

MEGAN BARRY
MAYOR



METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

DEPARTMENT OF WATER AND SEWERAGE SERVICES
Engineering Division
1600 Second Avenue North
Nashville, Tennessee 37208-2206

September 28, 2017

Ms. Mary S. Walker
Director, Water Protection Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, GA 30303-8960

RE: *Addendum to the CAP/ER*
Consent Decree 3:07-cv-01056
DOJ Case No. 90-5-1-1-09000

Dear Ms. Walker:

Subsequent to your the U.S. Environmental Protection Agency's approval of the *Corrective Action Plan / Engineering Report for Sanitary Sewer Overflows* (CAP/ER) on August 10, 2017, we hereby submit the enclosed *Addendum to the CAP/ER*. The Addendum summarizes the updates, modifications, and additions to projects described in the CAP/ER. When a project begins design, the changes have been presented in the Quarterly Progress Reports, subject to public review and comment via the Public Document Repository.

Nashville remains committed to completing the projects as described in the Addendum to the CAP/ER no later than eleven years from approval, or August 10, 2028.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or would like to discuss this further, do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink that reads "Ron C. Taylor".

Ron C. Taylor, P.E.
Clean Water Nashville Program Director

cc: Mr. David Apanian, EPA
Ms. Tisha Benton, TDEC
Ms. Jennifer Dodd, TDEC

Enclosure: *Addendum to the CAP/ER*



If you need assistance or an accommodation, please contact Metro Water Services,
at 615-862-4862, 1600 Second Avenue North, Nashville, Tennessee 37208.



PROGRAM OFFICE
210 25th Avenue North, Suite 1104
Nashville, Tennessee 37203
Phone (615) 915-0384 • Fax (615) 891-2508

Addendum

DATE: September 27, 2017

TO: Ron Taylor, P.E., CWNOAP Director

FROM: Kimberly Martin, P.E., CWNOAP Deputy Manager
Heather Housel, CDM Smith

RE: Addendum to the *Corrective Action Plan/Engineering Report* for Sanitary Sewer Overflows

cc: Greg Ballard, P.E., CWNOAP Deputy Director
Janelle Rogers, Ph.D., P.E., BCEE, PMP, CWNOAP Manager
Michael Krabacher, P.E., CWNOAP Controls Manager
Paul Stonecipher, P.E., CWNOAP Design Manager

No. of Pages: 27

Attachments: None

Introduction

In September 2011, CDM Smith and Metro Water Services (MWS) submitted the *Corrective Action Plan/Engineering Report* (CAP/ER) to fulfill the intent of Section VII, Part B.1 of the Consent Decree (CD) entered on March 12, 2009, between the United States of America, the State of Tennessee, and the Metropolitan Government of Nashville and Davidson County, Tennessee (Metro). The primary goal of the CAP/ER is to address the conditions causing sanitary sewer overflows (SSOs) through multiple projects identified by Metro that include conveyance improvements, equalization storage, pump station upgrades, and rehabilitation.

Approval of the CAP/ER was granted by the Environmental Protection Agency (EPA) on August 10, 2017; the Tennessee Department of Environment and Conservation (TDEC) was copied on this approval. Since submittal of the CAP/ER in 2011, information from additional flow monitoring data collection, constructability reviews, and hydraulic analysis has resulted in adjustments to several original projects, as well as the addition of projects to remediate SSOs. The purpose of this addendum is to present the adjustments to the original planned improvement projects. A summary of the current improvement projects is described in the next section.

1.0 Overview of Current CAP/ER Projects

A complete list of the current projects to be completed as part of the CAP/ER, including their current project status, is summarized as **Table 1-1** and shown in **Figure 1-1**.

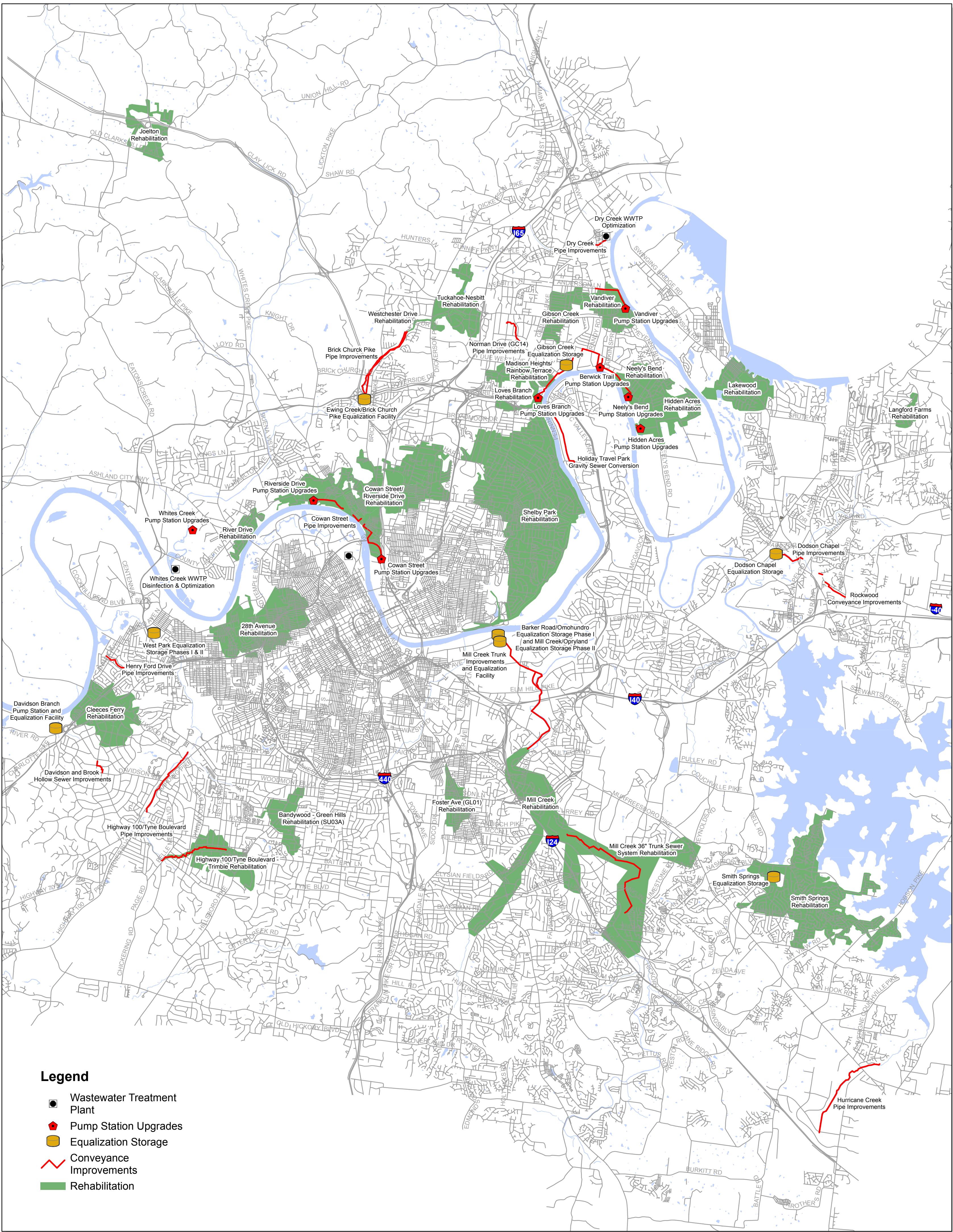
Table 1-1 Revised List of CAP/ER Projects

Project Name	Service Area	Project Type	Project Status*
28 th Avenue Rehabilitation	Central	Rehabilitation	Underway
<i>Bandywood – Green Hills Rehabilitation (SU03A)</i>	Whites Creek	Rehabilitation	Future
Barker Road/Omohundro Equalization Storage Phase I	Central	Equalization Storage	Complete
Berwick Trail Pipe Improvements	Dry Creek	Conveyance	Future
Berwick Trail Pump Station Upgrades	Dry Creek	Pump Station	Future
Brick Church Pike Pipe Improvements	Whites Creek	Conveyance	Underway
Cleeces Ferry Rehabilitation	Whites Creek	Rehabilitation	Future
Cowan Street Pump Station Upgrades	Central	Pump Station/Conveyance	Future
Cowan Street Pipe Improvements	Central	Conveyance	Future
Cowan Street/Riverside Drive Rehabilitation	Central	Rehabilitation	Underway
Davidson and Brook Hollow Sewer Improvements	Whites Creek	Conveyance	Complete
Davidson Branch Pump Station and Equalization Facility	Whites Creek	Pump Station/Equalization Storage	Underway
Dodson Chapel Equalization Storage	Central	Equalization Storage	Complete
Dodson Chapel Pipe Improvements	Central	Conveyance	Complete
Dry Creek WWTP Optimization	Dry Creek	Plant Optimization	Complete
Dry Creek Pipe Improvements	Dry Creek	Conveyance	Future
Ewing Creek/Brick Church Pike Equalization Facility	Whites Creek	Equalization Storage	Underway
Gibson Creek Equalization Storage	Dry Creek	Equalization Storage	Underway
Gibson Creek Rehabilitation	Dry Creek	Rehabilitation	Underway
Foster Avenue (GL01) Rehabilitation	Central	Rehabilitation	Future
Henry Ford Drive Pipe Improvements	Whites Creek	Conveyance	Future
Hidden Acres Pump Station Upgrades	Dry Creek	Pump Station/Conveyance	Future
<i>Hidden Acres Rehabilitation</i>	Dry Creek	Rehabilitation	Underway
Highway 100/Tyne Boulevard Pipe Improvements	Whites Creek	Conveyance	Future
<i>Highway 100/Tyne Boulevard – Trimble Rehabilitation</i>	Whites Creek	Rehabilitation	Complete
Holiday Travel Park Gravity Sewer Conversion	Central	Conveyance	Complete
Hurricane Creek Pipe Improvements	Central	Conveyance	Underway

Project Name	Service Area	Project Type	Project Status*
Joelton Rehabilitation	Whites Creek	Rehabilitation	Complete
Lakewood Rehabilitation	Dry Creek	Rehabilitation	Underway
Langford Farms Rehabilitation	Central	Rehabilitation	Underway
Loves Branch Pump Station Upgrades	Dry Creek	Pump Station/Conveyance	Future
<i>Loves Branch Rehabilitation</i>	Dry Creek	Rehabilitation	Underway
Madison Heights/Rainbow Terrace Rehabilitation	Dry Creek	Rehabilitation	Underway
Mill Creek 36 in Trunk Sewer Rehabilitation	Central	Conveyance	Complete
Mill Creek/Opryland Equalization Storage Phase II	Central	Equalization Storage	Complete
<i>Mill Creek Rehabilitation</i>	Central	Rehabilitation	Future
Mill Creek Trunk Improvements and Equalization Facility	Central	Equalization Storage/Conveyance	Future
Neely's Bend Pump Station Upgrades	Dry Creek	Pump Station/Conveyance	Future
Neely's Bend Rehabilitation	Dry Creek	Rehabilitation	Complete
Norman Drive (GC14) Pipe Improvements	Dry Creek	Conveyance	Future
River Drive Rehabilitation	Whites Creek	Rehabilitation	Future
Riverside Drive Pump Station Upgrades	Central	Pump Station/Conveyance	Future
Rockwood Conveyance Improvements	Central	Conveyance	Complete
Shelby Park Rehabilitation	Central	Rehabilitation	Underway
Smith Springs Equalization Storage	Central	Equalization Storage	Complete
Smith Springs Rehabilitation	Central	Rehabilitation	Underway
<i>Tuckahoe-Nesbitt Rehabilitation</i>	Whites Creek	Rehabilitation	Future
Vandiver Pump Station Upgrades	Dry Creek	Pump Station/Conveyance	Future
<i>Vandiver Rehabilitation</i>	Dry Creek	Rehabilitation	Underway
<i>Westchester Drive Rehabilitation</i>	Whites Creek	Rehabilitation	Complete
West Park Equalization Storage Phase I	Whites Creek	Equalization Storage	Complete
West Park Equalization Storage Phase II	Whites Creek	Equalization Storage	Underway
Whites Creek Pump Station Upgrades	Whites Creek	Pump Station	Complete
Whites Creek WWTP Disinfection and Optimization	Whites Creek	Plant Optimization	Complete

*Projects marked as Underway are under design, under construction, and/or partially complete as of August 31, 2017. Italicized projects have been added since submittal of the CAP/ER.

Projects that have been added or adjusted since development of the CAP/ER are discussed in **Sections 2.1 through 2.13.**



Legend

- Wastewater Treatment Plant
- ◆ Pump Station Upgrades
- Equalization Storage
- Conveyance Improvements
- Rehabilitation



Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 1-1 Overview of Current CAP/ER Projects



2.0 Revised Project Extents

The primary goal of the CAP/ER is to address the conditions causing SSOs such as rainfall-derived infiltration and inflow (RDII) or capacity restrictions through projects that include pump station upgrades, equalization storage, conveyance improvements, and rehabilitation. These projects include:

- **Pump Station Upgrades:** Pump stations located at or adjacent to CD and model-predicted, field-verified overflows were evaluated for capacity upgrades to convey the additional wet-weather flow to address the observed SSOs. In locations where SSOs are observed and pump station upgrades are a viable option, the proposed firm capacity would be capable of handling the wet-weather flows predicted under the 2-year, 24-hour design storm. The existing capacity of force mains associated with pump stations slated for upgrades was also evaluated to ensure that the force mains could handle the increased flows resulting from the improvements; these force mains were flagged, as necessary, for upsizing.
- **Equalization Storage:** Areas that cannot accommodate the wet-weather flow in the existing sewer system were evaluated for off-line flow equalization storage as a means of reducing SSOs by means of storing peak flows in excess of existing sewer capacity. The proposed off-line equalization storage is assumed to be in the form of above-ground, pre-stressed concrete storage tanks, with wet-weather flows diverted from the existing gravity sewers through the use of diversion structures and wet-weather pumping stations.
- **Conveyance Improvements:** Construction of replacement sewers to convey projected dry-weather and wet-weather flows in excess of existing trunk sewer capacity was also evaluated to address SSOs. Both replacement sewers (conveying dry-weather and wet-weather flows) and parallel sewers (conveying only wet-weather flow) were considered. Though replacement sewers were initially assumed for all conveyance improvement projects, this assumption has been and will continue to be evaluated throughout design.
- **Rehabilitation:** As defined in the CAP/ER, there are four general sewer rehabilitation approaches that can be implemented for the reduction of RDII and peak wet-weather flows:
 - Comprehensive rehabilitation of all sewers, manholes, and service laterals located both within the public rights-of-way and on private property;
 - Comprehensive rehabilitation of all sewers and manholes located within public rights-of-way only, which includes service laterals to the property line;
 - Rehabilitation of defective pipe segments and manholes and removal of major known inflow sources; and/or
 - Removal of major identified inflow sources and repair of structural defects.

For the most part, the second approach has been implemented for the majority of rehabilitation projects completed to date, although PVC pipes, iron pipes, and previously rehabilitated pipes, are typically excluded. Each area targeted for rehabilitation was assessed to determine the level and extent of rehabilitation to achieve the goal of addressing model-predicted, field-verified overflows during the design storm. Following construction, MWS has and will continue to conduct flow monitoring and additional hydraulic analysis using the sewer model to determine the projects' reduction of RDII to evaluate the effectiveness of rehabilitation.

Improvement projects that have been redefined or added/removed since submittal of the CAP/ER are summarized as **Table 2-1**.

Table 2-1 Planned Improvement Projects with Revised Scope

Project Name	Service Area	Improvements as Defined in CAP/ER	Current Revised Improvements
622 Davidson Rehabilitation	Whites Creek	Rehabilitation: 53,800 LF (530 ac)	N/A
Bandywood – Green Hills Rehabilitation (SU03A)	Whites Creek	N/A	Rehabilitation: 53,500 LF (400 ac)
Berwick Trail Pump Station Upgrades	Dry Creek	Force main: 7,100 LF Pump station: 4.2 mgd	Pump station: 4.2 mgd
Brick Church Pike Pipe Improvements	Whites Creek	Conveyance: 15,500 LF	Conveyance: 9,700 LF
Cleeces Ferry Rehabilitation	Whites Creek	Rehabilitation: 84,200 LF (820 ac)	Rehabilitation: 86,100 LF (850 ac)
Cowan Street/Riverside Drive Rehabilitation ¹	Central	Rehabilitation: 245,000 LF (1,900 ac)	Rehabilitation: 261,700 LF (2,230 ac)
Davidson and Brook Hollow Sewer Improvements ²	Whites Creek	N/A	Conveyance: 1,900 LF
Davidson Branch Pump Station and Equalization Facility	Whites Creek	Pump station: 7 mgd Equalization storage: 3 MG	Pump station: 11 mgd Equalization storage: 6 MG
Dodson Chapel Pipe Improvements ²	Central	Conveyance: 7,200 LF	Conveyance: 3,400 LF
Ewing Creek/Brick Church Pike Equalization Facility	Whites Creek	Pump station: 15 mgd Equalization storage: 6 MG	Pump station: 18 mgd Equalization storage: 10.6 MG
Gibson Creek Rehabilitation	Dry Creek	Rehabilitation: 94,100 LF (640 ac)	Rehabilitation: 59,500 LF (350 ac)
GL01 (Foster Avenue) Rehabilitation	Central	Rehabilitation: 53,600 LF (310 ac)	Rehabilitation: 53,600 LF (310 ac)
Hidden Acres Pump Station Upgrades	Dry Creek	Force main: 500 LF Pump station: 1.8 mgd	Force main: 500 LF Pump station: TBD ³
Hidden Acres Rehabilitation	Dry Creek	N/A	Rehabilitation: 59,800 LF (690 ac)
Highway 100/Tyne Boulevard Pipe Improvements	Whites Creek	Conveyance: 24,500 LF	Conveyance: 17,900 LF

Project Name	Service Area	Improvements as Defined in CAP/ER	Current Revised Improvements
Highway 100/Tyne Boulevard – Trimble Rehabilitation ²	Whites Creek	N/A	Rehabilitation: 63,000 LF (610 ac)
Hurricane Creek Pipe Improvements	Central	Conveyance: 7,100 LF	Conveyance: 12,100 LF
Lakewood Rehabilitation ¹	Dry Creek	Rehabilitation: 90,500 LF (670 ac)	Rehabilitation: 88,100 LF (650 ac)
Langford Farms Rehabilitation	Central	Rehabilitation: 11,600 LF (100 ac)	Rehabilitation: 13,300 LF (110 ac)
Loves Branch Pump Station Upgrades	Dry Creek	Force main: 5,000 LF Pump station: 7.5 mgd	Force main: 5,000 LF Pump station: TBD ³
Loves Branch Rehabilitation	Dry Creek	N/A	Rehabilitation: 51,900 LF (450 ac)
Mill Creek/Opryland Equalization Storage Phase II ²	Central	Equalization storage: 15 MG	Equalization storage: 19 MG
Mill Creek Rehabilitation	Central	N/A	Rehabilitation: Approx. 200,000 LF (3,140 ac)
Mill Creek Trunk Improvements and Equalization Facility	Central	Conveyance: 32,000 LF Pump station: 100 mgd Equalization storage: 60 MG	Conveyance: 21,000 LF Pump station: 100 mgd Equalization storage: 60 MG
Neely's Bend Pump Station Upgrades	Dry Creek	Force main: 5,600 LF Pump station: 4.8 mgd	Force main: 12,700 LF Pump station: TBD ³
Neely's Bend Rehabilitation ²	Dry Creek	Rehabilitation: 16,400 LF (130 ac)	Rehabilitation: 31,600 LF (330 ac)
Shelby Park Rehabilitation ¹	Central	Rehabilitation: 614,000 LF (3,830 ac)	Rehabilitation: 628,500 LF (3,930 ac)
Smith Springs Rehabilitation ¹	Central	Rehabilitation: 182,400 LF (1,300 ac)	Rehabilitation: 309,300 LF (2,320 ac)
Tuckahoe-Nesbitt Rehabilitation	White Creek	N/A	Rehabilitation: 52,500 LF (510 ac)
Vandiver Pump Station Upgrades	Dry Creek	Force main: 4,900 LF Pump station: 11 mgd	Force main: 4,900 LF Pump station: TBD ³
Vandiver Rehabilitation	Dry Creek	N/A	Rehabilitation: 55,300 LF (480 ac)
Westchester Drive Rehabilitation ²	Whites Creek	N/A	Rehabilitation: 3,800 LF (40 ac)
West Park Equalization Storage Phase II	Whites Creek	Equalization storage: 10 MG	Equalization storage: 21 MG
West Park Equalization Storage Phase III	Whites Creek	Equalization storage: 11 MG	N/A

¹ Project has been partially completed.

² Project has been wholly completed.

³ Size will be determined following completion of upstream rehabilitation.

As can be observed from **Table 2-1**, 34 projects have been adjusted or added/removed since submittal of the CAP/ER. The following subsections, **Sections 2.1** through **2.14**, summarize the

scope revisions for each of these projects. Projects with minor adjustments to the project boundaries, such as a change of 10 percent or less in linear footage, are not discussed in detail.

2.1 Bandywood – Green Hills Rehabilitation (SU03A)

Though not originally included in the list of projects proposed in the CAP/ER, the Bandywood – Green Hills Rehabilitation (SU03A) project will be undertaken to reduce RDII and mitigate downstream overflows. Located in the Whites Creek service area, the project will include the evaluation of approximately 52,000 linear feet (LF) of existing gravity sewer and approximately 290 manholes for rehabilitation. See **Figure 2-1** for location details.

2.2 Berwick Trail Pump Station Upgrades, Neely’s Bend Pump Station Upgrades, and Neely’s Bend Rehabilitation

As defined in the CAP/ER, the Neely’s Bend Rehabilitation project consisted of the evaluation and rehabilitation (as necessary) of approximately 16,400 LF of existing gravity sewer and approximately 80 manholes. To potentially reduce the required capacity improvements at the Neely’s Bend Pump Station, the project boundaries of the Neely’s Bend Rehabilitation project were expanded to include all gravity sewer that directly drains to the Neely’s Bend Pump Station, as shown in **Figure 2-2**. This resulted in approximately 15,200 LF of additional gravity sewer and 70 additional manholes as compared with the boundaries defined in the CAP/ER. The Neely’s Bend Rehabilitation project was completed in February 2015.

As presented in the CAP/ER, capacity upgrades are planned for both the Neely’s Bend Pump Station and the Berwick Trail Pump Station. The additional wet-weather flow from both stations will be routed to the Gibson Creek Equalization Facility. In the CAP/ER, both station upgrades included new force mains. However, for ease of design and construction, the planned force main conveyance improvements were combined and included as part of the Neely’s Bend Pump Station Upgrades project. The total length of proposed force main remains the same at 12,700 LF, as shown in **Figure 2-2**, along with the original project boundaries.

Depending on the success of the Neely’s Bend Rehabilitation and the Hidden Acres Rehabilitation projects, the extent of the capacity improvements at the Neely’s Bend Pump Station may potentially be reduced or eliminated.

2.3 Brick Church Pike Pipe Improvements, Ewing Creek/Brick Church Pike Equalization Facility, Tuckahoe-Nesbitt Rehabilitation, and Westchester Drive Rehabilitation

As presented in the CAP/ER, the Brick Church Pike Pipe Improvements project identified approximately 15,500 LF of existing gravity sewer requiring increased conveyance capacity to address SSOs. Following additional flow monitoring data collection, constructability reviews, and hydraulic analysis in 2013, the project’s scope was reduced to approximately 9,700 LF of sewer requiring increased capacity. Construction of the Brick Church Pike Pipe Improvements project began in August 2016.

Areas upstream of the revised Brick Church Pike Pipe Improvements were identified for evaluation and rehabilitation (as necessary) to reduce RDII under separate project scopes (Tuckahoe-Nesbitt Rehabilitation and Westchester Drive Rehabilitation). The Tuckahoe-Nesbitt Rehabilitation and Westchester Drive Rehabilitation projects include the evaluation and rehabilitation (as necessary) of approximately 52,500 LF and 3,800 LF, respectively, of existing gravity sewer. The Westchester Drive Rehabilitation project was completed in December 2015. See **Figure 2-3** for location details.

The Ewing Creek/Brick Church Pike Equalization Facility, originally referred to as the Brick Church Pike Equalization Storage project in the CAP/ER, originally included a 6 million gallon (MG) equalization storage tank and 15 million gallon per day (mgd) pumping station. Since development of the CAP/ER in 2011, the project scope was revised based on the following factors: additional flow monitoring data in the springs of 2012 and 2013, changes to the Brick Church Pike Improvements project, and moving the location of the equalization tank slightly farther upstream than originally proposed. The scope was revised to include an equalization storage volume of 10.6 MG and a wet-weather pumping capacity of 18 mgd. Construction of the Ewing Creek/Brick Church Pike Equalization Facility began in May 2017.

2.4 Davidson and Brook Hollow Sewer Improvements (622 Davidson Rehabilitation) and Davidson Branch Pump Station and Equalization Facility

The Davidson and Brook Hollow Sewer Improvements project, referred to as the 622 Davidson Rehabilitation project in the CAP/ER, included the evaluation of approximately 53,800 LF of gravity sewer and approximately 300 manholes for rehabilitation. Analysis of condition assessment data, including smoke testing data and flow monitoring data between 2011 and 2013, indicated that a portion of the sewer would require upsizing to address the overflow. Thus, the project scope was revised to include capacity improvements for 1,900 LF of the existing gravity sewer, and repair of several adjacent defective pipe segments (as presented in **Figure 2-4**) in place of the originally planned rehabilitation. The revised project was renamed as the Davidson and Brook Hollow Sewer Improvements project; this revised project was completed in August 2016.

The Davidson Branch Pump Station and Equalization Facility, referred to as the Davidson Branch Equalization Storage project in the CAP/ER, originally included construction of a 3 MG equalization storage tank and a 7 mgd wet-weather pumping station to address overflow at the station. Based on additional flow monitoring data, hydraulic model analysis, and feedback from MWS staff, the scope was expanded to include the replacement and relocation of the 3.6 mgd existing duty pump station, a 6 MG equalization storage tank, and 11 mgd wet-weather pumping station.



Legend

Bandywood - Green Hills Rehabilitation (SU03A)

Existing Gravity Sewer

- < 10" Diameter
- 10" - 16" Diameter
- 18" - 21" Diameter
- 24" - 30" Diameter
- > 30" Diameter

Figure 2-1 Bandywood - Green Hills Rehabilitation (SU03A) Project



Improvements shown are for planning purposes and will be reviewed during design.



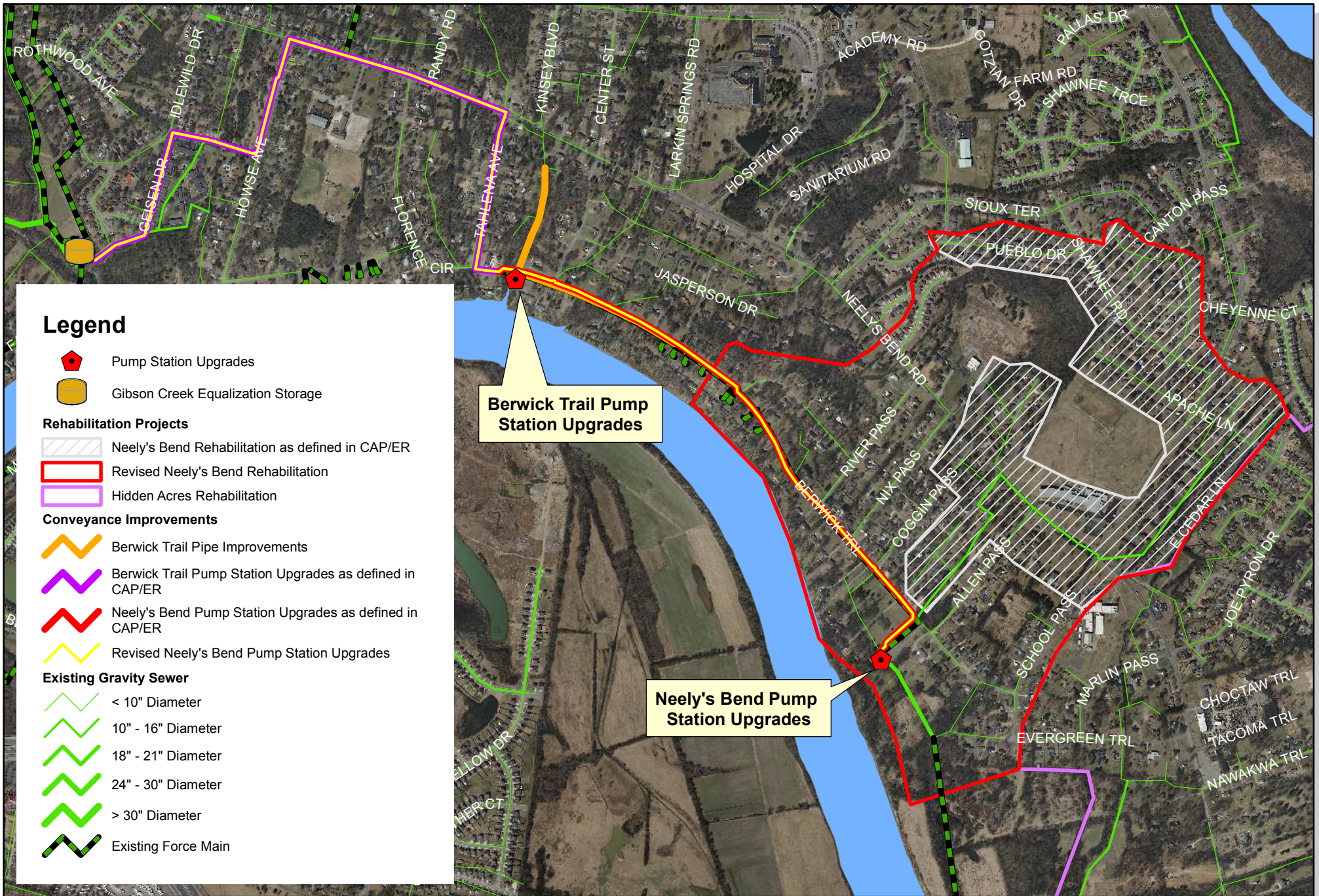
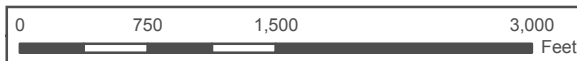


Figure 2-2 Revised Berwick Trail and Neely's Bend Projects

Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.



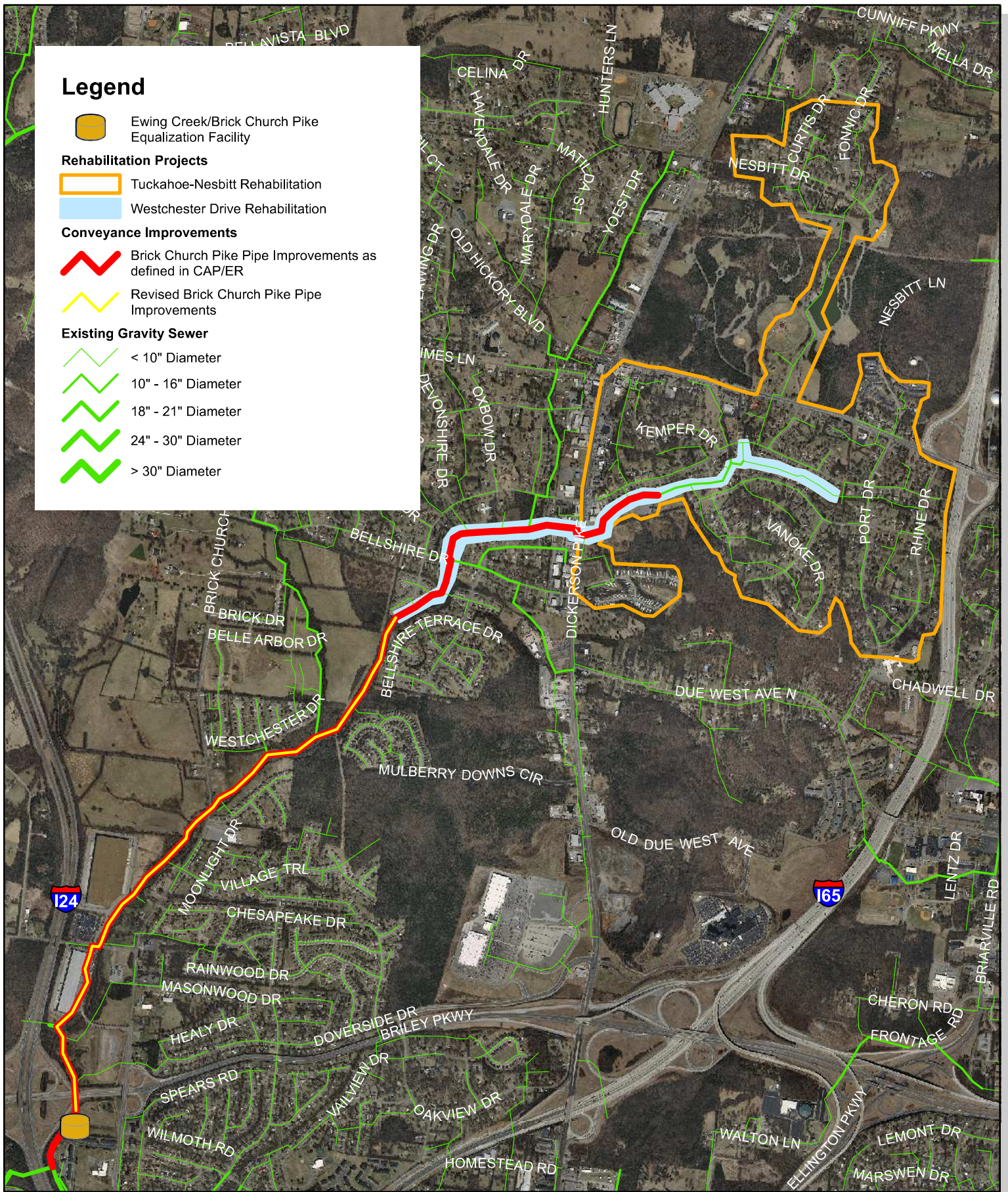
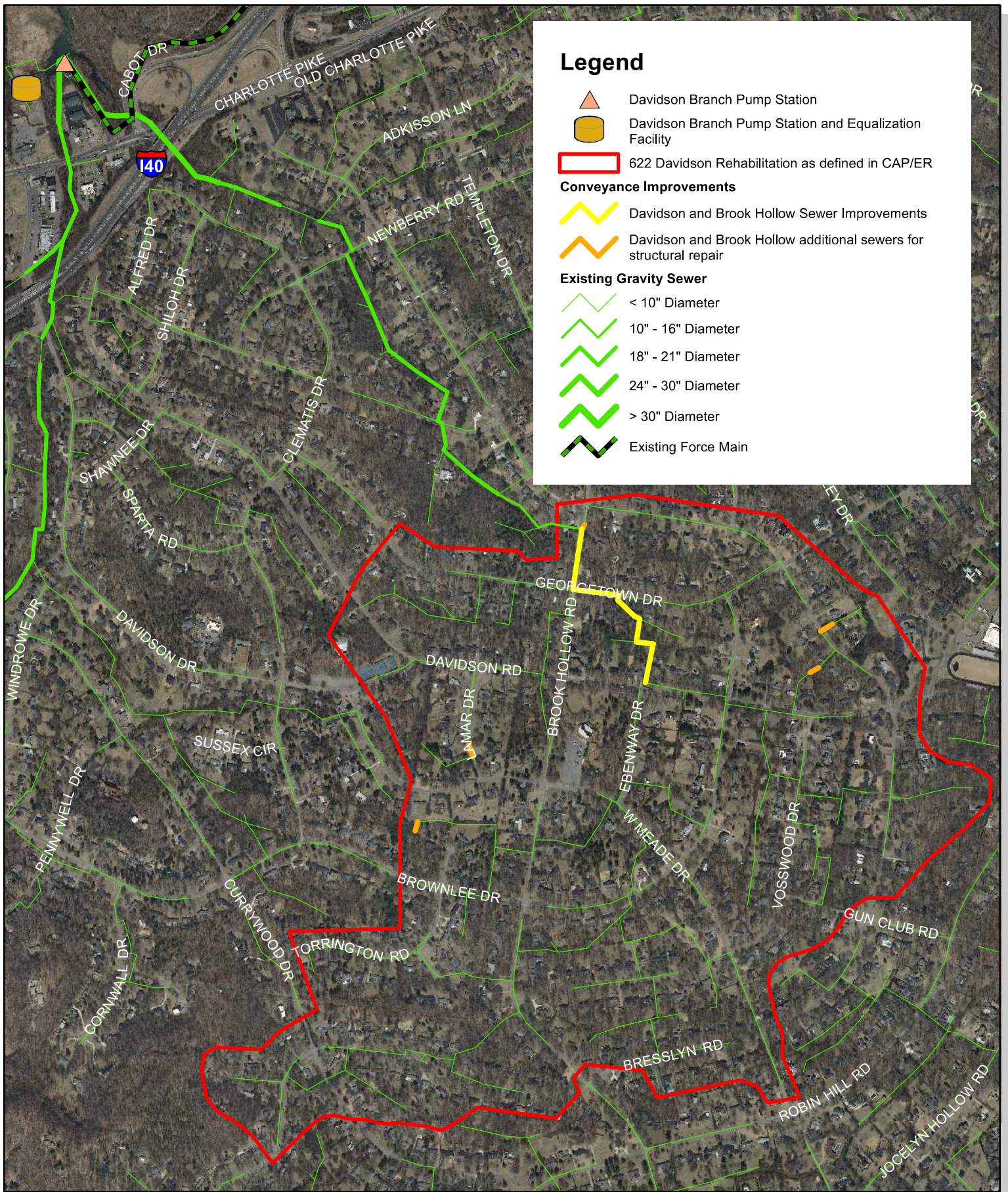





Figure 2-3 Revised Ewing Creek/Brick Church Pike Projects

Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.













Legend

-  Davidson Branch Pump Station
-  Davidson Branch Pump Station and Equalization Facility
-  622 Davidson Rehabilitation as defined in CAP/ER

Conveyance Improvements

-  Davidson and Brook Hollow Sewer Improvements
-  Davidson and Brook Hollow additional sewers for structural repair

Existing Gravity Sewer

-  < 10" Diameter
-  10" - 16" Diameter
-  18" - 21" Diameter
-  24" - 30" Diameter
-  > 30" Diameter
-  Existing Force Main

Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 2-4 Revised Davidson Branch Projects



2.5 Dodson Chapel Pipe Improvements

As presented in the CAP/ER, the Dodson Chapel Pipe Improvements project identified approximately 7,200 LF of existing gravity sewer requiring increased conveyance capacity to address SSOs. Following completion of the Rockwood Conveyance Improvements in 2011 and subsequent updates to the hydraulic model in this area, analysis indicated that the boundaries of the proposed project could be reduced while still addressing overflows. The revised scope includes approximately 3,400 LF of upsized, replacement pipe from just east of Old Hickory Boulevard to the Dodson Chapel Pump Station. This project was completed in December 2015. See **Figure 2-5** for location details.

2.6 Gibson Creek Rehabilitation

As defined in the CAP/ER, the Gibson Creek Rehabilitation project consisted of approximately 94,100 LF of existing gravity sewer and approximately 540 manholes to be evaluated for rehabilitation. Following additional analysis of flow monitoring data in the spring of 2013, it was determined that the rehabilitation area could be reduced to approximately 59,500 LF to achieve the desired level of RDII and wet-weather flow reduction. Construction of the Gibson Creek Rehabilitation project began in September 2016. See **Figure 2-6** for location details.

2.7 Hidden Acres Rehabilitation

Located in the Dry Creek basin, the Hidden Acres Rehabilitation project includes approximately 59,800 LF of existing gravity sewer and approximately 260 manholes to be evaluated for rehabilitation, as presented in **Figure 2-7**. Although not originally included in the list of projects proposed in the CAP/ER, additional flow monitoring data and hydraulic model analyses indicated that rehabilitation work could potentially reduce wet-weather flows and may provide a viable option to reduce or eliminate the required capacity improvements at the Hidden Acres Pump Station and Neely's Bend Pump Station downstream. As a result, design of the Hidden Acres Rehabilitation project began in October 2016.

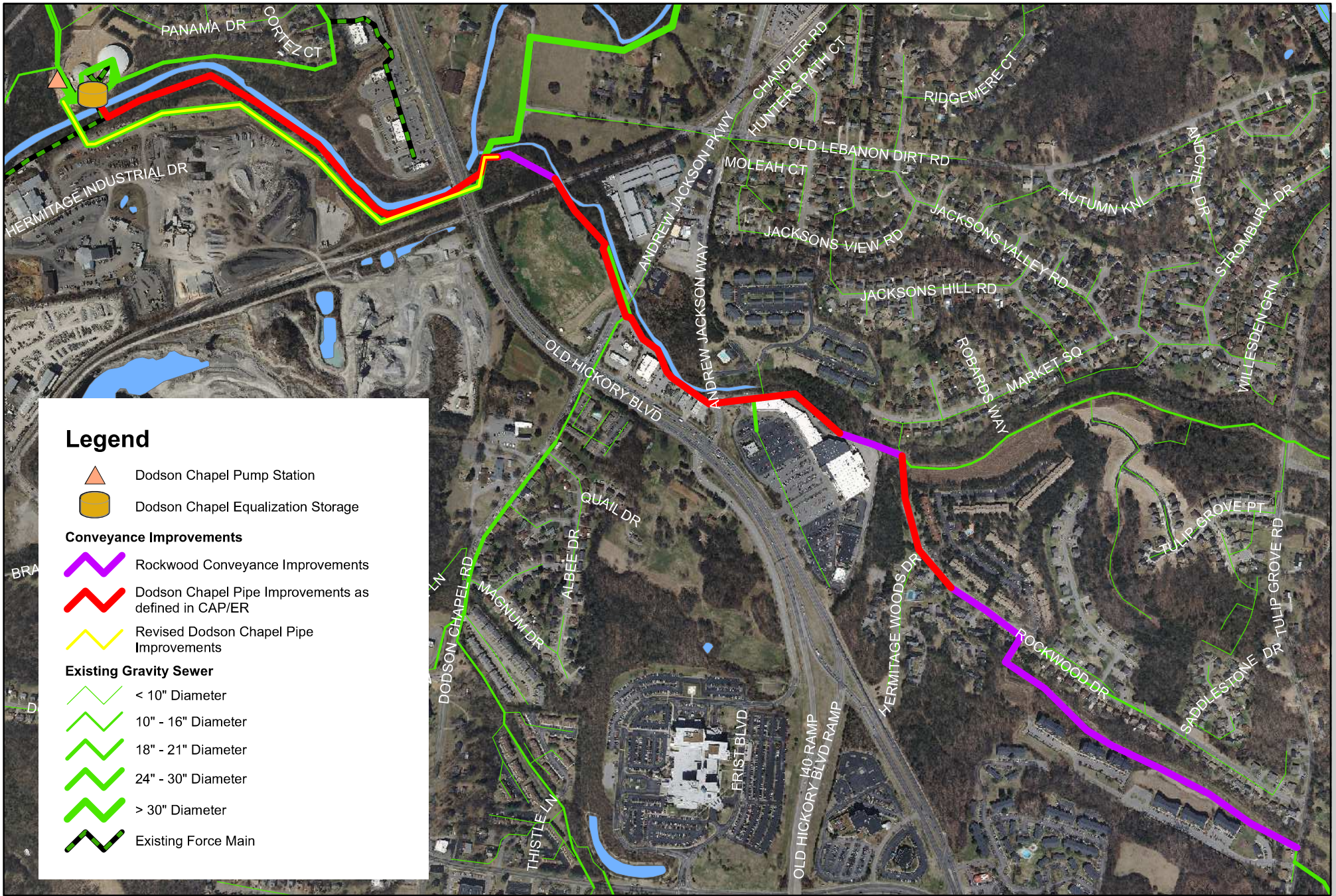
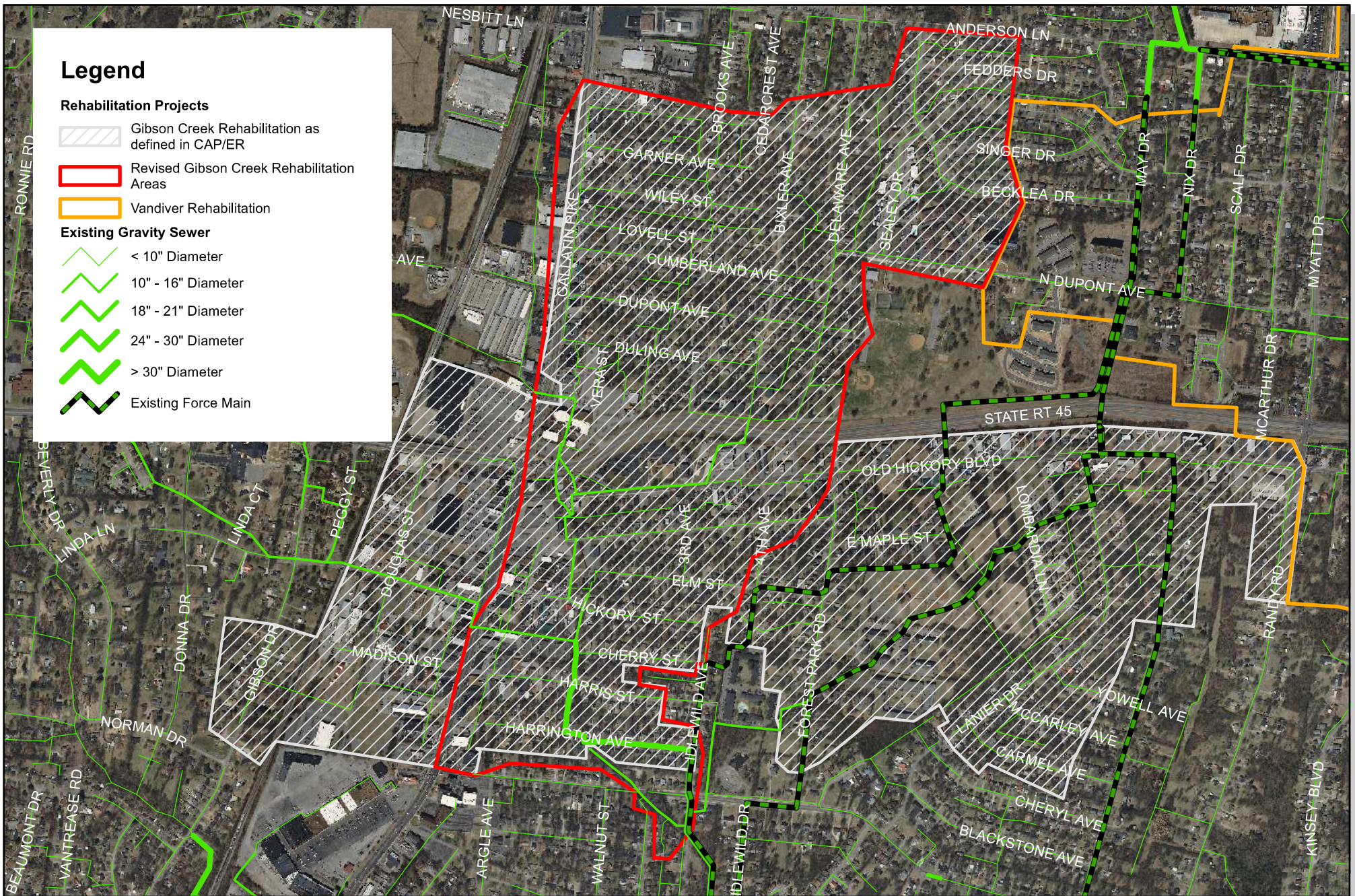


Figure 2-5 Revised Dodson Chapel Pipe Improvements Project



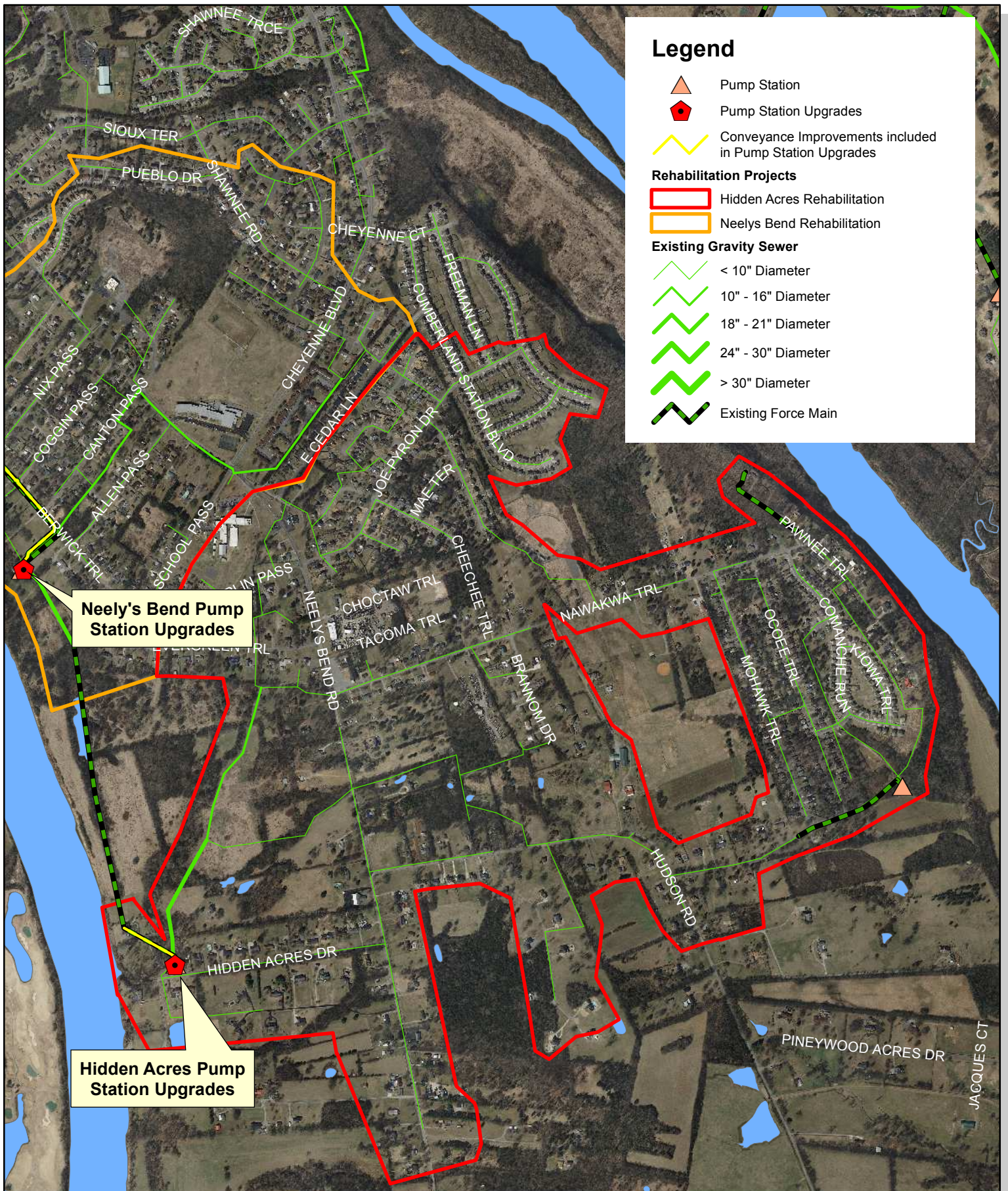
Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.
















All improvements shown are for planning purposes and will be reviewed during design.





Legend

-  Pump Station
 -  Pump Station Upgrades
 -  Conveyance Improvements included in Pump Station Upgrades
- Rehabilitation Projects**
-  Hidden Acres Rehabilitation
 -  Neelys Bend Rehabilitation
- Existing Gravity Sewer**
-  < 10" Diameter
 -  10" - 16" Diameter
 -  18" - 21" Diameter
 -  24" - 30" Diameter
 -  > 30" Diameter
 -  Existing Force Main

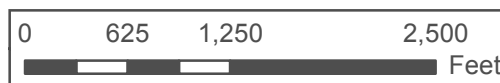
Neely's Bend Pump Station Upgrades

Hidden Acres Pump Station Upgrades



Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 2-7 Hidden Acres Rehabilitation Project



2.8 Highway 100/Tyne Boulevard Pipe Improvements and Highway 100/Tyne Boulevard – Trimble Rehabilitation

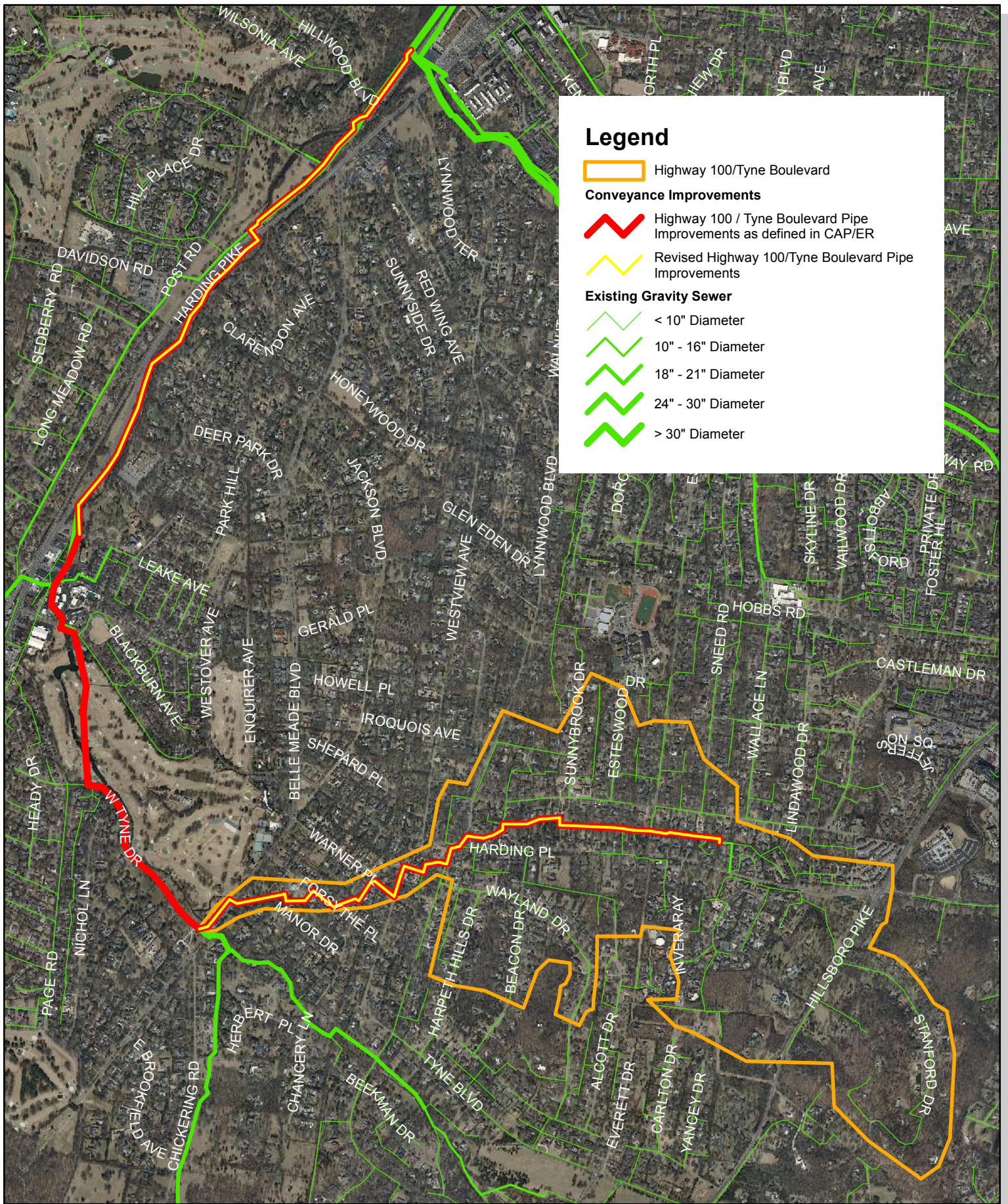
The Highway 100/Tyne Boulevard Pipe Improvements project, as presented in the CAP/ER, identified approximately 24,500 LF of gravity sewer requiring increased conveyance capacity to address SSOs. Following additional flow monitoring data collection, constructability reviews, and hydraulic analysis, it was determined that rehabilitation, in conjunction with a reduced scope for the Highway 100/Tyne Boulevard Pipe Improvements project (to approximately 17,900 LF), may be a viable option to address overflows. Approximately 63,000 LF of existing gravity sewer and approximately 300 manholes were evaluated for rehabilitation as part of the Highway 100/Tyne Boulevard – Trimble Rehabilitation project. Construction of the project was completed in January 2016. Additional analyses will be performed to confirm the reduction of the Highway 100/Tyne Boulevard Pipe Improvements project and determine if any additional conveyance improvements or rehabilitation projects are required. The revised Highway 100/Tyne Boulevard Pipe Improvements project and the Highway 100/Tyne Boulevard – Trimble Rehabilitation project are depicted in **Figure 2-8**.

2.9 Hurricane Creek Pipe Improvements

The Hurricane Creek Pipe Improvements project, as presented in the CAP/ER, identified approximately 7,100 LF of existing gravity sewer requiring increased conveyance capacity to address increased flow from a satellite user and reduce RDII along the existing sewer. Following analysis of additional flow monitoring data in the spring of 2015, the project's scope was extended to include approximately 12,000 LF of the existing trunk sewer. See **Figure 2-9** for additional information.

2.10 Loves Branch Rehabilitation

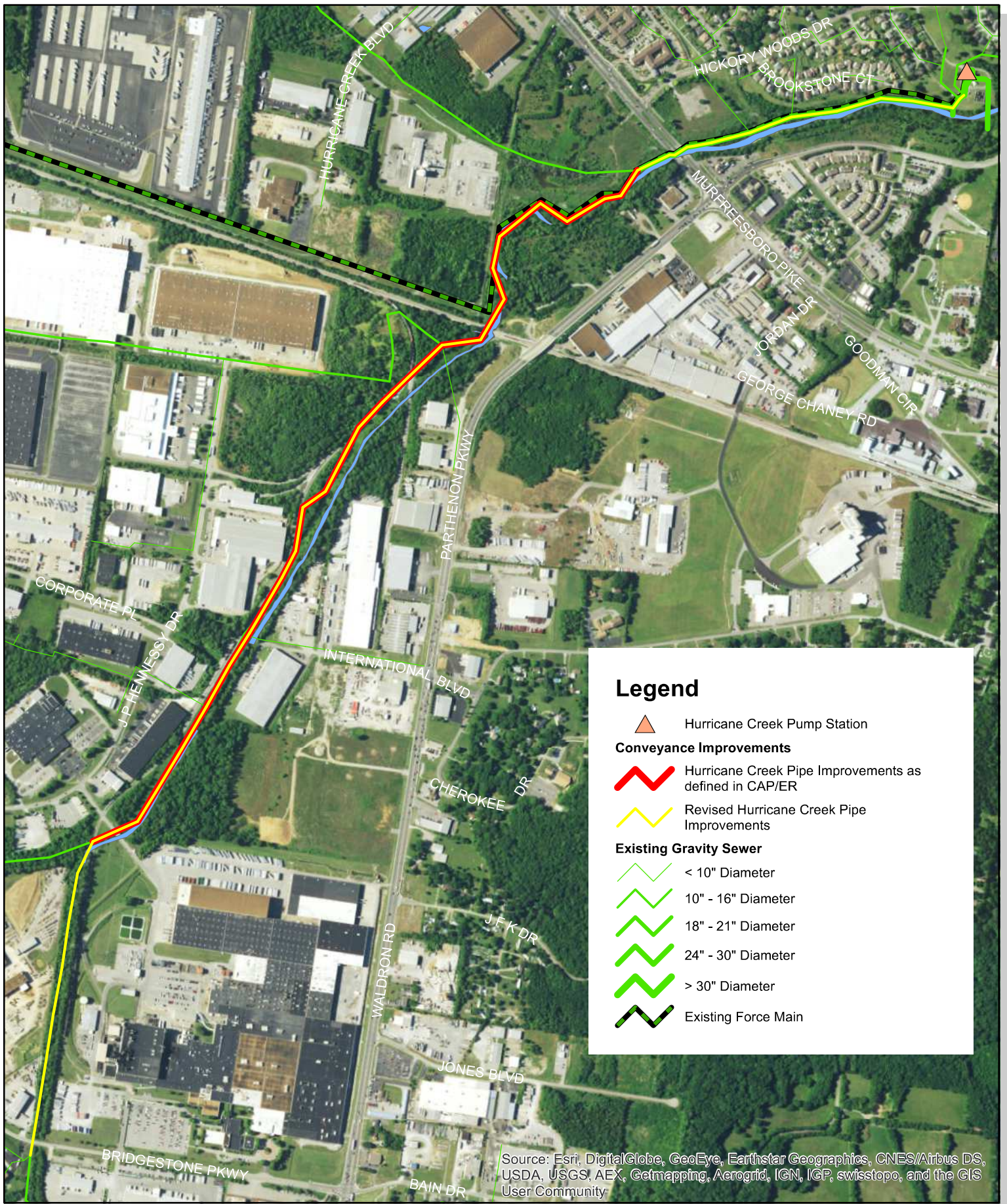
Located in the Dry Creek basin, the Loves Branch Rehabilitation project, shown in **Figure 2-10**, includes approximately 51,900 LF of existing gravity sewer and approximately 300 manholes to be evaluated for rehabilitation. Although not originally included in the CAP/ER, additional flow monitoring data and hydraulic model analyses indicated that rehabilitation work could potentially reduce wet-weather flows and may provide a viable option to reduce the required capacity improvements at the Loves Branch Pump Station. Construction of the Loves Branch Rehabilitation project is expected to begin in late 2017.



Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 2-8 Revised Highway 100/ Tyne Boulevard Projects





Conveyance improvements show the route of the existing sewer requiring increased capacity.

Figure 2-9 Revised Hurricane Creek Pipe Improvements Project





Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

2.11 Mill Creek/Opryland Equalization Storage Phase II, Mill Creek Trunk Improvements and Equalization Facility, and Mill Creek Rehabilitation

As originally proposed, the Mill Creek/Opryland Equalization Storage Phase II project included construction of a 15 MG equalization storage tank adjacent to the Barker Road/Omohundro Equalization Storage Phase I project (completed in 2010). An existing 25 mgd wet-weather pumping station would convey flow to the two tanks (the new 15 MG tank and the existing Barker Road tank). During design of the Mill Creek/Opryland Equalization Storage Phase II project, it was determined that construction of a 19 MG storage tank would be feasible and that the additional 4 MG of storage was considered desirable by MWS. The Mill Creek/Opryland Equalization Storage Phase II project, consisting of 19 MG of storage, completed construction in May 2015.

As presented in the CAP/ER, the Mill Creek/Opryland Equalization Storage Phase III project includes the construction of an additional 60 MG of equalization storage and a 100 mgd wet-weather pumping station across the street from the first two equalization phases. Due to their proximity and related infrastructure, this project was combined with the proposed Mill Creek Trunk Improvements project and is now referred to as the Mill Creek Trunk Improvements and Equalization Facility project.

As presented in the CAP/ER, the Mill Creek Trunk Improvements project identified approximately 31,500 LF of existing large-diameter gravity sewer requiring increased conveyance capacity to address SSOs. Based on additional flow monitoring data collection, constructability reviews, and hydraulic analyses, MWS believes that the observed overflows in the project area can be addressed through a combination of capacity improvements and wet-weather flow reduction through sewer rehabilitation. Thus, the scope of the project was reduced to 18,400 LF of existing sewer requiring capacity improvements; as previously stated, this project is now part of the Mill Creek Trunk Improvements and Equalization Facility project.

The area upstream (south) of the Mill Creek Trunk Improvements and Equalization Facility project is to be evaluated for rehabilitation. Although not originally included in the projects proposed in the CAP/ER, this rehabilitation effort, named the Mill Creek Rehabilitation project, will be performed to potentially reduce wet-weather flows in conjunction with the reduced conveyance improvements along Mill Creek. Although the specific project boundaries have not been finalized, the Mill Creek Rehabilitation project will be performed in multiple phases. Using flow monitoring data, hydraulic model analyses, and condition assessment data, MWS intends to focus efforts on areas with a high potential for RDII. A majority of the sewers to be evaluated are anticipated to be along Sevenmile Creek and Mill Creek. A preliminary area of approximately 3,140 acres is depicted in **Figure 2-11**.

2.12 Smith Springs Rehabilitation

The Smith Springs Rehabilitation project is a multi-phase project with approximately 309,300 LF of existing gravity sewer and over 1,500 manholes to be evaluated for rehabilitation. Based on additional flow monitoring data and hydraulic model analyses, the boundaries of the project area were revised to target areas that are believed to contribute to higher wet-weather flows. This

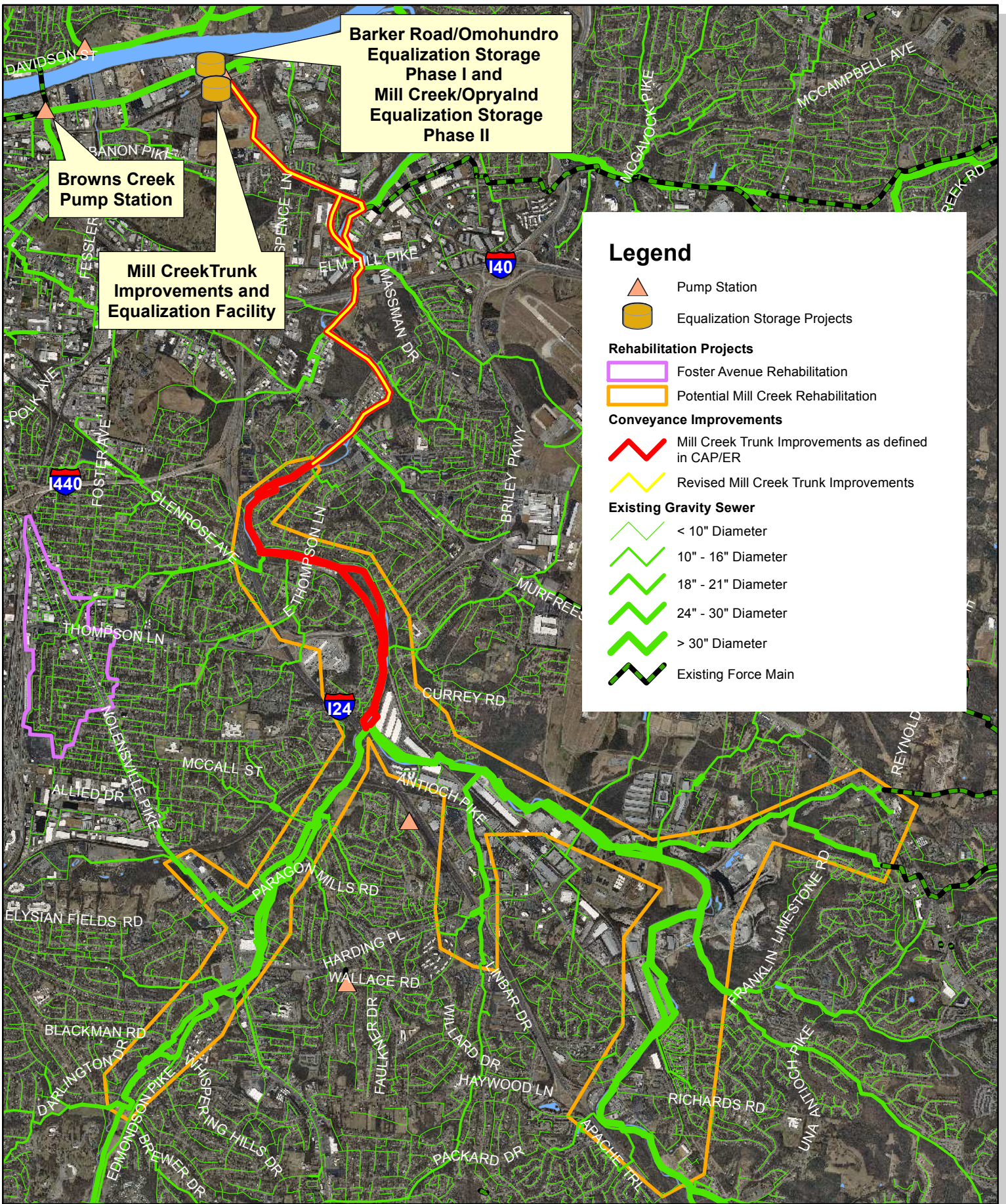
includes approximately 126,300 LF of additional gravity sewer and approximately 570 additional manholes targeted for evaluation and rehabilitation work compared with the extents planned in the CAP/ER, as presented in **Figure 2-12**. Based upon early rehabilitation results, MWS may reduce the project boundaries in the Smith Springs Rehabilitation area. The first area targeted for rehabilitation work was completed in March 2017, with construction of the second area beginning in January 2017.

2.13 Vandiver Rehabilitation

Located in the Dry Creek basin, the Vandiver Rehabilitation project includes approximately 55,300 LF of existing gravity sewer and approximately 290 manholes to be evaluated for rehabilitation. Although not originally included in the CAP/ER, additional flow monitoring data and hydraulic model analyses indicated that rehabilitation to reduce wet-weather flows may provide a viable option to reduce the required increase in pumping capacity for the Vandiver Pump Station. Construction of the Vandiver Rehabilitation project, as presented in **Figure 2-13**, is set to begin in late 2017.

2.14 West Park Equalization Storage Phase II and West Equalization Storage Phase III

As presented in the CAP/ER, the West Park Equalization Storage Phase II project and West Park Equalization Storage Phase III project included construction of 10 MG and 11 MG equalization storage tanks, respectively. To minimize impacts to the surrounding neighborhood, the two phases were combined into a single design and construction project, the West Park Equalization Storage Phase II project. Following additional analysis of potential flood impacts to adjacent properties, an alternate site for one 21 MG equalization tank was selected in the park adjacent to the West Park Pump Station. Construction of the West Park Equalization Storage Phase II project began in April 2015.



Barker Road/Omohundro Equalization Storage Phase I and Mill Creek/Opryalnd Equalization Storage Phase II

Browns Creek Pump Station

Mill Creek Trunk Improvements and Equalization Facility

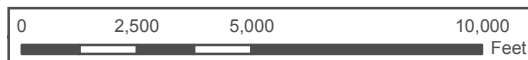
Legend

- Pump Station
- Equalization Storage Projects
- Rehabilitation Projects**
 - Foster Avenue Rehabilitation
 - Potential Mill Creek Rehabilitation
- Conveyance Improvements**
 - Mill Creek Trunk Improvements as defined in CAP/ER
 - Revised Mill Creek Trunk Improvements
- Existing Gravity Sewer**
 - < 10" Diameter
 - 10" - 16" Diameter
 - 18" - 21" Diameter
 - 24" - 30" Diameter
 - > 30" Diameter
 - Existing Force Main



Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 2-11 Revised Mill Creek Projects



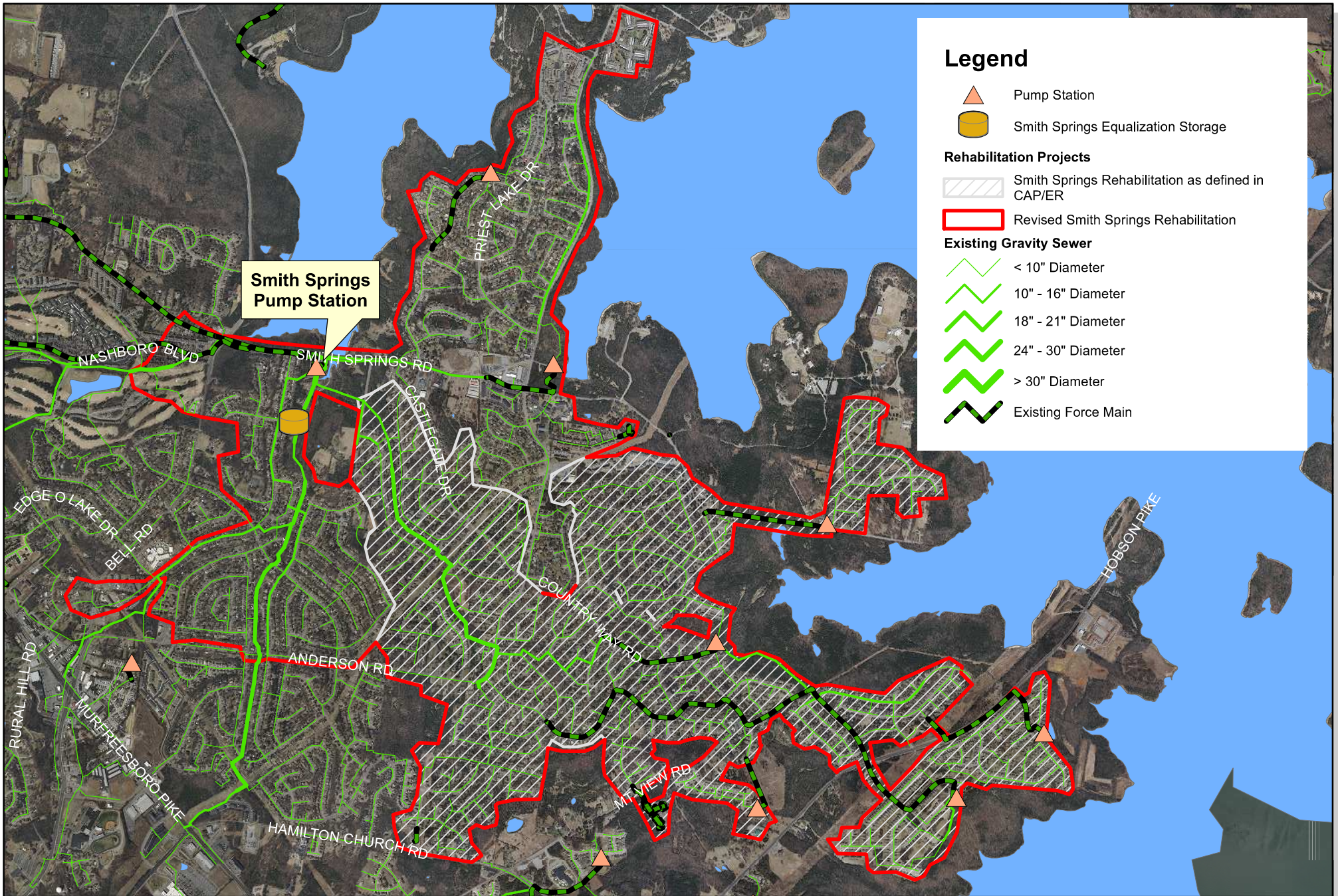


Figure 2-12 Revised Smith Springs Rehabilitation Project





All improvements shown are for planning purposes and will be reviewed during design.













Legend

-  Vandiver Pump Station Upgrades
-  Conveyance Improvements included in Pump Station Upgrades

Rehabilitation Projects

-  Vandiver Rehabilitation
-  Gibson Creek Rehabilitation

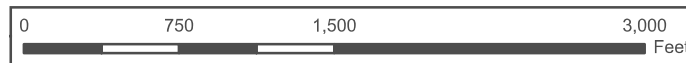
Existing Gravity Sewer

-  < 10" Diameter
-  10" - 16" Diameter
-  18" - 21" Diameter
-  24" - 30" Diameter
-  > 30" Diameter
-  Existing Force Main



Conveyance improvements show the route of the existing sewer requiring increased capacity. All improvements shown are for planning purposes and will be reviewed during design.

Figure 2-13 Vandiver Rehabilitation Project



3.0 Conclusion

As stated in the CAP/ER, although approximate sizing and extents of each project are/were provided for planning level purposes, the final sizing, extent, and layout of each project has been, or will be, determined during design. If rehabilitation is more successful than anticipated, less rehabilitation work may be required to address SSOs under the design condition. Additionally, if rehabilitation is more successful than anticipated, associated pump station upgrades and/or conveyance improvements may be modified. Any project scope modifications will continue to be explained in the progress reports submitted as part of the CD requirements. Following completion of each of the listed projects, analysis of the hydraulic model and flow monitoring data will be conducted to verify expected reduction of SSOs. As described in the CD, MWS intends to complete all planned projects within the eleven-year timeframe provided, with a target completion date of August 10, 2028.