# Table of Contents

## Chapter 1: Introduction ................................................................. 1-1

1.1 Purpose.......................................................................................... 1-1
1.2 Description and Responsibilities of the Milwaukee Metropolitan Sewerage District..... 1-1
1.3 History of Facilities Planning ......................................................... 1-1
1.4 Purpose and Need – 2020 Facilities Plan........................................... 1-1
1.5 Watershed Approach to Facilities Planning ....................................... 1-2
1.6 Planning Objective............................................................................ 1-2
1.7 Relationship to the Regional Water Quality Management Plan Update........ 1-3
1.8 Public Involvement ........................................................................ 1-3
1.9 Planning Principles ........................................................................ 1-3
1.10 Description of Planning Process ..................................................... 1-3
1.11 Treatment Report Organization ...................................................... 1-3

## Chapter 2: Description of Treatment Facilities ........................... 2-1

2.1 Introduction..................................................................................... 2-1
2.2 Milwaukee Metropolitan Sewerage District Service Area ..................... 2-1
2.3 Private Systems............................................................................... 2-1
2.4 The Milwaukee Metropolitan Sewerage District System ..................... 2-3
2.4.1 Inline Storage System Pump Station ........................................ 2-3
2.4.2 Jones Island Wastewater Treatment Plant .................................. 2-3
2.4.3 South Shore Wastewater Treatment Plant .................................. 2-8
2.4.4 Biosolids Facilities..................................................................... 2-8
2.4.5 Recycling Biosolids (Milorganite® and Agri-Life®) ....................... 2-14
2.4.6 Energy Facilities ....................................................................... 2-14
Chapter 2

Figures

2-1 Treatment Plant Service Areas for Potential Operations .................................................... 2-2
2-2 JIWWTP Site Plan .............................................................................................................. 2-5
2-3 JIWWTP ............................................................................................................................. 2-7
2-4 SSWWTP Site Plan ............................................................................................................. 2-9
2-5 SSWWTP .......................................................................................................................... 2-11
2-6 JIWWTP Biosolids Facility .............................................................................................. 2-12
2-7 SSWWTP Biosolids Facility ............................................................................................. 2-13

Chapter 3: Analytical Methods/Data Sources ................................................................. 3-1

3.1 Introduction ...................................................................................................................... 3-1
3.2 Information Compilation ................................................................................................. 3-1
3.3 Flow and Wasteload Development .................................................................................. 3-6
3.3.1 Flow Development ........................................................................................................ 3-6
3.3.2 Wasteload Development ............................................................................................. 3-6

Chapter 3

Tables

Table 3-1 Information Compilation ........................................................................................... 3-2

Chapter 4: Treatment Assessment – Existing Condition .............................................. 4-1

4.1 Introduction – Flows and Wasteload Development .......................................................... 4-1
4.1.1 Design Capacity ............................................................................................................. 4-2
4.1.2 Existing System Flows ................................................................................................. 4-3
4.1.3 Existing Wasteloads .................................................................................................... 4-10
4.2 Treatment Process Evaluation ........................................................................................ 4-16
4.2.1 Treatment Plants Overview ................................................................. 4-16
4.2.2 Utility, Electric, and Instrumentation & Control Processes .............. 4-18
4.2.3 Treatment Plant Unit Process Evaluation ........................................... 4-24
4.2.4 Biosolids Evaluation .......................................................................... 4-49
4.2.5 Air Emissions Evaluation ................................................................... 4-61
4.3 Treatment Systems Operations Documentation ..................................... 4-62
4.3.1 Operator – United Water Services ....................................................... 4-62
4.3.2 Inline Storage System Pump Station Operation .................................. 4-63
4.3.3 In-Plant Diversion Structure Operation ............................................ 4-63
4.3.4 Biosolids Operation ........................................................................... 4-65
4.3.5 Energy Operation .............................................................................. 4-66
4.4 Treatment Systems Policies/Programs Documentation ......................... 4-68
4.4.1 Industrial Pretreatment ..................................................................... 4-68
4.4.2 Household Hazardous Waste .............................................................. 4-68
4.5 Treatment System Performance Review and Analysis ......................... 4-69
4.5.1 Review of Wet Weather Events ......................................................... 4-69
4.5.2 Blending ............................................................................................ 4-75
4.5.3 Biosolids Production ....................................................................... 4-83
4.5.4 Wisconsin Department of Natural Resources Compliance Review .... 4-84
4.5.5 United Water Services Review ............................................................ 4-86
4.5.6 Other Milwaukee Metropolitan Sewerage District System Evaluations 4-88

Chapter 4

Tables
4-1 Design Flow Capacity ........................................................................ 4-2
4-2 Design Wasteload Capacity ............................................................... 4-3
4-3 MMSD System Flow Breakdown of Billable Flow by User Category .. 4-4
4-4 Wastewater Treatment Plant Existing Flows Comparison: Design Average Daily Flow to Actual Average Daily Flow ...................... 4-6
4-5 Potential Peak Deliverable Collection System Flows to Treatment Plants 4-7
4-6 Comparison of Potential Conveyance System Deliverable Flow to Treatment Plant Design Capacity ................................................................. 4-8
4-7 Jones Island Wastewater Treatment Plant Recorded Peak Hourly Flows in Excess of Design Peak Hourly Flow .......................................................... 4-9
4-8 South Shore Wastewater Treatment Plant Peak Hourly Flows in Excess of Design Peak Hourly Flow ................................................................. 4-10
4-9 Milwaukee Metropolitan Sewerage District Breakdown of Billable System Wasteload by User Class ........................................................................... 4-11
4-10 Wastewater Treatment Plant Existing Wasteloads Comparison: Design Average Day Wasteloads to Actual Average Daily Wasteloads ............... 4-14
4-11 Wastewater Treatment Plant Existing Condition Comparison: Design Maximum Wasteloads to Actual Influent Maximum Wasteloads, 1999-2003 . 4-15
4-12 JIWWTP Unit Process Analysis ........................................................................ 4-27
4-13 JIWWTP Comparison of Processes to Current Design Regulations .................. 4-29
4-14 SSWWTP Unit Process Evaluation .................................................................. 4-43
4-15 SSWWTP Comparison of Processes to Current Design Regulations .............. 4-45
4-16 Milorganite® Processes ..................................................................................... 4-51
4-17 Agri-Life® Processes ......................................................................................... 4-56
4-18 Interplant Solids Pumping.................................................................................... 4-61
4-19 United Water Services Contract Effluent Limits Compared to Wisconsin Department of Natural Resources Permit Effluent Limits ....................... 4-63
4-20 Jones Island Wastewater Treatment Plant Diversion Points .......................... 4-65
4-21 South Shore Wastewater Treatment Plant Diversion Points ......................... 4-65
4-22 Summary of Estimated Blending 1997-2004 .................................................... 4-75
4-23 Milorganite® Production 1998-2003 ................................................................. 4-83
4-24 Agri-Life® and Filter Cake Production 1998-2003 .......................................... 4-84
4-25 1999-2003 Treatment Plant Compliance Maintenance Annual Report Point Values ... 4-86
4-26 Yearly Average Effluent Water Quality 1999-2003 ............................................ 4-86
Chapter 4

Figures
4-1 Flow Trends ....................................................................................................................................... 4-5
4-2 BOD Trends ........................................................................................................................................ 4-12
4-3 TSS Trends ......................................................................................................................................... 4-13
4-4 JIWWTP Energy Schematic ............................................................................................................. 4-20
4-5 SSWWTP Energy Schematic ............................................................................................................ 4-23
4-6 Instrumentation and Control System Schematic ............................................................................... 4-25
4-7 Primary Clarifier Influent Channel Discharge .............................................................................. 4-34
4-8 Primary Clarifier #1 and #2 during a Wet Weather Event .............................................................. 4-35
4-9 Primary Clarifier #2 and #3 during a Wet Weather Event .............................................................. 4-36
4-10 Primary Clarifier #3 and #4 during a Wet Weather Event ............................................................ 4-37
4-11 Primary Clarifier #4 and #6 during a Wet Weather Event ............................................................ 4-38
4-12 Milorganite® Production ................................................................................................................. 4-55
4-13 In-Depth Analysis: Event B, August 1998 ..................................................................................... 4-71
4-14 In-Depth Analysis: Event H, May 2000 .......................................................................................... 4-72
4-15 In-Depth Analysis: Event I, Sept. 2000 .......................................................................................... 4-73
4-16 Effluent Quality Analysis: Event B – JIWWTP ............................................................................... 4-77
4-17 Effluent Quality Analysis: Event B – SSWWTP ............................................................................... 4-78
4-18 Effluent Quality Analysis: Event H – JIWWTP ............................................................................... 4-79
4-19 Effluent Quality Analysis: Event H – SSWWTP ............................................................................ 4-80
4-20 Effluent Quality Analysis: Event I – JIWWTP ............................................................................... 4-81
4-21 Effluent Quality Analysis: Event I – SSWWTP ............................................................................... 4-82

Chapter 4

Appendices
4A MMSD Annual Average Flow and Wasteload Review ................................................................. 4A-1
4B Storm Event Summary Data .............................................................................................................. 4B-1
4C ISS Pumpout Analysis ...................................................................................................................... 4C-1
4D MMSD/UWS In-Plant Diversion Records ...................................................................................... 4D-1
Chapter 5

Tables

5-1 MMSD System Billable Flow by User Category: Actual Average Flow to Projected Future Flows

5-2 Wastewater Treatment Plant Average Daily Flows Comparison: Design Average Daily Flow to Actual Average Flow and Projected Future Flows

5-3 Potential Peak Future (Revised 2020 Baseline) Collection System Flows to Treatment Plants

5-4 Comparison of Potential Future (Revised 2020 Baseline) Conveyance System Deliverable Flow to Treatment Plant Design Capacity

5-5 MMSD System Billable Wasteloads by User Class: Average Daily Existing Wasteloads to Projected Future Wasteloads

5-6 Wastewater Treatment Plant Wasteloads Comparison: Design Average Day Wasteloads to Actual Average and Projected Future Average Day Wasteloads

5-7 Wastewater Treatment Plant Wasteloads Comparison: Design Maximum Wasteloads to Actual Maximum and Project Future Maximum Wasteloads

5-8 JIWWTP Unit Process Evaluation – Revised 2020 Baseline Condition

5-9 JIWWTP Comparison of Revised 2020 Baseline Operations of Processes to Current Design Regulations

5-10 SSWWTP Unit Process Evaluation – Revised 2020 Baseline Condition

5-11 SSWWTP Comparison of Revised 2020 Baseline Operations of Processes to Current Design Regulations

5-12 Milorganite® Processes – Revised 2020 Baseline Condition

5-13 Agri-Life® Processes – Revised 2020 Baseline Condition

5-14 Interplant Solids Pumping – Revised 2020 Baseline Condition

5-15 JIWWTP Air Emission Evaluation

5-16 SSWWTP Air Emission Evaluation

5-17 Projected Revised 2020 Baseline Peak Flow Effluent Quality Compared to UWS Contract Effluent Limits and WDNR Permit Effluent Limits

5-18 Actual and Projected Milorganite®, Agri-Life®, and Filter Cake Production

5-19 2004 Compliance Maintenance Annual Report Review
2020 Facilities Plan

Chapter 5

Figures
5-1 Projected Future Billable Flow Trends ................................................................. 5-4
5-2 Projected Future WWTP Influent Flow Trends ..................................................... 5-5
5-3 Projected Future Billable BOD Trends ................................................................. 5-10
5-4 Projected Future Billable TSS Trends ................................................................. 5-11
5-5 Projected Future WWTP Influent BOD Trends ..................................................... 5-13
5-6 Projected Future WWTP Influent TSS Trends ..................................................... 5-14

Chapter 5

Appendices
5A Future Condition Flow and Wasteload Analysis ................................................. 5A-1
5B Harbor Siphon Capacity Memorandum ............................................................... 5B-1
5C MMSD System Revised 2020 Baseline Condition Mass Balance Analysis .......... 5C-1
5D Revised 2020 Baseline Condition Unit Process Calculations .............................. 5D-1
5E Projected CMAR Results Analysis ................................................................. 5E-1

Chapter 6: Wastewater Treatment Plant Permits ................................................ 6-1
6.1 Introduction ........................................................................................................ 6-1
6.2 Current Milwaukee Metropolitan Sewerage District Wisconsin Pollutant Discharge Elimination System Permit Requirements ............................................. 6-1
6.2.1 Influent Requirements .................................................................................... 6-1
6.2.2 Surface Water Requirements ....................................................................... 6-2
6.2.3 Land Application Requirements .................................................................... 6-9
6.2.4 Standard Requirements ............................................................................... 6-13
6.3 Current Milwaukee Metropolitan Sewerage District Air Pollution Control Operation Permits ................................................................. 6-13
Chapter 6
Tables
6-1 JIWWTP and SSWWTP Influent Monitoring Requirements
6-2 SSWWTP Sampling Point No. 001: Effluent Monitoring Requirements and Effluent Limitations
6-3 SSWWTP Sampling Point No. 001: Total Ammonia Nitrogen (NH3-N) Weekly Limitations, mg/L
6-4 JIWWTP Sampling Point No. 002: Effluent Monitoring Requirements and Effluent Limitations
6-5 JIWWTP Sampling Point No. 003: Non-Contact Cooling Water Monitoring Requirements and Effluent Limitations
6-6 JIWWTP Sampling Point No. 040: In-Plant Diversion Monitoring Requirements
6-7 Sampling Points No. 004 and 005: Agri-Life® and Anaerobically Digested Cake Sludge Monitoring Requirements and Effluent Limitations
6-8 Sampling Point No. 006: Milorganite® Monitoring Requirements and Limitations

Chapter 6
Appendices
6A MMSD WPDES Permit
6B Jones Island Wastewater Treatment Plant Air Pollution Control Operating Permit
6C South Shore Wastewater Treatment Plant Air Pollution Control Operating Permit

Chapter 7: Goals and Objectives
7.1 Overview

Chapter 8: Common Treatment Facilities, Programs, Operational Improvements and Policies for the Recommended Plan
8.1 Introduction
Chapter 8
Tables
8-1 Committed Treatment Projects for the Recommended Plan................................. 8-3
8-2 Recommended Milwaukee Metropolitan Sewerage District Projects – Included in 2007 Annual Budget ................................................................. 8-4
8-3 Milwaukee Metropolitan Sewerage District Comparison of Revised 2020 Baseline Operation of Processes to Current Design Regulations and Advisory Standards ........... 8-6

Chapter 9: Alternative Analysis ............................................................................. 9-1
9.1 Introduction........................................................................................................ 9-1
9.2.1 Point Source Indicators used in Analysis......................................................... 9-2
9.2.2 South Shore Wastewater Treatment Plant Treatment Options......................... 9-3
9.2.3 Jones Island Wastewater Treatment Plant Treatment Options.......................... 9-6
9.2.4 Inline Storage System Pumping Options......................................................... 9-7
9.3 Preliminary Treatment Alternatives...................................................................... 9-8
9.3.1 State of the Art Report Findings....................................................................... 9-8
9.3.2 Treatment Technologies Identified for Future Analysis....................................... 9-8
9.4 Alternatives Analysis ................................................................. 9-13
9.4.1 Screening and Preliminary Alternatives ........................................ 9-13
9.4.2 Treatment Technology Combination for 5-Year Level of Protection .......... 9-15
9.4.3 Treatment Technology Combination for 10-Year Level of Protection .......... 9-17
9.5 Recommended Treatment Alternatives ............................................ 9-17
9.5.1 Additional Inline Storage System Pumping to Jones Island Wastewater Treatment Plant ......................................................... 9-17
9.5.2 South Shore Wastewater Treatment Plant Additional Treatment Capacity .... 9-17
9.5.3 Considerations in Implementation .................................................. 9-22
9.6 Biosolids Analysis Introduction ......................................................... 9-22
9.6.1 2020 Baseline Influent Wasteloads and Biosolids Production ....................... 9-23
9.6.2 Cost Development ....................................................................... 9-25
9.7 Biosolids Screening Alternatives Evaluation ......................................... 9-26
9.7.1 Selection of Screening Alternatives and Evaluation Parameters .................. 9-26
9.7.2 Projected Future Influent Wasteload ............................................... 9-27
9.7.3 Future Sludge Production ............................................................ 9-28
9.7.4 Screening Alternatives Summaries .................................................... 9-29
9.8 Milorganite® and Glass Furnace Technology Sensitivity Analysis .................. 9-60
9.8.1 Introduction ................................................................................. 9-60
9.8.2 Base Case Assumptions ............................................................... 9-60
9.8.3 Sensitivity Analysis ..................................................................... 9-61
9.8.4 Results ....................................................................................... 9-61
9.8.5 Conclusions of the Sensitivity Analysis ............................................. 9-63
9.9 Recommended Plan Alternatives ....................................................... 9-67
9.9.1 Selection of Recommended Plan Alternatives and Evaluation Parameters .... 9-67
9.9.2 Projected Future Influent Wasteloads .............................................. 9-68
9.9.3 Future Sludge Production ............................................................ 9-69
9.9.4 Recommended Plan Alternative Summaries ....................................... 9-69
9.10 Interim Recommended Biosolids Plan ............................................... 9-107
9.10.1 Recommended Plan Alternatives Cost Summary and Interim Recommended Plan ... 9-107
9.10.2 Interim Recommendations .......................................................................................... 9-109
9.10.3 Biosolids Interim Recommendations Summary .................................................. 9-114

Chapter 9

Tables

9-1 Outer Harbor Assessment Point OH-11 Days per Year Meeting Water Quality Measures .......................................................................................................................... 9-1
9-2 Alternative B Variations Descriptions ......................................................................... 9-14
9-3 Cost for Additional Inline Storage System Pumping to Jones Island Wastewater Treatment Plant for 5-Year Level of Protection .................................................................. 9-15
9-4 Cost for Additional Treatment Capacity to South Shore Wastewater Treatment Plant for 5-Year Level of Protection ............................................................................. 9-16
9-5 Cost for Additional Treatment Capacity to Jones Island Wastewater Treatment Plant for 10-Year Level of Protection ................................................................................ 9-18
9-6 Year 2004 Milorganite® and Agri-Life® Production Costs .............................................. 9-26
9-7 Treatment Plant Influent Flows and Loads Used for Screening Alternatives .............. 9-28
9-8 Sludge Production Used for Screening Alternatives ....................................................... 9-28
9-9 Screening Alternative 1 - Maintain Existing Milorganite® and Agri-Life® Programs Capital Cost Summary ........................................................................................................ 9-34
9-10 Screening Alternative 1 - Maintain Existing Milorganite® and Agri-Life® Programs Annual Operation and Maintenance Costs .............................................................................. 9-35
9-11 Screening Alternative 2 - Glass Furnace Technology Capital Cost Summary ............ 9-40
9-12 Screening Alternative 2 - Glass Furnace Technology Annual Operation and Maintenance Costs .......................................................................................................................... 9-41
9-13 Screening Alternative 3 – Landfill Capital Cost Summary .......................................... 9-46
9-14 Screening Alternative 3 - Landfill Annual Operation and Maintenance Costs .......... 9-47
9-15 Screening Alternative 4 - Land Application Capital Cost Summary .................................. 9-51
9-16 Screening Alternative 4 - Land Application Annual Operation and Maintenance Costs ............................................................................................................................... 9-51
9-17 Screening Alternative 5 – Fluid Bed Incineration Capital Cost Summary .................. 9-55
9-18 Screening Alternative 5 - Fluid Bed Incineration Operation and Maintenance Costs .. 9-56
9-19 Screening Alternatives Cost Summary ........................................................................ 9-59
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-20</td>
<td>Key Assumptions for Base Case</td>
<td>9-64</td>
</tr>
<tr>
<td>9-21</td>
<td>Summary of Variables for Sensitivity Analyses</td>
<td>9-65</td>
</tr>
<tr>
<td>9-22</td>
<td>All Glass Furnace Technology or All Milorganite® Sensitivity Analysis</td>
<td>9-66</td>
</tr>
<tr>
<td>9-23</td>
<td>Treatment Plant Influent Flows and Loads Used for Recommended Plan</td>
<td>9-68</td>
</tr>
<tr>
<td>9-24</td>
<td>Capital Costs for Recommended Plan Alternative 1 – Landfill</td>
<td>9-73</td>
</tr>
<tr>
<td>9-25</td>
<td>O&amp;M Costs for Recommended Plan Alternative 1 – Landfill</td>
<td>9-74</td>
</tr>
<tr>
<td>9-26</td>
<td>Capital Costs for Recommended Plan Alternative 2 – Glass Furnace Technology</td>
<td>9-79</td>
</tr>
<tr>
<td>9-27</td>
<td>O&amp;M Costs for Recommended Plan Alternative 2 – Glass Furnace Technology</td>
<td>9-80</td>
</tr>
<tr>
<td>9-28</td>
<td>Capital Costs for Recommended Plan Alternative 3 – Maintain Existing Milorganite® Program</td>
<td>9-85</td>
</tr>
<tr>
<td>9-29</td>
<td>O&amp;M Costs for Recommended Plan Alternative 3 – Maintain Existing Milorganite® Program</td>
<td>9-86</td>
</tr>
<tr>
<td>9-30</td>
<td>Capital Costs for Recommended Plan Alternative 4 – Combine Milorganite® Program with Land Application</td>
<td>9-91</td>
</tr>
<tr>
<td>9-31</td>
<td>O&amp;M Costs for Recommended Plan Alternative 4 – Combine Milorganite® Program with Land Application</td>
<td>9-92</td>
</tr>
<tr>
<td>9-32</td>
<td>Capital Costs for Recommended Plan Alternative 5 – Combine Milorganite® Program with Glass Furnace Technology</td>
<td>9-96</td>
</tr>
<tr>
<td>9-33</td>
<td>O&amp;M for Recommended Plan Alternative 5 – Combine Milorganite® Program with Glass Furnace Technology</td>
<td>9-97</td>
</tr>
<tr>
<td>9-34</td>
<td>Capital Costs for Recommended Plan Alternative 6 – Combine Milorganite® Program with Landfill Disposal</td>
<td>9-103</td>
</tr>
<tr>
<td>9-35</td>
<td>O&amp;M Costs for Recommended Plan Alternative 6 – Combine Milorganite® Program with Landfill Disposal</td>
<td>9-104</td>
</tr>
<tr>
<td>9-36</td>
<td>Biosolids Alternatives Cost Summary ($M)</td>
<td>9-107</td>
</tr>
<tr>
<td>9-37</td>
<td>Comparison of Actual Jones Island Wastewater Treatment Plant Primary Clarifier Capture Efficiency to Typical Capture Efficiency and Design Intent</td>
<td>9-114</td>
</tr>
<tr>
<td>9-38</td>
<td>Recommended Interim Biosolids Projects</td>
<td>9-115</td>
</tr>
</tbody>
</table>
Chapter 9

Figures

9-1  SSO Volume Cost Benefit Curves ................................................................. 9-9
9-2  SSO Events Cost Benefit Curves ................................................................. 9-10
9-3  CSO Volume Cost Benefit Curves ................................................................. 9-11
9-4  CSO Events Cost Benefit Curves ................................................................. 9-12
9-5  Jones Island Wastewater Treatment Plant Proposed Facilities Site Plan ........ 9-19
9-6  ISS Pump Station Proposed Facilities Site Plan ........................................... 9-20
9-7  South Shore Wastewater Treatment Plant Proposed Facilities Site Plan ....... 9-21
9-8  Biosolids Schematic at JIWWTP for Screening Alternative 1 – Maintain Existing Milorganite® and Agri-Life® Programs ......................................................... 9-30
9-9  Biosolids Schematic at SSWWTP for Screening Alternative 1 – Maintain Existing Milorganite® and Agri-Life® Programs ......................................................... 9-31
9-10 Biosolids Schematic at JIWWTP for Screening Alternative 2 – Glass Furnace Technology ................................................................. 9-38
9-11 Biosolids Schematic at SSWWTP for Screening Alternative 2 – Glass Furnace Technology ................................................................. 9-39
9-12 Biosolids Schematic at JIWWTP for Screening Alternative 3 – Landfill .......... 9-44
9-13 Biosolids Schematic at SSWWTP for Screening Alternative 3 – Landfill ....... 9-45
9-14 Biosolids Schematic at JIWWTP for Screening Alternative 4 – Land Application .... 9-49
9-15 Biosolids Schematic at SSWWTP for Screening Alternative 4 – Land Application .... 9-50
9-16 Biosolids Schematic at JIWWTP for Screening Alternative 5 – Fluid Bed Incineration ................................................................. 9-53
9-17 Biosolids Schematic at SSWWTP for Screening Alternative 5 – Fluid Bed Incineration ................................................................. 9-54
9-18 Facilities and Land Requirements at SSWWTP for Screening Alternative 6 – Composting ................................................................. 9-58
9-19 Biosolids Schematic at JIWWTP for Recommended Plan Alternative 1 – Landfill .... 9-71
9-20 Biosolids Schematic at SSWWTP for Recommended Plan Alternative 1 – Landfill .... 9-72
9-21 Biosolids Schematic at JIWWTP for Recommended Plan Alternative 2 – Glass Furnace Technology ................................................................. 9-77
9-22 Biosolids Schematic at SSWWTP for Recommended Plan Alternative 2 – Glass Furnace Technology ................................................................. 9-78
9-23  Biosolids Schematic at JIWWTP for Recommended Plan Alternative 3 – Maintain Existing Milorganite® Program ................................................................. 9-83
9-24  Biosolids Schematic at SSWWTP for Recommended Plan Alternative 3 – Maintain Existing Milorganite® Program ................................................................. 9-84
9-25  Biosolids Schematic at JIWWTP for Recommended Plan Alternative 4 – Combine Milorganite® Program with Land Application............................... 9-88
9-26  Biosolids Schematic at SSWWTP for Recommended Plan Alternative 4 – Combine Milorganite® Program with Land Application............................... 9-89
9-27  Biosolids Schematic at JIWWTP for Recommended Plan Alternative 5 – Combine Milorganite® Program with Glass Furnace Technology....................... 9-94
9-28  Biosolids Schematic at SSWWTP for Recommended Plan Alternative 5 – Combine Milorganite® Program with Glass Furnace Technology....................... 9-95
9-29  Biosolids Schematic at JIWWTP for Recommended Plan Alternative 6 – Combine Milorganite® Program with Landfill Disposal........................................ 9-101
9-30  Biosolids Schematic at SSWWTP for Recommended Plan Alternative 6 – Combine Milorganite® Program with Landfill Disposal........................................ 9-102

Chapter 9
Appendices
9A  Treatment Recommended Plan Alternatives Cost Estimates................................. 9A-1
9B  Biosolids Screening Alternatives - Wasteload Projections..................................... 9B-1
9C  Historic MMSD Data ............................................................................................. 9C-1
9D  Biosolids Screening Alternatives - Cost Estimates............................................... 9D-1
9E  Milorganite® and Glass Furnace Technology Sensitivity Analysis........................ 9E-1
9F  Biosolids Recommended Plan Alternatives – Mass Balances.............................. 9F-1
9G  Biosolids Recommended Plan Alternatives – Cost Estimates.............................. 9G-1
9H  Glass Furnace Technology Proposals .................................................................. 9H-1
Chapter 10: Treatment Recommended Plan................................. 10-1
10.1 Introduction................................................................................................. 10-1
10.1.1 Background............................................................................................. 10-1
10.1.2 Plan Summary.......................................................................................... 10-2
10.2 Wet Weather Control Plan – Milwaukee Metropolitan Sewerage District Treatment Facilities.................................................................................. 10-7
10.3 Plan for Existing Treatment Facilities ....................................................... 10-10
10.4 Biosolids Plan............................................................................................. 10-12
10.5 Committed and Common Treatment Facilities......................................... 10-15
10.5.1 Milwaukee Metropolitan Sewerage District Committed Treatment Facilities .... 10-15
10.5.2 Recommended Milwaukee Metropolitan Sewerage District Projects ............ 10-16
10.6 Other Recommended Milwaukee Metropolitan Sewerage District Projects ....... 10-16
10.6.1 Treatment Issues Identified under Regulation Review.............................. 10-18
10.6.2 Additional Recommendations for Milwaukee Metropolitan Sewerage District to Consider.................................................................................. 10-18

Chapter 10
Tables
10-1 Summary of 2020 FP Treatment Recommendations – New FPOPs Identified by 2020........................................................................................................... 10-4
10-2 Summary of Existing Treatment FPOPs Recommended by 2020 FP to be Continued. 10-5
10-3 Wet Weather Control Plan – Treatment Facilities........................................ 10-9
10-4 Plan for Existing Milwaukee Metropolitan Sewerage District Facilities .......... 10-11
10-5 Project Elements for Interim Biosolids Management Plan............................ 10-14
10-6 Committed Treatment Facilities Projects....................................................... 10-15
10-7 Recommended Projects by Milwaukee Metropolitan Sewerage District – Treatment Facilities........................................................................................................... 10-17