

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY 1

 Introduction..... 1

 MS4 Program..... 2

 City of Anchorage 3

 City of Jeffersontown 3

 City of Prospect..... 4

 City of Shively..... 5

 City of St. Matthews..... 5

 City of Louisville..... 6

 Jefferson County..... 7

 Kentucky Transportation Cabinet, District Five 8

 Louisville and Jefferson County Metropolitan Sewer District..... 9

 CSO Program 15

 SSO Program..... 17

 Program Costs 19

2 PROGRAMS..... 21

 2.1 The Municipal Separate Storm Sewer System Program..... 21

 2.1.1 Objectives 21

 2.1.2 History 21

 2.1.3 Program Elements..... 21

 2.1.3.1 Illicit Discharge Program (ID)..... 21

 2.1.3.2 Construction Site Runoff Controls (CS)..... 23

 2.1.3.3 Post Construction Controls (PC)..... 26

 2.1.3.4 Good Housekeeping/Pollution Prevention (GH) 30

 2.1.3.5 Public Education/Outreach Programs (PE)..... 33

 2.1.3.6 Monitoring (M)..... 37

 2.1.3.7 Reporting (R) 39

 2.1.4 Program Costs..... 40

 2.2 The Combined Sewer Overflow Program..... 42

 2.2.1 Objectives 42

2.2.2	History (MSD and Regulatory)	42
2.2.3	CSO Program Elements.....	42
2.2.3.1	Status of Long-Term Control Plans	43
2.2.3.2	Compliance with the Nine Minimum Controls	49
2.2.3.3	CSO Performance Summary	50
2.2.3.4	Backflow Prevention Device Installation Program.....	50
2.2.4	MFWTP Wet Weather Flows	51
2.2.5	Program Costs	52
2.3	The Sanitary Sewer Overflow Program.....	53
2.3.1	Objectives of the I/I and SSO Program	53
2.3.2	History	53
2.3.3	Program Elements.....	54
2.3.3.1	Flow Monitoring	54
2.3.3.2	Computer Modeling	54
2.3.3.3	Investigation.....	55
2.3.3.4	Rehabilitation / Capacity Enhancements.....	55
2.3.3.5	Post Rehabilitation Flow Monitoring.....	57
2.3.3.6	Projects.....	57
2.3.3.7	Other Programs	59
2.3.4	Program Costs	59
3	WATERSHEDS	61
3.1	Harrods Creek	61
3.1.1	History, Demographic and Community Information	61
3.1.2	Hydrology and Flooding.....	61
3.1.2.1	Flood Prevention Measures	61
3.1.3	Status of Water Quality	61
3.1.4	Water Quality Impacts.....	62
3.1.4.1	Point Source	62
3.1.4.2	Non-Point Source	62
3.1.4.3	Habitat and Biological Quality.....	62
3.1.5	Tracking Changes in Water Quality	63
3.1.6	MS4 Program – Co-Permittees	63
3.1.6.1	City of Prospect	63

3.1.6.2	Jefferson County	64
3.1.6.3	Kentucky Transportation Cabinet, District Five.....	64
3.1.6.4	MSD.....	64
3.1.7	SSO Program – MSD.....	65
3.2	Goose Creek.....	67
3.2.1	History, Demographic and Community Information.....	67
3.2.2	Hydrology and Flooding	67
3.2.2.1	Flood Prevention Measures	67
3.2.3	Status of Water Quality.....	67
3.2.4	Water Quality Impacts	67
3.2.4.1	Point Source	68
3.2.4.2	Non-Point Source	68
3.2.4.3	Habitat and Biological Quality	68
3.2.5	Tracking Changes in Water Quality	69
3.2.6	MS4 Program – Co-Permittees	69
3.2.6.1	City of Anchorage.....	69
3.2.6.2	City of Prospect	69
3.2.6.3	Jefferson County	70
3.2.6.4	Kentucky Transportation Cabinet, District Five.....	70
3.2.6.5	MSD.....	70
3.2.7	SSO Program – MSD.....	71
3.3	Beargrass Creek – Muddy Fork.....	72
3.3.1	History, Demographic and Community Information.....	72
3.3.2	Hydrology and Flooding.....	72
3.3.2.1	Flood Prevention Measures	72
3.3.3	Status of Water Quality.....	72
3.3.4	Water Quality Impacts	73
3.3.4.1	Point Source	73
3.3.4.2	Non-Point Source.....	73
3.3.4.3	Habitat and Biological Quality	73
3.3.5	Tracking Changes in Water Quality	73
3.3.6	MS4 Program – Co-Permittees	74

3.3.6.1	City of St. Matthews	74
3.3.6.2	City of Louisville	74
3.3.6.3	Jefferson County	74
3.3.6.4	Kentucky Transportation Cabinet, District Five.....	74
3.3.6.5	MSD.....	75
3.3.7	CSO Program – MSD	75
3.3.8	SSO Program – MSD.....	76
3.4	Beargrass Creek – Middle Fork	78
3.4.1	History, Demographic and Community Information.....	78
3.4.2	Hydrology and Flooding	78
3.4.2.1	Flood Prevention Measures	78
3.4.3	Status of Water Quality.....	78
3.4.4	Water Quality Impacts	78
3.4.4.1	Point Source	79
3.4.4.2	Non-Point Source.....	79
3.4.4.3	Habitat and Biological Quality	79
3.4.5	Tracking Changes in Water Quality	80
3.4.6	MS4 Program Co-Permittees	80
3.4.6.1	City of Anchorage.....	80
3.4.6.2	City of Jeffersontown.....	80
3.4.6.3	City of St. Matthews	81
3.4.6.4	City of Louisville.....	81
3.4.6.5	Jefferson County	81
3.4.6.6	Kentucky Transportation Cabinet, District Five.....	81
3.4.6.7	MSD.....	82
3.4.7	CSO Program – MSD	85
3.4.8	SSO Program – MSD.....	87
3.5	Beargrass Creek – South Fork	89
3.5.1	History, Demographic and Community Information.....	89
3.5.2	Hydrology and Flooding	89
3.5.2.1	Flood Prevention Measures	89
3.5.3	Status of Water Quality.....	90

3.5.4	Water Quality Impacts	90
3.5.4.1	Point Source	91
3.5.4.2	Non-Point Source.....	91
3.5.4.3	Habitat and Biological Quality	91
3.5.5	Tracking Changes in Water Quality	91
3.5.6	MS4 Program – Co-Permittees	91
3.5.6.1	City of Jeffersontown.....	92
3.5.6.2	City of Louisville	92
3.5.6.3	Jefferson County	92
3.5.6.4	Kentucky Transportation Cabinet, District Five.....	92
3.5.6.5	MSD.....	92
3.5.7	CSO Program – MSD	93
3.5.8	SSO Program – MSD.....	98
3.6	Ohio River.....	100
3.6.1	History, Demographic and Community Information.....	100
3.6.2	Hydrology and Flooding	100
3.6.2.1	Flood Prevention Measures	100
3.6.3	Status of Water Quality.....	100
3.6.4	Water Quality Impacts	101
3.6.4.1	Point Source	102
3.6.4.2	Non-Point Source.....	102
3.6.4.3	Habitat and Biological Quality	102
3.6.5	Tracking Changes in Water Quality	102
3.6.6	MS4 Program – Co-Permittees	102
3.6.6.1	City of Prospect	103
3.6.6.2	City of Shively	103
3.6.6.3	City of Louisville.....	103
3.6.6.4	Jefferson County	103
3.6.6.5	Kentucky Transportation Cabinet, District Five.....	104
3.6.6.6	MSD.....	104
3.6.7	CSO Programs – MSD.....	105
3.6.8	SSO Programs – MSD	108

3.7 Mill Creek 110

 3.7.1 History, Demographic and Community Information..... 110

 3.7.2 Hydrology and Flooding..... 110

 3.7.2.1 Flood Prevention Measures 110

 3.7.3 Status of Water Quality..... 110

 3.7.4 Water Quality Impacts 110

 3.7.4.1 Point Source 111

 3.7.4.2 Non-Point Source..... 111

 3.7.4.3 Habitat and Biological Quality 111

 3.7.5 Tracking Changes in Water Quality 112

 3.7.6 MS4 Program – Co-Permittees 112

 3.7.6.1 City of Shively 112

 3.7.6.2 City of Louisville..... 112

 3.7.6.3 Jefferson County 112

 3.7.6.4 Kentucky Transportation Cabinet, District Five..... 113

 3.7.6.5 MSD..... 113

 3.7.7 SSO Program – MSD..... 114

3.8 Pond Creek..... 115

 3.8.1 History, Demographic and Community Information..... 115

 3.8.2 Hydrology and Flooding..... 115

 3.8.2.1 Flood Prevention Measures 115

 3.8.3 Status of Water Quality..... 115

 3.8.4 Water Quality Impacts 115

 3.8.4.1 Point Source 116

 3.8.4.2 Non-Point Source..... 116

 3.8.4.3 Habitat and Biological Quality 116

 3.8.5 Tracking Changes in Water Quality 117

 3.8.6 MS4 Program – Co-Permittees 117

 3.8.6.1 City of Jeffersontown..... 117

 3.8.6.2 City of Louisville..... 117

 3.8.6.3 Jefferson County 117

 3.8.6.4 Kentucky Transportation Cabinet, District Five..... 118

3.8.6.5	MSD.....	118
3.8.7	SSO Program – MSD.....	119
3.9	Pennsylvania Run	121
3.9.1	History, Demographic and Community Information.....	121
3.9.2	Hydrology and Flooding.....	121
3.9.2.1	Flood Prevention Measures	121
3.9.3	Status of Water Quality.....	121
3.9.4	Water Quality Impacts	121
3.9.4.1	Point Source	122
3.9.4.2	Non-Point Source.....	122
3.9.4.3	Habitat and Biological Quality	122
3.9.5	Tracking Changes in Water Quality	123
3.9.6	MS4 Programs – Co-Permittees.....	123
3.9.6.1	Jefferson County	123
3.9.6.2	Kentucky Transportation Cabinet, District Five.....	123
3.9.6.3	MSD.....	123
3.9.7	SSO Program – MSD.....	124
3.10	Cedar Creek	126
3.10.1	History, Demographic and Community Information.....	126
3.10.2	Hydrology and Flooding.....	126
3.10.2.1	Flood Prevention Measures	126
3.10.3	Status of Water Quality.....	126
3.10.4	Water Quality Impacts	126
3.10.4.1	Point Source	127
3.10.4.2	Non-Point Source.....	127
3.10.4.3	Habitat and Biological Quality	127
3.10.5	Tracking Changes in Water Quality	128
3.10.6	MS4 Program – Co-Permittees	128
3.10.6.1	Jefferson County	128
3.10.6.2	Kentucky Transportation Cabinet, District Five.....	128
3.10.6.3	MSD.....	128
3.10.7	SSO Program – MSD.....	130

3.11 Floyds Fork	131
3.11.1 History, Demographic and Community Information.....	131
3.11.2 Hydrology and Flooding.....	131
3.11.2.1 Flood Prevention Measures	131
3.11.3 Status of Water Quality.....	131
3.11.4 Water Quality Impacts	131
3.11.4.1 Point Source.....	131
3.11.4.2 Non-Point Source.....	132
3.11.4.3 Habitat and Biological Quality	132
3.11.5 Tracking Changes in Water Quality	133
3.11.6 MS4 Program – Co-Permittees	133
3.11.6.1 City of Anchorage.....	133
3.11.6.2 City of Jeffersontown.....	133
3.11.6.3 Jefferson County	134
3.11.6.4 Kentucky Transportation Cabinet, District Five.....	134
3.11.6.5 MSD.....	134
3.11.7 SSO Program – MSD.....	135

LIST OF TABLES

Table 1e.	2001 Outfall Summary – Middle Fork of Beargrass Creek.....	9
Table 2e.	Summary of Water Quality Violations in Jefferson County.....	13
Table 3e.	CSO Point Source Summary by Watershed.....	16
Table 4e.	SSO Point Source Summary by Watershed.....	18
Table 5e.	Summary of Total Co-Permittee MS4 Permit Costs for July 2000 – June 2004	19
Table 6e.	MSD’s MS4, CSO, SSO Related Costs for July 2000 – June 2004	20
Table 1.	2001 Outfall Summary – Middle Fork of Beargrass Creek.....	22
Table 2.	Illicit Discharge Program – Co-Permittee Activities.....	23
Table 3.	Construction Site Runoff Controls – Co-Permittee Activities.....	25
Table 4.	Post Construction Controls – Co-Permittee Activities	27
Table 5	Good Housekeeping/Pollution Prevention – Co-Permittee Activities..	30
Table 6.	Public Education/Outreach Programs – Co-Permittee Activities	35
Table 7.	Summary of Water Quality Violations in Jefferson County.....	38
Table 8.	Monitoring – Co-Permittee Activities	39
Table 9.	Reporting – Co-Permittee Activities.....	40
Table 10.	Summary of Total Co-Permittee MS4 Permit Costs for July 2000 – June 2004	40
Table 11.	MSD Total MS4 Permit Costs for July 2000 – June 2004	41
Table 12.	Average Annual Overflow Volumes for Region 1	46
Table 13.	Average Annual Overflow Volumes for Regions 2 and 3.....	46
Table 14.	Fiscal Year 2001 and 2002 Overflow Monitoring Sites	50
Table 15.	CSO Program Related Costs for July 2000 – June 2004	52
Table 16.	SSO Rehabilitation Projects.....	56
Table 17.	SSO Program Related Costs for July 2000 – June 2004.....	59
Table 18.	Summary of Water Quality Violations in the Harrods Creek Watershed	62
Table 19.	Summary of Point Sources – Harrods Creek Watershed.....	62
Table 20.	Monitoring Locations – Harrods Creek Watershed.....	65

Table 21.	SSO Program Related Costs for July 2000 – June 2004, Harrods Creek Watershed.....	66
Table 22.	Summary of Water Quality Violations in the Goose Creek Watershed	68
Table 23.	Summary of Point Sources – Goose Creek Watershed.....	68
Table 24.	Monitoring Locations – Goose Creek Watershed.....	70
Table 25.	SSO Program Related Costs for July 2000 – June 2004, Goose Creek Watershed.....	71
Table 26.	Summary of Point Sources – Muddy Fork of Beargrass Creek Watershed.....	73
Table 27.	CSO Program Related Costs for July 2000 – June 2004, Muddy Fork of Beargrass Creek Watershed.....	76
Table 28.	SSO Program Related Costs for July 2000 – June 2004, Muddy Fork of Beargrass Creek Watershed	77
Table 29.	Summary of Water Quality Violations in the Middle Fork of Beargrass Creek Watershed	79
Table 30.	Summary of Point Sources – Middle Fork of Beargrass Creek Watershed.....	79
Table 31.	2001 Outfall Summary – Middle Fork of Beargrass Creek Watershed	82
Table 32.	ICAM Contaminated Outfall Response – Middle Fork of Beargrass Creek Watershed	83
Table 33.	Comparison of 1993 and 2001 Outfall Data for the Middle Fork of Beargrass Creek Watersshed	84
Table 34.	Monitoring Locations – Middle Fork of Beargrass Creek Watershed..	85
Table 35.	CSO Program Related Costs for July 2000 – June 2004, Middle Fork of Beargrass Creek Watershed	87
Table 36.	SSO Program Related Costs for July 2000 – June 2004, Middle Fork of Beargrass Creek Watershed	88
Table 37.	Summary of Water Quality Violations in the South Fork of Beargrass Creek Watershed.....	90

Table 38.	Summary of Point Sources – South Fork of Beargrass Creek Watershed.....	91
Table 39.	Monitoring Locations – South Fork of Beargrass Creek Watershed....	93
Table 40.	CSO Program Related Costs for July 2000 – June 2004, South Fork of Beargrass Creek Watershed.....	98
Table 41.	SSO Program Related Costs for July 2000 – June 2004, South Fork of Beargrass Creek Watershed.....	99
Table 42.	Summary of Point Source Regulatory Obligations – Ohio River Watershed	102
Table 43.	CSO Program Related Costs for July 2000 – June 2004, Ohio River Watershed.....	108
Table 44.	SSO Program Related Costs for July 2000 – June 2004, Ohio River Watershed.....	109
Table 45.	Summary of Water Quality Violations in the Mill Creek Watershed...	111
Table 46.	Summary of Point Sources – Mill Creek Watershed.....	111
Table 47.	Monitoring Locations – Mill Creek Watershed.....	113
Table 48.	SSO Program Related Costs for July 2000 – June 2004, Mill Creek Watershed	114
Table 49.	Summary of Water Quality Violations in the Pond Creek Watershed .	116
Table 50.	Summary of Point Source Regulatory Obligations – Pond Creek Watershed.....	116
Table 51.	Monitoring Locations – Pond Creek Watershed.....	119
Table 52.	SSO Program Related Costs for July 2000 – June 2004, Pond Creek Watershed.....	120
Table 53.	Summary of Water Quality Violations in the Pennsylvania Run Watershed	122
Table 54.	Summary of Point Sources – Pennsylvania Run Watershed	122
Table 55.	Monitoring Locations – Pennsylvania Run Watershed	124
Table 56.	SSO Program Related Costs for July 2000 – June 2004, Pennsylvania Run Watershed	125
Table 57.	Summary of Water Quality Violations in the Cedar Creek Watershed	127
Table 58.	Summary of Point Sources – Cedar Creek Watershed	127

Table 59.	Monitoring Locations – Cedar Creek Watershed	129
Table 60.	SSO Program Related Costs for July 2000 – June 2004, Cedar Creek Watershed	130
Table 61.	Summary of Water Quality Violations in the Floyds Fork Watershed.	132
Table 62.	Summary of Point Sources – Floyds Fork Watershed	132
Table 63.	Monitoring Locations – Floyds Fork Watershed	135
Table 64.	SSO Program Related Costs for July 2000 – June 2004, Floyds Fork Watershed	136

LIST OF FIGURES

Figure 1e.	Components of the Combined Report.....	1
Figure 2e.	Watersheds of Jefferson County	1
Figure 3e.	MS4 Co-Permittee	2
Figure 4e.	Wetland at Nature Preserve – St. Matthews	6
Figure 5e.	Student Outfall Program Training	9
Figure 6e.	Location of Proposed Basin at MSD’s Central Facility	11
Figure 1.	Properly Installed Silt Fencing	24
Figure 2.	Students Participating in MSD’s Environmental Science Program.....	34
Figure 3.	Maintenance of a Minimonitor	37
Figure 4.	Taking a Grab Sample Downstream from a SSO	59
Figure 5.	Harrods Creek Watershed – Jefferson County Portion Only.....	61
Figure 6.	Goose Creek Watershed.....	67
Figure 7.	Muddy Fork Watershed	72
Figure 8.	Middle Fork of Beargrass Creek Watershed.....	78
Figure 9.	The Student Outfall Program.....	82
Figure 10.	CSO 206 Sewer Separation Project	85
Figure 11.	Typical Downspout Disconnection Project	86
Figure 12.	South Fork of Beargrass Creek Watershed.....	89
Figure 13.	Sneads Branch Relief In-Line Storage Project – Conceptual Profile ...	93
Figure 14.	Final Gross Screening Concept.....	95
Figure 15.	Priorities Map for Solids and Floatables Control on Beargrass Creek.	95
Figure 16.	Portable UV and CDS Units at CSO 108.....	96
Figure 17.	Ohio River Watershed.....	100
Figure 18.	Identification of 15 Problem Areas for 500-Year Storm	105
Figure 19.	10 th Street Flood Pumping Station.....	106
Figure 20.	Mill Creek Watershed	110
Figure 21.	Pond Creek Watershed (Jefferson County Only).....	115
Figure 22.	Pennsylvania Run Watershed	121
Figure 23.	Cedar Creek Watershed	126
Figure 24.	Floyds Fork Watershed (Jefferson County Only).....	131

LIST OF EXHIBITS

Exhibit 1. Watershed Information and Water Quality Summary 20

Exhibit 2. RTC Strategy 52

Exhibit 3. Initial RTC Implementation Program 52

Exhibit 4. Harrods Creek Watershed 66

Exhibit 5. Goose Creek Watershed 71

Exhibit 6. Muddy Fork of Beargrass Creek Watershed 77

Exhibit 7. Middle Fork of Beargrass Creek Watershed 88

Exhibit 8. South Fork of Beargrass Creek Watershed 99

Exhibit 9. City/Ohio River Watershed 109

Exhibit 10. Mill Creek Watershed 114

Exhibit 11. Pond Creek Watershed 120

Exhibit 12. Pennsylvania Run Watershed 125

Exhibit 13. Cedar Creek Watershed 130

Exhibit 14. Floyds Fork Watershed 136

LIST OF APPENDICIES

Appendix I	Waters Report and GIS Application
Appendix II	MS4 Permit – KPDES No: KYS000001
Appendix III	MS4 Matrix of Elements
Appendix IV	Erosion Prevention and Sediment Control Proposed Ordinance
Appendix V	SSO Fact Sheets
Appendix VI	CSO Tables

GLOSSARY OF ACRONYMS AND UNITS

Acronyms

ARC/INFO™	Geographic Information System Software from Environmental Systems Research, Inc.
ArcView™	Geographic Information System Software from Environmental Systems Research, Inc.
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CDS	Continuous Deflection Separation
CIPP	Cured In Place Pipe
CS	Construction Site Runoff Controls
CSO	Combined Sewer Overflow
CSOP	Combined Sewer Operational Plan
DO	Dissolved Oxygen
ECC	Environmental Compliance Committee
ECO	Environmental/Constructability Overview
EPSC	Erosion Prevention and Sediment Control
FEMA	Federal Emergency Management Administration
GH	Good Housekeeping/Pollution Prevention
GIS	Geographic Information System
HSPF	Hydrologic Simulation Program – FORTRAN
HUD	United States Department of Housing and Urban Development
ICAM	Industrial Compliance and Monitoring Program
ID	Illicit Discharge Program
I/I	Inflow and Infiltration
JCPS	Jefferson County Public Schools
KDOW	Kentucky Division of Water
KPDES	Kentucky Pollutant Discharge Elimination System
KyTC	Kentucky Transportation Cabinet
LOJIC	Louisville and Jefferson County Information Consortium
LTCP	Long-Term Control Plan

M	Monitoring
MDS	Main Diversion Structure
MFWTP	Morris Forman Wastewater Treatment Plant
MS4	Municipal Separate Storm Sewer System
MSD	Louisville and Jefferson County Metropolitan Sewer District
NMC	Nine Minimum Controls
ORI	Ohio River Interceptor
ORSANCO	Ohio River Valley Sanitation Commission
PC	Post Construction Controls
PE	Public Education/Outreach Program
POTW	Privately Owned Treatment Works
PS	Pump Station
PSC	Property Service Connection
R	Reporting
RFP	Request For Proposal
RTC	Real Time Control
SED	Southwest Diversion
SSES	Sanitary Sewer Evaluation Study
SSO	Sanitary Sewer Overflow
SSOAEP	Sanitary Sewer Overflow Abatement and Elimination Plan
SWMM	Storm Water Management Model
SWO	Southwestern Outfall
SWPS	Southwestern Pump Station
TDS	Total Dissolved Solids
TKN	Organic Nitrogen
TSS	Total Suspended Solids
TVI	Television Inspection
TVSS	Total Volatile Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WATERS	Watershed Approach to Environmentally Responsible Stewardship

WDR	Wastewater Discharge Regulations
WTP	Wastewater Treatment Plant
XL	Excellence in Leadership

Units

gpd	gallons per day
lf	linear feet
MG	million gallons
MGD	million gallons per day
sq. mi.	square mile