for Baseline, Future, and Buildout conditions for the different asset systems.
    a. A PowerPoint presentation will be prepared for the October 16, 2020 meeting.

RESPONSES TO DNR/SEWRPC REVIEW QUESTIONS

Date: October 30, 2020

Project Name: 2050 Facilities Plan – Ultimate Build-Out
HNTB Project No. 61129
MMSD Project No. M03037P01
MMSD File Code: P3100

Background:

Review Questions received during 10/16/2020 review meeting with Andrew Dutcher, DNR and Laura Herrick, SEWRPC

Responses provided by: Kate Ziino (HNTB), 2050 FP Consultant Technical Lead with review by Jay Kemp (Black & Veatch), and Kevin Jankowski and Karen Sands (MMSD)

Note: The backup information for these questions are in Appendix 4B, WRF and Biosolids Future Demand. Some responses required additional backcheck calculations, which have been captured in the backup files to Appendix 4B-1, Attachment B, and Appendix 4B-2. These additional calculations will be included in the final 2050 FP document, and therefore the updated PDFs of these documents are attached and page numbers referenced as "Attachment B" or "Appendix 4B-2" where applicable. Where information was not updated, the original page number from Appendix 4B is also referenced.

Responses:

1. Any analysis of the demands on a per capita basis? (A. Dutcher)

   Response: A review of flow and loading demands has been added to Appendix 4B-1, Attachment B document, in the "Checks on existing data and projections" worksheet. This document has been flagged to update in the final 2050 FP documentation and the updated Attachment B PDF is attached.

   The findings are presented in Table 1 (and can be found on p 40 of the Attachment B PDF):

Table 1

	WRF Baseline Conditions			WRF Future Conditions			Buildout Conditions		
	Flow	BOD	TSS	Flow	BOD	TSS	Flow	BOD	TSS
WRF	(gpcd)	(lb/c/d)	(lb/c/d)	(gpcd)	(lb/c/d)	(lb/c/d)	(gpcd)	(lb/c/d)	(lb/c/d)
JIWRF	195	0.44	0.42	187	0.41	0.40	187	0.41	0.40
% change from Baseline Conditions	NA	NA	NA	-4%	-6%	-5%	-4%	-6%	-5%
SSWRF	148	0.31	0.41	174	0.35	0.47	174	0.37	0.46
% change from Baseline Conditions	NA	NA	NA	18%	13%	14%	18%	20%	12%

Observations and Additional Notes:

- JIWRF service area is shown in Table 1 with a higher BOD per capita than SSWRF under all conditions. This result aligns with JIWRF service area having more industrial point sources than SSWRF.
- SSWRF service area is projected to have a higher TSS per capita than JIWRF service area under Future and Buildout Conditions. In reviewing additional backup information in Appendix 4B-2, WRF Future Conditions Flow and Wasteload Trends, this result aligns with findings that the percentage of total population, commercial area and industrial area is projected to increase for the SSWRF service as compared to the JIWRF service area (p 18 of updated Appendix 4B-2 PDF attached, will be included in Final 2050 FP: SSWRF population percent of total increases from 57% to 60% and 61%, commercial area from 76% to 81% and 83% and industrial area from 74% to 80% and 82% from Baseline to 2035 and Buildout projections used for Conveyance modeling). Each of these components have a higher TSS unit loading than BOD unit loading (see Table 3 in this document), which skews TSS up.
- Increase in SSWRF industrial flow due to projected increase of 50% under Future Conditions, and almost double under Buildout Conditions, presented in Projections: Industrial Portion analysis.
- The SSWRF 18% increase in flow compared to a 13% and 14% increase in BOD and TSS under Future Conditions is due to an assumption that non-contact cooling water point sources increase (assumed to have high flow, low BOD/TSS), most of which is in SSWRF service area.
- Backup used to make these observations are found in the "Projections: Industrial Portion of Total Flows and Wasteloads" worksheet (p 7 of Attachment B PDF)

2. Concerns related to industrial users within MMSD's system (A. Dutcher)
   a. What is the Industrial portion of BOD loading as percent of total projections? Does MMSD have enough industrial load that there could be a skew?
   Response: A review of the BOD loading as a percent of total projections is presented as part of Appendix 4B-1, Attachment B, in the "Projections: Industrial Portion of Total Flows and Wasteloads" worksheet (p 7 of the Attachment B PDF, p 241 of Appendix 4B). Table 2 below summarizes BOD industrial projections:

Table 2

WRF	Baseline Conditions			Future Conditions		
	Total BOD (lb/d)	Ind. BOD (lb/d)	% ind BOD of total	Total BOD (lb/d)	Ind. BOD (lb/d)	% ind BOD of total
JIWRF	205,000	89,000	43.2%	223,000	94,000	41.8%
SSWRF	188,000	27,000	13.8%	239,000	31,000	12.9%
TOTAL	393,000	116,000	29.5%	462,000	125,000	27.1%

Observations:

- The Industrial percent of total BOD drops under Future Conditions. The drop is due to non-contact cooling water assumptions (high flow, low BOD loading).
- Buildout Conditions are not presented here, as considered far past 2040, end of regulatory period, for SSWRF service area and achieved by Future Conditions for JIWRF service area.

b. Is Miller-Coors the largest user? What does Miller-Coors represent as a percent of total industrial BOD? Could this cause issues down the line?
Response:
   - Yes, Miller-Coors is the largest user. However, the "Major Industrial User" referred to in the 2050 FP is not necessarily Miller-Coors but could also represent a total of smaller industrial users.
   - Major Industrial User Baseline Conditions BOD load is based on the total data from 6 outfalls, and is calculated to be 33,000 lb/d, which represents 35% of JIWRF Future Conditions Industrial BOD, and 27% of total Future Conditions Industrial BOD. The BOD load is presented in Table 17 in Appendix 4B-1 (p 68 of Appendix 4B), and the percents are calculated using information presented in Table 2 above.
   - The concern down the line is if one major industrial user (or an accumulation of smaller industrial users) leaves - though the impact on treatment capacity would be to free up wasteload treatment capacity, the loss is anticipated to also decrease the quality of biosolids produced. At the time of the future demand development, there was no indication that a major industrial user was leaving - therefore findings are presented on impact to influent flows and load for information only, but no analysis or recommendations were made to address this concern under the 2050 FP.

c. What are the unit rates that were assumed to develop projections?
Response: The unit loading rates for BOD and TSS are presented in Table 3. As background, the BOD and TSS unit rates, based on annual MMSD Cost Recovery information, as presented in the "Methodology" worksheet in Appendix 4B-1, Attachment B (p 2 of Attachment B PDF, p 236 of Appendix 4B PDF), were used to calibrate the Baseline Conditions and calculate the projected incremental increase in BOD and TSS loading at both JIWRF and SSWRF for the modeled Buildout Conditions projections.

Table 3

	UNIT BOD (lbs/1000 gal)	UNIT TSS (lbs/1000 gal)
Residential	2.58	3.09
Commercial	2.59	3.09
Industrial	4.62	3.57
I/I	0.31	1.25

d. Analysis on industrial projections - modifications made to assumptions during developments: what were the modifications and which WRFs were impacted by modifications?
Response: The modifications were to the unit loadings - unit BOD and TSS loadings initially developed were very high at JIWRF and much lower at SSWRF. For incremental increases to Buildout Conditions, unit BOD and TSS loads were reduced at JIWRF and SSWRF to attempt to match cost recovery data. This is documented in the "Methodology" worksheet in in Appendix 4B-1, Attachment B (p 2 of Attachment B PDF, p 236 of Appendix 4B PDF). Note that, as stated above, JIWRF Future Conditions were set to Buildout Conditions using these calibrated unit loadings. SSWRF Future Conditions were set using trendlines and then the breakdown of components was developed to confirm trends were okay. This is presented in Appendix 4B-1, Section 6, User Flows (p 68 of Appendix 4B PDF), and in "Projections: Industrial Portion", "Projections: Residential Portion", "Projections: Commercial Portion" and "Projections: I/I Portion" worksheets in Appendix 4B-1, Attachment B (pgs 7-10 of Attachment B PDF, pgs 241-244 of Appendix 4B PDF).

3. What is the baseline for orthophosphate? (A. Dutcher)

Response: The baseline total phosphorus (TP) for wastewater was established as 3.76 mg/L at JIWRF and 5.61 mg/L at SSWRF using 2013-2016 data. The baseline drinking water TP concentrations were calculated as 0.42 mg/L at JIWRF and 0.64 mg/L at SSWRF, based on an assumed 6% TP by mass from drinking water (using WEF study as reference[1]). The new projected TP concentration for drinking water was assumed to be 2.86 mg/L, by assuming 3.5 mg/L as orthophosphate, at a 40% concentration. This is documented in Appendix 4B-1, Section 3 (pgs 65-66 of Appendix 4B PDF) and in the "TP Approach" worksheet in in Appendix 4B-1, Attachment B (p 6 of Attachment B PDF, p 240 of Appendix 4B PDF).

[1] A. Cantor, "Optimization of Phosphorus-Based Corrosion Control Chemicals Using a Comprehensive Perspective," Process Research Solutions, Madison, WI, 2017

RESPONSES TO DNR/SEWRPC REVIEW QUESTIONS

Date: November 23, 2020

Project Name: 2050 Facilities Plan – Ultimate Build-Out
HNTB Project No. 61129
MMSD Project No. M03037P01
MMSD File Code: P3100

Background:

During the DNR/SEWRPC review of the 2050 FP, the 2050 FP team has been meeting with Andrew Dutcher, DNR and Laura Herrick and James Mahoney, SEWRPC to facilitate the review process. As part of the review, questions by DNR and SEWRPC have prompted follow up response documentation. In addition, as part of the review of documents to provide responses, updates to the 2050 FP and responses have been identified. This document consolidates updates and responses that have come up since the last response document provided on October 30, 2020.

Document Outline:

Item 1: Update to responses provided in October 30, 2020 document
Item 2: Proposed updates to the 2050 FP
Item 3: Responses to Review Questions received during 11/6/2020 review meeting
Attachments to this document:
- Attachment 1: 2050 Facilities Plan Appendix 4A-2, Attachment A
- Attachment 2: 2050 Facilities Plan Appendix 4B-1, Attachment B
- Attachment 3: Attachment 3: 2050 Facilities Plan Appendix 4B-2

Responses provided by: Kate Ziino (HNTB), 2050 FP Consultant Technical Lead with review by Jay Kemp (Black & Veatch), and Kevin Jankowski and Karen Sands (MMSD)

Item 1: Updates to responses provided in October 30, 2020 document

Subsequent to the submittal of the October 30, 2020 response document, a review of population data used to develop Table 1 in response #1 determined that the most recent population and land use data from the municipalities was not incorporated into the source used: Table 4A-2 in Appendix 4A. Additional explanation is provided in Item 2: Proposed Updates to 2050 Facilities Plan, under "1. Appendix 4A, Conveyance Future Demand Population and Land Use" of this response document. To address this issue, the 2050 FP team has updated the resulting response #1 as well as Attachments to this document. The updated Response #1 is shown below with changes marked in red.

Updated response #1 (updates shown in red):

1. Any analysis of the demands on a per capita basis? (A. Dutcher)

   Response: A review of flow and loading demands has been added to Attachment 2, 2050 Facilities Plan Appendix 4B-1, Attachment B, in the "Checks on existing data and projections" worksheet. This document has been flagged to update in the final 2050 FP documentation.

The findings are presented below (and can be found on p 48 of Attachment 2):

Appendix 4B-1, Attachment B, Checks on existing data and projects: Total per Capita Loading based on Population Projections

	WRF Baseline Conditions			WRF Future Conditions			Buildout Conditions		
	Flow	BOD	TSS	Flow	BOD	TSS	Flow	BOD	TSS
WRF	(gpcd)	(lb/c/d)	(lb/c/d)	(gpcd)	(lb/c/d)	(lb/c/d)	(gpcd)	(lb/c/d)	(lb/c/d)
JIWRF	195	0.44	0.42	186	0.41	0.40	186	0.41	0.40
% change from Baseline Conditions	NA	NA	NA	-4%	-6%	-5%	-4%	-6%	-5%
SSWRF	148	0.31	0.41	159	0.32	0.43	173	0.36	0.46
% change from Baseline Conditions	NA	NA	NA	8%	4%	4%	18%	19%	12%

*Original numbers shown in black; updates are shown in red

Observations and Additional Notes:

- JIWRF service area is shown in Table 1 with a higher BOD per capita than SSWRF under all conditions. This result aligns with JIWRF service area having more industrial point sources than SSWRF.
- SSWRF service area is projected to have a higher TSS per capita than JIWRF service area under Future and Buildout Conditions. In reviewing additional backup information in Appendix 4B-2, WRF Future Conditions Flow and Wasteload Trends (included as Attachment 3 to this document), this result aligns with findings that the percentage of total population, commercial area and industrial area is projected to increase for the SSWRF service as compared to the JIWRF service area (p 18 of Attachment 3: SSWRF population percent of total increases from 57% to 60% and 61%, commercial area from 76% to 81% and 83% and industrial area from 74% to 80% and 82% from Baseline to 2035 and Buildout projections used for Conveyance modeling). Each of these components have a higher TSS unit loading than BOD unit loading (see Table 3 in this document), which skews TSS up.
- Increase in SSWRF industrial flow due to projected increase of 50% under Future Conditions, and almost double under Buildout Conditions, presented in Projections: Industrial Portion analysis.
- The SSWRF 8% increase in flow compared to a 4% and 4% increase in BOD and TSS under Future Conditions is due to an assumption that non-contact cooling water point sources increase (assumed to have high flow, low BOD/TSS), most of which is in SSWRF service area.
- Backup used to make these observations are found in the "Projections: Industrial Portion of Total Flows and Wasteloads" worksheet (p 7 of Attachment 2)

Additional update impacting October 30, 2020 response

Also subsequent to the submittal of the October 30, 2020 response document, a review of the approach used to determine the residential and commercial components of SSWRF Future Conditions Total Flow

and Wasteloads referenced in response #2d determined that the approach needed to be updated. Additional explanation is provided in Item 2: Proposed Updates to 2050 Facilities Plan, under "2. SSWRF Residential, Commercial, and Industrial Portions of WRF Future Conditions Total Flows" of this document. No information presented in Response #2d was updated and therefore is not repeated in this document, but the updated information is presented Appendix 2.

Item 2: Proposed updates to the 2050 FP

As noted in Item 1, revisions to the 2050 Facilities Plan (FP) were identified while reviewing the October 30, 2020 response document. This item covers the detail of these revisions that will be incorporated into the final 2050 FP submittal. The revisions impact two areas of the 2050 FP submittal, as follows:

1. Appendix 4A, Conveyance Future Demand Population, Land Use, and Flow

It was identified that the most recent population and land use data from the municipalities had not been incorporated in Table 4A-2, which necessitated a revision to Table 4-9, Table 4A-2, Appendix 4A-2, Attachment A, and associated text and figures. This update does not change the information presented in Chapters 5 through 9. The revisions are shown in red below and the updated Appendix 4A-2, Attachment A is included as Attachment 1 to this document.

UPDATES TO 2050 FACILITIES PLAN TABLE 4-9: POPULATION, LAND USE, AND FLOWS FOR CONVEYANCE BASELINE, CONVEYANCE FUTURE, AND BUILDOUT CONDITIONS*

Parameter	Conveyance Baseline Conditions	Conveyance Future Conditions	% change from Baseline to Future	Buildout Conditions	% change from Baseline to Buildout
Population	1,085,941	1,264,749 1,267,218	16.5% 16.7%	1,390,181 1,393,904	28.0% 28.4%
Industrial Area (acres)	10,119	14,274 14,584	41.1% 44.1%	16,682 17,178	64.9% 69.8%
Commercial Area (acres)	10,350	15,496 15,545	49.7% 50.2%	18,533 18,611	79.1% 79.8%
Average Base Sanitary Flow (MGD)	101	135 136	34.3% 35.1%	151 152	50.2% 51.4%
Average Dry Weather Flow (MGD)	137	178 179	29.9% 30.3%	197 198	43.8% 44.4%
Point Source Flow (MGD)[1]	8.69	16.96	95.2%	16.96	95.2%
5-year Peak Hourly Flow (MGD)[2]	1,521	1,672 1,677	9.9% 10.3%	1,779 1,784	17.0% 17.3%

*Original numbers shown in black; updates are shown in red

2. SSWRF Residential, Commercial, and Industrial Portions of WRF Future Conditions Total Flows

A discrepancy was identified related to how the residential component at SSWRF was calculated, which impacts the values depicted in Table 4-17, Table 4-18, and associated text. This revision does not change the information in Chapters 5 through 9. The revisions are shown in red below.

UPDATES TO 2050 FACILITIES PLAN TABLE 4-17: RESIDENTIAL, COMMERCIAL, INDUSTRIAL, AND I/I PORTION OF TOTAL ANNUAL AVERAGE FLOWS*

WRF	Residential		Commercial		Industrial		Inflow/Infiltration		Total	
	Flow (MGD)	% of Total	Flow (MGD)	% of Total	Flow (MGD)	% of Total	Flow (MGD)	% of Total	Flow (MGD)	% of Total
JIWRF										
Baseline Conditions	30	33%	4	4%	8	9%	49	53%	92	100%
Future Conditions	34	34%	5	5%	12	12%	50	49%	101	100%
Buildout Conditions	34	34%	5	5%	12	12%	50	49%	101	100%
SSWRF										
Baseline Conditions	32	35%	8	9%	7	8%	44	48%	91	100%
Future Conditions	42 40	35% 34%	10 10	9% 8%	15	12%	53 55	44% 46%	120	100%
Buildout Conditions	46	31%	19	13%	23	15%	60	41%	147	100%
Total – Both WRFs										
Baseline Conditions	62	34%	12	6%	16	9%	93	51%	182	100%
Future Conditions	77 75	35% 34%	15	7%	27	12%	103 105	46% 48%	221	100%
Buildout Conditions	80	32%	23	9%	35	14%	110	44%	249	100%

*Original numbers are shown in black; updates are shown in red

Item 3: Responses to Review Questions received during 11/6/2020 review meeting

Questions and Responses:

1. Does MMSD have an indication of how well primary clarification is performing? (A. Dutcher)

   Response: The primary clarifiers were assessed in Section 5.5 of Appendix 5B, WRFs and Biosolids Assessment of Existing Facilities and Risks. The metrics used to assess the primary clarifiers are presented in Table 1 below. The average annual primary BOD and TSS percent removal performance metrics, though not used to assess the primaries as they are not metrics identified in NR 110 or 10 State Standards, are also presented in Table 1 as they were reviewed

in detail in Appendix 6B analyses. Performance values that exceeded NR 110 requirements are identified in red, and those that don't meet design values are in bold

TABLE 1: PRIMARY CLARIFICATION PERFORMANCE

Design Criteria (Note 1)	Design Value (Note 1,2)	Performance (Note 2,3)	NR 110 Requirement (Note 2)
JIWRF			
Surface Overflow Rate (SOR) (gpd/sf) (Note 4) Average Annual Peak Hour	 760 2,052	 Baseline - 704, Future - 775 Baseline - 2,052, **Future - 2,269**	 1,000 1,500
Average Annual Weir Loading Rate (WLR) (gpd/lf) (Note 4)	30,400	Baseline - 28,170, **Future - 31,009**	10,000
% BOD Removal (Note 5) Average Annual Maximum Day	 35% NA	 **Baseline (at 92 MGD) - 18%, Future (at 101 MGD) - 15%** Baseline (at 300 MGD) - 8%, Future (at 300 MGD) - 8%	 NA NA
% TSS Removal (Note 5)l Average Annual Maximum Day	 70% NA	 Baseline (at 92 MGD) - 54%, Future (at 101 MGD) - 47% Baseline (at 300 MGD) - 36%, Future (at 300 MGD) - 36%	 NA NA
SSWRF			
Surface Overflow Rate (SOR) (gpd/sf) (Note 4) Average Annual Peak Hour	 1,100 2,930	 Baseline - 323, Future - 426 Baseline - 2,930, Future - 2,930	 1,000 1,500
Average Annual Weir Loading Rate (WLR) (gpd/lf) (Note 4)	24,500	Baseline - 19,715, **Future - 26,004**	10,000
% BOD Removal (Note 6) Average Annual Maximum Day	 32% NA	 Baseline (at 91 MGD) - 35%, Future (at 120 MGD) - 38% Baseline (at 300 MGD) - 20%, Future (at 300 MGD) - 20%	 NA NA
% TSS Removal (Note 6) Average Annual Maximum Day	 60% NA	 Baseline (at 91 MGD) - 65%, Future (at 120 MGD) - 64% Baseline (at 300 MGD) - 38%, Future (at 300 MGD) - 38%	 NA NA

Notes:

1) Design criteria and associated values are from JIWRF and SSWRF O&M Manuals.
2) Design values and performance values that exceeded NR 110 requirements are identified in red, and performance values that exceed design values are in bold.
3) Performance: Baseline - refers to Baseline Conditions, which used a data range of 2013-2016, but was set as 2015 for projection purposes; Future - refers to WRF Future Conditions, which was set in Ch 5 as 2035 for projection purposes but was determined to be equivalent to 2040, the end of the regulatory time period. (See p 5B-8 of Appendix 5B for more details.)
4) JIWRF and SSWRF SOR and WLR values are presented in Appendix 5B-5, WRF Capacity Assessment.
5) JIWRF BOD and TSS removal ranges are presented in Table 6B-8 on p 6B-16.
6) JIWRF BOD and TSS removal ranges presented in Table 6B-19 on p 6B-33. Percentages presented for average annual flows are actual data, percentages presented for maximum day are empirical values from table as not enough actual data was available to determine these values.

Observations and Additional Notes:

- The capacity analysis is predicated on the assumption that in those instances where NR 110 requirements differed from projected values, MMSD is not in violation of the NR 110 requirements, which are applicable to new and modified facilities. However, the 2050 FP did consider performance values that did not meet current NR 110 requirements as potential risks that are analyzed in Chapter 6.
- Primary clarification was identified at both JIWRF and SSWRF as having capacity risks.
- To be conservative, JIWRF capacity analysis assumed additional flow needed to maintain the baseline annual CSO frequency under WRF Future Conditions would go through primary clarification, though increasing JIWRF capacity through blending is also an option. This is discussed in more detail in the "Interim Level of Service Target to Maintain Baseline CSO Frequency" on p 5B-13 of Appendix 5B.
- In addition to the capacity risks, a level of service risk – R090, Risk of conveyance system overflows at BS0405 and DC0103 by not utilizing potential additional capacity at SSWRF – was also identified in Section 5.7, presented in Table 5B-8 on p 5B-25 of Appendix 5B.

Risks identified in Appendix 5B for WRFs and Biosolids are analyzed in Appendix 6B, WRFs and Biosolids Alternative Analyses. The analyses and recommendations associated with the risks listed above are as follows:

- JIWRF:
  - WRF R2, JIWRF Primary Clarification, Secondary Treatment Capacity Analysis (p 6B-25 of Appendix 6B): the analysis determined that it was unlikely that additional clarifiers or CEPT would improve primary clarifier performance and secondary treatment capacity is available; therefore, no capital improvements to primary clarifications were considered. However, the recommendations include consideration of a primary clarifier study to improve BOD removal, the costs of which are included in WRF R3. Peak flow is addressed in WRF FG8, with no additional peak flow recommended through primary clarifiers.
  - WRF FG8, JIWRF Wet Weather Capacity (p 6B-181 of Appendix 6B): the analysis recommends the implementation of additional blending capacity once operational management procedures presented in WRF R6, JIWRF TMDL Management are determined to be successful enough to allow for additional blending.
- SSWRF:
  - WRF R3, SSWRF Primary Clarification, Secondary Treatment Capacity Analysis (p 6B-64 of Appendix 6B): MMSD already has identified a project to address improvements to primary clarification to address Baseline Conditions concerns, which includes the consideration of chemically-enhanced primary treatment (CEPT). The WRF R3 analysis focused on CEPT as the benefits of adding capacity of replacing the primary clarifiers are not anticipated to outweigh the costs. As part of the recommendations, considerations of identifying primary clarifier improvements that could be applied to JIWRF were recommended. Additional capital improvements recommendations are made to address WRF Future Conditions capacity risks.
  - WRF FG9, SSWRF Wet Weather Capacity (p 6B-185 of Appendix 6B): the analysis recommends improvements associated with WRF R3 and with blending channel be implemented and then testing be conducted to confirm existing systems can meet increased blending capacity.

Projects for these analyses are presented in Chapters 7 (WRF FG3) and 8 (WRF FG8 and WRF FG9). The proposed design criteria updates related to these projects are presented in Chapter 9, Section 9.7 (p 9-30 of Chapter 9). As noted Section 9.7, the intent in the 2050 FP is not to decrease design criteria from the parameters presented in the JIWRF and SSWRF O&M manuals. Additional coordination is needed to address issues related to not meeting current NR 110 requirements when new projects are implemented.

2. Compliance Maintenance Annual Report (CMAR) max month – DNR has information but doesn't match CMAR, how to address now versus future demand? (A. Dutcher)

   Response: As background, there have been previous discussions with DNR staff regarding the maximum month design flow and design BOD that have historically been reported in CMARs and whether those are the correct values to use. After the November 6, 2020 meeting, MMSD staff confirmed that the DNR approved changes to the design values as presented in CMARs; therefore, there does not appear to be a current issue. Table 2 presents the revised CMAR values. The values presented are also the design maximum month flow and BOD values presented in Chapter 9, Implementation Plan; Table 9-10, Proposed Updates to JIWRF Design Criteria (starting on p 9-34 of Chapter 9); and Table 9-11, Proposed Updates to SSWRF Design Criteria (starting on p 9-41 of Chapter 9).

TABLE 2: REVISED CMAR VALUES*

WRF	Revised CMAR Values	
	Max Month Design Flow, MGD	Max Month Design (C)BOD, lbs/day
JIWRF	160	388,000
SSWRF	170	291,000

*Revised values that DNR had previously approved as documented in July 7, 2020 email from Bryan Hartsook, DNR to Pat Obenauf, MMSD, et.al.

Regarding future adjustments to CMAR values, Tables 9-10 and 9-11 of Chapter 9 also present Future Design values that represent influent flows and wasteloads after all recommended applicable projects have been implemented. The recommendation is to review CMAR values as future projects are implemented. Table 9-12, Performance Indicators that will trigger Initiation of Recommended Future Projects, in Chapter 9 outlines when recommended projects should be initiated.

Attachments:

Attachment 1: 2050 Facilities Plan Appendix 4A-2, Attachment A, Sewershed Population, Land Use, and Flow Tables
Attachment 2: 2050 Facilities Plan Appendix 4B-1, Attachment B, Future Demand Flows and Wasteloads
Attachment 3: 2050 Facilities Plan Appendix 4B-2, WRF Future Conditions Flows and Wasteloads Trends

The following attachments from the November 23,2020 response document are not included in this January 8, 2021 response submittal:

- Attachment 1: 2050 Facilities Plan Appendix 4A-2, Attachment A, Sewershed Population, Land Use, and Flow Tables
- Attachment 2: 2050 Facilities Plan Appendix 4B-1, Attachment B, Future Demand Flows and Wasteloads
- Attachment 3: 2050 Facilities Plan Appendix 4B-2, WRF Future Conditions Flows and Wasteloads Trends

These attachments will be updated as noted and included in the final 2050 FP.

RESPONSES TO DNR/SEWRPC REVIEW QUESTIONS

Date: December 10, 2020

Project Name: 2050 Facilities Plan – Ultimate Build-Out
HNTB Project No. 61129
MMSD Project No. M03037P01
MMSD File Code: P3100

Background:

During the DNR/SEWRPC review of the 2050 Facilities Plan (2050 FP), the 2050 FP team has been meeting with Andrew Dutcher, DNR and Laura Herrick and James Mahoney, SEWRPC to facilitate the review process. As part of the review, questions by DNR and SEWRPC have prompted follow up response documentation. In addition, as part of the review of documents to provide responses, updates to the 2050 FP and responses have been identified. This document consolidates updates and responses that have been identified since the last response document provided on November 23, 2020.

Document Outline:

Item 1: Additional proposed updates to the 2050 FP
Item 2: Responses to Review Questions received in November 30, 2020 email from Andrew Dutcher
Item 3: Responses to Review Questions in Appendix 6B document received in November 30, 2020 email from Andrew Dutcher
Attachments to this document:

- Attachment 1: 2050 Facilities Plan Appendix 5B-5
- Attachment 2: 2050 Facilities Plan Appendix 6B-4
- Attachment 3: 2050 Facilities Plan Appendix 9B
- Attachment 4: 2050 Facilities Plan Appendix 4B-1, Attachment A

Responses provided by: Kate Ziino (HNTB), 2050 FP Consultant Technical Lead with review by Jay Kemp (Black & Veatch), and Kevin Jankowski and Karen Sands (MMSD)

Item 1: Proposed Updates to the 2050 FP

Revisions to the 2050 FP were identified while reviewing the November 23, 2020 response document. This item details the revisions that will be incorporated into the final 2050 FP submittal. The revisions impact the following five areas of the 2050 FP:

1. Appendix 5B-5, WRF Capacity Assessment

Discrepancies were identified in the Appendix 5B-5, WRF Capacity Assessment associated with JIWRF and SSWRF primary and secondary clarification assessments, which necessitates a revision to Appendix 5B-5. The revisions are shown in red below and in the updated Appendix 5B-5, which is included as Attachment 1 to this document. A review was also conducted of any potential impact to the associated text in Chapter 5, Section 5.6 under subsection Capacity Failure Mode and in Section 5.5 of Appendix 5B,

WRFs and Biosolids Assessment of Existing Facilities. Notes from this review are documented in the "Impact to Chapter 5 and Appendix 5B" column in Table 1.

TABLE 1: EXCERPT FROM WRF AND BIOSOLIDS CAPACITY ASSESSMENT IN APPENDIX 5B-5, WRF CAPACITY ASSESSMENT (UPDATES ONLY)

* Updates are highlighted in yellow; strikethrough indicates deleted text

** Column to the far right is provided in this document only to explain changes and impacts to Chapter 5 and Appendix 5B

Level 2	Level 3	Level 5	Level 5	Design Treatment Capacity (if > than NR110, shown in red)			Specific Design Criteria		Performance - Firm Capacity (If > than NR110, shown in red) (If NR 110 okay but > firm design capacity, shown in blue)			Gap between Performance and Firm Design Capacity			Specific Change and Impact to Chapter 5 and Appendix 5B**
Facility	Facility Division	Major Process	Unit Process	UNITS	Total	Firm	Design Criteria Details	PERFORMANCE CRITERIA	2015	2035	2050	2015	2035	2050	
JIWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	760	~~760~~ 869	· 8 Primary Clarifiers - 160 dia. x 12 swd, each · Surface Overflow Rate (SOR), gpd/sf – ave day 760, max day 1,870, max week 1,180, max month 1,000, peak hour (calc) 2,052 with all units in service · Weir Loading Rate (WLR), calculated, gpd/lf – ave day 30,400, max day 74,800, max week 47,200, max month 40,000 with all units in service · Sludge Production (ton per day) – ave day 116, max day 236, max week 175, max month 153	Ave SOR (gpd/sf) with one unit out of service	704	775	777	0	~~15~~ 0	~~17~~ 0	Updated text in Chapter 5 and Appendix 5B, see Item 2, since average SOR does not exceed firm capacity.
JIWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	1,000	~~1,000~~ 1,143		Max month SOR (gpd/sf) with one unit out of service	751	827	829	0	0	0	No change in text related to maximum month SOR.
JIWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	2,052	~~2,052~~ 2,345		Peak hourly SOR (gpd/sf) with one unit out of service	~~2,052~~ 2,345	~~2,269~~ 2,593	~~2,673~~ 3,055	0	~~217~~ 248	~~621~~ 710	Performance values were originally calculated with all units in service, which is not consistent with how the other primary clarifier assessments were developed. Changes needed to text in Chapter 5 and Appendix 5B, see Item 2.
JIWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/lf	30,400	~~30,400~~ 34,933		Ave WLR (gpd/lf) with one unit out of service	28,170	31,009	31,061	0	~~609~~ 0	~~661~~ 0	Performance updated to compare to design with one unit out of service, now showing does not exceed capacity. Updated text in Chapter 5 and Appendix 5B, see Item 2, to delete reference to WLR exceeding capacity.
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	410	~~410~~ 429	· West Plant – 11 at 8,550 sf surface area each; East Plant – 10 at 13,230 sf surface area each; New East Plant – 12 at 6,250 sf surface area each · SOR, gpd/sf: - ave day 410, max day 1,000, max week 630, max month 530, peak hour (calc) 1,095 with all units in service · Solids Loading Rate (SLR), lb/d/sf: - ave day 12, max day 31, max week 20, max month 16, peak hour (calc) 34 with all units in service · WLR, calculated, gpd/lf – ave day 8,600 with all units in service	Ave SOR (gpd/sf) with one unit out of service	~~353~~ 346	~~389~~ 381	~~390~~ 383	0	0	0	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had minor impact to resultant projected SOR. No change to assessment.
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	530	~~530~~ 554		Max month SOR (gpd/sf) with one unit out of service	~~376~~ 369	~~415~~ 407	~~417~~ 409	0	0	0	Surface area was calculated incorrectly; minor impact to resultant projected SOR. No change to assessment.

Level 2	Level 3	Level 5	Level 5	Design Treatment Capacity (if > than NR110, shown in red)			Specific Design Criteria		Performance - Firm Capacity (If > than NR110, shown in red) (If NR 110 okay but > firm design capacity, shown in blue)			Gap between Performance and Firm Design Capacity			Specific Change and Impact to Chapter 5 and Appendix 5B**
Facility	Facility Division	Major Process	Unit Process	UNITS	Total	Firm	Design Criteria Details	PERFORMANCE CRITERIA	2015	2035	2050	2015	2035	2050	
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	1,096	~~1,096~~ 1,145		Peak hourly SOR (gpd/sf) with one unit out of service	~~1,096~~ 1,145	~~1,096~~ 1,145	~~1,096~~ 1,145	0	0	0	Performance values were originally calculated with all units in service, which is not consistent with how the other primary clarifier assessments were developed. No change to assessment.
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	12.00	~~12~~ 12.55		Ave Solids Loading Rate (lb/d/sf) with one unit out of service	~~16.00~~ 15.70	~~17.60~~ 17.30	~~17.70~~ 17.30	~~4.00~~ 3.15	~~5.60~~ 4.75	~~5.70~~ 4.75	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had minor impact to resultant projected SLR. No change to assessment as this was already flagged as an issue. But changes needed to text in Chapter 5 and Appendix 5B related to why values exceeded, see Item 2
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	16.00	~~16.00~~ 16.73		Max month Solids Loading Rate (lb/d/sf) with one unit out of service	~~23.70~~ 23.30	~~26.20~~ 25.70	~~26.30~~ 25.80	~~7.70~~ 6.57	~~10.20~~ 8.97	~~10.30~~ 9.07	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had minor impact to resultant projected SLR. No change to assessment as this was already flagged as an issue.
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	31.00	~~31.00~~ 32.42		Max day Solids Loading Rate (lb/d/sf) with one unit out of service	Not calculated	~~50.90~~ 50.00	~~51.20~~ 50.20	0.00	~~19.90~~ 17.58	~~20.20~~ 17.78	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had minor impact to resultant projected SLR. No change to assessment as this was already flagged as an issue.
JIWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/lf	8,600	~~8,600~~ 8,937		Ave WLR (gpd/lf) with one unit out of service	6,919	7,625	7,658	0	0	0	Performance updated to compare to design with one unit out of service. No change to assessment.
SSWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	1,100	~~1,100~~ 1,177	· Plant flow metering (upstream of primary clarification): 4 magnetic meters, 120 MGD each; 16 rectangular basins - 160x40x10 swd · Surface Overflow Rate (SOR), gpd/sf – ave day 1,100, max day 2,440, max week 1,855, max month 1,660, peak hour (calc) 2,930 with all units in service · Weir Loading Rate (WLR), calculated, gpd/lf – ave day 24,500, max day 54,200, max week 41,200, max month 36,900 with all units in service	Ave SOR (gpd/sf) with one unit out of service	~~323~~ 947	~~426~~ 1,250	~~524~~ 1,537	0	~~0~~ 73	~~0~~ 360	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had impact to resultant projected SOR. Changes needed to text in Appendix 5B, see Item 2.

Level 2	Level 3	Level 5	Level 5	Design Treatment Capacity (if > than NR110, shown in red)			Specific Design Criteria		Performance - Firm Capacity (If > than NR110, shown in red) (If NR 110 okay but > firm design capacity, shown in blue)			Gap between Performance and Firm Design Capacity			Specific Change and Impact to Chapter 5 and Appendix 5B**
Facility	Facility Division	Major Process	Unit Process	UNITS	Total	Firm	Design Criteria Details	PERFORMANCE CRITERIA	2015	2035	2050	2015	2035	2050	
							· Sludge Production (lb/d) – ave day 183,200, max day 318,900, max week 278,600, max month 234,900								
SSWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	1,660	~~1,660~~ 1,771		Max month SOR (gpd/sf) with one unit out of service	~~361~~ 1,059	~~477~~ 1,398	~~586~~ 1,719	0	0	0	Surface area as shown in this table is correct but was inputted incorrectly in the mass balances; corrected surface area had impact to resultant projected SOR. No changes to text for this item.
SSWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	2,930	~~2,930~~ 3,125		Peak hourly SOR (gpd/sf) with one unit out of service	~~2,930~~ 3,125	~~2,930~~ 3,125	~~2,930~~ 3,125	0	0	0	Values were originally calculated with all units in service, which is not consistent with how other primary clarifier assessments were developed. Changes needed to text in Appendix 5B, see Item 2.
SSWRF	Liquid	MP02 - PRIMARY CLARIFICATION	UP04 - PRIMARY CLARIFICATION	gpd/sf	24,500	~~24,500~~ 25,565		Ave WLR (gpd/lf) with one unit out of service	19,175	~~26,004~~ 26,012	31,987	0	~~1,504~~ 447	~~7,487~~ 6,422	Gap now calculated based on firm capacity with one unit out of service. No change to text as already identified as an issue.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	480	~~480~~ 501	· 24 octagonal clarifiers, 10,367 sf surface area each · SOR, gpd/sf: - ave day 480, max day 1,050, max week 800, max month 714, peak hour (calc) 1,246 · Solids Loading Rate (SLR), lb/d/sf: - ave day 18, max day 32, max week 25, max month 25, peak hour (calc) 37 · WLR, calculated, gpd/lf – ave day 13,413	Ave SOR (gpd/sf)	~~395~~ 375	~~521~~ 496	~~641~~ 609	0	~~41~~ 0	~~161~~ 108	Surface area was updated in update to Part 2, Volume 5, SSWRF Secondary Clarifier O&M, now reflected in table. No change to how UP06 flagged but change to text in Appendix 5B, see Item 2.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	714	~~714~~ 861		Max month SOR (gpd/sf)	~~441~~ 419	~~582~~ 553	~~715~~ 680	0	0	0	Surface area and design parameter updated, minor impact to resultant projected SOR. No change to assessment.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/sf	~~1,210~~ 1,246	~~1,210~~ 1,294		Peak hourly SOR (gpd/sf)	~~1,210~~ 1,294	~~1,210~~ 1,294	~~1,210~~ 1,294	0	0	0	Surface area and design parameter updated in Part 2, Volume 5 O&M, now reflected in table. Assessment values were originally calculated with all units in service, which is not consistent with how other primary clarifier assessments were developed. No change to how UP06 flagged in Appendix 5B text.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	18.00	~~18~~ 19.00		Ave Solids Loading Rate (lb/d/sf)	~~18.50~~ 17.60	~~24.40~~ 23.20	~~30.00~~ 28.50	~~0.50~~ 0.00	~~6.40~~ 4.20	~~12~~ 9.50	Surface area updated in update to Part 2, Volume 5, O&M, now reflected in table. No change to how UP06 flagged but change to text in Appendix 5B, see Item 2.

Level 2	Level 3	Level 5	Level 5	Design Treatment Capacity (if > than NR110, shown in red)			Specific Design Criteria		Performance - Firm Capacity (If > than NR110, shown in red) (If NR 110 okay but > firm design capacity, shown in blue)			Gap between Performance and Firm Design Capacity			Specific Change and Impact to Chapter 5 and Appendix 5B**
Facility	Facility Division	Major Process	Unit Process	UNITS	Total	Firm	Design Criteria Details	PERFORMANCE CRITERIA	2015	2035	2050	2015	2035	2050	
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	25.00	~~25~~ 26.00		Max month Solids Loading Rate (lb/d/sf)	~~27.50~~ 26.10	~~36.20~~ 34.50	~~44.60~~ 42.40	~~2.50~~ 0.10	~~11.20~~ 8.50	~~19.60~~ 16.40	Surface area updated in update to Part 2, Volume 5, O&M, now reflected in table. No change to how UP06 flagged in Appendix 5B text.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	lb/d/sf	~~37~~ 32.00	~~37~~ 33.00		Max day Solids Loading Rate (lb/d/sf)	Not calculated	~~49.90~~ 47.50	~~61.50~~ 58.50	0.00	~~12.90~~ 14.50	~~24.50~~ 25.50	Surface area updated in update to Part 2, Volume 5, O&M, now reflected in table. No change to how UP06 flagged in Appendix 5B text.
SSWRF	Liquid	MP05 - SECONDARY CLARIFICATION	UP06 - SECONDARY CLARIFICATION	gpd/lf	~~13,800~~ 13,413	~~13,800~~ 13,996		Ave WLR (gpd/lf)	10,400	13,700	16,800	0	0	~~3,000~~ 2,804	Circumference was recalculated, reducing calculated design and increasing gap. No change to how UP06 flagged but change to text in Chapter 5 and Appendix 5B, see Item 2.

2. Chapter 5 and Appendix 5B

a) The review of text associated with the WRF Capacity Assessment identified the following edits that needs to be made in Chapter 5:

i. On page 5-23, revise the second to last bullet point for JIWRF MP05 as follows:

"MP05 – Secondary Clarification: One UP is projected to have deficient capacity. UP06 – Secondary Clarification is projected to exceed solids loading rate (SLR) design parameters by the year 2020, due to a projected ~~biosolids~~ increase in BOD loadings to ~~the UP~~ MP04, Aeration, which in turn increases the mixed liquor suspended solids (MLSS) to the secondary clarifiers. The same note regarding the aerated effluent channels stated under MP04 above applies to this MP."

ii. On page 5-25, revise the second to last bullet for SSWRF MP-05, as follows:

"MP05 – Secondary Clarification: One UP is projected to have deficient capacity. The ~~SOR, WLR, and~~ SLR ~~solids loading rates are~~ is identified to exceed the design parameters of UP06 – Secondary Clarification under Baseline Conditions.

b) In addition, proposed edits were identified in Section 5.5, Capacity Failure Mode, of Appendix 5B:

i. In the last bullet point on page 5B-10, regarding JIWRF MP-02, the bullet point should be updated as follows:

"MP02 – Primary Clarification: One UP is projected to have deficient capacity. UP04 – Primary Clarification is projected to exceed the ~~average day~~ peak hour surface overflow rate (SOR) ~~weir loading rate (WLR)~~ design parameter by the year 2029. ~~Though the projected average annual flow of 101 MGD is less than design average annual flow of 123 MGD, the SOR WLR is exceeded due to a change in operation under WRF Baseline Conditions that was not assumed in design conditions. The mass balance analysis assumed that one primary clarifier will continue to be out of service under WRF Future and Buildout Conditions as is done under WRF Baseline Conditions, while the design condition WLR was calculated based on all eight primary clarifiers in service.~~ In addition, peak hourly SOR is higher than the 2017 NR 110 requirements."

ii. For the second bullet point on page 5B-11, for JIWRF MP-05, the bullet point should be updated as follows:

"MP05 – Secondary Clarification: One UP is projected to have deficient capacity. UP06 – Secondary Clarification is projected to exceed solids loading rate design parameters by the year 2020 due to a projected increase in ~~biosolids~~ BOD loadings to ~~the UP~~ MP04, Aeration, which in turn increases the mixed liquor suspended solids (MLSS) to the

secondary clarifiers. The same note regarding the aerated effluent channels stated under MP04 above applies to this MP as well."

iii. For the first of the last three bullet points on page 5B-14, for SSWRF MP02, the text needs to be updated as follows:

"MP02 – Primary Clarification: One UP is projected to have deficient capacity. UP04 – Primary Clarification is projected to exceed the weir loading rate (WLR) design parameter by the year 2020 due to increased average day flow projections under WRF Future and Buildout Conditions. In addition, peak hourly surface overflow rate (SOR) is higher than the 2017 NR 110 requirements but does not exceed design parameters. The average annual SOR is projected to exceed design parameters by the year 2029."

iv. For the last bullet point on page 5B-14, for SSWRF MP-05, the text needs to be updated as follows:

"MP05 – Secondary Clarification: One UP is projected to have deficient capacity. The ~~SOR, WLR, and solids loading rates are~~ SLR is identified to exceed the design parameters of UP06 – Secondary Clarification under Baseline Conditions. In addition, the SOR and WLR are projected to exceed design parameters by the year 2039."

3. Appendix 6B: WRF R2, JIWRF Primary Clarification, Secondary Treatment Capacity Analysis

The updates to Appendix 5B, WRF Capacity Assessment also impact the presentation of information in Appendix 6B for the WRF R2, JIWRF Primary Clarification, Secondary Treatment Capacity Analysis, requiring updates to Table 6B-5 and 6B-7 as presented on the following pages.

These updates do not impact the analysis but do require an update to the discussion in Alternative 1 on page 6B-15: The first sentence under Alternative 1 - Primary Treatment Operation should be corrected to: "Under WRF Future Conditions, ~~T~~the primary clarification system meets 2017 NR 110 ~~regulations~~ requirements for surface overflow rate for ~~the WRF Future Conditions~~ average day conditions ~~or~~ but does not meet 2017 NR 110 ~~regulations~~ requirements for peak hourly conditions."

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-5: MP02– PRIMARY CLARIFICATION CAPACITY ASSESSMENT SUMMARY[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Unit Process	Treatment Standards				Design Treatment Capacity[2]				
	Current Design Criteria/Capacity Details	Performance Criteria	Current NR 110 Regulation	10 States Standards Guidance	Units	WRF Baseline ~~(ave Day)~~		WRF Future [3,~~4~~]	
						Total[4]	Firm[4]	Total[4]	Firm[4]
02 – Primary Clarification	Surface Overflow Rate (SOR), gpd/sf – average day 760 total, 869 firm	Ave SOR (gpd/sf)	NR 110.18.2.d.1 Table 3, for Primary: · Surface settling rate (gpd/sf) - average 1,000	Sec. 72.21 - Average surface settling rate 1000 g pd/sf	Gallons per day per square foot of surface area (gpd/sf)	616	~~775~~ 704	678	775
02 – Primary Clarification	SOR, gpd/sf – ~~max day 1,870~~ peak hour (calc) 2,052 total, 2,345 firm	Peak Hour SOR (gpd/sf)	NR 110.18.2.d.1 Table 3, for Primary: · Surface settling rate (gpd/sf) - max hourly 1,500	Sec. 72.21 - Maximum hourly surface settling rate 2000 gpd/sf	gpd/sf	**2,052**	~~827~~ **2,345**	**2,052[5]**	~~827~~ **2,345[5]**
02 – Primary Clarification	Weir Loading Rate (WLR), calculated, gpd/lf – avg day 30,400 total, 34,933 firm~~, max day 74,800~~	Weir Loading Rate (WLR), gpd/lf	NR 110.18.2.d.1 Table 3, for Primary: - Weir loading rate (gpd/lf) - avg 10,000	Sec. 72.42 - No loading rate at average annual flow is provided; ~~Maximum hourly weir loading rate is 30,000 gpd/lf~~	Gallons per day per lineal foot (gpd/lf)	**24,649**	**28,170**	**27,133**	~~**33,063**~~ **31,009**

1) Areas that exceed NR 110, design guidance, 10 States Standards, or existing capacity as established in the JIWRF O&M Manual are in bold, red text
2) Design treatment capacity for the purposes of this table is the calculated capacity based on the criteria under noted flows and wasteloads
3) WRF Future Conditions capacity assumes impact if no change on existing infrastructure
4) Appendix 5B-5 assumed one unit out of service so values presented under Performance columns in that document represent firm capacity values in this table.
5) Future flow through MP02 reassessed in conjunction with WRF FG8, JIWRF Wet Weather Capacity Analysis. It was determined that projected future wet weather flow can be managed through blending and would therefore be bypassed around MP02, Primary Clarification. Therefore, WRF Future peak hour SOR values are set at the same values as presented for WRF Baseline Conditions.

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-7: MP05– SECONDARY CLARIFICATION CAPACITY ASSESSMENT SUMMARY[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Unit Process	Treatment Standards				Design Treatment Capacity [2]				
	Current Design Criteria/ Capacity Details	Performance Criteria	Current NR 110 Regulation	10 States Standards Guidance	Units	WRF Baseline		WRF Future [3,4]	
						Total[5]	Firm[5]	Total [5]	Firm[5]
06 – Secondary Clarification[6]	~~SOR, gpd/sf: - avg day 410, max day 1,000, max week 630, max month 530, peak hour (calc) 1,095~~ Solids Loading Rate (SLR), lb/d/sf [lb/h/sf]: - avg day 12 [0.5] total, 13 [0.54] firm ~~, max day 31 [1.29], max week 20 [0.83], max month 16 [0.67], peak hour (calc) 34 [1.41]~~ ~~WLR, calculated, gpd/lf - avg day 8,600 24 octagonal clarifiers, 10,333 sf surface area each~~	Ave SLR (lb/d/sf)[7]	NR 110.18.2.d.1 Table 3, for Final following Activated Sludge: SLR (lb/d/sf) [lb/h/sf] - avg 33.6 [1.4]	Sec. 72.232 – no average requirement	lb/d/sf	~~16.8~~ **15.0**	~~17.6~~ **15.7**	~~25.9~~ **16.5**	~~**27.1**~~ **17.3**
06 – Secondary Clarification[6]	SLR, lb/d/sf [lb/h/sf]: - peak hour (calc) 34 [1.41] total, 36 [1.5] firm [8]	Peak Hour SLR (lb/d/sf)	NR 110.18.2.d.1 Table 3, for Final following Activated Sludge: SLR (lb/h/sf) [lb/h/d] - ~~max day~~ peak hour 48 [2]	Sec. 72.232 – maximum hourly SLR is 40 lb/d/sf (1.67 lb/hr/sf); 35 for Extended aeration and Single Stage Nitrification	lb/d/sf	NA[8]	NA[8]	**48.7**[8]	**50.9**[8]

1) Areas that exceed NR 110, design guidance, 10 States Standards, or existing capacity as established in the JIWRF O&M Manual are in bold, red text
2) Design treatment capacity for the purposes of this table is the calculated capacity based on the criteria under noted flows and wasteloads
3) WRF Future Conditions capacity assumes impact if no change on existing infrastructure
4) WRF Future Conditions capacity based on nitrification option
5) Appendix 5B-5 assumed one unit out of service so values presented under Performance columns in that document represent firm capacity values in this table.
6) West Plant – 11 at 8,550 sf surface area each; East Plant – 10 at 13,230 sf surface area each; New East Plant – 12 at 6,250 sf surface area each
7) 25 lb/d/sf is selected for design purposes
8) Clarifier ~~wet weather solids loadings~~ SLR assessment in Appendix 5B-5 did not include peak hour assessment, which includes biosolids storage basins operation at flows greater than 200 MGD; values presented for WRF Future Conditions were developed under this analysis.

4. Appendix 6B: WRF R3, SSWRF Primary Clarification, Secondary Treatment Capacity Analysis

   The updates to Appendix 5B, WRF Capacity Assessment, also impact the presentation of information in Appendix 6B for the WRF R3, SSWRF Primary Clarification, Secondary Treatment Capacity Analysis, requiring updates to Table 6B-16 and 6B-18 as noted on the following pages. In addition, review of influent TSS assumptions determined updates were required for Tables 6B-20 through 6B-24, as noted on the following pages, and associated Appendix 6B-4 – WRF R3 SSWRF Primary, Secondary Capacity Mass Balance Analysis, included as Attachment 2 to this document. None of these updates impact the analysis or recommendation.

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-16: MP02– PRIMARY CLARIFICATION WRF CAPACITY ASSESSMENT SUMMARY[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Unit Process	Treatment Standards				Design Treatment Capacity[2]			
					WRF Baseline (gpd/sf)		WRF Future [3] (gpd/sf)	
	Design Criteria	Performance Criteria	Current NR 110 Regulation	10-States Standards Guidance	Total[4]	Firm[4]	Total[4]	Firm[4]
04 – Primary Clarification	Surface Overflow Rate (SOR), gpd/sf – average day 1,100 total, 1,177 firm	Ave SOR (gpd/sf)	NR 110.18.2.d.1 Table 3, for Primary: · Surface settling rate (gpd/sf) - average 1,000	Sec. 72.21 - Average surface settling rate 1000 gpd/sf	888	947	**1,172**	**1,250**
04 – Primary Clarification	Surface Overflow Rate (SOR), gpd/sf - ~~max day~~ peak hour (calc) 2,930 total, 3,125 firm	Peak Hour SOR (gpd/sf)	NR 110.18.2.d.1 Table 3, for Primary: · Surface settling rate (gpd/sf) - max hourly 1,500	Sec. 72.21 - Maximum hourly surface settling rate 2000 gpd/sf	**2,930**	**3,125**	**2,930**	**3,125**

1) Areas that exceed NR 110, design guidance, 10 States Standards or existing capacity as established in the SSWRF O&M Manual are in bold, red text
2) Design treatment capacity for the purposes of this table is the calculated capacity based on the criteria under noted flows and wasteloads
3) WRF Future capacity evaluations are relative to existing infrastructure
4) Appendix 5B-5 assumed one unit out of service so values presented under Performance columns in that document represent firm capacity values in this table

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-18: MP05– SECONDARY CLARIFICATION WRF CAPACITY ASSESSMENT SUMMARY[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Unit Process	Treatment Standards				Design Treatment Capacity[2]				
	Current Design Criteria/ Capacity Details	Performance Criteria	Current NR 110 Regulation	10-States Standards Guidance	Units	Current		WRF Future [3]	
						Total[4]	Firm[4]	Total[4]	Firm[4]
06 – Secondary Clarification	24 octagonal clarifiers, 10,367 sf surface area each	Peak Hour SOR (gpd/sf) - 1,246 total, 1,294 firm	NR 110.18.2.d.1 Table 3, for Final following Activated Sludge: Surface settling rate (gpd/sf) - max hourly 1,200	Sec. 72.232 – with chemical addition, maximum hourly surface overflow rate is 900 gpd/sf, 1200 gpd/sf conventional and extended aeration	gpd/sf	~~1,269~~ 1,240	~~1,324~~ 1,294	~~1,269~~ 1,240	~~1,324~~ 1,294
06 – Secondary Clarification	24 octagonal clarifiers, 10,367 sf surface area each	Ave SLR (lb/d/sf) [5, 6] - 25 total, 26 firm	NR 110.18.2.d.1 Table 3, for Final following Activated Sludge: Solids load rate (lb/d/sf) - avg 33.6	Sec. 72.232 – no average requirement	lb/d/sf	16.8	17.6	**25.9**[5]	**27.1**[5]
06 – Secondary Clarification	24 octagonal clarifiers, 10,367 sf surface area each [6]	Peak Hour SLR (lb/d/sf) - 37 total, 39 firm	NR 110.18.2.d.1 Table 3, for Final following Activated Sludge: Solids load rate (48 lb/h/sf) max day	Sec. 72.232 – maximum hourly solids loading rate is 40 lb/d/sf (1.67 lb/hr/sf); 35 for Extended aeration and Single Stage Nitrification	lb/d/sf	Not determined[7]		**60 lb/d/sf assuming 4800 mg/L MLSS and 10% reduction with Step Feed**[7]	

1) Areas that exceed NR 110, design guidance, 10 States Standards or existing capacity as established in the SSWRF O&M Manual are in bold, red text
2) Design Treatment Capacity for the purposes of this table is the calculated capacity based on the criteria under noted flows and wasteloads
3) WRF Future capacity assumes impact if no change on existing infrastructure
4) Appendix 5B-5 assumed one unit out of service so values presented under Performance columns in that document represent firm capacity values in this table
5) WRF Future capacity updated from Appendix 5B-5 assessment in this analysis based on nitrification option
6) 25 lb/d/sf is selected for design purposes
7) ~~25 lb/d/sf is selected for design purposes~~ Clarifier SLR assessment in Appendix 5B-5 did not include peak hour assessment, which includes step feed operation at flows greater than 150 MGD; values presented for WRF Future Conditions were developed under this analysis and demonstrate the need to either improve primary treatment BOD removal or add secondary treatment capacity as presented in this analysis

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-20: ALTERNATIVE NO. 2 – LIMIT NITRIFICATION PARAMETERS @ 9 DEG C[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Avg Day	Max Month	Max Week	Max Day	Peak Hour
Primary Treatment						
BOD_5 Removal	%	30	30	30	20	----[2]
TSS Removal	%	50	50	50	38	----[2]
Ferric Chloride Solution	gpd	800	1,000	1,400	----[2]	----[2]
PSD TSS Load	LB/D	~~138,300~~ 162,800	~~174,700~~ 205,700	~~221,000~~ 261,000	----[2]	----[2]
Surface Overflow Rate	gal/d/ft2	1,250	1,398	1,416	1,919	3,125
Detention Time	hr	1.44	1.28	1.27	0.94	0.57
Aeration Basins						
Forward Flow	MGD	120	134	136	184	300
Process Air Requirement	scfm	75,000	85,000	98,000	145,000	----[2]
Volumetric Organic Loading	lb BOD/d/kcf	37	43	49	----[2]	----[2]
MLSS	mg/L	3,500	3,500	3,500	----[2]	----[2]
Total Bioreactor SRT	d	6.0	6.0	6.0	----[2]	----[2]
PE Step Feed Flow	MGD	0	0	0	0	50
WAS Produced	lb/d	~~159,000~~ 165,000	~~188,000~~ 195,000	~~223,000~~ 233,000	----[2]	----[2]
Bulk Selector F:M Ratio	1/d	1.1	1.2	1.3	2.3	----[2]
Bulk Selector True HRT (PE Q + RAS Q Basis)	min	41.1	36.8	36.3	26.8	14.7
Total (All Basins) Selector Volume	MG	4.4				
Total Aeration Basin Volume[3]	MG	33.6				
Total Bioreactor F:M Ratio	1/day	0.15	0.2	0.2	0.35	----[2]
Secondary Clarifiers						
Secondary Clarifier SOR	gpd/sf	526	587	595	806	1,324
Secondary Clarifier Plug Flow SLR	Lb/d/sf	17.6	19.7	19.9	26.9	39.2
Secondary Clarifier Step Feed SLR	Lb/d/sf	17.6	19.7	19.9	26.9	35.0
Effluent NH3-N Concentration	mg/L	9.1	7.7	7.2	8.2	----[2]

1) General assumptions: Bio-P process, MCRT to 3 to 5 days, yield is 0.75 lb TSS per pound of BOD removed
2) Since Max Day and Peak Hour are short term conditions, certain parameters were determined to not be needed for evaluation
3) Volume calculated based on one aeration basin out of service

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-21: ALTERNATIVE NO. 3 – NITRIFICATION/MORE VOLUME PARAMETERS @ 9 DEG C[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Avg Day	Max Month	Max Week	Max Day	Peak Hour
Primary Treatment						
BOD_5 Removal	%	30	30	30	20	----[2]
TSS Removal	%	50	50	50	38	----[2]
Ferric Chloride Solution	gpd	4,500	4,800	5,500	----[2]	----[2]
Ferric Chloride Dose (as Fe)	mg/L	6.4	6.1	6.9		
PSD TSS Load	LB/D	~~145,000~~ 170,000	~~182,000~~ 213,000	~~230,000~~ 270,000	----[2]	----[2]
Surface Overflow Rate	gal/d/ft2	1,250	1,398	1,416	1,919	3,125
Detention Time	hr	1.44	1.28	1.27	0.94	0.57
Aeration Basins						
Forward Flow	MGD	120	134	136	184	300
Process Air Requirement	scfm	93,000	103,000	116,000	168,000	----[2]
Volumetric Organic Loading	lb BOD/d/kcf	~~35~~ 39	~~40~~ 43	~~46~~ 49	~~78~~ 84	----[2]
MLSS	mg/L	4,200	4,500	5,300	----[2]	----[2]
Total Bioreactor SRT	d	8.0	8.0	8.0	----[2]	----[2]
PE Step Feed Flow	MGD	0	40	40	95	230
WAS Produced	lb/d	~~157,000~~ 167,000	~~173,000~~ 179,000	~~202,000~~ 203,000	----[2]	----[2]
Bulk Selector F:M Ratio	1/d	1.0	0.7	0.7	1.2	----[2]
Bulk Selector True HRT (PE Q + RAS Q Basis)	min	41.1	36.8	36.3	26.8	14.7
Total (All Basins) Selector Volume	MG	4.7				
Total Aeration Basin Volume[3]	MG	36.1				
Aerated Bioreactor F:M Ratio	1/day	0.1	0.1	0.1	0.2	
Secondary Clarifiers						
Secondary Clarifier SOR	gpd/sf	449	502	507	688	1,128
Secondary Clarifier Plug Flow SLR	Lb/d/sf	25.2	30.1	35.9	48.6	70.8
Secondary Clarifier SF SLR	Lb/d/sf	25.2	25.2	30.2	35.2	34.9
Effluent NH3-N Concentration	mg/L	0.5	0.5	0.5	0.5	----[2]

1) General assumptions: Aerobic selectors, MCRT 8 days, 4 additional secondary clarifiers, and 2 additional aeration basins.
2) Since Max Day and Peak Hour are short term conditions, certain parameters were determined to not be needed for evaluation.
3) Aeration volume is not sufficient, resulting in MLSS and secondary clarifier SLR is too high. Requires up to 10 MG additional aeration volume.

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-22: ALTERNATIVE NO. 4A - NITRIFICATION/CEPT PARAMETERS @ 9 DEG C

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Avg Day	Max Month	Max Week	Max Day	Peak Hour
Primary Treatment						
BOD_5 Removal	%	50	50	40	28	----[2]
TSS Removal	%	75	75	60	42	----[2]
Ferric Chloride Solution	gpd	6,800	7,800	11,400	----[2]	----[2]
Ferric Chloride Dose (as Fe)	mg/L	10.0	10.0	10.0	----[2]	----[2]
PSD TSS Load	LB/D	~~224,000~~ 260,000	~~281,000~~ 327,000	~~Was blank~~ 328,000	----[2]	----[2]
Surface Overflow Rate	gal/d/ft2	1,250	1,398	1,416	1,919	3,125
Detention Time	hr	1.44	1.28	1.27	0.94	0.57
Aeration Basins						
Forward Flow	MGD	120	134	136	184	300
Process Air Requirement	scfm	75,000	82,000	104,000	153,000	---- [2]
Volumetric Organic Loading	lb BOD/d/kcf	27	30	42	----[2]	---- [2]
MLSS	mg/L	3,050	3,400	4,700	----[2]	----[2]
Total Bioreactor SRT	d	8.0	8.0	8.0	6.6	----[2]
PE Step Feed Flow[3]	MGD	0	15	50	110	255
WAS Produced	lb/d	~~106,000~~ 109,000	~~121,000~~ 124,000	~~170,000~~ 176,000	----[2]	----[2]
Bulk Selector F:M Ratio	1/d	1.1	1.0	0.7	1.1	
Total (All Basins) Selector Volume	MG	4.4				
Total Aeration Basin Volume[4]	MG	33.6				
Aerated Bioreactor F:M Ratio	1/day	0.1	0.1	0.1	0.2	----[2]
Secondary Clarifiers						
Secondary Clarifier SOR	gpd/sf	526	587	595	806	1,324
Secondary Clarifier Plug Flow SLR	Lb/d/sf	21.4	26.6	37.3	50.6	73.7
Secondary Clarifier SLR	lb/d/sf	21.4	25.0	29.8	34.4	35.0
Effluent NH3-N Concentration	mg/L	0.5	0.5	0.5	0.5	----[2]
Effluent Alkalinity as CaCO3	mg/L	32	34	36	----[2]	----[2]
Magnesium Hydroxide Solution Req'd for Effluent Alkalinity = 50 mg/L	Gal/d	260	----[2]	----[2]	----[2]	----[2]

1) General assumption: Aerobic selectors.
2) Since Max Day and Peak Hour are short term conditions, certain parameters were determined to not be needed for evaluation. Note for magnesium hydroxide solution, only average day sized.
3) Aeration step feed may not provide sustained full nitrification for extended periods of peak flow.
4) Consider two additional aeration basins at middle road.

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-23: ALTERNATIVE NO. 5A – NITRIFICATION, NO CEPT WITH MBR PARALLEL TREATMENT (MAINSTREAM PROCESS - EXISTING AERATION BASINS) @ 9 DEG C[1]

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Avg Day	Max Month	Max Week	Max Day	Peak Hour
Primary Treatment						
BOD_5 Removal	%	30	30	30	20	----[2]
TSS Removal	%	50	50	50	38	----[2]
Ferric Chloride Solution	gpd	3,400	3,700	4,300	----[2]	----[2]
Ferric Chloride Dose	mg/L	6.1	6.1	6.9	----[2]	----[2]
PSD TSS Load	LB/D	~~145,000~~ 170,000	~~182,000~~ 213,000	~~230,000~~ 269,000	----[2]	----[2]
Surface Overflow Rate	gal/d/ft2	1,250	1,398	1,416	1,919	3,125
Detention Time	hr	1.44	1.28	1.27	0.94	0.57
Aeration Basins						
Forward Flow	MGD	90	104	106	133	270
Process Air Requirement	scfm	70,000	80,000	90,000	120,000	
Volumetric Organic Loading	lb BOD/d/kcf	28	31	36	---- [2]	---- [2]
MLSS	mg/L	3,400	4,100	4,800	----[2]	----[2]
Total Bioreactor SRT	d	8.0	8.0	8.0	----[2]	----[2]
PE Step Feed Flow[3]	MGD	0	0	0	0	240
WAS Produced	lb/d	~~119,000~~ 136,000	~~142,000~~ 166,000	~~167,000~~ 199,000	----[2]	---- [2]
Bulk Selector F:M Ratio	1/d	1.0	1.0	1.0	1.6	---- [2]
Total (All Basins) Selector Volume	MG	4.4				
Total Aeration Basin Volume	MG	33.6				
Aerated Bioreactor F:M Ratio	1/day	0.1	0.1	0.1	0.2	---- [2]
Secondary Clarifiers						
Secondary Clarifier SOR	gpd/sf	400	440	450	560	1,300
Secondary Clarifier Plug Flow SLR	Lb/d/sf	18	24	29	36	75
Secondary Clarifier S/F SLR	lb/d/sf	18	24	29	36	35
Effluent NH3-N Concentration	mg/L	0.5	0.5	0.5	0.5	

1) General assumptions: Aerobic selectors
2) Since Max Day and Peak Hour are short term conditions, certain parameters were determined to not be needed for evaluation
3) Aeration step feed may not be sustainable for extended peak flow

UPDATES TO 2050 FACILITIES PLAN TABLE 6B-24: ALTERNATIVE NO. 5A – NITRIFICATION, NO CEPT WITH MBR PARALLEL TREATMENT (MBR PROCESS) @ 9 DEG C

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Avg Day	Max Month	Max Week	Max Day	Peak Hour
Primary Treatment						
BOD_5 Removal	%	30	30	30	20	----
TSS Removal	%	50	50	50	38	----
Parallel Treatment Process						
Ferric Chloride Solution	gpd	1,100	1,100	1,200	----	----
Ferric Chloride Dose	mg/L	6.4	6.1	6.9	7.4	----
Forward Flow	MGD	30	30	30	50	50
Process Air Requirement	scfm	23,000	23,000	26,000	48,000	
MLSS	mg/L	7,700	8,000	9,200	----	----
Aerobic SRT	d	8.0	8.0	8.0	8.0	----
WAS Produced	lb/d	~~39,300~~ 45,400	~~40,800~~ 47,900	~~47,400~~ 56,000	----	----

5. Chapter 9, Design Summary

The updates to Appendix 5B, WRF Capacity Assessment also impacted the presentation of information in Section 9.7, Proposed Design Criteria Updates. Specifically, the update of the SSWRF secondary clarifier surface area also impacts the values presented for MP05, Secondary Clarification SOR and SLR in Table 9-11, Proposed Updates to SSWRF Design Criteria on p 9-43 and in Appendix 9B, Updated WRF Future Condition Mass Balances Incorporating Implementation of Recommended Projects. An excerpt from Table 9-11 on p 9-43 is presented on the next page to show the proposed changes. The updated Appendix 9B is included as Attachment 3 to this document. These updates do not impact the analysis.

UPDATES TO 2050 FACILITIES PLAN TABLE 9-11: PROPOSED UPDATES TO SSWRF DESIGN CRITERIA

* Updates are highlighted in yellow; strikethrough indicates deleted text

Parameter	Units	Flow and Wasteload Scenarios							
		Average Day		Maximum Month		Maximum Week		Maximum Day	
		Design	Future Design	Design	Future Design	Design	Future Design	Design	Future Design
MP05, Secondary Clarification									
Number of Units	no.	24	24	24	24	24	24	24	24
Surface Overflow Rate[12]	gpd/sf	480	~~510~~ 500	714	~~720~~ 710	800	800	1,050	~~1,120~~ 1,110
Solids Loading	lbs/d/sf	18	~~20~~ 19	25	~~26~~ 25	25	~~29~~ 28	32	~~41~~ 39
Detention Time	hrs	5.2	NA[3]	3.5	NA[3]	3.1	NA[3]	2.4	NA[3]
Return Sludge Flow	MGD	57	60	85	85	95	95	125	133
Sludge Concentration	mg/l	9,000	9,000	8,500	8,500	7,500	8,500	7,000	8,500
Waste Sludge Flow	MGD	2.30	1.4	3.64	1.7	5.13	2.3	5.49	2.3
Waste Sludge Production	lbs/d	172,900	107,000	257,900	119,000	320,900	164,000	320,900	164,000

Item 2: Responses to Review Questions received in 11/30/2020 email from Andrew Dutcher

Andrew Dutcher sent an email on November 30, 2020 with questions in the body of the email and a link to a PDF of Appendix 6B, WRF and Biosolids Alternative Analyses, with comments embedded. This item only addresses the questions included in the body of the email. Responses to comments embedded in Appendix 6B are addressed in Item 3.

Questions and Responses:

Note that both questions relate to 2050 Facilities Plan Appendix 4B-2, WRF Future Conditions Flows and Wasteloads Trends

1. Was the underlying data validated to have an approximately log-normal distribution?

   Response: As stated on p 11 in Appendix 4B-1, it was elected to use a log-normal distribution to calculate peaking factors using the mean and standard deviation of the dataset according to the methodology for calculating permit limits described in the U.S. EPA Technical Support Document for Water Quality-based Toxics Control.[1] The data was validated using quantile-quantile (Q-Q) plots.

   To clarify this, additional text will be added to the first paragraph on p 11 as follows

   "The use of a log-normal distribution methodology for calculating maximum values of future projects was validated using quantile-quantile (Q-Q) plots of JIWRF and SSWRF maximum week and month BOD and TSS values from the Recent Dataset, as presented in Attachment A. Q-Q plots are used as a visual tool to determine if the dataset is distributed normally by comparing the actual data to the theoretical data calculated for a normal distribution. If the dataset is distributed normally, the plots should be generally linear[2]. Engineering judgment determined that the data are linear enough to justify the use of the log-normal distribution methodology."

   In addition, Attachment A, Recent Data Summary - JIWRF and SSWRF, will be updated as shown in Attachment 4 to this document with Q-Q plots included as part of the Recent Dataset analysis under "Log-Normal Validation: Q-Q Plots of Actual versus Theoretical Maximum Week/Maximum Month Data" on p 2.

2. How long of time period was used for the analysis? Is this the ~2007 to 2017 period (writing from memory, so the dates may not be exact) that was mentioned elsewhere in 6B? Serial correlation renders this statistical test as less appropriate if over a shorter timescale, but assuming that the time evaluated was ~10 years, the degrees of freedom means that the t-value (even when the degrees of freedom are significantly reduced to address pseudo-replication) approaches the z-value.

   Response: The time period used for the Recent Dataset was from January 1, 2006 through December 31, 2017. The year 2006 was selected because it was the first year after LeSaffre Yeast left the JIWRF service area, which had a substantial impact to wasteloads as they were a

[1] USEPA, Office of Water, Technical Support Document for Water Quality-based Toxics Control, Washington, D.C., 1991.

[2] Ford, C., "Understanding Q-Q Plots," 2015. [Online]. Available: https://data.library.virginia.edu/understanding-q-q-plots/. [Accessed 9 December 2020].

major industrial user. The year 2017 was selected as it was the last full year of data available when developing this methodology document and it was desired to evaluate 10 years of data.

Item 3: Responses to Review Questions in Appendix 6B document received in November 30, 2020 email from Andrew Dutcher

Responses to comments embedded in Appendix 6B provided by Andrew Dutcher in a link in his November 30, 2020 email are provided in Table 2.

TABLE 2: RESPONSES TO DNR COMMENTS ON APPENDIX 6B, WRFS AND BIOSOLIDS ALTERNATIVE ANALYSES

* Updates to Appendix 6B are highlighted in yellow; strikethrough indicates deleted text

Appendix 6B Page Number	Andrew Dutcher Comment	2050 FP Team Response
15	code requirement is for is max hour condition, not peak day	Agree, text changes needed. Table 6B-7 will be corrected as noted.
30	Is this typical/normal operation even at high flow periods? This seems very high, and if real, almost certainly contributes to bulking issues (very low F:M). This concern ameliorated to a large degree with the proposed selector zone	Agree, text changes needed. The aeration MLSS concentration of 4,800 mg/l presented is based on future flows and loadings without CEPT, not WRF Baseline Conditions. This MLSS demonstrates the need to either use CEPT, otherwise improve primary treatment BOD removal or add secondary treatment capacity, as presented in the WRF R3 analysis. See proposed edits to footnote 7 in Table 6B-18 under Item 4 in this document to clarify this.
42	possibly not feasible due to Ch. 30 permits	Agree, text changes needed related to this comment and the next comment. The proposed edits are as follows: "Since this alternative includes ~~cannot provide the full~~ additional secondary treatment ~~capacity without site lakefill or pumping to the activated sludge system~~ infrastructure that may require expanding the plant footprint into the lake, pumping to new facilities on the upper site, or other activated sludge technologies on the upper site, this alternative was ~~not~~ considered prohibitively expensive and possibly ~~viable~~ infeasible due to permitting constraints with adding lakefill; therefore, conceptual costs for this alternative were not developed for this planning level effort."
42	Clearly more costly, but not infeasible As a matter of semantics, this alternative is not infeasible, but clearly more costly than the other alternatives	Agree, text changes needed. See proposed edits in previous comment.
46	Please confirm that this includes nitrification demands	No text changes related to this response. Nitrification oxygen demand is included in the process air requirements in Table 6B-22.

Appendix 6B Page Number	Andrew Dutcher Comment	2050 FP Team Response
46	Did this assume high BOD conditions? BOD peaking is presumably non-coincident with flow peaking, given industrial sources. Is TKN load peaking coincident with BOD peaking?	No text changes related to this response. Note 2 of Table 6B-22 is a general statement covering all parameters not calculated. In general, since Max Day and Peak Hour are short term conditions, certain parameters were determined to not be needed for evaluation. However, Max Day BOD loading was calculated and is presented, projected from the max day influent loadings with the appropriate primary treatment BOD removal (with CEPT for Alternative 4A). Maximum BOD loading is typically not associated with high flows. TKN maximum loading is likely to coincide with BOD maximum loading. The projected WRF Future Conditions influent TKN is not presented in Table 6B-22 but is presented in Appendix 6B-4, WRF R3 SSWRF Primary, Secondary Capacity Mass Balance Analysis.
62	Was modeling done to verify that bio-P is not feasible in existing (or modestly expanded) tank volumes? It appears that a mass-balance modeling approach was utilized, but the appropriate volumetric loading to ensure nitrification was not modeled	Agree, text changes need in Alternative 4A discussion. To answer the questions: - Discussion under Alternative 2, on p 6B-34, notes Bio-P, as recommended in MMSD Project S02012E01, could be implemented under Alternative 2. - Alternative 3 includes the determination of the appropriate volumetric load to ensure nitrification. Process mass balance calculations for Alternative 3 (which did not include CEPT) noted that currently there is inadequate volume to support reliable nitrification. The following text will be added as the last sentence to the first paragraph on p 6B-44, under Alternative 4A to clarify why Bio-P can't be used with CEPT: "When CEPT is utilized, the phosphorus entering the activated sludge process is chemically bound with the iron and is not available to the phosphorus accumulating organisms (PAOs). Therefore, Bio-P is not feasible with CEPT."
63	Typo: decimal	Agree, text change needed. In Table 6B-28 on p 6B-62, Value Ratio of Alternative 5A should be "1.82"

Appendix 6B Page Number	Andrew Dutcher Comment	2050 FP Team Response
64	What condition (compared to present loads) does this cover?	No text changes related to this response. Existing conditions data average aeration air demand was ~70,000 scfm (~70% of firm capacity, 3 of 4 aeration blowers). When average aeration air demand exceeds ~90,000 scfm (90% of firm capacity) the District should begin to implement air supply / aeration capacity improvements so they are in place before capacity is exceeded as projected under WRF Future Conditions.
65	What is the plug flow pipe?	No text changes related to this response. The aeration tanks at SSWRF are supplied with primary effluent to operate in the plug flow process mode or the step feed process mode through separate pipes, such that each aeration tank has one “plug flow pipe” and multiple “step feed pipes.” The plug flow mode adds primary effluent and RAS through the plug flow pipe into the beginning of the tank and the tank mixed liquor flows through the tank to the tank outlet in a plug flow pattern. This is the standard operating mode. The step feed mode adds primary effluent from step feed pipes at multiple points along the length of the aeration tank. Step feed mode is used in wet weather to increase the hydraulic capacity for conveying the primary effluent and to provide some degree of mixed liquor dilution and associated reduced solids loading to the secondary clarifiers.
74	One of these is incorrect	Agree, text changes needed as follows: the chlorine contact time values are reversed and will be corrected.
75	Typo 2)	Agree, text changes needed. Second “1)” will corrected to be “2)”.
94	Note: already seasonally implemented at SS. Report should reflect reality for clarity's sake	Agree, text changes needed. Text will be added to the description of Alternative 2 on p 6B-80 by editing the first sentence in the first paragraph as follows: “This alternative manages the disinfection process using monochloramine as the primary disinfectant as the standard process throughout the year, not just seasonally as is the WRF Baseline Condition operation. Monochloramine disinfection is effective when the nitrification process is stable but is not effective with small variations of ammonia concentration in the effluent.”
103	This image has poor quality	Agree, update needed. Table 6B-43 on p 6B-102 will be updated to improve the image quality.

Appendix 6B Page Number	Andrew Dutcher Comment	2050 FP Team Response
152	Current location	Reviewer confirmed this was not a review comment and therefore no response required.

Attachments:

Attachment 1: 2050 Facilities Plan Appendix 5B-5, WRF Capacity Assessment
Attachment 2: 2050 Facilities Plan Appendix 6B-4, WRF R3 SSWRF Primary, Secondary Capacity Mass Balance Analysis
Attachment 3: 2050 Facilities Plan Appendix 9B, Updated WRF Future Condition Mass Balances Incorporating Implementation of Recommended Projects
Attachment 4: 2050 Facilities Plan Appendix 4B-1, Attachment A, Recent Data Summary - JIWRF and SSWRF

The following attachments from the December 10, 2020 response document are not included in this January 8, 2021 response submittal:

- Attachment 1: 2050 Facilities Plan Appendix 5B-5, WRF Capacity Assessment
- Attachment 2: 2050 Facilities Plan Appendix 6B-4, WRF R3 SSWRF Primary, Secondary Capacity Mass Balance Analysis
- Attachment 3: 2050 Facilities Plan Appendix 9B, Updated WRF Future Condition Mass Balances Incorporating Implementation of Recommended Projects
- Attachment 4: 2050 Facilities Plan Appendix 4B-1, Attachment A, Recent Data Summary - JIWRF and SSWRF

These attachments will be updated as noted and included in the final 2050 FP.

APPENDIX 9E-3: Updated Responses to WDNR Comments -

Appendix 9E, SEWRPC/WDNR Review Documentation

Updated responses to the responses to WDNR review comments originally provided in January 8, 2021 response letter, which is included in this appendix

ID	WDNR Comment	Original Response	Updated Response	Chapter/Appendix No. Section No.	Page No.
1	January 8, 2021 response letter Table 1, Comment 1.2.1 Are the flows at design average or peak flow rates? No unit process design is controlled by average daily flow rate. Basically, all hydraulically controlled units are based on peak day to peak instantaneous flow rate	Agree, text changes needed. Additional edits to user flow information will be made to add peak flow breakdown to new appendix to Appendix 4B.	Refer to Appendix 4B-3. [Not specifically identified in original response.]	App 4B-3 (NEW)	NA
2	January 8, 2021 response letter Table 1, Comment 1.2.2 Is there an evaluation for BOD? Processes are based on anywhere from average daily load (aeration basin volumes) to peak day (aeration).	Agree, text changes needed.Additional edits to user BOD/TSS information will be made to add maximum breakdown to new appendix to Appendix 4B. Prior to edits, 2050 FP will test max week versus max month BOD - if industrial % doesn't change much, will just use max month with explanation added to discussion.	Made edits to the user BOD and TSS information by adding maximum breakdown information to Appendix 4B-3. The 2050 FP team reviewed maximum day/week/month information and determined that the breakdown of user flows and wasteloads was only available for annual average conditions. Therefore, the percentages developed for annual average were applied to maximum month total wasteload conditions to determine the maximum month user wasteload breakdown.	App 4B-3 (NEW)	NA
3	January 8, 2021 response letter Table 1, Comment 2.1 My understanding is that Jones Island operates as pseudo-contact stabilization, though the operation merges toward conventional plug flow activated sludge as the high flow conditions persist. Is there more capacity for secondary treatment during sustained high flow events if JI implements step feed or provides piping so that it can run by design as contact stabilization? Are there implications with respect to filtration needs as a result? Blending is not an either/or: the expectation under NR 210.12(2)(c) is that blending is minimized ("no feasible alternatives"), so additional evaluation is required. To be clear, the regulations and DNR are clearly in favor of blending over overflows.	No change to response as it relates to Appendix 5B. Below is the original response related to Appendix 6B:In Appendix 6B, Section 6.4, WRF FG8 purpose subsection, a discussion will be added to note that before a utility blends, the utility needs to consider maximizing full treatment first. Note that HRT is not considered "full" treatment from a regulatory perspective. A reference to the JIWRF 2011 capacity report will be added, noting that recommendations were implemented but could only achieve 330 peak treatment because hydraulic capacity is limiting. A discussion regarding step feed of primary effluent will also be included, noting that this secondary treatment method was not considered as it would require major infrastructure modifications to intercept primary effluent (PE) flow at the flow control structure (FCS) and run new PE piping to the heads of the 32 west and east aeration basins, which are each a significant distance away from the FCS and would require penetrating the existing channels in multiple locations. The design analysis would need to include whether pumping would be required to achieve these modifications and whether step feed would improve capacity since the existing arrangement that utilizes the ML channel as an anoxic zone is believed to already maximize treatment capacity. Therefore, the 2050 FP project team did not consider additional traditional full treatment modifications to be a reasonable option for the WRF FG 8 analysis. However, the SW FG1, JIWRF and SSWRF reutilization analysis in Appendix 6E did look at wet weather treatment of flow at JIWRF utilizing primary filtration and biological facilities technology. This technology will be considered in Alternative 2.Note that a new Alternative 2 will be added to the WRF FG8 analysis, including costs and scoring in the evaluation section and the recommendation section updated accordingly. The recommendation will remain to proceed with blending channel upgrades with the need to review filtration in Alternative 1 against full treatment in Alternative 2 if operational management alone cannot meet TSS mass limits.	The following general edits were made: • Created two new alternatives: Alternative 1A, Increase Blending, No Effluent Filtration and Alternative 2, Add Additional Full Treatment. • Changed the capacity of all alternatives to 35 MGD additional capacity to achieve the total 95 MGD additional wet weather capacity needed to maintain the baseline CSO frequency. • The recommendation HAS changed - the recommendation is now Alternative 1A because its value ratio is much higher than Alternative 1 or 2. Therefore, the total project capital, annual O&M and present worth costs dropped as presented for the WRF FG8 recommendation in Appendix 6B and in Chapter 6. • The implementation remains near end of the 2020 to 2040 time period to allow MMSD to confirm that it can manage TMDL limits through operational management procedures as noted in WRF R6, JIWRF TMDL Management before implementing this recommendation.	App 6B, Sec 6.4, WRF FG8	6B-186 thru -194

ID	WDNR Comment	Original Response	Updated Response	Chapter/Appendix No. Section No.	Page No.
4	January 8, 2021 response letter Table 1, Comment 2.1 The updated response regarding WRF FG8, JIWRF Wet Weather Capacity impacts Chapter 8 capital and annual costs.	NA	WRF FG8 projected capital and annual costs have been decreased: capital costs decreased from $48.5 million to $1.6 million and annual O&M costs decreased from $1,120,000 to $10,000 based on the change in the evaluation in Appendix 6B, which required changes in text and to Table 8-2 and Table 8-4.	Ch 8	8-10, 8-12, 8-19
5	January 8, 2021 response letter Table 1, Comment 3.2 Project S03003C03 was reviewed and approved by DNR in July. Some of the conclusions of the engineering report do not align with the facility plan (off-hand, the chlorine and bisulfite doses). Given that the more specific evaluation already occurred, I am reluctant to approve the plan without updating the facility plan to reflect the design under S03003C03, unless the facility plan is clearly intended to supersede the engineering report evaluation. The facility plan seems to be unaware of this project moving forward (see 6B-186).	Agree, text changes needed. An additional reference to S03003C03 will be added in WRF R4 and in WRF FG9 analyses noting differences in disinfection dose assumptions in the S03003C03 project. Discussion will note that although the S03003C03 project assumed a higher chlorine dose is needed than the dose assumed in the 2050 FP, both projects assumed more than 1.0 mg/L of additional chlorine is needed to achieve E. coli limits. Additional discussion will be added to tie back to the operation project included in the WRF R4 recommendation to confirm what dose is needed.	The original response is still applicable. Additional details were added throughout the analysis regarding chlorine concentration, contact times, and the chlorine doses needed to achieve the anticipated *E. coli* effluent limits in the next WPDES permit. The updates changed the costs and value ratio scores for Alternatives 1 through 3, but the recommended alternative remains Alternative 1.	App 6B, Sec. 6.3, WRF R4	6B-67 thru 6B-98
6	January 8, 2021 response letter Table 1, Comment 3.2 The updated response regarding WRF R4, Meeting Future *E. coli* Limits at JIWRF and SSWRF Analysis impacts Chapter 7 annual costs.	NA	In Appendix 6B, WRF R4 projected annual O&M costs have been increased from $770,000 to $1,050,000, which required changes in Table 7-1 and Table 7-5.	Ch 7	7-9, 7-23
7	January 8, 2021 response letter Table 1, Comment 2.1 and 3.2 The updated responses required updates to capital costs (due to WRF FG8) and annual O&M costs (due to WRF R4 and WRF FG8), impacting text and tables in Chapter 9.	NA	In Chapter 9, the total capital costs decreased by $46.9 million, reflecting the changes made in WRF FG8. Total annual O&M costs decreased by $830,000, reflecting the increase in annual O&M costs for WRF R4 and the decrease in annual O&M costs for WRF FG8. The increase in annual O&M costs associated with WRF R4 had not been included in the MMSD annual O&M budget because of the uncertainties surrounding the recommendation. MMSD is conducting the extended operational evaluation now as part of capital project M03113. These changes required changes to Figure 9-3, Table 9-1, Table 9-2, Table 9-4, Table 9-5, Table 9-6 (and footnote), Table 9-7, Table 9-14, and text.	Ch 9	9-6 thru 9-8,9-12, 9-15, 9-20 thru 9-26, 9-30, 9-31, 9-59, 9-60

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8	January 8, 2021 response letter Table 1, Comment 2.1 and 3.2 The updated responses required updates to capital costs (due to WRF FG8) and annual O&M costs (due to WRF R4 and WRF FG8), impacting text and tables in Executive Summary.	NA	Changes were made to Table ES-2, Table ES-3, Figure ES-5, Table ES-4, and text as the changes in costs noted in Chapter 7, 8, and 9 also apply to the Executive Summary.	Executive Summary	ES-10 thru ES-13, ES-15, ES-17, ES-19
9	January 8, 2021 response letter Table 1, Comment 4.1 Total nitrogen limitations are likely on the horizon. Development of nitrogen water quality standards has been highly ranked for the triennial standards review for several cycles, though it has not progressed. Was this considered when evaluating the DnD recommendation to stay at Jones Island?	Agree, text changes needed. Text will be added to Ch 4 under changes to permit discussion regarding TN to acknowledge the Oct 2019 guidance letter from WDNR on this topic indicating that monitoring is now needed but limits not set until gather enough data. The discussion will note that the 2019 permit does not require monitoring due to timing but MMSD can anticipate it being added in the 2024 permit. The discussion will note that MMSD currently does not test for TN but accommodating quarterly samples is not anticipated to be an issue. Discussion will also note no information is available regarding any anticipated specific TN limits. Text in Appendix 6B will be added to reference this discussion in the WRF R2, R3, and FG2, biosolids, analyses. Will note in the discussion the uncertainty about assumption and potential to change in future. The WRF FG2 discussion will also note that the recommendation commits the D&D land space for biosolids, which means that this area will not be available for treatment expansion to meet TN or other more restrictive effluent requirements. Text will be added in Chapter 8 and 9 to tie back to these added discussions.	Revised Chapter 4 and Table 4-3 to note TN monitoring, while most of the detail has been added to the same section in Appendix 4B.	Ch 4	8
			Revised Appendix 4B in the "Changes to Permit" section to acknowledge the Oct 2019 guidance letter from WDNR stating that TN monitoring will be required, anticipate it being added in the 2024 permit. The discussion has been updated to note that MMSD currently does not test for TN but accommodating quarterly samples is not anticipated to be an issue. Discussion also added to note more stringent limits on pollutants already regulated could occur in the future, referencing TN as an example. The new text notes that no information is available regarding any anticipated specific TN limits, but future TN limits are of a concern to MMSD.	App 4B	4B-7
			Added a footnote to the Approach section of the WRF R2 analysis stating that there is an inherent uncertainty in predicting future WPDES permit effluent limits and referenced TN as an example.	App 6B, Sec. 6.3, WRF R2	6B-11
			Added a footnote to the Approach section of the WRF R3 analysis stating that there is an inherent uncertainty in predicting future WPDES permit effluent limits and referenced TN as an example.	App 6B, Sec. 6.3, WRF R3	6B-26
			The Approach discussion in WRF FG2 analysis has been updated to acknowledge the inherent uncertainty in predicting future WPDES permit effluent limits. The discussion has also been updated to note that the recommendation commits the D&D land space for biosolids, which means that this area will not be available for treatment expansion to meet TN or other more restrictive effluent requirements.	App 6B, Sec 6.4, WRF FG2	6B-151
			Added a footnote to the WRF FG2 discussion in Section 8.2 to acknowledge the inherent uncertainty in predicting future WPDES permit effluent limits similar to the text noted for App 6B, Section 6.4, WRF FG2. In addition, edited the Emerging Contaminants discussion in Section 8.6 to acknowledge the uncertainty in predicting future regulations, including more stringent limits on pollutants that are already regulated and limits on emerging contaminants.	Chap 8	8-47
			Added a footnote in Section 9.3 to acknowledge the uncertainty inherent in planning based on future regulatory assumptions.	Chap 9	9-12

ID	WDNR Comment	Original Response	Updated Response	Chapter/Appendix No. Section No.	Page No.
10	January 8, 2021 response letter Attachment 4: December 10, 2020 Response to Questions Item 3 Comment related to Appendix 6B, WRF R4, Alternative 2 Note: already seasonally implemented at SS. Report should reflect reality for clarity's sake	Agree, text changes needed. Text will be added to the description of Alternative 2 on p 6B-80 by editing the first sentence in the first paragraph as follows (new proposed text in **bold**): "This alternative manages the disinfection process using monochloramine as the primary disinfectant **as the standard process throughout the year, not just seasonally as is the WRF Baseline Condition operation. Monochloramine disinfection is effective when the nitrification process is stable but is not effective with small variations of ammonia concentration in the effluent.**"	Agree, text changes needed. As background: The seasonal issue is that nitrification becomes unstable as temperatures fluctuate, especially in the late winter and early spring, which means that chlorine disinfection is not as effective during certain times of the year. The specific type of chlorination disinfection currently used at JIWRF and SSWRF may seasonally be monochloramine when nitrification is stable and chlorine-to-ammonia ratios are 5:1 or less, but this was not established since MMSD has met fecal coliform limits without adding ammonia sulfate under WRF Baseline Conditions regardless of whether nitrification is stable or not. Since the WRF R4 analysis shows JIWRF and SSWRF have not disinfected enough to consistently meet future *E. coli* limits, the current operation was only reviewed to establish the disinfection costs to determine the incremental increase to implement the recommended alternative. Additional text was added in the first paragraph under Alternative 2 to clarify that the assumption is that nitrification is not reliably stable, which is why ammonia sulfate is added.	App 6B, Sec. 6.3, WRF R4	6B-93