Clean Water 2020 Program

CAPACITY ASSURANCE PROGRAM (CAP)

July 2024

CITY OF Columbia

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Section 1 Summary and Intent

The City of Columbia (City) has developed a Capacity Assurance Program (CAP) to be implemented for review and approval of requests for additional flow (from proposed new sewer connections or increased sewer flow from existing connections) to be discharged to the City's Wastewater Collection and Transmission System (WCTS) and to the Metro Wastewater Treatment Plant (WWTP). The CAP describes the procedures that the City will use to determine if there is available capacity in the City's Treatment, Collection, and Transmission facilities.

The CAP was prepared in accordance with Paragraph 12.e. (Capacity Assurance Program) of the Consent Decree 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 vs. The City of Columbia*, Civil Action No. 3:13-2429-TLW, DOJ Case Number 90-5-1-1-09954, which is referred to herein as the Consent Decree or CD.

Table 1-1 contains a list of the CD requirements for the CAP and the sections of this CAP that address each requirement.

Table 1-1: Summary of Consent Decree Requirements for the Capacity Assurance Program

CD Paragraph	CD Requirements	Report Section
12.e.	Capacity Assurance Program. Within one hundred and eighty (180) Days after EPA approval of the Hydraulic Model Report, Columbia shall submit to EPA and DES (f/k/a DHEC) for review, comment, and approval a Capacity Assurance Program ("CAP"). The CAP shall identify each Sewerbasin with insufficient capacity under peak wet weather, average conditions, or both. It shall also analyze all portions of the WCTS that have experienced SSOs either due to, or exacerbated by, an excessive hydraulic contribution. The CAP shall assess peak flow capacity of all major Sewer System components for existing and proposed flows. At minimum, the CAP shall include, and Columbia shall implement, the requirements set forth in Paragraphs 12.e.(i) through 12.e.(iii), below.	Sections 2 and 8
12.e.(i)	Adequate Capacity Certifications. Except as otherwise provided in Paragraphs 12.e.(ii)(F) through 12.e.(ii)(I), below, after sixty (60) Days following EPA's approval of the CAP, Columbia shall authorize a new sewer service connection, or additional flow from an existing sewer service connection, only after it certifies that the analysis procedures contained in the approved CAP have been used and that Columbia has determined, based on those procedures, that there is Adequate Treatment Capacity, Adequate Transmission Capacity and Adequate Collection Capacity as set forth below. Notwithstanding the foregoing, the standards contained in the Capacity Assurance Program shall not be construed as standards for the ultimate design or rehabilitation of Columbia's WCTS.	Section 6

CD Paragraph	CD Requirements	Report Section
12.e.(i)(A)	Treatment Capacity. For the purposes of Columbia's Capacity Assurance Program, "Adequate Treatment Capacity" shall exist when the WWTP would not be in "non-compliance" for quarterly reporting as defined in 40 C.F.R. § 123.45, Appendix A, if the WWTP were to receive the flow from the new connection or the increased flow from an existing sewer service connection(s), combined with the flow predicted to occur from all other authorized sewer service connections (including those which have not begun to discharge into the WCTS).	Section 4
12.e.(i)(B)	Transmission Capacity. For the purposes of Columbia's Capacity Assurance Program, "Adequate Transmission Capacity" shall exist when each Pump Station through which the proposed additional flow would pass has the capacity to transmit, with its largest pump out of service, the existing one (1) hour peak flow passing through such Pump Station, plus the additional one (1) hour peak flow predicted to occur from the new connection(s) or from the increased flow from an existing sewer service connection(s), plus the additional one (1) hour peak flow predicted to pass through such Pump Station from all other authorized sewer service connections which have not begun to discharge into the WCTS.	Section 4
12.e.(i)(C)	Collection Capacity. For the purposes of Columbia's Capacity Assurance Program, For the purposes of Columbia's Capacity Assurance Program, "Adequate Collection Capacity" shall exist when each Gravity Sewer Line through which the proposed additional flow would pass has the capacity, without causing a Surcharge Condition, to carry the existing one (1) hour peak flow passing through such Gravity Sewer Line, plus the additional one (1) hour peak flow predicted to occur from the new connection(s) or from the increased flow from an existing sewer service connection(s), plus the additional one (1) hour peak flow predicted to pass through such Gravity Sewer Line from all other authorized sewer service connections which have not begun to discharge into the WCTS."	Section 5
12.e.(i)(D)	One (1) Hour Peak Flow. For purposes of Columbia's Capacity Assurance Program, the term "one (1) hour peak flow" shall mean the greatest flow in a sewer averaged over a sixty (60) minute period at a specific location expected to occur as a result of a representative 2 year-24 hour storm event.	N/A

CD Paragraph	CD Requirements	Report Section
12.e.(i)(E)	Surcharge Condition. Except as otherwise set forth in Paragraph 12(e)(i)(F), below, the term "Surcharge Condition" shall mean: (1) For two years from the date of EPA's approval of the CAP, the condition that exists when the supply of wastewater resulting from the one (1) hour peak flow is greater than the capacity of the pipes to carry it and the surface of the wastewater rises to an elevation within two (2) feet of the rim of any manhole, and the gravity sewer pipe is under pressure or head, rather than at atmospheric pressure. Columbia agrees to not construct additional manholes and to not increase the elevation of existing manholes except to ensure that the elevation is no higher than five (5) feet above the Base Flood elevation as that term is defined at 44 C.F.R. § 59.1. (2) After two years from the date of EPA's approval of the CAP, the condition that exists when the wastewater resulting from the one (1) hour peak flow is greater than the capacity of the pipes to carry it and the surface of the wastewater in manholes rises to an elevation greater than twenty-four (24) inches above the top of the pipe or within two (2) feet of the rim of the manhole, and the gravity sewer pipe is under pressure or head, rather than at atmospheric pressure, unless Columbia has, pursuant to Paragraph 12.e.(ii)(A), identified that pipe segment and manhole as designed to operate in that condition, in which case the identified level of surcharge for that pipe segment and manhole will be used to define a Surcharge Condition.	Section 5
12.e.(i)(F)	Exception to Definition of Surcharge Condition. Notwithstanding the definition of "Surcharge Condition" in Paragraph 12(e)(i)(E), any rise in elevation above the top of the pipe shall be considered a Surcharge Condition if the manhole has experienced a capacity-related wet weather SSO during the previous twelve (12) month period (excluding 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), unless Columbia can certify that the cause of the SSO has been corrected through improvements to the WCTS.	Section 5
12.e.(ii)	Capacity Assurance Program Content	
12.e.(ii)(A)	The CAP shall identify the technical information, methodology and analytical techniques to be used by Columbia to determine Adequate Treatment Capacity, Adequate Transmission Capacity and Adequate Collection Capacity. Protocols for evaluating adequate capacity shall include identification of modeling software, standard design flow rate rules of thumb regarding pipe roughness, manhole head losses, as-built drawing accuracy (distance and slope), and water use (gallons per capita per day); projected flow impact calculation techniques; and flow metering. Columbia may identify sewer line segments which have been specifically designed and constructed to operate under surcharge conditions (e.g., with welded or bolted joints) and identify the level of acceptable surcharge for those segments.	Section 5
12.e.(ii)(B)	The CAP shall identify the technical information, methodology and analytical techniques, including the model or software, by which Columbia will calculate the net (cumulative) increase or decrease in volume of wastewater introduced to the WCTS as a result of Columbia's authorization of new service connections and increases in flows from existing connections and the completion of specific projects that add or restore capacity to the WCTS or WWTPs ("Capacity Enhancing Projects"), specific projects that reduce peak flow through removal of I/I ("I/I Projects"), and permanent removal of sewer connections ("Removal of Connections").	Section 3

CD Paragraph	CD Requirements	Report Section
12.e.(ii)(C)	The CAP shall identify the process by which Columbia will integrate its certification of Adequate Treatment Capacity, Adequate Transmission Capacity and Adequate Collection Capacity into the authorization of new sewer service connections and increases in flow from existing connections.	Section 6
12.e.(ii)(D)	The CAP will describe the CAP Information Management System to be used to track the accumulation of available capacity, from completion of Capacity Enhancing Projects, I/I Projects and Removal of Connections, and the reduction in capacity from authorized increases in flow from new and existing sewer service connections.	Section 3
12.e.(ii)(E)	Capacity Certifications. Except as otherwise provided in Paragraphs 12(e)(ii)(F), (G), (H), and (I), below, after sixty (60) Days of EPA's approval of the CAP, Columbia may authorize new sewer service connections, or additional flow from existing sewer service connections, only after it certifies that the analysis procedures contained in the approved CAP have been used and that Columbia has determined, based on those procedures, that there is Adequate Treatment Capacity, Adequate Transmission Capacity and Adequate Collection Capacity. All certifications pursuant to this Paragraph 12.e.(ii)(E) shall be made by a registered professional engineer (P.E.) in the State of South Carolina and shall be approved by a responsible official of Columbia as defined by 40 C.F.R. § 122.22(b). Columbia shall maintain Capacity Assurance Program certifications, and all data on which the certifications are based, in its offices for inspection by EPA and DES. EPA and DES may request, and Columbia shall provide, any and all documentation necessary to support any certification made by Columbia pursuant to the approved CAP, and make available, to the extent possible, individuals providing such certifications to meet with EPA and DES.	Section 6
12.e.(ii)(F)	Minor Sewer Connections. The CAP may include provisions for authorization of Minor Sewer Connections. For the purposes of the CAP, a "Minor Sewer Connection" is a connection with an average flow not to exceed four thousand (4,000) gallons per day. For minor sewer service connections, Columbia may elect to perform a quarterly capacity analysis for each Sewerbasin or Subbasin by certifying that the Sewerbasin or Subbasin has Adequate Treatment Capacity, Adequate Transmission Capacity, and Adequate Collection Capacity to carry existing flows and the additional flows generated by all such minor sewer service connections projected to be approved since the last capacity analysis. For any Sewerbasin or Subbasin which can be so certified, Columbia may approve these projected minor sewer service connections without performing individual capacity analysis for each connection.	Section 6
12.e.(ii)(G)	Capacity for Treatment, Transmission, and Collection in Lieu of Certification. Columbia may authorize a new sewer service connection, or additional flow from an existing sewer service connection, even if it cannot satisfy the requirements of Paragraph 12.e.(ii)(E), above, provided Columbia certifies that all of the following provisions, where applicable, are satisfied: (1) Columbia is in substantial compliance with this Consent Decree. (2) The sewer lines which will convey the proposed additional flow from new or existing sewer service connections have not experienced dry weather SSOs due to inadequate capacity within the previous twelve (12) months; or, in the alternative, the causes of any dry weather SSOs due to inadequate capacity have been eliminated. (3) Columbia has identified the sewer line segment(s), Pump Station(s) and/or wastewater treatment systems that do not meet the conditions for certification of	Section 7

CD Paragraph	CD Requirements	Report Section
	Adequate Treatment Capacity, Adequate Collection Capacity and/or Adequate Transmission Capacity.	
12.e.(ii)(G) (continued)	(4) Columbia shall have completed, after June 10, 2010, and prior to the time the proposed additional flow from new or existing sewer connections is introduced into the WCTS, specific Capacity Enhancing Projects, I/I Projects and/or Removal of Connections which will add sewer capacity or reduce peak flows to the identified sewer line segment(s), lift station(s), and/or wastewater treatment system(s) in accordance with the requirements set forth below: i. Where Columbia has undertaken specific Capacity Enhancing Projects that provide for additional off-line storage and/or specific Removal of Connections to satisfy the requirements of this Paragraph 12.e.(ii)(G)(4), the estimated added capacity resulting from such projects must be equal to or greater than the estimated amount of any proposed additional flow. ii. Where Columbia has undertaken specific Capacity Enhancing Projects, other than those that provide for additional off-line storage, to satisfy the requirements of this Paragraph 12.e.(ii)(G)(4), the estimated reduction in peak flows or added capacity resulting from such projects must exceed the estimated amount of any proposed additional flow by a factor of 2:1. iii. Where Columbia has undertaken specific I/I Projects to satisfy the requirements of this Paragraph 12.e.(ii)(G)(4), the estimated reduction in peak flows or added capacity resulting from such projects must exceed the estimated amount of any proposed additional flow by a factor of 3:1. (5) Commencing one year after EPA approval of the CAP and annually thereafter, Columbia has performed a review of specific Capacity Enhancing Projects and I/I Projects undertaken to determine if actual added capacity and peak flow reductions are in line with what Columbia originally estimated for such projects; and Columbia has used the results of this review to adjust future estimates as necessary. (6) Any new sewer service connection or increase in flow to an existing connection authorized prior to the completion of a necessary added capacity or peak flow reduction project as set forth above shall be conditioned upon completion of such project prior to the time that the new sewer service connection or flow increase is introduced into the WCTS.	Section 7
12.e.(ii)(H)	Essential Services. The CAP may contain provisions for Columbia to authorize a new sewer service connection, or additional flow from an existing sewer service connection, in cases where there is not Adequate Transmission Capacity, Adequate Collection Capacity and/or Adequate Treatment Capacity for health care facilities, public safety facilities and public schools and, subject to EPA review and approval, for government facilities; and in those cases where a pollution or sanitary nuisance condition exists, as determined by the Richland or Lexington County Health Department, as the result of a discharge of untreated wastewater from an on-site septic tank. All such new service connections, or additions to flow from an existing connection, shall be tracked in the CAP Information Management System.	Section 2

CD Paragraph	CD Requirements	Report Section
12.e.(ii)(I)	Existing Illicit Connections. The CAP may contain provisions for Columbia to authorize a new sewer service connection, or additional flow from an existing sewer service connection in cases where there is not Adequate Transmission Capacity and/or Adequate Collection Capacity and/or Adequate Treatment Capacity for any illicit connections or discharge of wastewater to the stormwater system. All such new service connections or additions to flow from an existing connection created after the Date of Entry that result from the elimination of such illicit connections or discharges shall be tracked in the CAP Information Management System."	Section 2

Pursuant to CD Paragraph 12.e.(iii) Capacity Procedures Prior to CAP Approval, the City developed a Standard Operating Procedure for the Wastewater System Capacity Assurance Program, dated May 2013, referred to as the Interim CAP, to document and implement capacity assessment procedures for the City to follow for review of CAP Requests until the CAP herein is approved. The Interim CAP was subsequently revised in April 2018. The Interim CAP was developed in accordance with Paragraph 12.e.(iii) Capacity Procedures Prior to CAP Approval, which states as follows:

> *Paragraph 12.e.(iii) - Within ninety (90) Days after the Date of Entry of this Consent Decree, Columbia shall establish a list of all authorized new sewer service connections or increases in flow from existing service connections, which flows have not yet been introduced into the WCTS. The following information shall be recorded for each such authorized connection: street address, estimated average daily flow, estimated peak flow, Sewerbasin or Subbasin, date authorized, and estimated Calendar Quarter when the additional flow from the connection will begin. Columbia shall update and maintain this list as necessary until full implementation of the CAP, as approved by EPA. In addition, upon execution of this Consent Decree and until EPA approves the CAP as required by Paragraph 12.e., Columbia agrees to continue to implement its current capacity program.*

The City is in compliance with CD Paragraph 12.e.(iii).

1.1 Document Layout

Section 1 Summary and Intent (this section).

Section 2 Capacity Certification Process: Section 2 summarizes the overall CAP Certification Process with a flow diagram and references to other sections that provide further discussion.

Section 3 CAP Information Management System: Section 3 describes the CAP IMS that is used to track each CAP Request and the reduction in available capacity resulting from the approval/authorization of each CAP Request, the net cumulative increase or decrease in wastewater flow introduced to the WCTS, and the increase of system capacity achieved through the implementation of Capacity Enhancing Projects or I/I (Reduction) Projects and the Removal of Connections.

Section 4 Treatment and Transmission Capacity: Section 4 describes the technical information, methodology and analytical techniques to be used by the City to determine Adequate Treatment Capacity and Adequate Transmission Capacity.

Section 5 Collection Capacity: Section 5 describes the technical information, methodology and analytical techniques to be used by the City to determine Adequate Collection Capacity.

Section 6 Capacity Certifications: Section 6 provides guidelines and requirements the City will use to authorize new sewer service connections and increases in flow from existing connections.

Section 7 In Lieu Of Capacity Certifications: Section 7 provides guidelines and requirements for the In Lieu-Of-Certification the City may use to authorize new sewer service connections and increases in flow from existing connections even if it cannot satisfy the requirements of the capacity certification.

Section 8 Existing System Capacity Analysis: This section identifies each sewerbasin with insufficient capacity under peak wet weather and/or average conditions.

1.2 Glossary of Terms

- **Adequate Treatment, Transmission, and Collection Capacity Certification** – The term used to represent approval of the CAP Request and compliance with the certification requirements of available system capacity for new or additional flow in this document.
- **Average Daily Dry Weather Flow (ADF)** – The average flow recorded throughout the day, excluding any additional flows resulting from rainfall events.
- **Calibration** – The adjustment of model parameters to closely match modeled flows to measured flows within an established criteria range.
- **CAP Request** – A CAP Request is the formal request made in an application by an individual or an entity for a potential future discharge to the City's sewer system. Each CAP Request will be analyzed to determine if there is adequate treatment, transmission , or collection capacity available in the WCTS to accept the new or additional flow without exceeding the surcharge and capacity criteria established in this CAP.
- **Collection System Capacity** – Collection system capacity is the capacity of the gravity sewer collection system (gravity sewer lines and manholes) carrying the existing one-hour peak flow passing through the system to convey the flow without causing a Surcharge Condition.
- **Design Storm** – Representative 2-year, 24-hours storm event used for analysis. Adequate transmission and collection capacity is evaluated for the total peak flow expected to occur in the City's WCTS during this design storm.
- **Force Main** – A pipe that receives and conveys, or whose purpose is to receive and convey, wastewater under pressure from the discharge side of a pump.
- **Gravity Sewer** – Any pipe that receives, contains, and conveys, or whose purpose is to receive, convey, and contain, wastewater not normally under pressure, but unassisted under the influence of gravity.

- **Groundwater Infiltration** – Groundwater entering the collection system through defects in pipes, pipe joints, and manhole walls. This infiltration component may not be directly impacted by rainfall events.
- **Infiltration** – Extraneous water, other than wastewater, that enters the WCTS (including sewer service connections and foundation drains) from the ground through such means as, but not limited to, defective pipes, pipe joints, connections, or manholes. Infiltration does not include and is distinguishable from Inflow**.**
- **Inflow** – Extraneous water, other than wastewater, that enters the WCTS (including sewer service connections), from sources such as, but not limited to, roof leaders, cellar drains, yard drains, sump pumps, foundation drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage. Inflow does not include and is distinguished from Infiltration.
- **I/I** – The total quantity of water from inflow, infiltration, and rainfall induced infiltration.
- **Minor Sewer Connection** – A connection with an average flow not to exceed 4,000 gallons per day (gpd).
- **One-Hour Peak Flow** – For purposes of the CAP, the term one-hour peak flow shall mean the greatest flow in a sewer averaged over a sixty-minute period at a specific location expected to occur as a result of a design storm event.
- **Pump Station** – Pump stations are facilities comprised of pumps which lift wastewater to a higher hydraulic elevation, including all related electrical, mechanical, and structural systems necessary to the operation of the facilities.
- **Rainfall Induced Infiltration** – The extraneous flow into a sewer system that is not directly generated by rainfall during an event. Rainfall induced infiltration is differentiated by the immediate response rainfall may generate.
- **Sanitary Sewer Overflow (SSO)** – An SSO is an overflow, spill, or release of wastewater from City's sewer system including: (a) unpermitted discharges; (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State of South Carolina; and (c) all building backups.
- **Sewerbasin** – The eight hydraulically linked portions of the City's Wastewater Collection and Transmission System that are tributary to a trunk sewer that directly leads to the WWTP – Mill Creek, Gills Creek, Rocky Branch, Smith Branch, Crane Creek, Broad River, Saluda River, and West Columbia.
- **Subbasin** – The subdivision of a Sewerbasin which consists of hydraulically linked sewers that are tributary to a common point in the sewer system. Sewer system evaluation techniques are undertaken on a Subbasin basis. A Subbasin typically consists of 10,000 to 50,000 linear feet of sewer.
- **Total Existing Peak Flow** – This consists of the existing one-hour peak flow in the CAP IMS, plus one-hour peak flows from approved CAP Requests and one-hour peak flows from other authorized sewer service connections which have not yet begun to discharge into the WCTS.

- **Total Peak Flow** – This consists of the total existing peak flow (existing one-hour peak flow in the CAP IMS, plus one-hour peak flows from approved CAP Requests and one-hour peak flows from other authorized sewer service connections which have not yet begun to discharge into the WCTS) and the additional one-hour peak flows predicted to occur from a CAP Request (from new connections or from increased flow from an existing sewer service connection).
- **Transmission System** – This term is applied to the combination of sewer pumping stations and the downstream force main connected to the pump station. This includes force mains that serve a combined set of pump stations, such as for the Mill Creek Pump Station force main that serves the Mill Creek, Atlas Road, Versch Lock, and East Bluff Pump Stations.
- **Treatment System** – This term is applied to all facilities used in the treatment of sewer. the City owns, maintains, and operates one treatment facility – Metro Wastewater Treatment Plant.
- **Wastewater Collection and Transmission System (WCTS)** – WCTS shall mean the municipal wastewater collection, retention, and transmission system, including all pipes, force mains, gravity sewers, pump stations, pumps, manholes, and appurtenances thereto, which are owned or operated by the City and which flow to the WWTP.
- **Wastewater Treatment Plant (WWTP)** – WWTP shall mean the Metropolitan Wastewater Treatment Plant located at 1200 Simmon Tree Lane, Columbia, South Carolina, and all components of such wastewater treatment facility.

1.3 Acronyms and Abbreviations

- **ADF** – Average Daily Flow
- **CAP** – Capacity Assurance Program
- **CD** – Consent Decree
- **CCTV** – Closed Circuit Television
- **City** – City of Columbia
- **DES** – South Carolina Department of Environmental Services (formerly known as South Carolina Department of Health and Environmental Control)
- **EPA** – United States Environmental Protection Agency
- **ESRI** – Environmental Systems Research Institute, Inc.
- **GIS** – Geographic Information System
- **GPD** – Gallons per Day
- **HMR** – Sewer System Hydraulic Model Report
- **I/I** – Infiltration and Inflow
- **IMS** – Information Management System
- **MGD** – Million Gallons per Day
- **NPDES** – National Pollutant Discharge Elimination System
- **P.E.** – Professional Engineer
- **SSO** – Sanitary Sewer Overflow

- **SRPS** – Saluda River Pump Station
- **WCTS** – Wastewater Collection and Transmission System
- **WWTP** – Wastewater Treatment Plant

Section 2 Capacity Certification Process

2.1 CAP Process Overview

Figure 2-1 summarizes the capacity evaluation process that the City will use to determine whether the existing WCTS has Adequate Treatment Capacity, Adequate Transmission Capacity, and Adequate Collection Capacity to approve (through certification) new sewer service connections or increases in flow from existing connections, herein after referred to as a CAP Request. The process has numbered actions as discussed below.

Action 1 in the CAP process will be to determine whether the CAP Request can be evaluated as a Minor Sewer Connection. A Minor Connection is a CAP Request with an average flow not to exceed four thousand (4,000) gallons per day. The CD allows the City to include provisions for authorization of Minor Sewer Connections by a separate process using a quarterly analysis of adequate treatment, transmission, and collection capacity. The approach for Minor Sewer Connections is discussed in Section 6.

If the CAP Request is not a Minor Sewer Connection, the Applicant (CAP Requestor) must submit information to the City via a CAP Request. CAP Request Forms are available on the City's website. When the CAP Request Form is received, the City completes a review of the CAP Request for completeness including plans and computations of flow projections (Action 2).

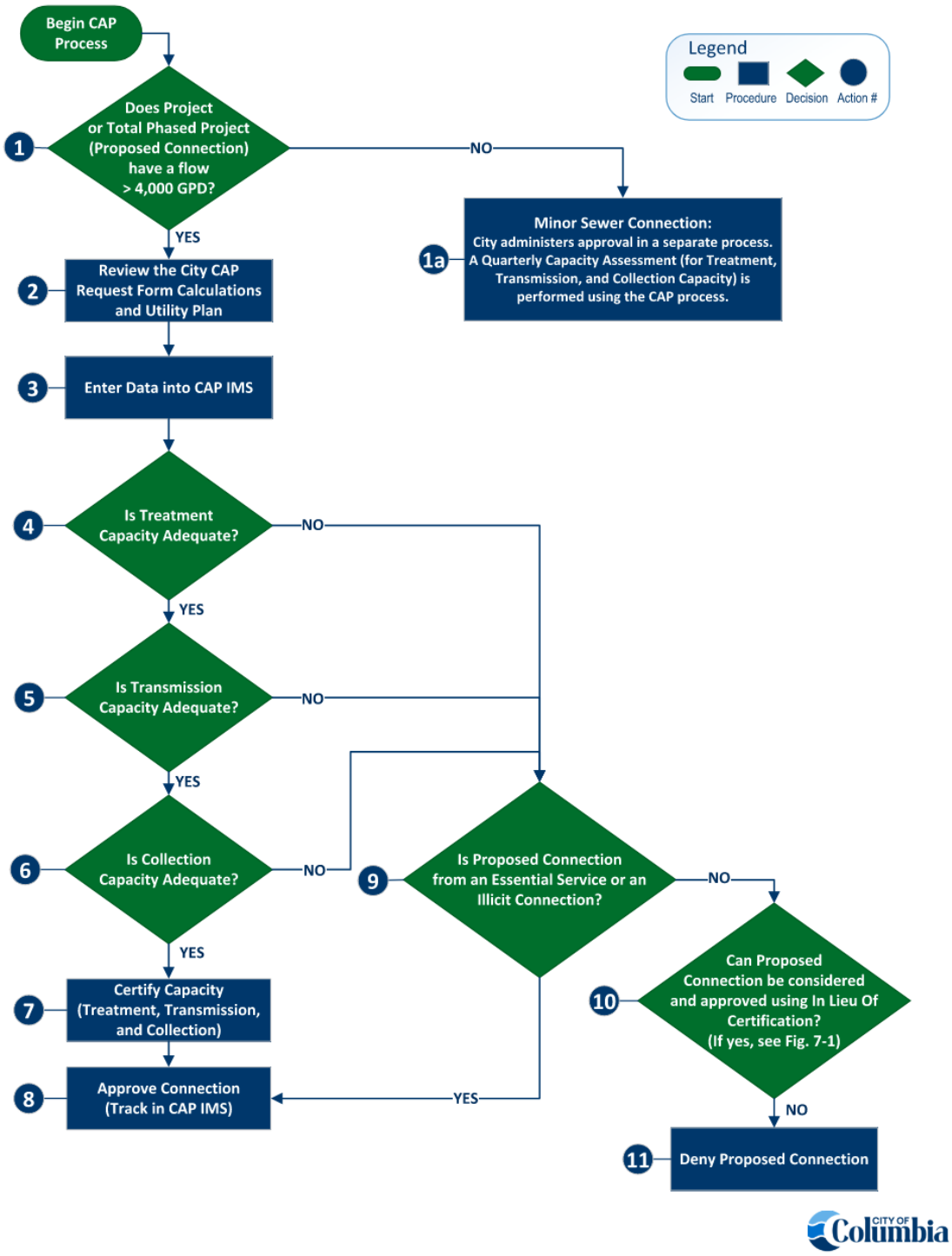
If the CAP Request Form is complete, the City will enter the data into the CAP Information Management System (IMS) (Action 3), which is discussed in Section 3, and the capacity evaluation process begins. The CAP Process incorporates various tools to review and evaluate available system capacity. Available system capacity will be evaluated from the WCTS connection location(s) proposed for the CAP Request (downstream) to the WWTP.

WWTP Treatment Capacity (Action 4) adequacy will be determined based on the total average day flow compared to available treatment capacity, as discussed in Section 4. The CAP IMS applies the total average day flow of the existing WCTS, plus the cumulative total average daily flow (ADF) of approved CAP Requests, plus the proposed CAP Request ADF, to determine total potential flow to the WWTP.

Adequate transmission and collection capacity will be evaluated for the one-hour peak flow expected to occur in the City's WCTS (total existing peak flow) during a representative 2-year, 24-hour storm event (design storm). To determine the total peak flow for the CAP Request, the CAP IMS calculates the total of the peak flow of the existing system in the WCTS, plus the cumulative peak flow of all prior approved CAP Requests, plus the proposed CAP Request peak flow (total peak flow).

- Adequacy of transmission capacity (Action 5) will be determined from a comparison of the total peak flow passing through the pump station compared to the confirmed capacity of the pump station (and force main), as discussed in Section 4.

Figure 2-1 – Overview of CAP Process



- Collection capacity (Action 6) will be determined based on system piping capacity under the appropriate surcharge conditions established in the CD, which is predicated on whether there were previous downstream wet weather sanitary sewer overflows (SSOs) during the prior twelve months (excluding several natural conditions as defined in the CD Paragraph 12.e.(i)(E)). Section 5 discusses how the collection capacity is determined under the CAP Process. Collection capacity adequacy is determined based on a comparison of the total peak flow in the WCTS passing through the pipes compared to the capacity of each pipe.

The outcome of the CAP Process may be ONE of the following:

- **Action 8** - If it is determined that the City has Adequate Treatment, Transmission, and Collection Capacity for the CAP Request, the City notifies the Applicant with a Capacity Certification authorizing (or approving) the CAP Request and the flow will be tracked in the CAP IMS.
- **Action 9** - If it is determined that the City's WCTS does not have Adequate Treatment, Transmission, or Collection Capacity for the CAP Request, the City may approve the connection if the CAP Request is an Essential Service or for the removal of an Illicit Connection. In this case, the CAP Request may be approved, and the flow will be tracked in the CAP IMS.
    - **Essential Service**. The City may authorize a new sewer service connection, or additional flow from an existing sewer service connection, in cases where there is not Adequate Treatment, Transmission, and/or Collection Capacity for health care facilities, public safety facilities and public schools and, subject to EPA review and approval, for government facilities; and in those cases where a pollution or sanitary nuisance condition exists, as determined by the Richland or Lexington County Health Department, as the result of a discharge of untreated wastewater from an on-site septic tank. All such new service connections, or additions to flow from an existing connection, shall be tracked in the CAP IMS.
    - **Illicit Connections**. The City may authorize a new sewer service connection in cases where there is not Adequate Treatment, Transmission, and/or Collection Capacity for any illicit connections or discharge of wastewater to the stormwater system. All such new service connections that result from the elimination of such illicit connections or discharges shall be tracked in the CAP IMS.
- **Action 10** - If it is determined that the City's WCTS does not have Adequate Treatment, Transmission, or Collection Capacity for the CAP Request, then the City may elect to potentially consider the CAP Request via an In Lieu Of Capacity Certification Process. The In Lieu of Certification Process considers the completion of planned Capacity Enhancing Projects that would address the capacity deficiencies. Thus, the City may potentially approve the CAP request with an In Lieu of Certification. The In Lieu Of Capacity Certification Process is discussed in Section 7.
- **Action 11** - If it is determined that the City does not have Adequate Treatment, Transmission, and Collection Capacity for the CAP Request, the City notifies the Applicant with a denial of the CAP Request.

Section 3 CAP Information Management System

3.1 CAP IMS Software

The CAP IMS is an interactive web-based tool residing on the City's intranet designed to keep track of the net accumulation and/or reduction in available capacity in the WCTS. The CAP IMS will be used to track each CAP Request, the net (cumulative) increase or decrease in wastewater flow introduced to the WCTS, and the increase of system capacity achieved through the implementation of Capacity Enhancing Projects, I/I (Reduction) Projects, or the Removal of Connections.

The CAP IMS uses a combination of programming languages and database tools to store and recall information and perform a capacity review analysis related to the capacity requests and system capacity tracking. Various other functions and tasks are called or invoked from the user interface where the CAP Request data will be managed, stored, and presented. Database and data management functions are controlled in several SQL databases. Mapping graphical interfaces are managed through Environmental Systems Research Institute, Inc. (Esri) mapping interface.

The City reserves the right to update the CAP IMS from its existing software to a new software as technology progresses, but the intent of the CAP IMS as expressed in this document will remain the same.

3.2 Initial Data Entry for Each CAP Request

Information from each CAP Request Form entered in the CAP IMS may include the following:

- Date of Application
- Project Name
- CAP # (assigned by the CAP Manager)
- Wastewater Service Area
- Owner Information
    - Name (Company, Applicant)
    - Address
    - Contact Information (phone numbers, email)
- Consulting Engineer (if applicable)
    - Name
    - Company Name
    - Address
    - Contact Information (phone numbers, email)
- Development/Project Information
    - Address

  - City
  - County
  - Wastewater Service Area (Sewerbasin)
  - Description of the Proposed Development
  - Type of Development
  - Type of Wastewater (Domestic/Commercial or Industrial)
  - TMS# of Proposed Development
  - Does the project connect to downstream pump stations (names)
  - Is this a Phased Project?
  - Is this a revision to a previous CAP Request?
    - Provide further information
  - Estimated average daily flow (ADF)
  - Estimated Peak Flow for the CAP Request
  - Does the project include a private pump station onsite?
    - Proposed Private Lift Station Capacity (MGD)
  - Estimated Calendar Quarter when the additional flow will begin
- Reviewer Name
- Reviewer Title Position

3.3 CAP Request Flow Estimates

3.3.1 Average Daily Flows

Flow estimates for the CAP Request are computed by the Applicant as prescribed in DES Regulation 61-67 Appendix A (Unit Contributory Loading to All Domestic Wastewater Treatment Facilities). The City may update estimated unit loading rates that reflect flow trends for new sewer connections either based on the latest update to unit loadings by DES in Regulation 61-67 or engineering judgement using other available information such as metered flow for existing connections that have similar discharge characteristics as the proposed CAP Request.

The flow estimate will be evaluated by the City and approved before it is entered into the CAP IMS.

3.3.2 Peak Hourly Flows

The one-hour peak flow for each CAP Request will be computed based on a factor multiplied by the average daily flow. This factor will be applied according to the DES Regulation 61-67, which states that peak hourly flow projections shall be at least two and one half (2.5) times the ADF projection, unless otherwise justified. If a different peak hourly flow factor is warranted (i.e., a specific type of industry) and is proposed by the Applicant, the justification must be provided, and the City must approve this factor before it will be entered into the CAP IMS.

Section 4 Treatment and Transmission Capacity

4.1 Introduction

Section 4 outlines the technical information, methodology and analytical techniques that will be used by the City to determine Adequate Treatment and Transmission Capacity.

4.2 Treatment Capacity Adequacy

The current WWTP design capacity is 60 MGD as defined in the plant's National Pollutant Discharge Elimination System (NPDES) permit, which cannot be exceeded by the cumulative approved CAP Requests unless a Treatment Capacity Enhancing project is completed. The capacity of the WWTP is defined as the maximum monthly average flow over a calendar year at which the WWTP is designed to operate in compliance with the facility's NPDES Permit.

Each CAP Request will be compared to the WWTP treatment capacity to determine whether the new CAP Request flow can be approved with the total ADF including existing flow and all previously approved CAP Requests. If the total ADF with the CAP Request ADF is less than the current design capacity of the WWTP, then there is Adequate Treatment Capacity.

As noted above, the City also maintains an equalization storage facility (160 MG) and associated influent pump station at the WWTP. Though the equalization storage does not increase the process capacity at the plant, it does allow the capture and temporary storage of any excess peak flows from large wet weather events to avoid upstream SSOs.

The City may complete a treatment capacity enhancement project in the future for the WWTP capacity. If this upgrade is completed, the CAP IMS will be updated.

4.3 Transmission Capacity Adequacy

The total peak flow passing through each downstream pump station will be compared to available pump capacity at each station to determine if there is adequate transmission capacity. A pump station and its associated force main are typically considered as a unit for this assessment.

Available transmission capacity will be determined based on the firm capacity of the pump station for the peak hourly pumping rate with the largest pump out of service and all remaining pumps operating at 100 percent speed.

It is important to note that the assessment of Adequate Transmission Capacity requires an assessment of the total peak flow in the WCTS. System flows generated by the design storm, as determined for the assessment of the collection capacity, are discussed in Section 5.

The City may complete transmission capacity enhancing projects to upgrade pump station capacity. If any transmission capacity upgrades are completed, the City will determine the actual capacity upgrade achieved and update the CAP IMS.

Section 5 Collection Capacity

5.1 Introduction

Section 5 discusses the technical information, methodology and analytical techniques that will be used by the City to determine adequate collection capacity for the gravity sewer system. This section describes the protocols for evaluating adequate collection capacity, including standard design flow rate, rules of thumb regarding pipe roughness, manhole head losses, as-built drawing accuracy (distance and slope), water use (gallons per capita per day), projected flow impact calculation techniques, and flow metering.

5.2 Surcharge Conditions

The CD establishes three surcharge conditions for collection capacity analysis. Surcharge Conditions 1 and 2 are phased after the CAP is approved.

- **Condition 1**, illustrated in **Figure 5-1**, is an interim condition that governs for two years after the CAP is approved that limits the maximum allowable pipeline surcharge, resulting from a one-hour peak flow during a design storm, to no higher than 2 feet below the rim of the sewer manhole. This is referred to as the Shaw Exemption.
- **Condition 2**, illustrated in **Figure 5-2**, is the condition that governs after two years from the CAP approval that limits the maximum allowable pipeline surcharge, resulting from a one-hour peak flow during a design storm, to no higher than 2 feet above the crown of the pipe or within 2 feet of the rim of the manhole, and the gravity sewer pipe is under pressure or head, rather than at atmospheric pressure.
- **Condition 3**, illustrated in **Figure 5-3**, is the condition that supersedes Condition 1 or Condition 2 if there was a capacity-related wet weather SSO in any portion of the system downstream of the proposed CAP Request during the previous 12 month period (excluding those SSOs caused by severe natural conditions discussed in **Section 5.2.1**), unless the City can certify that the cause of the wet weather SSO has been corrected through improvements to the WCTS. This surcharge condition limits the maximum allowable pipeline surcharge during a design storm to no more than the crown of the downstream pipe segments affected by the downstream SSO. This is a "full pipe" flow condition.

5.2.1 Exception to Definition of Surcharge Condition

The CD identifies several severe natural conditions that are exceptions to the definition of a surcharge condition for collection capacity analysis. If an SSO occurs because of these conditions, collection capacity analysis condition No. 3 will apply.

These conditions include:

- Hurricanes and Tornadoes
- Widespread flooding (caused by extreme events or natural disasters)
- Earthquakes
- Rainfall greater than the representative 2-year, 24-hour rainfall event

Figure 5-1 – Surcharge Limitations in Gravity Sewers for Two Years after CAP Approval

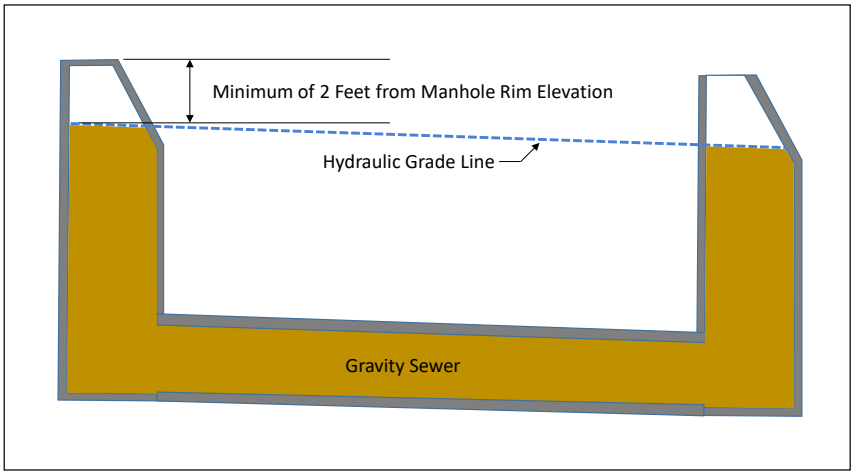


Figure 5-2 – Surcharge Limitation in Gravity Sewers Starting Two Years after CAP Approval

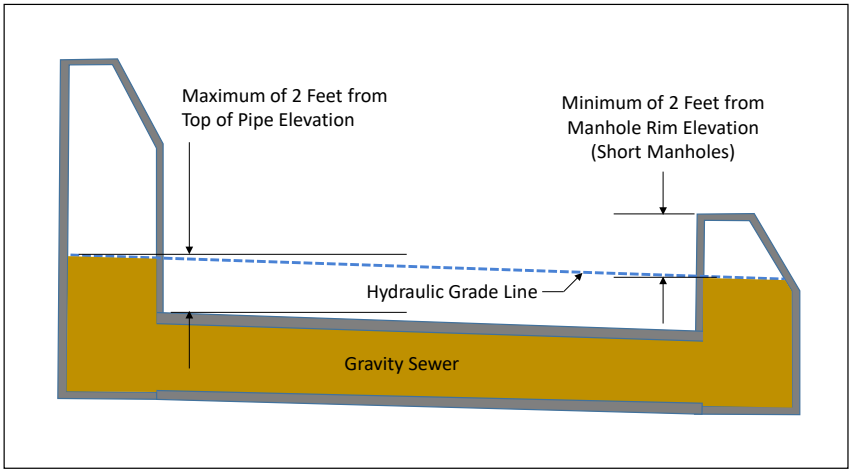
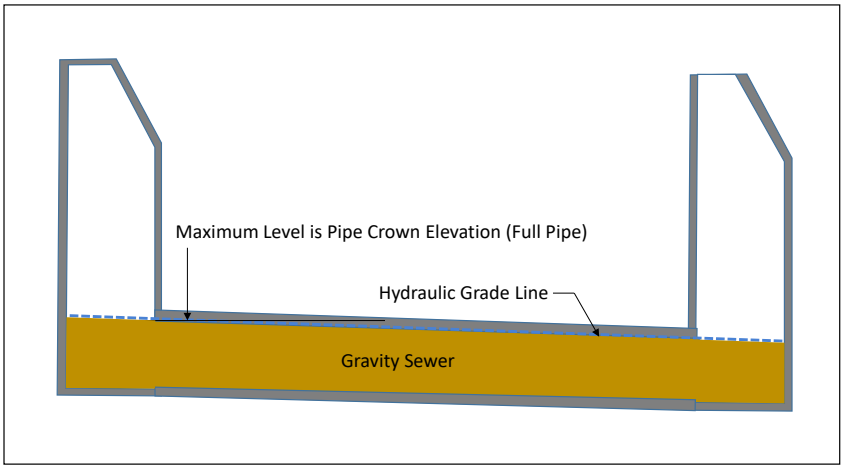


Figure 5-3 – Surcharge Limitation in Gravity Sewer Sections with Past Wet Weather Overflows (within the past 12 months exclusive of severe natural conditions, Section 5.2.1)



5.3 Existing Collection Capacity

To determine available capacity in the existing collection system (existing total peak flow and pipe capacities), the City used the Hydraulic Model of the Major WCTS. The Hydraulic Model Major WCTS data was then extrapolated to the Minor WCTS.

The City's GIS (updated by the City's Sewer Mapping Program) was used to identify physical system data (such as pipe size, material, manhole elevations and depths, etc.).

5.3.1 Major WCTS Sewer Capacity and Peak Flow

The City developed and calibrated a Hydraulic Model, in compliance with CD Paragraph 17, of its Major WCTS components to establish existing hydraulic conditions and plan for future capacity needs of the collection system. The Hydraulic Model includes pipes in the system that are at least 15 inches in diameter and larger and incorporates pump stations that receive flow from gravity lines 15 inches or larger or that discharge into force mains 15 inches or larger in diameter, and all the pipes downstream.

The August 2020 Sewer System Hydraulic Model Report (HMR) that documents the Hydraulic Model development was approved on April 4, 2024. The HMR should be referenced for information regarding the model software selection, model development (using GIS/Sewer Mapping Program information), pipe and manhole attributes using Manning's Formula criteria for pipe and manhole head losses, characterization of wastewater flows including the assignment of sanitary flow and Groundwater Infiltration, calibration of the Hydraulic Model to a comprehensive flow metering program during wet weather periods, and modeling maintenance procedures and protocols. The Hydraulic Model currently uses Infoworks ICM software, a computation hydraulic modeling software appropriate for simulation of the complexity of the City's WCTS.

Accordingly, for the Major WCTS, the Hydraulic Model was used to determine:

- the individual gravity pipe capacities under each of the three surcharge conditions discussed in **Section 5.2**; and
- the actual flow rates along each Major WCTS pipe for the total existing peak flow during the design storm.

5.3.2 Minor WCTS Sewer Capacity and Peak Flow

The pipe capacity for the Minor WCTS sewers (pipes that are less than 15 inches in diameter and are not included in the Hydraulic Model) was determined using a worksheet computation for each pipe segment (manhole to manhole) using the Manning's Formula for full pipe flow (no surcharge or flow level greater than the crown of the pipe).

Pipe roughness is based on Manning's roughness values. The roughness values selected for each piping system evaluated within this CAP were based on engineering judgment and/or the calibration efforts associated with the Hydraulic Model. Roughness coefficients are described further in the HMR. The worksheet computation does not incorporate manhole head losses as the pipe velocities are typically lower and the analysis does not consider surcharge conditions, which would increase the need to consider

manhole losses. For the smaller diameter pipes, Manning's Formula accounts for the typical manhole head losses. This process identified the design pipe capacity and is entered into the CAP IMS.

Existing peak flow in the Minor WCTS is developed from the nearest downstream node in the calibrated Hydraulic Model and water meter consumption data. Minor system flow assignments in each sewer subbasin were initially established based on water consumption meter data. Average daily water consumption meter data is assigned to the nearest Minor WCTS pipe in proximity to the water meter. Total existing peak flow in the Hydraulic Model (during the design storm) is then proportionally distributed to each Minor WCTS pipe in the upstream subbasin based on the total ADF assigned to each Minor WCTS Pipe.

5.4 Available Collection Capacity

To determine available collection capacity, the CAP IMS compares total peak flow to the existing pipe capacity under the three surcharge conditions in the Major WCTS and the full pipe flow condition (no surcharge) in the Minor WCTS. The CAP IMS identifies each pipe that has adequate capacity under each of the surcharge conditions, which also identified which pipes do not have adequate capacity, all the way down to the WWTP. Two years after the CAP is approved, the first surcharge condition, Figure 5-1, will be removed from consideration.

The Minor WCTS pipe capacity assessment is conservative. If the initial CAP Request evaluation indicates that there is no available Minor WCTS pipe capacity, the City may utilize other dynamic modeling and analysis tools (like Sewer-CAD) or extend the Hydraulic Model into the Minor WCTS subbasin, if necessary, for further assessment of available pipe capacity under the CD surcharge conditions. The City may also collect new data (survey, flow data, or CCTV, etc.) that may be used to conduct a more detailed analysis of the Minor WCTS to determine the available collection capacity in the local area.

The CAP IMS reports on the assessment of available capacity (peak flow versus pipe capacity) and tracks the use of and results additional assessment tools for the Minor WCTS, to potentially approve CAP Requests.

The City will periodically complete projects that may increase the WCTS collection capacity, which could involve new storage, increased pump station capacity, or the replacement or lining of pipes, etc. that change conveyance capacity. The Hydraulic Model or other computational tools may be used to identify the capacity increase for each component achieved by the completed project. The capacity enhancing projects that include improvements to the collection capacity will be applied directly to the CAP IMS for that installed capacity after the capacity enhancing project is complete.

5.5 Sewer Lines Designed to Operate Under Surcharge

Appendix A provides a list of the Major WCTS sewer lines that are specifically designed and constructed to operate under acceptable surcharge conditions. Gravity pipes that are designed to operate under acceptable surcharge conditions may operate beyond the established surcharge conditions in **Section 5.2** but the actual surcharge condition will not result in predicted SSOs.

Examples of these special conditions may include but are not limited to inverted siphons, water body crossings, pump station influent lines that surcharge due to designed operating conditions of the downstream pump station, pipes that are influenced by downstream flow diversion structures (Example: Saluda River Pump Station equalization diversion), and sealed gravity systems. Smaller pipes connected to larger downstream sewers may have pipe crown elevations lower than the downstream sewer crown elevation. When the larger pipe is even flowing partially full, this condition can result in the smaller pipe being in an adverse surcharge condition. The smaller pipe still has adequate capacity, but it is only surcharged because of the downstream (connecting) pipe's normal flow condition. In these cases, the smaller pipe segment(s) just upstream of the larger pipe connection are allowed to surcharge up to the allowable surcharge of the larger downstream pipe crown (as long this condition did not result in a predicted SSO).

Section 6 Capacity Certifications

6.1 Overview

The City may authorize CAP Requests after it certifies that the analysis procedures contained in the approved CAP have been used, and the City has determined that there is Adequate Treatment, Transmission, and Collection Capacity. All certifications of adequate treatment, transmission, and collection capacity are made by a registered professional engineer (P.E.) in the State of South Carolina and approved by the City. The City maintains CAP certifications and supporting files and documents in its office and within the CAP IMS. The CAP IMS tracks the reductions in available capacity due to the CAP Request approvals.

Expired (and unconnected) CAP Requests with previously approved flows may be credited back within the CAP IMS to return (increase) the tracked available capacity that was not used.

6.2 Credits for Capacity Certification

The City will continue to make capacity improvements in the WCTS that will increase available treatment, transmission, and collections capacity. Some of these capacity enhancement projects will be directly applied to the assets after the projects are completed and the increase in capacity is verified. Sections 4 and 5 discuss the updates to treatment, transmission, and collection capacity that may be directly incorporated into the CAP IMS. For other system improvements, the City will record the increase in available capacity as credits in the CAP IMS. These credits include offline storage and I/I removal (resulting from sewer rehabilitation and renewal activities). The CAP IMS will be used to track and utilize flow credits during each CAP Request review.

6.2.1 Offline Storage

The City may elect to construct additional offline storage in portions of the system to store excess wet weather flow. Offline storage will be represented in the CAP IMS as capacity credits. The amount of the available credit will be determined using either the calibrated Hydraulic Model or other modeling tools to dynamically simulate the evaluation of the system upstream and downstream of the storage facility to capture and temporarily store the excess peak flows from the design storm. For each CAP Request, the CAP IMS considers existing peak flows plus the cumulative total of all previously approved CAP Requests to determine if there will be adequate capacity. Storage will be applied on a 1:1 ratio for the purposes of managing peak flow plus CAP Requests.

6.2.2 I/I Removal

I/I removal can be an effective means to improve and restore system capacity by reducing total peak flow. The City performs a pre- and post-flow monitoring program to quantify the actual amount of I/I removed as an integral part of system rehabilitation and renewal projects. The I/I removal amount confirmed by the metering program and analysis can be used to determine the available credit for the I/I removal achieved in each specific metered subbasin and assign the credit to the actual sewer pipe and/or sewer manhole improved by the I/I removal. The credits are loaded into the CAP IMS will be used automatically to offset CAP Requests on a 1:1 basis (versus the project credits applied in the In Lieu Of Certification Process, discussed in **Section 7**).

6.2.3 Removal of Connections

The removal of a connection(s) will decrease the existing peak flow from the point of the current connection. These capacity increases will be tracked by the CAP IMS as a reduction of flow in each pipe based on the actual flow removed from the sewer basin or subbasin after the connection removal is completed. Where actual flows are not known for connections removed from the system, removed wastewater flows shall be estimated on ADF rates based on DES Regulation 61-67 Appendix A (Unit Contributory Loading to All Domestic Wastewater Treatment Facilities). These loading rates can be used in connection with any reduction of loadings permitted by DES. Regulatory guidelines and/or engineering judgement should be used when removing flows from the sewer system and accounting for them in the CAP. If no other flow data is available, the one-hour peak flow for each Connection Removed (to be applied in the CAP IMS) will be based on a factor of 2.5 multiplied by the ADF.

Credits are stored in the CAP IMS and are used to offset flow increases for each CAP Request, as necessary.

6.3 Minor Sewer Connections

For minor sewer service connections, the City may elect to perform a quarterly capacity analysis for each sewerbasin or subbasin by certifying that the sewerbasin or subbasin has adequate treatment, transmission, and collection capacity to convey existing peak flow, all approved CAP Requests, and the potential additional flow generated by all such minor sewer service connections projected to be approved for the next quarter. The quarterly minor sewer connection flow projection will be evaluated using the CAP IMS, or other engineering computational methods to check available capacity for the certification, and the certification will be recorded in the CAP IMS.

The City, or its representative, will control the approvals of the minor sewer connection to each sewer basin or subbasin and will maintain a list of those minor sewer connections (including owner, address, meter, and approved amount) approved each quarter.

The actual flow approved will be reviewed by the City (and entered into the CAP IMS) on a quarterly basis to track all minor sewer connections and to identify trends in minor system connections to project for the next quarter. Based on the previous quarter use, the City may issue another certification for minor sewer flow connections for the next quarter. The CAP IMS will be used to track this quarterly minor sewer connection program.

Section 7 In Lieu Of Capacity Certifications

7.1 Overview of Process

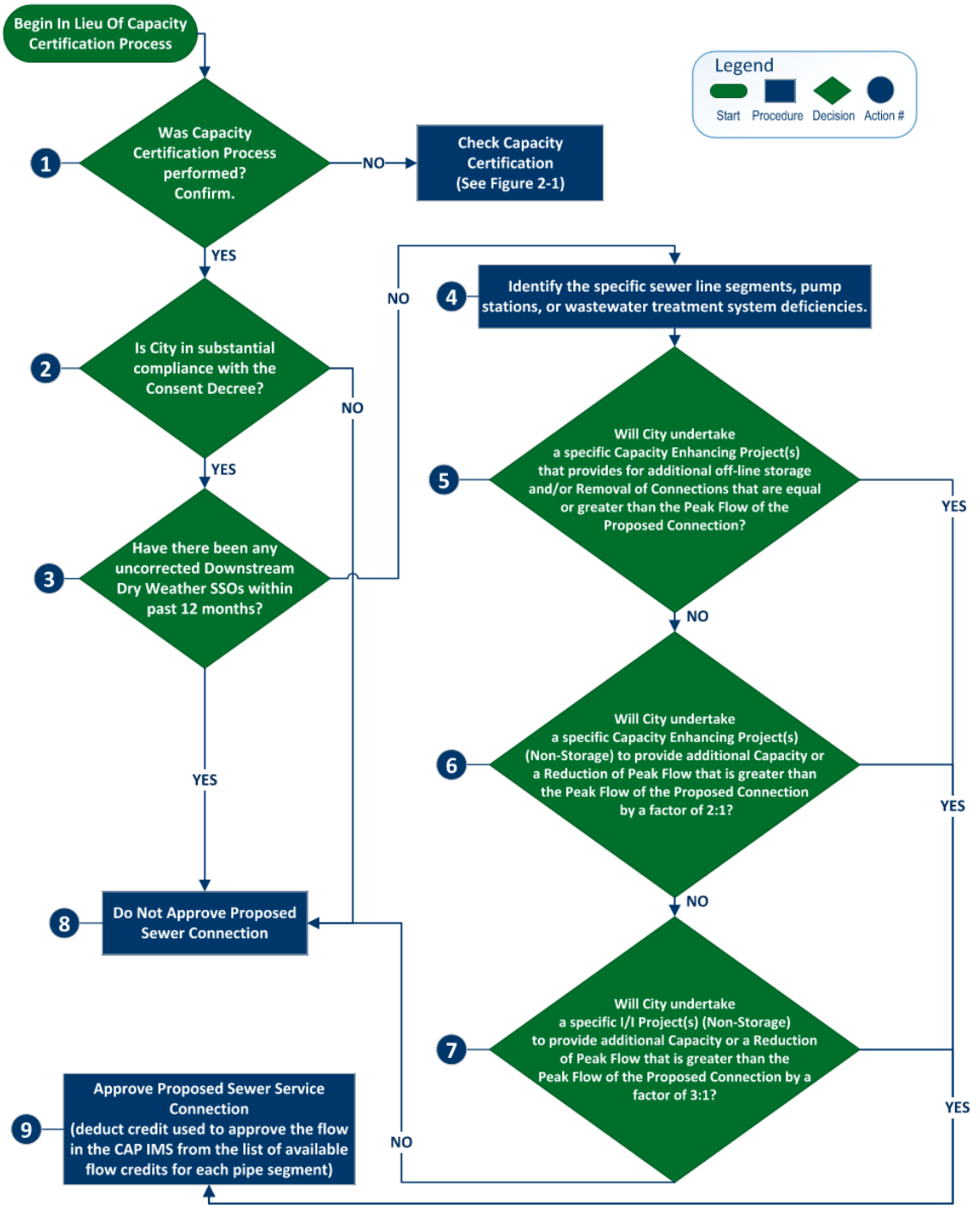
The City may authorize a CAP Request under the In Lieu Of Capacity Certification process even if it cannot satisfy the requirements of Sections 4 and 5 above provided that the City certifies that all the following provisions, where applicable, are satisfied (**Figure 7-1** shows the process for the In Lieu Of Capacity Certification process for CAP Requests with the action numbers):

- The City is in substantial compliance with this Consent Decree (Action 2).
- The sewer lines which will convey the proposed additional flow from new or existing sewer service connections have not experienced dry weather SSOs due to inadequate capacity within the previous twelve months; or, in the alternative, the causes of any dry weather SSOs due to inadequate capacity have been eliminated. (Action 3).
- The City has identified the sewer line segment(s), Pump Station(s) and/or wastewater treatment systems that do not meet the conditions for certification of Adequate Treatment Capacity, Adequate Collection Capacity and/or Adequate Transmission Capacity. (Action 4).
- The City shall have completed, after June 10, 2010, and prior to the time the proposed additional flow from new or existing sewer connections is introduced into the WCTS, specific Capacity Enhancing Projects, I/I Projects and/or Removal of Connections that will add sewer capacity or reduce peak flows to the identified sewer line segment(s), lift station(s), and/or wastewater treatment system(s) in accordance with the CD requirements (Actions 5, 6, and 7). See **Section 7.2** for a further discussion of how these capacity improvements are applied in the In Lieu Of Capacity Certification Process.

The City will complete an annual review of specific Capacity Enhancing Projects and I/I Projects undertaken to determine if actual added capacity and peak flow reductions are in line with what the City originally estimated for such projects. The results of this review will be used to adjust future estimates, as necessary.

All Capacity Enhancing Projects and I/I Projects undertaken by the City to address capacity for any CAP Requests authorized in the In Lieu Of Capacity Certification process must be completed prior to the connection of the approved CAP Request flow to the sewer system. This will be a condition of the In Lieu Of Capacity Certification.

Figure 7-1 – In Lieu Of Capacity Certification Process



Note: Specific Capacity Enhancing Projects that will allow approval under the In Lieu Of Capacity Certification process must be completed before the Proposed Connection is completed and approved.

7.2 Application of Credits for In Lieu Of Capacity Certification

As part of In Lieu Of Capacity Certification, a methodology will be used to track and utilize projected capacity credits for Capacity Enhancing Projects, I/I removal (resulting from pipeline and manhole rehabilitation and renewal activities), and the Removal of Connections in the CAP IMS.

7.2.1 Capacity Enhancing Projects

The City may undertake projects that increase the capacity of the WCTS. The projects are initially planned and developed based on best information available and are developed at a planning level.

- The City may add future additional offline storage to manage future peak flows. Offline storage could be recognized as a projected credit in the CAP IMS for In Lieu Of Capacity Certification if the City has undertaken the project improvement. The capacity of this offline storage will be assessed during the design storm to determine future flow rate credits that can be included in the CAP IMS. Off-line storage credits must be greater than or equal to the CAP Request for the purposes of managing total peak flow plus the CAP Request for the In Lieu Of Capacity Certification.
- For future non-storage transmission and collection capacity enhancing projects, a credit can be applied in the CAP IMS for the In Lieu Of Capacity Certification based on the projected capacity increase. The projected capacity increase must be greater than or equal to the CAP Request by a factor of at least 2:1 for planning and approval purposes. After the project is completed, the City shall confirm the actual capacity of the improvement and the CAP IMS will be updated for the actual transmission or collection capacity installed.

7.2.2 I/I Removal

For In Lieu Of Capacity Certification, the City may undertake I/I removal projects to reduce total peak flow to address a CAP Request. The City will project potential I/I credits that may be achieved by these ongoing projects. The credit will be added to the CAP IMS to be used to offset peak flow from future CAP Requests. The projected capacity increase must be greater than or equal to the CAP Request by a factor of at least 3:1 for planning and approval purposes. After the project is completed, the City shall confirm the actual capacity achieved by the I/I Removal project(s) and the CAP IMS will be updated for this flow with a 1:1 credit.

7.2.3 Removal of Connections

The City may be aware of the future Removal of Connections that may satisfy the capacity requirements for the CAP Request to reduce total peak flow during the design storm. The projected capacity achieved by the Removal of Connections must be greater than or equal to the CAP Request for the In Lieu Of Capacity Certification.

Section 8 Sewerbasin Capacity Analysis

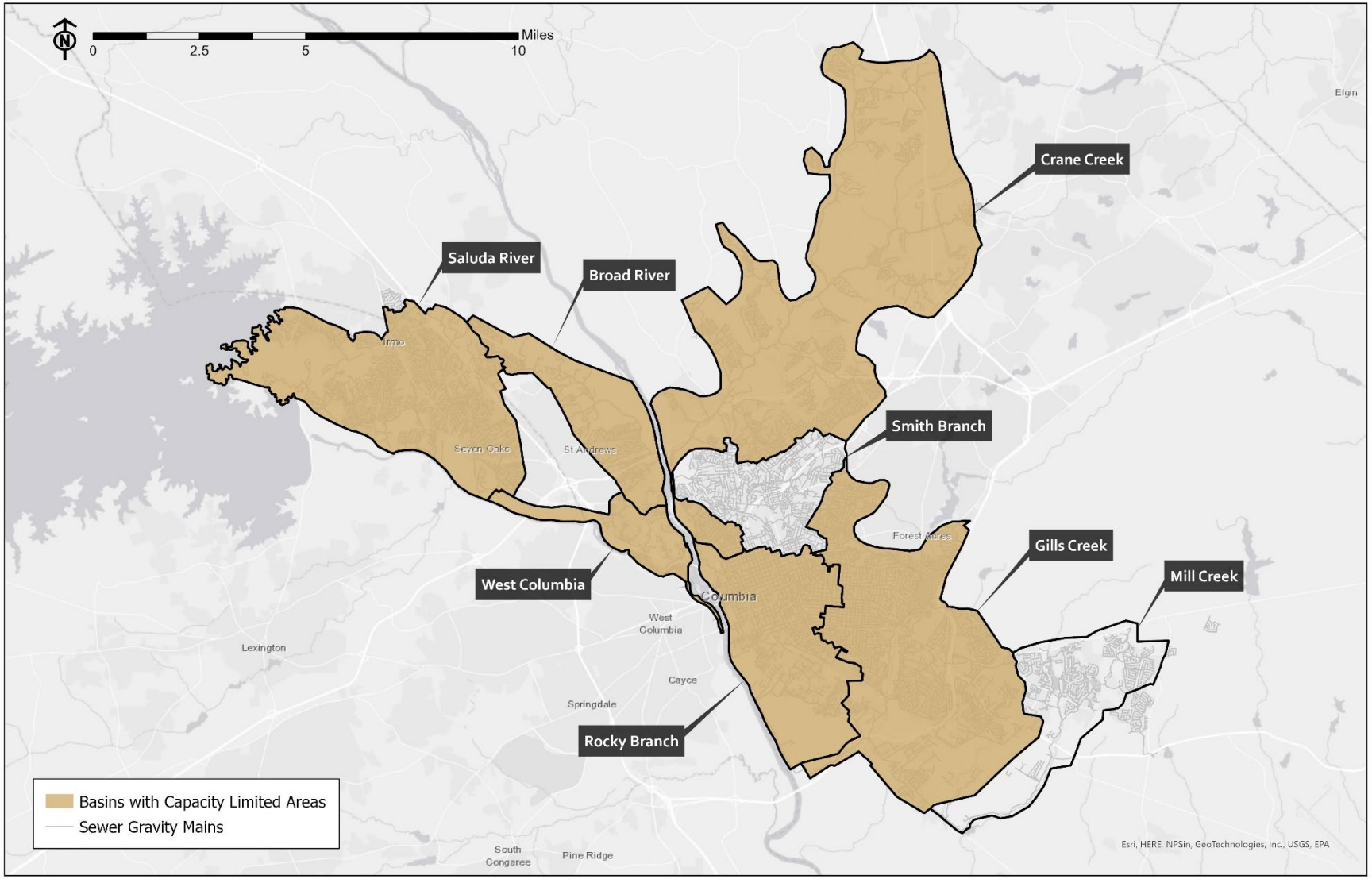
The City's Hydraulic Model was utilized to evaluate the City's Major WCTS to determine the sewerbasins that may be susceptible to surcharging and SSOs. The existing condition was simulated under dry weather conditions and wet weather conditions using the design storm. It is noted that 5 out of the 8 sewerbasins have one or more capacity limited areas for major sewers that require Capacity Enhancing measures.

The sewerbasins that have capacity limited areas include:

- Broad River Basin
- Crane Creek Basin
- Gills Creek Basin
- Rocky Branch Basin
- Saluda River Basin
- West Columbia Basin

Figure 8-1 illustrates a map of the basins containing capacity limited areas.

Figure 8-1 – Sewer Basins with Capacity Limited Areas



APPENDIX A

Major Pipe Sections Designed to Operate Under Surcharge Conditions

Basin	Size (in)	Length (ft)	Condition	From MH	To MH	Acceptable Level of Surcharge
Broad River	15	50	Pipe Lower than Downstream Crown	00152MH	00151MH	2.2
Broad River	18	235	Pipe Lower than Downstream Crown	00054MH	00074MH	2.5
Broad River	24	501	Pipe Lower than Downstream Crown	24066MH	24067MH	2.5
Crane Creek	15	207	Pipe Lower than Downstream Crown	01293MH	01294MH	2.3
Crane Creek	15	396	Pipe Lower than Downstream Crown	11831MH	11830MH	2.5
Crane Creek	15	307	Pipe Lower than Downstream Crown	15286MH	15250MH	2.3
Crane Creek	15	185	Pipe Lower than Downstream Crown	19213MH	26844MH	4.3
Crane Creek	18	226	Pipe Lower than Downstream Crown	19133MH	24427MH	2.2
Crane Creek	18	208	Pipe Lower than Downstream Crown	25870MH	25871MH	3.5
Crane Creek	18	229	Pipe Lower than Downstream Crown	15847MH	24386MH	2.9
Crane Creek	18	104	Pipe Lower than Downstream Crown	10785MH	26818MH	2.7
Crane Creek	18	229	Pipe Lower than Downstream Crown	15847MH	24386MH	2.9
Crane Creek	21	53	Pipe Lower than Downstream Crown	10375MH	10392MH	2.1
Crane Creek	24	36	Pipe Lower than Downstream Crown	26807MH	26806MH	2.5
Crane Creek	27	314	Pipe Lower than Downstream Crown	11497MH	11496MH	2.3
Crane Creek	30	398	Pipe Lower than Downstream Crown	25872MH	25871MH	3.5
Crane Creek	36	319	Pipe Lower than Downstream Crown	26805MH	26806MH	2.5
Crane Creek	42	23	Pipe Lower than Downstream Crown	19145MH	24428MH	2.5
Crane Creek	48	4622	Pump Station Operates Above Crown	15932MH	North Columbia Pump Station	4.9
Gills Creek	15	47	Pipe Lower than Downstream Crown	02448MH	02449MH	2.3
Gills Creek	15	67	Pipe Lower than Downstream Crown	24552MH	24311MH	2.9

Basin	Size (in)	Length (ft)	Condition	From MH	To MH	Acceptable Level of Surcharge
Gills Creek	15	48	Pipe Lower than Downstream Crown	27869MH	02449MH	2.3
Gills Creek	18	416	Pipe Lower than Downstream Crown	02617MH	24344MH	2.7
Gills Creek	18	536	Pipe Lower than Downstream Crown	06679MH	06677MH	2.2
Gills Creek	18	53	Pipe Lower than Downstream Crown	31898MH	02245MH	2.1
Gills Creek	18	96	Pipe Lower than Downstream Crown	33671MH	33675MH	2.4
Gills Creek	24	404	Pipe Lower than Downstream Crown	02850MH	31311MH	2.5
Gills Creek	24	373	Pipe Lower than Downstream Crown	06126MH	24286MH	2.3
Gills Creek	24	210	Pipe Lower than Downstream Crown	06925MH	NewMH1	3.0
Gills Creek	30	806	Pipe Lower than Downstream Crown	31253MH	31320MH	2.5
Gills Creek	30	186	Pipe Lower than Downstream Crown	NewMH30	NewMH31	2.5
Gills Creek	36	138	Pipe Lower than Downstream Crown	NewMH34	NewMH35	2.2
Gills Creek	48	393	Pipe Lower than Downstream Crown	24385MH	31320MH	2.5
Gills Creek	54	766	Pipe Lower than Downstream Crown	24370MH	24368MH	2.5
Gills Creek	54	13	Pipe Lower than Downstream Crown	24369MH	24368MH	2.5
Mill Creek	12	279	Pipe Lower than Downstream Crown	01774MH	32157MH	3.0
Mill Creek	15	126	Pipe Lower than Downstream Crown	01223MH	01235MH	2.3
Mill Creek	15	371	Pipe Lower than Downstream Crown	00930MH	00427MH	2.6
Mill Creek	15	289	Pipe Lower than Downstream Crown	14255MH	02325MH	2.3
Mill Creek	15	215	Pipe Lower than Downstream Crown	00931MH	00427MH	2.6
Mill Creek	18	132	Pipe Lower than Downstream Crown	00508MH	00647MH	3.0
Mill Creek	18	644	Pipe Lower than Downstream Crown	00637MH	00638MH	2.0
Mill Creek	24	348	Pump Station Operates Above Crown	32157MH	Mill Creek Pump Station	2.5
Rocky Branch	15	276	Pipe Lower than Downstream Crown	03162MH	03154MH	2.3

Basin	Size (in)	Length (ft)	Condition	From MH	To MH	Acceptable Level of Surcharge
Rocky Branch	15	457	Pipe Lower than Downstream Crown	05450MH	05446MH	2.3
Rocky Branch	15	143	Pipe Lower than Downstream Crown	24790MH	24776MH	2.3
Rocky Branch	15	141	Pipe Lower than Downstream Crown	24668MH	27456MH	2.3
Rocky Branch	15	60	Pipe Lower than Downstream Crown	24698MH	24699MH	2.3
Rocky Branch	15	530	Pipe Lower than Downstream Crown	27328MH	27327MH	2.3
Rocky Branch	15	277	Pipe Lower than Downstream Crown	27458MH	27457MH	2.3
Rocky Branch	15	356	Pipe Lower than Downstream Crown	27223MH	07080MH	2.3
Rocky Branch	15	66	Pipe Lower than Downstream Crown	31598MH	31596MH	2.4
Rocky Branch	15	768	Pipe Lower than Downstream Crown	27147MH	27149MH	2.2
Rocky Branch	18	247	Pipe Lower than Downstream Crown	05517MH	14558MH	2.5
Rocky Branch	18	224	Pipe Lower than Downstream Crown	07171MH	31469MH	2.1
Rocky Branch	18	314	Pipe Lower than Downstream Crown	24774MH	31467MH	3.0
Rocky Branch	18	63	Pipe Lower than Downstream Crown	31477MH	31476MH	2.2
Rocky Branch	18	18	Pipe Lower than Downstream Crown	31484MH	02873MH	2.2
Rocky Branch	18	292	Pipe Lower than Downstream Crown	31458MH	07116MH	2.4
Rocky Branch	20	166	Pipe Lower than Downstream Crown	05448MH	05427MH	2.1
Rocky Branch	20	145	Pipe Lower than Downstream Crown	05521MH	05524MH	2.1
Rocky Branch	21	183	Pipe Lower than Downstream Crown	31473MH	31472MH	2.3
Rocky Branch	21	324	Pipe Lower than Downstream Crown	31602MH	31592MH	2.3
Rocky Branch	24	81	Pipe Lower than Downstream Crown	14376MH	14377MH	2.5
Rocky Branch	24	208	Pipe Lower than Downstream Crown	24188MH	24185MH	5.0
Rocky Branch	24	22	Pipe Lower than Downstream Crown	31486MH	00756MH	7.1
Rocky Branch	24	101	Pipe Lower than Downstream Crown	31461MH	31462MH	2.5
Rocky Branch	24	346	Pipe Lower than Downstream Crown	33076MH	02788MH	2.2

Basin	Size (in)	Length (ft)	Condition	From MH	To MH	Acceptable Level of Surcharge
Rocky Branch	48	794	Pipe Lower than Downstream Crown	24153MH	24154MH	2.5
Saluda River	15	305	Pipe Lower than Downstream Crown	19942MH	19449MH	2.1
Saluda River	15	342	Pipe Lower than Downstream Crown	20966MH	19588MH	2.9
Saluda River	15	201	Pipe Lower than Downstream Crown	25352MH	25356MH	2.3
Saluda River	15	33	Pipe Lower than Downstream Crown	31400MH	19069MH	3.0
Saluda River	18	374	Pipe Lower than Downstream Crown	25381MH	25138MH	2.7
Saluda River	18	287	Pipe Lower than Downstream Crown	19081MH	19068MH	2.5
Saluda River	18	347	Pipe Lower than Downstream Crown	25145MH	25144MH	2.3
Saluda River	21	180	Pipe Lower than Downstream Crown	25136MH	25138MH	2.7
Saluda River	27	382	Pipe Lower than Downstream Crown	18689MH	18682MH	2.2
Saluda River	30	464	Pipe Lower than Downstream Crown	16068MH	16070MH	2.1
Saluda River	30	351	Pipe Lower than Downstream Crown	16077MH	16070MH	2.1
Saluda River	36	407	Pipe Lower than Downstream Crown	16096MH	32391MH	2.5
Saluda River	42	81	Weir to Storage Operation	32393MH	Saluda Pump Station	6.3
Smith Branch	15	144	Pipe Lower than Downstream Crown	09172MH	30893MH	2.3
Smith Branch	15	270	Pipe Lower than Downstream Crown	15711MH	16713MH	2.3
Smith Branch	15	237	Pipe Lower than Downstream Crown	16212MH	15581MH	2.3
Smith Branch	15	112	Pipe Lower than Downstream Crown	24201MH	33115MH	3.2
Smith Branch	15	112	Pipe Lower than Downstream Crown	33127MH	33109MH	2.1
Smith Branch	15	539	Pipe Lower than Downstream Crown	24210MH	24209MH	2.9
Smith Branch	15	217	Pipe Lower than Downstream Crown	35488MH	24209MH	2.9
Smith Branch	18	137	Pipe Lower than Downstream Crown	08521MH	08517MH	2.5
Smith Branch	18	194	Pipe Lower than Downstream Crown	33107MH	33133MH	2.5

Basin	Size (in)	Length (ft)	Condition	From MH	To MH	Acceptable Level of Surcharge
Smith Branch	24	437	Pipe Lower than Downstream Crown	15510MH	15240JC	2.5
Smith Branch	24	425	Pipe Lower than Downstream Crown	33743MH	16183MH	3.0
West Columbia	30	618	Pipe Lower than Downstream Crown	14858MH	25203MH	2.5
West Columbia	36	311	Pipe Lower than Downstream Crown	25204MH	25205MH	2.5
West Columbia	42	868	Deep Pipe Under River	14434MH	West Columbia PS	8.9