Clean Water 2020 Program

SUPPLEMENTAL INFRASTRUCTURE REHABILITATION REPORT (Supplemental IR Report)

November 2022

We Are Columbia

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Acronyms & Abbreviations

ARV – Air Release Valve

CAP – Capacity Assurance Program

CD – Consent Decree

CIP – Capital Improvement Projects

City – City of Columbia

CSAP – Continuing Sewer Assessment Program

DHEC – South Carolina Department of Health and Environmental Control

EACIP – Early Action Capital Improvement Projects

EPA – United States Environmental Protection Agency

GIS – Geographic Information System

HMR – Hydraulic Model Report

I/I – Inflow and Infiltration

IR – Infrastructure Rehabilitation

LF – Linear Feet

MACP – Manhole Assessment and Certification Program

MH – Manhole

NASSCO – National Association of Sewer Service Companies

O&M – Operations and Maintenance

PACP – Pipeline Assessment and Certification Program

PS – Pump Station

SCDOT – South Carolina Department of Transportation

SOP – Standard Operating Procedure

SSES – Sanitary Sewer Evaluation Surveys

SSO(s) – Sanitary Sewer Overflow(s)

WCTS – Wastewater Collection and Transmission System

WTP – Water Treatment Plant

Program Summary and Intent

The City of Columbia (City) prepared this Supplemental Infrastructure Rehabilitation Report (Supplemental IR Report) to summarize the updated results of the Continuing Sewer Assessment Program (CSAP) of the major components of the Wastewater Collection and Transmission System (WCTS) since the Infrastructure Rehabilitation Report (IR Report); summarize the results of the CSAP of the minor WCTS components; provide updated descriptions of projects identified in the IR Report that have been completed; and to identify the City's proposed rehabilitation projects including minor system rehabilitation projects currently underway and updated major WCTS projects.

This Supplemental IR Report was prepared in accordance with the requirements of Paragraph 16 of the Consent Decree (CD) entered by order dated May 21, 2014, in *The United States of America and State of South Carolina by and through the Department of Health and Environmental Control [DHEC] vs. The City of Columbia*, Civil Action No. 3:13-2429-TWL, DOJ Case Number 90-5-1-1-00954.

Table 0-1 is a list of the CD requirements for the Supplemental IR Report, and the sections of this document that address each requirement.

Table 0-1 – Summary of Consent Decree Requirements for the Supplemental IR Report

CD Section	CD Requirements	Report Section
V.16.c	"Supplemental IR Report. Within six (6) months after Columbia has assessed the remainder of the entire WCTS pursuant to the CSAP, as required by Paragraph 14.a, Columbia shall submit to EPA [United States Environmental Protection Agency] and DHEC for review, comment, and approval a supplemental IR Report which shall update all portions of the IR Report to reflect additional information developed by Columbia through completion of the assessment of the remainder of the entire WCTS."	Supplemental IR Report Sections 1 through 9
	"The Supplemental IR Report shall include an updated description of remedial projects that have been completed, including line repairs and small-scale repairs completed on a find and fix basis, and shall identify any additional rehabilitation projects identified through ongoing implementation of the CSAP, as needed to address I/I and other conditions causing SSOs."	Supplemental IR Report Sections 2 through 8
	"The Supplemental IR Report shall include a schedule for completion of any additional rehabilitation projects no later than five years after EPA/DHEC approval of the Supplemental IR Report. Upon approval of the Supplemental IR Report by EPA and DHEC, Columbia shall complete all additional rehabilitation projects identified in the Supplemental IR Report in accordance with the schedule contained therein. "	Supplemental IR Report Section 8

Section 1 Introduction

1.1 Supplemental IR Report Overview

The Supplemental IR Report is one of several reports required by the CD for continued improvement of the WCTS with a goal of mitigating future Sanitary Sewer Overflows (SSOs). The Supplemental IR Report presents a summary of the results of the CSAP assessment of the minor components of the WCTS, an update of additional information collected since the IR Report for major components of the WCTS, a description of the proposed rehabilitation measures and projects not previously identified in the IR Report (including those currently underway), and prioritized system improvements to mitigate SSOs. Rehabilitation measures and projects presented in this Supplemental IR Report focus on addressing Inflow and Infiltration (I/I) and other system conditions that may have resulted in SSOs in the WCTS from May 21, 2014, through December 31, 2021, and system conditions that may cause future SSOs that have not been previously incorporated into the IR Report. The summaries of the results of the CSAP assessments for major and minor assets presented in this report are through December 31, 2021.

The Supplemental IR Report is based on the implementation of other programs, prepared in accordance with the CD, including the following:

- The CSAP, originally approved on May 23, 2016, describes the methods and standard procedures used for assessment of the WCTS and establishes the schedules for prioritizing and implementing the continual assessment of the WCTS. Results of the CSAP of the major components of the WCTS are summarized in the IR Report, and updates since the IR Report are summarized in this Supplemental IR Report. Results of the CSAP of the minor components of the WCTS are summarized in this Supplemental IR Report.

- The Infrastructure Rehabilitation Program (IR Program), originally approved April 27, 2017, describes the policies and procedures for implementing rehabilitation measures to address I/I, structural issues and the other conditions in the WCTS causing SSOs, including the evaluation process by which condition data collected through the CSAP is utilized with factors such as SSO frequencies and SSO volumes to prioritize and implement rehabilitation measures. The IR Report describes the application of the IR Program procedures to assign condition and criticality ratings to major components of the WCTS and identify rehabilitation priorities. The Supplemental IR Report describes the application of the IR Program procedures to assign condition and criticality ratings to minor components of the WCTS and identify rehabilitation priorities, which were not included in the IR Report, as well as any updates on the major components of the WCTS since the IR Report.

1.2 Summary of Major and Minor WCTS Components

The WCTS currently consists of approximately 1,090 miles of mainline Gravity Sewer with diameters ranging from 6 inches to 60 inches, 50 Pump Stations, and approximately 34 miles of Force Main located both inside the city limits and in portions of Richland and Lexington Counties. The major components of the WCTS include all Gravity Sewer and Force Main with diameters 15 inches or larger and their appurtenances, such as manholes and Pump Stations. Since publishing the IR Report, some assets (such as the Garners Ferry Road Pump Station [Pump Station Number 40] and Force Main) were transferred to

Richland County in accordance with Paragraph 4 of the Consent Decree and the Lower Richland Sewer Service Agreement, attached to the Consent Decree as Appendix B. The minor components of the WCTS include all Gravity Sewer and Force Mains with diameters less than 15 inches and their appurtenances, such as manholes and Pump Stations. Minor WCTS components are summarized in **Tables 1-1** through **1-3** and shown on **Figure 1-1.** An update of the IR Report's tables of the inventory of the Major Gravity Sewer Lines, Major Pump Stations, and major Force Mains is included in **Tables 1-4** through **1-6** and shown on **Figure 1-2.**

Table 1-1 – Minor Gravity Sewer Lines and Minor Manholes

Basin	Approximate Length of Minor Gravity Sewer Lines (miles)	Approximate Number of Minor Manholes
Broad River	50	1,500
Crane Creek	180	5,000
Gills Creek	240	5,700
Mill Creek	70	1,500
Rocky Branch	120	2,600
Saluda River	180	5,300
Smith Branch	100	2,400
West Columbia	20	600
Total	**960**	**24,600**

Table 1-2 – Minor Pump Stations

Pump Station Number	Pump Station Name	Pump Station Number	Pump Station Name
005	Atlas Road	165	Homeless Shelter
010	Woodlands	170	Meadowlands
025	Animal Shelter	175	Piney Grove
030	East Bluff	180	Regatta Point #1
035	Emerald Lakes	185	Regatta Point #2
045	Galaxy	190	Regatta Point #3
055	Heathwood Hall	200	Three Rivers
060	Mallard Pointe	205	Wexford
075	Owens Field	210	Wexhurst
085	The Retreat	215	Windsong
090	Starlite	220	Yacht Cove
100	Versch Lock	225	Lake Murray WTP
105	Village Pond	275	Killian Crossing
115	Clearwater	305	Prescott Manor

Pump Station Number	Pump Station Name	Pump Station Number	Pump Station Name
120	Colonial Life	310	Shady Lane
125	Crockett Road	320	Farrow Pointe
135	Georgetown	325	Blythewood Crossing
140	Harbison #2	330	Bookert Heights
145	Harbison #4	340	Hawkins Creek
150	Harbour Pointe	345	The Palms
155	Hillcreek #1	350	Owens Field Park
160	Hillcreek #2	355	Regatta Forest

Table 1-3 – Minor Force Mains

Force Main Name	Approximate Length of Minor Force Main (Miles)
Atlas Road Force Main	0.4
Woodlands Force Main	0.5
Animal Shelter Force Main	0.2
East Bluff Force Main	0.3
Emerald Lakes Force Main	0.1
Galaxy Force Main	0.6
Heathwood Hall Force Main	0.2
Mallard Pointe Force Main	0.4
Owens Field Force Main	0.3
The Retreat Force Main	0.3
Starlite Force Main	0.3
Versch Lock Force Main	0.9
Village Pond Force Main	0.1
Clearwater Force Main	0.5
Colonial Life Force Main	0.7
Crockett Road Force Main	0.3
EdVenture Force Main	0.2
Georgetown Force Main	0.1
Harbison #2 Force Main	0.1
Harbison #4 Force Main	0.7
Harbour Pointe Force Main	0.1
Hillcreek #1 Force Main	0.3
Hillcreek #2 Force Main	0.3
Homeless Shelter Force Main	0.4
Meadowlands Force Main	1.1
Piney Grove Force Main	0.2

Force Main Name	Approximate Length of Minor Force Main (Miles)
Regatta Point #1 Force Main	1.7
Regatta Point #2 Force Main	0.1
Regatta Point #3 Force Main	0.1
Regatta Phase #4 Force Main	0.3
Three Rivers Force Main	0.5
Wexford Force Main	0.6
Wexhurst Force Main	0.2
Windsong Force Main	0.6
Yacht Cove Force Main	0.3
Lake Murray WTP Force Main	0.6
Killian Crossing Force Main	0.8
Prescott Manor Force Main	0.2
Shady Lane Force Main	0.3
Farrow Pointe Force Main	0.2
Blythewood Crossing Force Main	0.4
Bookert Heights Force Main	0.2
Hawkins Creek Force Main	0.6
The Palms Force Main	0.2
Owens Field Park Force Main	0.1
Regatta Forest Force Main	0.01
Pasta Company Force Main	0.6
Pine Island Force Main	1.3
Total	**19.5**

Table 1-4 – Updated Major Gravity Sewer Lines and Major Manholes

Basin	Approximate Length of Major Gravity Sewer Lines (miles)	Approximate Number of Major Manholes
Broad River	10	100
Crane Creek	30	600
Gills Creek	20	500
Mill Creek	10	200
Rocky Branch	20	400
Saluda River	20	400
Smith Branch	10	300
West Columbia	10	100
Total	**130**	**2,600**

Table 1-5 – Updated Major Pump Stations

Pump Station Number	Pump Station Name
065	Mill Creek
110	West Columbia
130	EdVenture
195	Saluda River
295	North Columbia
335	Broad River

Table 1-6 – Updated Major Force Mains

Force Main Name	Approximate Length of Major Force Main (miles)
Broad River Force Main	1.7
Mill Creek Force Main	4.6
North Columbia Force Main	0.2
Saluda River Force Main	4.2
West Columbia Force Main	4.1
Total	**14.8**

Figure 1-1 – Minor Collection System Components

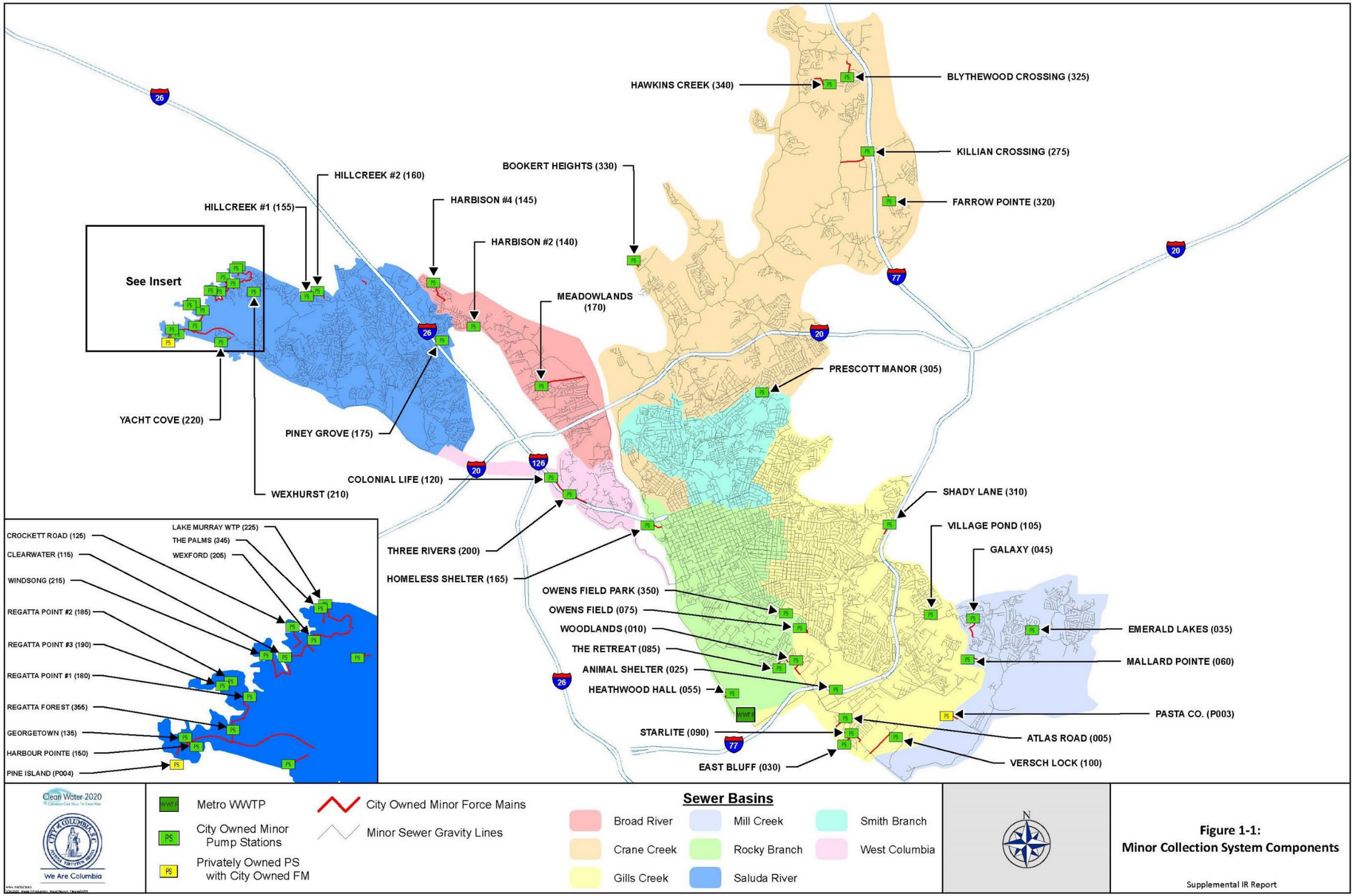
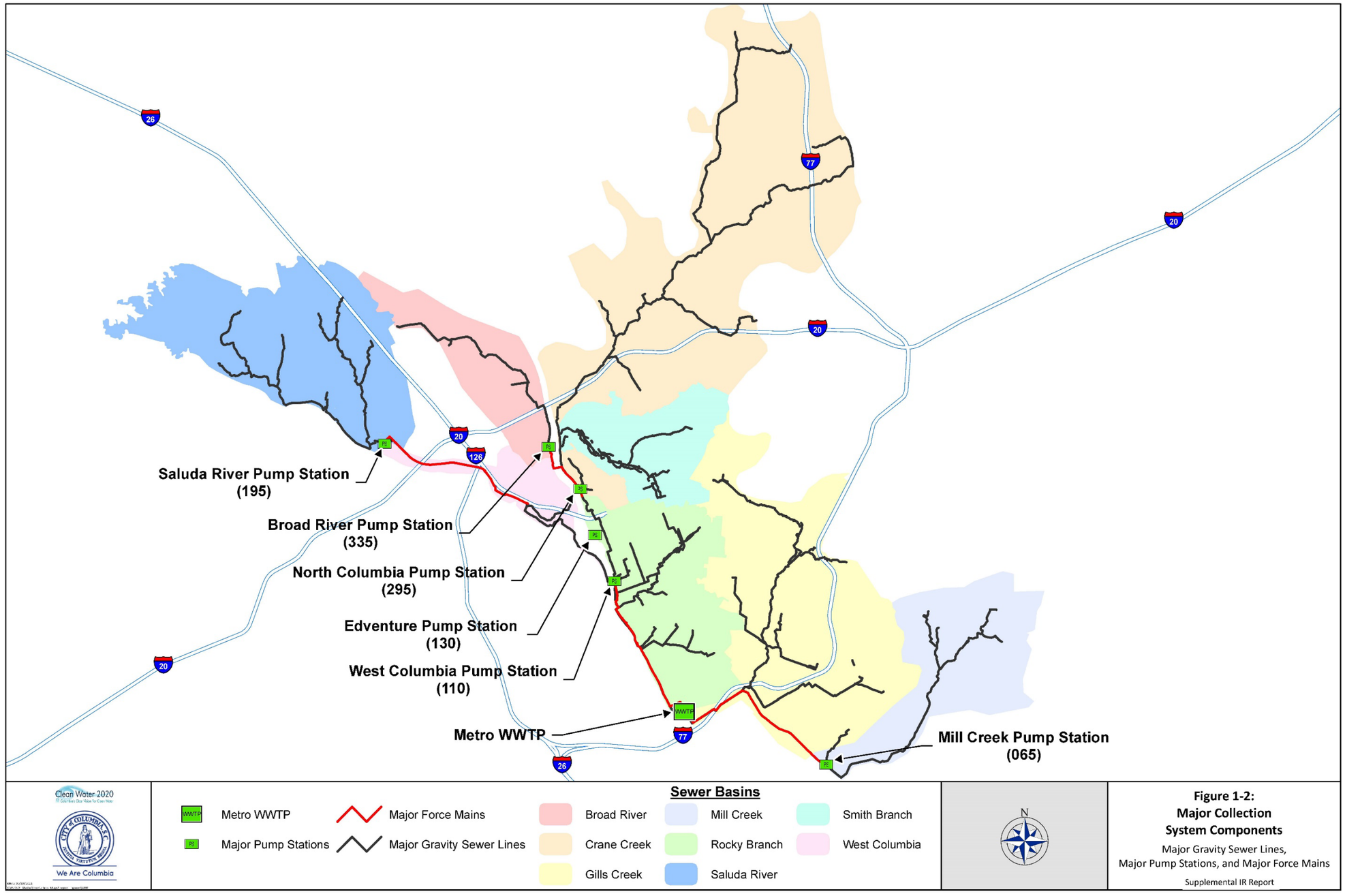


Figure 1-2 – Major Collection System Components



1.3 Approach and Report Organization

The IR Program describes the City's procedures for implementing rehabilitation priorities and schedules for WCTS components (Gravity Sewer Lines, manholes, Pump Stations, and Force Mains) that are identified as being in need of rehabilitation based on information collected under the CSAP (as required in Paragraph 15.a. through 15.d. of the CD). The purpose of the prioritization process is to identify and prioritize rehabilitation projects according to the project's ability to resolve the most serious problems as identified through the CSAP's initial assessment. The prioritization considers both the condition (probability of failure) of the WCTS component, as determined from SSO history and CSAP assessment, and the criticality (consequence of failure) of the WCTS component (with the exception of minor gravity sewer lines and manholes since these are assessed on a Subbasin level as described in Section 3) based on relative potential impact to public health, environmental, and other impacts if the asset were to fail. For a given WCTS asset, the condition rating or combination of the condition rating and the criticality rating defines the relative rehabilitation priority.

Sections 2, 4, and 6 of this Supplemental IR Report discuss any updates since the IR Report (with a cut-off date of December 31, 2018, for inclusion in the IR Report) to the results of the CSAP for the major components of the WCTS, application of the IR Program procedures to set priorities, and proposed rehabilitation measures or other actions to address specific conditions that may be causing SSOs by major asset type. Major Gravity Sewer Lines and major manholes are discussed in Section 2. Major Pump Stations are discussed in Section 4. Major Force Mains are discussed in Section 6. In these sections, SSOs are referred to as Updated recent historical SSOs. These include SSOs that have occurred on major components since the IR Report was published (January 1, 2019, to December 31, 2021, the cut-off date for inclusion in the Supplemental IR Report).

Sections 3, 5, and 7 of this Supplemental IR Report discuss the results of the CSAP for the minor components of the WCTS, application of the IR Program procedures to set priorities, and proposed rehabilitation measures or other actions to address specific conditions that may be causing SSOs by minor asset type. Minor gravity sewer lines and minor manholes are discussed in Section 3. Minor Pump Stations are discussed in Section 5. Minor Force Mains are discussed in Section 7. In these sections, SSOs included are referred to as recent historical SSOs. These include recent SSOs that have occurred on minor components since the execution of the CD since the minor components were not previously included in the IR Report (May 21, 2014, to December 31, 2021, the cut-off date for inclusion in the Supplemental IR Report).

Section 8 presents the prioritization of projects and I/I reduction estimates as required by the CD.

Section 9 presents an update to the status of the City's Hydraulic Model Report (HMR) required under Paragraph 17.d. of the CD.

The CD specifies that the City complete Early Action Capital Improvement Projects (EACIP) for the WCTS. These projects have been completed and were previously included in Section 1.4 of the IR Report. Therefore, they are not addressed further in this Supplemental IR Report.

Section 2 Update of Major Gravity Sewer Lines and Major Manholes

This section presents the continued application of the IR Program procedures for Major Gravity Sewer Lines and major manholes. This section provides an update to the IR Report and includes only additional information that was captured since the IR Report and through the cut-off date of this report as discussed in **Section 1**. The process for Major Gravity Sewer and major manhole assessment, rating, and prioritization is discussed in Section 2 of the IR Report. Updates to information presented in the IR Report are included in each section below. This section includes a review of updated SSO history (**Section 2.1**), any updates to the results of the CSAP (**Section 2.2**), updates from the prioritization process (**Section 2.3**), and additional proposed actions that were identified (**Section 2.5**). The update to the schedule for the rehabilitation of the Major Gravity Sewer Lines and major manholes is discussed in Section 8.

The approach for the estimation of I/I contribution from major gravity sewers and major manholes has not changed since the IR Report.

2.1 Updated Recent Historical SSOs

Section 2.1.1 of the IR Program summarizes the rationale for evaluating past SSOs related to a given Gravity Sewer Line or manhole to establish the condition rating for Gravity Sewer Lines and manholes.

SSOs that occurred on Major Gravity Sewer Lines and major manholes from January 1, 2019, through December 31, 2021, are referred to as updated recent historical SSOs for this evaluation. SSO cause was recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response Standard Operating Procedure (SOP) and any updates are based on further evaluation. Causes of the recent historical SSOs on or as a result of Major Gravity Sewer Lines and major manholes are grouped into the categories of Wet Weather, Structural Conditions, Operations and Maintenance (O&M) Conditions, and Other as defined in Section 2.1 of the IR Report.

Updated recent historical SSOs on Major Gravity Sewer Lines and major manholes are listed in **Table 2-1** and **Table B-1** in **Appendix B** of this report, with the reported SSO cause and identified SSO category. Table 2-1 and **Figure 2-1** list updated recent historical SSOs on Major Gravity Sewer Lines and major manholes that are covered under the CD and addressed in this Supplemental IR Report. Table B-1 presents the remaining SSOs caused by severe natural conditions that were not considered in the prioritization and proposed rehabilitation actions discussed in Section 2.

Table 2-1 – Updated Recent Historical SSOs on Major Gravity Sewer Lines and Major Manholes

			SSO Characteristics		
Date[1]	SSO ID	Basin	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
2/9/2019	02281	Mill Creek	Roots	O&M	120
12/16/2019	02396	West Columbia	Collapsed Line	Structural	150
12/18/2019	02398	Saluda River	Wet Weather	Wet Weather	105
12/19/2019	02400	West Columbia	Collapsed Line	Structural	6,300

			SSO Characteristics		
Date[1]	SSO ID	Basin	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
12/23/2019	02404	Saluda River	Wet Weather	Wet Weather	200
12/23/2019	02406	West Columbia	Wet Weather	Wet Weather	1,878
1/3/2020	02417	Gills Creek	Wet Weather	Wet Weather	45
1/13/2020	02425	Gills Creek	Wet Weather	Wet Weather	60
1/16/2020	02435	Broad River	Collapsed Line	Structural	4,680
2/8/2020	02458	West Columbia	Wet Weather	Wet Weather	16,295
2/9/2020	02459	West Columbia	Wet Weather	Wet Weather	174
5/20/2020	02516	Gills Creek	3rd Party Responsible	Other	2,900
10/5/2020	02572	Mill Creek	Collapsed Line	Structural	315,000
2/9/2021	02627	Saluda River	Debris	O&M	2,731
2/28/2021	02650	Gills Creek	Collapsed Line	Structural	17,184
7/21/2021	02710	Rocky Branch	Bypass	Other	216,837

Note: SSOs on Major Gravity Sewer Lines and major manholes caused by severe natural conditions (listed in Table B-1 in Appendix B) are not considered in this analysis. SSOs in Table 2-1 are covered under the CD and addressed in this report.

1) Updated recent historical SSOs that occurred from January 1, 2019, through December 31, 2021.

2) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

3) SSO category is assigned for this evaluation based on the SSO cause. See Section 2.1 in IR Report for category definitions.

4) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Figure 2-1 – Updated Recent Historical SSOs on Major Gravity Sewer Lines and Major Manholes

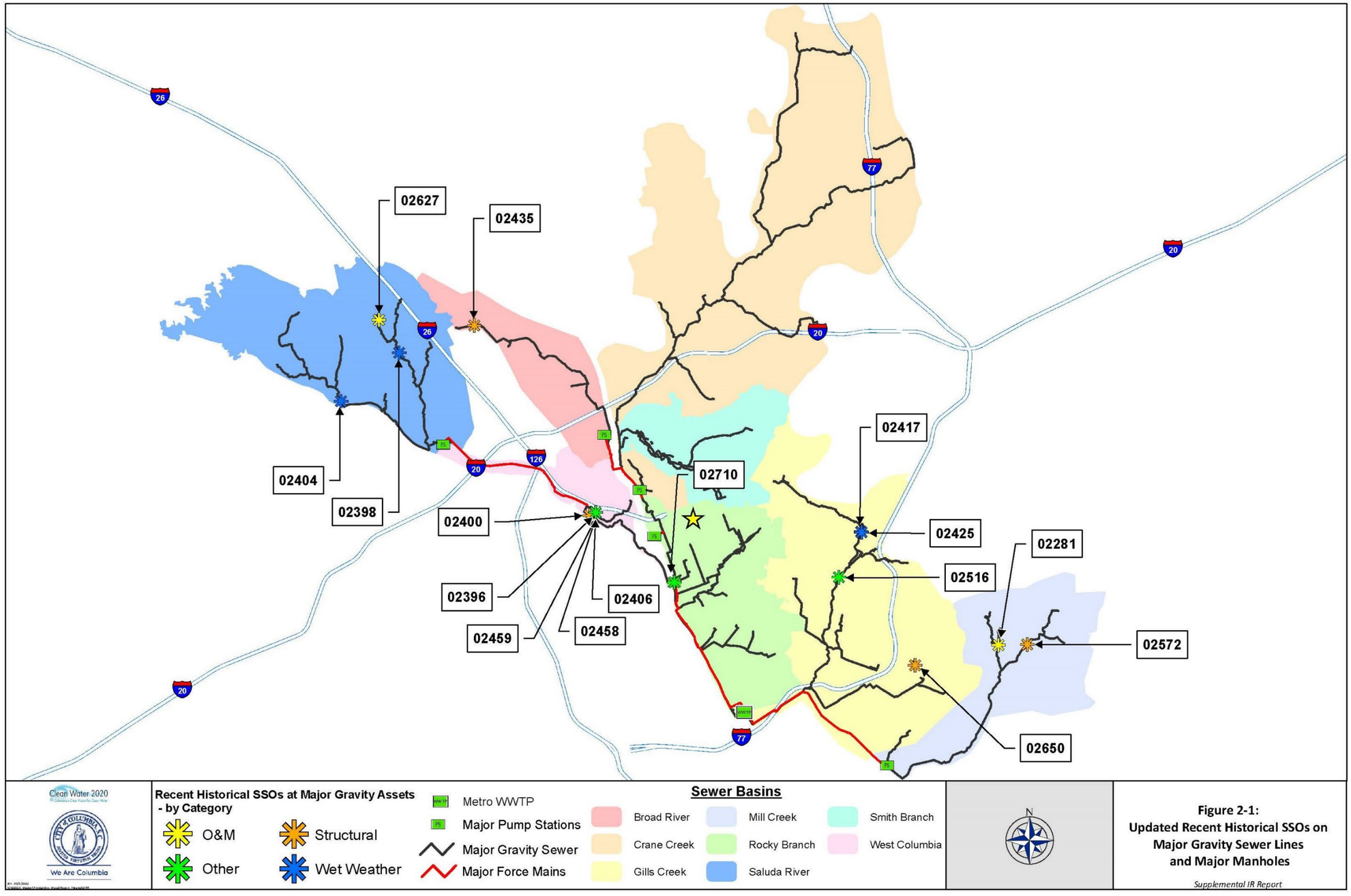


Table 2-2 summarizes the total number and volume of SSOs listed in Table 2-1.

Table 2-2 – Summary by Category of Updated Recent Historical SSOs on Major Gravity Sewers and Major Manholes

SSO Category	Number of Recent Historical SSOs	Estimated Volume (gallons)
Wet Weather	6	16,879
Structural	5	343,314
O&M	2	2,851
Other	3	221,615

Note: For the purposes of the City's Capacity Assurance Program (CAP), the CD allows the City to exclude those SSOs caused by severe natural conditions such as hurricanes, tornados, widespread flooding, earthquakes, or rainfall events greater than a representative 2-year, 24-hour storm event from the definition of Surcharge Condition (Paragraph 12.e.i.F of the CD). This table does not show SSOs listed in Appendix B that were caused by severe natural conditions and are not considered when assigning condition ratings and identifying rehabilitation priorities.

2.2 Updated Results of the CSAP

The CSAP describes various methods and procedures that may be used by the City for ongoing assessment of the condition of the major components of the WCTS. The City completed additional assessments under the CSAP for the Major Gravity Sewer Lines and major manholes since the submittal of the IR Report as summarized in the sections below, including flow monitoring, Major Gravity Sewer Line inspections, and major manhole inspections.

2.2.1 Flow Monitoring

The City continues to collect flow data through temporary and permanent monitors in accordance with procedures set forth in Section 3.5 of the CSAP. This data is periodically evaluated and incorporated into the CSAP evaluations as the City deems appropriate. See Section 2.2.1 of the IR Report for previously submitted information on flow monitoring, including data collection, evaluation, and Subbasin flow characteristics. Additional flow monitoring data utilized for estimating I/I removal for this report that was previously not included in the IR Report is included in **Section 8.3.1** of this report.

2.2.2 Major Gravity Sewer Line Inspections

According to CSAP re-inspection intervals, as defined in Section 4.2 of the CSAP, no system-wide re-inspections are required, and have not been completed since the IR Report and through the cut-off date of this Supplemental IR Report.

However, incidental inspections were completed on individual assets as a part of other work or on a find and fix basis using methods as described in Sections 3.6 through 3.9 of the CSAP. Defects found through these incidental Major Gravity Sewer Line inspections since the IR Report, using methods that are intended to identify possible I/I sources, are listed in **Table C-1** in **Appendix C**. As required under CD Paragraph 16.a.(v), the table lists defects by Subbasin with specific defect type and National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) defect code, quantity of each defect type, and defect rating. The Subbasins referenced in Table C-1 are shown on **Figure C-1** in Appendix C.

2.2.3 Major Manhole Inspections

According to CSAP re-inspection intervals, as defined in Section 4.2 of the CSAP, no system-wide re-inspections were required or completed since the IR Report through the cut-off date of this Supplemental IR Report.

However, incidental inspections were completed on individual assets as a part of other work or on a find and fix basis using methods as described in Section 3.4 of the CSAP. Defects found through these incidental major manhole inspections since the IR Report using methods that are intended to identify possible I/I sources are listed in **Table D-1** in **Appendix D**. As required under CD Paragraph 16.a.(v), the table lists defects by Subbasin with specific defect type and NASSCO Manhole Assessment and Certification Program (MACP) defect code, quantity of each defect type, and defect rating. The Subbasins referenced in Table D-1 are shown on Figure C-1 in Appendix C.

2.2.4 Summary of I/I Sources

As an update to Section 2.2.4 of the IR Report, additional defects identified since the IR Report along the Major Gravity Sewer Lines (summarized in Table C-1 in Appendix C) and within major manholes (summarized in Table D-1 in Appendix D) are included in this report.

2.3 Prioritizing Based on Condition and Criticality Ratings

Following the CSAP schedule, no system-wide reassessments on the Major Gravity Sewer Lines and major manholes are required or have been completed since the IR Report. Therefore, the prioritization of the Major Gravity Sewer Lines and major manholes has not been updated since the IR Report.

2.4 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified and as previously described in Section 2.4 of the IR Report.

2.5 Additional Proposed Corrective Actions

Assets that have had single or multiple updated recent historical SSOs since the IR Report are included in this Supplemental IR Report. Additional SSOs on assets included in the IR Report are identified in the Supplemental IR Report; however, the projects identified in the IR Report will remain in the group identified previously in Section 5.1 of the IR Report. A detailed Prioritization Matrix showing how assets are categorized based on their recent SSO history, criticality, and condition, with emphasis on the recent historical SSOs, is presented in Section 2 of the IR Report. Overall WCTS project grouping and scheduling is discussed in Section 8 of this report.

2.5.1 Recent Historical SSOs

The projects listed in **Table 2-3** address the root cause of the updated recent historical SSOs as determined through review of SSO investigations, CSAP assessment, hydraulic modeling, or other information. Projects listed in Table 2-3 are capacity improvements to address conditions causing updated recent historical Wet Weather SSOs on Major Gravity Sewer Lines or major manholes since the

IR Report. Find and fix actions, as listed in **Table 2-4**, were completed to address the root cause of all updated recent historical SSOs caused by structural or other conditions on the Major Gravity Sewer Lines and major manholes.

Table 2-3 – Capacity Improvement Projects to Address Updated Recent Historical SSOs on Major Gravity Sewer Lines and Major Manholes

Basin	SSO ID[1]	Project Name	Estimated Volume (gallons)[2]
Gills Creek	02417, 02425	SS7261 Lake Katherine Sewer Line Capacity Enhancement[3]	105
Saluda River	02398	SS7331 Upper Kinley Creek[3]	105
Saluda River	02404	SS7428 Lower Saluda Relief Sewer[3]	200

Note: Updated recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

1) SSOs caused by severe natural conditions (listed in Table B-1 in Appendix B) are not considered in this analysis. SSOs in Table 2-1 are covered under the CD and addressed in this report.

2) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown. Projects previously included in IR Report; however, new or additional SSOs have occurred in those locations since the IR Report. Volumes only include SSO volume from SSOs since the IR Report. These projects are not included in any figures in the Supplemental IR Report since they were previously identified as a project and included in the IR Report.

Table 2-4 – Find and Fix Action to Address Updated Recent Historical SSOs on Major Gravity Sewer Lines and Major Manholes

Basin	SSO ID[1]	Find and Fix Action	Estimated Volume (gallons)[2]
Mill Creek	02281	Removed roots from manhole and mainline	120
West Columbia	02396	Fixed 42-inch gravity line collapsed downstream	150
West Columbia	02400	Repaired collapsed pipeline	6,300
West Columbia	02406	Bypass failed during wet weather; Bypass pump rate was adjusted	1,878
Broad River	02435	Repaired pipe and manhole	4,680
West Columbia	02458	Fixed 42-inch gravity line collapsed downstream	16,295
West Columbia	02459	Fixed 42-inch gravity line collapsed downstream	174
Gills Creek	02516	Repaired temporary bypass discharge	2,900
Mill Creek	02572	Mainline repair	315,000
Saluda River	02627	Washed mainline to remove stoppage	2,731
Gills Creek	02650	Mainline repair	17,184
Saluda River	02710	Flow diversion to gravity for West Columbia Force Main wash caused overflow due to downstream bypass on the gravity. Stopped flow diversion to gravity line and removed bypass set up.	216,837

Note: Updated recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

1) SSOs caused by severe natural conditions (listed in Table B-1 in Appendix B) are not considered in this analysis. SSOs in Table 2-1 are covered under the CD and addressed in this report.

2) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

2.5.2 High and Low Priority for Rehabilitation

According to the CSAP re-inspection intervals, as defined in Section 4.2 of the CSAP, no system-wide re-inspections are required, and have not been completed since the IR Report and through the cut-off date of this Supplemental IR Report. Therefore, no additional proposed projects were identified to address the most critical Major Gravity Sewer Lines and major manholes in the poorest condition based on defect ratings or other information collected through the CSAP assessments and professional judgment. The assets and projects previously identified based on the system-wide condition assessment are included in Section 2.5.3 of the IR Report.

Section 3 Minor Gravity Sewer Lines and Minor Manholes

This section presents the application of the IR Program procedures for the assessment of rehabilitation needs and prioritization for minor gravity sewer lines and minor manholes on a Subbasin level per CSAP Section 2.2.1. As described more fully in Section 2.2.1 of the CSAP, the initial prioritization of the minor gravity sewer lines and minor manholes was conducted to identify high priority Subbasins.

The CSAP results include the CSAP Prioritization Process (as discussed in **Section 3.2**) which identifies high priority Subbasins for further assessment to identify and prioritize needs for rehabilitation or investigation (**Section 3.2.5**), if needed. Proposed actions were identified from the prioritization process (**Section 3.4**). The schedule for the projects identified to address the proposed actions for the minor gravity sewer lines and minor manholes is discussed in Section 8.

Recent historical SSOs (**Section 3.1**) within the high priority Subbasins, as identified in **Table 3-2**, are addressed either on a find and fix basis or within a project (as discussed in Section 3.4).

3.1 Recent Historical SSOs in High Priority Subbasins

As discussed in Section 2.1.1 of the IR Program, past SSOs related to gravity sewer lines and manholes are assumed to indicate a higher probability of an SSO occurring at that location in the future if a permanent solution to address the past SSO is not implemented. Therefore, it is important to understand the underlying cause of an SSO. For instance, an SSO may occur at a manhole, but the cause of the SSO may be an electrical problem at a Pump Station located some distance downstream of the overflowing manhole, or the underlying cause of the SSO is attributable to the gravity sewer line or manhole condition. The location, the underlying cause, and frequency of recent historical SSOs is used, as appropriate, in conjunction with the CSAP data and engineering judgment to establish the condition rating for the gravity sewer lines and manholes.

SSOs that occurred on minor gravity sewer lines and minor manholes in high priority Subbasins from May 21, 2014 (the Effective Date of the CD), through December 31, 2021 (the cut-off date for the Supplemental IR Report), are referred to as recent historical SSOs for this evaluation. The cause of each SSO is recorded at the time of the SSO investigation per the Wastewater Spill Response SOP. Causes of the recent historical SSOs on or as a result of issues on minor gravity sewer lines or minor manholes (in the high priority Subbasins) are grouped into the following categories:

- Wet Weather – SSOs primarily caused by wet weather events with excessive I/I entering the system and/or by capacity constraints in the WCTS. These SSOs may have been exacerbated by structural or maintenance issues.
- Structural Conditions – SSOs caused by issues related to the structural integrity of the pipe or manhole.
- O&M Conditions – SSOs caused by issues related to operations and maintenance such as build-up of grease, roots, and debris or Pump Station failures.

- Other – SSOs that are not related to wet weather, structural, or O&M conditions. This category includes SSOs that are a result of damage caused by third parties or SSOs that occur during temporary bypass operations.

For the purposes of the City's CAP, the CD allows the City to exclude those SSOs caused by severe natural conditions, such as hurricanes, tornados, widespread flooding, earthquakes, or rainfall events greater than a representative 2-year, 24-hour storm event, from the definition of a Surcharge Condition (Paragraph 12.e.i.F of the CD). Therefore, recent historical SSOs caused by rainfall events greater than a 2-year, 24-hour storm event (or other severe natural conditions per the CD) were not considered when assigning condition ratings and identifying rehabilitation priorities.

From the CSAP assessment as discussed in Section 3.2, high priority Subbasins were identified. Recent historical SSOs on minor gravity lines and minor manholes in these high priority Subbasins are listed in **Table 3-1** and **Table B-2** in Appendix B by high priority Subbasin. Table 3-1 lists recent historical SSOs on minor gravity sewer lines and minor manholes that were considered in the prioritization and proposed rehabilitation actions discussed later in Section 3. Table B-2 presents the remaining SSOs caused by severe natural conditions that were not considered in the prioritization and proposed rehabilitation actions discussed later in Section 3. A detailed list of each SSO, including the date, cause, estimated volume, and corrective action is included in **Appendix E**. No figure is included showing the SSO locations due to the large number of SSOs on minor gravity sewer lines and minor manholes.

Table 3-1 – Recent Historical SSOs on Minor Gravity Lines and Minor Manholes in High Priority Subbasins

Subbasin	SSO ID[1]	Estimated Volume (gallons)[2]
BR02	01550, 01551, 01553, 01562, 01589, 01592, 01593, 01613, 01614, 01664, 01741, 01832, 01850, 01865, 01937, 01938, 01967, 01972, 01978, 01981, 02077, 02129, 02199, 02251, 02315, 02316, 02385, 02440, 02478, 02532, 02560, 02634, 02667, 02678, 02704, 02738	62,509
BR04	01675, 01696, 01896, 01902, 01936, 01946, 02225, 02237, 02238, 02252, 02403, 02410, 02434, 02468, 02480, 02485, 02490, 02526	17,544
CC01	01488, 01498, 01533, 01585, 01650, 01709, 01711, 01714, 01730, 01736, 01821, 01857, 01859, 01866, 02033, 02064, 02112, 02202, 02239, 02256, 02270, 02589, 02682, 02725	29,614
CC02	01539, 01558, 01560, 01665, 01673, 01678, 01698, 01750, 01853, 01863, 01913, 01931, 01944, 02065, 02133, 02147, 02267, 02282, 02466, 02617, 02674, 02733, 02749	822,895
CC03	01547, 01728, 01855, 01939, 01977, 02017, 02244, 02248, 02313, 02481, 02543, 02596, 02707, 02752	15,937
CC04	01484, 01668, 01817, 01820, 01835, 01928, 02016, 02094, 02128, 02178, 02201, 02240, 02242, 02266, 02352, 02463, 02506, 02510, 02513, 02536, 02568, 02672, 02676	50,903
CC06	01594, 01833, 02013, 02181, 02236, 02305, 02366, 02447, 02492, 02504, 02540, 02652, 02656, 02661, 02662, 02708, 02723	32,769
GC01	01657, 01663, 01676, 01731, 01837, 02057, 02101, 02131, 02139, 02157, 02233, 02246, 02273, 02357, 02365, 02677, 02679, 02737	10,431
GC02	01528, 01574, 01788, 01831, 01917, 02150, 02299, 02308, 02341, 02418, 02429, 02562, 02642	5,427

Subbasin	SSO ID[1]	Estimated Volume (gallons)[2]
GC03	01546, 01568, 01580, 01679, 01680, 01708, 01800, 01804, 01845, 01871, 01885, 01893, 01905, 02071, 02105, 02127, 02148, 02164, 02216, 02318, 02511, 02599, 02693, 02709	52,889
GC04	02136	10
GC08	01507, 01653, 01692, 01738, 01740, 01787, 01843, 01961, 02002, 02124, 02187, 02234, 02356, 02372, 02373, 02384, 02590, 02675, 02690	43,286
GC10	01745, 02060, 02623	1,010
MC01	01497, 01524, 01532, 01566, 01578, 01606, 01630, 01677, 01886, 01922, 02079, 02145, 02172, 02173, 02180, 02209, 02272, 02307, 02322, 02382, 02412, 02433, 02494, 02505, 02509, 02528, 02624, 02740, 02743	74,620
RB03	01527, 01603, 01604, 01643, 01713, 01717, 01734, 01839, 01842, 01847, 01879, 01882, 01983, 02099, 02167, 02179, 02206, 02260, 02333, 02395, 02658	13,524
SB04	01493, 01514, 01732, 01854, 01876, 01982, 01989, 02018, 02032, 02059, 02108, 02141, 02154, 02207, 02275, 02311, 02345, 02426, 02471, 02499, 02525, 02606, 02688, 02692	42,578
SB05	01559, 01655, 01975, 02048, 02075, 02091, 02092, 02226, 02259, 02303, 02699	6,539
SB06	02008, 02135	80
SR02	01552, 01629, 01761, 01762, 01774, 01777, 01823, 01846, 01867, 02025, 02121, 02137, 02186, 02188, 02302, 02524, 02527, 02545, 02558, 02644, 02696, 02703, 02720, 02721, 02724, 02728	16,874
SR06	01515, 01526, 01721, 01739, 01742, 01751, 01767, 01877, 01887, 01921, 01947, 01979, 01986, 02078, 02103, 02109, 02364, 02439, 02487, 02570, 02576, 02619, 02731	9,864
SR10	01597, 01752, 01883, 01884, 01974, 02169, 02264, 02325	12,583
SR11	01586, 01724, 02001, 02014, 02061, 02156, 02335	627
SR12	01480, 01556, 01557, 01615, 01705, 01748, 01969, 01970, 02195, 02306, 02312, 02320, 02467, 02469, 02531, 02544	5,154
SR15	01505, 01873, 02117, 02126	1,080

Note: SSOs on minor gravity sewer lines and minor manholes caused by severe natural conditions (listed in Table B-2 in Appendix B) are not considered in this analysis. SSOs in Table 3-1 are covered under the CD and addressed in this report.

1) Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014) through December 31, 2021.

2) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

3.2 Results of the CSAP

The CSAP describes the methods and procedures that may be used by the City to assess the condition of the minor components of the WCTS. According to Section 2.2.1 of the CSAP, the initial prioritization of the minor gravity sewers and manholes for condition assessment will be performed primarily on a Subbasin level. Initial condition assessment will be performed on the highest priority facilities using methods

described in Section 3 of the CSAP. The City selected and completed the following under the CSAP for minor gravity sewer lines and minor manholes which are summarized in the sections referenced below:

- Flow monitoring was conducted in accordance with the procedures defined in CSAP Section 3.5. Results are discussed in **Section 3.2.1** of this report.
- Initial prioritization to identify high priority Subbasins was conducted in accordance with the procedures defined in CSAP Section 2.2.1. Results are discussed in **Section 3.2.2** of this report.
- Initial condition assessment of identified high priority Subbasins was conducted in accordance with the procedures defined in CSAP Section 3. Results are discussed in **Section 3.2.3** of this report.
- Actions were identified within high priority Subbasins based on the results of the initial condition assessment and prioritized for rehabilitation as discussed in Section 3.2.5 with results discussed in Section 3.4 of this report.

3.2.1 Flow Monitoring

The City continues to collect flow data through temporary and permanent monitors in accordance with procedures set forth in the CSAP. This data is periodically evaluated and incorporated into the CSAP evaluations as the City deems appropriate. See Section 2.2.1 of the IR Report for additional information on flow monitoring, including data collection, evaluation and Subbasin flow characteristics. Additional flow monitoring data utilized for estimating I/I removal for this report that was not previously included in the IR Report is included in Section 8.3.1 of this report.

For the minor gravity sewer lines and minor manholes presented in this Supplemental IR Report, the flow monitoring results were utilized along with several other factors, such as SSOs, as a part of the initial prioritization (Section 3.2.2) in assigning condition ratings to identify high priority Subbasins.

3.2.2 Initial Subbasin Prioritization for Condition Assessment

The initial prioritization for minor gravity sewer lines and minor manholes was conducted by desktop assessment on a Subbasin level in accordance with Section 3 of the CSAP. The desktop assessment identifies high priority Subbasins for initial condition assessment and considers the condition rating only since criticality ratings are asset specific as discussed in the sections below.

Based on the desktop assessments, the following Subbasins were identified as high priority as shown in Table 3-2 and **Figure 3-1**.

Table 3-2 – High Priority Subbasins

Subbasin ID	Subbasin ID	Subbasin ID	Subbasin ID
BR02	CC06	GC10	SR02
BR04	GC01	MC01	SR06
CC01	GC02	RB03	SR10
CC02	GC03	SB04	SR11
CC03	GC04	SB05	SR12
CC04	GC08	SB06	SR15

3.2.2.1 Subbasin Criticality Rating

The criticality rating is currently not utilized as a part of the desktop assessment of minor gravity sewer lines and minor manholes since the prioritization is currently conducted on a Subbasin level.

3.2.2.2 Subbasin Condition Rating

The desktop assessment incorporates several condition criteria including age and material of pipes, work orders and customer service requests, flow monitoring data, and SSOs to calculate a condition rating. The criteria are weighted, and a combined condition score is calculated for each Subbasin. The calculated condition rating for each Subbasin is grouped into priority categories. Subbasins with the highest condition scores are prioritized for condition assessment.

High priority Subbasins that are currently included in an ongoing or completed project are excluded from the further condition assessment because it is anticipated that the Subbasin issues have been or will be addressed. These Subbasins will be reevaluated during subsequent prioritization according to the CSAP. Subbasins that are not considered high priority may not have any condition assessment conducted but will be reevaluated to determine if they are high priority during the next prioritization year using the desktop assessment. The desktop assessment is conducted periodically to identify high priority Subbasins for condition assessment per the CSAP.

3.2.3 Initial Condition Assessment for High Priority Subbasins

High priority Subbasins are initially assessed utilizing one or more methods described in Section 3 of the CSAP. As described in CSAP Section 2.2.1, the procedures used to assess the condition of the gravity system are selected based on which criteria contributed to the condition score and engineering judgment. The combination of methods to address any issues within the high priority Subbasins and the areas assessed by each type of method varies widely and, in some cases, may include the use of more than one method. The desktop condition assessment entails an in-depth review of prioritization factors, I/I and SSO cause analysis, and Subbasin specific characteristics. With the importance of addressing conditions that may lead to potential SSOs, SSOs within each high priority Subbasin are reviewed on a Subbasin level based on cause, location, and other factors that may provide insight into underlying issues that may need to be addressed within the Subbasin or a portion of the Subbasin.

During the desktop condition assessment of the high priority Subbasins, a detailed review of the high priority Subbasins is conducted with key City staff and personnel as a part of the prioritization process. The in-depth and collaborative review considers not only the initial desktop assessment and condition

information captured within the Subbasin, but also takes into consideration work order history, reasons for work orders, and any City staff and personnel insight and institutional knowledge of the Subbasin and recurring issues that may need to be addressed.

3.2.4 Summary of I/I Sources within High Priority Subbasins

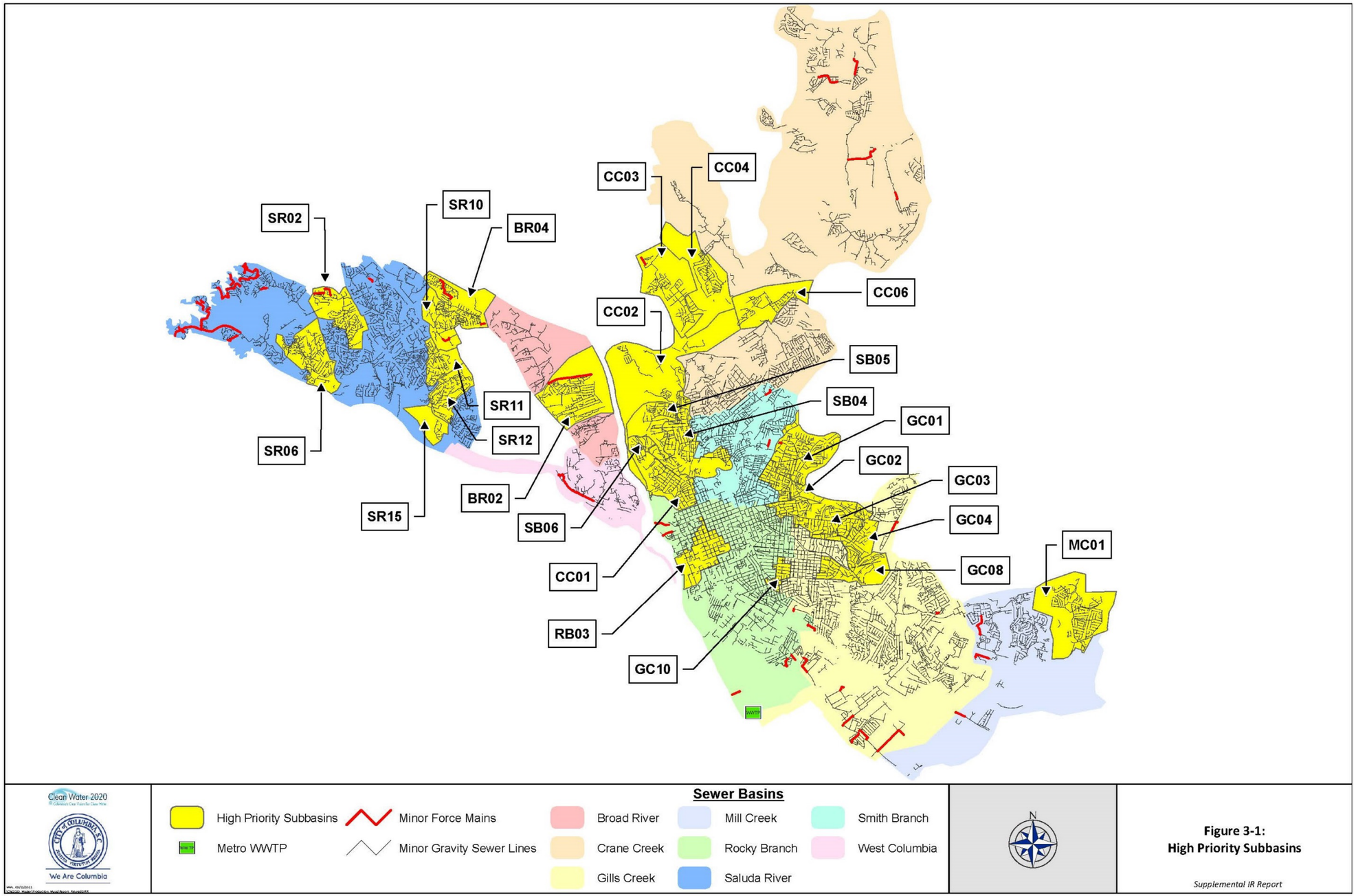
Defects identified in the minor gravity sewer lines (summarized in **Table C-2** in Appendix C) and minor manholes (summarized in **Table D-2** in Appendix D) in high priority Subbasins may potentially contribute I/I to the WCTS. The minor gravity sewer lines and minor manholes are prioritized on a Subbasin level for condition assessment. Condition information is captured utilizing various methods as described in Section 3.2.3, which includes desktop assessments and other methods that may not identify I/I sources on an asset level. Therefore, condition information in Table C-2 and D-2 is summarized only for high priority Subbasins and includes select assets where condition information was captured in a method as described in CSAP Section 3 that resulted in defect coding that can be directly attributed to I/I sources. The theoretical I/I contribution to each Subbasin (listed in Appendix A of the IR Report) is determined through flow monitoring using the procedures outlined in Section 2.1.1 of the IR Program and engineering judgment. Accordingly, the flow information is used as a guide to help identify overall Subbasins with the highest I/I, as well as for the purposes listed above.

3.2.5 Prioritization for Rehabilitation within High Priority Subbasins

As a part of the City's prioritization process, the results of the initial condition assessment (Section 3.2.3) are evaluated, presented, discussed, and any resulting actions are identified. Actions identified within each Subbasin vary widely based on the findings of the initial condition assessment and are specific to each Subbasin and in some cases, to smaller areas within each Subbasin. In some instances, a desktop condition assessment or field screening method is selected for all or a portion of a Subbasin to determine if a more intensive inspection method is needed. The issues to be addressed or additional actions needed within the high priority Subbasins are identified, prioritized, and included in a project based on engineering judgement. These can include a range of actions from rehabilitation, O&M, or other actions identified.

During the prioritization process, the project types are identified to address the actions identified within the high priority Subbasins. Examples of project types are Rehabilitation, O&M Projects, Further Inspection and Continued Monitoring. However, the City reserves the right to choose a different project type or types that will address the actions identified, as needed. The identification and prioritization of the actions into project types is the final step of the CSAP Prioritization Process and projects are identified to complete the proposed corrective actions (Section 3.4).

Figure 3-1 – High Priority Subbasins



3.3 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified. Find and fix repairs are intended to promptly address assets that are discovered, through the course of continuing WCTS inspections, to be in poor condition with a high probability of failure. Those minor gravity sewer line and minor manhole components determined to be in poor condition (based on professional judgment and condition assessment) are scheduled to be repaired without being prioritized and grouped into scheduled rehabilitation actions. The find and fix actions also include rehabilitation or repairs that are made to promptly address defects that are found to be the cause of an SSO in order to avoid recurrent SSOs.

3.4 Proposed Corrective Actions

The proposed corrective actions under the Supplemental IR Report to address conditions causing SSOs on minor gravity sewer line and manhole segments are presented in the following sections. Corrective actions are categorized by those that address recent historical SSOs as discussed in **Section 3.4.1**, or those to address assets that have not yet failed but are highest priority for rehabilitation based on condition as discussed in **Section 3.4.2**. Overall WCTS project grouping and scheduling is discussed in Section 8.

3.4.1 Recent Historical SSOs

The projects listed in **Table 3-3**, with locations shown on **Figure 3-2,** are capacity improvements to address the root cause of recent historical Wet Weather SSOs as determined through review of SSO investigations, CSAP assessment, hydraulic modeling, or other available information. Recent historical SSOs caused by structural, O&M, or other conditions that were addressed by find and fix actions to address the root cause are listed in **Table 3-4**. The corrective action and volume for each SSO is included in Appendix E.

Table 3-3 – Capacity Improvement Projects to Address Recent Historical SSOs within High Priority Subbasins on Minor Gravity Sewer Lines and Minor Manholes

Subbasin	SSO ID[1]	Project Name	Estimated Volume (gallons)[2]
BR04	01675, 01696, 01896, 01902, 02225, 02238, 02252, 02403, 02468, 02480, 02490	SS7583 – SR02 and BR04 Engineer Led Find & Fix Rehabilitation	9,876
CC02	01539, 01698	SS6954 – 48" Sanitary Sewer Interceptor Along Crane Creek and Broad River[3]	784,875
GC03	01680, 01893, 02216	SS7261 – Lake Katherine Sewer Line Capacity Enhancement[3]	38,325

Note: SSOs caused by severe natural conditions (listed in Table B-2 in Appendix B) are not considered in this analysis. SSOs in Table 3-1 are covered under the CD and addressed in this report.

1) Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014) through December 31, 2021.

2) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown. Projects previously included in IR Report; however, new or additional SSOs have occurred in those locations since the IR Report. Volumes only include SSO volume from SSOs since the IR Report. These projects are not included in any figures in Section 8 of the Supplemental IR Report since they were previously identified as a project and included in the IR Report.

Figure 3-2 – Capacity Improvement Projects to Address Recent Historical SSOs within High Priority Subbasins on Minor Gravity Sewer Lines and Minor Manholes

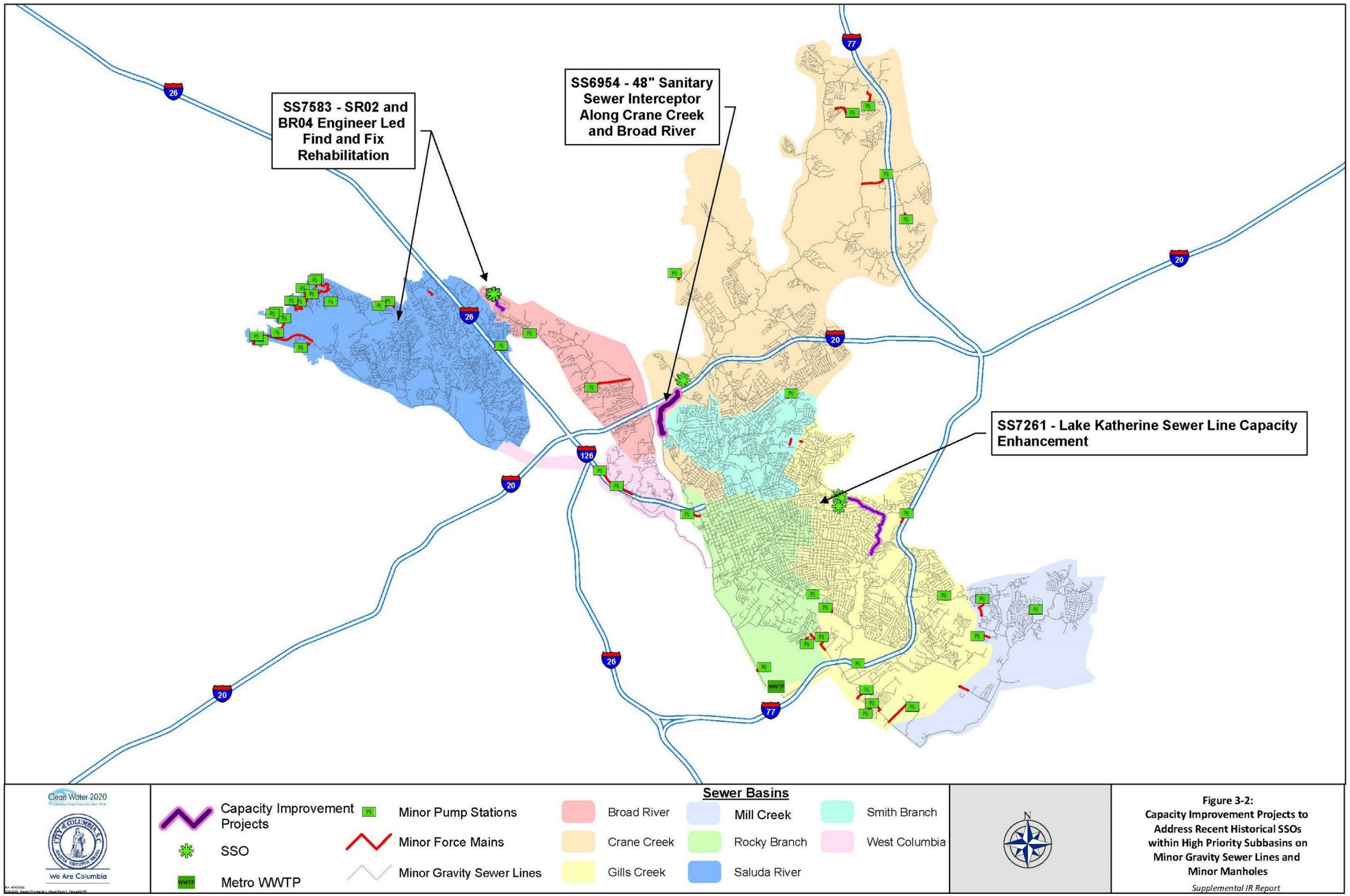


Table 3-4 – Recent Historical SSOs within High Priority Subbasins on Minor Gravity Sewer Lines and Minor Manholes Addressed by Find and Fix Actions

Subbasin	SSO ID[1]	Estimated Volume (gallons)[2]
BR02	01550, 01551, 01553, 01562, 01589, 01592, 01593, 01613, 01614, 01664, 01741, 01832, 01850, 01865, 01937, 01938, 01967, 01972, 01978, 01981, 02077, 02129, 02199, 02251, 02315, 02316, 02385, 02440, 02478, 02532, 02560, 02634, 02667, 02678, 02704, 02738	62,509
BR04	01936, 01946, 02237, 02410, 02434, 02485, 02526	7,668
CC01	01488, 01498, 01533, 01585, 01650, 01709, 01711, 01714, 01730, 01736, 01821, 01857, 01859, 01866, 02202, 02033, 02064, 02112, 02239, 02256, 02270, 02589, 02682, 02725	29,614
CC02	01558, 01560, 01665, 01673, 01678, 01750, 01853, 01863, 01913, 01931, 01944, 02065, 02133, 02147, 02267, 02282, 02466, 02617, 02674, 02733, 02749	38,020
CC03	01547, 01728, 01855, 01939, 01977, 02017, 02244, 02248, 02313, 02481, 02543, 02596, 02707, 02752	15,937
CC04	01484, 01668, 01817, 01820, 01835, 01928, 02016, 02094, 02128, 02178, 02201, 02240, 02242, 02266, 02352, 02463, 02506, 02510, 02513, 02536, 02568, 02672, 02676	50,903
CC06	01594, 01833, 02013, 02181, 02236, 02305, 02366, 02447, 02492, 02504, 02540, 02652, 02656, 02661, 02662, 02708, 02723	32,769
GC01	01657, 01663, 01676, 01731, 01837, 02057, 02101, 02131, 02139, 02157, 02233, 02246, 02273, 02357, 02365, 02677, 02679, 02737	10,431
GC02	01528, 01574, 01788, 01831, 01917, 02150, 02299, 02308, 02341, 02418, 02429, 02562, 02642	5,427
GC03	01546, 01568, 01580, 01679, 01708, 01800, 01804, 01845, 01871, 01885, 01905, 02071, 02105, 02127, 02148, 02164, 02318, 02511, 02599, 02693, 02709	14,564
GC04	02136	10
GC08	01507, 01653, 01692, 01738, 01740, 01787, 01843, 01961, 02002, 02124, 02187, 02234, 02356, 02372, 02373, 02384, 02590, 02675, 02690	43,286
GC10	01745, 02060, 02623	1,010
MC01	01497, 01524, 01532, 01566, 01578, 01606, 01630, 01677, 01886, 01922, 02079, 02145, 02172, 02173, 02180, 02209, 02272, 02307, 02322, 02382, 02412, 02433, 02494, 02505, 02509, 02528, 02624, 02740, 02743	74,620
RB03	01527, 01603, 01604, 01643, 01713, 01717, 01734, 01839, 01842, 01847, 01879, 01882, 01983, 02099, 02167, 02179, 02206, 02260, 02333, 02395, 02658	13,524
SB04	01493, 01514, 01732, 01854, 01876, 01982, 01989, 02018, 02032, 02059, 02108, 02141, 02154, 02207, 02275, 02311, 02345, 02426, 02471, 02499, 02525, 02606, 02688, 02692	42,578
SB05	01559, 01655, 01975, 02048, 02075, 02091, 02092, 02226, 02259, 02303, 02699	6,539
SB06	02008, 02135	80

Subbasin	SSO ID[1]	Estimated Volume (gallons)[2]
SR02	01552, 01629, 01761, 01762, 01774, 01777, 01823, 01846, 01867, 02025, 02121, 02137, 02186, 02188, 02302, 02524, 02527, 02545, 02558, 02644, 02696, 02703, 02720, 02721, 02724, 02728	16,874
SR06	01515, 01526, 01721, 01739, 01742, 01751, 01767, 01877, 01887, 01921, 01947, 01979, 01986, 02078, 02103, 02109, 02364, 02439, 02487, 02570, 02576, 02619, 02731	9,864
SR10	01597, 01752, 01883, 01884, 01974, 02169, 02264, 02325	12,583
SR11	01586, 01724, 02001, 02014, 02061, 02156, 02335	627
SR12	01480, 01556, 01557, 01615, 01705, 01748, 01969, 01970, 02195, 02306, 02312, 02320, 02467, 02469, 02531, 02544	5,154
SR15	01505, 01873, 02117, 02126	1,080

Note: SSOs on minor gravity sewer lines and minor manholes caused by severe natural conditions (listed in Table B-2 in Appendix B) are not considered in this analysis. SSOs in Table 3-1 are covered under the CD and addressed in this report.

1) Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014) through December 31, 2021.

2) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

3.4.2 High Priority Subbasins for Rehabilitation

In addition to the projects to address SSOs as discussed in Section 3.4.1, proposed projects or actions were identified to address issues with minor gravity sewer lines and minor manholes within high priority Subbasins based on initial desktop assessment and prioritization or other information collected through the CSAP assessments.

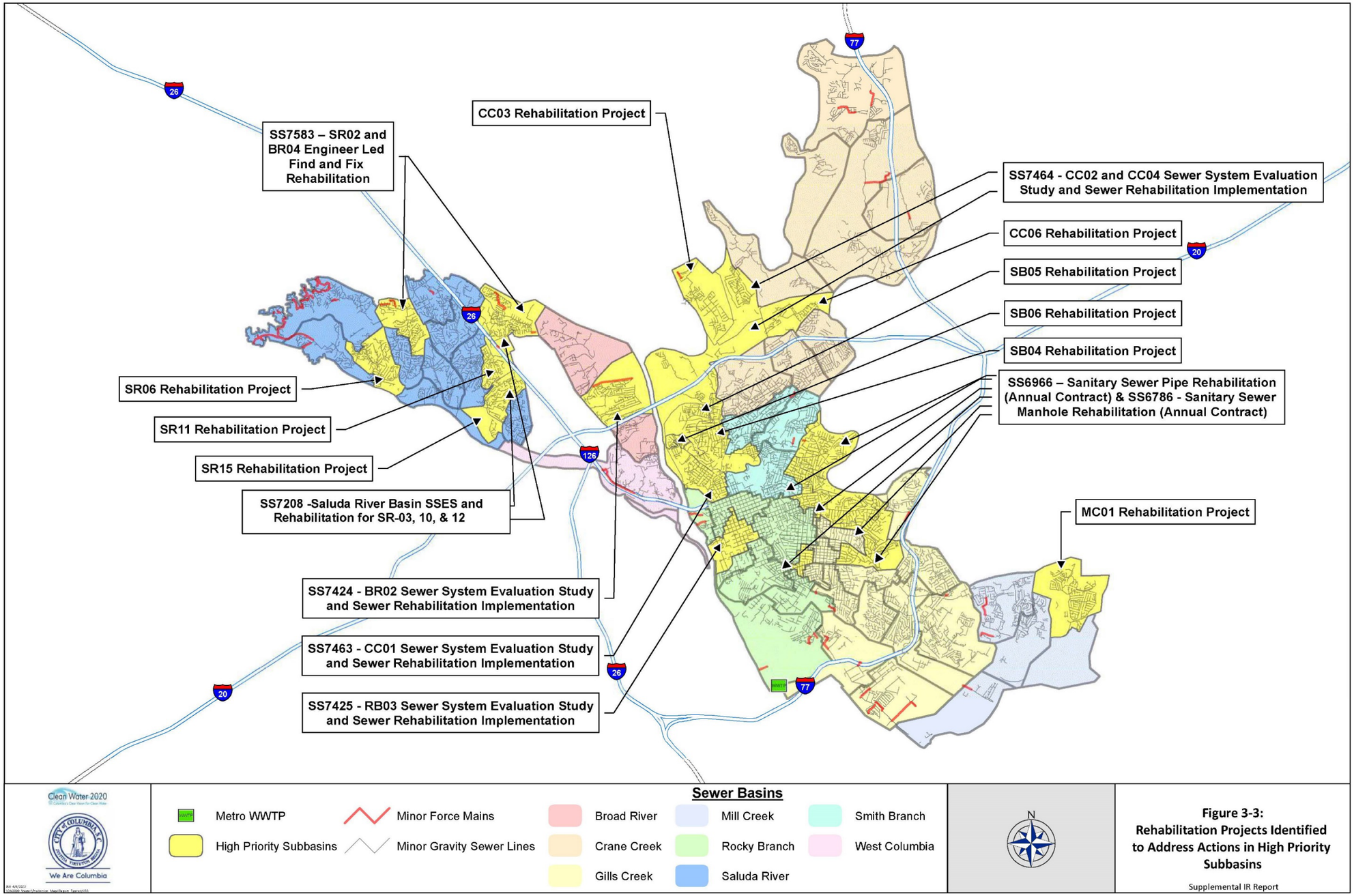
The projects listed in **Table 3-5**, with locations shown on **Figure 3-3,** were identified to address issues such as condition, O&M related items, and other concerns on minor gravity sewer lines and minor manholes that were identified within high priority Subbasins from the CSAP Prioritization Process.

In some cases, actions identified in Table 3-5 within high priority Subbasins in this Supplemental IR Report are currently incorporated into some of the City's larger planned projects, which include rehabilitation and/or replacement of other areas and/or assets that are not scheduled for rehabilitation under the CSAP Prioritization Process. The City reserves the right to address these actions within high priority Subbasins, identified in the CSAP Prioritization Process separately from these larger planned projects if deemed more appropriate, or to modify the project type used to complete the actions. These actions will be completed in accordance with the project scheduling in Section 8. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, portions of subbasins, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

Table 3-5 – Rehabilitation Projects to Address Actions within High Priority Subbasins

Project Name	Actions
SS7424 – BR02 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin BR02
SS7583 – SR02 and BR04 Engineer Led Find & Fix Rehabilitation	Evaluation and rehabilitation of priority pipes and manholes upstream of the Harbison #4 Pump Station in Subbasin BR04 & evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin SR02
SS7463 – CC01 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin CC01
SS7464 – CC02 and CC04 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasins CC02 and CC04
CC03 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin CC03
CC06 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in Subbasin CC06
SS6966 – Sanitary Sewer Pipe Rehabilitation (Annual Contract) & SS6786 - Sanitary Sewer Manhole Rehabilitation (Annual Contract)	Evaluation and rehabilitation of priority pipes and manholes in Subbasins GC01, GC02, GC03, GC04, GC08 and GC10
MC01 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in Subbasin MC01
SS7425 – RB03 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin RB03
SB04 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SB04
SB05 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SB05
SB06 Rehabilitation Project	Evaluation and rehabilitation of priority pipes in Subbasin SB06
SR06 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin SR06
SS7208 – Saluda River Basin SSES and Rehabilitation for SR-03, 10, & 12	Evaluation and rehabilitation of priority pipes and manholes in Subbasins SR10 and SR12
SR11 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SR11
SR15 Rehabilitation Project	Evaluation and rehabilitation of priority pipes in Subbasin SR15

Figure 3-3 – Rehabilitation Projects Identified to Address Actions in High Priority Subbasins



Section 4 Update of Major Pump Stations

This section presents the continued application of the IR Program procedures for Major Pump Stations. This section is an update to the IR Report for the Major Pump Stations and includes only additional information that was captured since the IR Report through the cut-off date of this report as discussed in Section 1. The process for Major Pump Station assessment, rating, and prioritization is described in Section 3 of the IR Report. Updates to information presented in the IR Report are included in each section below. This section includes the review of updated recent SSO history (**Section 4.1**), updated results of the CSAP assessments (**Section 4.2**), updates from the prioritization process (**Section 4.3**), and additional proposed actions that were identified (**Section 4.5**). The update to the schedule for the rehabilitation of the Major Pump Stations is discussed in Section 8.

4.1 Updated Recent Historical SSOs

As discussed in Section 2.2.1 of the IR Program, past SSOs related to a given Major Pump Station are assumed to indicate a higher probability of an SSO occurring at that location in the future if a permanent solution to address the past SSO is not implemented.

SSOs that occurred at or as a result of Major Pump Stations from January 1, 2019, through December 31, 2021, are referred to as updated recent historical SSOs for this evaluation. The IR Report included SSOs from May 21, 2014 (the Effective Date of the CD), through December 31, 2018, and these are not included in this report. SSO cause was recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP and any updates are based on further evaluation. Causes of the recent historical SSOs on or as a result of Major Pump Stations are grouped into the categories of Wet Weather, Structural Conditions, O&M Conditions, and Other as defined in Section 3.1 of the IR Report.

Updated recent historical SSOs on Major Pump Stations are listed in **Table 4-1** and shown on **Figure 4-1**. None of the recent historical SSOs on Major Pump Stations were caused by severe natural conditions.

Table 4-1 – Updated Recent Historical SSOs on Major Pump Stations

			SSO Characteristics		
Date[1]	SSO ID	Pump Station	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
3/4/2019	02285	Broad River	3rd Party Responsible	Other	122,833
3/8/2019	02290	North Columbia	Equipment	Other	50
12/13/2019	02391	Broad River	Pump Station Failure	Other	26,063
2/8/2020	02461	Saluda River	Equipment	Other	790
8/22/2021	02717	Broad River	Pump Station Failure	Other	9,522
12/30/2021	02754	Mill Creek	Pump Station Failure	Other	86,920

1) Updated recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

2) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

3) SSO category is assigned for this evaluation based on the SSO cause. See Section 3.1 of the IR Report for category definitions.

4) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Figure 4-1 – Updated Recent Historical SSOs on Major Pump Stations

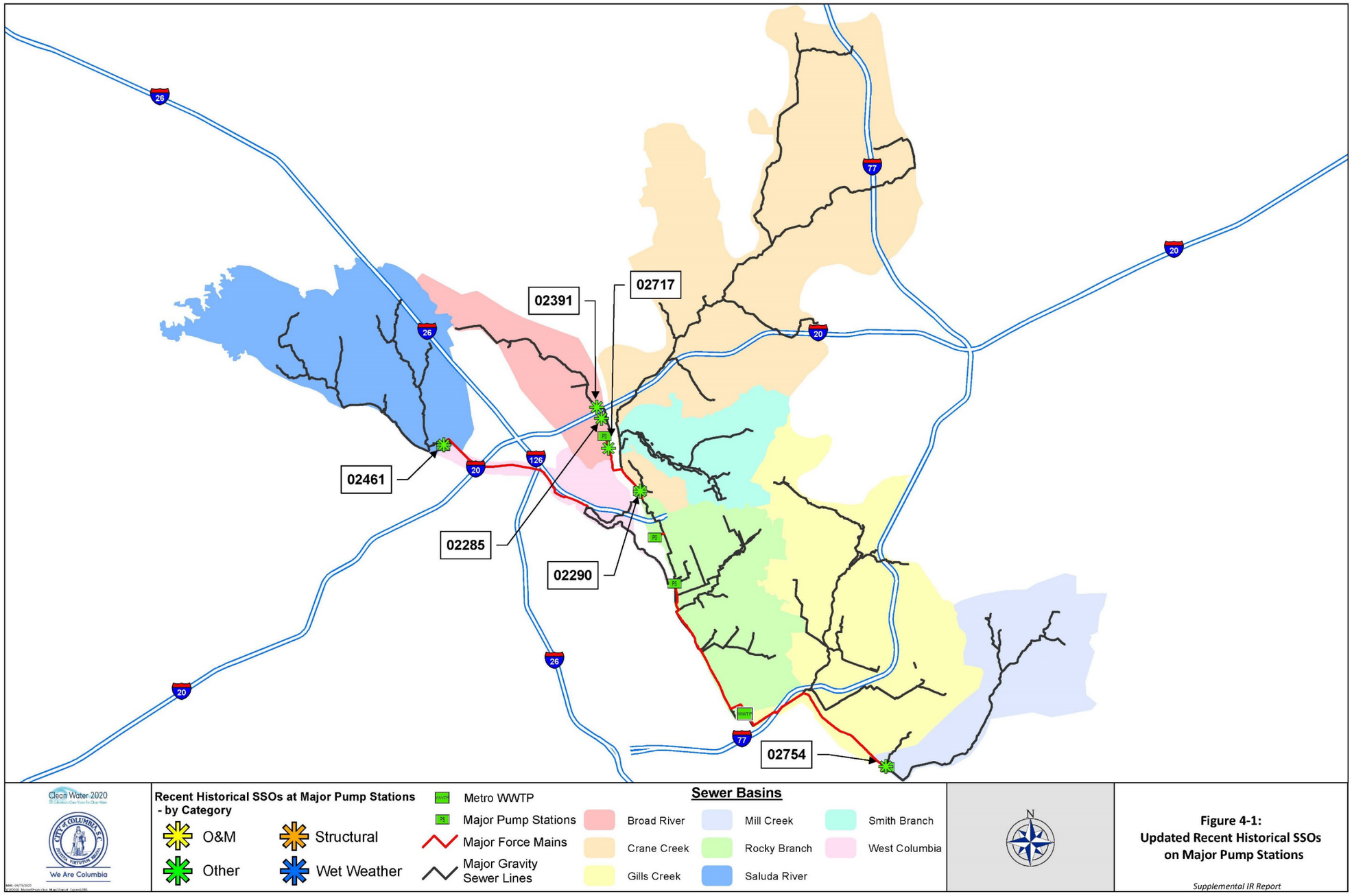


Figure 4-1:
Updated Recent Historical SSOs on Major Pump Stations

Supplemental IR Report

4.2 Updated Results of the CSAP

The following is an update to the CSAP results section (Section 3.2) of the IR Report. The CSAP report describes various methods and procedures that may be used by the City to assess the condition of the major components of the WCTS. The City selected and completed the following assessments under the CSAP for the Major Pump Stations.

- All Major Pump Stations were assessed using the methods and procedures described in CSAP Section 3.10.5. This approach consists of a review of Pump Station operating history and a visual inspection and assessment of the condition of Pump Station components to the extent possible without disrupting operations. Updates to the results previously presented in the IR Report are discussed in this section. The evaluation approach utilized is outlined in Section 3 of the IR Report.
- Updated condition information was incorporated into the desktop analysis, where available. The Major Pump Stations that were identified as the highest priority from the updated desktop analysis based on the condition and criticality ratings discussed in Section 4.3 were recommended for further assessment using methods described in Section 3 of the CSAP per CSAP Section 2.1.2.

4.3 Prioritizing Based on Condition and Criticality Ratings

The process established in the IR Program was used to identify and prioritize rehabilitation actions for the Major Pump Stations as discussed in Section 3.3 of the IR Report. Specific rehabilitation actions for prioritized Major Pump Stations that were not included in the IR Report are presented in Section 4.5 of this Supplemental IR Report.

4.4 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified and as previously described in the IR Report in Section 3.4.

4.5 Additional Proposed Corrective Actions

The additional proposed corrective actions under the Supplemental IR Report to address conditions causing SSOs at or as a result of Major Pump Stations are presented in the following sections. Corrective actions are categorized by those that address updated recent historical SSOs, or those to address assets that have not yet failed but are highest priority for rehabilitation based on condition and criticality. Overall WCTS project grouping and scheduling is discussed in Section 8.

4.5.1 Updated Recent Historical SSOs

Find and fix actions, as listed in **Table 4-2**, were performed to address the root cause of all updated recent historical SSOs caused by structural or other conditions at the Major Pump Stations.

Table 4-2 – Find and Fix Actions to Address Updated Recent Historical SSOs on Major Pump Stations

Pump Station	SSO ID	Find and Fix Action	Estimated Volume (gallons)[1]
Broad River	02285	Fluctuating utility power did not allow high voltage equipment to operate. Manually opened the discharge valves and restarted the pumps. Utility restored power to pump station site	122,833
North Columbia	02290	Replaced leaking Air Release Valve (ARV)	50
Broad River	02391	Electrical issues caused breaker to trip; reset VFDs, pump station breaker	26,063
Saluda River	02461	Tightened bolts on bulkhead to stop leak	790
Broad River	02717	VFD breaker tripped due to short; reset VFD breaker	9,522
Mill Creek	02754	Pumps tripped during cleaning. Pumps were reset and restored to full operation	86,920

Note: Updated recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

1) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

4.5.2 High Priority for Rehabilitation

In addition to addressing SSOs on a find and fix basis as identified in Table 4-2, proposed projects were identified to address the most critical Major Pump Stations in the poorest condition based on the desktop prioritizations, defect ratings or other information collected through the CSAP assessments. These Major Pump Stations are considered high priority for rehabilitation.

The projects listed below, with locations shown on **Figure 4-2**, were identified to address capacity, condition, and other concerns on Major Pump Stations that were identified as high priority from the updated CSAP desktop analysis.

In some cases, Major Pump Stations identified as high priority may be incorporated into larger planned projects. The City reserves the right to rehabilitate the high priority assets separately from these larger planned projects if deemed more appropriate. The high priority assets will be rehabilitated in accordance with the project scheduling in Section 8. However, complications in implementing the complete project (right-of-way permitting, budgeting, etc.) may dictate that the high priority Major Pump Stations be completed separately from the larger project. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

High priority Major Pump Stations that were not previously identified in the IR Report and are in need of rehabilitation based on the updated desktop assessment and engineering judgment are listed below and are included in rehabilitation projects shown in **Table 4-3**.

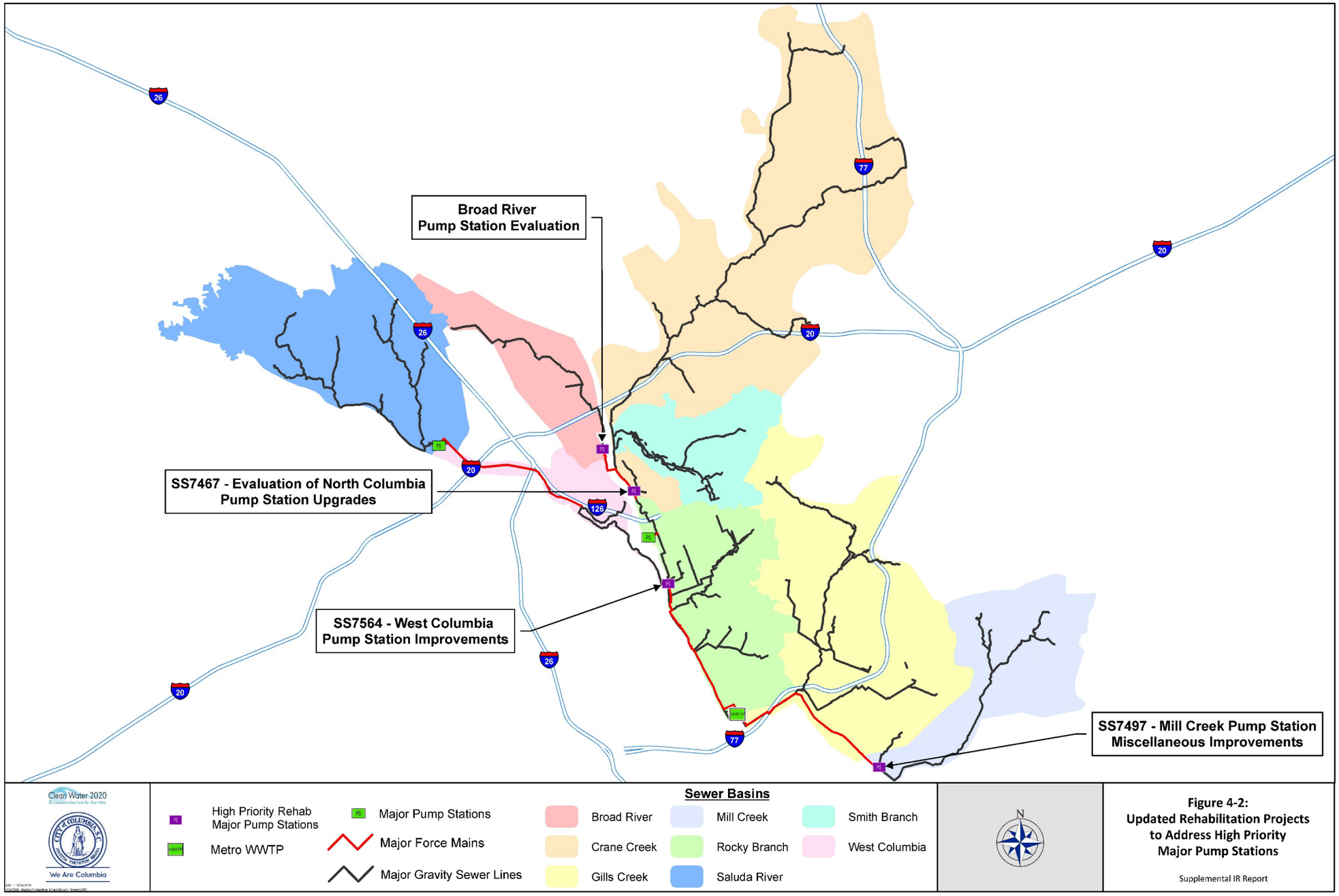
- Broad River Pump Station

- North Columbia Pump Station
- West Columbia Pump Station
- Mill Creek Pump Station

Table 4-3 – Updated Rehabilitation Projects to Address High Priority Major Pump Stations

Project Name	Actions
Broad River Pump Station Evaluation	Address electrical issues contributing to SSOs
SS7467 – Evaluation of North Columbia Pump Station Upgrades	Evaluation and upgrades to North Columbia Pump Station
SS7564 – West Columbia Pump Station Improvements	Evaluation and upgrades to West Columbia Pump Station
SS7497 – Mill Creek Pump Station Miscellaneous Improvements	Evaluation and upgrades to Mill Creek Pump Station

Figure 4-2 – Updated Rehabilitation Projects to Address High Priority Major Pump Stations



Section 5 Minor Pump Stations

This section presents the application of the IR Program procedures for Minor Pump Stations. SSO history (**Section 5.1**) and results of the CSAP assessments (**Section 5.2**) were used as a basis to assign condition ratings. Condition ratings and criticality ratings were combined for the prioritization process (**Section 5.3**). From the prioritization process, proposed actions were identified (**Section 5.5**). The schedule for the rehabilitation of the Minor Pump Stations is discussed in Section 8.

5.1 Recent Historical SSOs

As discussed in Section 2.2.1 of the IR Program, past SSOs related to a given Minor Pump Station are assumed to indicate a higher probability of an SSO occurring at that location in the future if a permanent solution to address the past SSO is not implemented. Therefore, it is important to understand the underlying cause of an SSO. For instance, an SSO may occur at a manhole, but the cause of the SSO may be an electrical problem at a Pump Station located some distance downstream of the overflowing manhole. If the underlying cause of the SSO is attributable to the Pump Station condition, the location and frequency of recent historical SSOs is used, as appropriate, in conjunction with the CSAP data and professional judgment to establish the condition rating for the Pump Station.

SSOs that occurred at or as a result of Minor Pump Stations from May 21, 2014 (the Effective Date of the CD), through December 31, 2021, are referred to as recent historical SSOs for this evaluation. SSO cause was recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP and any updates are based on further evaluation. Causes of the recent historical SSOs on or as a result of Minor Pump Stations are grouped into the following categories:

- Wet Weather – SSOs primarily caused by wet weather events with I/I entering the system and/or capacity constraints in the WCTS.
- Structural Conditions – SSOs due to issues related to the structural integrity of the Pump Station or components.
- O&M Conditions – SSOs due to issues related to O&M.
- Other – SSOs that are not related to wet weather, structural, or O&M conditions. This category includes SSOs that are the result of loss of power, electrical issues, or operator error.

For the purposes of the City's CAP, the CD allows the City to exclude those SSOs caused by severe natural conditions such as hurricanes, tornados, widespread flooding, earthquakes, or rainfall events greater than a representative 2-year, 24-hour storm event from the definition of Surcharge Condition (Paragraph 12.e.i.F of the CD). Therefore, recent historical SSOs caused by rainfall events greater than a 2-year, 24-hour storm event (or other severe natural conditions per the CD) were not considered when assigning condition ratings and identifying rehabilitation priorities.

Recent historical SSOs on Minor Pump Stations are listed in **Table 5-1** and shown on **Figure 5-1**. Table 5-1 lists updated recent historical SSOs on Minor Pump Stations that are covered under the CD and addressed in this Supplemental IR Report. None of the recent historical SSOs on Minor Pump Stations are caused by severe natural conditions.

Table 5-1 – Recent Historical SSOs on Minor Pump Stations

			SSO Characteristics		
Date[1]	SSO ID	Pump Station	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
12/25/2014	01544	Starlite	3rd Party Responsible	Other	4,659
6/10/2015	01610	Bookert Heights	3rd Party Responsible	Other	1
3/29/2016	01744	Colonial Life	Pump Station Failure	Other	350
4/1/2016	01746	Starlite	Pump Station Failure	Other	750
7/25/2016	01775	Colonial Life	Pump Station Failure	Other	700
7/29/2016	01776	Hillcreek #2	Pump Station Failure	Other	50
10/8/2016	01814	Galaxy	3rd Party Responsible	Other	Unknown
5/2/2017	01924	Colonial Life	Debris	Other	100
5/4/2017	01927	Meadowlands	Equipment	Other	85
5/23/2017	01932	Colonial Life	Equipment	Other	2,000
5/26/2017	01933	Harbison 2	Pump Station Failure	Other	120
9/11/2017	01962	Yacht Cove	Equipment	Other	45
7/6/2018	02158	Harbison 2	Pump Station Failure	Other	485
10/11/2018	02196	Starlite	3rd Party Responsible	Other	875
3/13/2019	02297	Harbison 4	Pump Station Failure	Other	383
7/22/2019	02346	Animal Shelter	Pump Station Failure	Other	32
12/13/2019	02389	Starlite	Pump Station Failure	Other	7,370
1/12/2020	02423	Starlite	Wet Weather	Wet Weather	12,675
1/13/2020	02424	Hillcreek #2	Pump Station Failure	Other	474
4/13/2020	02498	Hillcreek #2	3rd Party Responsible	Other	10
5/23/2020	02521	Hillcreek #2	3rd Party Responsible	Other	3375
7/7/2020	02533	Lake Murray WTP	Pump Station Failure	Other	1,500
1/3/2021	02612	Wexford	Pump Station Failure	Other	497
1/14/2021	02621	Broad River	Equipment	Other	150
2/8/2021	02628	Hillcreek #2	Pump Station Failure	Other	153,808
4/14/2021	02671	Farrow Pointe	Equipment	Other	20
4/30/2021	02680	Farrow Pointe	Equipment	Other	70
5/6/2021	02683	Lake Murray WTP	Equipment	Other	30

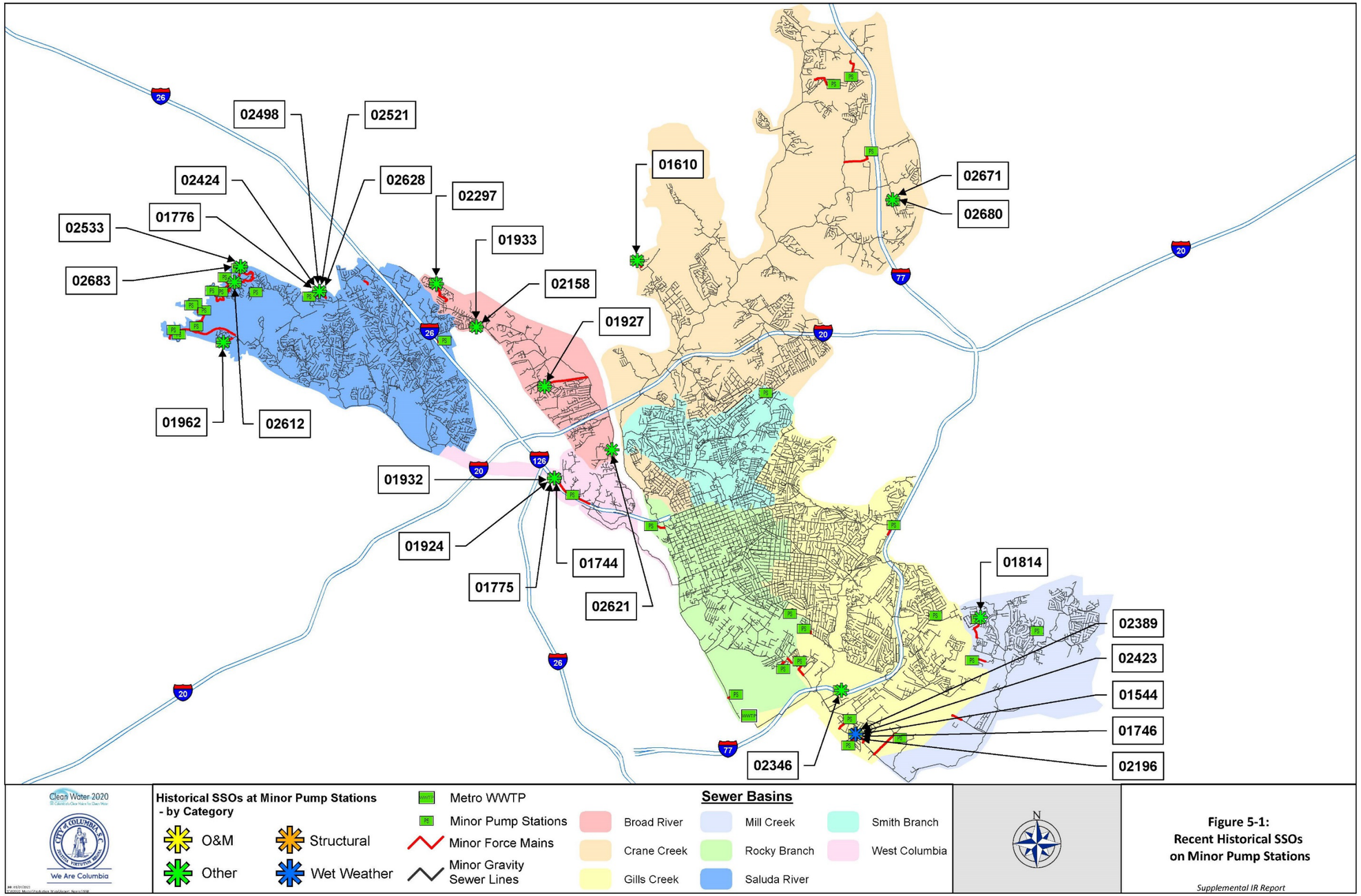
1) Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014), through December 31, 2021.

2) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

3) SSO category is assigned for this evaluation based on the SSO cause. See Section 5.1 for category definitions.

4) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Figure 5-1 – Recent Historical SSOs on Minor Pump Stations



5.2 Results of the CSAP

The CSAP report describes various methods and procedures that may be used by the City to assess the condition of the minor components of the WCTS. The City selected and completed an evaluation of Pump Station condition using the methods and procedures described in CSAP Section 3.10.5 for all the Minor Pump Stations. This approach consists of a review of Pump Station operating history and a visual inspection and assessment of the condition of Pump Station components to the extent possible without disrupting operations. This methodology is the same as the Major Pump Stations and the evaluation approach is outlined below.

Field Evaluation – Field evaluation consists of a site visit to each Pump Station, a non-invasive, visual inspection of the assets, and discussions with Pump Station O&M staff. The following components were evaluated:

- Pumps
- Motor
- System valves
- Control systems
- Generators
- Instrumentation (floats, meters, etc.)
- Control valves
- Structures (buildings, wet wells, tanks, etc.)
- Weight handling equipment
- Comminutors

Each piece of equipment was given an individual field evaluation score, with low values assigned to represent a good condition and high values assigned to represent a poor condition. Assessment and weighting factors were applied to the individual equipment scores to create an overall field evaluation score for the Pump Station under review.

Review of Operating and Mechanical Failure History – Each Pump Station's recent operating and mechanical failure history during the past five years was used, when available, as part of this evaluation. The following operating and maintenance data was reviewed, if available:

- Odor or corrosion control issues
- Maintenance related SSOs
- Wet Weather related SSOs
- Pump Station reliability issues
- Pump run times
- Age, based on installation or renovation date
- Response time/time to overflow
- Backup power
- Reserve pump availability

Each Pump Station was given an operating and mechanical history score, with low values assigned to represent a good condition and high values assigned to represent a poor condition.

The field evaluation scores and operating and mechanical history scores were averaged to determine the overall condition score for each Pump Station.

Condition information was incorporated into the desktop analysis. The Minor Pump Stations that were identified as the highest priority from the desktop analysis based on the condition and criticality ratings

discussed in **Section 5.3.1** and **5.3.2** were recommended for further assessment using methods described in Section 3 of the CSAP per CSAP Section 2.1.2.

5.3 Prioritizing Based on Condition and Criticality Ratings

The process established in the IR Program was used to identify and prioritize rehabilitation actions for the Minor Pump Stations. In general, the IR Program considers both the criticality (consequence of failure) of the WCTS component based on relative potential impact to public health, environmental and other impacts, and condition (probability of failure) of the WCTS component as determined from CSAP assessment and SSO history. For a given WCTS asset, the combination of the criticality and condition rating defines the rehabilitation priority. Criticality and condition ratings are applied to the Minor Pump Stations as described in the IR Program and summarized as follows.

5.3.1 Criticality Rating

The criticality rating of an asset is used to represent the relative consequence of failure of a minor component of the WCTS. For the purposes of this analysis, a failure is considered to be an SSO. The criticality rating is a numerical value, with low values assigned to represent a low consequence of failure and high values assigned to represent a high consequence of failure. Criticality ratings were developed for each Minor Pump Station considering factors such as the quantity of flow conveyed by an asset (i.e., potential quantity of an SSO), the potential impact to public health, and the potential impact to the environment. A criticality model was developed to evaluate criticality of all Pump Stations in the WCTS.

5.3.2 Condition Rating

The condition rating of an asset is developed to represent the probability that the WCTS asset will fail. The condition rating is a numerical value with low values assigned to represent a good condition and high values assigned to represent a poor condition. The condition rating is primarily assigned using recent historical SSOs, probability of failure information collected through the CSAP, and professional judgment (IR Program Section 2.2.1).

The highest (poorest) condition rating is assigned to Minor Pump Stations whose poor condition is determined to be the root cause of a recent historical SSO. The poor condition of these assets has already resulted in failure, and therefore, the assets are assumed to have a high probability of a future SSO occurring at that location if a permanent solution to address the past failures is not implemented. The failures may be related to the capacity of the asset or the condition as evidenced by information collected through the CSAP assessments.

The remaining condition ratings are assigned based on information collected in the CSAP assessments and professional judgment. Since these assets have not failed, the condition rating based on CSAP results is lower than the condition rating of assets whose condition has caused an SSO.

5.3.3 Prioritization for Rehabilitation

Infrastructure rehabilitation is prioritized based on the risk score – the combination of condition and criticality ratings. Minor Pump Stations determined to be high risk are considered for rehabilitation projects under the IR Program. The rehabilitation projects can include rehabilitation, replacement, O&M

procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets.

Of the Minor Pump Stations in poor condition, rehabilitation is prioritized based on the condition (probability of failure) rating and the criticality (consequence of failure) rating. The highest priority for rehabilitation is assigned to Minor Pump Stations with the highest (poorest) condition rating and highest criticality rating. Specific rehabilitation actions for prioritized Minor Pump Stations are presented in Section 5.5 below. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed at the Pump Station.

Minor Pump Stations with a lower risk score are not prioritized for rehabilitation. These assets will be reassessed, based on the frequencies given in the CSAP, to determine if the condition has deteriorated to the point that the asset would be moved into a higher priority rehabilitation category under the IR Program.

5.4 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified. Find and fix repairs are intended to promptly address assets that are discovered, through the course of continuing WCTS inspections, to be in poor condition with a high probability of failure. Those Pump Station components determined to be in poor condition (based on professional judgment and condition assessment) are scheduled to be repaired without being prioritized and grouped into scheduled rehabilitation actions. The find and fix actions also include rehabilitation or repairs that are made to promptly address defects that are found to be the cause of an SSO in order to avoid recurrent SSOs.

5.5 Proposed Corrective Actions

The proposed corrective actions under the Supplemental IR Report to address conditions causing SSOs on Minor Pump Stations are presented in the following sections. Corrective actions are categorized by those that address recent historical SSOs, or those to address assets that have not yet failed but are highest priority for rehabilitation based on condition and criticality. Overall WCTS project grouping and scheduling is discussed in Section 8.

5.5.1 Recent Historical SSOs

Proposed projects were identified to address Minor Pump Stations whose poor condition is the root cause of multiple or single recent historical SSOs (excluding SSOs caused by severe natural conditions). Although the prioritization matrix also considers the criticality of assets, the primary objective of the IR Program is to reduce the occurrence of SSOs in the WCTS. These assets have already contributed to SSOs; therefore, it was determined that projects be included for these assets regardless of criticality.

The projects listed in **Table 5-2,** with locations shown on **Figure 5-2**, show improvements to address conditions causing recent Wet Weather SSOs on Minor Pump Stations. Find and fix actions, as listed in **Table 5-3**, were performed to address the root cause of all updated recent historical SSOs caused by structural or other conditions at the Minor Pump Stations.

Table 5-2 – Projects to Address Recent Historical SSOs on Minor Pump Stations

Pump Station	SSO ID	Project Name	Estimated Volume (gallons)
Starlite	02423	SS7432 – Starlite Pump Station Decommissioning* and Basin Rehabilitation Related Works	12,675

*A study was conducted and it was found that the Starlite Pump Station could be served by gravity, allowing for the Pump Station to be taken out of service entirely.

Figure 5-2 – Projects to Address Recent Historical SSOs on Minor Pump Stations

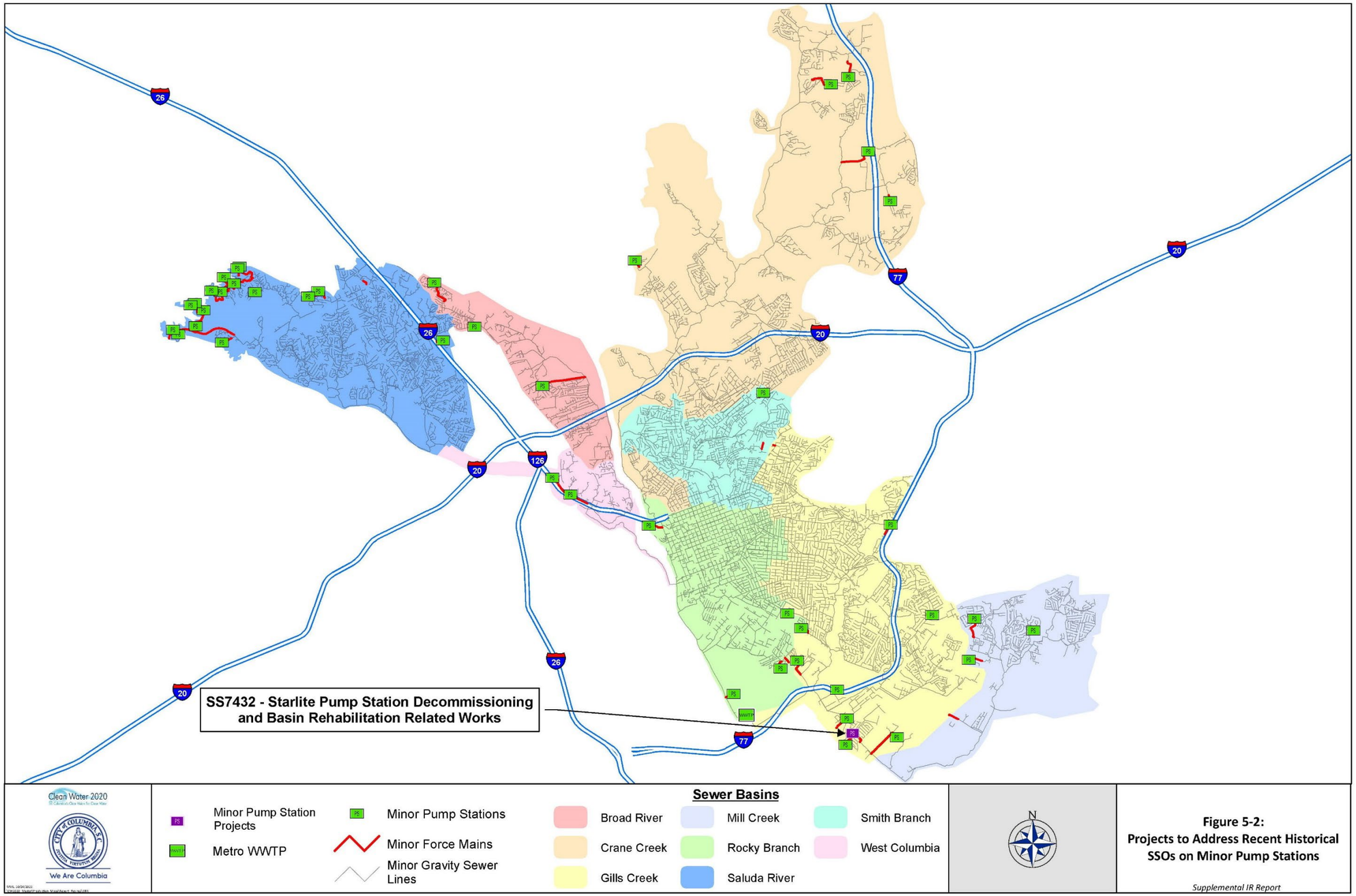


Table 5-3 – Find and Fix Actions to Address Recent Historical SSOs on Minor Pump Stations

Pump Station	SSO ID	Find and Fix Action	Estimated Volume (gallons)[1]
Starlite	01544	Restored power and plugged abandoned line	4,659
Bookert Heights	01610	Loss of Utility power; power restored, generator now installed	1
Colonial Life	01744	Loss of prime on bypass pumps; re-primed bypass pumps and put back into operation	350
Starlite	01746	Loss of Utility power; power restored	750
Colonial Life	01775	Loss of prime on pumps; re-primed pumps and put back into operation	700
Hillcreek #2	01776	Float switches inoperable, pumps didn't turn on; turned pumps on manually and repaired float switch wire	50
Galaxy	01814	Loss of Utility power; power restored	Unknown
Colonial Life	01924	Bypass pumps clogged; pumps unclogged, supplier contacted to confirm auto-dialer and service pumps	100
Meadowlands	01927	Bypass valve was open; closed valve	85
Colonial Life	01932	Failure of bypass discharge hose; repaired leaking hose connection	2,000
Harbison #2	01933	Float inoperable; replaced, tested and repositioned float	120
Yacht Cove	01962	The bypass pump was disconnected and hose removed due to a leaking Bauer fitting. Bypass setup was removed following completion of rehab at the Pump Station	45
Harbison #2	02158	Bypass pump failure; pumps serviced and returned to operation	485
Starlite	02196	Loss of Utility power; power restored	875
Harbison #4	02297	Replaced bad phase monitor	383
Animal Shelter	02346	Floats inoperable; floats fixed and replaced in wet well	32
Starlite	02389	Pump failure; pulled pump, cleared debris, reconnected and restarted	7,370
Hillcreek #2	02424	Pump failure; reset pump and returned to operation	474
Hillcreek #2	02498	Loss of Utility power; power restored, generator to be installed	10
Hillcreek #2	02521	Loss of Utility power; power restored, portable generator installed on site, permanent generator to be installed	3,375
Lake Murray WTP	02533	Pump Failure, Reset Pump #1 and returned to operation	1,500
Wexford	02612	Replaced blown fuse in control panel	497
Broad River	02621	Closed valve on the sludge box	150
Hillcreek #2	02628	Installed the correct voltage relay in the control panel, returned to operation	153,808
Farrow Pointe	02671	Replaced damaged hose on by-pass pump	20

Pump Station	SSO ID	Find and Fix Action	Estimated Volume (gallons)[1]
Farrow Pointe	02680	Replaced damaged hose on by-pass pump	70
Lake Murray WTP	02683	Turned RPZ (Reduced Pressure Zone) valve off	30

Note: Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014), through December 31, 2021.

1) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

5.5.2 High Priority for Rehabilitation

Additional proposed projects were identified to address the most critical Minor Pump Stations in the poorest condition based on the desktop prioritizations, defect ratings or other information collected through the CSAP assessments. These Pump Stations are considered high priority for rehabilitation.

The projects listed below, with locations shown on **Figure 5-3,** were identified to address capacity, condition, and other concerns on Minor Pump Stations that were identified as high priority from the CSAP desktop analysis.

In some cases, Minor Pump Stations identified as high priority may be incorporated into larger planned projects. The City reserves the right to rehabilitate the high priority assets separately from these larger planned projects if deemed more appropriate. The high priority assets will be rehabilitated in accordance with the project scheduling in Section 8. However, complications in implementing the complete project (right-of-way permitting, budgeting, etc.) may dictate that the high priority Minor Pump Stations be completed separately from the larger project. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

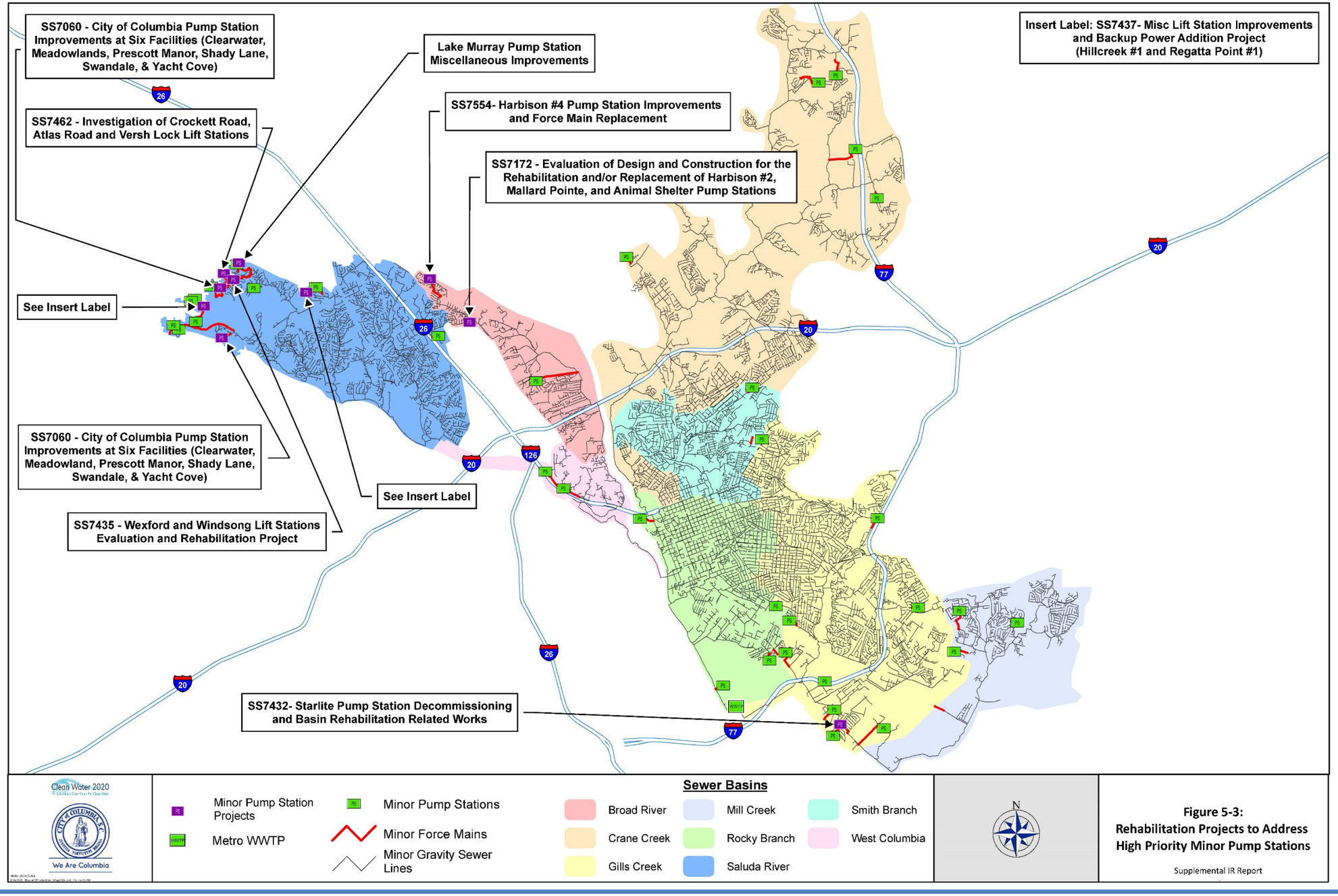
Based on the results of the CSAP desktop assessments and professional judgment, the following Minor Pump Stations were prioritized for rehabilitation and are included in rehabilitation projects as shown in **Table 5-4**.

- Starlite Pump Station
- Clearwater Pump Station
- Yacht Cove Pump Station
- Wexford Pump Station
- Crockett Road Pump Station
- Lake Murray Pump Station
- Harbison #2 Pump Station
- Hillcreek #1 Pump Station
- Regatta Point #1 Pump Station
- Harbison #4 Pump Station

Table 5-4 – Rehabilitation Projects to Address High Priority Minor Pump Stations

Project Name	Actions
SS7432 – Starlite Pump Station Decommissioning and Basin Rehabilitation Related Works	Starlite Pump Station was identified as high priority and recommended for decommissioning
SS7060 – City of Columbia Pump Station Improvements at Six Facilities (Clearwater, Meadowlands, Prescott Manor, Shady Lane, Swandale, and Yacht Cove)	Clearwater and Yacht Cove Pump Stations were identified as high priority and recommended for pump station rehabilitation
SS7435 – Wexford and Windsong Lift Stations Evaluation and Rehabilitation Project	Wexford Pump Station was identified as high priority and recommended for evaluation and pump station improvements
SS7462 – Investigation of Crockett Road, Atlas Road, and Versch Lock Lift Stations	Crockett Road Pump Station was identified as high priority and recommended for evaluation and pump station improvements
Lake Murray Pump Station Miscellaneous Improvements	Lake Murray Pump Station was identified as high priority and recommended for evaluation, testing and equipment upgrades
SS7172 – Evaluation of Design and Construction for the Rehabilitation and/or Replacement of Harbison #2, Mallard Pointe, and Animal Shelter Pump Stations	Harbison #2 Pump Station was identified as high priority and recommended for pump station improvements
SS7437 – Miscellaneous Lift Station Improvements and Backup Power Addition Project	Hillcreek #1 and Regatta Point #1 Pump Stations were identified as high priority and recommended for evaluation and pump station improvements
SS7554 – Harbison #4 Pump Station Improvements and Force Main Replacement	Harbison #4 was identified as high priority and recommended for evaluation and pump station improvements

Figure 5-3 – Rehabilitation Projects to Address High Priority Minor Pump Stations



Section 6 Update of Major Force Mains

This section presents the continued application of the IR Program procedures for major Force Mains. This section is an update to the IR Report and includes only additional information that was captured since the IR Report through the cut-off date of this report as discussed in Section 1. The process for major Force Main assessment, rating, and prioritization is described in Section 4 of the IR Report. Updates to information presented in the IR Report are included in each section below. This section presents the review of updated recent SSO history (**Section 6.1**), updated results of the CSAP assessment (**Section 6.2**) updates from the prioritization process (**Section 6.3**) and additional proposed actions identified (**Section 6.5**). The update to the schedule for the rehabilitation of the major Force Main segments is discussed in Section 8.

6.1 Updated Recent Historical SSOs

As discussed in Section 2.3.1 of the IR Program, past SSOs related to a given major Force Main segment are assumed to indicate a higher probability of an SSO occurring on that segment in the future if a permanent solution to address the past SSO is not implemented. Therefore, if the underlying cause of the SSO is attributable to the Force Main condition, the location and frequency of recent historical SSOs are used, as appropriate, in conjunction with the CSAP data and professional judgment to establish the condition rating for the Force Main segments.

SSOs that occurred on major Force Main segments from January 1, 2019, through December 31, 2021, are referred to as updated recent historical SSOs for this evaluation. The IR Report included SSOs from May 21, 2014 (the Effective Date of the CD), through December 31, 2018, and these are not included in this report. SSO cause was recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP and any updates are based on further evaluation. Causes of the recent historical SSOs on or as a result of major Force Mains are grouped into the categories of Wet Weather, Structural Conditions, O&M Conditions, and Other as defined in Section 4.1 of the IR Report.

Updated recent historical SSOs on major Force Main segments are listed in **Table 6-1** and shown on **Figure 6-1**. None of the recent historical SSOs on major Force Mains are caused by severe natural conditions.

As listed in Table 6-1, none of the SSOs on major Force Main segments are due to structural conditions and all are categorized as other causes unrelated to the condition of the Force Main.

Table 6-1 – Updated Recent Historical SSOs on Major Force Mains

			SSO Characteristics		
Date[1]	SSO ID	Force Main Segment with Asset ID	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
2/11/2020	02460	West Columbia 110-ARV 88	ARV malfunction; Replaced ARV.	Other	1,075

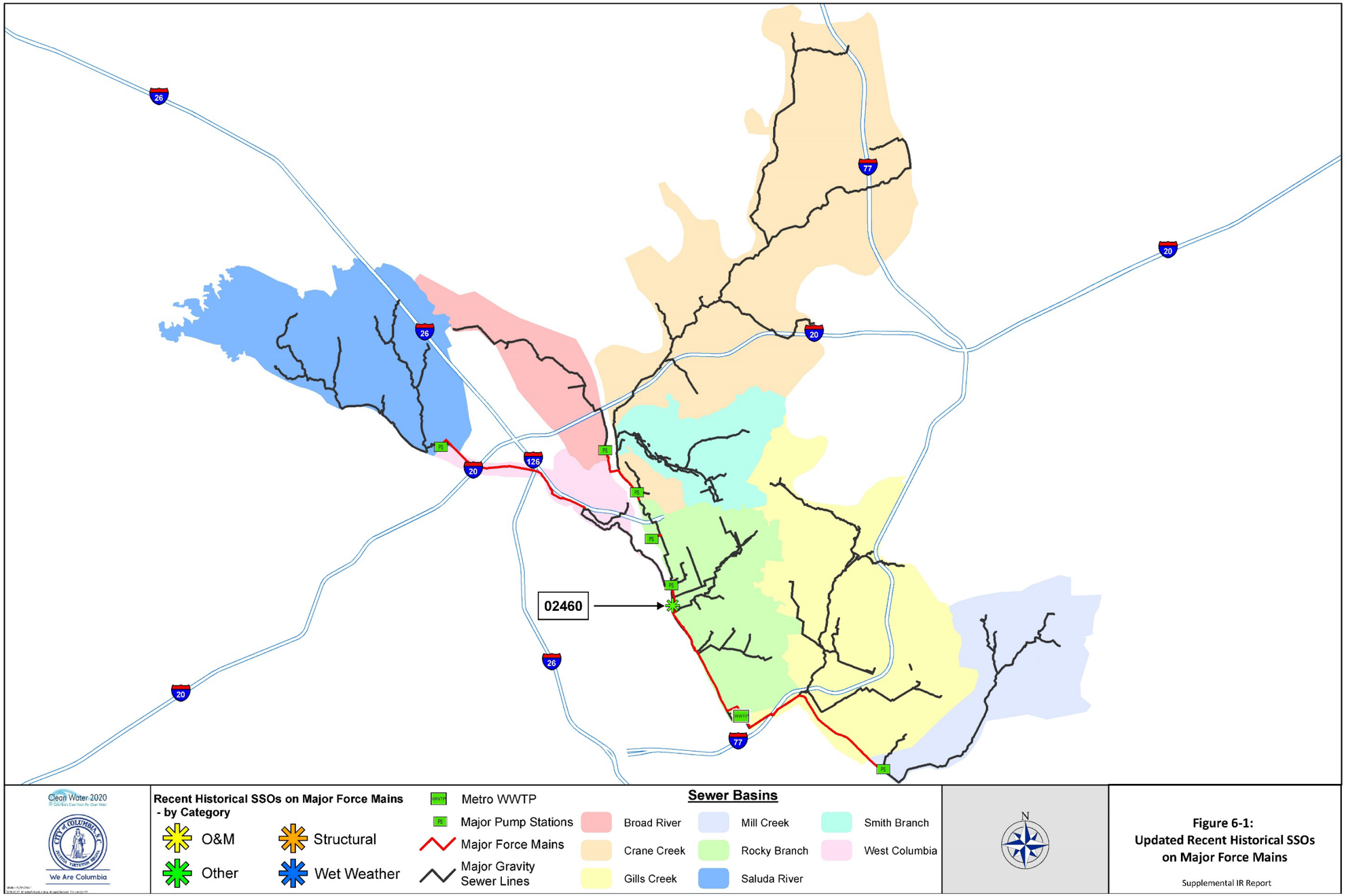
1) Updated Recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

2) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

3) SSO category is assigned for this evaluation based on the SSO cause. See Section 4.1 of the IR Report for category definitions.

4) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Figure 6-1 – Updated Recent Historical SSOs on Major Force Mains



6.2 Updated Results of the CSAP

The following is an update to the CSAP results section (Section 4.2) of the IR Report. The CSAP report describes various methods and procedures that may be used by the City to assess the condition of the major components of the WCTS. The City selected and completed the following assessments under the CSAP for the major Force Mains.

- All major Force Mains were assessed by segment using a Force Main desktop analysis as defined in CSAP Section 3.11. Updates to the results previously presented in the IR Report are discussed in **Section 6.2.1**.
- Force Main segments that were identified as the highest priority from the updated desktop analysis and engineering judgment that were recommended for further assessment by field inspection, rehabilitation, or replacement as discussed in **Section 6.2.2.**

6.2.1 Desktop Analysis

The desktop analysis was used to prioritize each Force Main segment based on the probability and consequence of failure. The highest priority Force Mains from the updated desktop analysis and engineering judgment were identified for condition assessment by field inspection, rehabilitation, or replacement, as follows. This includes only major Force Main segments that were not previously identified in the IR Report.

- Based on the updated desktop analysis and engineering judgment, the North Columbia Force Main was identified as high priority and recommended for further assessment of the Force Main condition through field inspections. A more detailed desktop analysis determined that no additional field assessments are needed at this time. Based on projected future growth, the City has initiated a capacity enhancement project with a new Pump Station and Force Main to accommodate the anticipated additional flow in this area of the system. The City expects this project to alleviate the need for further assessment of the existing North Columbia Force Main.

6.2.2 Field Inspections

No additional field inspections were performed on major Force Mains since the IR Report.

6.3 Prioritizing Based on Condition and Criticality Ratings

The process established in the IR Program was used to identify and prioritize rehabilitation actions for the major Force Mains as discussed in Section 4.3 of the IR Report. Specific rehabilitation actions for prioritized major Force Mains that were not included in the IR Report are presented in Section 6.5 of this Supplemental IR Report.

Specific rehabilitation actions for prioritized major Force Main segments that were not included in the IR Report are presented in Section 6.5.

6.4 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified and as previously described in the IR Report in Section 4.4.

6.5 Additional Proposed Corrective Actions

The additional proposed corrective actions under the Supplemental IR Report to address conditions causing SSOs on major Force Main segments are presented in the following sections. None of the major Force Main segments have multiple recent historical SSOs whose root cause is attributed to the poor condition or capacity of the Force Main segment. Corrective actions are categorized by those that address a single updated recent historical SSO, or those to address assets that have not failed, but are highest priority for rehabilitation based on condition and criticality. Overall WCTS project grouping and scheduling is discussed in Section 8.

6.5.1 Updated Recent Historical SSOs

Find and fix actions, as listed in **Table 6-2**, were completed to address the root cause of all updated recent historical SSOs caused by structural or other conditions on the major Force Main segments.

Table 6-2 – Find and Fix Actions to Address Updated Recent Historical SSOs on Major Force Mains

Force Main Segment with Asset ID	SSO ID	Find and Fix Action	Estimated Volume (gallons)[1]
West Columbia 110-ARV 88	02460	Replaced ARV	1,075

Note: Updated recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

1) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

6.5.2 High Priority for Rehabilitation

No additional proposed projects were identified to address the most critical major Force Main segments in the poorest condition based on the updated desktop prioritization, defect ratings or other information collected through the updated CSAP assessments and professional judgment.

Section 7 Minor Force Mains

This section presents the application of the IR Program procedures for minor Force Mains. The minor Force Mains are divided into segments for the purposes of the CSAP and prioritization process, and each segment is considered a separate asset by the City. The review of SSO history (**Section 7.1**) and results of the CSAP assessment (**Section 7.2**) are used as a basis to assign condition ratings. Condition ratings and criticality ratings are combined for the prioritization process (**Section 7.3**). From the prioritization process, proposed actions are identified (**Section 7.5**). The schedule for the rehabilitation of the minor Force Main segments is discussed in Section 8.

7.1 Recent Historical SSOs

As discussed in Section 2.3.1 of the IR Program, past SSOs related to a given minor Force Main segment are assumed to indicate a higher probability of an SSO occurring on the segment in the future if a permanent solution to address the past SSO is not implemented. Therefore, if the underlying cause of the SSO is attributable to the Force Main condition, the location and frequency of recent historical SSOs are used, as appropriate, in conjunction with the CSAP data and professional judgment to establish the condition rating for the Force Main segments.

SSOs that occurred on minor Force Main segments from May 21, 2014 (the Effective Date of the CD) through December 31, 2021, are referred to as recent historical SSOs for this evaluation. SSO cause was recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP and any updates are based on further evaluation. Causes of the recent historical SSOs on or as a result of minor Force Mains are grouped into the following categories:

- Wet Weather – SSOs primarily caused by wet weather events with I/I entering the system and/or capacity constraints in the WCTS. There are no recent historical SSOs on minor Force Main segments caused by wet weather.
- Structural Conditions – SSOs due to issues related to the structural integrity of the pipe or other appurtenances such as ARVs.
- O&M Conditions – SSOs due to issues related to operations and maintenance. There are no recent historical SSOs on minor Force Main segments caused by O&M conditions.
- Other – SSOs that are not related to wet weather, structural, or O&M conditions. This category includes SSOs that are a result of damage caused by third parties, operator error, or SSOs that occur during temporary bypass operations.

Recent historical SSOs on minor Force Main segments are listed in **Table 7-1** and shown on **Figure 7-1**. None of the recent historical SSOs on minor Force Mains are caused by severe natural conditions.

Table 7-1 – Recent Historical SSOs on Minor Force Mains

			SSO Characteristics		
Date[1]	SSO ID	Force Main Segment with Asset ID	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
3/1/2015	01576	Colonial Life PS 120, ARV 1	Force Main ARV Failure	Other	105
1/13/2016	01703	Lake Murray WTP PS 225, 225_0577	Force Main Blockage	O&M	300
5/3/2016	01757	Broad River PS 335, 335_0807	Broad River Force Main Collapse	Structural	550
5/4/2016	01758	Regatta Point #1 PS 180, 180_0448	3rd Party Responsible	Other	1,653
5/10/2016	01759	Regatta Point #1 PS 180, 180_0444	3rd Party Responsible	Other	385
9/2/2016	01794	Colonial Life PS 120, 120_0339	Collapsed Force Main	Structural	11,400
10/8/2016	01806	Colonial Life PS 120, 120_0339	Structural Force Main Issue	Structural	Unknown
10/31/2016	01825	Lake Murray WTP PS 225, 225_0587	3rd Party Responsible	Other	449
12/1/2016	01836	Regatta Point #1 PS 180, 180_0448	3rd Party Responsible	Other	750
12/7/2016	01838	Regatta Point #1 PS 180, 180_0445	3rd Party Responsible	Other	260
6/26/2017	01942	Colonial Life PS 120, ARV 2	Force Main ARV Failure	Other	50
7/21/2017	01949	N/A	Bypass Force Main Failure Caused by Contractor	Other	334
1/21/2020	02437	Regatta Point #3 PS 190, 190_0463	Force Main Valve Was Closed	Other	1
8/13/2020	02549	Lake Murray WTP PS 225, ARV 2	Force Main ARV Was Faulty	Other	497
10/26/2020	02581	Killian Crossing PS 275, 257_0621	Broken Force Main	Structural	140
12/21/2020	02603	Harbison 4 PS 145, 145_0368	Pinhole in Force Main	Structural	6,069
1/18/2021	02620	Mallard Pointe PS 060, 060_0114	Broken Force Main	Structural	672
4/8/2021	02668	Lake Murray WTP PS 225, 225_0575	3rd Party Responsible	Other	719
5/18/2021	02689	Lake Murray WTP PS 225, 225_0575	Broken Force Main Caused by Lake Murray Maintenance Staff Digging to Locate Cleanouts	Other	36
7/27/2021	02711	Lake Murray WTP PS 225, ARV 2	Debris in ARV	Other	78

			SSO Characteristics		
Date[1]	SSO ID	Force Main Segment with Asset ID	Cause[2]	Category[3]	Estimated Volume (gallons)[4]
8/19/2021	02715	Saluda River PS 195, 195_0500	3rd Party Responsible	Other	600
11/23/2021	02735	Private Force Main Service Lateral Connection	Broken Force Main	Structural	195

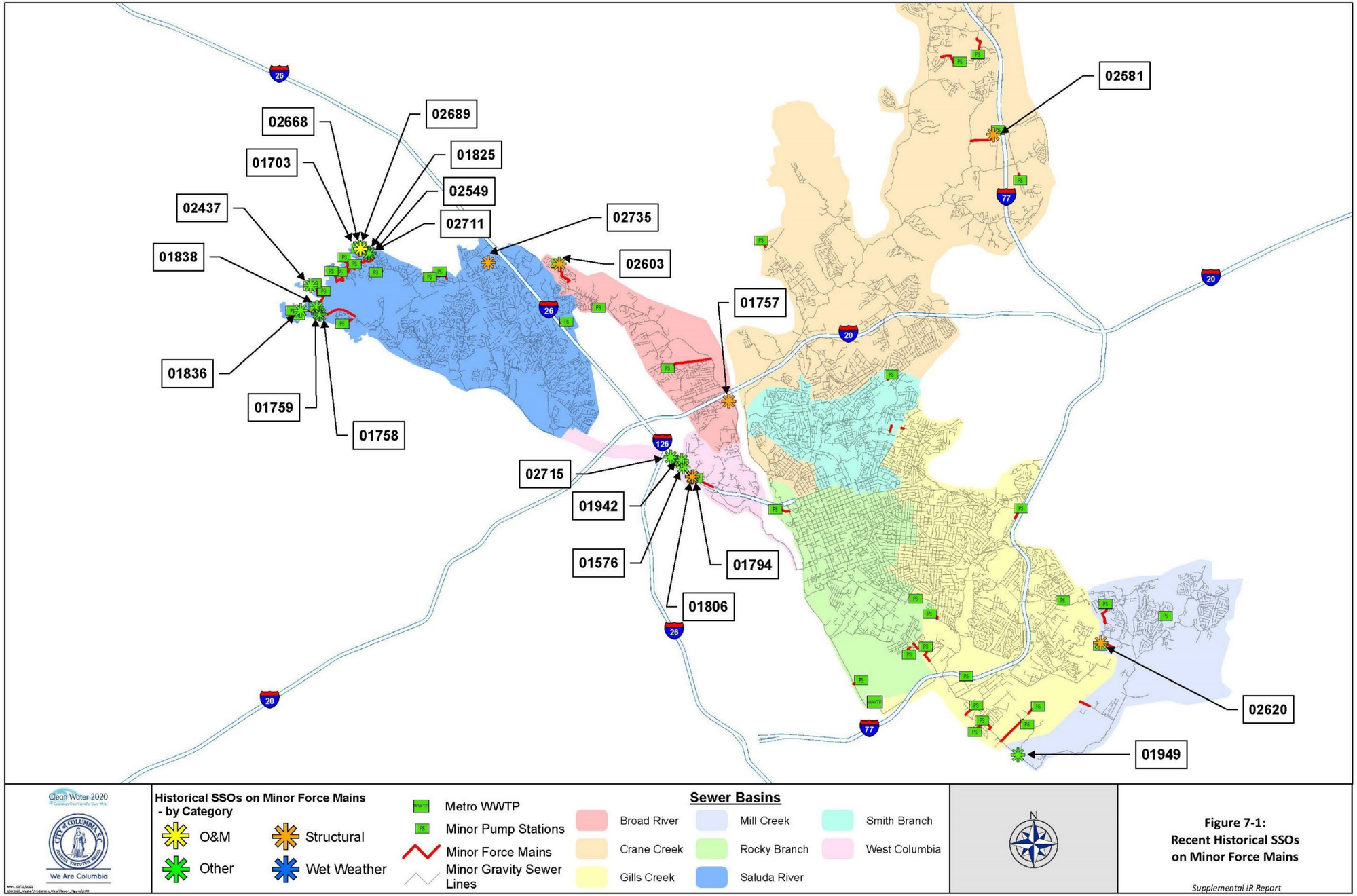
1) Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014), through December 31, 2021.

2) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

3) SSO category is assigned for this evaluation based on the SSO cause. See Section 7.1 for category definitions.

4) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Figure 7-1 – Recent Historical SSOs on Minor Force Mains



7.2 Results of the CSAP

The CSAP report describes various methods and procedures that may be used by the City to assess the condition of the minor components of the WCTS. The City selected and completed the following assessments under the CSAP for the minor Force Mains.

- All minor Force Mains were assessed by segment using a Force Main desktop analysis as defined in CSAP Section 3.11. Results are discussed in **Section 7.2.1**.
- Force Main segments that were identified as the highest priority from the desktop analysis and using engineering judgment that were recommended for further assessment by field inspection, rehabilitation, or replacement as discussed in **Section 7.2.2.**

7.2.1 Desktop Analysis

The desktop analysis was used to prioritize each Force Main segment based on the probability and consequence of failure. The highest priority Force Mains from the desktop analysis and based on engineering judgment were identified for condition assessment by field inspection, rehabilitation, or replacement, as follows.

- Based on the initial desktop analysis and engineering judgment, Woodlands Force Main was identified as high priority and recommended for further assessment of the Force Main condition through field inspections. However, after completing a more detailed desktop assessment, the City initiated a project to replace the Woodlands Force Main (SS7549) without further assessment.
- Based on the initial desktop analysis and engineering judgment, Colonial Life Force Main was identified as high priority and recommended for further assessment of the Force Main condition through field inspections.
- Based on the initial desktop analysis and engineering judgment, Three Rivers Force Main was identified as high priority and recommended for further assessment of the Force Main condition through field inspections. However, after completing a more detailed desktop assessment, the City initiated a project to replace the Three Rivers Force Main (SS7468) without further assessment.

7.2.2 Field Inspections

As a follow up to the desktop analysis, field inspections were performed on one minor Force Main due to the reasons summarized in Section 7.2.1. The Colonial Life Force Main was inspected utilizing localized inspection methods as described in Section 3.11 of the CSAP. The field inspections identified a portion of one Force Main segment as high priority for rehabilitation. The project identified to address the portion of this high priority segment is included in **Table 7-3**.

7.3 Prioritizing Based on Condition and Criticality Ratings

The process set forth in the IR Program was used to identify and prioritize actions for the minor Force Mains. In general, the IR Program considers both the criticality (consequence of failure) of the WCTS component based on relative potential impact to public health, environmental and other impacts, and condition (probability of failure) of the WCTS component as determined from CSAP assessment and SSO

history. For a given WCTS asset, the combination of the criticality and condition rating defines the rehabilitation priority. Criticality and condition ratings are applied to the minor Force Main segments by asset as described in the IR Program and summarized as follows.

7.3.1 Criticality Rating

The criticality rating of an asset is used to represent the relative consequence of failure of a minor component of the WCTS. For the purposes of this analysis, a failure is considered to be an SSO. The criticality rating is a numerical value, with low values assigned to represent a low consequence of failure and high values assigned to represent a high consequence of failure. Criticality ratings were developed for each minor Force Main segment considering factors such as the quantity of flow conveyed by an asset (i.e., potential SSO volume), the potential impact to public health, and the potential impact to the environment (IR Program, Section 2.3.2). A criticality model was developed in the Geographic Information System (GIS) to evaluate criticality of all Force Main segments in the WCTS.

7.3.2 Condition Rating

The condition rating of an asset is developed to represent the probability that the WCTS asset will fail. The condition rating is a numerical value with low values assigned to represent a good condition and high values assigned to represent a poor condition. The condition rating is primarily assigned using recent historical SSOs, probability of failure information collected through the CSAP assessments, and professional judgment (IR Program, Section 2.3.1). In general, assets that have recent historical SSOs are assigned the poorest (highest) condition ratings since addressing SSOs is a primary goal of the CD. The following paragraphs describe the general procedure for assigning condition rating based on recent historical SSOs and the information collected through the CSAP assessments.

The highest (poorest) condition rating is assigned to minor Force Main segments whose poor condition is determined to be the root cause of recent historical SSOs. The poor condition of these assets has already resulted in failures, and therefore, these assets are assumed to have a high probability of a future SSO occurring at that location if a permanent solution to address the past failures is not implemented.

The remaining condition ratings are assigned based on information collected in the CSAP assessments and professional judgment. Since these assets have not failed, the condition rating based on CSAP results is lower than the condition rating of assets whose condition has caused an SSO.

7.3.3 Prioritization for Rehabilitation

Infrastructure rehabilitation is prioritized based on the combination of condition and criticality ratings. Minor Force Main segments determined to be in poor condition are considered for rehabilitation projects under the IR Program. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, portions of Subbasins, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

Of the minor Force Main segments in poor condition, rehabilitation is prioritized based on the condition (probability of failure) rating and the criticality (consequence of failure) rating. The highest priority for

rehabilitation is assigned to minor Force Main segments with the highest (poorest) condition rating and highest criticality rating. Specific rehabilitation actions for prioritized minor Force Main segments are presented in Section 7.5.

Minor Force Main segments in poor condition (high condition rating) but with a lower criticality rating are tracked in decreasing priority according to decreasing criticality rating. These assets will be considered for potential future infrastructure rehabilitation after the higher priority projects are addressed since a failure of these assets would represent a smaller impact to public health and the environment. If they are not scheduled for rehabilitation, these assets will be reassessed, based on the frequencies given in the CSAP, to determine if the condition has deteriorated to the point that the asset would be moved into a higher priority rehabilitation category under the IR Program. Per Section 4.2 of the CSAP, high priority WCTS components, which are those that are both highly critical and suspected to be in poor condition, will receive the most frequent assessment.

Minor Force Main segments with a low probability of failure are not prioritized for rehabilitation. These assets will be reassessed, based on the frequencies given in the CSAP, to determine if the condition has deteriorated to the point that the asset would be moved into a higher priority rehabilitation category under the IR Program. Assets that have a low probability of failure but are highly critical will receive a medium frequency assessment to determine their condition. Remaining WCTS components will be assessed with lower frequency to determine if field investigations are needed.

7.4 Find and Fix Program

In addition to infrastructure rehabilitation actions, the City may also perform small-scale rehabilitation or repairs on a find and fix basis as defects are identified. Find and fix repairs are intended to promptly address assets that are discovered, through the course of continuing WCTS inspections, to be in poor condition with a high probability of failure. Those assets determined to be in poor condition (based on professional judgment and condition assessment) are scheduled to be repaired without being prioritized and grouped into scheduled rehabilitation actions. The find and fix actions also include rehabilitation or repairs that are made to promptly address defects that are found to be the cause of an SSO in order to avoid recurrent SSOs.

7.5 Proposed Corrective Actions

The proposed corrective actions under the Supplemental IR Report to address conditions causing SSOs on minor Force Main segments are presented in the following sections. Corrective actions are categorized by those that address a recent historical SSO, or those to address assets that have not failed, but are highest priority for rehabilitation based on condition and criticality. Overall WCTS project grouping and scheduling is discussed in Section 8.

7.5.1 Recent Historical SSOs

Find and fix actions, as listed in **Table 7-2**, were completed to address the root cause of all recent historical SSOs caused by structural or other conditions on the minor Force Main segments.

Table 7-2 – Find and Fix Actions to Address Recent Historical SSOs on Minor Force Mains

Force Main Segment/Asset ID	SSO ID	Find and Fix Action	Estimated Volume (gallons)[1]
Colonial Life PS 120, ARV 1	01576	Replaced broken ARV, flushed storm drain	105
Lake Murray WTP PS 225, 225_0577	01703	Flushed Force Main to remove obstruction and clear line	300
24041MH	01757	The shutdown of Broad River Pump Station to repair Force Main caused gravity line to overflow. Repaired Force Main and restarted Pump Station.	550
Regatta Point #1 PS 180, 180_0448	01758	Repaired Force Main	1,653
Regatta Point #1 PS 180, 180_0444	01759	Point repair at the broken pipe	385
Colonial Life PS 120, 120_0339	01794	Replaced line segment	11,400
Colonial Life PS 120, 120_0339	01806	Contractor repaired the Force Main	Unknown
Lake Murray WTP PS 225, 225_0587	01825	Force Main capped to stop overflow	449
Regatta Point #1 PS 180, 180_0448	01836	Repaired Force Main	750
Regatta Point #1 PS 180, 180_0445	01838	Replaced coupling to repair 2" service line connecting to Force Main	260
Colonial Life PS 120, ARV 2	01942	Replaced ARV	50
01774MH & 01772MH[2]	01949	Force Main bypass caused back-up into gravity system. Temporary repair made to the construction project allowing the PS to return to service	334
Regatta Point #3 PS 190, 190_0463	02437	Opened Force Main valve	1
Lake Murray WTP PS 225, ARV 2	02549	Replaced ARV	497
Killian Crossing PS 275, 257_0621	02581	Repaired Force Main	140
Harbison 4 PS 145, 145_0368	02603	Repaired Force Main	6,069
Mallard Pointe PS 060, 060_0114	02620	Repaired Force Main	672
Lake Murray WTP PS 225, 225_0575	02668	Repaired 2.5" cap to Force Main access point	719
Lake Murray WTP PS 225, 225_0575	02689	Repaired Force Main	36
Lake Murray WTP PS 225, ARV 2	02711	Shut off ARV and replaced	78
Saluda River PS 195, 195_0500	02715	Repaired Force Main	600
Private Force Main Service Lateral Connection	02735	Repaired Force Main	195

Note: Recent historical SSOs occurred from the Effective Date of the CD (May 21, 2014) through December 31, 2021.

1) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

2) Force Main bypass during Mill Creek Force Main replacement caused backup in gravity.

7.5.2 High Priority for Rehabilitation

Additional proposed projects were identified to address the most critical minor Force Main segments in the poorest condition based on initial desktop prioritization, defect ratings or other information collected through the CSAP assessments and professional judgment, but that have not resulted in a recent historical SSO. Within the prioritization matrix, these assets have the next highest condition ratings after those assets with recent historical SSO(s) and are the most critical. Therefore, these assets are considered high priority for rehabilitation.

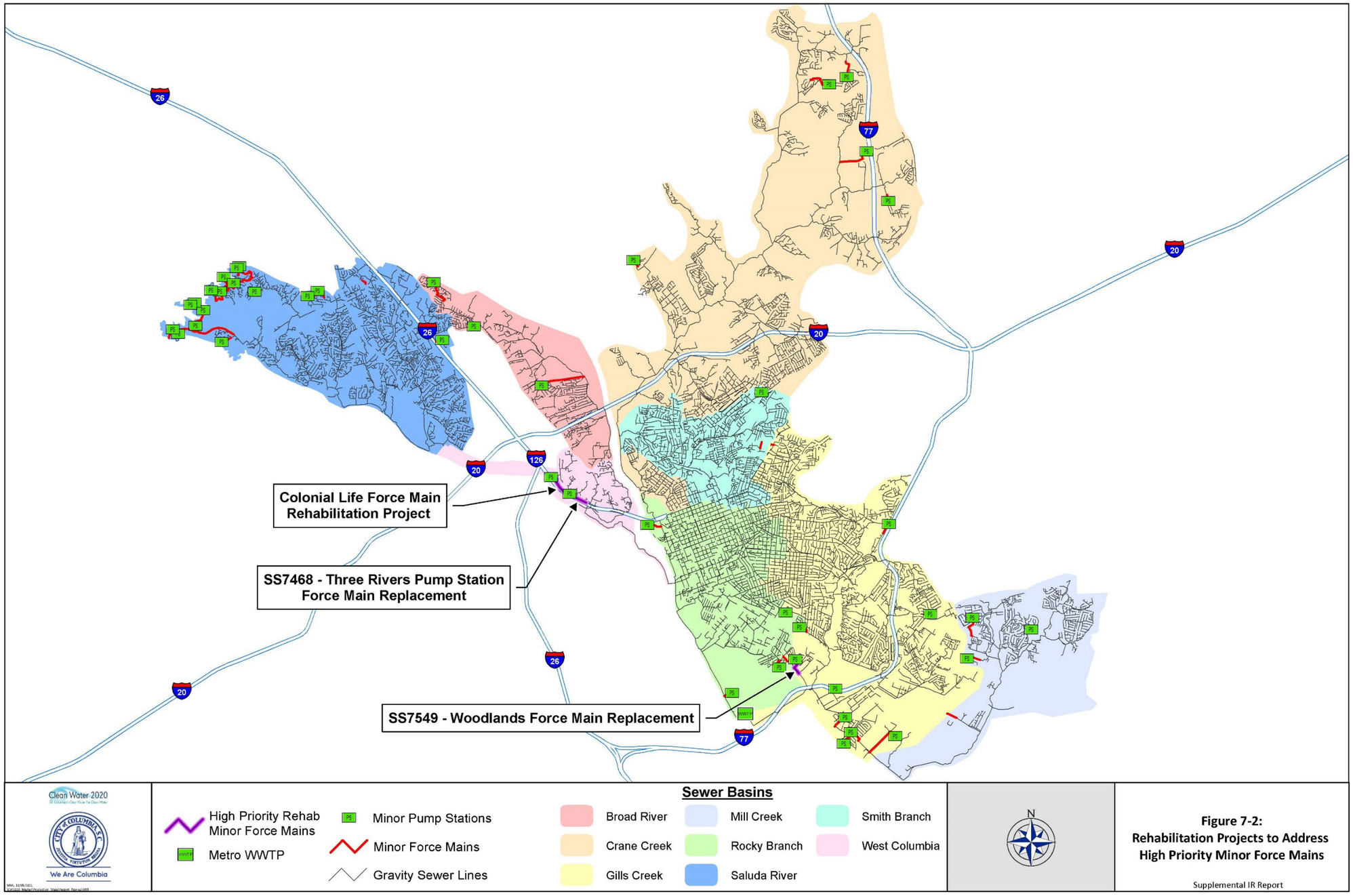
The projects listed in Table 7-3, with locations shown on **Figure 7-2** were identified to address capacity, condition, and other concerns on minor Force Main segments that were identified as high priority from the CSAP desktop analysis.

In some cases, minor Force Main segments deemed high priority may be incorporated into larger planned projects which also include rehabilitation and/or replacement of Force Mains which are not identified for rehabilitation under the Supplemental IR Report. It is anticipated that these larger planned projects will result in rehabilitation or replacement of the high priority Force Main segments within the project limits. Table 7-3 shows larger planned projects that will include rehabilitation of minor Force Mains considered high priority. The linear feet of high priority pipe set forth in Table 7-3 indicates the portion of the larger planned projects which is subject to the Supplemental IR Report rehabilitation schedule. The City reserves the right to rehabilitate the high priority assets separately from these larger planned projects if deemed more appropriate by the City. The high priority assets will be rehabilitated in accordance with the project scheduling in Section 8. However, complications in implementing the complete project (right-of-way permitting, budgeting, etc.) may dictate that the high priority minor Force Main segments be completed separately from the larger project. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

Table 7-3 – Rehabilitation Projects to Address High Priority Minor Force Mains

Project Name/Description	Action
SS7549 – Woodlands Force Main Replacement	Replacement of 510 LF of high priority Force Main segments
Colonial Life Force Main Rehabilitation Project	Rehabilitation of 140 LF of high priority Force Main segments
SS7468 – Three Rivers Pump Station Force Main Replacement	Replacement of 1,317 LF of high priority Force Main segments

Figure 7-2 – Rehabilitation Projects to Address High Priority Minor Force Mains



Section 8 Rehabilitation of Infrastructure

As required under CD Paragraph 16.c., this section provides an update to projects that have been completed since the IR Report. It also identifies all specific rehabilitation measures and projects, including those currently underway and those additional rehabilitation projects identified through the assessment of the minor components of the WCTS not previously included in the IR Report and pursuant to the CSAP, as needed to address I/I and other conditions causing SSOs.

Rehabilitation measures and projects presented in the IR Report focused on and included conditions causing SSOs in the WCTS on major components after May 21, 2014, through December 31, 2018. Rehabilitation measures and projects presented in this Supplemental IR Report focus on conditions causing SSOs in the WCTS after May 21, 2014, through December 31, 2021 on minor components, and from January 1, 2019, through December 31, 2021, on major components. The rehabilitation projects can include rehabilitation, replacement, O&M procedures (when it is determined that the condition rating is based on O&M conditions), or other actions of priority assets. Priority assets are based on individual select assets, portions of Subbasins, or a combination of assets determined as needed as a part of the CSAP Prioritization Process. In some cases, a subsequent evaluation may determine that there are no priority assets for rehabilitation and no further action is needed.

8.1 Project Summary and Prioritization

The rehabilitation projects identified in the IR Report were grouped into three scheduling categories (referred to as "Group 1," "Group 2," and "Group 3"). This was done according to priority of the projects, as required under CD Paragraph 16.b. and detailed in the IR Report Section 5. This Supplemental IR Report provides a status update to any of these projects that have been completed since the IR Report.

Projects identified in this Supplemental IR Report include rehabilitation projects for major components of the WCTS not previously identified in the IR Report and newly identified projects for minor components of the WCTS, as required under CD Paragraph 16.c., and have a schedule for completion of five years from the Supplemental IR Report approval.

The find and fix actions to address updated recent historical SSOs on Major Gravity Sewer Lines (Table 2-4), Major Pump Stations (Table 4-2), major Force Main segments (Table 6-2) and recent historical SSOs on minor gravity sewer lines (Table 3-4), Minor Pump Stations (Table 5-3) and minor Force Mains (Table 7-2) were completed as the defects were identified and are not included in this section.

8.1.1 Group 1 Projects Update

In accordance with the CD, Group 1 projects were identified in Section 5.1.1 of the IR Report and shall be completed no later than three years following EPA and DHEC approval of the IR Report. Group 1 projects completed since the IR Report are included in **Table 8-1**.

Table 8-1 – Completed Group 1 Projects

Project Name	Project Description	Completion Date
SS7261 – Lake Katherine Sewer Capacity Enhancement	Approximately 13,000 LF of pipe capacity upgrades	December 17, 2020

8.1.2 Group 2 Projects Update

In accordance with the CD, Group 2 projects were identified in Section 5.1.2 of the IR Report and shall be completed no later than five years following EPA and DHEC approval of the IR Report. No Group 2 projects have been completed since the IR Report.

8.1.3 Group 3 Projects Update

In accordance with the CD, Group 3 projects were identified in Section 5.1.2 of the IR Report and shall be completed no later than seven years following EPA and DHEC approval of the IR Report. Group 3 projects completed since the IR Report are included in **Table 8-2**.

Table 8-2 – Completed Group 3 Projects

Project Name	Project Description	Completion Date
SS7389 – Crane Creek and Smith Branch Manhole Repair and Mitigation	Repair/replacement of approximately 12 high and low priority manholes	August 26, 2019

8.1.4 Newly Identified Projects

In accordance with the CD, newly identified projects in the Supplemental IR Report shall be completed no later than five years following EPA and DHEC approval of the Supplemental IR Report. These projects address newly identified projects for minor components of the WCTS, and major components of the WCTS, identified through CSAP assessment, not included in the IR Report. **Table 8-3** includes a summary and description of the projects that the City has undertaken or plans to undertake per the Supplemental IR Report. Once an asset is selected for rehabilitation, an engineering assessment will determine the method of rehabilitation required, including the option of constructing a new asset (pipeline, manhole or pump station) or O&M actions (such as cleaning, root control, etc.) based on the noted defects. The newly identified projects are shown on **Figures 8-1 and 8-2** for major and minor components of the WCTS.

Table 8-3 – Supplemental IR Report Newly Identified Projects on Major and Minor WCTS Components

Asset/Project Type	Project Name	Actions
Minor Gravity Sewers and Minor Manholes	SS7424 – BR02 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin BR02
	SS7583 – SR02 and BR04 Engineer Led Find & Fix Rehabilitation	Evaluation and rehabilitation of priority pipes and manholes upstream of the Harbison #4 Pump Station in Subbasin BR04 and evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin SR02
	SS7463 – CC01 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin CC01
	SS7464 – CC02 and CC04 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasins CC02 and CC04

Asset/Project Type	Project Name	Actions
Minor Gravity Sewers and Minor Manholes	CC03 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin CC03
	CC06 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in Subbasin CC06
	SS6966 – Sanitary Sewer Pipe Rehabilitation (Annual Contract) & SS6786 – Sanitary Sewer Manhole Rehabilitation (Annual Contract)	Evaluation and rehabilitation of priority pipes and manholes in Subbasins GC01, GC02, GC03, GC04, GC08 and GC10
	MC01 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in Subbasin MC01
	SS7425 – RB03 Sewer System Evaluation Study and Sewer Rehabilitation Implementation	Evaluation and rehabilitation of priority pipes and manholes in Subbasin RB03
	SB04 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SB04
	SB05 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SB05
	SB06 Rehabilitation Project	Evaluation and rehabilitation of priority pipes in Subbasin SB06
	SR06 Rehabilitation Project	Selective evaluation and rehabilitation of priority pipes and manholes in a portion of Subbasin SR06
	SS7208 – Saluda River Basin SSES and Rehabilitation for SR-03, 10, & 12	Evaluation and rehabilitation of priority pipes and manholes in Subbasins SR10 and SR12
	SR11 Rehabilitation Project	Evaluation and rehabilitation of priority pipes and manholes in Subbasin SR11
	SR15 Rehabilitation Project	Evaluation and rehabilitation of priority pipes in Subbasin SR15
Major Pump Stations	Broad River Pump Station Evaluation	Address electrical issues contributing to SSOs
	SS7467 – Evaluation of North Columbia Pump Station Upgrades	Evaluation and upgrades to North Columbia Pump Station
	SS7564 – West Columbia Pump Station Improvements	Evaluation and upgrades to West Columbia Pump Station
	SS7497 – Mill Creek Pump Station Miscellaneous Improvements	Evaluation and upgrades to Mill Creek Pump Station
Minor Pump Stations	SS7432 – Starlite Pump Station Decommissioning and Basin Rehabilitation Related Works	Decommissioning of Starlite Pump Station

Asset/Project Type	Project Name	Actions
Minor Pump Stations	SS7060 – City of Columbia Pump Station Improvements at Six Facilities (Clearwater, Meadowlands, Prescott Manor, Shady Lane, Swandale and Yacht Cove)	Rehabilitation of Yacht Cove and Clearwater Pump Stations
	SS7435 – Wexford and Windsong Lift Stations Evaluation and Rehabilitation Project	Evaluation and improvements of Wexford Pump Station
	SS7462 – Investigation of Crockett Road, Atlas Road and Versch Lock Lift Stations	Evaluation and improvements of Crockett Road Pump Station
	Lake Murray Pump Station Miscellaneous Improvements	Evaluation and upgrades to Lake Murray Pump Station
	SS7172 – Evaluation of Design and Construction for the Rehabilitation and/or Replacement of Harbison #2, Mallard Pointe, and Animal Shelter Pump Stations	Evaluation and improvements of Harbison #2 Pump Station
	SS7437 – Miscellaneous Lift Station Improvements and Backup Power Addition Project	Evaluation and improvements of Hillcreek #1 and Regatta Point #1 Pump Stations
	SS7554 – Harbison #4 Pump Station Improvements and Force Main Replacement	Evaluation and improvements of Harbison #4 Pump Station
Minor Force Mains	SS7549 – Woodlands Force Main Replacement	Replacement of 510 LF of high priority Force Main segments
	Colonial Life Force Main Rehabilitation Project	Rehabilitation of 140 LF of high priority Force Main segments
	SS7468 – Three Rivers Pump Station Force Main Replacement	Replacement of 1,317 LF of high priority Force Main segments

Figure 8-1 – Supplemental IR Report Projects on Major Components

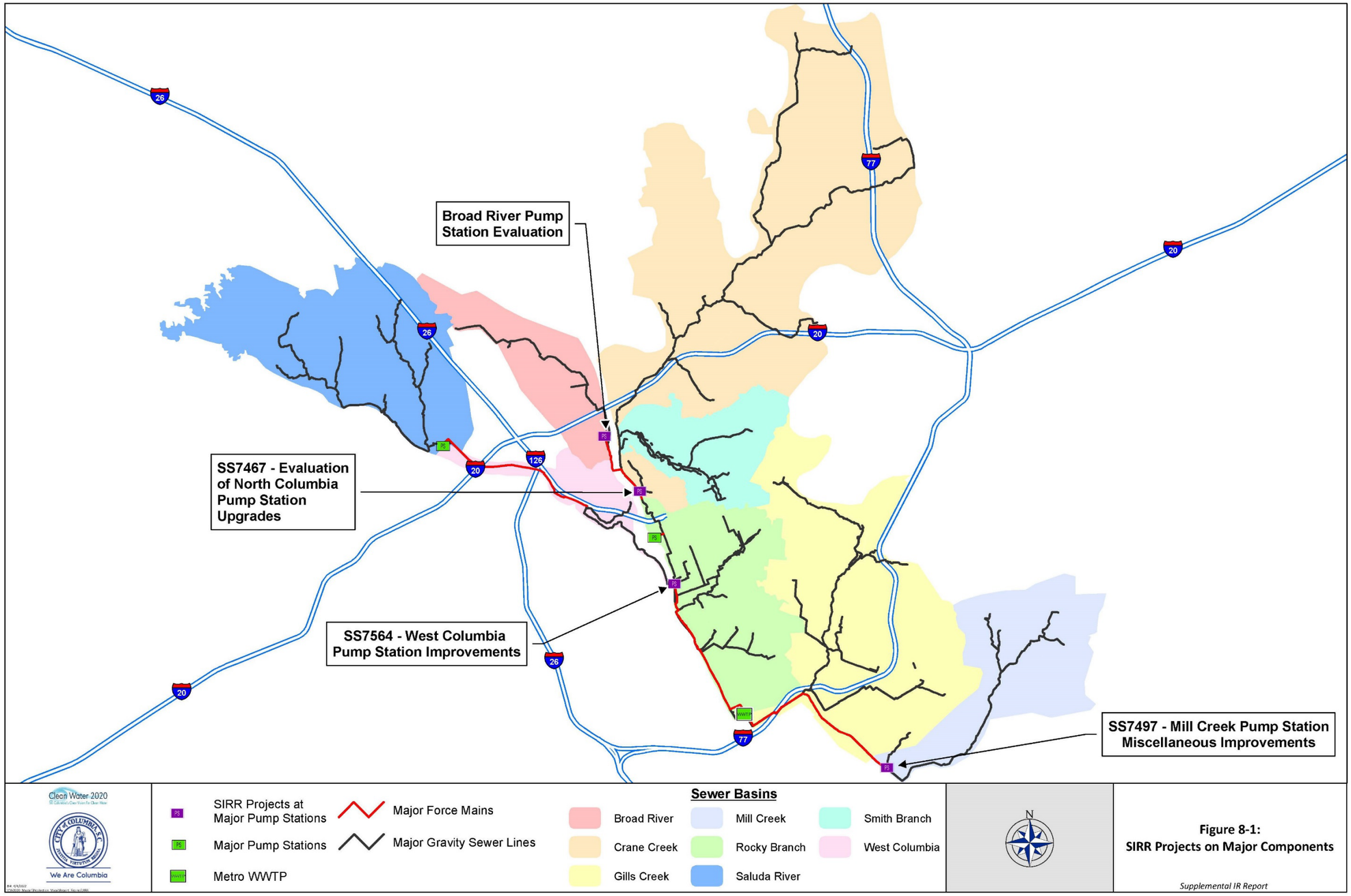
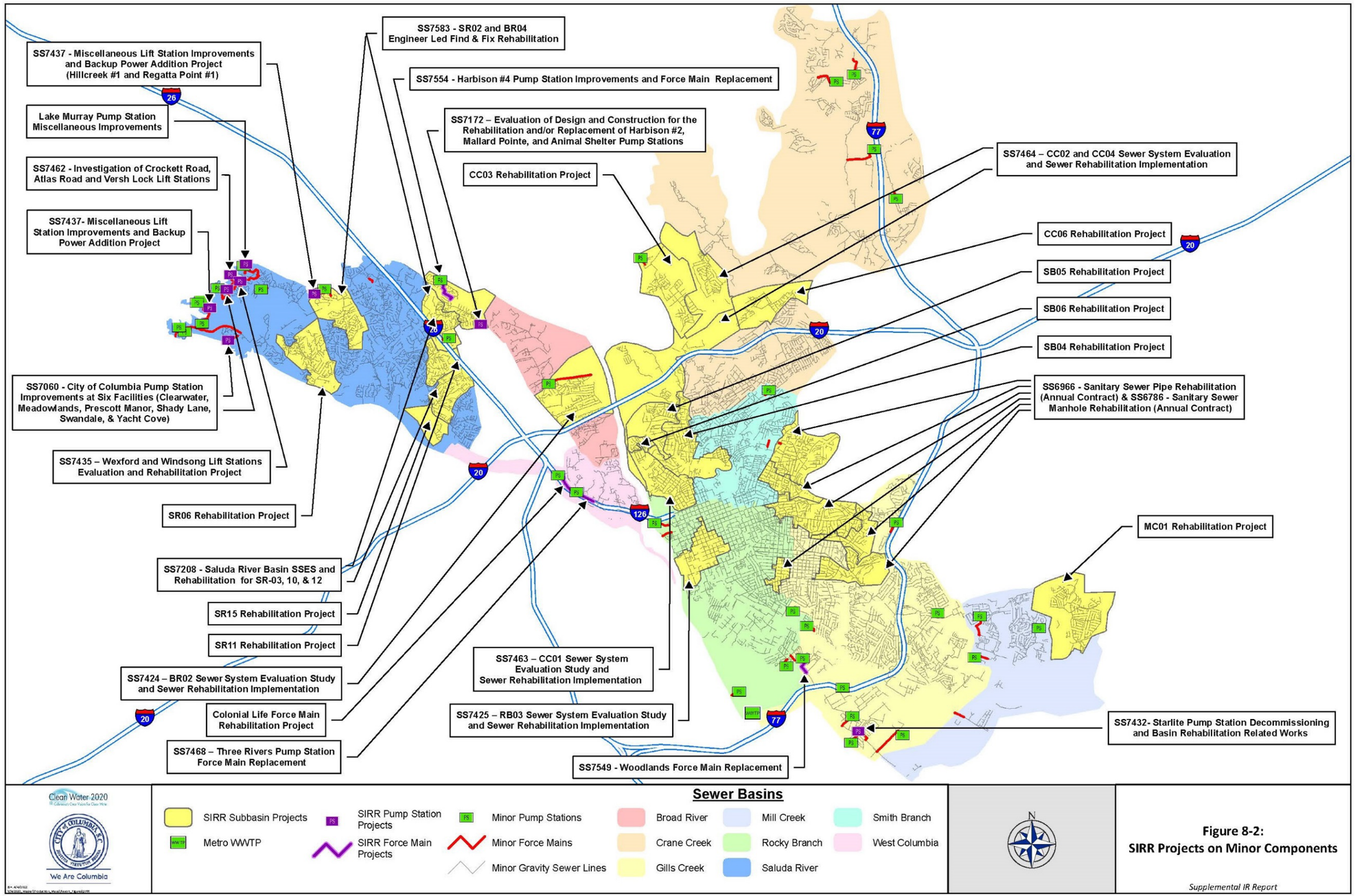


Figure 8-2 – Supplemental IR Report Projects on Minor Components



8.2 Rehabilitation Project Schedule

The City has developed a proposed schedule to complete the projects identified in Table 8-3 within five years after EPA/DHEC approval of the Supplement IR Report as required by Paragraph 16.c. of the CD. The proposed schedule for completion of the rehabilitation projects is summarized in **Table 8-4**; however, periodic modifications to individual project schedules within the five-year deadline in the CD may be required. With respect to the Colonial Life Force Main Rehabilitation Project, this Project will likely be impacted by the South Carolina Department of Transportation (SCDOT) Carolina Crossroads project, a $1.7 billion project with approximately 90% federal funding. In May 2019, SCDOT and the Federal Highway Administrative issued a final environmental impact statement and record of decision for the Carolina Crossroads project. SCDOT announced that the first phase of the project will be the reconfiguration of the Colonial Life Boulevard interchange. Impacts from this first phase of the Carolina Crossroads project and any resulting delays to the City's Colonial Life Force Main Rehabilitation Project are beyond the control of the City and may be unavoidable. The City will update EPA on any such modifications to individual project schedules in its Quarterly Reports. For the projects that include other Subbasins or individual assets within the currently proposed project limits, in addition to the high priority Subbasins or assets, only the prioritized Subbasins or assets must be addressed in the schedule shown in Table 8-4.

Table 8-4 – Initial Rehabilitation Project Schedule

		Year 1 after approval of SIRR				Year 2 after approval of SIRR				Year 3 after approval of SIRR				Year 4 after approval of SIRR				Year 5 after approval of SIRR			
EPA Approval of SIRR	Year 0	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4
SS7424 – BR02 Sewer System Evaluation Study and Sewer Rehabilitation Implementation																					
SS7583 – SR02 and BR04 Engineer Led Find & Fix Rehabilitation																					
SS7463 – CC01 Sewer System Evaluation Study and Sewer Rehabilitation Implementation																					
SS7464 – CC02 and CC04 Sewer System Evaluation Study and Sewer Rehabilitation Implementation																					
CC03 Rehabilitation Project																					
CC06 Rehabilitation Project																					
SS6966 – Sanitary Sewer Pipe Rehabilitation (Annual Contract)																					
SS6786 – Sanitary Sewer Manhole Rehabilitation (Annual Contract)																					
MC01 Rehabilitation Project																					
SS7425 – RB03 Sewer System Evaluation Study and Sewer Rehabilitation Implementation																					

EPA Approval of SIRR		Year 1 after approval of SIRR				Year 2 after approval of SIRR				Year 3 after approval of SIRR				Year 4 after approval of SIRR				Year 5 after approval of SIRR			
	Year 0	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4
SB04 Rehabilitation Project																					
SB05 Rehabilitation Project																					
SB06 Rehabilitation Project																					
SR06 Rehabilitation Project																					
SS7208 – Saluda River Basin SSES and Rehabilitation for SR-03, 10, & 12	*																				
SR11 Rehabilitation Project																					
SR15 Rehabilitation Project																					
Broad River Pump Station Evaluation	*																				
SS7467 – Evaluation of North Columbia Pump Station Upgrades																					
SS7564 – West Columbia Pump Station Improvements																					
SS7497 – Mill Creek Pump Station Miscellaneous Improvements																					
SS7432 – Starlite Pump Station Decommissioning and Basin Rehabilitation Related Works																					
SS7060 – City of Columbia Pump Station Improvements at Six Facilities (Clearwater, Meadowlands, Prescott Manor, Shady Lane, Swandale & Yacht Cove)	*																				
SS7435 – Wexford and Windsong Lift Stations Evaluation and Rehabilitation Project																					
SS7462 – Investigation of Crockett Road, Atlas Road and Versch Lock Lift Stations																					
Lake Murray Pump Station Miscellaneous Improvements																					
SS7172 – Evaluation of Design and Construction for the Rehabilitation and/or Replacement of Harbison #2, Mallard Pointe, and Animal Shelter Pump Stations	*																				
SS7437 – Miscellaneous Lift Station Improvements and Backup Power Addition Project (Hillcreek #1 and Regatta Point #1)																					
SS7554 – Harbison #4 Pump Station Improvements and Force Main Replacement																					
SS7549 – Woodlands Force Main Replacement																					

EPA Approval of SIRR	Year 0	Year 1 after approval of SIRR				Year 2 after approval of SIRR				Year 3 after approval of SIRR				Year 4 after approval of SIRR				Year 5 after approval of SIRR			
		QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4
Colonial Life Force Main Rehabilitation Project																					**
SS7468 – Three Rivers Pump Station Force Main Replacement																					

* Projects that have already been completed.

**As discussed above, the schedule for this Project may be impacted by the schedule for the SCDOT Carolina Crossroads project, and therefore, the City may be unable to complete this Project within the five-year deadline in the CD. The City will update EPA on any postponements in this schedule, as necessary, in the Quarterly Reports.

8.3 I/I Reduction Estimates

As required under CD Paragraph 16.b., the IR Report should address the quantity of I/I that the City estimates will be removed through each identified rehabilitation project, and describe the methods used to quantify the I/I projected to be removed, including an explanation of the variables used in estimating the I/I projected to be removed. Section 5.3 of the IR Report included a brief discussion of how this requirement was applied on the major components of the WCTS. As discussed in Section 2 of the IR Report, based on the frequent interconnections of the minor and major components and current metering technology, it is not reasonably feasible to separately quantify I/I contribution of the major versus the minor components. However, since the percentage of major components in each basin is relatively small compared to the minor components, the majority of the I/I contribution is likely from minor components.

The IR Report noted that the Supplemental IR Report would include I/I reduction estimates for the minor WCTS components. Table 8-5 shows the potential Peak I/I flow rates the City estimates could be removed through identified WCTS projects. The table includes all projects identified under the Supplemental IR Report including new projects identified on major components.

To estimate the potential I/I to be removed, each project was first categorized into project type. The project type was determined using engineering judgement based on project intent (based on the CSAP results as discussed in previous sections of the report), extent of the work, and type of rehabilitation planned. Typical rehabilitation project types include:

- Annual Contract – This project type provides a more uniform, targeted approach for identifying priority assets and is typically limited to select asset types (such as pipes only, or manholes only). Annual Contracts can range between Subbasin-wide to targeted/smaller areas (such as the lining of priority manholes only in a select area) or even down to a specific asset level and may or may not include service lateral rehabilitation. Projects selected for Annual Contract use limited assessment methods (such as CCTV only) and consider less variables to determine if an asset is high priority.
- SSES/Rehabilitation – This project type provides a more detailed approach, and typically encompasses multiple asset types (such as manholes and pipes). Sanitary Sewer Evaluation

Survey (SSES)/Rehabilitation projects are typically Subbasin-wide but can also cover smaller subareas. Projects selected for SSES/Rehabilitation typically have the option to use a range of assessment methods (such as smoke testing, dye testing, CCTV, manhole inspections, etc.) within the project area, and look at more variables to determine if an asset is high priority.

- Engineer Led Find & Fix – This project type is similar to SSES/Rehabilitation; however, the project is typically implemented more quickly. Engineer Led Find & Fix projects range from Subbasin-wide to smaller subareas. They look at multiple variables to determine if an asset is high priority.
- O&M – This project type targets specific O&M issues in select areas. O&M projects can range between Subbasin-wide to targeted/smaller areas, or even asset level. Projects selected for O&M typically have no I/I removal goals and look at limited variables to decide if an asset is high priority.
- Pump Station/Force Main – These are other projects that have no impact on I/I removal such as Force Main replacement projects.

For the Supplemental IR Report, several variables were factored into the methodology for estimating potential I/I removal including project experience in other parts of the country and engineering judgement. An initial baseline range for estimated I/I percent removal was established based on anticipated project type, which considered project intent, goals of the project, what the project work was anticipated to address (e.g., infiltration, inflow, structural only, etc.). These variables were used to refine the baseline percentages specific to each project or Subbasin. For example, projects that only include small, targeted areas of work on mainline pipes typically will result in lower overall or broader range of estimated I/I reduction compared to projects that include more widespread and comprehensive rehabilitation work such as mainline pipe, manhole, and service lateral rehabilitation. Depending on the intent of the project, some projects considered more or less variables than others for estimating the I/I projected to be removed. Variables considered included:

- The purpose of the project and its intent (asset condition, O&M, infiltration removal, inflow removal, etc.).
- The percent of the area and the type of assets (mainline sewers, manholes, service laterals, private inflow sources, etc.) to be evaluated, inspected, and rehabilitated in each project.
- The methods used for evaluation and inspection, level of rehabilitation anticipated and the types of assets that are anticipated to be included in the rehabilitation.
- Composition of the project area for condition factors such as pipe material, age, and recent previous rehabilitation.
- The extraneous flow characteristics of the project area based on flow monitoring data such as R-value, peaking factor, minimum nighttime flow rates, and RDII volume.
- Other factors such as the presence of a flood plain or water body that can surcharge due to severe weather in close proximity to the project.

In limited areas when available, the adjusted ranges were then compared to existing reports within the project area that were related to estimated I/I removal and adjustments were made as needed based on engineering judgment.

The estimates of potential I/I reduction are based on flow meter data from 2015/2016 (December 2015 through February 2016) and select areas for 2017 (September 2017). The 2015/2016 flow monitoring period included five storm events that ranged from less than 1-month to a 20-year return frequency storm event. It is important to note that these storms varied spatially and affected the flow meters differently in the system. The storm event that generated the largest peak flow for a particular meter was selected to quantify the existing RDI/I in that area. The estimated I/I reduction was evaluated as ranges of percentage of I/I removed to account for the variability inherent to I/I identification, measurement, and removal due to a multitude of factors, many of which cannot be quantified until the project is complete. These I/I removal percentage ranges described above, and available flow data have been used to estimate the peak I/I flow rates to be removed based on peak rates of RDI/I recorded over a 24-hour period during the metering program and are presented in Table 8-5.

The I/I flow rate was estimated using the data generated from the 2015/2016 Winter Flow Metering Period and the 2017 Flow Monitoring Period and is a representation of the groundwater and storm conditions at the time of the metering. The groundwater conditions during 2015/2016 monitoring period were generally higher than normal. In addition, seasonal variations, the variability in storms, groundwater conditions, and other factors that can significantly impact the determination of I/I flow rates. Finally, the metering program data was basin specific and not necessarily focused on Minor WCTS sewer tributaries.

As discussed in previous sections, in some cases, actions or assets identified as high priority per the Supplemental IR Report are currently incorporated into larger planned projects, which also include rehabilitation and/or replacement of other areas and/or assets which are not high priority. The City reserves the right to modify the project type and/or address high priority actions or assets identified in the CSAP Prioritization Process separately from these larger planned projects if deemed more appropriate. Modifications to the project type and/or project definition can impact the estimated I/I reduction. The I/I reduction estimates in the table below are estimates only based on the current project approach (which is subject to alteration by the City), and the project's successful completion shall not be determined by the final I/I reduction value achieved. The estimated I/I reductions in the Supplemental IR Report, as presented in Table 8-5, are based on the currently anticipated project types.

Table 8-5 – Potential Peak I/I Reduction Rate Estimates

Potential Peak I/I Reduction Rate (MGD) Estimates [1, 2, 3, 4]							
Project Name/Subbasin	0%	0-10%	5-15%	10-30%	15-40%	25-50%	Currently Anticipated Project Type
SS7424 – BR02 Sewer System Evaluation Study and Sewer Rehabilitation Implementation					0.26-0.70		SSES/Rehabilitation
SS7583- SR02 and BR04 Engineer Led Find & Fix Rehabilitation SR02 BR04				 0.17-0.51	 0.12-0.33		Engineer Led Find & Fix
SS7463 – CC01 Sewer System Evaluation Study and Sewer Rehabilitation Implementation					0.61-1.62		SSES/Rehabilitation
SS7464 – CC02 and CC04 Sewer System Evaluation Study and Sewer Rehabilitation Implementation CC02 CC04					 0.08-0.22	 0.29-0.59	SSES/Rehabilitation
CC03 Rehabilitation Project					0.33-0.89		Engineer Led Find & Fix
CC06 Rehabilitation Project			0.05-0.16				O&M
SS6966 – Sanitary Sewer Pipe Rehabilitation (Annual Contract) & SS6786 - Sanitary Sewer Manhole Rehabilitation (Annual Contract) GC01 GC02 GC03 GC04 GC08		 0.00-0.22 0.00-0.17 0.00-0.40 0.00-0.16 0.00-0.10					Annual Contract

Potential Peak I/I Reduction Rate (MGD) Estimates [1, 2, 3, 4]							
Project Name/Subbasin	0%	0-10%	5-15%	10-30%	15-40%	25-50%	Currently Anticipated Project Type
GC10		0.00-0.07					
MC01 Rehabilitation Project	0.00						O&M
SS7425 – RB03 Sewer System Evaluation Study and Sewer Rehabilitation Implementation						1.00-2.00	SSES/Rehabilitation
SB04 Rehabilitation Project		0.00-0.30					Annual Contract
SB05 Rehabilitation Project		0.00-0.10					O&M
SB06 Rehabilitation Project			0.004-0.013				O&M
SR06 Rehabilitation Project		0.00-0.19					O&M
SS7208 - Saluda River Basin SSES and Rehabilitation for SR-03, 10, & 12 SR10 SR12		0.00-0.24	0.23-0.68				SSES/Rehabilitation
SR11 Rehabilitation Project					0.29-0.76		O&M
SR15 Rehabilitation Project		0.00-0.080					O&M
Broad River Pump Station Evaluation	0.00						Pump Station

Potential Peak I/I Reduction Rate (MGD) Estimates [1, 2, 3, 4]							
Project Name/Subbasin	0%	0-10%	5-15%	10-30%	15-40%	25-50%	Currently Anticipated Project Type
SS7467 – Evaluation of North Columbia Pump Station Upgrades	0.00						Pump Station
SS7564 – West Columbia Pump Station Improvements	0.00						Pump Station
SS7497 – Mill Creek Pump Station Miscellaneous Improvements	0.00						Pump Station
SS7432 – Starlite Pump Station Decommissioning and Basin Rehabilitation Related Works	0.00						Pump Station
SS7060 – City of Columbia Pump Station Improvements at Six Facilities (Clearwater, Meadowlands, Prescott Manor, Shady Lane, Swandale & Yacht Cove)	0.00						Pump Station
SS7435 – Wexford and Windsong Lift Stations Evaluation and Rehabilitation Project	0.00						Pump Station
SS7462 – Investigation of Crockett Road, Atlas Road and Versch Lock Lift Stations	0.00						Pump Station
Lake Murray Pump Station Miscellaneous Improvements	0.00						Pump Station
SS7172 – Evaluation of Design and Construction for the Rehabilitation and/or Replacement of Harbison #2, Mallard Pointe, and Animal Shelter Pump Stations	0.00						Pump Station
SS7437- Miscellaneous Lift Station Improvements and Backup Power Addition Project (Hillcreek #1 and Regatta Point #1)	0.00						Pump Station

Potential Peak I/I Reduction Rate (MGD) Estimates [1, 2, 3, 4]							
Project Name/Subbasin	0%	0-10%	5-15%	10-30%	15-40%	25-50%	Currently Anticipated Project Type
SS7554 – Harbison #4 Pump Station Improvements and Force Main Replacement	0.00						Pump Station
SS7549 – Woodlands Force Main Replacement	0.00						Force Main
Colonial Life Force Main Rehabilitation Project	0.00						Force Main
SS7468 - Three Rivers Pump Station Force Main Replacement	0.00						Force Main

1) The values in the cells represent the peak I/I flow rates to be removed based on peak rates of RDI/I observed over a 24-hour period during the metering program, as a result of the rehabilitation projects.

2) Quantities of I/I reduction estimates are based on the utilization of reasonable flow meter data and engineering judgement. In some cases, meter data may only cover a portion of a project area. Estimates are based on available data for the meters utilized.

3) Quantities are estimated from a specific flow monitoring period and may vary with subsequent flow monitoring results. Estimates are based on the specific time period selected for this analysis.

4) For projects identified to address high priority Subbasins, the estimated removal ranges are based on a percent reduction for the entire subbasin.

8.3.1 Additional Flow Monitoring for Estimating I/I Removal

The City continues to collect flow data through temporary and permanent monitors in accordance with procedures set forth in the CSAP. This data is periodically evaluated and incorporated into the CSAP evaluations as the City deems appropriate. See Section 2.2.1 of the IR Report for additional information on flow monitoring, including data collection, evaluation, and Subbasin flow characteristics.

The City utilized flow monitoring information that was previously included in the IR Report, as well as additional flow monitoring information that was not previously included in the IR Report for estimating I/I removal as described in **Section 8.3** of the Supplemental IR Report. The additional flow monitoring not previously included in the IR Report is included in section 8.3.1.1.

8.3.1.1 Data Collection and Evaluation

The City conducts periodic temporary flow monitoring in the WCTS and maintains permanent flow monitors in the WCTS. Additional flow monitoring, including maps showing the delineation of the monitored Subbasins or portions of Subbasins and the location of each meter for the additional flow monitoring, utilized since the IR Report in select areas for estimating I/I removal, is provided in **Appendix A**.

During the collection of flow monitoring data, quality control and quality assurance activities are performed consistently using the guidance provided in the CSAP. These activities are discussed in more detail in Section 2.2.1.1 of the IR Report.

No significant deviations from the CSAP flow monitoring procedures were encountered with the flow monitoring programs performed to date. No significant problems that would impact the overall validity of results of the flow monitoring were experienced during any of the flow monitoring programs. There were no significant gaps in data and where minor data gaps or suspect data was observed, the data in question was excluded from the flow monitoring data analysis.

After collection and quality review of flow monitoring data, the data was analyzed using the procedures described in the CSAP to estimate existing flows and I/I within each monitored Subbasin.

8.3.1.2 Subbasin Flow Characteristics

As required under the CD Paragraph 16.a., the flow data was used to determine the existing flows for each Subbasin within the WCTS including average and peak daily dry weather flow, average dry weather infiltration rate (in gallons per day per inch-diameter mile), peak wet weather flow, and peaking factors. A brief description of how these are calculated is included in Section 2.2.1.2 of the IR Report. The results from the analysis of the flow data are included in Appendix A.

Section 9 Summary of Status of the Hydraulic Model Report

As required under CD Paragraph 16.a.(viii), Section 6 of the IR Report summarized the status of the City's development of the HMR, including a description of the completed activities and the remaining tasks and activities to be carried out in development of the HMR, and the anticipated dates of completion of the remaining tasks and activities. The CD tasks and activities have been completed, and the HMR was submitted to the EPA on August 21, 2020.

Appendix A – Additional Flow Monitoring Results Used for Estimating I/I Removal

Table A-1 – Existing Dry Weather Flows and Average Dry Weather Infiltration Rate (2017 Temporary Flow Monitoring Program)*

Subbasin	Temporary Flow Meters	Existing Dry Weather Flows (MGD)
CC02	A1	0.083
CC02	A2	0.03
CC02	A3	0.009
CC02	A4	0.006
CC04	A7	0.017

*Analysis from 9/1/2017 to 9/27/2017 in Crane Creek

Table A-2 – Peak Wet Weather Flows and Peaking Factors (2017 Temporary Flow Monitoring Program)*

Subbasin	Temporary Flow Meters	Peak Hourly Wet Weather Flows (MGD)	Peaking Factors
CC02	A1	0.157	1.9
CC02	A2	0.051	1.7
CC02	A3	0.096	10.4
CC02	A4	0.19	30.5
CC04	A7	0.609	35.3

*Analysis from 9/1/2017 to 9/27/2017 in Crane Creek

Table A-3 – Rainfall Events Used for Estimating I/I (2017 Temporary Flow Monitoring Program)

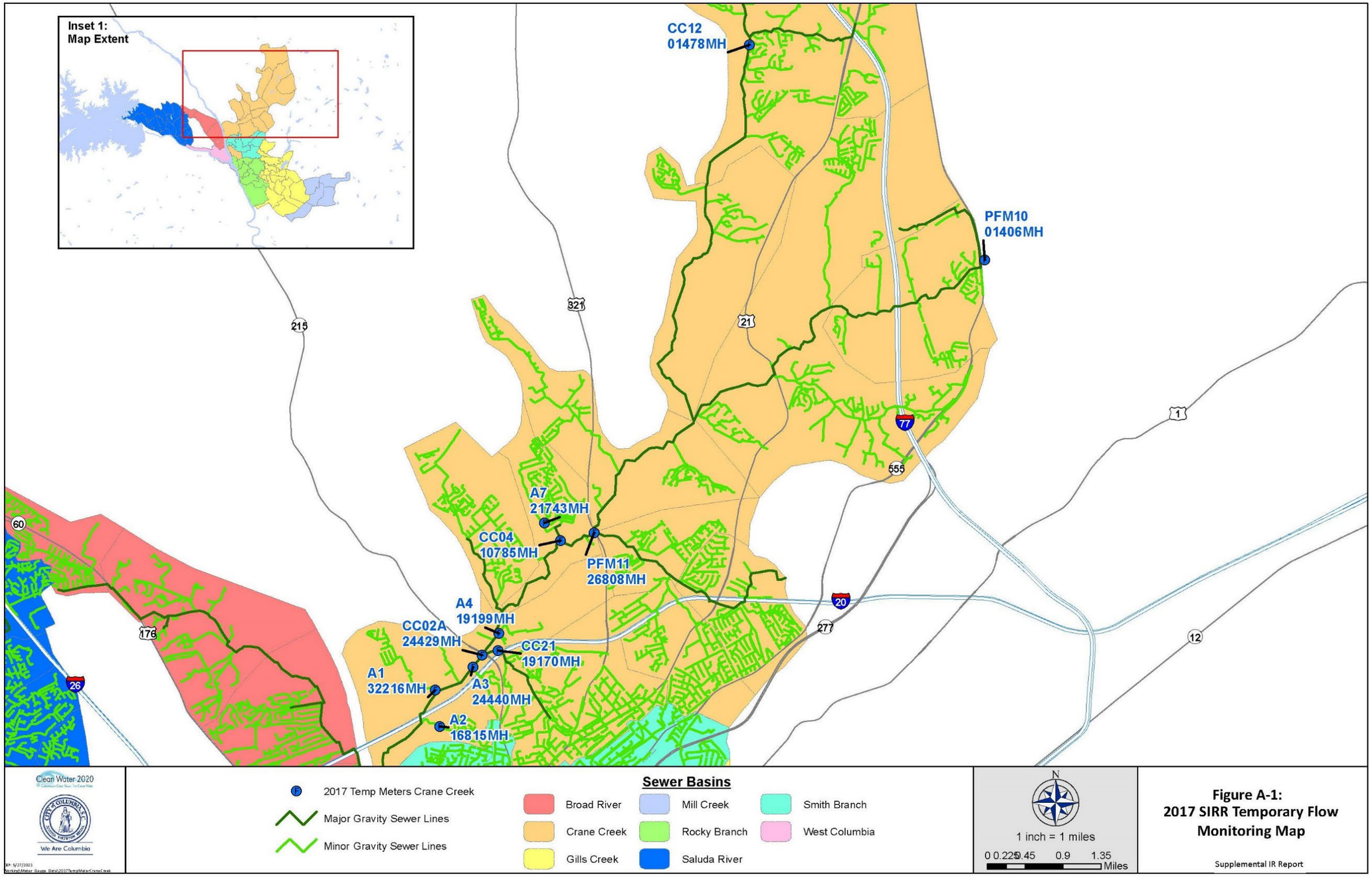
Event	Total Rainfall (in)	Duration (hrs)	Peak Intensity (in/hrs)	Preceding Dry Period (days)
9/5/2017	0.35	19.17	0.21	4.4
9/11/2017	3.07	33.83	0.65	4.4
9/14/2017	0.31	2.67	0.17	1.6
9/21/2017	0.14	1.67	0.11	1.2

Table A-4 – Estimate of Total I/I Contributions (2017 Temporary Flow Monitoring Program)*

Subbasin	Temporary Flow Meters	RDI/I (Incremental Volume (MG)	Effective R-value (%)	Infiltration (GPM)
CC02	A1	0.098	1.2	28.5
CC02	A2	0.045	0.8	13.1
CC02	A3	0.047	1.0	13.7
CC02	A4	0.037	0.8	10.8
CC04	A7	0.280	8.0	81.4

* Analysis from 9/1/2017 to 9/27/2017 in Crane Creek

Figure A-1 – Additional Flow Meter Locations from 2017 Temporary Flow Monitoring Used for Estimating I/I Removal



Appendix B – Recent Historical SSOs Caused by Severe Natural Conditions

Table B-1 – Updated Recent Historical SSOs Caused by Severe Natural Conditions on Major Gravity Sewer Lines and Major Manholes

Date[1]	SSO ID	Basin	Category[2]	Estimated Volume (gallons)[3]
7/13/2019	02339	Gills Creek	Wet Weather	210
7/13/2019	02340	Gills Creek	Wet Weather	84
12/13/2019	02392	Gills Creek	Wet Weather	185
12/13/2019	02393	Gills Creek	Wet Weather	83
12/14/2019	02394	Saluda River	Wet Weather	37,403
2/6/2020	02450	Saluda River	Wet Weather	44,450
2/6/2020	02451	Gills Creek	Wet Weather	127,800
2/6/2020	02452	West Columbia	Wet Weather	84
2/6/2020	02453	Gills Creek	Wet Weather	44,562
2/7/2020	02455	Broad River	Wet Weather	180
2/7/2020	02457	West Columbia	Wet Weather	26,663
1/3/2021	02609	West Columbia	Wet Weather	13,600
1/3/2021	02610	West Columbia	Wet Weather	63,875
1/2/2021	02611	Saluda River	Wet Weather	21,174
2/15/2021	02632	West Columbia	Wet Weather	118,200
2/18/2021	02635	West Columbia	Wet Weather	122,288

1) Updated Recent historical SSOs occurred from January 1, 2019, through December 31, 2021.

2) SSO category is assigned for this evaluation based on the SSO cause. See Section 2.1 in IR Report for category definitions.

3) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Table B-2 – Recent Historical SSOs Caused by Severe Natural Conditions on Minor Gravity Sewer and Minor Manholes within High Priority Subbasins

Date[1]	SSO ID	Basin	Category[2]	Estimated Volume (gallons)[3]
8/6/2015	01625	Gills Creek	Wet Weather	Unknown
9/22/2015	01636	Gills Creek	Wet Weather	Unknown
9/24/2015	01642	Gills Creek	Wet Weather	3,825
9/24/2015	01644	Gills Creek	Wet Weather	Unknown
8/2/2016	01786	Crane Creek	Wet Weather	Unknown
9/2/2016	01791	Gills Creek	Wet Weather	39,750
9/2/2016	01793	Broad River	Wet Weather	12,730
10/8/2016	01807	Gills Creek	Wet Weather	18,988
10/8/2016	01810	Broad River	Wet Weather	925
4/5/2017	01897	Gills Creek	Wet Weather	325
10/11/2018	02192	Gills Creek	Wet Weather	2,813

Date[1]	SSO ID	Basin	Category[2]	Estimated Volume (gallons)[3]
10/11/2018	02193	Broad River	Wet Weather	1,320
10/11/2018	02194	Crane Creek	Wet Weather	3,975
6/9/2019	02332	Mill Creek	Wet Weather	28,125
12/13/2019	02390	Broad River	Wet Weather	5,520
2/6/2020	02449	Broad River	Wet Weather	14,520
2/6/2020	02454	Crane Creek	Wet Weather	133
2/19/2021	02638	Crane Creek	Wet Weather	14,323
2/19/2021	02639	Gills Creek	Wet Weather	659

1) Recent historical SSOs occurred from the effective date of the CD (May 21, 2014) through December 31, 2021.

2) SSO category is assigned for this evaluation based on the SSO cause. See Section 3.1 for category definitions.

3) Estimated SSO volume as listed on the SSO reports to DHEC. Volume is estimated per the Wastewater Spill Response SOP. For unobserved overflows where an estimated volume could not be calculated, the volume was reported as unknown.

Appendix C – Gravity Sewer Line Inspections Results

Table C-1 – Summary of Defects Found through Updated Major Gravity Sewer Line Inspections*

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
Gills Creek Basin								
GC01			**11**	**3**		**1**		**15**
	RBL	Roots Ball Lateral				1		1
	RFJ	Roots Fine Joint	10					10
	RFL	Roots Fine Lateral	1					1
	TFD	Tap Factory Made Defective		3				3
GC02			**6**		**2**			**8**
	RFJ	Roots Fine Joint	6					6
	RMJ	Roots Medium Joint			2			2
GC04						**2**	**6**	**8**
	B	Broken					2	2
	BSV	Broken Soil Visible					2	2
	HSV	Hole Soil Visible					2	2
	MWLS	Water Level Sag				2		2
GC09			**2**		**2**			**4**
	RFJ	Roots Fine Joint	2					2
	RMJ	Roots Medium Joint			2			2
Rocky Branch Basin								
RB01			**2**	**4**	**1**			**7**
	CL	Crack Longitudinal		2				2
	CM	Crack Multiple			1			1
	IW	Infiltration Weeper		2				2
	RFJ	Roots Fine Joint	2					2
RB02			**2**	**1**	**12**		**2**	**17**
	IG	Infiltration Gusher					2	2
	LFW	Lining Failure Wrinkled			1			1
	RFC	Roots Fine Connection	2					2
	TBD	Tap Break-In/Hammer Defective			11			11
	TFD	Tap Factory Made Defective		1				1
RB05					**12**		**6**	**18**
	B	Broken			2		2	4
	BSV	Broken Soil Visible					2	2
	CM	Crack Multiple			4			4
	FL	Fracture Longitudinal			4			4
	HSV	Hole Soil Visible					2	2
	ID	Infiltration Dripper			2			2
RB08					**9**			**9**
	MWLS	Water Level Sag			8			8
	SCP	Surface Corrosion Metal Pipe			1			1
Smith Branch Basin								
SB02			**2**	**23**	**4**	**4**		**33**
	CC	Crack Circumferential	2					2
	FM	Fracture Multiple				2		2
	ID	Infiltration Dripper			4			4
	IR	Infiltration Runner				2		2
	MWLS	Water Level Sag		18				18
	RFB	Roots Fine Barrel		5				5
SB05				**10**	**15**		**2**	**27**
	B	Broken					2	2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	CM	Crack Multiple			3			3
	FL	Fracture Longitudinal			12			12
	RFB	Roots Fine Barrel		10				10
West Columbia Basin								
WC02					**4**			**4**
	FL	Fracture Longitudinal			2			2
	JOM	Joint Offset Medium			2			2
Grand Total			**25**	**41**	**61**	**7**	**16**	**150**

*From inspections since the cut-off date of the IR Report through December 31, 2021

Table C-2 – Summary of Defects Found through Minor Gravity Sewer Line Inspections within High Priority Subbasins

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
Broad River Basin								
BR01			**26**	**2**	**25**	**10**	**1**	**64**
	B	Broken			8		1	9
	CC	Crack Circumferential	2					2
	CM	Crack Multiple			2			2
	FM	Fracture Multiple				1		1
	IR	Infiltration Runner				1		1
	JOM	Joint Offset Medium			2			2
	MWLS	Water Level Sag		2				2
	RBJ	Roots Ball Joint				7		7
	RFJ	Roots Fine Joint	24					24
	RMB	Roots Medium Barrel				1		1
	RMJ	Roots Medium Joint			13			13
BR02			**1,768**	**1,816**	**2,521**	**955**	**372**	**7,432**
	B	Broken			70	47	119	236
	BSV	Broken Soil Visible					90	90
	BVV	Broken Void Visible					54	54
	CC	Crack Circumferential	27					27
	CL	Crack Longitudinal		390				390
	CM	Crack Multiple			115			115
	CS	Crack Spiral		133				133
	D	Deformed				27	6	33
	DH	Deformed Horizontal					3	3
	FC	Fracture Circumferential		76				76
	FH2	Fracture Longitudinal Hinge, 2			31			31
	FH3	Fracture Longitudinal Hinge, 3				21		21
	FL	Fracture Longitudinal			696			696
	FM	Fracture Multiple				599		599
	FS	Fracture Spiral			497			497
	H	Hole				19	2	21
	HSV	Hole Soil Visible					72	72
	HVV	Hole Void Visible					8	8
	ID	Infiltration Dripper			20			20
	IG	Infiltration Gusher					5	5

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	IR	Infiltration Runner				15		15
	ISGT	Intruding Sealing Grout		4				4
	ISSR	Intruding Sealing Ring		2				2
	ISSRB	Intruding Sealing Ring Broken		8				8
	ISSRH	Intruding Sealing Ring Hanging		6				6
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting		6				6
	ISZ	Intruding Seal Material Other		16				16
	IW	Infiltration Weeper		5				5
	JAL	Joint Angular Large				8		8
	JAM	Joint Angular Medium			14			14
	JOL	Joint Offset Large				145		145
	JOM	Joint Offset Medium			636			636
	JSL	Joint Separated Large				15		15
	JSM	Joint Separated Medium			74			74
	MWLS	Water Level Sag		934	91	5	5	1,035
	OBI	Obstacle Intruding Thru Wall					6	6
	OBJ	Obstacle In Joint		6				6
	RBB	Roots Ball Barrel					1	1
	RBC	Roots Ball Connection				3		3
	RBJ	Roots Ball Joint				27		27
	RBL	Roots Ball Lateral				6		6
	RFB	Roots Fine Barrel		60				60
	RFC	Roots Fine Connection	29					29
	RFJ	Roots Fine Joint	1,614					1,614
	RFL	Roots Fine Lateral	98					98
	RMB	Roots Medium Barrel				14		14
	RMC	Roots Medium Connection			10			10
	RMJ	Roots Medium Joint			95			95
	RML	Roots Medium Lateral			13			13
	RPPD	Repair Patch Defective				4		4
	RTB	Roots Tap Barrel			5			5
	RTC	Roots Tap Connection		6				6
	RTJ	Roots Tap Joint		48				48
	SCP	Surface Corrosion Metal Pipe			70			70
	TBD	Tap Break-In/Hammer Defective			84			84
	TFD	Tap Factory Made Defective		110				110
	TSD	Tap Saddle Defective		6				6
	XP	Collapse Pipe Sewer					1	1
BR03			**189**	**34**	**111**	**40**	**26**	**400**
	B	Broken			4	6	12	22
	BSV	Broken Soil Visible					4	4
	CC	Crack Circumferential	26					26
	CL	Crack Longitudinal		24				24
	CM	Crack Multiple			6			6
	CS	Crack Spiral		4				4
	FS	Fracture Spiral			2			2
	HSV	Hole Soil Visible					6	6
	IR	Infiltration Runner				2		2
	JOL	Joint Offset Large				4		4
	JOM	Joint Offset Medium			38			38

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSM	Joint Separated Medium			3			3
	MWLS	Water Level Sag		3	2			5
	RBB	Roots Ball Barrel					4	4
	RBJ	Roots Ball Joint				22		22
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		2				2
	RFJ	Roots Fine Joint	163					163
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			52			52
	RML	Roots Medium Lateral			2			2
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		1				1
BR04			**97**	**19**	**85**	**22**	**15**	**238**
	B	Broken					5	5
	BSV	Broken Soil Visible					6	6
	CC	Crack Circumferential	4					4
	CH2	Crack Longitudinal Hinge, 2		2				2
	FL	Fracture Longitudinal			10			10
	JOL	Joint Offset Large				7		7
	JOM	Joint Offset Medium			9			9
	MWLS	Water Level Sag		8	3			11
	RBB	Roots Ball Barrel					2	2
	RBJ	Roots Ball Joint				5		5
	RBL	Roots Ball Lateral				6		6
	RFJ	Roots Fine Joint	89					89
	RFL	Roots Fine Lateral	4					4
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			6			6
	RMJ	Roots Medium Joint			47			47
	RML	Roots Medium Lateral			6			6
	RPPD	Repair Patch Defective				2		2
	RTB	Roots Tap Barrel			2			2
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		7				7
	XP	Collapse Pipe Sewer					2	2
Crane Creek Basin								
CC01			**952**	**1,166**	**1,492**	**589**	**449**	**4,648**
	B	Broken			83	38	89	210
	BSV	Broken Soil Visible					90	90
	BVV	Broken Void Visible					34	34
	CC	Crack Circumferential	92					92
	CH2	Crack Longitudinal Hinge, 2		3				3
	CH3	Crack Longitudinal Hinge, 3			1			1
	CL	Crack Longitudinal		245				245
	CM	Crack Multiple			327			327
	CS	Crack Spiral		103				103
	D	Deformed				5	7	12
	FC	Fracture Circumferential		104				104

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	FH2	Fracture Longitudinal Hinge, 2			8			8
	FH3	Fracture Longitudinal Hinge, 3				7		7
	FL	Fracture Longitudinal			229			229
	FM	Fracture Multiple				275		275
	FS	Fracture Spiral			220			220
	H	Hole				124	6	130
	HSV	Hole Soil Visible					172	172
	HVV	Hole Void Visible					28	28
	ID	Infiltration Dripper			48			48
	IG	Infiltration Gusher					10	10
	IR	Infiltration Runner				37		37
	ISSRH	Intruding Sealing Ring Hanging		2				2
	ISZ	Intruding Seal Material Other		8				8
	IW	Infiltration Weeper		28				28
	JAL	Joint Angular Large				10		10
	JAM	Joint Angular Medium			31			31
	JOL	Joint Offset Large				35		35
	JOM	Joint Offset Medium			233			233
	JSL	Joint Separated Large				11		11
	JSM	Joint Separated Medium			70			70
	LFB	Lining Failure Blistered			6			6
	LFD	Lining Failure Detached			30			30
	LFDL	Lining Failure Delaminating			3			3
	LFUC	Lining Failure Undercut Connection			39			39
	LFW	Lining Failure Wrinkled			10			10
	MWLS	Water Level Sag		487	45	7		539
	OBC	Obstacle Thru Connection		3				3
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		15				15
	OBP	Obstacle External Pipe or Cable		2	2			4
	RBB	Roots Ball Barrel					2	2
	RBJ	Roots Ball Joint				8		8
	RBL	Roots Ball Lateral				10		10
	RFB	Roots Fine Barrel		45				45
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	846					846
	RFL	Roots Fine Lateral	12					12
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			44			44
	RML	Roots Medium Lateral			12			12
	RPPD	Repair Patch Defective				20		20
	RTJ	Roots Tap Joint		14				14
	SCP	Surface Corrosion Metal Pipe			22			22
	SMW	Surface Missing Wall					3	3
	TBD	Tap Break-In/Hammer Defective			29			29
	TFD	Tap Factory Made Defective		107				107
	XP	Collapse Pipe Sewer					6	6
CC02			**1,121**	**611**	**1,379**	**355**	**197**	**3,663**
	B	Broken			26	39	64	129
	BSV	Broken Soil Visible					61	61

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	BVV	Broken Void Visible					24	24
	CC	Crack Circumferential	32					32
	CL	Crack Longitudinal		148				148
	CM	Crack Multiple			79			79
	CS	Crack Spiral		10				10
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		91				91
	FH3	Fracture Longitudinal Hinge, 3				4		4
	FL	Fracture Longitudinal			250			250
	FM	Fracture Multiple				164		164
	FS	Fracture Spiral			46			46
	H	Hole				11	2	13
	HSV	Hole Soil Visible					28	28
	HVV	Hole Void Visible					4	4
	ID	Infiltration Dripper			12			12
	IG	Infiltration Gusher					5	5
	IR	Infiltration Runner				20		20
	ISSRB	Intruding Sealing Ring Broken		51				51
	ISSRH	Intruding Sealing Ring Hanging		43				43
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting		12				12
	IW	Infiltration Weeper		1				1
	JOL	Joint Offset Large				86		86
	JOM	Joint Offset Medium			700			700
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			30			30
	LFB	Lining Failure Blistered			2			2
	MWLS	Water Level Sag		186	49		4	239
	OBC	Obstacle Thru Connection		1				1
	OBJ	Obstacle In Joint		1				1
	RBJ	Roots Ball Joint				27		27
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	3					3
	RFJ	Roots Fine Joint	1,074					1,074
	RFL	Roots Fine Lateral	12					12
	RMJ	Roots Medium Joint			162			162
	RML	Roots Medium Lateral			9			9
	RTB	Roots Tap Barrel			1			1
	RTJ	Roots Tap Joint		47				47
	TBD	Tap Break-In/Hammer Defective			13			13
	TFD	Tap Factory Made Defective		16				16
	XP	Collapse Pipe Sewer					3	3
CC03			**70**	**18**	**36**	**35**	**5**	**164**
	B	Broken				1	1	2
	BSV	Broken Soil Visible					2	2
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		4				4
	CS	Crack Spiral		2				2
	FL	Fracture Longitudinal			2			2
	JOL	Joint Offset Large				25		25

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JOM	Joint Offset Medium			12			12
	MWLS	Water Level Sag		5	3			8
	OBC	Obstacle Thru Connection		1				1
	RBB	Roots Ball Barrel					2	2
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				6		6
	RBL	Roots Ball Lateral				1		1
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	67					67
	RMJ	Roots Medium Joint			16			16
	TBD	Tap Break-In/Hammer Defective			3			3
	TFD	Tap Factory Made Defective		2				2
CC04			**1,660**	**922**	**1,541**	**340**	**368**	**4,831**
	B	Broken			81	28	85	194
	BSV	Broken Soil Visible					210	210
	CC	Crack Circumferential	82					82
	CH2	Crack Longitudinal Hinge, 2		5				5
	CH3	Crack Longitudinal Hinge, 3			1			1
	CL	Crack Longitudinal		288				288
	CM	Crack Multiple			97			97
	CS	Crack Spiral		14				14
	FC	Fracture Circumferential		155				155
	FH2	Fracture Longitudinal Hinge, 2			5			5
	FL	Fracture Longitudinal			202			202
	FM	Fracture Multiple				166		166
	FS	Fracture Spiral			55			55
	H	Hole				6	2	8
	HSV	Hole Soil Visible					33	33
	HVV	Hole Void Visible					2	2
	ID	Infiltration Dripper			35			35
	IG	Infiltration Gusher					25	25
	IR	Infiltration Runner				18		18
	ISSRB	Intruding Sealing Ring Broken		1	1			2
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting		4				4
	ISZ	Intruding Seal Material Other		2				2
	IW	Infiltration Weeper		34				34
	JOL	Joint Offset Large				74		74
	JOM	Joint Offset Medium			576			576
	JSL	Joint Separated Large				4		4
	JSM	Joint Separated Medium			17			17
	LFW	Lining Failure Wrinkled			2			2
	MWLS	Water Level Sag		318	148	7		473
	OBI	Obstacle Intruding Thru Wall					2	2
	RBB	Roots Ball Barrel					5	5
	RBJ	Roots Ball Joint				23		23
	RBL	Roots Ball Lateral				12		12
	RFB	Roots Fine Barrel		6				6
	RFC	Roots Fine Connection	3					3
	RFJ	Roots Fine Joint	1,531					1,531

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RFL	Roots Fine Lateral	44					44
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			287			287
	RML	Roots Medium Lateral			16			16
	RTC	Roots Tap Connection		1				1
	RTJ	Roots Tap Joint		77				77
	TBD	Tap Break-In/Hammer Defective			16			16
	TFD	Tap Factory Made Defective		17				17
	XP	Collapse Pipe Sewer					4	4
CC05			**80**	**32**	**44**	**19**	**8**	**183**
	B	Broken			1			1
	BSV	Broken Soil Visible					2	2
	CH2	Crack Longitudinal Hinge, 2		2				2
	CH3	Crack Longitudinal Hinge, 3			1			1
	CL	Crack Longitudinal		10				10
	CM	Crack Multiple			5			5
	CS	Crack Spiral		7				7
	FC	Fracture Circumferential		2				2
	FM	Fracture Multiple				2		2
	FS	Fracture Spiral			4			4
	HSV	Hole Soil Visible					5	5
	ID	Infiltration Dripper			4			4
	IR	Infiltration Runner				4		4
	ISZ	Intruding Seal Material Other		2				2
	JOL	Joint Offset Large				3		3
	JOM	Joint Offset Medium			10			10
	JSL	Joint Separated Large				2		2
	MWLS	Water Level Sag		1				1
	RBB	Roots Ball Barrel					1	1
	RBJ	Roots Ball Joint				8		8
	RFB	Roots Fine Barrel		2				2
	RFJ	Roots Fine Joint	78					78
	RFL	Roots Fine Lateral	2					2
	RMJ	Roots Medium Joint			17			17
	RTB	Roots Tap Barrel			2			2
	RTC	Roots Tap Connection		2				2
	RTJ	Roots Tap Joint		4				4
CC06			**64**	**31**	**48**	**18**	**13**	**174**
	B	Broken			4	1	10	15
	CC	Crack Circumferential	12					12
	CL	Crack Longitudinal		10				10
	CM	Crack Multiple			2			2
	FC	Fracture Circumferential		2				2
	FL	Fracture Longitudinal			3			3
	FM	Fracture Multiple				2		2
	FS	Fracture Spiral			2			2
	H	Hole				4		4
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				2		2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JAM	Joint Angular Medium			2			2
	JOL	Joint Offset Large				4		4
	JOM	Joint Offset Medium			14			14
	MWLS	Water Level Sag		5	6	3	1	15
	RBJ	Roots Ball Joint				2		2
	RFB	Roots Fine Barrel		1				1
	RFJ	Roots Fine Joint	48					48
	RFL	Roots Fine Lateral	4					4
	RMJ	Roots Medium Joint			10			10
	RML	Roots Medium Lateral			1			1
	RTJ	Roots Tap Joint		6				6
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		7				7
	XP	Collapse Pipe Sewer					2	2
CC07			**78**	**64**	**123**	**32**	**11**	**308**
	B	Broken			4	4		8
	BSV	Broken Soil Visible					4	4
	BVV	Broken Void Visible					4	4
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		18				18
	CM	Crack Multiple			2			2
	CS	Crack Spiral		4				4
	D	Deformed				2		2
	FC	Fracture Circumferential		6				6
	FH3	Fracture Longitudinal Hinge, 3				2		2
	FL	Fracture Longitudinal			7			7
	FM	Fracture Multiple				4		4
	ID	Infiltration Dripper			2			2
	JAL	Joint Angular Large				2		2
	JOL	Joint Offset Large				10		10
	JOM	Joint Offset Medium			72			72
	JSL	Joint Separated Large				1		1
	JSM	Joint Separated Medium			3			3
	MWLS	Water Level Sag		17	10	3	1	31
	RBB	Roots Ball Barrel					2	2
	RBJ	Roots Ball Joint				4		4
	RFB	Roots Fine Barrel		4				4
	RFJ	Roots Fine Joint	74					74
	RFL	Roots Fine Lateral	2					2
	RMJ	Roots Medium Joint			18			18
	RML	Roots Medium Lateral			2			2
	RTB	Roots Tap Barrel			2			2
	RTJ	Roots Tap Joint		6				6
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		9				9
CC08			**21**	**31**	**36**	**22**	**26**	**136**
	B	Broken			4		9	13
	BVV	Broken Void Visible					6	6
	CL	Crack Longitudinal		16				16
	FC	Fracture Circumferential		4				4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	FL	Fracture Longitudinal			4			4
	HSV	Hole Soil Visible					2	2
	IG	Infiltration Gusher					2	2
	ISSR	Intruding Sealing Ring		2				2
	IW	Infiltration Weeper		2				2
	JOL	Joint Offset Large				16		16
	JOM	Joint Offset Medium			18			18
	MWLS	Water Level Sag		3	9		6	18
	RBB	Roots Ball Barrel					1	1
	RBJ	Roots Ball Joint				6		6
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	18					18
	RFL	Roots Fine Lateral	2					2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		4				4
CC09			**36**	**22**	**6**	**5**	**18**	**87**
	BSV	Broken Soil Visible					6	6
	BVV	Broken Void Visible					6	6
	CH2	Crack Longitudinal Hinge, 2		1				1
	CL	Crack Longitudinal		3				3
	CM	Crack Multiple			1			1
	D	Deformed				2		2
	HSV	Hole Soil Visible					2	2
	JOL	Joint Offset Large				2		2
	MWLS	Water Level Sag		9				9
	RBB	Roots Ball Barrel					4	4
	RBJ	Roots Ball Joint				1		1
	RFB	Roots Fine Barrel		2				2
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	34					34
	RMJ	Roots Medium Joint			4			4
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		7				7
CC10			**26**	**14**	**37**	**5**	**6**	**88**
	BVV	Broken Void Visible					2	2
	CM	Crack Multiple			2			2
	HSV	Hole Soil Visible					2	2
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting					2	2
	ISZ	Intruding Seal Material Other			1			1
	JOM	Joint Offset Medium			6			6
	MWLS	Water Level Sag			18	3		21
	RBJ	Roots Ball Joint				2		2
	RFJ	Roots Fine Joint	24					24
	RFL	Roots Fine Lateral	2					2
	RMJ	Roots Medium Joint			2			2
	TBD	Tap Break-In/Hammer Defective			8			8
	TFD	Tap Factory Made Defective		14				14
CC12				**5**	**4**	**10**	**10**	**29**
	B	Broken			4		2	6

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	BSV	Broken Soil Visible					2	2
	D	Deformed				2		2
	HSV	Hole Soil Visible					4	4
	JSL	Joint Separated Large				2		2
	OBP	Obstacle External Pipe or Cable		2			2	4
	RMB	Roots Medium Barrel				6		6
	TFD	Tap Factory Made Defective		3				3
CC21			**211**	**67**	**113**	**39**	**44**	**474**
	B	Broken			2	2	10	14
	BSV	Broken Soil Visible					11	11
	BVV	Broken Void Visible					8	8
	CC	Crack Circumferential	6					6
	CH2	Crack Longitudinal Hinge, 2		2				2
	CL	Crack Longitudinal		22				22
	CM	Crack Multiple			2			2
	FC	Fracture Circumferential		8				8
	FH3	Fracture Longitudinal Hinge, 3				2		2
	FL	Fracture Longitudinal			13			13
	H	Hole				4		4
	ID	Infiltration Dripper			12			12
	IG	Infiltration Gusher					6	6
	IR	Infiltration Runner				8		8
	JOL	Joint Offset Large				4		4
	JOM	Joint Offset Medium			12			12
	JSM	Joint Separated Medium			4			4
	LFD	Lining Failure Detached			4			4
	MWLS	Water Level Sag		7	3	4		14
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		4				4
	RBB	Roots Ball Barrel					7	7
	RBJ	Roots Ball Joint				11		11
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		6				6
	RFC	Roots Fine Connection	5					5
	RFJ	Roots Fine Joint	196					196
	RFL	Roots Fine Lateral	4					4
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			49			49
	RML	Roots Medium Lateral			6			6
	TBD	Tap Break-In/Hammer Defective			6			6
	TFD	Tap Factory Made Defective		18				18
Gills Creek Basin								
GC01			**196**	**202**	**184**	**258**	**220**	**1,060**
	B	Broken			6		36	42
	BSV	Broken Soil Visible					24	24
	BVV	Broken Void Visible					4	4
	CC	Crack Circumferential	5					5
	CL	Crack Longitudinal		30				30
	CM	Crack Multiple			8			8

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	DH	Deformed Horizontal					2	2
	FL	Fracture Longitudinal			16			16
	FM	Fracture Multiple				201		201
	FS	Fracture Spiral			11			11
	H	Hole				4	1	5
	HSV	Hole Soil Visible					118	118
	HVV	Hole Void Visible					8	8
	ID	Infiltration Dripper			4			4
	IG	Infiltration Gusher					10	10
	IR	Infiltration Runner				8		8
	JOL	Joint Offset Large				24		24
	JOM	Joint Offset Medium			49			49
	LFD	Lining Failure Detached			2			2
	LFDE	Lining Failure Defective End			2			2
	LFDL	Lining Failure Delaminating			1			1
	MWLS	Water Level Sag		134	62	9	4	209
	RBB	Roots Ball Barrel					5	5
	RBJ	Roots Ball Joint				6		6
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	186					186
	RFL	Roots Fine Lateral	4					4
	RMB	Roots Medium Barrel				4		4
	RMJ	Roots Medium Joint			15			15
	RML	Roots Medium Lateral			4			4
	RPPD	Repair Patch Defective				2		2
	RTC	Roots Tap Connection		1				1
	RTJ	Roots Tap Joint		5				5
	SCP	Surface Corrosion Metal Pipe			1			1
	TBD	Tap Break-In/Hammer Defective			3			3
	TFD	Tap Factory Made Defective		28				28
	XP	Collapse Pipe Sewer					8	8
GC02			**111**	**207**	**155**	**256**	**237**	**966**
	B	Broken			6	1	36	43
	BSV	Broken Soil Visible					9	9
	BVV	Broken Void Visible					10	10
	CL	Crack Longitudinal		11				11
	CM	Crack Multiple			7			7
	CS	Crack Spiral		2				2
	D	Deformed					2	2
	FC	Fracture Circumferential		5				5
	FL	Fracture Longitudinal			35			35
	FM	Fracture Multiple				174		174
	FS	Fracture Spiral			7			7
	H	Hole				12		12
	HSV	Hole Soil Visible					144	144
	HVV	Hole Void Visible					18	18
	ID	Infiltration Dripper			2			2
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				12		12

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	ISSR	Intruding Sealing Ring		2				2
	ISSRH	Intruding Sealing Ring Hanging					1	1
	JOL	Joint Offset Large				37		37
	JOM	Joint Offset Medium			31			31
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			5			5
	LFDL	Lining Failure Delaminating			4			4
	MWLS	Water Level Sag		150	27	3	4	184
	OBJ	Obstacle In Joint			1			1
	RBB	Roots Ball Barrel					5	5
	RBJ	Roots Ball Joint				9		9
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		8				8
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	108					108
	RFL	Roots Fine Lateral	2					2
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			17			17
	RML	Roots Medium Lateral			8			8
	RPPD	Repair Patch Defective				2		2
	RTB	Roots Tap Barrel			4			4
	RTJ	Roots Tap Joint		10				10
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		19				19
	XP	Collapse Pipe Sewer					6	6
GC03			**360**	**679**	**651**	**396**	**457**	**2,543**
	B	Broken			13	3	25	41
	BSV	Broken Soil Visible					77	77
	BVV	Broken Void Visible					34	34
	CC	Crack Circumferential	39					39
	CH2	Crack Longitudinal Hinge, 2		2				2
	CH3	Crack Longitudinal Hinge, 3			2			2
	CL	Crack Longitudinal		69				69
	CM	Crack Multiple			160			160
	CS	Crack Spiral		32				32
	D	Deformed				2		2
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		29				29
	FH3	Fracture Longitudinal Hinge, 3				3		3
	FL	Fracture Longitudinal			47			47
	FM	Fracture Multiple				214		214
	FS	Fracture Spiral			63			63
	H	Hole				31	6	37
	HSV	Hole Soil Visible					226	226
	HVV	Hole Void Visible					33	33
	ID	Infiltration Dripper			18			18
	IG	Infiltration Gusher					20	20
	IR	Infiltration Runner				48		48
	ISSRH	Intruding Sealing Ring Hanging		2				2
	IW	Infiltration Weeper		7				7

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JOL	Joint Offset Large				62		62
	JOM	Joint Offset Medium			64			64
	JSL	Joint Separated Large				5		5
	JSM	Joint Separated Medium			1			1
	LFB	Lining Failure Blistered			7			7
	LFD	Lining Failure Detached			23			23
	LFDL	Lining Failure Delaminating			23			23
	LFPH	Lining Failure Pinhole			1			1
	LFUC	Lining Failure Undercut Connection			4			4
	LFW	Lining Failure Wrinkled			14			14
	MWLS	Water Level Sag		484	144	6	13	647
	OBJ	Obstacle In Joint		2	1			3
	RBB	Roots Ball Barrel					6	6
	RBJ	Roots Ball Joint				12		12
	RBL	Roots Ball Lateral				3		3
	RFB	Roots Fine Barrel		6				6
	RFJ	Roots Fine Joint	307					307
	RFL	Roots Fine Lateral	14					14
	RMB	Roots Medium Barrel				7		7
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			44			44
	RML	Roots Medium Lateral			10			10
	RTB	Roots Tap Barrel			2			2
	RTJ	Roots Tap Joint		11				11
	TBD	Tap Break-In/Hammer Defective			8			8
	TFD	Tap Factory Made Defective		35				35
	XP	Collapse Pipe Sewer					15	15
GC04			**107**	**224**	**271**	**342**	**318**	**1,262**
	B	Broken			9	3	66	78
	BSV	Broken Soil Visible					41	41
	BVV	Broken Void Visible					30	30
	CC	Crack Circumferential	12					12
	CL	Crack Longitudinal		9				9
	CM	Crack Multiple			39			39
	CS	Crack Spiral		9				9
	D	Deformed				1		1
	FC	Fracture Circumferential		24				24
	FL	Fracture Longitudinal			45			45
	FM	Fracture Multiple				261		261
	FS	Fracture Spiral			47			47
	H	Hole				11		11
	HSV	Hole Soil Visible					156	156
	HVV	Hole Void Visible					18	18
	ID	Infiltration Dripper			2			2
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				12		12
	ISGT	Intruding Sealing Grout		2	1			3
	IW	Infiltration Weeper		3				3
	JOL	Joint Offset Large				37		37
	JOM	Joint Offset Medium			61			61

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSL	Joint Separated Large				1		1
	JSM	Joint Separated Medium			4			4
	LFPH	Lining Failure Pinhole			2			2
	LFW	Lining Failure Wrinkled			5			5
	MWLS	Water Level Sag		152	30	7	1	190
	OBP	Obstacle External Pipe or Cable				4		4
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		2				2
	RFJ	Roots Fine Joint	82					82
	RFL	Roots Fine Lateral	13					13
	RMB	Roots Medium Barrel				1		1
	RMJ	Roots Medium Joint			14			14
	RML	Roots Medium Lateral			5			5
	RTB	Roots Tap Barrel			3			3
	RTC	Roots Tap Connection		2				2
	RTJ	Roots Tap Joint		6				6
	SCP	Surface Corrosion Metal Pipe			1			1
	TBD	Tap Break-In/Hammer Defective			3			3
	TFD	Tap Factory Made Defective		15				15
	XP	Collapse Pipe Sewer					4	4
GC05			**20**	**199**	**122**	**47**	**34**	**422**
	D	Deformed				2		2
	DH	Deformed Horizontal					2	2
	FM	Fracture Multiple				4		4
	FS	Fracture Spiral			6			6
	HSV	Hole Soil Visible					10	10
	HVV	Hole Void Visible					2	2
	IG	Infiltration Gusher					11	11
	IR	Infiltration Runner				5		5
	ISSRH	Intruding Sealing Ring Hanging		2				2
	JOL	Joint Offset Large				18		18
	JOM	Joint Offset Medium			24			24
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			2			2
	LFB	Lining Failure Blistered			4			4
	LFDL	Lining Failure Delaminating			6			6
	LFW	Lining Failure Wrinkled			21			21
	MWLS	Water Level Sag		178	48	11	9	246
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		16				16
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	12					12
	RFL	Roots Fine Lateral	7					7
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			1			1
	RML	Roots Medium Lateral			1			1
	RPPD	Repair Patch Defective				1		1
	TBD	Tap Break-In/Hammer Defective			7			7
	TFD	Tap Factory Made Defective		2				2
	TSD	Tap Saddle Defective		1				1

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
GC06			**48**	**74**	**53**	**60**	**95**	**330**
	B	Broken			6	8	16	30
	BSV	Broken Soil Visible					21	21
	BVV	Broken Void Visible					13	13
	CC	Crack Circumferential	37					37
	CL	Crack Longitudinal		27				27
	CM	Crack Multiple			16			16
	FC	Fracture Circumferential		8				8
	FL	Fracture Longitudinal			11			11
	FM	Fracture Multiple				48		48
	HSV	Hole Soil Visible					26	26
	HVV	Hole Void Visible					15	15
	JOL	Joint Offset Large				2		2
	JOM	Joint Offset Medium			5			5
	LFDL	Lining Failure Delaminating			2			2
	MWLS	Water Level Sag		18	8		4	30
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		1				1
	RFJ	Roots Fine Joint	9					9
	RFL	Roots Fine Lateral	2					2
	RTB	Roots Tap Barrel			2			2
	TBD	Tap Break-In/Hammer Defective			3			3
	TFD	Tap Factory Made Defective		20				20
GC07			**320**	**400**	**603**	**1,157**	**682**	**3,162**
	B	Broken			21	9	33	63
	BSV	Broken Soil Visible					241	241
	BVV	Broken Void Visible					91	91
	CC	Crack Circumferential	49					49
	CH2	Crack Longitudinal Hinge, 2		5				5
	CL	Crack Longitudinal		170				170
	CM	Crack Multiple			102			102
	CS	Crack Spiral		11				11
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		28				28
	FL	Fracture Longitudinal			151			151
	FM	Fracture Multiple				1,080		1,080
	FS	Fracture Spiral			50			50
	H	Hole				3		3
	HSV	Hole Soil Visible					197	197
	HVV	Hole Void Visible					100	100
	ID	Infiltration Dripper			14			14
	IG	Infiltration Gusher					7	7
	IR	Infiltration Runner				15		15
	ISGT	Intruding Sealing Grout		6				6
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting		2				2
	ISZ	Intruding Seal Material Other		1				1
	JAM	Joint Angular Medium			2			2
	JOL	Joint Offset Large				17		17
	JOM	Joint Offset Medium			61			61
	JSL	Joint Separated Large				4		4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSM	Joint Separated Medium			10			10
	LFB	Lining Failure Blistered			6			6
	LFDE	Lining Failure Defective End			4			4
	LFUC	Lining Failure Undercut Connection			6			6
	LFW	Lining Failure Wrinkled			63			63
	MWLS	Water Level Sag		98	30		1	129
	OBC	Obstacle Thru Connection		1				1
	OBJ	Obstacle In Joint		2				2
	RBC	Roots Ball Connection				1		1
	RBJ	Roots Ball Joint				20		20
	RFC	Roots Fine Connection	5					5
	RFJ	Roots Fine Joint	266					266
	RMC	Roots Medium Connection			1			1
	RMJ	Roots Medium Joint			60			60
	RML	Roots Medium Lateral			1			1
	RPPD	Repair Patch Defective				8		8
	RTJ	Roots Tap Joint		1				1
	SCP	Surface Corrosion Metal Pipe			1			1
	SMW	Surface Missing Wall					1	1
	TBD	Tap Break-In/Hammer Defective			20			20
	TFD	Tap Factory Made Defective		74				74
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					9	9
GC08			**729**	**465**	**554**	**165**	**298**	**2,211**
	B	Broken			27	9	22	58
	BSV	Broken Soil Visible					70	70
	BVV	Broken Void Visible					54	54
	CC	Crack Circumferential	61					61
	CH2	Crack Longitudinal Hinge, 2		1				1
	CL	Crack Longitudinal		111				111
	CM	Crack Multiple			16			16
	CS	Crack Spiral		7				7
	D	Deformed				2	1	3
	FC	Fracture Circumferential		45				45
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FH3	Fracture Longitudinal Hinge, 3				3		3
	FL	Fracture Longitudinal			105			105
	FM	Fracture Multiple				55		55
	FS	Fracture Spiral			38			38
	H	Hole				10		10
	HSV	Hole Soil Visible					74	74
	HVV	Hole Void Visible					66	66
	ID	Infiltration Dripper			6			6
	IG	Infiltration Gusher					3	3
	IR	Infiltration Runner				9		9
	ISSR	Intruding Sealing Ring		4				4
	ISSRB	Intruding Sealing Ring Broken		1				1
	ISSRH	Intruding Sealing Ring Hanging				1		1
	IW	Infiltration Weeper		65				65
	JAL	Joint Angular Large				2		2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JAM	Joint Angular Medium			35			35
	JOL	Joint Offset Large				18		18
	JOM	Joint Offset Medium			124			124
	JSL	Joint Separated Large				12		12
	JSM	Joint Separated Medium			7			7
	LFB	Lining Failure Blistered			4			4
	LFDE	Lining Failure Defective End			2			2
	LFUC	Lining Failure Undercut Connection			13			13
	LFW	Lining Failure Wrinkled			66			66
	MWLS	Water Level Sag		108	26	4		138
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		1				1
	RBC	Roots Ball Connection				4		4
	RBJ	Roots Ball Joint				28		28
	RBL	Roots Ball Lateral				3		3
	RFB	Roots Fine Barrel		9				9
	RFC	Roots Fine Connection	11					11
	RFJ	Roots Fine Joint	651					651
	RFL	Roots Fine Lateral	6					6
	RMB	Roots Medium Barrel				3		3
	RMC	Roots Medium Connection			5			5
	RMJ	Roots Medium Joint			36			36
	RML	Roots Medium Lateral			13			13
	RPPD	Repair Patch Defective				2		2
	RTB	Roots Tap Barrel			1			1
	RTC	Roots Tap Connection		1				1
	RTJ	Roots Tap Joint		16				16
	SCP	Surface Corrosion Metal Pipe			3			3
	TBD	Tap Break-In/Hammer Defective			25			25
	TFD	Tap Factory Made Defective		95				95
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					6	6
GC09			**729**	**299**	**352**	**111**	**81**	**1,572**
	B	Broken			13	13	24	50
	BSV	Broken Soil Visible					9	9
	BVV	Broken Void Visible					9	9
	CC	Crack Circumferential	11					11
	CL	Crack Longitudinal		28				28
	CM	Crack Multiple			7			7
	CS	Crack Spiral		14				14
	DH	Deformed Horizontal					1	1
	FC	Fracture Circumferential		29				29
	FH3	Fracture Longitudinal Hinge, 3				3		3
	FL	Fracture Longitudinal			72			72
	FM	Fracture Multiple				30		30
	FS	Fracture Spiral			30			30
	H	Hole				1		1
	HSV	Hole Soil Visible					12	12
	HVV	Hole Void Visible					17	17
	ID	Infiltration Dripper			12			12

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	IG	Infiltration Gusher					1	1
	IR	Infiltration Runner				13		13
	ISGT	Intruding Sealing Grout		9				9
	ISSR	Intruding Sealing Ring		2				2
	ISSRB	Intruding Sealing Ring Broken		4				4
	ISSRH	Intruding Sealing Ring Hanging		1				1
	ISZ	Intruding Seal Material Other		2				2
	IW	Infiltration Weeper		96				96
	JAM	Joint Angular Medium			3			3
	JOL	Joint Offset Large				26		26
	JOM	Joint Offset Medium			100			100
	JSL	Joint Separated Large				14		14
	JSM	Joint Separated Medium			18			18
	LFUC	Lining Failure Undercut Connection			2			2
	LFW	Lining Failure Wrinkled			3			3
	MWLS	Water Level Sag		58	15	2	1	76
	OBJ	Obstacle In Joint			2			2
	RBB	Roots Ball Barrel					5	5
	RBJ	Roots Ball Joint				2		2
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	9					9
	RFJ	Roots Fine Joint	692					692
	RFL	Roots Fine Lateral	17					17
	RMB	Roots Medium Barrel				3		3
	RMC	Roots Medium Connection			4			4
	RMJ	Roots Medium Joint			49			49
	RML	Roots Medium Lateral			10			10
	RPPD	Repair Patch Defective				2		2
	RTC	Roots Tap Connection		1				1
	RTJ	Roots Tap Joint		15				15
	SCP	Surface Corrosion Metal Pipe			2			2
	TBD	Tap Break-In/Hammer Defective			10			10
	TFD	Tap Factory Made Defective		35				35
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					2	2
GC10			**91**	**132**	**118**	**17**	**104**	**462**
	B	Broken			24	6	24	54
	BSV	Broken Soil Visible					30	30
	BVV	Broken Void Visible					14	14
	CC	Crack Circumferential	62					62
	CH2	Crack Longitudinal Hinge, 2		1				1
	CL	Crack Longitudinal		86				86
	CM	Crack Multiple			33			33
	CS	Crack Spiral		1				1
	FC	Fracture Circumferential		16				16
	FH2	Fracture Longitudinal Hinge, 2			3			3
	FL	Fracture Longitudinal			42			42
	FM	Fracture Multiple				3		3
	FS	Fracture Spiral			4			4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	H	Hole				3		3
	HSV	Hole Soil Visible					24	24
	HVV	Hole Void Visible					8	8
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				2		2
	JOM	Joint Offset Medium			3			3
	LFPH	Lining Failure Pinhole			2			2
	MWLS	Water Level Sag		6				6
	OBI	Obstacle Intruding Thru Wall					4	4
	OBP	Obstacle External Pipe or Cable			2			2
	RFB	Roots Fine Barrel		3				3
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	20					20
	RFL	Roots Fine Lateral	7					7
	RMB	Roots Medium Barrel				3		3
	RML	Roots Medium Lateral			3			3
	TFD	Tap Factory Made Defective		19				19
GC11			**25**	**23**	**17**	**7**	**23**	**95**
	B	Broken			2			2
	BSV	Broken Soil Visible					6	6
	BVV	Broken Void Visible					6	6
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		8				8
	HSV	Hole Soil Visible					7	7
	HVV	Hole Void Visible					4	4
	IR	Infiltration Runner				1		1
	JOM	Joint Offset Medium			14			14
	MWLS	Water Level Sag		1				1
	RBJ	Roots Ball Joint				4		4
	RBL	Roots Ball Lateral				2		2
	RFJ	Roots Fine Joint	19					19
	RFL	Roots Fine Lateral	4					4
	RMJ	Roots Medium Joint			1			1
	TFD	Tap Factory Made Defective		14				14
GC12			**61**	**89**	**65**	**33**	**34**	**282**
	B	Broken			2	1	1	4
	BSV	Broken Soil Visible					4	4
	BVV	Broken Void Visible					6	6
	CC	Crack Circumferential	7					7
	CL	Crack Longitudinal		16				16
	CM	Crack Multiple			2			2
	CS	Crack Spiral		2				2
	DH	Deformed Horizontal					4	4
	FC	Fracture Circumferential		27				27
	FL	Fracture Longitudinal			14			14
	FM	Fracture Multiple				8		8
	FS	Fracture Spiral			2			2
	H	Hole				4		4
	HSV	Hole Soil Visible					3	3
	HVV	Hole Void Visible					13	13

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	ID	Infiltration Dripper			6			6
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				7		7
	JOM	Joint Offset Medium			21			21
	MWLS	Water Level Sag		6				6
	RBB	Roots Ball Barrel					3	3
	RBC	Roots Ball Connection				2		2
	RBL	Roots Ball Lateral				7		7
	RFB	Roots Fine Barrel		2				2
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	52					52
	RMJ	Roots Medium Joint			12			12
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			6			6
	TFD	Tap Factory Made Defective		34				34
GC13			**238**	**22**	**33**	**10**	**23**	**326**
	B	Broken			5	4	8	17
	BSV	Broken Soil Visible					3	3
	BVV	Broken Void Visible					2	2
	CL	Crack Longitudinal		5				5
	CM	Crack Multiple			4			4
	D	Deformed				2		2
	FC	Fracture Circumferential		2				2
	FL	Fracture Longitudinal			3			3
	FM	Fracture Multiple				2		2
	HSV	Hole Soil Visible					4	4
	ID	Infiltration Dripper			5			5
	IG	Infiltration Gusher					4	4
	JOL	Joint Offset Large				2		2
	JOM	Joint Offset Medium			2			2
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		3	2		2	7
	OBJ	Obstacle In Joint		1				1
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	236					236
	RMJ	Roots Medium Joint			6			6
	TBD	Tap Break-In/Hammer Defective			4			4
	TFD	Tap Factory Made Defective		7				7
GC14			**102**	**49**	**85**	**43**	**24**	**303**
	B	Broken			4	2		6
	BSV	Broken Soil Visible					7	7
	BVV	Broken Void Visible					4	4
	CH2	Crack Longitudinal Hinge, 2		2				2
	CL	Crack Longitudinal		8				8
	CM	Crack Multiple			4			4
	CS	Crack Spiral		2				2
	FC	Fracture Circumferential		8				8
	FL	Fracture Longitudinal			10			10
	FM	Fracture Multiple				2		2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	FS	Fracture Spiral			2			2
	HSV	Hole Soil Visible					2	2
	ID	Infiltration Dripper			1			1
	IG	Infiltration Gusher					6	6
	IR	Infiltration Runner				18		18
	JOM	Joint Offset Medium			22			22
	JSL	Joint Separated Large				2		2
	MWLS	Water Level Sag		8	7			15
	RBB	Roots Ball Barrel					5	5
	RBJ	Roots Ball Joint				10		10
	RBL	Roots Ball Lateral				7		7
	RFB	Roots Fine Barrel		2				2
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	96					96
	RFL	Roots Fine Lateral	4					4
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			27			27
	RML	Roots Medium Lateral			5			5
	RTC	Roots Tap Connection		2				2
	RTJ	Roots Tap Joint		8				8
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		8				8
	TSD	Tap Saddle Defective		1				1
GC15			**190**	**85**	**117**	**42**	**21**	**455**
	B	Broken			2	4	9	15
	CC	Crack Circumferential	4					4
	CL	Crack Longitudinal		11				11
	CM	Crack Multiple			8			8
	CS	Crack Spiral		2				2
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FL	Fracture Longitudinal			16			16
	FM	Fracture Multiple				9		9
	H	Hole				4		4
	HSV	Hole Soil Visible					2	2
	ID	Infiltration Dripper			17			17
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				8		8
	JOM	Joint Offset Medium			13			13
	MWLS	Water Level Sag		47	27	1	2	77
	RBB	Roots Ball Barrel					4	4
	RBJ	Roots Ball Joint				12		12
	RFB	Roots Fine Barrel		6				6
	RFJ	Roots Fine Joint	186					186
	RMJ	Roots Medium Joint			30			30
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		17				17
	XP	Collapse Pipe Sewer					2	2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
GC16			**48**	**8**	**11**	**14**	**2**	**83**
	BSV	Broken Soil Visible					2	2
	CL	Crack Longitudinal		2				2
	CS	Crack Spiral		2				2
	ID	Infiltration Dripper			1			1
	IR	Infiltration Runner				8		8
	MWLS	Water Level Sag			2			2
	RBJ	Roots Ball Joint				4		4
	RFJ	Roots Fine Joint	44					44
	RFL	Roots Fine Lateral	4					4
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			5			5
	RML	Roots Medium Lateral			2			2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		3				3
	TSD	Tap Saddle Defective		1				1
GC17			**233**	**18**	**77**	**22**	**8**	**358**
	BVV	Broken Void Visible					2	2
	CC	Crack Circumferential	10					10
	CH3	Crack Longitudinal Hinge, 3			8			8
	CL	Crack Longitudinal		10				10
	CM	Crack Multiple			8			8
	FL	Fracture Longitudinal			8			8
	FM	Fracture Multiple				6		6
	JOL	Joint Offset Large				6		6
	MWLS	Water Level Sag		4	9			13
	OBJ	Obstacle In Joint					2	2
	RBB	Roots Ball Barrel					2	2
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				6		6
	RFJ	Roots Fine Joint	223					223
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			42			42
	RML	Roots Medium Lateral			2			2
	RTJ	Roots Tap Joint		2				2
	TFD	Tap Factory Made Defective		2				2
	XP	Collapse Pipe Sewer					2	2
GC18			**12**	**34**	**24**	**7**	**3**	**80**
	B	Broken			2			2
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		2				2
	HSV	Hole Soil Visible					1	1
	ID	Infiltration Dripper			1			1
	LFB	Lining Failure Blistered			2			2
	LFW	Lining Failure Wrinkled			8			8
	MWLS	Water Level Sag		16	10	4	2	32
	RBC	Roots Ball Connection				1		1
	RBJ	Roots Ball Joint				2		2
	RFJ	Roots Fine Joint	8					8

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RFL	Roots Fine Lateral	2					2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		16				16
Mill Creek Basin								
MC01			**147**	**67**	**116**	**58**	**28**	**416**
	B	Broken			6			6
	BSV	Broken Soil Visible					12	12
	BVV	Broken Void Visible					4	4
	CL	Crack Longitudinal		24				24
	CM	Crack Multiple			9			9
	FC	Fracture Circumferential		1				1
	FH2	Fracture Longitudinal Hinge, 2			1			1
	FL	Fracture Longitudinal			8			8
	FM	Fracture Multiple				6		6
	FS	Fracture Spiral			2			2
	HSV	Hole Soil Visible					1	1
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				4		4
	ISSR	Intruding Sealing Ring		2				2
	JOL	Joint Offset Large				5		5
	JOM	Joint Offset Medium			35			35
	JSL	Joint Separated Large				5		5
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		6	8	2		16
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		1				1
	RBB	Roots Ball Barrel					7	7
	RBC	Roots Ball Connection				1		1
	RBJ	Roots Ball Joint				24		24
	RBL	Roots Ball Lateral				11		11
	RFB	Roots Fine Barrel		1				1
	RFJ	Roots Fine Joint	145					145
	RFL	Roots Fine Lateral	2					2
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			28			28
	RML	Roots Medium Lateral			4			4
	RTB	Roots Tap Barrel			3			3
	RTC	Roots Tap Connection		1				1
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			8			8
	TFD	Tap Factory Made Defective		28				28
	TSD	Tap Saddle Defective		1				1
MC02			**204**	**74**	**112**	**64**	**25**	**479**
	B	Broken			7		3	10
	BSV	Broken Soil Visible					8	8
	CC	Crack Circumferential	25					25
	CL	Crack Longitudinal		21				21
	CM	Crack Multiple			7			7
	CS	Crack Spiral		3				3

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	FC	Fracture Circumferential		6				6
	FL	Fracture Longitudinal			11			11
	FM	Fracture Multiple				17		17
	FS	Fracture Spiral			2			2
	HSV	Hole Soil Visible					2	2
	ID	Infiltration Dripper			4			4
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				10		10
	JOM	Joint Offset Medium			16			16
	JSM	Joint Separated Medium			4			4
	MWLS	Water Level Sag		17	6	2		25
	RBB	Roots Ball Barrel					8	8
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				22		22
	RBL	Roots Ball Lateral				7		7
	RFB	Roots Fine Barrel		1				1
	RFC	Roots Fine Connection	4					4
	RFJ	Roots Fine Joint	169					169
	RFL	Roots Fine Lateral	6					6
	RMJ	Roots Medium Joint			48			48
	RTJ	Roots Tap Joint		4				4
	TBD	Tap Break-In/Hammer Defective			7			7
	TFD	Tap Factory Made Defective		22				22
	XP	Collapse Pipe Sewer					2	2
MC03			**109**	**36**	**82**	**34**	**16**	**277**
	B	Broken					6	6
	BSV	Broken Soil Visible					4	4
	BVV	Broken Void Visible					4	4
	CC	Crack Circumferential	6					6
	CL	Crack Longitudinal		7				7
	CM	Crack Multiple			4			4
	CS	Crack Spiral		2				2
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		2				2
	FL	Fracture Longitudinal			2			2
	FM	Fracture Multiple				4		4
	FS	Fracture Spiral			2			2
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				2		2
	JOL	Joint Offset Large				4		4
	JOM	Joint Offset Medium			8			8
	JSL	Joint Separated Large				6		6
	MWLS	Water Level Sag		10	2			12
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				12		12
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		2				2
	RFJ	Roots Fine Joint	99					99
	RFL	Roots Fine Lateral	4					4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			52			52
	RML	Roots Medium Lateral			6			6
	RTB	Roots Tap Barrel			1			1
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		11				11
MC04			**142**	**27**	**42**	**22**	**15**	**248**
	B	Broken					5	5
	BSV	Broken Soil Visible					4	4
	CL	Crack Longitudinal		4				4
	CM	Crack Multiple			6			6
	FL	Fracture Longitudinal			4			4
	FS	Fracture Spiral			2			2
	JOL	Joint Offset Large				2		2
	JOM	Joint Offset Medium			6			6
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		11	5			16
	RBB	Roots Ball Barrel					6	6
	RBJ	Roots Ball Joint				12		12
	RBL	Roots Ball Lateral				6		6
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	134					134
	RFL	Roots Fine Lateral	6					6
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			13			13
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		12				12
MC05			**2**					**2**
	RFL	Roots Fine Lateral	2					2
Rocky Branch Basin								
RB01			**929**	**1,248**	**1,164**	**269**	**297**	**3,907**
	B	Broken			44	40	48	132
	BSV	Broken Soil Visible					63	63
	BVV	Broken Void Visible					47	47
	CC	Crack Circumferential	226					226
	CH2	Crack Longitudinal Hinge, 2		29				29
	CH3	Crack Longitudinal Hinge, 3			2			2
	CL	Crack Longitudinal		563				563
	CM	Crack Multiple			705			705
	CS	Crack Spiral		206				206
	DH	Deformed Horizontal					4	4
	FC	Fracture Circumferential		64				64
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FH3	Fracture Longitudinal Hinge, 3				2		2
	FL	Fracture Longitudinal			46			46
	FM	Fracture Multiple				98		98
	FS	Fracture Spiral			74			74

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	H	Hole				5		5
	HSV	Hole Soil Visible					23	23
	HVV	Hole Void Visible					33	33
	ID	Infiltration Dripper			33			33
	IG	Infiltration Gusher					9	9
	IR	Infiltration Runner				19		19
	ISGT	Intruding Sealing Grout		4				4
	ISSR	Intruding Sealing Ring		2				2
	IW	Infiltration Weeper		6				6
	JAM	Joint Angular Medium			19			19
	JOL	Joint Offset Large				12		12
	JOM	Joint Offset Medium			73			73
	JSL	Joint Separated Large				4		4
	JSM	Joint Separated Medium			11			11
	LFB	Lining Failure Blistered			11			11
	LFD	Lining Failure Detached			4			4
	LFDL	Lining Failure Delaminating			2			2
	LFUC	Lining Failure Undercut Connection			3			3
	LFW	Lining Failure Wrinkled			9			9
	MWLS	Water Level Sag		255	33	3		291
	OBC	Obstacle Thru Connection		2				2
	OBP	Obstacle External Pipe or Cable		7	2			9
	RBB	Roots Ball Barrel					2	2
	RBC	Roots Ball Connection				1		1
	RBJ	Roots Ball Joint				12		12
	RBL	Roots Ball Lateral				17		17
	RFB	Roots Fine Barrel		7				7
	RFC	Roots Fine Connection	7					7
	RFJ	Roots Fine Joint	632					632
	RFL	Roots Fine Lateral	64					64
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			4			4
	RMJ	Roots Medium Joint			46			46
	RML	Roots Medium Lateral			15			15
	RPPD	Repair Patch Defective				54		54
	RTB	Roots Tap Barrel			2			2
	RTC	Roots Tap Connection		1				1
	SCP	Surface Corrosion Metal Pipe			9			9
	SMW	Surface Missing Wall					54	54
	TBD	Tap Break-In/Hammer Defective			15			15
	TFD	Tap Factory Made Defective		101				101
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					14	14
RB02			**69**	**217**	**213**	**110**	**62**	**671**
	B	Broken			13	6	11	30
	BSV	Broken Soil Visible					15	15
	BVV	Broken Void Visible					5	5
	CC	Crack Circumferential	27					27
	CL	Crack Longitudinal		116				116
	CM	Crack Multiple			61			61

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	CS	Crack Spiral		21				21
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		11				11
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FL	Fracture Longitudinal			33			33
	FM	Fracture Multiple				35		35
	FS	Fracture Spiral			20			20
	H	Hole				13	2	15
	HSV	Hole Soil Visible					11	11
	HVV	Hole Void Visible					8	8
	JAM	Joint Angular Medium			2			2
	JOL	Joint Offset Large				22		22
	JOM	Joint Offset Medium			61			61
	JSL	Joint Separated Large				10		10
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		9	14	7	3	33
	OBI	Obstacle Intruding Thru Wall					5	5
	RBL	Roots Ball Lateral				2		2
	RFJ	Roots Fine Joint	37					37
	RFL	Roots Fine Lateral	5					5
	RMJ	Roots Medium Joint			1			1
	RPPD	Repair Patch Defective				15		15
	RTC	Roots Tap Connection		2				2
	SCP	Surface Corrosion Metal Pipe			3			3
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		58				58
RB03			**657**	**1,795**	**1,528**	**782**	**494**	**5,256**
	B	Broken			62	80	270	412
	BSV	Broken Soil Visible					23	23
	BVV	Broken Void Visible					4	4
	CC	Crack Circumferential	125					125
	CH2	Crack Longitudinal Hinge, 2		6				6
	CH3	Crack Longitudinal Hinge, 3			1			1
	CL	Crack Longitudinal		350				350
	CM	Crack Multiple			296			296
	CS	Crack Spiral		122				122
	D	Deformed				16	17	33
	FC	Fracture Circumferential		95				95
	FH2	Fracture Longitudinal Hinge, 2			5			5
	FH3	Fracture Longitudinal Hinge, 3				2		2
	FL	Fracture Longitudinal			109			109
	FM	Fracture Multiple				289		289
	FS	Fracture Spiral			129			129
	H	Hole				250	21	271
	HSV	Hole Soil Visible					55	55
	HVV	Hole Void Visible					77	77
	ID	Infiltration Dripper			11			11
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				20		20
	ISGT	Intruding Sealing Grout		3	1			4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	ISSRB	Intruding Sealing Ring Broken		12	2			14
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting				1		1
	ISZ	Intruding Seal Material Other		5				5
	JAL	Joint Angular Large				6		6
	JAM	Joint Angular Medium			30			30
	JOL	Joint Offset Large				66		66
	JOM	Joint Offset Medium			249			249
	JSL	Joint Separated Large				7		7
	JSM	Joint Separated Medium			52			52
	LFB	Lining Failure Blistered			21			21
	LFUC	Lining Failure Undercut Connection			98			98
	LFW	Lining Failure Wrinkled			36			36
	MWLS	Water Level Sag		103	27	5	2	137
	OBC	Obstacle Thru Connection			1			1
	OBI	Obstacle Intruding Thru Wall					1	1
	OBJ	Obstacle In Joint		30	5			35
	OBP	Obstacle External Pipe or Cable		2	9	5	2	18
	RBJ	Roots Ball Joint				2		2
	RBL	Roots Ball Lateral				1		1
	RFB	Roots Fine Barrel		18				18
	RFC	Roots Fine Connection	1					1
	RFJ	Roots Fine Joint	523					523
	RFL	Roots Fine Lateral	8					8
	RMB	Roots Medium Barrel				1		1
	RMJ	Roots Medium Joint			206			206
	RML	Roots Medium Lateral			1			1
	RPPD	Repair Patch Defective				31		31
	RTJ	Roots Tap Joint		40				40
	SCP	Surface Corrosion Metal Pipe			67			67
	SMW	Surface Missing Wall					2	2
	TBD	Tap Break-In/Hammer Defective			110			110
	TFD	Tap Factory Made Defective		982				982
	TSD	Tap Saddle Defective		27				27
	XP	Collapse Pipe Sewer					18	18
RB04			**47**	**39**	**22**	**10**	**16**	**134**
	B	Broken			8	4	8	20
	BSV	Broken Soil Visible					6	6
	BVV	Broken Void Visible					2	2
	CC	Crack Circumferential	14					14
	CL	Crack Longitudinal		16				16
	CM	Crack Multiple			4			4
	D	Deformed				2		2
	FC	Fracture Circumferential		6				6
	FL	Fracture Longitudinal			2			2
	JOM	Joint Offset Medium			4			4
	JSL	Joint Separated Large				2		2
	MWLS	Water Level Sag		6	2			8
	RBL	Roots Ball Lateral				2		2
	RFJ	Roots Fine Joint	29					29
	RFL	Roots Fine Lateral	4					4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RMJ	Roots Medium Joint			2			2
	TFD	Tap Factory Made Defective		11				11
RB05			**842**	**476**	**750**	**360**	**229**	**2,657**
	B	Broken			38	27	55	120
	BSV	Broken Soil Visible					44	44
	BVV	Broken Void Visible					18	18
	CC	Crack Circumferential	41					41
	CH2	Crack Longitudinal Hinge, 2		7				7
	CH3	Crack Longitudinal Hinge, 3			3			3
	CL	Crack Longitudinal		189				189
	CM	Crack Multiple			79			79
	CS	Crack Spiral		54				54
	D	Deformed				2	9	11
	FC	Fracture Circumferential		26				26
	FH2	Fracture Longitudinal Hinge, 2			18			18
	FH3	Fracture Longitudinal Hinge, 3				10		10
	FL	Fracture Longitudinal			145			145
	FM	Fracture Multiple				210		210
	FS	Fracture Spiral			145			145
	H	Hole				15	4	19
	HSV	Hole Soil Visible					61	61
	HVV	Hole Void Visible					22	22
	ID	Infiltration Dripper			26			26
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				13		13
	ISGT	Intruding Sealing Grout		15				15
	ISSR	Intruding Sealing Ring		4				4
	ISSRH	Intruding Sealing Ring Hanging			2			2
	IW	Infiltration Weeper		2				2
	JOL	Joint Offset Large				56		56
	JOM	Joint Offset Medium			53			53
	JSL	Joint Separated Large				10		10
	JSM	Joint Separated Medium			10			10
	MWLS	Water Level Sag		44	4	1		49
	OBC	Obstacle Thru Connection		1				1
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		5				5
	RBB	Roots Ball Barrel					3	3
	RBJ	Roots Ball Joint				3		3
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		21				21
	RFC	Roots Fine Connection	17					17
	RFJ	Roots Fine Joint	759					759
	RFL	Roots Fine Lateral	25					25
	RMB	Roots Medium Barrel				7		7
	RMC	Roots Medium Connection			11			11
	RMJ	Roots Medium Joint			173			173
	RML	Roots Medium Lateral			25			25
	RPPD	Repair Patch Defective				2		2
	RTB	Roots Tap Barrel			2			2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RTJ	Roots Tap Joint		26				26
	SCP	Surface Corrosion Metal Pipe			7			7
	SMW	Surface Missing Wall					7	7
	TBD	Tap Break-In/Hammer Defective			9			9
	TFD	Tap Factory Made Defective		82				82
	XP	Collapse Pipe Sewer					2	2
RB06						**2**		**2**
	D	Deformed				2		2
RB07			**139**	**59**	**72**	**11**	**35**	**316**
	B	Broken			9	2	12	23
	BSV	Broken Soil Visible					10	10
	CC	Crack Circumferential	22					22
	CL	Crack Longitudinal		21				21
	CM	Crack Multiple			12			12
	FC	Fracture Circumferential		10				10
	FH3	Fracture Longitudinal Hinge, 3				1		1
	FL	Fracture Longitudinal			7			7
	FM	Fracture Multiple				5		5
	HSV	Hole Soil Visible					4	4
	HVV	Hole Void Visible					6	6
	IG	Infiltration Gusher					3	3
	ISGT	Intruding Sealing Grout		1				1
	ISSR	Intruding Sealing Ring		2				2
	IW	Infiltration Weeper		1				1
	JOM	Joint Offset Medium			6			6
	JSM	Joint Separated Medium			4			4
	LFW	Lining Failure Wrinkled			2			2
	RBL	Roots Ball Lateral				3		3
	RFB	Roots Fine Barrel		2				2
	RFC	Roots Fine Connection	4					4
	RFJ	Roots Fine Joint	108					108
	RFL	Roots Fine Lateral	5					5
	RMJ	Roots Medium Joint			22			22
	TBD	Tap Break-In/Hammer Defective			10			10
	TFD	Tap Factory Made Defective		21				21
	TSD	Tap Saddle Defective		1				1
RB08			**82**	**7**	**31**	**12**		**132**
	B	Broken			2			2
	CC	Crack Circumferential	8					8
	FL	Fracture Longitudinal			2			2
	JOL	Joint Offset Large				4		4
	MWLS	Water Level Sag		6				6
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				6		6
	RFJ	Roots Fine Joint	72					72
	RFL	Roots Fine Lateral	2					2
	RMJ	Roots Medium Joint			26			26
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		1				1

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
Saluda River Basin								
SB01			**45**	**19**	**29**	**11**	**5**	**109**
	B	Broken			2			2
	BSV	Broken Soil Visible					1	1
	BVV	Broken Void Visible					1	1
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		2				2
	FL	Fracture Longitudinal			3			3
	HSV	Hole Soil Visible					1	1
	ID	Infiltration Dripper			2			2
	JOM	Joint Offset Medium			4			4
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		10	3			13
	RBB	Roots Ball Barrel					2	2
	RBJ	Roots Ball Joint				9		9
	RFB	Roots Fine Barrel		4				4
	RFJ	Roots Fine Joint	43					43
	RMJ	Roots Medium Joint			13			13
	TFD	Tap Factory Made Defective		3				3
SB02			**758**	**1,319**	**870**	**443**	**331**	**3,721**
	B	Broken			38	21	33	92
	BSV	Broken Soil Visible					58	58
	BVV	Broken Void Visible					24	24
	CC	Crack Circumferential	98					98
	CH2	Crack Longitudinal Hinge, 2		21				21
	CH3	Crack Longitudinal Hinge, 3			14			14
	CL	Crack Longitudinal		280				280
	CM	Crack Multiple			78			78
	CS	Crack Spiral		43				43
	D	Deformed				16	4	20
	DH	Deformed Horizontal					4	4
	FC	Fracture Circumferential		97				97
	FH2	Fracture Longitudinal Hinge, 2			50			50
	FH3	Fracture Longitudinal Hinge, 3				6		6
	FL	Fracture Longitudinal			229			229
	FM	Fracture Multiple				150		150
	FS	Fracture Spiral			54			54
	H	Hole				49	5	54
	HSV	Hole Soil Visible					127	127
	HVV	Hole Void Visible					53	53
	ID	Infiltration Dripper			50			50
	IG	Infiltration Gusher					10	10
	IR	Infiltration Runner				44		44
	ISSR	Intruding Sealing Ring		1				1
	ISSRB	Intruding Sealing Ring Broken		5	2			7
	ISSRH	Intruding Sealing Ring Hanging		5				5
	ISZ	Intruding Seal Material Other		2				2
	IW	Infiltration Weeper		13				13

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JAL	Joint Angular Large				1		1
	JAM	Joint Angular Medium			14			14
	JOL	Joint Offset Large				100		100
	JOM	Joint Offset Medium			153			153
	JSL	Joint Separated Large				11		11
	JSM	Joint Separated Medium			11			11
	LFB	Lining Failure Blistered			2			2
	LFUC	Lining Failure Undercut Connection			1			1
	LFW	Lining Failure Wrinkled			13			13
	MWLS	Water Level Sag		526	57	4	2	589
	OBJ	Obstacle In Joint		13		1		14
	OBP	Obstacle External Pipe or Cable			3			3
	RBB	Roots Ball Barrel					3	3
	RBC	Roots Ball Connection				3		3
	RBJ	Roots Ball Joint				10		10
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		10				10
	RFC	Roots Fine Connection	7					7
	RFJ	Roots Fine Joint	612					612
	RFL	Roots Fine Lateral	41					41
	RMB	Roots Medium Barrel				3		3
	RMJ	Roots Medium Joint			54			54
	RML	Roots Medium Lateral			1			1
	RPPD	Repair Patch Defective				20		20
	RTJ	Roots Tap Joint		10				10
	SCP	Surface Corrosion Metal Pipe			21			21
	SMW	Surface Missing Wall					1	1
	TBD	Tap Break-In/Hammer Defective			25			25
	TFD	Tap Factory Made Defective		290				290
	TSD	Tap Saddle Defective		3				3
	XP	Collapse Pipe Sewer					7	7
SB03			**204**	**240**	**287**	**76**	**217**	**1,024**
	B	Broken			8	3	12	23
	BSV	Broken Soil Visible					15	15
	BVV	Broken Void Visible					12	12
	CC	Crack Circumferential	19					19
	CH2	Crack Longitudinal Hinge, 2		4				4
	CL	Crack Longitudinal		112				112
	CM	Crack Multiple			78			78
	CS	Crack Spiral		4				4
	FC	Fracture Circumferential		4				4
	FL	Fracture Longitudinal			24			24
	FM	Fracture Multiple				7		7
	H	Hole				38		38
	HSV	Hole Soil Visible					63	63
	HVV	Hole Void Visible					109	109
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				3		3
	JOL	Joint Offset Large				4		4
	JOM	Joint Offset Medium			35			35

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSM	Joint Separated Medium			4			4
	LFB	Lining Failure Blistered			1			1
	LFD	Lining Failure Detached			2			2
	LFUC	Lining Failure Undercut Connection			1			1
	LFW	Lining Failure Wrinkled			6			6
	MWLS	Water Level Sag		24	8	2		34
	OBP	Obstacle External Pipe or Cable		2				2
	RBB	Roots Ball Barrel					5	5
	RBC	Roots Ball Connection				4		4
	RBJ	Roots Ball Joint				6		6
	RBL	Roots Ball Lateral				3		3
	RFB	Roots Fine Barrel		13				13
	RFC	Roots Fine Connection	9					9
	RFJ	Roots Fine Joint	176					176
	RMB	Roots Medium Barrel				6		6
	RMC	Roots Medium Connection			6			6
	RMJ	Roots Medium Joint			29			29
	RML	Roots Medium Lateral			2			2
	RTJ	Roots Tap Joint		1				1
	TBD	Tap Break-In/Hammer Defective			81			81
	TFD	Tap Factory Made Defective		74				74
	TSD	Tap Saddle Defective		2				2
	XP	Collapse Pipe Sewer					1	1
SB04			**162**	**295**	**244**	**154**	**525**	**1,380**
	B	Broken			33	6	16	55
	BSV	Broken Soil Visible					121	121
	BVV	Broken Void Visible					87	87
	CC	Crack Circumferential	11					11
	CH2	Crack Longitudinal Hinge, 2		4				4
	CL	Crack Longitudinal		158				158
	CM	Crack Multiple			44			44
	CS	Crack Spiral		6				6
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		9				9
	FH2	Fracture Longitudinal Hinge, 2			1			1
	FH3	Fracture Longitudinal Hinge, 3				2		2
	FL	Fracture Longitudinal			51			51
	FM	Fracture Multiple				20		20
	FS	Fracture Spiral			1			1
	H	Hole				95		95
	HSV	Hole Soil Visible					135	135
	HVV	Hole Void Visible					131	131
	ID	Infiltration Dripper			2			2
	IG	Infiltration Gusher					4	4
	JOL	Joint Offset Large				12		12
	JOM	Joint Offset Medium			16			16
	JSL	Joint Separated Large				1		1
	MWLS	Water Level Sag		39	9	1	3	52
	OBC	Obstacle Thru Connection		1		1		2
	OBI	Obstacle Intruding Thru Wall					12	12

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	OBJ	Obstacle In Joint		2				2
	OBP	Obstacle External Pipe or Cable		2		2		4
	RBB	Roots Ball Barrel					8	8
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				2		2
	RBL	Roots Ball Lateral				1		1
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	5					5
	RFJ	Roots Fine Joint	145					145
	RFL	Roots Fine Lateral	1					1
	RMB	Roots Medium Barrel				4		4
	RMC	Roots Medium Connection			5			5
	RMJ	Roots Medium Joint			14			14
	RML	Roots Medium Lateral			2			2
	RPPD	Repair Patch Defective				5		5
	RTB	Roots Tap Barrel			1			1
	RTJ	Roots Tap Joint		4				4
	SMW	Surface Missing Wall					1	1
	TBD	Tap Break-In/Hammer Defective			65			65
	TFD	Tap Factory Made Defective		63				63
	TSD	Tap Saddle Defective		3				3
	XP	Collapse Pipe Sewer					5	5
SB05			**220**	**102**	**201**	**73**	**6**	**602**
	B	Broken			8	2	1	11
	BSV	Broken Soil Visible					1	1
	BVV	Broken Void Visible					2	2
	CC	Crack Circumferential	10					10
	CH2	Crack Longitudinal Hinge, 2		2				2
	CL	Crack Longitudinal		47				47
	CM	Crack Multiple			44			44
	FC	Fracture Circumferential		2				2
	FL	Fracture Longitudinal			30			30
	FM	Fracture Multiple				10		10
	FS	Fracture Spiral			2			2
	IG	Infiltration Gusher					2	2
	IR	Infiltration Runner				2		2
	JOL	Joint Offset Large				24		24
	JOM	Joint Offset Medium			43			43
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		17	7			24
	OBC	Obstacle Thru Connection		2				2
	OBJ	Obstacle In Joint		2				2
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				6		6
	RBL	Roots Ball Lateral				19		19
	RFB	Roots Fine Barrel		2				2
	RFC	Roots Fine Connection	6					6
	RFJ	Roots Fine Joint	197					197
	RFL	Roots Fine Lateral	7					7
	RMB	Roots Medium Barrel				4		4

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RMJ	Roots Medium Joint			51			51
	RML	Roots Medium Lateral			6			6
	RPPD	Repair Patch Defective				4		4
	RTB	Roots Tap Barrel			2			2
	RTC	Roots Tap Connection		2				2
	RTJ	Roots Tap Joint		9				9
	TBD	Tap Break-In/Hammer Defective			6			6
	TFD	Tap Factory Made Defective		17				17
SB06			**54**	**42**	**59**	**9**	**2**	**166**
	B	Broken			4			4
	CC	Crack Circumferential	3					3
	CH2	Crack Longitudinal Hinge, 2		2				2
	CL	Crack Longitudinal		26				26
	CM	Crack Multiple			5			5
	CS	Crack Spiral		2				2
	FL	Fracture Longitudinal			8			8
	FM	Fracture Multiple				4		4
	FS	Fracture Spiral			6			6
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				2		2
	JOL	Joint Offset Large				1		1
	JOM	Joint Offset Medium			2			2
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			17			17
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	43					43
	RFL	Roots Fine Lateral	6					6
	RMJ	Roots Medium Joint			13			13
	RML	Roots Medium Lateral			2			2
	RTJ	Roots Tap Joint		4				4
	TFD	Tap Factory Made Defective		7				7
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					2	2
Saluda River Basin								
SR01			**4**	**5**	**15**	**9**	**10**	**43**
	D	Deformed				1		1
	DH	Deformed Horizontal					8	8
	FL	Fracture Longitudinal			2			2
	H	Hole				2		2
	JOM	Joint Offset Medium			4			4
	MWLS	Water Level Sag		4	3			7
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				2		2
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	2					2
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			5			5
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		1				1

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	XP	Collapse Pipe Sewer					2	2
SR02			**83**	**43**	**68**	**37**	**29**	**260**
	B	Broken			8	7	5	20
	BSV	Broken Soil Visible					6	6
	BVV	Broken Void Visible					4	4
	CC	Crack Circumferential	10					10
	CH2	Crack Longitudinal Hinge, 2		2				2
	CL	Crack Longitudinal		14				14
	CM	Crack Multiple			8			8
	CS	Crack Spiral		1				1
	H	Hole					3	3
	HSV	Hole Soil Visible					7	7
	IG	Infiltration Gusher					1	1
	JOL	Joint Offset Large				9		9
	JOM	Joint Offset Medium			10			10
	MWLS	Water Level Sag		4	4	1		9
	RBB	Roots Ball Barrel					3	3
	RBC	Roots Ball Connection				6		6
	RBJ	Roots Ball Joint				12		12
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		1				1
	RFJ	Roots Fine Joint	73					73
	RMJ	Roots Medium Joint			35			35
	RML	Roots Medium Lateral			2			2
	RTC	Roots Tap Connection		2				2
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		17				17
SR03			**599**	**274**	**333**	**83**	**54**	**1,343**
	B	Broken			5	1	13	19
	BSV	Broken Soil Visible					7	7
	BVV	Broken Void Visible					3	3
	CC	Crack Circumferential	51					51
	CL	Crack Longitudinal		28				28
	CM	Crack Multiple			18			18
	CS	Crack Spiral		4				4
	D	Deformed				14	1	15
	FC	Fracture Circumferential		44				44
	FL	Fracture Longitudinal			13			13
	FM	Fracture Multiple				25		25
	FS	Fracture Spiral			11			11
	HSV	Hole Soil Visible					18	18
	HVV	Hole Void Visible					7	7
	ID	Infiltration Dripper			5			5
	IR	Infiltration Runner				5		5
	ISGT	Intruding Sealing Grout		2				2
	ISSR	Intruding Sealing Ring		1				1
	IW	Infiltration Weeper		1				1
	JAM	Joint Angular Medium			1			1
	JOL	Joint Offset Large				13		13

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JOM	Joint Offset Medium			44			44
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			5			5
	MWLS	Water Level Sag		103	10	2	2	117
	RBB	Roots Ball Barrel					1	1
	RBJ	Roots Ball Joint				11		11
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		25				25
	RFC	Roots Fine Connection	6					6
	RFJ	Roots Fine Joint	512					512
	RFL	Roots Fine Lateral	30					30
	RMB	Roots Medium Barrel				4		4
	RMJ	Roots Medium Joint			189			189
	RML	Roots Medium Lateral			13			13
	RPPD	Repair Patch Defective				2		2
	RTB	Roots Tap Barrel			2			2
	RTJ	Roots Tap Joint		37				37
	SCP	Surface Corrosion Metal Pipe			6			6
	TBD	Tap Break-In/Hammer Defective			11			11
	TFD	Tap Factory Made Defective		28				28
	TSD	Tap Saddle Defective		1				1
	XP	Collapse Pipe Sewer					2	2
SR04			**150**	**39**	**70**	**26**	**8**	**293**
	B	Broken					1	1
	BSV	Broken Soil Visible					1	1
	CC	Crack Circumferential	8					8
	CL	Crack Longitudinal		4				4
	CM	Crack Multiple			2			2
	D	Deformed					2	2
	FC	Fracture Circumferential		3				3
	FM	Fracture Multiple				8		8
	ID	Infiltration Dripper			2			2
	JOL	Joint Offset Large				3		3
	JOM	Joint Offset Medium			12			12
	JSM	Joint Separated Medium			9			9
	MWLS	Water Level Sag		18	10	6		34
	OBI	Obstacle Intruding Thru Wall					1	1
	RBB	Roots Ball Barrel					3	3
	RBJ	Roots Ball Joint				7		7
	RFJ	Roots Fine Joint	141					141
	RFL	Roots Fine Lateral	1					1
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			1			1
	RMJ	Roots Medium Joint			34			34
	RTJ	Roots Tap Joint		7				7
	TFD	Tap Factory Made Defective		7				7
SR05			**70**	**23**	**21**	**19**	**13**	**146**
	B	Broken				2	1	3
	BSV	Broken Soil Visible					2	2
	CH2	Crack Longitudinal Hinge, 2		2				2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	CL	Crack Longitudinal		6				6
	CM	Crack Multiple			2			2
	CS	Crack Spiral		1				1
	FC	Fracture Circumferential		2				2
	FH2	Fracture Longitudinal Hinge, 2			5			5
	FL	Fracture Longitudinal			2			2
	FM	Fracture Multiple				1		1
	HVV	Hole Void Visible					4	4
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				1		1
	LFDL	Lining Failure Delaminating			2			2
	MWLS	Water Level Sag		4	6			10
	RBB	Roots Ball Barrel					4	4
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				8		8
	RBL	Roots Ball Lateral				3		3
	RFB	Roots Fine Barrel		2				2
	RFJ	Roots Fine Joint	68					68
	RFL	Roots Fine Lateral	2					2
	RMB	Roots Medium Barrel				2		2
	RMJ	Roots Medium Joint			2			2
	TFD	Tap Factory Made Defective		6				6
	XP	Collapse Pipe Sewer					2	2
SR06			**215**	**368**	**796**	**192**	**85**	**1,656**
	B	Broken			31	2	43	76
	BSV	Broken Soil Visible					8	8
	BVV	Broken Void Visible					2	2
	CC	Crack Circumferential	10					10
	CL	Crack Longitudinal		6				6
	CM	Crack Multiple			2			2
	CS	Crack Spiral		2				2
	D	Deformed				4	2	6
	FC	Fracture Circumferential		25				25
	FL	Fracture Longitudinal			14			14
	FM	Fracture Multiple				17		17
	FS	Fracture Spiral			8			8
	H	Hole				23	3	26
	HSV	Hole Soil Visible					10	10
	HVV	Hole Void Visible					3	3
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				8		8
	ISSR	Intruding Sealing Ring			1			1
	JAL	Joint Angular Large				6		6
	JAM	Joint Angular Medium			39			39
	JOL	Joint Offset Large				47		47
	JOM	Joint Offset Medium			108			108
	JSL	Joint Separated Large				4		4
	JSM	Joint Separated Medium			13			13
	MWLS	Water Level Sag		5		2		7
	OBI	Obstacle Intruding Thru Wall					2	2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	OBP	Obstacle External Pipe or Cable					1	1
	RBB	Roots Ball Barrel					11	11
	RBJ	Roots Ball Joint				75		75
	RFB	Roots Fine Barrel		9				9
	RFJ	Roots Fine Joint	203					203
	RFL	Roots Fine Lateral	2					2
	RMB	Roots Medium Barrel				4		4
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			575			575
	RTJ	Roots Tap Joint		304				304
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		17				17
SR07			**178**	**43**	**40**	**10**	**20**	**291**
	B	Broken					2	2
	BSV	Broken Soil Visible					2	2
	BVV	Broken Void Visible					6	6
	CC	Crack Circumferential	16					16
	CL	Crack Longitudinal		10				10
	CM	Crack Multiple			4			4
	CS	Crack Spiral		2				2
	DH	Deformed Horizontal					2	2
	FC	Fracture Circumferential		6				6
	FL	Fracture Longitudinal			2			2
	IW	Infiltration Weeper		2				2
	JOM	Joint Offset Medium			6			6
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			6			6
	MWLS	Water Level Sag		2	5			7
	RBB	Roots Ball Barrel					8	8
	RBJ	Roots Ball Joint				7		7
	RFB	Roots Fine Barrel		4				4
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	160					160
	RMB	Roots Medium Barrel				1		1
	RMJ	Roots Medium Joint			13			13
	RTB	Roots Tap Barrel			2			2
	RTC	Roots Tap Connection		4				4
	TBD	Tap Break-In/Hammer Defective			2			2
	TFD	Tap Factory Made Defective		13				13
SR08			**81**	**35**	**47**	**32**	**9**	**204**
	B	Broken			9	4	4	17
	CC	Crack Circumferential	5					5
	CL	Crack Longitudinal		15				15
	CM	Crack Multiple			5			5
	D	Deformed				2		2
	FL	Fracture Longitudinal			6			6
	HSV	Hole Soil Visible					2	2
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				6		6
	JOM	Joint Offset Medium			2			2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSM	Joint Separated Medium			2			2
	MWLS	Water Level Sag		10	3	2		15
	OBJ	Obstacle In Joint		2				2
	RBB	Roots Ball Barrel					3	3
	RBJ	Roots Ball Joint				14		14
	RFJ	Roots Fine Joint	76					76
	RMJ	Roots Medium Joint			20			20
	TFD	Tap Factory Made Defective		8				8
SR09			**192**	**100**	**145**	**54**	**28**	**519**
	B	Broken			2		7	9
	BVV	Broken Void Visible					7	7
	CC	Crack Circumferential	30					30
	CL	Crack Longitudinal		29				29
	CM	Crack Multiple			10			10
	FC	Fracture Circumferential		8				8
	FL	Fracture Longitudinal			11			11
	FM	Fracture Multiple				13		13
	FS	Fracture Spiral			2			2
	HSV	Hole Soil Visible					6	6
	HVV	Hole Void Visible					4	4
	IR	Infiltration Runner				2		2
	ISSR	Intruding Sealing Ring			4			4
	JOL	Joint Offset Large				22		22
	JOM	Joint Offset Medium			59			59
	JSL	Joint Separated Large				4		4
	JSM	Joint Separated Medium			7			7
	MWLS	Water Level Sag		38	5	1		44
	OBI	Obstacle Intruding Thru Wall					2	2
	RBB	Roots Ball Barrel					2	2
	RBC	Roots Ball Connection				2		2
	RBJ	Roots Ball Joint				8		8
	RFB	Roots Fine Barrel		1				1
	RFC	Roots Fine Connection	14					14
	RFJ	Roots Fine Joint	146					146
	RFL	Roots Fine Lateral	2					2
	RMB	Roots Medium Barrel				2		2
	RMC	Roots Medium Connection			3			3
	RMJ	Roots Medium Joint			25			25
	RML	Roots Medium Lateral			4			4
	RTJ	Roots Tap Joint		1				1
	SCP	Surface Corrosion Metal Pipe			1			1
	TBD	Tap Break-In/Hammer Defective			12			12
	TFD	Tap Factory Made Defective		22				22
	TSD	Tap Saddle Defective		1				1
SR10			**478**	**154**	**197**	**70**	**24**	**923**
	B	Broken			2	2	8	12
	BSV	Broken Soil Visible					6	6
	BVV	Broken Void Visible					3	3
	CC	Crack Circumferential	12					12
	CH3	Crack Longitudinal Hinge, 3			2			2

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	CL	Crack Longitudinal		19				19
	CM	Crack Multiple			23			23
	CS	Crack Spiral		6				6
	FC	Fracture Circumferential		28				28
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FL	Fracture Longitudinal			29			29
	FM	Fracture Multiple				23		23
	FS	Fracture Spiral			2			2
	H	Hole				4		4
	HSV	Hole Soil Visible					3	3
	ID	Infiltration Dripper			4			4
	ISSRH	Intruding Sealing Ring Hanging		1				1
	JOL	Joint Offset Large				15		15
	JOM	Joint Offset Medium			24			24
	JSL	Joint Separated Large				2		2
	JSM	Joint Separated Medium			9			9
	MWLS	Water Level Sag		68	22	2		92
	RBB	Roots Ball Barrel					2	2
	RBJ	Roots Ball Joint				9		9
	RBL	Roots Ball Lateral				4		4
	RFB	Roots Fine Barrel		4				4
	RFJ	Roots Fine Joint	454					454
	RFL	Roots Fine Lateral	12					12
	RMB	Roots Medium Barrel				9		9
	RMJ	Roots Medium Joint			66			66
	RML	Roots Medium Lateral			4			4
	RTB	Roots Tap Barrel			2			2
	RTJ	Roots Tap Joint		13				13
	SCP	Surface Corrosion Metal Pipe			5			5
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		15				15
	XP	Collapse Pipe Sewer					2	2
SR11			**40**	**6**	**34**	**13**	**12**	**105**
	B	Broken					12	12
	CC	Crack Circumferential	3					3
	D	Deformed				2		2
	FC	Fracture Circumferential		3				3
	FM	Fracture Multiple				2		2
	FS	Fracture Spiral			2			2
	JOL	Joint Offset Large				2		2
	JOM	Joint Offset Medium			10			10
	MWLS	Water Level Sag			2			2
	RBJ	Roots Ball Joint				7		7
	RFJ	Roots Fine Joint	37					37
	RMC	Roots Medium Connection			2			2
	RMJ	Roots Medium Joint			17			17
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		3				3
SR12			**1,436**	**619**	**951**	**520**	**166**	**3,692**

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	B	Broken			28	11	58	97
	BSV	Broken Soil Visible					13	13
	BVV	Broken Void Visible					6	6
	CC	Crack Circumferential	40					40
	CL	Crack Longitudinal		103				103
	CM	Crack Multiple			47			47
	CS	Crack Spiral		20				20
	D	Deformed				3	4	7
	FC	Fracture Circumferential		61				61
	FH2	Fracture Longitudinal Hinge, 2			1			1
	FH3	Fracture Longitudinal Hinge, 3				1		1
	FL	Fracture Longitudinal			92			92
	FM	Fracture Multiple				191		191
	FS	Fracture Spiral			130			130
	H	Hole				14		14
	HSV	Hole Soil Visible					38	38
	HVV	Hole Void Visible					11	11
	ID	Infiltration Dripper			130			130
	IG	Infiltration Gusher					11	11
	IR	Infiltration Runner				49		49
	ISGT	Intruding Sealing Grout		4				4
	ISSRL	Intruding Sealing Ring Loose/Poorly Fitting		1				1
	ISZ	Intruding Seal Material Other		2				2
	IW	Infiltration Weeper		2				2
	JOL	Joint Offset Large				175		175
	JOM	Joint Offset Medium			138			138
	JSL	Joint Separated Large				4		4
	JSM	Joint Separated Medium			5			5
	MWLS	Water Level Sag		247	78	16	10	351
	OBI	Obstacle Intruding Thru Wall					2	2
	OBJ	Obstacle In Joint		3				3
	RBB	Roots Ball Barrel					3	3
	RBC	Roots Ball Connection				12		12
	RBJ	Roots Ball Joint				13		13
	RBL	Roots Ball Lateral				30		30
	RFB	Roots Fine Barrel		26				26
	RFC	Roots Fine Connection	74					74
	RFJ	Roots Fine Joint	1,313					1,313
	RFL	Roots Fine Lateral	9					9
	RMB	Roots Medium Barrel				1		1
	RMC	Roots Medium Connection			24			24
	RMJ	Roots Medium Joint			156			156
	RML	Roots Medium Lateral			22			22
	RTB	Roots Tap Barrel			3			3
	RTC	Roots Tap Connection		6				6
	RTJ	Roots Tap Joint		81				81
	SCP	Surface Corrosion Metal Pipe			2			2
	TBD	Tap Break-In/Hammer Defective			95			95
	TFD	Tap Factory Made Defective		63				63
	XP	Collapse Pipe Sewer					10	10

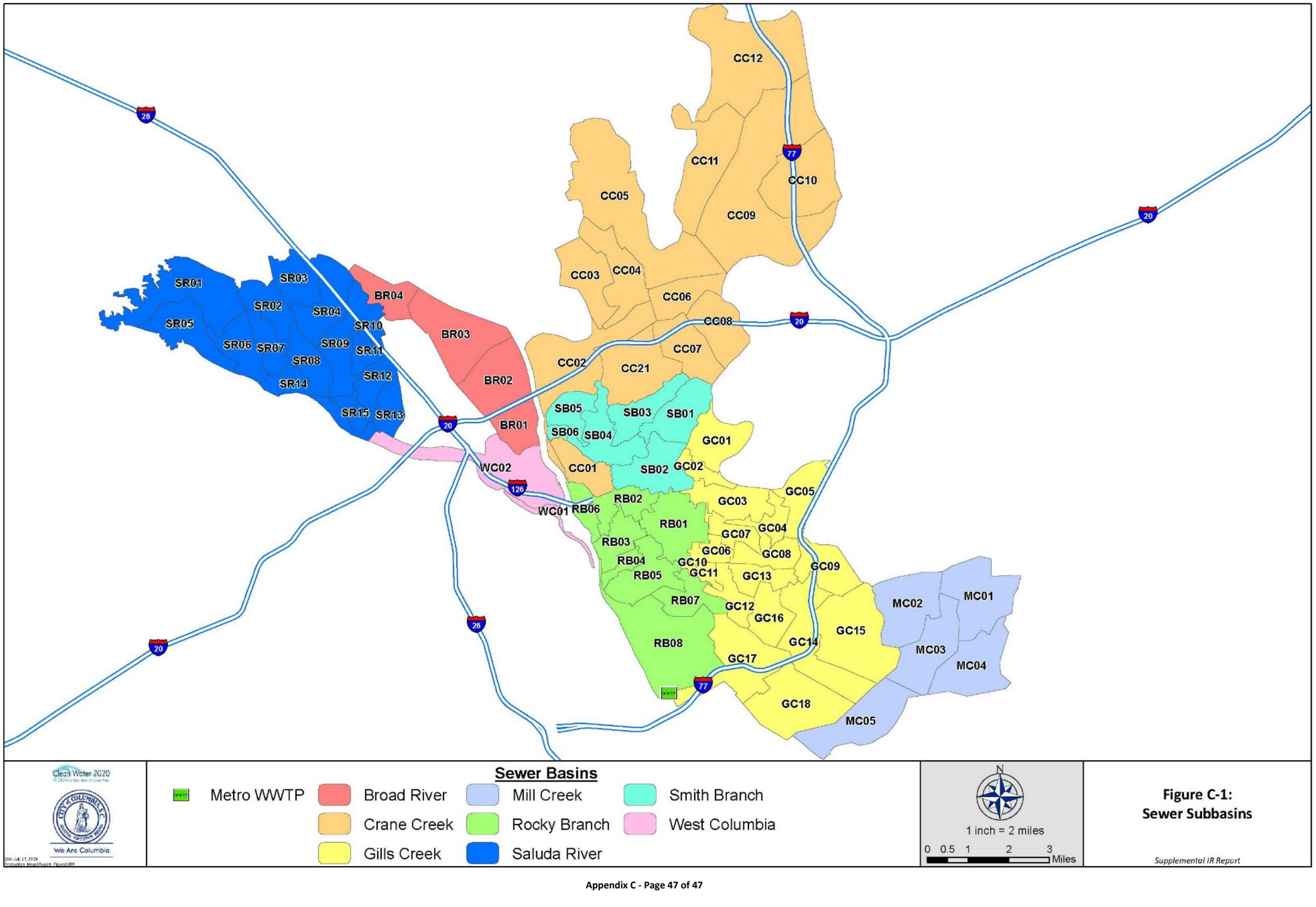
Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
SR13			**177**	**271**	**660**	**225**	**102**	**1,435**
	B	Broken			15	2	28	45
	BSV	Broken Soil Visible					5	5
	BVV	Broken Void Visible					10	10
	CC	Crack Circumferential	5					5
	CL	Crack Longitudinal		31				31
	CM	Crack Multiple			8			8
	CS	Crack Spiral		2				2
	D	Deformed				2	12	14
	DH	Deformed Horizontal					1	1
	FC	Fracture Circumferential		18				18
	FH2	Fracture Longitudinal Hinge, 2			2			2
	FL	Fracture Longitudinal			16			16
	FM	Fracture Multiple				28		28
	FS	Fracture Spiral			1			1
	H	Hole				15	4	19
	HSV	Hole Soil Visible					12	12
	HVV	Hole Void Visible					3	3
	ID	Infiltration Dripper			10			10
	IG	Infiltration Gusher					9	9
	IR	Infiltration Runner				40		40
	ISGT	Intruding Sealing Grout		2				2
	ISSR	Intruding Sealing Ring		9				9
	IW	Infiltration Weeper		8				8
	JAL	Joint Angular Large				2		2
	JAM	Joint Angular Medium			55			55
	JOL	Joint Offset Large				82		82
	JOM	Joint Offset Medium			248			248
	JSL	Joint Separated Large				7		7
	JSM	Joint Separated Medium			10			10
	LFB	Lining Failure Blistered			1			1
	LFD	Lining Failure Detached			8			8
	LFUC	Lining Failure Undercut Connection			7			7
	LFW	Lining Failure Wrinkled			1			1
	MWLS	Water Level Sag		58	37	9	1	105
	OBI	Obstacle Intruding Thru Wall					6	6
	OBJ	Obstacle In Joint					2	2
	OBP	Obstacle External Pipe or Cable				4		4
	RBB	Roots Ball Barrel					9	9
	RBJ	Roots Ball Joint				29		29
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel		1				1
	RFC	Roots Fine Connection	9					9
	RFJ	Roots Fine Joint	163					163
	RMJ	Roots Medium Joint			228			228
	RML	Roots Medium Lateral			4			4
	RPPD	Repair Patch Defective				3		3
	RTJ	Roots Tap Joint		96				96
	TBD	Tap Break-In/Hammer Defective			9			9
	TFD	Tap Factory Made Defective		44				44

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	TSD	Tap Saddle Defective		2				2
SR14			**6**			**4**		**10**
	JOL	Joint Offset Large				2		2
	RBL	Roots Ball Lateral				2		2
	RFJ	Roots Fine Joint	6					6
SR15			**124**	**83**	**101**	**52**	**11**	**371**
	B	Broken				4	6	10
	BVV	Broken Void Visible					2	2
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal		19				19
	CM	Crack Multiple			18			18
	CS	Crack Spiral		17				17
	D	Deformed					1	1
	FC	Fracture Circumferential		5				5
	FL	Fracture Longitudinal			10			10
	FM	Fracture Multiple				20		20
	FS	Fracture Spiral			11			11
	H	Hole				2		2
	ID	Infiltration Dripper			4			4
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				10		10
	JOM	Joint Offset Medium			21			21
	JSM	Joint Separated Medium			1			1
	MWLS	Water Level Sag		24	7	6	1	38
	OBC	Obstacle Thru Connection				1		1
	RBB	Roots Ball Barrel					1	1
	RBJ	Roots Ball Joint				2		2
	RBL	Roots Ball Lateral				2		2
	RFC	Roots Fine Connection	2					2
	RFJ	Roots Fine Joint	120					120
	RMB	Roots Medium Barrel				1		1
	RMJ	Roots Medium Joint			27			27
	RML	Roots Medium Lateral			1			1
	RTJ	Roots Tap Joint		2				2
	TBD	Tap Break-In/Hammer Defective			1			1
	TFD	Tap Factory Made Defective		16				16
West Columbia Basin								
WC02			**8**	**13**	**23**	**15**	**7**	**66**
	B	Broken			4			4
	BSV	Broken Soil Visible					1	1
	CL	Crack Longitudinal		6				6
	CM	Crack Multiple			2			2
	FM	Fracture Multiple				4		4
	ID	Infiltration Dripper			2			2
	IR	Infiltration Runner				4		4
	JOL	Joint Offset Large				3		3
	JOM	Joint Offset Medium			4			4
	MWLS	Water Level Sag		6	3		1	10
	RBB	Roots Ball Barrel					5	5

Subbasin ID	PACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	RBJ	Roots Ball Joint				2		2
	RBL	Roots Ball Lateral				2		2
	RFJ	Roots Fine Joint	8					8
	RMJ	Roots Medium Joint			8			8
	TFD	Tap Factory Made Defective		1				1
Grand Total			**18,672**	**16,201**	**20,416**	**9,344**	**7,114**	**71,747**

*From inspections through December 31, 2021

Figure C-1 – Sewer Subbasins



Appendix D – Manhole Inspection Results

Table D-1 – Summary of Defects Found through Updated Major Manhole Inspections

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
Broad River Basin								
BR02				**1**				**1**
	H	Hole		1				1
Crane Creek Basin								
CC01				**11**	**1**	**1**		**13**
	CL	Crack Longitudinal			1			1
	IS	Infiltration Stain		7				7
	IW	Infiltration Weeper		3				3
	MMM	Lining Failure Wrinkled		1				1
	RFB	Roots Fine Barrel				1		1
CC09				**1**				**1**
	IW	Infiltration Weeper		1				1
Gills Creek Basin								
GC17				**4**	**1**	**1**		**6**
	IS	Infiltration Stain		1				1
	IW	Infiltration Weeper		3				3
	RFB	Roots Fine Barrel				1		1
	RFJ	Roots Fine Joint			1			1
Mill Creek Basin								
MC01				**3**				**3**
	IW	Infiltration Weeper		3				3
Rocky Branch Basin								
RB01				**6**				**6**
	IW	Infiltration Weeper		5				5
	MMM	Lining Failure Wrinkled		1				1
RB05				**1**	**1**			**2**
	ISSR	Intruding Sealing Ring		1				2
	RFJ	Roots Fine Joint			1			3
RB08				**2**				**2**
	IW	Infiltration Weeper		2				2
Smith Branch Basin								
SB02				**3**				**3**
	H	Hole		1				1
	IS	Infiltration Stain		1				1
	MMS	Lining Failure Wrinkled		1				1
West Columbia Basin								
WC01				**1**				**1**
	IW	Infiltration Weeper		1				1
Grand Total				**33**	**3**	**2**		**38**

*From inspections since the IR Report through December 31, 2021

Table D-2 – Summary of Defects Found through Minor Manhole Inspections within High Priority Subbasins*

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
Broad River Basin								
BR02			**8**	**159**	**13**	**26**		**206**
	CC	Crack Circumferential	3					3
	H	Hole		13				13
	HSV	Hole Soil Visible		3				3
	HVV	Hole Void Visible		2				2
	ID	Infiltration Dripper		3				3
	IS	Infiltration Stain		68				68
	ISGT	Intruding Sealing Grout	2					2
	IW	Infiltration Weeper		48				48
	JSM	Joint Separated Medium			1			1
	MB	Missing Brick				2		2
	MML	Lining Failure Wrinkled		1		1		2
	MMM	Lining Failure Wrinkled	1	12				13
	MMS	Lining Failure Wrinkled	1	8				9
	RBB	Roots Ball Barrel		1				1
	RBL	Roots Ball Lateral				1		1
	RFB	Roots Fine Barrel				22		22
	RFJ	Roots Fine Joint			8			8
	RMB	Roots Medium Barrel			4			4
	RTL	Roots Tap Lateral	1					1
Crane Creek Basin								
CC01			**33**	**670**	**20**	**49**	**20**	**792**
	B	Broken			1			1
	BSV	Broken Soil Visible					7	7
	CC	Crack Circumferential	3					3
	CL	Crack Longitudinal			8			8
	CM	Crack Multiple		13				13
	DB	Deformed		17				17
	DI	Deformed Horizontal					11	11
	FC	Fracture Circumferential			1			1
	FL	Fracture Longitudinal			1			1
	FM	Fracture Multiple				2		2
	H	Hole		49				49
	HSV	Hole Soil Visible		15				15
	HVV	Hole Void Visible		1				1
	ID	Infiltration Dripper		1				1
	IR	Infiltration Runner				3		3
	IS	Infiltration Stain		289				289
	ISGT	Intruding Sealing Grout	2					2
	IW	Infiltration Weeper		178				178
	LFDC	Lining Failure Detached	4					4
	LFDL	Lining Failure Delaminating	14					14
	MB	Missing Brick				15		15
	MML	Lining Failure Wrinkled		7				7
	MMM	Lining Failure Wrinkled		48				48
	MMS	Lining Failure Wrinkled		52				52
	OBI	Obstacle Intruding Thru Wall				1		1

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	OBP	Obstacle External Pipe or Cable	10					10
	RFB	Roots Fine Barrel				27		27
	RFC	Roots Fine Connection				1		1
	RFJ	Roots Fine Joint			8			8
	RFL	Roots Fine Lateral			1			1
	RTB	Roots Tap Barrel					1	1
	SMW	Surface Missing Wall					1	1
CC02			**11**	**448**	**43**	**51**	**1**	**554**
	CC	Crack Circumferential	8					8
	CL	Crack Longitudinal			15			15
	CM	Crack Multiple		2				2
	CS	Crack Spiral		2				2
	DB	Deformed		1				1
	FC	Fracture Circumferential			2			2
	FL	Fracture Longitudinal			1			1
	H	Hole		6				6
	HSV	Hole Soil Visible		17				17
	HVV	Hole Void Visible		7				7
	ID	Infiltration Dripper		8				8
	IR	Infiltration Runner				5		5
	IS	Infiltration Stain		165				165
	IW	Infiltration Weeper		196				196
	JOM	Joint Offset Medium			2			2
	JSM	Joint Separated Medium			1			1
	MB	Missing Brick				7		7
	MMM	Lining Failure Wrinkled		32				32
	MMS	Lining Failure Wrinkled		6				6
	OBP	Obstacle External Pipe or Cable	1					1
	RBB	Roots Ball Barrel		3				3
	RBC	Roots Ball Connection		1				1
	RBJ	Roots Ball Joint		2				2
	RBL	Roots Ball Lateral				1		1
	RFB	Roots Fine Barrel				36		36
	RFC	Roots Fine Connection				2		2
	RFJ	Roots Fine Joint			12			12
	RMB	Roots Medium Barrel			3			3
	RMJ	Roots Medium Joint			7			7
	RTB	Roots Tap Barrel					1	1
	RTJ	Roots Tap Joint	2					2
CC04			**9**	**281**	**46**	**95**	**10**	**441**
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal			6			6
	CS	Crack Spiral		2				2
	HSV	Hole Soil Visible		6				6
	HVV	Hole Void Visible		3				3
	ID	Infiltration Dripper		4				4
	IG	Infiltration Gusher		1				1
	IS	Infiltration Stain		83				83
	IW	Infiltration Weeper		169				169
	JOM	Joint Offset Medium			3			3

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	JSM	Joint Separated Medium			5			5
	MB	Missing Brick				12		12
	MMM	Lining Failure Wrinkled		2				2
	OBI	Obstacle Intruding Thru Wall				5		5
	RBB	Roots Ball Barrel		5				5
	RBC	Roots Ball Connection		4				4
	RBJ	Roots Ball Joint		2				2
	RBL	Roots Ball Lateral				2		2
	RFB	Roots Fine Barrel				71		71
	RFC	Roots Fine Connection				5		5
	RFJ	Roots Fine Joint			19			19
	RMB	Roots Medium Barrel			10			10
	RMJ	Roots Medium Joint			2			2
	RML	Roots Medium Lateral			1			1
	RTB	Roots Tap Barrel					10	10
	RTJ	Roots Tap Joint	7					7
Gills Creek Basin								
GC01			**1**		**4**	**5**		**10**
	OBI	Obstacle Intruding Thru Wall				4		4
	OBP	Obstacle External Pipe or Cable	1					1
	RBL	Roots Ball Lateral				1		1
	RFJ	Roots Fine Joint			2			2
	RML	Roots Medium Lateral			2			2
GC02			**1**	**1**				**2**
	IS	Infiltration Stain		1				1
	LFPH	Lining Failure Pinhole	1					1
GC03			**3**	**52**	**7**	**30**	**4**	**96**
	B	Broken			3		4	7
	H	Hole		1				1
	ID	Infiltration Dripper		2				2
	IG	Infiltration Gusher		4				4
	IR	Infiltration Runner				28		28
	IS	Infiltration Stain		3				3
	IW	Infiltration Weeper		38				38
	OBP	Obstacle External Pipe or Cable	3					3
	RBB	Roots Ball Barrel		3				3
	RBC	Roots Ball Connection		1				1
	RFB	Roots Fine Barrel				2		2
	RFJ	Roots Fine Joint			1			1
	RMB	Roots Medium Barrel			3			3
GC04				**5**	**4**	**3**	**1**	**13**
	B	Broken			1		1	2
	H	Hole		2				2
	ID	Infiltration Dripper		2				2
	IR	Infiltration Runner				3		3
	IW	Infiltration Weeper		1				1
	RMB	Roots Medium Barrel			3			3
GC05				**5**	**2**	**4**		**11**
	CL	Crack Longitudinal			1			1
	ID	Infiltration Dripper		1				1

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	IG	Infiltration Gusher		2				2
	IR	Infiltration Runner				3		3
	IW	Infiltration Weeper		2				2
	OBI	Obstacle Intruding Thru Wall				1		1
	RFJ	Roots Fine Joint			1			1
GC06						**3**		**3**
	OBI	Obstacle Intruding Thru Wall				3		3
GC07						**1**		**1**
	OBI	Obstacle Intruding Thru Wall				1		1
GC10			**3**					**3**
	CC	Crack Circumferential	3					3
GC11						**3**		**3**
	MB	Missing Brick				1		1
	OBI	Obstacle Intruding Thru Wall				2		2
GC12						**1**		**1**
	OBI	Obstacle Intruding Thru Wall				1		1
Rocky Branch Basin								
RB01			**3**	**27**		**1**	**1**	**32**
	BSV	Broken Soil Visible					1	1
	DB	Deformed		1				1
	HSV	Hole Soil Visible		1				1
	IS	Infiltration Stain		8				8
	ISGT	Intruding Sealing Grout	1					1
	IW	Infiltration Weeper		2				2
	MMM	Lining Failure Wrinkled		1				1
	MMS	Lining Failure Wrinkled		14				14
	OBP	Obstacle External Pipe or Cable	2					2
	RFB	Roots Fine Barrel				1		1
RB03			**30**	**394**	**15**	**18**	**3**	**460**
	B	Broken			4		1	5
	BSV	Broken Soil Visible					1	1
	CC	Crack Circumferential	2					2
	CL	Crack Longitudinal			2			2
	CM	Crack Multiple		5				5
	DB	Deformed		5				5
	DI	Deformed Horizontal					1	1
	FL	Fracture Longitudinal			6			6
	H	Hole		18				18
	HSV	Hole Soil Visible		16				16
	HVV	Hole Void Visible		21				21
	IS	Infiltration Stain		167				167
	ISSR	Intruding Sealing Ring		3				3
	IW	Infiltration Weeper		72				72
	LFD	Lining Failure Detached	1					1
	LFDC	Lining Failure Detached	3					3
	LFDL	Lining Failure Delaminating	15					15
	LFPH	Lining Failure Pinhole	3					3
	MB	Missing Brick				9		9
	MML	Lining Failure Wrinkled		4				4
	MMM	Lining Failure Wrinkled		17				17

Subbasin ID	MACP Code	Code Description	Defect Rating 1	2	3	4	5	Grand Total
	MMS	Lining Failure Wrinkled		66				66
	OBI	Obstacle Intruding Thru Wall				4		4
	OBP	Obstacle External Pipe or Cable	6					6
	RFB	Roots Fine Barrel				4		4
	RFC	Roots Fine Connection				1		1
	RFJ	Roots Fine Joint			2			2
	RMB	Roots Medium Barrel			1			1
Smith Branch Basin								
SB02			**3**	**52**	**2**	**4**	**2**	**63**
	BSV	Broken Soil Visible					1	1
	CM	Crack Multiple		1				1
	DB	Deformed		2				2
	FC	Fracture Circumferential			1			1
	HSV	Hole Soil Visible		1				1
	IS	Infiltration Stain		19				19
	IW	Infiltration Weeper		14				14
	LFDL	Lining Failure Delaminating	1					1
	LFPH	Lining Failure Pinhole	2					2
	MB	Missing Brick				2		2
	MML	Lining Failure Wrinkled		1				1
	MMM	Lining Failure Wrinkled		2				2
	MMS	Lining Failure Wrinkled		12				12
	RFB	Roots Fine Barrel				1		1
	RFC	Roots Fine Connection				1		1
	RFJ	Roots Fine Joint			1			1
	SMW	Surface Missing Wall					1	1
Grand Total			**105**	**2,094**	**156**	**294**	**42**	**2,691**

*From inspections through December 31, 2021

Appendix E – Recent Historical SSOs on Minor Gravity Sewer Lines and Minor Manholes within High Priority Subbasins

Table E-1 – Recent Historical SSOs on Minor Gravity Lines and Minor Manholes within High Priority Subbasins

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01480	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	726
01484	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	889
01488	Crane Creek	Collapsed Line	Structural	Repaired mainline	5,250
01493	Smith Branch	Collapsed Line	Structural	Repaired mainline	1,050
01497	Mill Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	300
01498	Crane Creek	Collapsed Line	Structural	Repaired mainline	533
01505	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	450
01507	Gills Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1,383
01514	Smith Branch	Collapsed Line	Structural	Bypass line collapsed; repaired bypass line	470
01515	Saluda River	Debris	O&M	Removed stoppage and washed mainline to clear blockage	150
01524	Mill Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	201
01526	Saluda River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	351
01527	Rocky Branch	Grease	O&M	Removed stoppage and washed mainline to clear blockage	2,400
01528	Gills Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1,350
01532	Mill Creek	Roots	O&M	Repaired mainline and performed tap renewal	1,800
01533	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1
01539	Crane Creek	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	61,500
01546	Gills Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	3,750
01547	Crane Creek	Debris	O&M	Washed mainline and cleaned manhole to clear blockage	2,125
01550	Broad River	Collapsed Line	Structural	Repaired mainline	1080
01551	Broad River	Roots	O&M	Removed stoppage to clear blockage	Unknown
01552	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	349
01553	Broad River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	375
01556	Saluda River	Collapsed Line	Structural	Repaired service line tap	45
01557	Saluda River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	450
01558	Crane Creek	Collapsed Line	Structural	Repaired mainline	900

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01559	Smith Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	4.9
01560	Crane Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	99.33
01562	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	750
01566	Mill Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	7,000
01568	Gills Creek	Roots	O&M	Removed stoppage and repaired mainline	3,375
01574	Gills Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	559
01578	Mill Creek	Roots	O&M	Removed stoppage and repaired service line	37
01580	Gills Creek	Collapsed Line	Structural	Repaired mainline	300
01585	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	940
01586	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	315
01589	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	45
01592	Broad River	Roots	O&M	Removed stoppage and washed service line to clear blockage	150
01593	Broad River	Roots	O&M	Removed stoppage and repaired mainline	1,513
01594	Crane Creek	Grease	O&M	Removed stoppage, washed and degreased mainline to clear blockage	500
01597	Saluda River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	258
01603	Rocky Branch	Grease	O&M	Removed stoppage and washed mainline to clear blockage	150
01604	Rocky Branch	Grease	O&M	Removed stoppage, washed and degreased mainline to clear blockage	750
01606	Mill Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	3750
01613	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	185
01614	Broad River	Roots	O&M	Removed stoppage, washed mainline to clear blockage, renewed tap and repaired mainline	525
01615	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	25
01629	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	800
01630	Mill Creek	Roots	O&M	Removed stoppage and repaired mainline	300
01643	Rocky Branch	Grease	O&M	Removed stoppage and washed mainline to clear blockage	3,550
01650	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,060
01653	Gills Creek	Debris	O&M	Removed stoppage to clear blockage	6,565

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01655	Smith Branch	Collapsed Line	Structural	Repaired mainline	Unknown
01657	Gills Creek	Collapsed Line	Structural	Repaired mainline	1,875
01663	Gills Creek	Collapsed Line	Structural	Repaired mainline	600
01664	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1,000
01665	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	3,650
01668	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	2,000
01673	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,500
01675	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	206
01676	Gills Creek	Roots	O&M	Removed stoppage and made point repair	3,020
01677	Mill Creek	Roots	O&M	Removed stoppage, washed and degreased mainline to clear blockage	6
01678	Crane Creek	Collapsed Line	Structural	Repaired mainline	75
01679	Gills Creek	3rd Party Responsible	Other	Repaired mainline	100
01680	Gills Creek	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	36,825
01692	Gills Creek	Collapsed Line	Structural	Repaired mainline	3,750
01696	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	2,290
01698	Crane Creek	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	723,375
01705	Saluda River	Debris	O&M	Removed stoppage to clear blockage	15
01708	Gills Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	125
01709	Crane Creek	Equipment	Other	Reset bypass pump	275
01711	Crane Creek	Collapsed Line	Structural	Repaired mainline	Unknown
01713	Rocky Branch	Debris	O&M	Removed stoppage and washed mainline to clear blockage	31
01714	Crane Creek	Collapsed Line	Structural	Repaired mainline	300
01717	Rocky Branch	Collapsed Line	Structural	Repaired mainline	4,825
01721	Saluda River	Debris	O&M	Removed stoppage to clear blockage	750
01724	Saluda River	Grease	O&M	Removed stoppage to clear blockage	28

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01728	Crane Creek	Roots	O&M	Removed stoppage to clear blockage	3,000
01730	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	150
01731	Gills Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	16
01732	Smith Branch	Roots	O&M	Removed stoppage and washed service line to clear blockage	360
01734	Rocky Branch	3rd Party Responsible	Other	Replaced bypass hose back in manhole	1
01736	Crane Creek	Collapsed Line	Structural	Repaired mainline	Unknown
01738	Gills Creek	Collapsed Line	Structural	Repaired mainline	129
01739	Saluda River	Grease	O&M	Removed stoppage to clear blockage	600
01740	Gills Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	22
01741	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	5
01742	Saluda River	Grease	O&M	Removed stoppage to clear blockage	210
01745	Gills Creek	Roots	O&M	Removed stoppage to clear blockage	1
01748	Saluda River	Debris	O&M	Removed stoppage to clear blockage	37
01750	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,500
01751	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	998
01752	Saluda River	3rd Party Responsible	Other	Repaired mainline	5,900
01761	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	143
01762	Saluda River	Debris	O&M	Removed stoppage and washed mainline to clear blockage	200
01767	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	240
01774	Saluda River	Collapsed Line	Structural	Repaired mainline	68
01777	Saluda River	Collapsed Line	Structural	Repaired manhole	1
01787	Gills Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	9,000
01788	Gills Creek	Equipment	Other	Changed out bypass hose and completed mainline repair	750
01800	Gills Creek	Roots	O&M	Removed stoppage and repaired mainline	838
01804	Gills Creek	Collapsed Line	Structural	Repaired mainline	1,082
01817	Crane Creek	Collapsed Line	Structural	Repaired mainline	100
01820	Crane Creek	Collapsed Line	Structural	Repaired service line	200
01821	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,200
01823	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	727

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01831	Gills Creek	Collapsed Line	Structural	Relocated mainline	130
01832	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1,750
01833	Crane Creek	Collapsed Line	Structural	Repaired mainline	3,000
01835	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	50
01837	Gills Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1
01839	Rocky Branch	Debris	O&M	Removed stoppage and washed mainline to clear blockage	125
01842	Rocky Branch	Debris	O&M	Removed stoppage and washed mainline to clear blockage	125
01843	Gills Creek	Collapsed Line	Structural	Washed, degreased, and vacuumed mainline to clear any potential for future blockage; Pipe sag to be repaired to prevent future SSOs	2,724
01845	Gills Creek	3rd Party Responsible	Other	Repaired service line	15
01846	Saluda River	Roots	O&M	Removed stoppage and repaired service line	13
01847	Rocky Branch	Collapsed Line	Structural	Repaired mainline	15
01850	Broad River	Roots	O&M	Removed stoppage, washed and degreased mainline to clear blockage; Repaired mainline.	179
01853	Crane Creek	Roots	O&M	Removed stoppage to clear blockage	7,500
01854	Smith Branch	Collapsed Line	Structural	Repaired service line	1
01855	Crane Creek	Grease	O&M	Removed stoppage to clear blockage	5,250
01857	Crane Creek	Collapsed Line	Structural	Repaired mainline	2,700
01859	Crane Creek	3rd Party Responsible	Other	Repaired mainline	1,500
01863	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,650
01865	Broad River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	420
01866	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	90
01867	Saluda River	Debris	O&M	Removed stoppage and washed mainline to clear blockage	1
01871	Gills Creek	Collapsed Line	Structural	Repaired mainline	900
01873	Saluda River	Debris	O&M	Removed stoppage to clear blockage	300
01876	Smith Branch	3rd Party Responsible	Other	Removed stoppage to clear blockage	50
01877	Saluda River	Roots	O&M	Removed stoppage to clear blockage	245
01879	Rocky Branch	Collapsed Line	Structural	Repaired mainline	196
01882	Rocky Branch	3rd Party Responsible	Other	Repaired mainline	720

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01883	Saluda River	Roots	O&M	Removed stoppage and washed service line to clear blockage	20
01884	Saluda River	Roots	O&M	Removed stoppage and washed cleanout to clear blockage	60
01885	Gills Creek	Collapsed Line	Structural	Repaired mainline	1,000
01886	Mill Creek	Collapsed Line	Structural	Repaired mainline	135
01887	Saluda River	Roots	O&M	Repaired service line	4
01893	Gills Creek	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	Unknown
01896	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	760
01902	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	3,358
01905	Gills Creek	Debris	O&M	Removed stoppage to clear blockage	300
01913	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	4,525
01917	Gills Creek	Debris	O&M	Removed stoppage, washed and cut gasket out of mainline	1,800
01921	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,075
01922	Mill Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	36
01928	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,650
01931	Crane Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	750
01936	Broad River	Roots	O&M	Removed stoppage and repaired mainline	900
01937	Broad River	Roots	O&M	Removed stoppage and repaired mainline	2,244
01938	Broad River	Grease	O&M	Removed stoppage and repaired service line	5
01939	Crane Creek	Collapsed Line	Structural	Repaired mainline	3,350
01944	Crane Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	100
01946	Broad River	Collapsed Line	Structural	Repaired tap	4
01947	Saluda River	Collapsed Line	Structural	Repaired mainline	120
01961	Gills Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	34
01967	Broad River	Equipment	Other	Removed stoppage, washed service line and installed cleanout	22
01969	Saluda River	Equipment	Other	Removed stoppage, washed service line and installed cleanout	9

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
01970	Saluda River	Equipment	Other	Removed stoppage, washed service line and installed cleanout	5
01972	Broad River	Equipment	Other	Removed stoppage, washed service line and installed cleanout	53
01974	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	600
01975	Smith Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	1
01977	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	50
01978	Broad River	Roots	O&M	Removed stoppage, washed service line, installed cleanout and renewed service line to mainline	63
01979	Saluda River	Roots	O&M	Removed stoppage to clear blockage	126
01981	Broad River	Collapsed Line	Structural	Repaired mainline	23
01982	Smith Branch	Roots	O&M	Repaired service line	45
01983	Rocky Branch	Debris	O&M	Removed stoppage to clear blockage	13
01986	Saluda River	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,300
01989	Smith Branch	Collapsed Line	Structural	Removed stoppage clear blockage and pipe sag to be repaired to prevent future SSOs	390
02001	Saluda River	Roots	O&M	Removed stoppage, washed service line, repaired service line and renewed tap	52
02002	Gills Creek	Collapsed Line	Structural	Repaired service line	7
02008	Smith Branch	Roots	O&M	Removed stoppage to clear blockage	60
02013	Crane Creek	Collapsed Line	Structural	Washed mainline to clear any potential for future blockage; pipe sag to be repaired to prevent future SSOs	440
02014	Saluda River	Debris	O&M	Removed stoppage and washed service line to clear blockage	5
02016	Crane Creek	Collapsed Line	Structural	Repaired mainline	38
02017	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	7
02018	Smith Branch	Collapsed Line	Structural	Tap renewed to mainline	42
02025	Saluda River	Roots	O&M	Removed stoppage and washed mainline; Repaired mainline	400
02032	Smith Branch	3rd Party Responsible	Other	Repaired tap	300
02033	Crane Creek	Collapsed Line	Structural	Repaired mainline	2,325
02048	Smith Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	1

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02057	Gills Creek	Roots	O&M	Removed stoppage, washed service line, and repaired service line and cleanout	20
02059	Smith Branch	Roots	O&M	Removed stoppage, washed service line, and repaired service line and cleanout	38
02060	Gills Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	3
02061	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	102
02064	Crane Creek	Collapsed Line	Structural	Repaired service line	15
02065	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	15
02071	Gills Creek	Collapsed Line	Structural	Repaired mainline	245
02075	Smith Branch	Collapsed Line	Structural	Repaired mainline	360
02077	Broad River	Collapsed Line	Structural	Repaired service line	15
02078	Saluda River	Roots	O&M	Removed stoppage and washed service line to clear blockage	20
02079	Mill Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	10
02091	Smith Branch	Roots	O&M	Removed stoppage, washed and repaired mainline	1,390
02092	Smith Branch	Debris	O&M	Removed stoppage and washed mainline to clear blockage	24
02094	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	20
02099	Rocky Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	3
02101	Gills Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	20
02103	Saluda River	Roots	O&M	Removed stoppage and washed service line to clear blockage	10
02105	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	11
02108	Smith Branch	Roots	O&M	Removed stoppage and washed service line to clear blockage	30
02109	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	395
02112	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	40
02117	Saluda River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	300
02121	Saluda River	Collapsed Line	Structural	Repaired service line	20
02124	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	21
02126	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	30
02127	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	60
02128	Crane Creek	Collapsed Line	Structural	Removed stoppage and washed service line to clear blockage	20

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02129	Broad River	Roots	O&M	Removed stoppage, washed and repaired service line	23
02131	Gills Creek	Collapsed Line	Structural	Repaired mainline	966
02133	Crane Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	142
02135	Smith Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	20
02136	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	10
02137	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	480
02139	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired service line	2,250
02141	Smith Branch	Roots	O&M	Removed stoppage, washed and repaired mainline	720
02145	Mill Creek	Roots	O&M	Removed stoppage, washed service line and installed cleanout	10
02147	Crane Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	20
02148	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired service line	6
02150	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired service line	2
02154	Smith Branch	Roots	O&M	Removed stoppage, washed and repaired mainline	90
02156	Saluda River	Roots	O&M	Removed stoppage, washed service line, repaired service line, and installed cleanout	10
02157	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired service line	946
02164	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	30
02167	Rocky Branch	Collapsed Line	Structural	Repaired mainline	187
02169	Saluda River	Debris	O&M	Removed stoppage and washed mainline to clear blockage	4,500
02172	Mill Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	20
02173	Mill Creek	Roots	O&M	Removed stoppage, washed and repaired service line	6
02178	Crane Creek	Collapsed Line	Structural	Removed stoppage, washed mainline and pipe was added to PM wash list to prevent future SSOs at sag	840
02179	Rocky Branch	Roots	O&M	Removed stoppage, washed and repaired service line	247
02180	Mill Creek	Collapsed Line	Structural	Repaired mainline and renewed tap	164
02181	Crane Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	1,000
02186	Saluda River	Collapsed Line	Structural	Repaired mainline	1,227
02187	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	60

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02188	Saluda River	Roots	O&M	Removed stoppage, washed, repaired mainline and repaired service line	8
02195	Saluda River	Debris	O&M	Removed stoppage to clear blockage	40
02199	Broad River	Roots	O&M	Removed stoppage, washed and repaired mainline	478
02201	Crane Creek	Collapsed Line	Structural	Repaired mainline	5,673
02202	Crane Creek	Collapsed Line	Structural	Repaired mainline	30
02206	Rocky Branch	Debris	O&M	Removed stoppage to clear blockage	45
02207	Smith Branch	Collapsed Line	Structural	Repaired mainline	15
02209	Mill Creek	Roots	O&M	Removed stoppage to clear blockage	210
02216	Gills Creek	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	1,500
02225	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	375
02226	Smith Branch	Roots	O&M	Removed stoppage and washed mainline to clear blockage	180
02233	Gills Creek	Debris	O&M	Removed stoppage to clear blockage	4
02234	Gills Creek	Equipment	Other	Resecured clamp on temporary bypass	268
02236	Crane Creek	Collapsed Line	Structural	Repaired mainline	168
02237	Broad River	Roots	O&M	Removed stoppage, washed and repaired mainline	4,500
02238	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	243
02239	Crane Creek	Collapsed Line	Structural	Repaired mainline	10,500
02240	Crane Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	16,839
02242	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,200
02244	Crane Creek	Collapsed Line	Structural	Repaired service line	60
02246	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	20
02248	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	15
02251	Broad River	Collapsed Line	Structural	Washed mainline to clear blockage and pipe was added to PM wash list to prevent future SSOs at sag	1,745

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02252	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	62
02256	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,110
02259	Smith Branch	Collapsed Line	Structural	Repaired mainline	4,568
02260	Rocky Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	10
02264	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	1,200
02266	Crane Creek	Roots	O&M	Removed stoppage and washed service line to clear blockage	10
02267	Crane Creek	Collapsed Line	Structural	Repaired service line	15
02270	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	650
02272	Mill Creek	Collapsed Line	Structural	Repaired service line	100
02273	Gills Creek	Collapsed Line	Structural	Repaired service line	40
02275	Smith Branch	Roots	O&M	Removed stoppage, washed and repaired mainline	20
02282	Crane Creek	Debris	O&M	Removed stoppage from manhole to clear blockage	7,650
02299	Gills Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	9
02302	Saluda River	Collapsed Line	Structural	Repaired mainline	60
02303	Smith Branch	Roots	O&M	Removed stoppage and washed service line to clear blockage	6
02305	Crane Creek	Collapsed Line	Structural	Repaired service line	10
02306	Saluda River	Debris	O&M	Removed stoppage, washed and repaired mainline	15
02307	Mill Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	120
02308	Gills Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	27
02311	Smith Branch	Collapsed Line	Structural	Repaired service line	140
02312	Saluda River	Collapsed Line	Structural	Removed stoppage and washed service line to clear blockage; Pipe sag to be repaired to prevent future SSOs	30
02313	Crane Creek	Debris	O&M	Removed stoppage, washed mainline and removed debris from manhole	100
02315	Broad River	Grease	O&M	Removed stoppage and washed service line to clear blockage	180
02316	Broad River	Debris	O&M	Removed stoppage and washed service line to clear blockage	50
02318	Gills Creek	Collapsed Line	Structural	Removed stoppage, washed mainline and pipe was added to PM wash list to prevent future SSOs at sag	1,100
02320	Saluda River	Debris	O&M	Removed stoppage, washed and repaired mainline	800

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02322	Mill Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	200
02325	Saluda River	Collapsed Line	Structural	Renewed tap	45
02333	Rocky Branch	Debris	O&M	Removed stoppage and washed service line to clear blockage	8
02335	Saluda River	Roots	O&M	Removed stoppage from manhole to clear blockage	115
02341	Gills Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	240
02345	Smith Branch	Collapsed Line	Structural	Repaired mainline	600
02352	Crane Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	540
02356	Gills Creek	Collapsed Line	Structural	Repaired mainline	1,838
02357	Gills Creek	Debris	O&M	Removed stoppage and cleanout cap from service line to clear blockage	8
02364	Saluda River	Debris	O&M	Removed stoppage and washed service line to clear blockage	30
02365	Gills Creek	Roots	O&M	Removed stoppage, repaired service line and raised cleanout	40
02366	Crane Creek	Roots	O&M	Removed stoppage and repaired mainline	37
02372	Gills Creek	3rd Party Responsible	Other	Replaced broken hose on bypass pump	241
02373	Gills Creek	3rd Party Responsible	Other	Resecured bypass discharge hose into manhole	15,750
02382	Mill Creek	Roots	O&M	Removed stoppage to clear blockage	6
02384	Gills Creek	3rd Party Responsible	Other	Repaired mainline	436
02385	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	30
02395	Rocky Branch	Grease	O&M	Removed stoppage and washed mainline to clear blockage	115
02403	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for Project(s) identified to address this SSO	300
02410	Broad River	Grease	O&M	Removed stoppage and washed mainline to clear blockage	674
02412	Mill Creek	Roots	O&M	Removed stoppage and renewed tap	106
02418	Gills Creek	Roots	O&M	Removed stoppage and repaired service line	100
02426	Smith Branch	Collapsed Line	Structural	Repaired mainline	37,355
02429	Gills Creek	Roots	O&M	Removed stoppage to clear blockage	40
02433	Mill Creek	Roots	O&M	Removed stoppage, repaired mainline, and renewed tap	48
02434	Broad River	Roots	O&M	Removed stoppage to clear blockage	375
02439	Saluda River	3rd Party Responsible	Other	Repaired service line	477

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02440	Broad River	Collapsed Line	Structural	Repaired service line	12
02447	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	60
02463	Crane Creek	Debris	O&M	Removed stoppage and washed service line to clear blockage	72
02466	Crane Creek	Collapsed Line	Structural	Repaired mainline	5,091
02467	Saluda River	Debris	O&M	Removed stoppage and washed mainline to clear blockage	180
02468	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	499
02469	Saluda River	Collapsed Line	Structural	Repaired service line	374
02471	Smith Branch	Equipment	Other	Repaired clamp on bypass pump hose and restarted pump	15
02478	Broad River	Debris	O&M	Removed stoppage and washed service line to clear blockage	30
02480	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	425
02481	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	50
02485	Broad River	Collapsed Line	Structural	Repaired service line	15
02487	Saluda River	Roots	O&M	Removed stoppage to clear blockage	4
02490	Broad River	Wet Weather	Wet Weather	See Table 3-3 of the Supplemental IR Report for project(s) identified to address this SSO	1,358
02492	Crane Creek	Roots	O&M	Removed stoppage and repaired mainline	17,562
02494	Mill Creek	Collapsed Line	Structural	Removed stoppage, washed mainline to clear blockage and pipe was added to PM wash list to prevent future SSOs at sag	1,500
02499	Smith Branch	3rd Party Responsible	Other	Renewed tap	210
02504	Crane Creek	Roots	O&M	Removed stoppage to clear blockage	30
02505	Mill Creek	Roots	O&M	Removed stoppage and repaired service line	12
02506	Crane Creek	Roots	O&M	Removed stoppage, washed and repaired mainline	18,500
02509	Mill Creek	Grease	O&M	Removed stoppage and washed service line to clear blockage	60
02510	Crane Creek	Collapsed Line	Structural	Repaired service line	9
02511	Gills Creek	Roots	O&M	Removed stoppage and renewed tap	1,218
02513	Crane Creek	Collapsed Line	Structural	Repaired mainline	15
02524	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	2,982

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02525	Smith Branch	Collapsed Line	Structural	Repaired service line	60
02526	Broad River	Debris	O&M	Removed stoppage to clear blockage	1,200
02527	Saluda River	Roots	O&M	Removed stoppage and repaired service line	13
02528	Mill Creek	Roots	O&M	Removed stoppage and repaired mainline	600
02531	Saluda River	Collapsed Line	Structural	Repaired mainline	66
02532	Broad River	Collapsed Line	Structural	Repaired mainline	4,425
02536	Crane Creek	Grease	O&M	Removed stoppage to clear blockage	940
02540	Crane Creek	Collapsed Line	Structural	Repaired service line	41
02543	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	1,500
02544	Saluda River	Roots	O&M	Removed stoppage and renewed tap	2,337
02545	Saluda River	Roots	O&M	Removed stoppage and repaired mainline	603
02558	Saluda River	Roots	O&M	Removed stoppage and repaired service line	15
02560	Broad River	Collapsed Line	Structural	Removed stoppage and repaired mainline	4,600
02562	Gills Creek	Roots	O&M	Removed stoppage, repaired service line and installed cleanout	40
02568	Crane Creek	Collapsed Line	Structural	Repaired service line	25
02570	Saluda River	Roots	O&M	Removed stoppage, washed and repaired mainline	1,676
02576	Saluda River	Roots	O&M	Removed stoppage and washed service line to clear blockage	38
02589	Crane Creek	Collapsed Line	Structural	Repaired service line	180
02590	Gills Creek	Roots	O&M	Removed stoppage to clear blockage	10
02596	Crane Creek	Collapsed Line	Structural	Repaired mainline	15
02599	Gills Creek	3rd Party Responsible	Other	Repaired service line and installed cleanout	8
02606	Smith Branch	Collapsed Line	Structural	Removed stoppage; Pipe sag to be repaired to prevent future SSOs	200
02617	Crane Creek	Roots	O&M	Removed stoppage and washed mainline to clear blockage	1,371
02619	Saluda River	Collapsed Line	Structural	Repaired service line	38
02623	Gills Creek	3rd Party Responsible	Other	Repaired mainline	1,006
02624	Mill Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	23
02634	Broad River	Grease	O&M	Removed stoppage; Line added to preventative maintenance wash list	2,365
02642	Gills Creek	Collapsed Line	Structural	Repaired mainline	380

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02644	Saluda River	Grease	O&M	Removed stoppage to clear blockage	7497
02652	Crane Creek	Collapsed Line	Structural	Repaired service line	11
02656	Crane Creek	Collapsed Line	Structural	Repaired service line and installed cleanout	73
02658	Rocky Branch	Debris	O&M	Removed stoppage to clear blockage	8
02661	Crane Creek	Collapsed Line	Structural	Repaired mainline	6
02662	Crane Creek	Collapsed Line	Structural	Repaired mainline	8,025
02667	Broad River	Collapsed Line	Structural	Repaired mainline	1,509
02672	Crane Creek	Collapsed Line	Structural	Repaired service line	84
02674	Crane Creek	Collapsed Line	Structural	Repaired mainline	51
02675	Gills Creek	Debris	O&M	Removed stoppage to clear blockage	1,000
02676	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	1,189
02677	Gills Creek	Roots	O&M	Removed stoppage to clear blockage	39
02678	Broad River	Debris	O&M	Removed stoppage to clear blockage	600
02679	Gills Creek	Collapsed Line	Structural	Repaired service line	6
02682	Crane Creek	3rd Party Responsible	Other	Removed stoppage to clear blockage	659
02688	Smith Branch	Roots	O&M	Removed stoppage to clear blockage	300
02690	Gills Creek	Grease	O&M	Removed stoppage to clear blockage	48
02692	Smith Branch	Debris	O&M	Removed stoppage to clear blockage	77
02693	Gills Creek	Grease	O&M	Removed stoppage to clear blockage	62
02696	Saluda River	Collapsed Line	Structural	Repaired service line	54
02699	Smith Branch	Roots	O&M	Removed stoppage and lined service line to prevent root intrusion	4
02703	Saluda River	Roots	O&M	Removed stoppage and made CIPP point repair	100
02704	Broad River	Collapsed Line	Structural	Repaired loose tap with a saddle	36,000
02707	Crane Creek	Grease	O&M	Removed stoppage to clear blockage	300
02708	Crane Creek	Debris	O&M	Removed stoppage to clear blockage	12
02709	Gills Creek	Grease	O&M	Removed stoppage to clear blockage	39
02720	Saluda River	Collapsed Line	Structural	Repaired mainline	29
02721	Saluda River	Roots	O&M	Removed stoppage to clear blockage	4
02723	Crane Creek	Grease	O&M	Removed stoppage and washed mainline to clear blockage	1,794

SSO ID	Basin	Cause[1,3]	Category[2]	Corrective Action	Estimated Volume (gallons)
02724	Saluda River	Grease	O&M	Removed stoppage to clear blockage	875
02725	Crane Creek	Grease	O&M	Removed stoppage to clear blockage	106
02728	Saluda River	3rd Party Responsible	Other	Removed stoppage, washed and repaired service line	205
02731	Saluda River	Collapsed Line	Structural	Repaired manhole to remove intruding liner	1,007
02733	Crane Creek	Collapsed Line	Structural	Repaired mainline	1,190
02737	Gills Creek	Debris	O&M	Removed stoppage and washed mainline to clear blockage	560
02738	Broad River	Collapsed Line	Structural	Repaired mainline	60
02740	Mill Creek	3rd Party Responsible	Other	Removed stoppage and washed mainline to clear blockage	57,850
02743	Mill Creek	Debris	O&M	Removed stoppage and removed gasket at tap to prevent debris build up	10
02749	Crane Creek	Roots	O&M	Removed stoppage and installed liner	226
02752	Crane Creek	Roots	O&M	Removed stoppage and installed liner	115

1) SSO cause recorded at the time of the SSO investigation in accordance with the Wastewater Spill Response SOP, and any updates based on further evaluation.

2) SSO category is assigned for this evaluation based on the SSO cause. See Section 3.1 for category definitions.

3) SSOs identified as collapsed lined could be caused by physical collapsed lines or sags in the pipe. While the pipes that are identified as sags are in the structural category, they can be addressed by preventative cleaning to prevent build up in the sag and therefore future SSOs.